

BEST PRACTICE SUSTAINABILITY WITHIN THE NORTHERN AND WESTERN GEELONG GROWTH AREAS

Final Report



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ACKNOWLEDGEMENTS

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- WESTERN GEELONG GROWTH AREA LANDOWNERS CONSORTIUM
- NORTHERN GEELONG GROWTH AREA LANDOWNERS CONSORTIUM
- FUTURE PROOFING GEELONG
- POWERCOR
- BARWON WATER
- PUBLIC TRANSPORT VICTORIA
- BARWON SOUTH WEST WASTE AND RESOURCE RECOVERY GROUP
- DEPARTMENT OF ENVIRONMENT, LAND, WATER AND PLANNING
- AGL
- VIC ROADS
- BIOREGIONAL AUSTRALIA



WHO WE ARE

HIP V. HYPE SUSTAINABILITY WORKS WITH CLIENTS WHO ARE SEEKING EXCEPTIONAL SUSTAINABILITY OUTCOMES AND ARE WILLING TO THINK STRATEGICALLY TO ACHIEVE THESE.

WE SEE SUSTAINABILITY AS INHERENT TO GOOD DESIGN. IT'S NOT JUST AN OPTION, A DIFFERENTIATOR OR A MARKETING TOOL. AT A GLOBAL SCALE IT IS ALSO, BY DEFINITION, NON-NEGOTIABLE.

PETER STEELE, HIP V. HYPE SUSTAINABILITY MANAGING DIRECTOR, IS AN EXPERIENCED URBAN PLANNING AND SUSTAINABILITY PRACTITIONER. HE SEES SUSTAINABILITY AS BEING INHERENTLY LINKED WITH LONG-TERM PROSPERITY; NOT AN OPTION OR A BARRIER, BUT AN OPPORTUNITY.

—
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Overview

The Northern and Western Geelong Growth Areas (NWGGA) present a unique set of opportunities and challenges for sustainable urban development. The scale and likely long term nature of development within these areas means a strong plan for sustainability integration, within planning, infrastructure and development, is required.

To ensure that urban development within these areas can make the most of these opportunities and overcome these challenges, it is critical that the right planning framework and tools are established early, and that effective partnerships and collaboration are fostered between key stakeholders.

Utilising a set of sustainability principles adopted by the City of Greater Geelong (shown opposite), based on the One Planet Living framework, this report has identified four 'headline opportunities' and 27 other specific opportunities that will help the NWGGA realise its potential as an international exemplar in smart, sustainable urban development.

SUSTAINABILITY PRINCIPLES FOR NWGGA



ZERO CARBON



ZERO WASTE



SUSTAINABLE TRANSPORT



SUSTAINABLE WATER



ECOLOGY AND BIODIVERSITY



SUSTAINABLE MATERIALS AND CONSUMPTION

Overview - a sustainable vision for the Northern and Western Geelong Growth areas

The NWGGA Project Context Report sets out the vision and principles of the project, with regard to the overarching G21 Regional Growth Plan vision and the desire to deliver; “a liveable vibrant and cohesive community.”

Based on the research, engagement and analysis undertaken for this Sustainability Opportunities Report, the following complementary vision for sustainability within the NWGGA is proposed.

The Northern and Western Geelong Growth Areas support vibrant, diverse and sustainable communities.

The variety of housing choices, including higher density options such as townhouses and apartments within dense mixed-use centres, means that the community includes people of all ages and from all walks of life.

50% of residents get to school, the local tafe or their job by foot, bike or using the Bus Rapid Transit (BRT) system which has been operating from the first stage of the development. Commuters can easily access a network of high frequency shuttle buses, connecting them to rail services to central Geelong and Melbourne. For those travelling to Melbourne they can reliably arrive at Southern Cross Station less than 1.5 hours after leaving home.

The NWGGA seamlessly integrates ‘smart city’ principles in its design and technology. Electric vehicle charging is available in most homes and in commercial car parks, and a significant transition is underway to autonomous, zero emissions vehicles. This has been assisted by the transition plan adopted for the road network, allowing progressive transition to dedicated autonomous vehicle lanes.

High speed NBN and the availability of flexible co-working, home-office and business incubator options within the major activity centres have attracted many entrepreneurs and startup businesses who want to live, work and socialise locally.

The early decision to install solar PV and batteries in all buildings means the local energy network is highly efficient and resilient.

The substantial savings achieved in reducing the network capacity through local generation, storage and demand management were invested in subsidies to support a mandatory requirement for solar on every home and business. As a result, the growth area generates as much energy as it needs each year, and residents and businesses enjoy a low cost, zero carbon energy supply.

The urban landscape is closely linked to and integrated with the natural environment, giving residents a strong feeling of connection to nature. Local biodiversity is flourishing in the large areas of native landscape established across the growth areas, particularly around waterways, as well as in streets and backyards throughout. This helps reduce local urban heat impacts, creates pollinator pathways and supports local flora and fauna. This is also part of a regional network of active transport routes that mean the community can easily and safely travel by bike or foot.

The Northern and Western Geelong growth areas are a demonstration and catalyst of Geelong’s future capacity to be a world leading sustainable city, where people can live a happy, healthy life within a fair share of earth’s resources.

Overview - headline opportunities for NWGGA

1

'FIVE MINUTE LIVING' THROUGH COMPACT URBAN FORM AND MIXED LAND USES

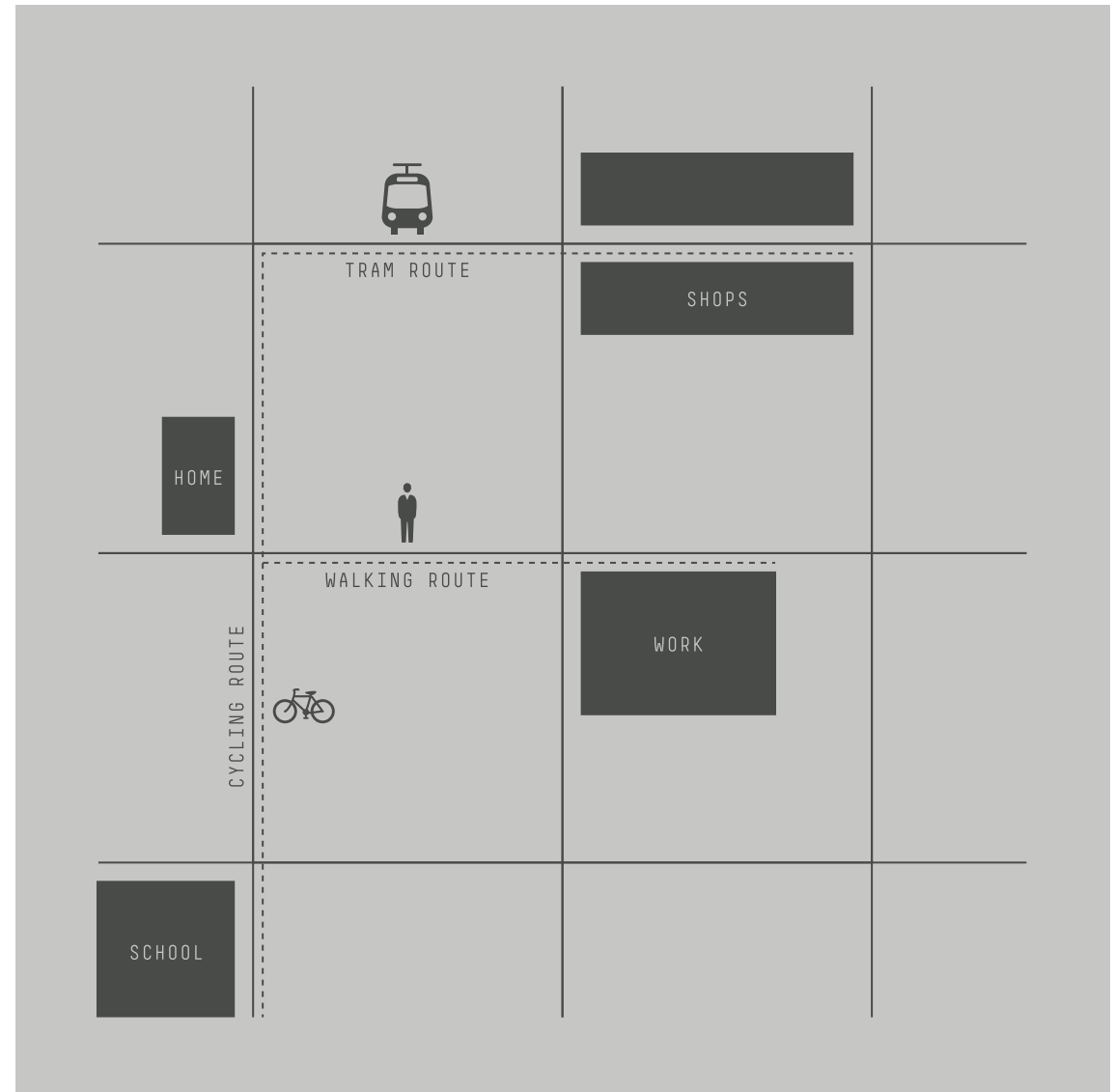
The sheer scale of potential future development, and the potential population size of the future NWGGA communities, presents both significant sustainability challenges and opportunities. The challenges to sustainability associated with extending Geelong's urban area significantly can be mitigated if this growth delivers a genuine shift from 'business as usual' suburban sprawl.

Creating a new series of communities which fully embrace concepts like 'five minute living' in their urban form, land use and density arrangements, has the potential to significantly boost Geelong's future sustainability as a city.

'Five minute living' is possible in communities that have significant and varied employment opportunities, beyond that offered by small neighbourhood activity centres, and embrace a diversity of dwelling types from standalone homes with big backyards through to townhouses and apartments within higher density activities centres, and which have access to excellent public and active transport choices. Employment opportunities education facilities at all levels, health services, 'high street' daily needs and community facilities are all equally critical.

NWGGA presents an incredible opportunity to establish a world leading example of a growth area embracing 'five minute living' and in doing so support Geelong's long-term place as a highly sustainable city.

Recommendation: Put 'five minute living' at the core of the Framework Plans and subsequent Precinct Structure Plans for the growth areas, through more compact urban form, higher averages densities coupled with diversity of densities, and diverse land uses that support local living.



Overview - headline opportunities for NWGGA

2

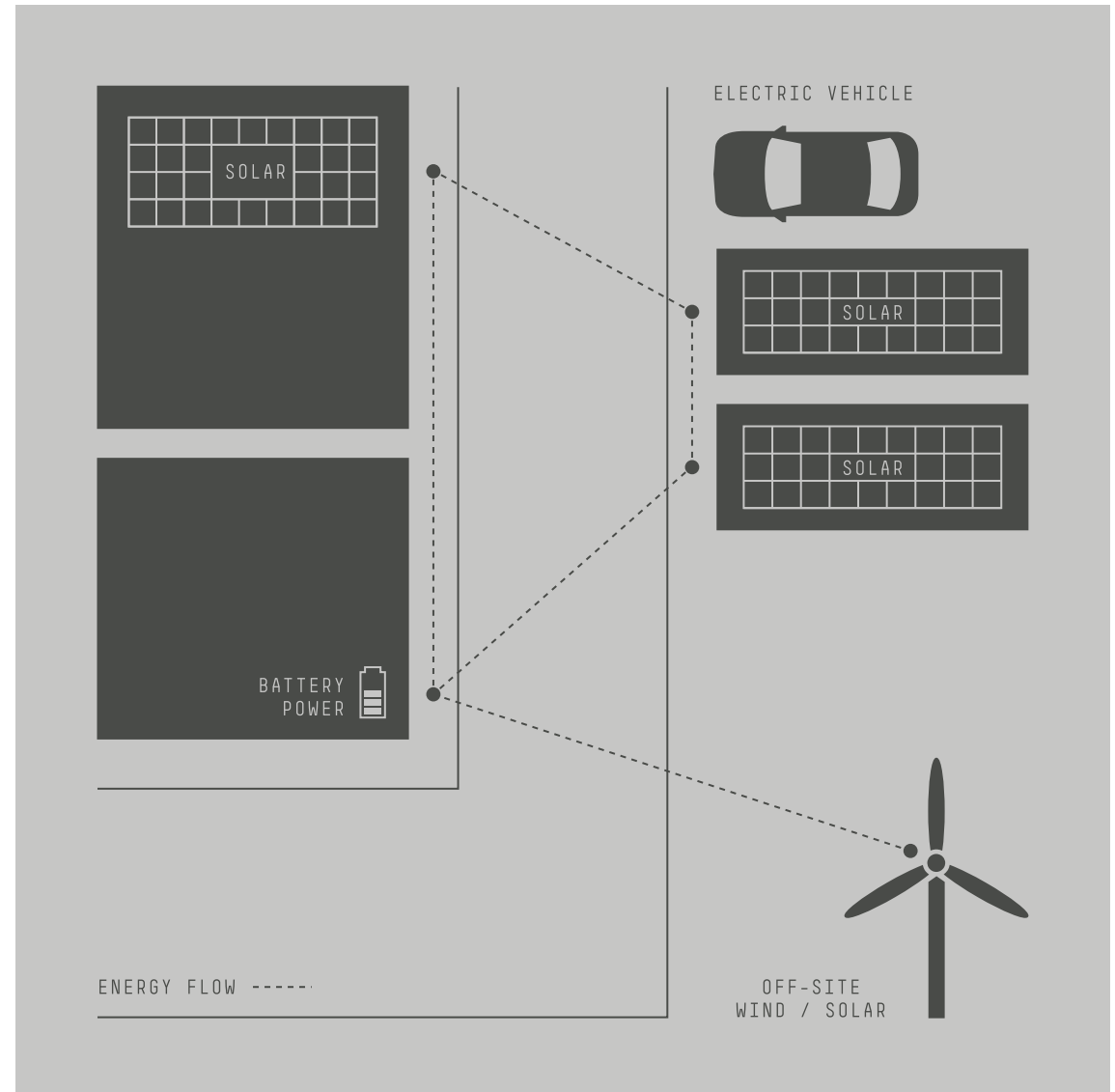
ZERO CARBON AND ZERO NET ENERGY

Australia and the entire world is rapidly approaching the end of its 'carbon budget'. If this budget is exceeded within the next 25 years, the world will experience significant dangerous and irreversible climatic changes.

Given the urgency of this issue, and the small remaining 'carbon budget' we have to work within, new urban development within areas such as NWGGA must have a medium term target of being net zero carbon. Due to the complexity and long timeframes associated with decarbonisation of existing urban areas, energy supplies and transport systems, it is a non-negotiable for new areas to have a plan to be net zero carbon. This will be significantly aided by establishing a 'zero net energy' system, which generates as much renewable energy as the community requires during the average year.

Encouragingly, this also represents a significant opportunity for NWGGA. With the benefit of early consideration, development within these growth areas can capitalise on new low-carbon technologies, and use partnerships, to reduce both upfront and ongoing costs associated with meeting the future community's energy requirements. This will also have related benefits in creating more energy efficient, climate resilient buildings and creating an energy system that is protected from external shifts in prices.

—
Recommendation: Commit to developing the NWGGA as zero carbon and net zero energy communities, and carry these aspirations through all stages of the planning and development process. Establish key partnerships, including with Powercor, to lock in the benefits of this early commitment through reducing upfront infrastructure costs.



Overview - headline opportunities for NWGGA

3

'DAY ONE' PUBLIC AND ACTIVE TRANSPORT, SUPPORTED BY A LONG TERM INTEGRATED PLAN

The interplay between land use arrangements, development densities and transport planning has a significant influence on the long-term sustainability of urban communities. A genuinely integrated, sustainable transport system is not possible without the right combination of land uses and densities, and vice versa.

As a result, in combination with the compact urban form and mixed land uses proposed in 'Headline Opportunity 1', the long term sustainability of the NWGGA relies on a high quality public and active transport system being in place from 'day one' of early development stages, supported by a long term plan that links with regional public and active transport strategies.

A strong upfront commitment to high quality, regular public transport services and an excellent network of active transport lanes and paths, will give confidence to developers to increase densities around key transport corridors, and deliver greater diversity of land uses. The early delivery and operation of this infrastructure will ensure residents and businesses within the growth areas can establish sustainable transport behaviours early on.

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Recommendation: Identify key public and active transport corridors within the two growth areas on the Framework Plans and further detail these within Precinct Structure Plans. Build support from PTV, Department of Economic Development, Jobs, Transport and Resources and developers to deliver 'day one' public transport services within the growth areas and establish a long term, integrated plan.



Overview - headline opportunities for NWGGA

4

ESTABLISH A NETWORK OF MULTI-FUNCTIONAL BLUE AND GREEN INFRASTRUCTURE THROUGHOUT THE NWGGA TO CREATE A CLIMATE RESILIENT, HEALTHY COMMUNITY

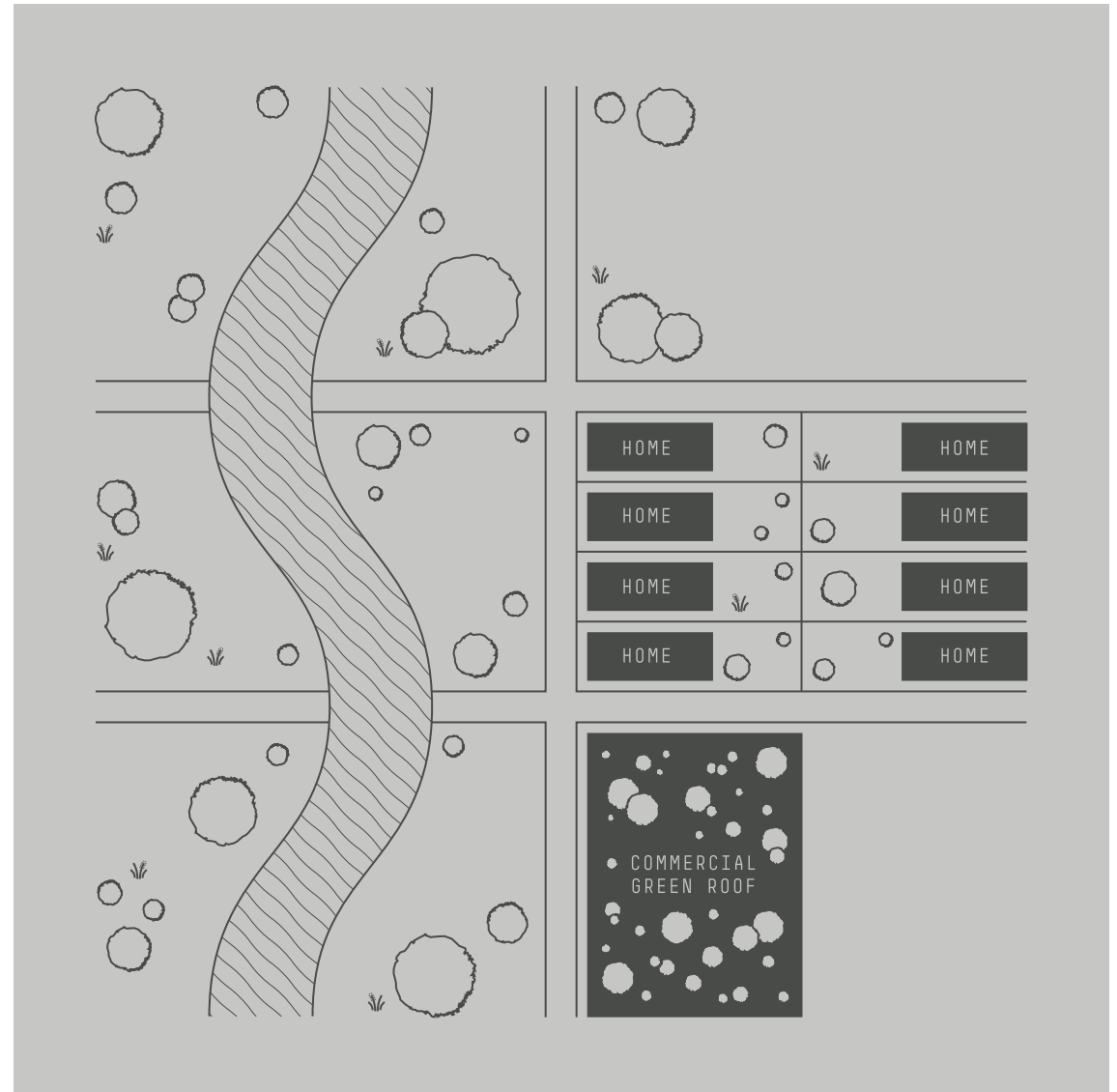
Blue infrastructure, such as waterways and Water Sensitive Urban Design (e.g. bioretention and biofiltration) assets, and green infrastructure including street trees, parks, open spaces and vegetation buffers, can be mutually supportive of one another. When considered as an integrated network, these assets have the potential to make significant contributions to the climate resilience, health and amenity of the NWGGA.

Distributed stormwater management, treatment and reuse can support green infrastructure, improve the amenity of active transport and recreational spaces, and make a significant contribution to reducing urban heat impacts.

Likewise, extensive urban greenery, including active and passive green spaces, street trees and verge planting, and landscaping within private property all support the climate resilience and biodiversity of the broader community.

Creating a plan to make the most of these assets, including considering long-term ownership and maintenance, will offer long term benefits to multiple stakeholders.

Recommendation: Identify location and scale of key blue and green infrastructure assets within the Framework Plans and further detail these within the Precinct Structure Plans. Establish a strategy for integration of blue and green infrastructure with stormwater management, landscape, open space and transport plans, ensuring alignment and complementarity. Establish best practice benchmarks for green corridors and minimum canopy tree cover requirements across both growth areas.



Overview - headline opportunities for NWGGA

5

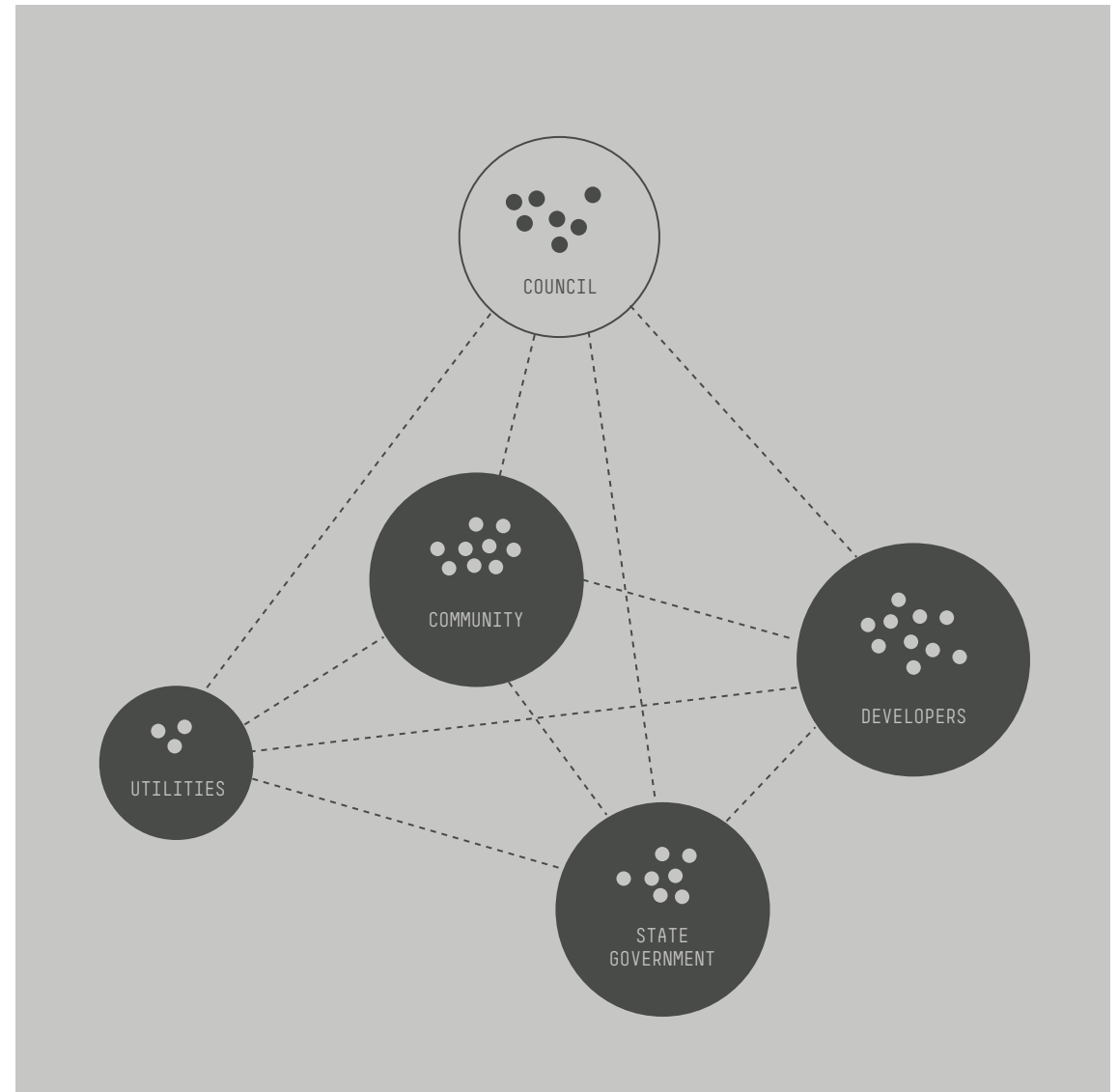
LEADERSHIP, ADVOCACY AND COLLABORATIVE GOVERNANCE

The establishment of collaborative governance, deep partnerships and visionary leadership present critical opportunities for NWGGA to realise internationally-significant, long-term sustainability outcomes. The nature of NWGGA is such that the delivery of highly complex, high cost or multi-benefit initiatives requires the commitment of multiple agencies or stakeholders. The early establishment of deep partnerships will support a collaborative model of governance in achieving the shared vision for NWGGA.

The role of leadership and advocacy (e.g. seeking funding and other forms of support for critical infrastructure) will be vital, particularly for public transport. Given the long time frames associated with both growth areas, strong and consistent leadership will be critical.

The City of Greater Geelong has the opportunity to take a long-term leadership position to bring the vision for a sustainable NWGGA to life. This will involve utilising direct and indirect influence during all stages of the planning and development process.

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Recommendation: Council to take a lead role in driving the development of a collaborative governance model that allows for shared decision-making based on transparent information sharing. Establish partnerships between key stakeholders such as developers, landowners, councils, Powercor, Barwon Water and a university partner with research capacity in the built environment. Council to pursue a strong, consistent case, in partnership with other stakeholders to gain strategic investment in key initiatives with long-term benefits.



Contents

OVERVIEW	4
INTRODUCTION	12
CONTEXT	13
TRENDS, INSIGHTS AND OPPORTUNITIES	16
ZERO CARBON	19
ZERO WASTE	26
SUSTAINABLE TRANSPORT	30
SUSTAINABLE WATER	41
ECOLOGY AND BIODIVERSITY	46
SUSTAINABLE MATERIALS AND CONSUMPTION	52
DELIVERY MECHANISMS AND PLANNING IMPLEMENTATION	56
NEXT STEPS	70



Introduction, purpose and process

HIP V. HYPE Sustainability, in collaboration with Moreland Energy Foundation, was engaged by City of Greater Geelong to explore local and international best practice examples of sustainability solutions and associated delivery mechanisms to inform the approach to regional growth in the NWGGA.

This report has been prepared following a process of targeted engagement, research and analysis. The overarching intent of this process was to investigate projects locally and internationally that had utilised innovative solutions and delivery mechanisms that have the potential to be implemented within the NWGGA to achieve the stated sustainability ambitions for the growth areas.

A central element of the project has been local and international project benchmarking research. This research has targeted projects and interventions that have explicit or implicit relevance to the NWGGA context, and could offer insights into the success (or otherwise) of the approach taken.

To ensure that the project benefits from the experience and lessons learned by other projects with relevance to the NWGGA, the research phase cast a wide net. The intent for each project researched was to identify those opportunities, delivery mechanisms, governance and finance arrangements and ‘critical success factors’ that could inform the identification and pursuit of appropriate ESD opportunities for NWGGA. The current stage of the NWGGA planning process - pre-Framework Planning - guided the projects chosen and the information sought, however additional information relevant to future stages

was also gathered and will provide a valuable resource in the future.

Data on projects was collected through a combination of desktop review, key informant interview and, for a number of notable Australian projects, site visits. This information was consolidated into a research database, utilising a framework of principles and opportunity areas to rationalise the information.

This database was then analysed, utilising additional criteria exploring costs and benefits, barriers to uptake within NWGGA and recommended next steps to enable implementation. Combined with the insights gained through the stakeholder engagement process, this will inform the development of the NWGGA Sustainability Opportunities Report.

The graphic below summarises the approach taken.



Context

NWGGA PROJECT

This report has been prepared as an input to the broader NWGGA project, which will see the creation of an Integrated Infrastructure Delivery Plan for both growth areas and a Framework Plan for each growth area.

This project is underpinned by the **G21 Regional Growth Plan Implementation Plan**, which identifies the two growth areas and notes the importance of this further planning to create a more viable, liveable and connected urban environment.

The G21 RGP Implementation Plan includes a number of sustainability outcomes that are considered important to taking the 'next step' in planning for new communities including:

- Zero carbon
- Zero waste
- Sustainable water
- Sustainable transport
- Improved environmental outcomes

KEY POLICY DRIVERS

The following policies have direct and indirect relevance to the consideration of sustainability within the NWGGA, and have provided important strategic background to this work:

- G21 Regional Growth Plan and Implementation Plan: provides a framework and implementation plan for land use and growth (on a regional level) that can sustainably respond to projected growth rates.
- Low Carbon Growth Plan (updated 2015): identifies a series of greenhouse gas (GHG) abatement opportunities that can be achieved for the lowest cost in Greater Geelong.
- Climate Change Adaptation Strategy (March 2011): provides a framework for integrating climate change adaptation throughout Council activities and decision-making processes
- Environment Management Strategy 2014 - 2017: guides Council planning, decision-making and activity that impact the Greater Geelong environment and ensure a "quality environment." The ten One Planet Living principles have been adopted to guide the EMS.
- City of Greater Geelong Draft Greenhouse Strategy (2016): outlines a vision to reduce Council's greenhouse emissions and encourage others to adopt and implement a One Planet Living zero emissions goal in order to reduce Council's corporate greenhouse emissions and deliver emissions reductions in the community.

OTHER TECHNICAL REPORTS

A number of other technical reports are being delivered in parallel with the Sustainability Opportunities Report that have some degree of relevance, interdependency or impact on this work. These include:

- Integrated Water Cycle Management Plan (IWCM)
- Movement and Access Strategy
- Flora and Fauna Study
- Activity Centre Planning Report
- Social Infrastructure Report

In large part these reports were still underway during drafting. While some opportunities to 'compare notes' with the teams generating these reports have been created, it will be important to recognise the potential complementarity and/or conflict that may be raised within these reports when synthesising their findings and recommendations.

Context

LOCATION

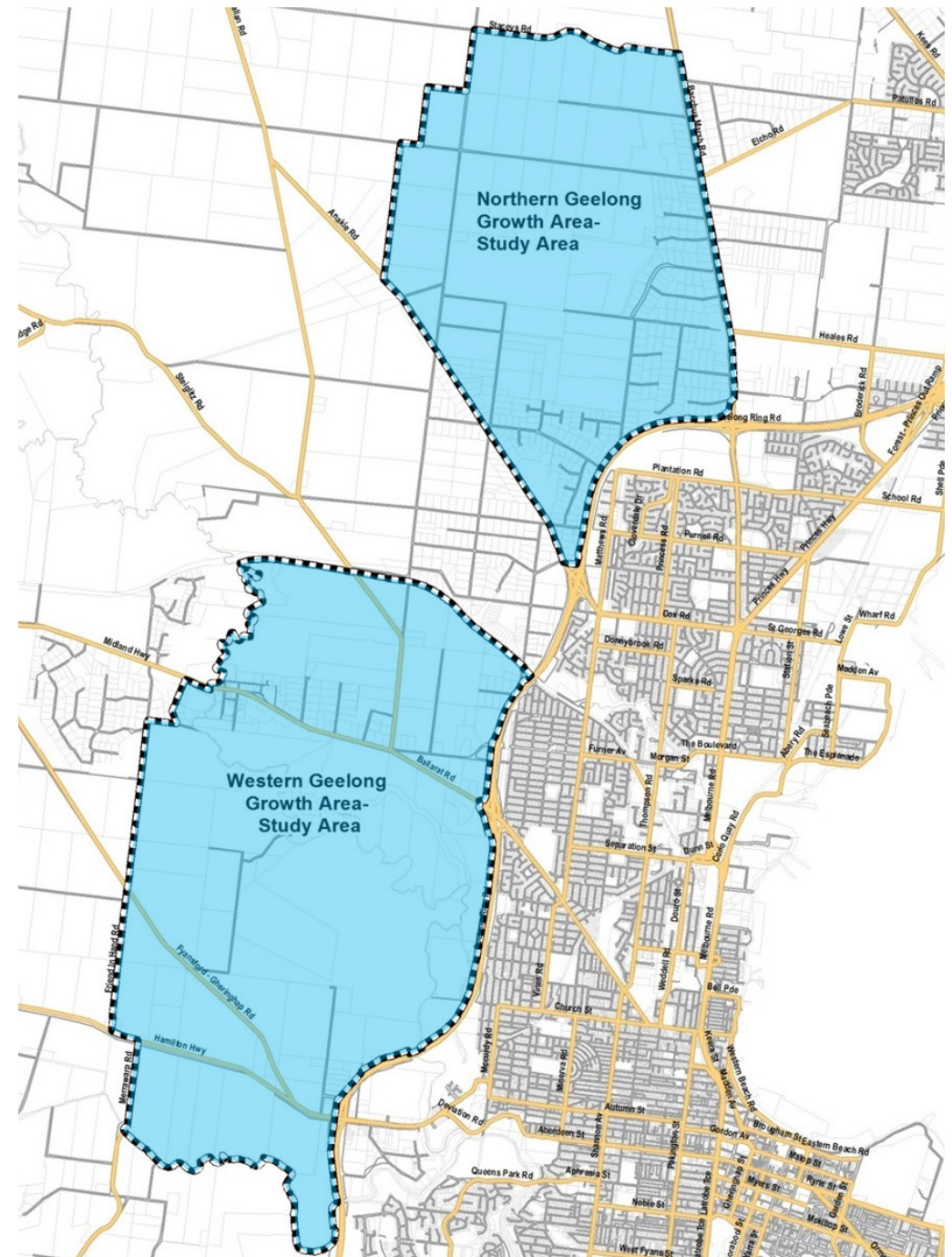
The Northern Geelong Growth Area is located in the Lovely Banks area and is generally bounded by Staceys Road to the north, Evans Road to the west and Bacchus Marsh Road to the east, and Anakie Road/Geelong Ringroad to the south. It includes a number of constraints and significant physical features, including:

- _ Barwon Water tanks, Anakie Road
- _ South-West transmission gas pipeline
- _ Lara Energetic Materials Manufacturing Plant (LEMMP) 1km industry buffer
- _ Geelong Ring Road Employment Precinct (GREP) 1km industry buffer
- _ AusNet electricity transmission powerline easements

The Western Geelong Growth Area is located west of the Geelong Ring Road and extending through parts of Batesford from the Ballarat – Geelong rail line in Bell Post Hill to the north, to the Barwon River in Fyansford, and extending to Dog Rocks/Friend in Hand Roads in the west.

- _ Batesford Quarry and associated overburden
- _ AusNet electricity transmission powerline easements
- _ flood prone areas
- _ ecologically sensitive areas
- _ areas with steep slopes

The Northern and Western Geelong Growth areas are 2,127 and 3,240 hectares (ha) respectively, with estimated developable land area of 3,411ha across both areas. Combined, the two areas are projected to have the capacity to house up to 112,000 people.









Context

SUSTAINABILITY PRINCIPLES

City of Greater Geelong has a strong commitment to environmental, social and economic sustainability for both its own operations and the broader community.

To support this long-term commitment, Council has applied the ten principles of One Planet Living to its operations, and is now one of only three certified One Planet Councils in Australia.

The framework of ten One Planet Living principles has been adapted to focus on environmental sustainability for the purpose of this Sustainability Opportunities Assessment for Northern and Western Geelong Growth Areas.

PRINCIPLE	OBJECTIVE
Zero Carbon	 <p>Create a community that generates most of its electricity locally from renewable resources, supports low living costs and achieves net zero carbon emissions, supporting the establishment of a safe climate for future generations.</p>
Zero Waste	 <p>Minimise the amount of waste generated during construction and operation, and reduce total waste to landfill. Establish a long-term plan for NWGGA to achieve a 'zero waste' aspiration.</p>
Sustainable Transport	 <p>Establish a community where places for living, socialising, playing and working can all be accessed without using a car. Create environments where active transport modes and public transport are prioritised and achieve the highest amenity.</p>
Sustainable Water	 <p>Manage stormwater in a way that maintains or enhances the pre-development hydrology of the area, minimises downstream impacts and enhances the sustainability of the urban landscape. Ensure the ecological condition and functionality of waterways, wetlands and floodplains is protected, maintained and restored and these assets offer multi-functional environmental, social and economic values in this unique urban landscape. Maximise the use of alternative water to meet fit-for-purpose needs.</p>
Ecology and Biodiversity	 <p>Bring biodiversity into the urban environment, within both private and public areas. Support the establishment of strong ecological values and the reestablishment of flora and fauna native to the area, supporting biodiversity, community amenity and reduced urban heat.</p>
Sustainable Materials and Consumption	 <p>Build using materials that have lower embodied energy, use recycled content, use local manufacturers and renewable resources, exclude harmful substances. Create a community where living happy, healthy life while consuming less is easy and affordable.</p>

Trends, insights and opportunities

A variety of high level trends and influences were observed across many of the projects researched, and were also noted during the discussions undertaken during the stakeholder engagement activities.

These trends are seen as highly relevant to the consideration of sustainability within the NWGGA, particularly in the consideration of how future flexibility can be maintained over the expected long delivery timeframe.

THE ELECTRICITY GRID IS CHANGING FROM A UNIDIRECTIONAL, CENTRALISED NETWORK TO A BIDIRECTIONAL DE-CENTRALISED NETWORK.

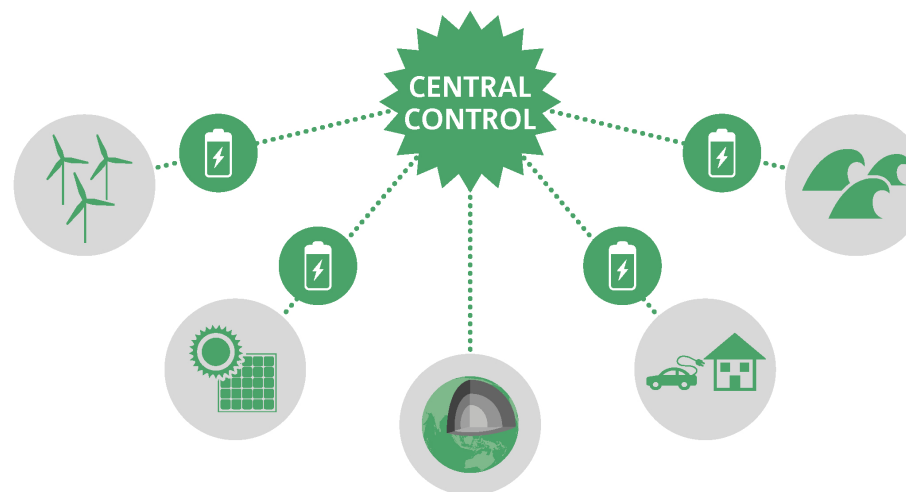
Innovations in the electricity network have the potential to see NWGGA achieve ambitious targets such as Zero Net Energy and Zero Net Emissions. This will require early, coordinated planning and commitment.

Future electricity generation, distribution and management technologies present significant upfront and ongoing benefits to the NWGGA if effectively integrated.

THE COST OF BATTERY STORAGE IS DROPPING RAPIDLY, CLOSELY FOLLOWING THE TRAJECTORY OF SOLAR PANELS.

While batteries are currently in an 'early adopter' phase, it is considered very likely that there will be a strong business case for many households in Australia to install battery storage in the near future.

If mandated for all new buildings within the growth areas, and linked to efficient local network operation (i.e. some form of control allowing peak event management) this could dramatically reduce upfront network investment while allowing future homes and businesses to be energy self-sufficient.



FUTURE GRID ELEMENTS (IMAGE: CSIRO)

ELECTRIC VEHICLES AND AUTONOMOUS VEHICLES ARE SET FOR SIGNIFICANT MARKET UPTAKE

Electric vehicles and autonomous vehicles are projected to see significant uptake over the next 30 years. However, this will be an incremental uptake, and is likely to require transitional arrangements to avoid ‘messy’ conflicts .

Viewing the risks and opportunities presented by electric and autonomous vehicles, the following will be important:
_not focusing on an end point (i.e. it will be an ongoing progress)

_not seeing it as a silver bullet (cars still have amenity, environment and economic drawbacks if they are electric / autonomous)

_retaining flexibility (i.e. keep asking “what comes after that, or instead of that?”).

RISE OF ‘SHARE ECONOMY’ SERVICES - RIDE-SHARE (E.G. UBER), CAR SHARE, BIKE SHARE, WORK SHARE (E.G. FREE-LANCER) ARE CHANGING THE WAY PRODUCTS AND SERVICES ARE DELIVERED, TRAVEL IS UNDERTAKEN AND THE WAY WE WORK.

These trends can represent an opportunity as well as a risk to NWGGA. Embedding flexibility to be able to respond to and take advantage of these shifts in the way people are living will be critical.

This has potential direct implications for transport planning, land use arrangements, governance arrangements and building design. It will link directly to the long-term economic, social and environmental sustainability of the NWGGA.



GOOGLE SELF DRIVING CAR PROTOTYPE (IMAGE: GOOGLE)

PUBLIC TRANSPORT INFRASTRUCTURE AND SERVICES, TRANSIT-ORIENTED DEVELOPMENT AND 'USER PAYS' ROAD PRICING ARE THE CRITICAL TOOLS TO AVOIDING AND/OR REDUCING CONGESTION.

Nationally and internationally, governments and private developers are recognising that the economic and environmental costs of road congestion are not solved by expanding road network capacity .

This lesson is an important one for NWGGA. Given the scale of long term development expected, the ability of future residents, visitors and workers to travel within and to/from the growth areas efficiently will rely on a significant proportion of trips being undertaken using modes other than private vehicle.

The delivery of high quality public transport infrastructure early in development will have a significant impact on land values and development yield. This presents an opportunity to capture a portion of the value created by this infrastructure and use this to pay off part of the upfront cost of delivering this infrastructure.

EDUCATION AND EMPLOYMENT SHIFTS WILL INFLUENCE WHAT JOBS ARE AVAILABLE AND WHERE

Geelong has experienced significant changes in employment make-up over the past 5-10 years. Notably, job losses in manufacturing businesses including Ford and Alcoa, and industrial businesses including Qantas heavy maintenance and the Shell refinery have seen short term drops in local employment opportunities . While new employment will be created, reskilling is likely to be a priority to ensure that the workforce is suited to the opportunities available.

In line with these changes Geelong has seen an increase in the proportion of jobs in healthcare services, education and training, and professional services .

Planning for the NWGGA will need to consider these changes and consider how long-term employment opportunities in sustainable industries can be created. This is likely to require that developers actively seek major employers, such as hospitals, universities and light industrial uses as 'anchor' tenants or development partners.

It will also need to consider how work practices are changing, and respond to the increased use of flexible and remote work arrangements.

SHORT AND MEDIUM TERM CLIMATE CHANGE IMPACTS

Some changes to our climate are already being experienced, and further changes are essentially 'locked in' due to the greenhouse gases already emitted. Changes included higher average temperatures, increases in frequency and severity of extreme weather events (including heatwaves and storms) and changes in annual rainfall volume and distribution.

As a result it is very important that the NWGGA plans for the extent of changes that can be reasonably expected. This will make consideration of the climate resilience of approaches to water supply, thermal comfort, landscaping and vegetation and utility networks critical.

Zero Carbon



Objective:

Create a community that generates most of its electricity locally from renewable resources, supports affordable living and achieves net zero carbon emissions, supporting the establishment of a safe climate for future generations.

OVERVIEW

In the context of NWGGA, the principle 'Zero Carbon' represents a short- to medium-term goal that is directly linked to an evidence-based and equitable approach to global greenhouse gas emissions reduction.

For global average temperature increases to be kept below 2 degrees celcius, climate scientists have calculated that a global 'carbon budget' of approximately 800 GtCO₂ must not be exceeded in the next 25 years¹. Given existing human settlement, energy consumption and transport will soon exceed this if not effectively and rapidly decarbonised, any new development must be in a position to achieve net carbon neutrality within the short to medium term.

This doesn't mean that development within NWGGA needs to be carbon neutral from day one. But it does mean that the growth areas must plan for this as a required outcome, and capitalise on the opportunities that exist now to make the transition as orderly and efficient as possible.

This section explores opportunities within 'Energy Efficiency' and 'Sustainable Energy Supply' to work towards this goal.

Zero Carbon



ENERGY EFFICIENCY

OPPORTUNITY

COSTS AND BENEFITS

RISKS AND BARRIERS

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Provide for smaller lot sizes, diversity of lot sizes, smaller building footprints.

Costs
 _cost neutral or potentially cost positive if greater development yield is achieved (however highly dependent on mix of sizes and densities achieved across the growth areas).

Benefits
 _potential yield increase.
 _improved energy efficiency, climate resilience, reduced operating costs.
 -supports more compact built form across the NWGGA.

_potential lag in market uptake during early stages due to lack of market awareness.

_potential lack of developer and landowner 'buy in' to this opportunity.

Critical Success Factors
 _market acceptance and education for buyers and builders, and strong developer recognition of value proposition.
 _adoption of design criteria and effective planning framework to support these outcomes.

Next steps
 1. Note desire for diversity within Framework Plans.
 2. Include combination of requirements and incentives in Precinct Structure Plans.
 3. Use Design Guidelines to implement specific requirements.

Ensure lot designs recognise and protect (where possible) solar resources:
 _passive (passive solar efficiency)
 _active (solar PV power generation).

Costs
 _ cost neutral if integrated early.

Benefits
 _improved energy efficiency, climate resilience, reduced operating costs.

_inadequate consistency of implementation across different developments, reducing impact.

_likely reliance on developer guidelines to implement at the finer grain.

Critical Success Factors
 Early integration with transport planning will be critical to ensure that the street network supports solar lot design.

Next steps
 1. Embed passive and active solar design principles into Framework Plans, Precinct Structure Plans and master plans.



ENERGY EFFICIENCY

OPPORTUNITY

Increased building performance standards across all building types, including thermal fabric, air permeability, thermal bridging.

Achieve significantly higher performance than minimum compliance (at present 6 star NatHERS rating for residential), with a short-medium-term target of 8+ star NatHERS rating.

COSTS AND BENEFITS

Costs

_potential minor cost increases in construction and testing.
_additional skills and resources required for compliance enforcement.

Benefits

_significant improvement in climate resilience, indoor environment quality and long-term operational energy efficiency.

RISKS AND BARRIERS

_potential to increase construction costs if requirements are not coupled with industry capacity building and potential incentives.

_potential resistance from developers to additional regulation.

_in situations where individual buildings don't require a planning permit then no obvious implementation mechanism is available.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

_striking the right balance between ambition and pragmatism.
_securing long-term flexibility to adapt to changing construction standards and material performance.

Next steps

1. Include high-level principles of high performance buildings in Framework Plans.
2. Further explore suitable compliance mechanism/s in Precinct Structure Plans, Zone schedules and/or Design Guidelines.
3. Establish industry capacity building and incentives program to complement increased mandatory requirements. An industry design competition and demonstration project could be used as a means to demonstrate how the requirements can be met without increasing construction costs or reducing the quality or amenity of the built outcome.

PROJECT EXAMPLE



BOWDEN URBAN VILLAGE MASTERPLAN (IMAGE: RENEWAL SA)

Bowden Urban Village, South Australia

The high level approach at Bowden towards Zero Carbon was to ensure at the masterplanning level that street orientation and density was going to provide the best chance for individual apartment and town house development parcels to achieve strong passive solar design outcomes.

Developers were then asked to respond through a staged tender process as to how they would meet targeted greenhouse reductions using GreenStar benchmarks – with the developers retaining flexibility as to how the targets would be achieved.

An embedded network has been adopted by one building and a strong monitoring and evaluation framework for benchmarking carbon over time has been developed in partnership with the University of South Australia.

Critical success factors have included:

- Collaboration between State and local government and key partners across a range of industries.
- Flexibility over how transport and carbon targets are met by individual developments.
- Stakeholder buy-in to a strong sustainability vision.



SUSTAINABLE ENERGY SUPPLY

OPPORTUNITY

Create a pathway to establishing a Fossil Fuel Free precinct, including exploring the potential to avoid gas supply to most or all of the growth areas.

COSTS AND BENEFITS

Costs

_potential minor cost increase to provide heat pump hot water and induction cooking.

Benefits

_significant savings through avoided gas infrastructure could be invested in subsidisation of solar PV systems, heat pump hot water units and high efficiency reverse cycle heating and cooling.
_protection from future gas price rises.
_pathway to 'Zero Net Energy' through combination with on-site PV systems.

RISKS AND BARRIERS

_market acceptance of all electric homes, including induction cooking and heat pump hot water and space conditioning.

_existing regulations generally require provision of gas supply network within all growth area development.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

_combining mandatory requirements with incentives and education. Market acceptance and education for buyers and builders.

Next steps

1. Include objective in Framework Plans.
2. Progress discussions with Powercor regarding implications on electricity network, and create working group to explore combination of requirements and incentives.
3. Utilise a demonstration project to show how a high efficiency, all electric home can be high amenity and low cost.



SUSTAINABLE ENERGY SUPPLY

OPPORTUNITY

Establish the NWGGA as a Zero Net Energy precinct, generating as much energy as it consumes on an annual basis. This could include the following key elements:

_PV and battery storage systems in all dwellings, potentially utilising new technology such as Building Integrated PV (e.g. roof tiles)

_Large scale local PV (potential for community ownership / investment)

_‘smart grid’ with intelligent demand management.

COSTS AND BENEFITS

Costs

_upfront costs of increased local renewable energy generation and storage. Can be limited through financed system offers and/or bulk purchase to significantly reduce per unit cost.

Benefits

_significant upfront development cost savings through avoided electrical grid augmentation.

_long term operational cost savings and protection from electricity price increases.

RISKS AND BARRIERS

_without a coordinated approach across the growth areas the benefits (in particular in avoided network augmentation costs) risk being lost or significantly reduced.

_upfront investment in energy generation and storage infrastructure, if not effectively linked to reduced costs of grid augmentation.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

_early engagement and collaboration between network operator, developers and government to realise the potential cost savings.

_reliability of reduced peak demand (through mandatory controls) to enable reduced upfront network investment.

Next steps

1. Include as objective in Framework Plans.
2. Scenario modelling to identify preferred pathway and quantify costs and benefits.
3. Establish working group to progress concept involving landowners, CoGG and Powercor (at minimum).

PROJECT EXAMPLES



SANTA MONICA (IMAGE: SOLARINDUSTRYMAG.COM)

Santa Monica Zero Net Building Requirement, California

The Santa Monica City Council approved an ordinance in 2016 requiring all new single-family (stand alone) homes constructed in the city to be zero-net energy. In effect this means that the quantity of energy produced on-site by renewable energy resources is equal to the amount of the energy consumed annually by the building. The ordinance will ensure that new residential development is energy self sufficient on an annualised basis, contributing to the long-term goal of the city becoming carbon neutral.

The successful adoption of this ordinance was only achieved through an effective partnership between the City Council and the California Energy Commission, which is responsible for the state's energy network.

RECOMMENDATION

Commit to developing the NWGGA as zero carbon and net zero energy communities, and carry these aspirations through all stages of the planning and development process.

Establish key partnerships, including with Powercor, to lock in the benefits of this early commitment through reducing upfront infrastructure costs.

Zero Waste



Objectives:

Minimise the amount of waste generated during construction and operation, and reduce total waste to landfill.

Establish a long-term plan for NWGGA to achieve a 'zero waste' aspiration.

OVERVIEW

New buildings and infrastructure generate waste during both construction and operation. With considered thinking and minor changes during design, both can be significantly reduced.

Over 75% of waste generated during demolition and construction is clean excavated material, concrete, bricks and timber which are all highly recyclable. Similarly, approximately 40% of household waste sent to landfill is organic [including food and garden waste].

NWGGA has the potential to address both waste during construction and operation through forward planning. While most of these opportunities are not related to the Framework Plans that will be developed, early consideration and planning is critical to ensuring that the benefits can be realised.



COLLECTION INFRASTRUCTURE

OPPORTUNITY	COSTS AND BENEFITS	RISKS AND BARRIERS	CRITICAL SUCCESS FACTORS AND NEXT STEPS
<p>Establish a precinct-wide waste management system that incentivises waste minimisation in operation.</p>	<p><u>Costs</u></p> <ul style="list-style-type: none"> _administration costs _incentive costs (unless captured through reduced cost of collection and disposal). <p><u>Benefits</u></p> <ul style="list-style-type: none"> _reduced overall waste generation and reduced cost of waste collection and disposal. 	<ul style="list-style-type: none"> _complexity of this requires long-term buy in from key stakeholders. _potential lack of a coordinating stakeholder. 	<p><u>Critical Success Factors</u></p> <ul style="list-style-type: none"> _effective engagement of large commercial tenants to implement appropriate and effective incentives. <p><u>Next steps</u></p> <ol style="list-style-type: none"> 1. Discuss concept further with Barwon South West Waste and Resource Recovery Group (BSWRRG) in the context of statewide plan.
<p>Utilise the first stages of development to trial three bin separated collection for:</p> <ul style="list-style-type: none"> _recycling _organic waste (including garden and kitchen waste) _residual waste (landfill). 	<p><u>Costs</u></p> <ul style="list-style-type: none"> _potential increase in collection costs. <p><u>Benefits</u></p> <ul style="list-style-type: none"> _potential decrease in disposal costs. _significant benefits through removing organic waste from landfill. Estimated at 40% of current landfill bin content is organic (residential). 	<ul style="list-style-type: none"> _inadequate support during establishment period leads to poor outcomes. _the challenge of behaviour change to support effective three stream separation. 	<p><u>Critical Success Factors</u></p> <ul style="list-style-type: none"> _establish early on to avoid issues with behaviour change. Focus on building on our existing strong culture of recycling separation. _maintain collection frequency during early implementation. <p><u>Next steps</u></p> <ol style="list-style-type: none"> 1. Discuss further within CoGG and with BSWRRG to determine feasibility of trial.



COLLECTION INFRASTRUCTURE (CONT.)

OPPORTUNITY	COSTS AND BENEFITS	RISKS AND BARRIERS	CRITICAL SUCCESS FACTORS AND NEXT STEPS
<p>'Smart bin' technology for public realm waste collection in denser mixed use centres within the growth areas.</p>	<p><u>Costs</u> _higher upfront cost, potentially higher operational cost due to different collection requirements.</p> <p><u>Benefits</u> _reduced collection frequency resulting in fewer vehicle movements.</p>	<p>_potential to complicate street hierarchy and below ground infrastructure.</p>	<p><u>Critical Success Factors</u> _consider public realm waste collection strategy - convenience vs encouraging community responsibly for waste.</p> <p><u>Next steps</u> 1. Undertake lifecycle cost benefit analysis during Precinct Structure Planning stage.</p>

TREATMENT

OPPORTUNITY	COSTS AND BENEFITS	RISKS AND BARRIERS	CRITICAL SUCCESS FACTORS AND NEXT STEPS
<p>Local (precinct scale) organic waste management</p>	<p><u>Costs</u> _upfront cost and increased cost of separate organic waste collection.</p> <p><u>Benefits</u> _significant reduction in waste to landfill. _potential for valuable byproducts such as fertiliser and biogas.</p>	<p>_potential amenity risks if technology and location not carefully considered.</p> <p>_unlikely to be a viable option if a regional organic waste treatment plan exists or is planned. However if not, the NWGGA could host such a facility (subject to buffer distances).</p>	<p><u>Critical Success Factors</u> _alignment with regional waste management strategy.</p> <p><u>Next steps</u> 1. Discuss further with BSWRRG and CoGG. 2. If local (precinct scale) organic waste treatment has potential, identify possible locations and undertake scenario analysis to determine viability during Precinct Structure Planning stage.</p>

PROJECT EXAMPLES



NILLUMBİK SHIRE COUNCIL WASTE COLLECTION INFORMATION (IMAGE: NILLUMBİK)

Nillumbik Organics Collection

Nillumbik Shire Council, in the northern suburbs of Melbourne, introduced a trial of kerbside organic waste collection in 2003. Kitchen and garden organics were collected in a green bin, and landfill bins were reduced in size and collection frequency reduced.

The community took some time to adapt to the new system, and it has been acknowledged that the switch to fortnightly collection frequency was made too quickly. This led to high levels of contamination of the organics stream.

Ultimately behaviour change and better information has led to improved waste separation. The waste collected is treated at Veolia's organic waste processing plant at Bulla as part of the Northern and Western Organics Processing Contract.

NWGGGA has the opportunity to learn from these experiences to implement a highly successful organic waste collection service, significantly reducing the volume of waste going to landfill from these growth areas.

RECOMMENDATION

Set 'Zero Waste' as a long term target for the precinct. Commit to the first step along this path as part of the earliest development, by instituting a three bin collection system, including kitchen and garden organics.

Explore long term opportunities for future on-site management of organic waste within the growth areas using a biodigester or waste to energy plant.

Sustainable Transport



Objectives:

Create communities where ‘five minute living’ is possible through compact urban form and mixed land uses.

Establish a transport network that, from the first development stages, makes public and active transport modes attractive and convenient.

OVERVIEW

A sustainable transport system, supported by a combination of land use and urban form, infrastructure and behaviour can lead to reduced greenhouse gas emissions, less air pollution, lower living costs and improved health and wellbeing.

The NWGGA is not currently served by either public or active transport modes. Sustainable transport outcomes will only be achieved through a commitment to varied land uses, diverse densities and the establishment of higher density, high intensity centres, and an early, high quality and high frequency public transport system.

Sustainable Transport



URBAN FORM

OPPORTUNITY

Adopt a commitment to enabling '5 minute living': mixed land uses, higher density centres, local diverse employment opportunities, all levels of education and essential community services providing for reduced overall travel.

Actively seek partnerships with potential tenants such as universities, cafes and hospitals to anchor and catalyse the scale and intensity of development required to achieve this objective.

COSTS AND BENEFITS

Costs
 _potential increased upfront infrastructure costs to attract suitable 'anchor' uses.
 _potential increased land holding costs while waiting for local market to be mature for higher density mixed use development.

Benefits
 _establishment of more diverse, thriving neighbourhoods.
 _reduction in overall travel needs and private vehicle travel, reducing air pollution, improving safety, improving physical and mental health.
 _potential significant increase in land values and development returns through greater yield and diversity of uses.

RISKS AND BARRIERS

_relies heavily on the early delivery of high quality, high frequency public transport services (preferably rail) and high quality shared streets and public realm.

_competition from more central locations within Geelong for similar density, diversity of development.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors
 _establishment of early commitment and funding for delivery of 'day one' public transport within the earliest stages of the growth areas.
 _likely to require collaboration between multiple landowners and a significant role for CoGG and the Victorian Government as facilitators.

Next steps
 1. Include within Framework Plans vision and principles.
 2. Undertake development feasibility scenario modelling to determine viability and project timing of local market maturity to support such development.

Sustainable Transport



URBAN FORM

OPPORTUNITY

Deliver high speed broadband and utilise flexible design (e.g. shop top housing, home office development) to encourage businesses to establish locally, and individuals to consider remote working.

COSTS AND BENEFITS

Costs
 _NBN considered 'business as usual' from an infrastructure standpoint.

Benefits
 _increase in flexibility and local employment opportunities.
 _if effectively incorporated into mixed use precincts, offers the potential to attract small startups and create a culture of innovation.

RISKS AND BARRIERS

_lack of market demand, and competition with other areas offering similar opportunities.

_requires market demand and delivery of 'catalyst' projects to demonstrate the potential.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors
 _establish flexibility and incentives to encourage new businesses to locate within the area.

Next steps
 1. Include supporting principles in Framework Plans.
 2. Consider encouraging home-office development and micro office development through Precinct Structure Plans and/or zoning provisions.

PROJECT EXAMPLES



BOWDEN URBAN VILLAGE CONCEPT PLAN (IMAGE: RENEWAL SA)

Bowden Urban Village, South Australia

The emphasis behind Bowden village was for a concentration of commercial, retail, community and residential uses close to existing public transport nodes (Transport Orientated Development or TOD). The project is the first of South Australia's 11 planned TODs with aims to make it a world leading example of successful TOD. The Bowden Village town centre and train station are located at the western edge of the site.

Benchmarks for reduced car parking were set for the development at 0.75 car parks per dwelling. These were supported by a finer grained streetscape design which has seen vehicle speeds reduced by more than 10km/h compared with surrounding streets. This sense of shared space is welcomed by residents.

While the early stages of the Bowden Village development has been successful as a transit orientated development, an initial lack of certainty over fixed rail infrastructure (electrification and grade separation) held back the development of the station and accompanying town centre for later in the development timeframe than was initially intended, constraining the ability to meet transport targets (e.g. car parking rates) for the overall site.

It is important that planning for the NWGGA recognises this important link between land use, density and the timing of public transport infrastructure delivery when considering development staging. Advocacy and partnerships to deliver critical 'catalyst' public infrastructure for the growth areas early is seen as a high priority.

Sustainable Transport



PUBLIC TRANSPORT

OPPORTUNITY

Develop and implement a regional public transport strategy that includes NWGGA as part of a multi-modal transport system.

Recognise the strengths and weaknesses of the two growth areas with regard to proximity to existing transport infrastructure, and identify short, medium and long-term priorities for public transport within the growth areas.

COSTS AND BENEFITS

Costs

-significant upfront investment required.

Benefits

-reduction in greenhouse gas emissions from private car use.
-reduction in local and regional congestion through reducing private vehicle trips (particularly to central Geelong and Melbourne).
-significant potential increases in land values through certainty created by public transport infrastructure commitments.

RISKS AND BARRIERS

-this is a large undertaking and is unlikely to be complete for several years. It is important that the public transport strategy for NWGGA is not exclusively reliant on this plan being developed.

-funding and commitment from state government may not be forthcoming if this isn't seen as a strategic priority.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

-acknowledging the critical role the NWGGA will play in Geelong's future.

-ensure that high quality, high frequency public transport services available from the first stages of development. Must be committed and funded early, and delivered in concert with early stages to create certainty for private investment in higher density, transit oriented development.

-identify suitable sources of funding, including consideration of development contributions (or other mechanisms to capture a proportion of new value created).

Next steps

1. Establish a sustainable transport partnership to drive and deliver the NWGGA public transport network as part of a broader Geelong public transport strategy.
2. Build on findings of strategic road and rail assessment (underway) to identify preferred options and include key public transport connections in Framework Plans.

Sustainable Transport



PUBLIC TRANSPORT

OPPORTUNITY

COSTS AND BENEFITS

RISKS AND BARRIERS

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Consider short term opportunities to improve public transport access to the growth areas. This could include relocation of Corio Train station to Heales Road, and investigating establishing passenger shuttle to Geelong CBD on the existing Geelong-Ballarat line.

Costs
_significant costs likely to be involved in any new public transport infrastructure, particularly major stations/exchanges.

Benefits
_establish a better public transport option early on to allow connection via train to Melbourne.

_whether an effective link can be made to a relocated station (e.g. high frequency shuttle) or to a new station on the existing Geelong-Ballarat line.

_likely to require significant state/federal government funding.

Critical Success Factors
_effective collaboration between key agencies.

Next steps
1. Further explore the strategic merits of these proposals to inform the Framework Plans.
2. Identify possible future strategic transport infrastructure, such as train station/s, on Framework Plans (if merit is established).

Establish dedicated public transport corridors (separated lanes) for key routes. Utilise buses initially with potential to convert to light/heavy rail in the future.

Costs
_planning and land acquisition costs and lost developable land.

Benefits
_establish certainty for development, allowing higher density along key routes with reduced car parking requirements.

_whether an effective link can be made to a relocated station (e.g. high frequency shuttle) or to a new station on the existing Geelong-Ballarat line.

Critical Success Factors
_delivery of high quality, frequent service even during early stages of development, to establish certainty and confidence in developers, residents and businesses.

Next steps
1. Identify preferred locations of key routes on Framework Plans.
2. Consult with PTV (preferably as part of a broader discussion regarding a regional public transport strategy).

Explore potential for developer funded 'day one' high frequency bus service to ensure excellent early public transport services while reducing reliance on long-term government funded service provision.

PROJECT EXAMPLES



SMART TRAIN (IMAGE: SONOMA MARIN AREA RAIL TRANSIT)

Sonoma Mountain Village, San Francisco, California, USA

The Sonoma Mountain Village 2020 Sustainability Action Plan Report outlines a targetted 82% reduction in GHG emissions arising from travel. Several strategies have been designed to reduce emissions. Active transport strategies include pedestrian promenades, narrow tree-lined streets, wide sidewalks and safe bike and pedestrian paths directly to the train station, including landscaping and lighting. 'Five-minute-living' has been incorporated into the overall design strategy of the project with amenities within walking distance reducing the need for fossil-fuel- based transport modes.

Key to the sustainable transport strategy is the Sonoma-Marin Area Rail Transit (SMART), which starts passenger services in early 2017. The 70 mile passenger train and pedestrian and bicycle network project runs along the Northwestern Pacific Railroad alignment in North Bay, San Francisco. The project revives the publicly owned railroad right of way, which has been dormant for many years. The Sonoma Mountain Village project was active in advocacy and political support for the SMART initiative to bring the train to a station that can be easily accessed from the town square.

The project has been funded by a combination of local, state and federal government funding, along with a localised sales tax increase which was approved by voters. This demonstrates the power of government partnerships and creative funding models to deliver critical public transport infrastructure.⁵

Sustainable Transport



ACTIVE TRANSPORT

OPPORTUNITY

Deliver a high quality network of on-road (part of 'complete streets') and off-road separated cycle paths. Ensure these links meet recreational and non-recreational needs, integrate and enhance open space and ecological corridors, and connect to key destinations within and beyond the NWGGA.

COSTS AND BENEFITS

Costs
_additional land allocation and increased upfront road infrastructure delivery costs.

Benefits
_increased long-term value of property with access to this network.
_improved physical and mental health of residents.
_lower cost of living through reduced car usage.
_reduced air pollution and greenhouse gas emissions.

RISKS AND BARRIERS

_any discontinuity in the network will significantly reduce its function and appeal to future residents.

_competition for space within the public realm.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors
_deliver active transport network upfront with broader street network.
_ensure active transport network is continuous and connects key destinations within and outside the growth areas.

Next steps
1. Identify key active transport routes within Framework Plans.
2. Ensure land allocations for street networks across the growth areas allow for high quality on and off-road bicycle and walking paths.
3. Collaborate early with stakeholder group to create a typical 'complete street' cross-section, to identify practicalities of implementation. Include this in Integrated Infrastructure Delivery Plan.

Sustainable Transport



ZERO EMISSIONS VEHICLES AND AUTONOMOUS VEHICLES

OPPORTUNITY	COSTS AND BENEFITS	RISKS AND BARRIERS	CRITICAL SUCCESS FACTORS AND NEXT STEPS
<p>Future proof streets and the overall urban structure of NWGGA to allow for transition to electric and autonomous vehicles, including planning for future adaptation of streets to support transitional arrangements.</p> <p>This could include transition to dedicated autonomous vehicle lanes, massive reductions in public car parking requirements, and dedicated autonomous vehicle car parks with electric vehicle charging.</p>	<p><u>Costs</u></p> <ul style="list-style-type: none"> -potential land acquisition costs and lost development yield. <p><u>Benefits</u></p> <ul style="list-style-type: none"> -avoided or minimised future disruptive works to rearrange streets and utility infrastructure. 	<ul style="list-style-type: none"> -difficult to 'predict the future' and know ultimately how these technologies will change optimal street and urban structures. -potential resistance from developers and government agencies who disagree with projected timeframes for takeup of these technologies. 	<p><u>Critical Success Factors</u></p> <ul style="list-style-type: none"> -coordination between relevant authorities, agencies and developers (including Powercor, VicRoads). <p><u>Next steps</u></p> <ol style="list-style-type: none"> 1. Ensure consideration of future transition to electric and autonomous vehicles is considered in street widths and location of parking infrastructure within mixed use centres during Precinct Structure Planning stage.

Sustainable Transport



ZERO EMISSIONS VEHICLES AND AUTONOMOUS VEHICLES

OPPORTUNITY	COSTS AND BENEFITS	RISKS AND BARRIERS	CRITICAL SUCCESS FACTORS AND NEXT STEPS
<p>Mandate electric vehicle charging infrastructure in all development.</p>	<p><u>Costs</u> _minor upfront cost increase [however could be expected that an EV manufacturer or energy retailer will offer to pre-install charge points at low or zero cost].</p> <p><u>Benefits</u> _significant avoided retrofitting costs. _facilitate the uptake of electric vehicles, reducing greenhouse gas and other air pollution associated with internal combustion engines. _electric vehicles have the potential to become part of an integrated 'smart' renewable energy network, acting as distributed storage.</p>	<p>_potential market resistance to additional costs.</p> <p>_lack of market standard for charging ports could present a barrier to uptake.</p>	<p><u>Critical Success Factors</u> _adoption of standards regarding plug types and scale / type of charging facilities for different land uses.</p> <p><u>Next steps</u> 1. Further analysis of the likely costs and any potential complexity of non-standard charging connectors across different electric vehicles. Explore potential partnership with charging network providers. 2. Explore appropriate implementation pathway, likely via developer Design Guidelines.</p>

PROJECT EXAMPLES



TESLA HOME CHARGER (IMAGE: TESLA)

EU Directive - Electric Vehicle Charging

A draft EU directive, expected to be brought into effect by 2019, will require all new or refurbished homes to include provision of an electric vehicle charging point. A further requirement within the regulation will see new commercial buildings dedicate 10% of spaces to electric vehicles and provide associated charging infrastructure.

This directive links to the Union's greenhouse gas reduction targets as well as strategies to reduce the increasing air pollution problems experienced in many major cities.⁶

The expectation that a significant number of new cars sold will be electric within the next 5-10 years provides an important cue for NWGGA. Being proactive in the consideration of charging infrastructure would give the growth areas a competitive advantage in the market, while also avoiding or limiting costly retrofits in the future.

RECOMMENDATION

Identify key public and active transport corridors within the two growth areas on the Framework Plans and further detail these within Precinct Structure Plans.

Build support from PTV, Department of Economic Development, Jobs, Transport and Resources and developers to deliver 'day one' public transport services within the growth areas and establish a long term, integrated plan.

Consider the implications of the expected increase in uptake of electric and autonomous vehicles and explore industry partnerships to take advantage of the opportunities these technologies present.

Sustainable Water



Objectives:

Manage stormwater in a way that maintains or enhances the pre-development hydrology of the area, minimises downstream impacts and enhances the sustainability of the urban landscape.

Ensure the ecological condition and functionality of waterways, wetlands and floodplains is protected, maintained and restored and these assets offer multi-functional environmental, social and economic values in this unique urban landscape.

Maximise the use of alternative water to meet fit-for-purpose needs.

OVERVIEW

Water is an incredibly important natural resource. Well managed, it can provide for a multitude of uses critical to our day to day lives, while also sustaining the environment on which we fundamentally depend. However there are increasing demands placed on our water resources, and unsustainable water management practices remain common.

The NWGGA has a unique opportunity to consider and plan for the sustainable management and enhancement of its water resources. The strong leadership of Barwon Water, and the current process which will lead to the preparation of an Integrated Water Cycle Management Plan, presents a very positive start to this process.

To avoid duplication this section of the report has drawn heavily on material prepared by Barwon Water as part of the stakeholder engagement process. The objectives noted on this page reflect the objectives adopted by Barwon Water that have the most direct links to sustainability outcomes within the NWGGA, and where relevant the opportunities noted have also drawn from this material.

Sustainable Water



ALTERNATIVE WATER SUPPLY

OPPORTUNITY

Establish a NWGGA best practice potable water target (for example, 100 litres per person per day) through establishing minimum efficiency requirements and alternative water supply.

Maximise the use of alternative water to meet fit-for-purpose needs.

Explore options at building (e.g. tank to toilet), cluster (e.g. localised stormwater harvesting) and precinct scale (e.g. Class A recycled water via dual pipe, use of lake water supplemented by local stormwater and/or recycled water for internal and/or external demand nodes).

COSTS AND BENEFITS

Costs

_dependent on availability of alternate water sources.

Benefits

_locks in long-term reduced potable water supply requirements, reducing pressure on regional water supplies.
_improved resilience to drought and other climate impacts.

Costs

_likely costs vary across the potential options from negligible to significant upfront investment.

Benefits

_dependent on scale from 10% of required supply to 30% from alternative supplies.
_improved resilience to drought and other climate impacts.

RISKS AND BARRIERS

_resistance from developers and/or market to alternative water supply.

_viability of local alternative water supply not yet established.

_resistance from developers and/or market to alternative water supply.

_early analysis from Barwon Water suggests at most 30% of supply can be provided by alternative water supplies.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

_alignment between planning requirements and critical water infrastructure to make this possible.

Next steps

1. Work with Barwon Water to determine any requirements for inclusion within the Framework Plans and IIDP.

Critical Success Factors

_early identification of preferred approach and coupled, coordinated implementation across infrastructure and land use planning processes.

Next steps

1. Include an objective to maximise use of alternative water, and consider use of targets, in the Framework Plans and IIDP.
2. Determine potential sources of recycled water from existing local treatment plants. In the absence of long-term, secure supply to service the projected population, investigate business case for local treatment plant to service the two growth areas.

PROJECT EXAMPLES



AQUAVERO, LYNDHURST VICTORIA (IMAGE: AQUAVERO.COM)

Aquarevo, Lyndhurst Victoria

This planned 460 lot master planned subdivision in Melbourne's South East has placed a strong focus on sustainable water management, and demonstrates implementation of some of the building and precinct scale opportunities relevant to NWGGA.

A partnership between South East Water and developer Villawood Properties will see a range of significant water efficiency, alternative water supply and stormwater management measures implemented across the precinct. These include:

- reuse of rainwater in a specialised hot water system providing for bathing and showering that includes screening, filtering, treatment and temperature sensing devices.
- a pressure sewer system that pumps wastewater to a local water recycling plant, treats the water to Class A standard, and sends it back to each home for use in the garden, toilet or washing machine – closing the loop.
- rainwater tanks for each dwelling with technology that receives weather forecasts, then releases water before heavy rainfall to minimise overflows or flooding in local waterways.
- building management device that controls the water technology in each home, remotely monitors the pressure sewer and reads each home's water and energy use.³



SUSTAINABLE STORMWATER MANAGEMENT

OPPORTUNITY

Manage stormwater in a way that maintains or enhances the pre-development hydrology of the area, minimises downstream impacts and enhances the sustainability of the urban landscape.

Realise this through bioretention, biofiltration and surface stormwater management and reuse as part of integrated green-blue infrastructure. Integrate opportunities at small (e.g. streetscape) scale and large (e.g. site of the rehabilitated quarry) scale.

COSTS AND BENEFITS

Costs

_likely to require significant upfront investment, however costs will vary depending on specific measures implemented.

Benefits

_long term environmental benefits created through resilience to flooding and droughts, improved water quality in downstream environments.
 _amenity benefits through utilising stormwater management within high amenity open spaces.
 _contributes to reduction in urban heat impacts.

RISKS AND BARRIERS

_resistance from developers.

_competition for space with other critical services.

_requires significant upfront, coordinated funding.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

_effective ongoing management and maintenance is critical to long term value and success.

Next steps

1. Identify key 'green and blue infrastructure' assets and corridors on Framework Plans and within IIDP, including integration with active transport and ecological corridors.
2. Establish long term partnership arrangement with Barwon Water, Council and developers to fund and deliver.
3. Include key stormwater management assets and requirements within Precinct Structure Plans.

PROJECT EXAMPLES



CONSTRUCTION OF ONE SECTION OF THE BANYULE STORMWATER HARVESTING PROJECT
(IMAGE: WWW.202020VISION.COM.AU)

Banyule Stormwater Harvesting Project

The Banyule Stormwater Harvesting Project has established one of the largest stormwater harvesting networks in Melbourne. This large scale stormwater harvesting project harvests and treats up to 138 million litres of stormwater for the irrigation of over 30 hectares of green space, saving \$300,000 worth of drinking water annually.

Over 15 million litres of water storage was built underground for the project, thus minimising the loss of open space. A particular innovation at Kalparrin Reserve is the 'double-decker' design, with a wetland and treatment zones on top of the storage.

Underground water storage was built with load-bearing scoria rock and other media wrapped in a waterproof geotextile fabric – the scoria and other media void space is occupied by harvested stormwater. A bioactive film on the scoria removes nitrogen and phosphorous.

Harvested stormwater is pumped from the underground storages through a sand filter and ultra-violet disinfection gives one last clean to ensure public safety with the water irrigated on open spaces.

Partnerships were critical between state government and local government and other stakeholders such as Melbourne Water.⁴

RECOMMENDATION

Build on the existing partnership with Barwon Water to progress a truly integrated approach to water management.

Ensure key infrastructure elements, including major stormwater harvesting assets such as the quarry, are identified on the Framework Plans and within the Integrated Infrastructure Development Plan.

Establish detailed requirements for public realm and private development, and include these within Precinct Structure Plans and Development Contribution Plans.

Ecology and Biodiversity



Objectives:

Bring biodiversity into the urban environment, within both private and public areas.

Support the establishment of strong ecological values and the reestablishment of flora and fauna native to the area, supporting biodiversity, community amenity and reduced urban heat.

OVERVIEW

The impact of urban development on land use and biodiversity, and the best way to have a positive impact on this, varies dramatically according to context. A greenfield site with existing biodiversity values requires a careful design response to protect and enhance these values. Alternatively, a brownfield site with little or no existing biodiversity value may present an opportunity to re-establish a landscape that supports the proliferation of flora and fauna and in doing so have a significant impact on local biodiversity. The diversity of existing conditions within the NWGGA means that both these opportunities are relevant.

As recognised within CoGG's Urban Forest Strategy, urban greenery is also critical to human health and wellbeing. Access to many and varied green spaces within urban environments encourages physical activity, improves air quality, has proven links to mental health and supports the establishment and sustenance of a connection to the natural environment.

Urban greenery is also vital in establishing resilience to urban heat impacts and the increasing incidence and severity of extreme heat that climate change will bring. Many recent growth area developments have not adequately addressed this risk, and risk becoming areas at high risk of climate change impacts, including increasingly dangers urban heat impacts.

The diversity of landscapes and likely development densities and land uses within the NWGGA presents an opportunity to foster and enhance biodiversity values at all scales, and link the urban ecology of the site to its amenity and climate resilience. If successful, the future communities will be protected from climate change impacts while enjoying healthier, more ecological diverse environments.



PROTECT AND ENHANCE EXISTING BIODIVERSITY

OPPORTUNITY

Establish habitat corridors and pollinator pathways of sufficient size/width, particularly around waterways such as the Moorabool and Barwon Rivers.

COSTS AND BENEFITS

Costs

_allocation and protection of appropriate land, potentially reducing development yield.

Benefits

_support long-term biodiversity values, improving landscape health and mitigating urban heat island impacts.
_improve residents health and wellbeing.

RISKS AND BARRIERS

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors

_early establishment and maintenance of landscape, and long-term management clearly agreed.

Next steps

1. Identify key existing/new ecosystem corridors for protection and revitalisation in Framework Plans.
2. Develop a detailed Green Infrastructure master plan for each growth area during Precinct Structure Planning stage which integrates strongly with active transport and open space strategies.

Protect existing mature trees and identify opportunities for 'rewilding' (reestablishment of functional ecosystems) within suitable areas throughout both growth areas, using local, indigenous species and carefully selected exotic species where appropriate.

Costs

_negligible cost.

Benefits

_ensures some mature trees are present early in development, supporting biodiversity values and retaining a sense of the past indigenous landscape and ecosystem.

_competition for open space allocation between recreational and ecological uses.

_locations of existing mature trees may be incompatible with proposed key infrastructure.

Critical Success Factors

_recognising the value of mature trees and utilising creative thinking to avoid the need for their removal.

Next steps

1. Identify existing mature trees and formalise appropriate protection during Precinct Structure Planning / Subdivision Planning (subject to detailed Flora and Fauna Study).

Ecology and Biodiversity



PROTECT AND ENHANCE EXISTING BIODIVERSITY

OPPORTUNITY

Establish minimum requirements for canopy trees (e.g. 25% canopy cover across NWGGA, aligned with CoGG Urban Forest Strategy target for the municipality) and ongoing protection for new canopy trees delivered in the public realm and on private lots across all land uses.

COSTS AND BENEFITS

Costs
_minor possible loss of developable land.
Benefits
_creates certainty of canopy tree cover into the future, reducing urban heat island impacts and increasing biodiversity values.

RISKS AND BARRIERS

_could require complex administrative arrangements.

_lack of a clear mechanism for implementation across multiple developments.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Critical Success Factors
_identification of appropriate mechanism for protection (e.g. restrictive covenant on title)

Next steps
1. Further investigate appropriate mechanisms and targets for canopy trees that provides appropriate protection while avoiding inflexibility.

PROJECT EXAMPLES



AQUAVERO, GROW COMMUNITY, ANTHONY RICH

Grow Community, Seattle, Washington USA

Situated on Bainbridge Island, Grow Community is an eight acre net-zero housing development endorsed by One Planet Living.

Grow Community implemented a number of strategies in an effort to increase biodiversity and biological productivity including the preservation and augmentation of the forested area of the site and the creation of new habitat types.

10% of the site has been certified as Wildlife Backyard Habitat, over 50% has been designated as open space and a 35% tree canopy averaged over the project site. Plants selection throughout the site was based on restoration and cultivation goals.

Asani, Grow Community and the City of Bainbridge Island have partnered to create a Pollinator Improvement Project. The goals of the project are to pass an ordinance which prohibits the use of pesticides on public property and to create a pollinator friendly landscape that can be replicated in other communities and further serve as an education tool for younger generations on the importance of pollinators for the sustainability of the plant ecosystem and our food source.



URBAN HEAT ISLAND MITIGATION

OPPORTUNITY

Create an urban heat mitigation and management plan for the growth areas, linking public and private realm landscaping, stormwater and watercourse management and heatwave refuges.

COSTS AND BENEFITS

Costs
 _council or external resource costs to prepare plan.

Benefits
 _establishes a tangible link between landscape, urban water management and urban heat island impacts.
 _allows informed decision making.

RISKS AND BARRIERS

_lack of a suitable governance entity to create and implement the plan.

_likely to require upfront and ongoing resourcing to develop and implement the plan.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

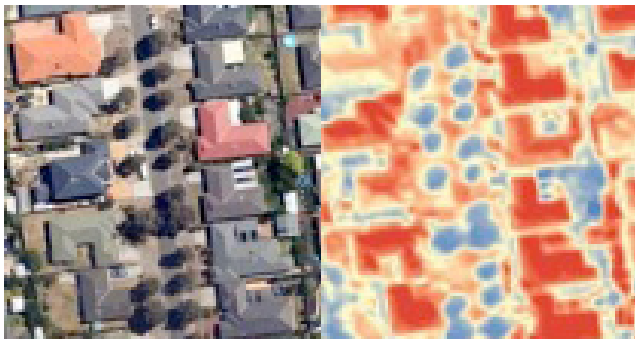
Critical Success Factors
 _effective integration between landscape and biodiversity planning and stormwater management.

Next steps
 1. Include climate resilience and mitigation of urban heat island impacts as principles within Framework Plans and Precinct Structure Plans.
 2. Identify appropriate lead within Council and key external stakeholders to progress urban heat mitigation and management plan.
 3. Undertake spatial analysis of potential biodiversity corridors and identify required canopy tree cover to effectively mitigate urban heat island impacts.

PROJECT EXAMPLE



COOLING EFFECTS OF WATER WITHIN THE URBAN LANDSCAPE, BOTH THROUGH EVAPORATIVE COOLING AND PROVIDING THERMAL MASS (IMAGE: AECOM AND MONASH UNIVERSITY)



COOLING EFFECTS OF STREET TREES AND BACKYARD PLANTINGS (IMAGE: AECOM AND MONASH UNIVERSITY)

Urban Heat Island Study - City of Greater Geelong and Wyndham City Council

This 2013 report undertaken by consulting firm AECOM in partnership with Monash University utilised aerial thermal imaging of areas of the two municipalities to examine urban heat risks and mitigation impacts presented by different urban and natural environments.

It identified a number of urban heat risks presented by new urban growth, including:

- health and wellbeing impact on future residents, particularly vulnerable groups (e.g. elderly, disabled)
- increase in living expenses due to increased reliance on air conditioning and private vehicle transport, if active transport is not supported by mitigation of urban heat
- increase in urban heat impacts on surrounding areas.

The report identifies a number of interventions highly relevant to the consideration of urban heat within the NWGGA, including:

- utilising waterways and stormwater management to bring water in the urban landscape, offering passive cooling
- canopy trees in the public and private realm
- light coloured roofing materials, permeable paving and light coloured paving.

RECOMMENDATION

Identify opportunities for significant areas of ‘rewilding’, including key open space and biodiversity corridors, within the Framework Plans and in further detail within Precinct Structure Plans.

Recognise the ecological, health and wellbeing, and climate resilience benefits of different landscaping outcomes within an integrated landscape plan for each of the growth areas.

Sustainable Materials and Consumption



Objectives:

Build using materials that have lower embodied energy, use recycled content, use local manufacturers and renewable resources, exclude harmful substances.

Create a community where living happy, healthy life while consuming less is easy and affordable.

OVERVIEW

All materials used in construction have an environmental and social impact. This varies dramatically depending on the raw materials used, manufacturing process, the application and ongoing maintenance requirements.

Careful consideration in selecting materials can significantly reduce the overall environmental and social impact of the project. Materials that have lower embodied energy, use recycled content and renewable resources, exclude harmful substances such as Volatile Organic Compounds (VOCs) and are more durable will result in a more sustainable, longer lasting and safer building.

Development within the NWGGA has the opportunity to establish and support new, sustainable healthy construction trades and industries within Geelong.

Sustainable Materials and Consumption



REDUCING MATERIAL IMPACTS

OPPORTUNITY

Support and promote local, sustainable and healthy materials, building products and trades during construction. This could include exploring new industry opportunities in sustainable construction, such as modular housing or engineered timber.

Explore potential reuse of quarry overburden material where appropriate.

COSTS AND BENEFITS

Costs

_potential cost premium associated with local materials.

Benefits

_potential cost reduction, particularly where transport costs are a significant part of overall cost.

_reduced 'carbon miles' in transport.

_establish and support local industries and manufacturers, within NWGGA and the broader Geelong region.

RISKS AND BARRIERS

_lack of an appropriate mechanism to ensure this is considered (i.e. reliant on the market).

_potential lack of local trades and suppliers meeting the needs of development of this scale.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Establishing connection between local industry and the development of the growth areas.

Next steps

1. Work to determine early development opportunities to utilise materials within the growth areas (e.g. quarry overburden) in site preparation and landscaping during early works.
2. Create (or leverage existing) industry partnerships to promote local sustainable trades, builders and building material manufacturers in Geelong, and promote the opportunity to be part of delivering development as well as locating their businesses within NWGGA.
3. Utilise industry engagement and Design Guidelines to encourage projects to utilise locally sourced, sustainable and healthy materials through creating a Sustainable Materials Guide for development.

Sustainable Materials and Consumption



SUSTAINABLE FOOD AND CONSUMPTION

OPPORTUNITY

Create multi-purpose urban spaces suited to farmers markets within the dense urban centres of each growth area.

'Sustainable House' education facility/ies delivered early on, showcasing how a future household can embrace sustainability in design, construction and operation.

COSTS AND BENEFITS

Costs

-allocation of appropriate land, potentially reducing development yield.

Benefits

-creates opportunities for future NWGGA communities to link to surrounding agricultural uses through regular farmers markets.
-becomes a key social integrator and community focal point.

Costs

-cost of design and construction.
-cost of operation including staffing and program delivery costs.

Benefits

-lead the market with a vision of sustainable living within the NWGGA.

RISKS AND BARRIERS

-competition for space could limit the viability of this.
-development staging will significantly influence the ability for this to be achieved.

CRITICAL SUCCESS FACTORS AND NEXT STEPS

Creating spaces easily accessed by a large population, and catalysing this use early on.

Next steps

1. Ensure this is integrated into public realm design requirements during Precinct Structure Planning stage.

Early establishment and effective promotion will be critical to the impact of this opportunity.

Next steps

1. Identify likely earliest stages of development in both growth areas.
2. Establish working group between Council and developers to progress concept and identify sources of funding (public and private).

PROJECT EXAMPLE



SELANDRA COMMUNITY PLACE (IMAGE: CASEY CONVERSATIONS)

Selandra Community Place

Selandra Community Place is an initiative developed through a partnership between City of Casey, Stockland, Henley Property Group and South East Councils Climate Change Alliance. It has created a highly interactive and engaging display home, featuring information to support purchasers in making sustainable choices when buying a new home. The building itself is a demonstration of sustainable design, built to an 8 star thermal performance rating and is generates as much energy as it uses over an average year.

Providing detailed and direct support and interaction with potential purchasers creates the opportunity to educate the market, driving demand for more sustainable housing options. The centre is staffed by City of Casey.

The centre is also a resource for use by residents as they move it, offer health and wellbeing activities and a small business centre for community use.

RECOMMENDATION

Utilise partnerships between Council, state government and developers to identify opportunities for NWGGA to enable and support local industries involved in the design and construction of sustainable buildings. Identify an early opportunity to further support this, and engage with and educate the future residents of the area, through development of a demonstration house.

Delivery Mechanisms

Capitalising on the opportunities identified within this report will rely on a wide variety of delivery mechanisms. Planning tools will be critical, however must be supported by effective partnerships, governance arrangements and advocacy.

This section explores some of these delivery mechanisms, and their relationship to the opportunities identified in this report. It examines the following implementation categories:

_planning implementation: create the framework and drive implementation of the identified sustainability opportunities through strategic and statutory planning processes.

_sustainability rating tools: integrate, benchmark and verify sustainability outcomes on building, development and growth area scale.

_non-planning implementation: create the partnerships, governance and advocacy to guide long term implementation and management, and source funding.



STREET ART (IMAGE: LLOYD ECODISTRICT)

Planning Implementation

1. Framework Plan

DESCRIPTION	RELATIONSHIP TO SUSTAINABILITY	RECOMMENDATIONS FOR NWGGA
<p>A Growth Area Framework Plan is a long-term strategic land use plan that provides a basis for more detailed land use planning through the precinct structure planning process.</p>	<p>The Framework Plan is underpinned by a number of technical reports which relate to environmental sustainability e.g. Integrated Water Cycle Management report and Flora and Fauna study.</p>	<p>This represents the key opportunity to articulate a strong vision for the growth areas, to be driven by subsequent planning stages. The Framework Plan should embed fundamental environmental principles, opportunities and targets for the growth areas, such as:</p>
<p>Future plans must be consistent with the Framework Plan, but on its own does not constitute the basis for rezoning. The plan is flexible enough such that it can accommodate changes through what can be up to a 30 year planning horizon.</p>	<p>Major arterial roads and fixed transport infrastructure is determined or land reserved.</p>	<ul style="list-style-type: none">_zero net emissions housing_reduced network infrastructure in response to demand management commitments (e.g. solar / battery as standard)_management of Urban Heat Island.
<p>A Framework Plan sets up the staging of future development.</p>	<p>Activity centre locations are determined through a high level and flexible urban structure.</p> <p>It also sets the ambition for the size of employment precincts and activity centres.</p>	<p>The Framework Plans should include within their scope a regional plan for integrating surface water flows, active transport links and revegetation corridors.</p>
	<p>Key areas of ecological value are reserved and major green links identified.</p>	<p>The Framework Plans should clearly enhance the ambition and set the scale and location for jobs close to homes, with a hierarchy of activity centres which is diverse and allows for the vast majority of needs to be met within the growth areas.</p>
	<p>Key partnerships are identified for integrated water cycle management, energy supply and transport provision.</p>	<p>The Framework Plans should include within their scope or bring rise to an update to the regional public transport strategy to guide overall growth for the Geelong region.</p>
		<p>The Framework Plan stage is the key opportunity to cement any collaborative governance arrangement for each of the growth areas.</p>

Planning Implementation

2. Precinct Structure Plans

DESCRIPTION	RELATIONSHIP TO SUSTAINABILITY	RECOMMENDATIONS FOR NWGGA
<p>A Precinct Structure Plan or PSP prescribes land use and development to a more detailed level for areas of land, which will generally support between 10,000 and 30,000 people.</p> <p>The PSP describes the 'what' and 'where' of major infrastructure for the land area.</p> <p>The PSP also sets the development contributions plan for the PSP area. These contributions include payments or in-kind works, facilities or services provided by developers toward the identified needs of a community.</p> <p>The contents of a PSP are described in the Victorian Planning Authority's PSP guidelines and inform an Urban Growth Zone schedule which sets out use and development for the land area consistent with the PSP.</p> <p>It may bring rise to specific zoning and the use of overlays (e.g. Design Development Overlay [DDO]) to encourage or require specific design outcomes within different parcels.</p>	<p><u>Overall</u></p> <ul style="list-style-type: none">_sets up any future requirements for the subsequent planning stages._all sustainability related initiatives where cost is spread over multiple land owners are costed, as such it is the last remaining opportunity for leveraging financial support for environmental initiatives._in concert with the PSP, tools such as a DDO can be utilised to nominate specific performance requirements or design initiatives that different development types must meet. This presents an opportunity to 'fast track' or streamline development applications that meet these requirements, incentivising developers to go beyond 'minimum compliance' and integrate these measures from the outset. <p><u>Zero Carbon</u></p> <ul style="list-style-type: none">_sets parameters of lot orientation through arterial and connector road layout._provision of a utilities plan and energy statement. <p><u>Sustainable Transport</u></p> <ul style="list-style-type: none">_sets out the hierarchy of road network and its proposed capacity._dictates any fixed public transport services and preliminary bus networks._sets the location of activity centres and refines their size as well as the high and medium density nodes around them._sets the location of key community infrastructure such as schools._sets the active transport links.	<p><u>Overall</u></p> <p>The vision set by each PSP should represent a refinement and more detailed vision translated from the Framework Plans as well as any site specific vision (for example the treatment of the quarry area) or a different development type. The high level targets and principles are translated into meaningful requirements and objectives for the PSP area.</p> <p>Articulate recommendations on sustainability information requirements and / or standards to be governed by subsequent stages; application of zones and overlays (including exploration of a DDO incentivising high performance outcomes across all development types), subdivision planning, design guidelines and Sustainable Design Assessment in the Planning Process.</p> <p><u>Zero Carbon</u></p> <ul style="list-style-type: none">_the NWGGA should challenge the current scope of the energy statement - which is currently 'very light on', by undertaking a review of detailed precinct and site specific energy opportunities linked to strong partnerships with Powercor._key individual lot requirements set for Design Guidelines stage, consistent with Framework Plan targets. <p><u>Sustainable Transport</u></p> <ul style="list-style-type: none">_the road hierarchy, network and urban form to take stock of future trends in autonomous and electric vehicles._the urban structure to respond to the regional public transport strategy developed during the Framework Planning stage._the active transport links to be refined and detailed consistent with the regional plan for integrating surface water flows, active transport links and revegetation._Development Contribution Plan (DCP) and other ways of capturing value set to fund key transport infrastructure.

Planning Implementation
2. Precinct Structure Plans (cont.)

DESCRIPTION	RELATIONSHIP TO SUSTAINABILITY	RECOMMENDATIONS FOR NWGGA
	<p><u>Sustainable Water</u> _refines detail of Integrated Water Cycle Management approach. _sets individual lot requirements for water recycling.</p> <p><u>Ecology and Biodiversity</u> _a biodiversity plan (which will include or cross refer to a Native Vegetation Precinct Plan and, if required, a Conservation Management Plan)</p>	<p><u>Sustainable Water</u> Integrates the findings of the regional plan for integrating surface water flows, active transport links and revegetation with the Integrated Water Cycle Management Plan at the PSP level.</p> <p><u>Ecology and Biodiversity</u> _refines detail of the regional plan for integrating surface water flows, active transport links and revegetation. _provide guidance at this scale on measures to reduce Urban Heat Island effect.</p> <p><u>Zero Waste</u> _includes a requirement to develop town centre waste strategies to identify commercial centre waste minimisation and organic waste treatment opportunities.</p> <p><u>Sustainable Materials</u> _requires that Design Guidelines address this principle. _sets principles / guidelines for public realm materials protocol / procurement.</p>

Planning Implementation

3. Subdivision Plan

DESCRIPTION	RELATIONSHIP TO SUSTAINABILITY	RECOMMENDATIONS FOR NWGGA
<p>A plan of subdivision allows an applicant to divide land into two or more new parcels of land that can be disposed of separately.</p> <p>The only new parcels that can be created by a plan of subdivision are lots, roads, reserves or common property.</p> <p>In growth areas this is generally undertaken through a staged subdivision plan.</p>	<p>The subdivision plan dictates the ability of the subdivision to achieve specific outcomes of the PSP's and the staging of development in response to the rollout of key infrastructure.</p> <p>This includes:</p> <ul style="list-style-type: none">_lot orientation._lot size and diversity._capacity of road network to support infrastructure, biodiversity and active transport.	<p>Key for the NWGGA areas is the ability to:</p> <ul style="list-style-type: none">_bring forward low maintenance establishment of parks and waterways ahead of strict subdivision staging_ensure that lot orientation is consistent with passive design principles e.g minimising terrace lots on the south side of roads, superlots to support future applications of apartment developments.

Planning Implementation

4. Design Guidelines

DESCRIPTION	RELATIONSHIP TO SUSTAINABILITY	RECOMMENDATIONS FOR NWGGA
<p>Design Guidelines help establish a common understanding of design principles and standards that apply to a specific area.</p> <p>They are generally supported by a design review process that ensures that the design of buildings and the public realm conform with the guidelines.</p> <p>Guidelines govern a wide variety of building and urban form elements which can and sometimes do include sustainability.</p>	<p>Most land developers use design guidelines already, but traditionally they have related to aesthetic details of a dwelling and lot and not to sustainability outcomes.</p> <p>Many developers now extend these to specific sustainability initiatives such as rainwater tanks, materials and energy efficiency.</p> <p>The specific role of design guidelines relates to built form that <u>does not</u> require a planning permit.</p>	<p>There is a real opportunity to have a process of formal Council endorsement of Design Guidelines which would ensure consistency with targets and objectives of the Framework Plans and PSP's.</p> <p>Developer would be proposed to retain control over the 'look and feel' of the development within the prescribed area through drafting of the 'Design Guidelines'.</p> <p>Council would have an assessment role which encourages use of guidelines to improve environmental standards of development with a focus on no-cost and low-cost opportunities.</p> <p>The Design Guidelines would prescribe elements that contribute to the vision and objectives, for example relating to:</p> <ul style="list-style-type: none">_energy efficiency standards_solar / battery requirements_Urban Heat Island reduction (e.g. landscaping, canopy cover, roof colour, external materials, paving materials and colour)._on-site water recycling_site permeability_biodiversity e.g. planting palette specifying local, indigenous species.

Planning Implementation

5. Sustainable Design Assessment in the Planning Process

DESCRIPTION	RELATIONSHIP TO SUSTAINABILITY	RECOMMENDATIONS FOR NWGGA
<p>The SDAPP (Sustainable Design Assessment in the Planning Process) framework refers to the inclusion of key environmental performance considerations into the planning permit approvals process in order to achieve more sustainable building outcomes for the long-term benefit of the wider community.</p> <p>18 Councils across Victoria use the framework to assess the development applications with support from suggested tools, e.g. Built Environment Sustainability Scorecard (BESS).</p>	<p>This process has traditionally applied to development applications of a reasonable scale, but has recently been adapted with policy support for smaller development (provided it needs a planning permit).</p>	<p>The key opportunity for NWGGA is to ensure this process (or one similar to it) supports the assessment process of built form as part of the general planning permit process.</p>

ONE PLANET LIVING



Health and happiness

Encouraging active, sociable, meaningful lives to promote good health and well being



Equity and local economy

Creating bioregional economies that support equity and diverse local employment and international fair trade



Culture and community

Respecting and reviving local identity and culture; encouraging the involvement of people in shaping their community and creating a new culture of sustainability



Land use and wildlife

Protecting and restoring biodiversity and creating new natural habitats through good land use and integration into the built environment



Sustainable water

Using water efficiently in buildings, farming and manufacturing. Designing to avoid local issues such as flooding, drought and water course pollution



Local and sustainable food

Supporting sustainable and humane farming, promoting access to healthy, low impact, local, seasonal and organic diets and reducing food waste



Sustainable materials

Using sustainable and healthy products, such as those with low embodied energy, sourced locally, made from renewable or waste resources



Sustainable transport

Reducing the need to travel, and encouraging low and zero carbon modes of transport to reduce emissions



Zero waste

Reducing waste, reusing where possible, and ultimately sending zero waste to landfill



Zero carbon

Making buildings energy efficient and delivering all energy with renewable technologies

One Planet Living is an international sustainability initiative based on ten principles which guide sustainable development. These principles form a framework to assist organisations plan for, deliver and communicate sustainable development, addressing key sustainability challenges. It takes a holistic approach to development that focuses on providing a high quality, sustainable built environment as well as infrastructure and services that make it easy and affordable for people to live more sustainable lives.

Projects or organisations can partner in the One Planet Living initiative and apply the Framework to their development. Each partner is required to develop an Action Plan in collaboration with One Planet Living that outlines strategies, actions and targets to achieve One Planet Living. This is then endorsed and made public so everyone can see the commitments made. Partners must also report annually on progress and publish their results, as a method of knowledge sharing and monitoring.

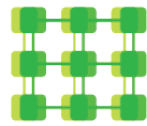
One Planet Living has informed the framework adopted for this Sustainability Opportunities Assessment. It has the potential to continue to be used, or to inform, the subsequent stages of sustainability integration within the planning processes for NWGGA.

It also has the potential to be utilised by individual developments within the NWGGA as an integration, verification and endorsement scheme. This also provides a potentially valuable communication tool to use in marketing.

GREEN STAR COMMUNITIES



Governance



Livability



**Economic
Prosperity**



Environment



Innovation

Green Star is a national voluntary sustainability rating system for buildings and communities developed by the Green Building Council of Australia. The system has been developed to help improve the environmental efficiencies of our building stock, with buildings and precincts required to meet a number of sustainability benchmarks in order to achieve certification.

There are four rating tools available for certification, including Green Star – Communities which focuses on planning, design and construction of large-scale sustainable developments at a precinct-scale. The tool is broken down into five categories and credits;

_Governance

_Livability

_Economic prosperity

_Environment

_Innovation

Projects must demonstrate how they meet each of the criteria thereby earning Green Star points contributing towards certification.

Green Star Communities has the potential to be used as an overarching integration, verification and certification tool for NWGGA.

ENVIRODEVELOPMENT



EnviroDevelopment is an environmental assessment scheme that independently reviews development projects and has been designed to assist potential purchasers to recognise and select more sustainable developments and lifestyles. Certified developments will have been carefully designed to protect the environment and use resources responsibly, whilst offering a range of benefits to homeowners, industry and government. Projects are awarded certification under six categories of sustainability;

_Ecosystems

_Waste

_Energy

_Materials

_Water

_Community

Developments must meet particular technical standards under each element in order to achieve the particular certification. These standards have been determined by a panel of government, industry and environmental experts and reviewed periodically to ensure the criteria remain appropriate in light of new technology, regulation and standard practices. The Technical Standards are specifically tailored to nine different development types.

This tool has the potential to be applied to individual developments within the NWGGA, to assist in verifying sustainability performance outcomes and to provide a marketing tool to assist in sales.

BUILT ENVIRONMENT SUSTAINABILITY SCORECARD



The Built Environment Sustainability Scorecard (BESS) is an assessment tool that has been created to assist builders and developers demonstrate how they meet sustainability information requirements as part of the planning permit process. The tool assesses energy and water efficiency, thermal comfort, waste management, and overall environmental sustainability performance of a new building or alteration.

The tool has been designed to incorporate best practice sustainability initiatives into the design and planning process, and provide a consistent framework in the assessment of sustainability at the planning stage. The interface is flexible in order to apply to a range of development types and sizes.

The BESS is available free of charge to planning permit applicants within subscribed CASBE (Council Alliance for a Sustainable Built Environment) councils. Management and maintenance of the tool is funded by participating local governments through an annual subscription fee.

BESS could be incorporated into the Development Approval process within NWGGA. It is likely to be most relevant to the denser residential and mixed use centres created within the growth areas.

Non-planning Delivery Mechanisms

DELIVERY MECHANISMS	IMPLEMENTATION	INDICATIVE ROLES AND RESPONSIBILITIES
Governance	<p>Collaborative Governance will be critical to the success of the NWGGA in meeting its objectives for sustainability.</p> <p>Functionally a platform to allow all parties responsible for delivering against a shared vision is required. This is critical given the long time frames associated with both growth areas.</p> <p>Whilst the nature of specific initiatives that will benefit from or require ongoing governance arrangements at a precinct or growth area scale are yet to be determined (and will largely be driven by which initiatives are agreed between parties) the need for the platform should be highlighted at this stage.</p>	<p>Council would ideally take the lead role in driving the development of a collaborative governance model, that allows for shared decision-making based on transparent information sharing.</p> <p>If agreed, the terms of reference for such a group would be developed as part of the next stage of planning in association with the Framework Planning stage.</p> <p>Land owners and developers, key agencies e.g. Barwon Water would need to commit to the process and associated outcomes.</p>
Partnerships	<p>The national and international research have borne out the value in developing early, deep partnerships to deliver on the ground results over time.</p> <p>As an extension of the workshop series already undertaken, the opportunity exists to cement these partnerships through the collaborative governance model suggested above, but also through deeper technical partnerships where required to ensure alignment and delivery of highly complex, high cost or multi- benefit initiatives that require the commitment of multiple agencies or stakeholders.</p>	<p>Ongoing dialogue between developers, Councils and Powercor needs to be undertaken to agree in particular carbon initiatives that may lead to reductions in the cost of network infrastructure up front.</p> <p>A university partner with research capacity in the built environment should be sought (initially by Council) to understand the potential for research to be aligned to the delivery of the sustainability vision for the site.</p> <p>Ongoing partnerships between Barwon Water, active transport and open space representatives from Council and the key landowners will be highly beneficial to the development of a multi- benefit approach to revegetation of waterways linking with active transport infrastructure regionally.</p> <p>Whilst other partnerships, such as for the development of aligned autonomous and electric vehicle infrastructure will be important, the above are critical.</p>

Non-planning Delivery Mechanisms

DELIVERY MECHANISMS	IMPLEMENTATION	INDICATIVE ROLES AND RESPONSIBILITIES
<p>Advocacy</p>	<p>In order to deliver the sustainability vision for NWGGA over time, the role of advocacy ie engaging others to commit funds and other sorts of support will be critical.</p> <p>This is especially important for transport where a co-contribution for planning and infrastructure beyond what can be redeemed through a development contributions plan may be required.</p> <p>Many of these strategic initiatives will be ‘long term plays’ so a strong, consistent case, potentially in partnership with other stakeholders will be required to gain strategic investment in key initiatives with long-term benefits.</p>	<p>Council should consider leading a push for an update to the Integrated Comprehensive Transport Plan for the Geelong region to take into account the NWGGA in a more comprehensive way. This would act as a precursor for state and potentially national funding into transport infrastructure.</p> <p>The second key advocacy opportunity is the securing of a major employment cluster (preferably based on education, health or similar) to drive jobs near to new residential areas. This is a potential win for all parties in being able to support the marketing of residential development but alignment between Council, land owners and DEDJTR will be critical.</p> <p>The third key avenue is to further the partnership with the distribution network to develop an understanding of how ‘the grid’ could be developed in a way that can reduce up front investment with flow through benefit for new residents and businesses.</p>
<p>Leadership and demonstration</p>	<p>Visionary leadership and practical demonstration of what’s possible will be important in breaking down barriers which are implicitly linked to ‘first movers’. Council should develop a concise Sustainability Action Plan for the growth areas, creating a pathway to lead implementation.</p> <p>The approach taken through the research and analysis was driven by a need to provide confidence to stakeholders. The case study analysis of local and international examples has provided tangible ‘go to’ examples that can help navigate constraints that could arise during implementation.</p> <p>With this in mind, leadership and demonstration locally will be important in establishing awareness in purchasers, climate resilience at the growth area scale and integration between ‘disciplines’.</p>	<p>Council is in a unique position to act as leader and facilitator in realising the opportunities for NWGGA to achieve world-leading sustainability outcomes.</p> <p>All stakeholders will be required to show leadership in their respective responsibility areas, with the framework planning stage the opportunity to coordinate areas of particular importance for demonstration and leadership.</p> <p>One example is the potential for bringing forward establishment of landscaping along waterways and in park reserves ahead of their usual staging. This would be an opportunity led by landowners and Council with input from Barwon Water.</p>

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Education	<p>The need for up front investment in educate to create an aware purchaser is critical for commercial drivers for sustainability to succeed. Early engagement with land owners has established that their development model will be responsive to the needs of purchasers.</p> <p>The ability to ‘sell’ some of the sustainability measures direct to the future community is therefore crucial. The knowledge of those charged with the responsibility for rolling out the infrastructure may also need to be enhanced to ensure follow through on commitments made through the process.</p>	<p>Developers have a key role in ensuring that sustainability is front and centre in communications, but a role which also drives the delivery of sustainability initiatives would be useful in integrating sales with the benefit of sustainable design and operation.</p> <p>A Sustainability Integrator role to act as key advocate and delivery agent to ensure effective integration of principles into all stages of development is proposed, with a funding mechanism to be determined by the subsequent planning stage.</p> <p>This would include the creation of a program of market education early on, to ensure the value proposition presented by the sustainable development pathway is communicated to prospective purchasers, builders, businesses and banks.</p>
Value Capture	<p>Aggregating the value delivered by investment in key infrastructure such as large transport nodes offers a mechanism to delivering infrastructure earlier and seeing the feedback loop between density and transport provision in particular flourish</p> <p>Whilst the mechanism is ultimately flexible, international and increasingly local examples are being developed where the value of private investment in infrastructure can be aggregated into major projects, for example utilising local land tax capture.</p>	<p>The framework planning stage offers the platform to start this conversation, however strong aligned positions between parties regarding areas of density, location of employment areas and transport infrastructure will need to be developed so the value can be captured and aggregated to mutual benefit. The partnerships and governance frameworks proposed provide support for this dialogue to occur.</p>

Next Steps

The NWGGA present a unique opportunity to learn from and build on the practices and achievements of sustainability integration within Geelong's existing major growth areas such as Armstrong Creek. The long term nature of NWGGA provides a unique opportunity to future proof communities and work consistently towards the creation of genuinely sustainable, healthy and liveable environments.

This report presents a summary of opportunities across six principles of sustainability, with a focus on the immediate next steps that will enable these opportunities to be integrated into the Framework Plans. It aims to support and catalyse the consideration of sustainability at the core and forefront of the planning process for the two growth areas.

The critical next stage will involve the effective integration/embedding of these the principles within the Framework Planning process to ensure a strong sustainability framework is established to inform, guide and drive future planning phases.

The role of the 'next steps' outlined within this Opportunity Assessment build on the ambition set out in the G21 Regional Growth Plan Implementation Plan to create more viable liveable and connected urban environments.

Realisation of this ambition requires commitment and collaboration. Next steps will require action by the City, key stakeholders, landowners/developers and the community to truly embed the vision of sustainable living.

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LIVING WALL (IMAGE: PETER STEELE)

Glossary of terms

TERM	DEFINITION
BRT	Bus Rapid Transit
BSWRRRG	Barwon South West Waste and Resource Recovery Group
CASBE	Council Alliance for the Sustainable Built Environment
CoGG	City of Greater Geelong
DEDJTR	Department of Economic Development, Jobs, Transport and Resources.
ESD	Environmentally Sustainable Design
EV	Electric Vehicle
GHG	Greenhouse Gas (e.g. Carbon Dioxide)
GtCO2	Giga-tonnes of carbon dioxide equivalent greenhouse gases
IWCM	Integrated Water Cycle Management
MEFL	Moreland Energy Foundation Limited
NatHERS	National Home Energy Rating System - thermal performance rating out of 10 for new dwellings of all types
NWGGA	Northern and Western Geelong Growth Areas
PV	Photovoltaic (solar electricity technology)
VOC	Volatile Organic Compound
WSUD	Water Sensitive Urban Design
Zero Net Energy	A system that generates as much energy as it requires across a given period (generally annually).

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