Carseldine Village

Overall Development Strategy for Sustainability

Economic Development Queensland

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Executive Summary

Purpose

The Overall Development Strategy for Sustainability for the Carseldine Village (CV) Project has been prepared to present the project sustainability strategies that have been implemented or are planned to be implemented throughout the project. This strategy provides assurance that the required outcomes for the development approval are met (or will be met upon completion), as well as captures performance against industry best practice guidelines.

The CV Project is being developed by Economic Development Queensland as a showcase of sustainability outcomes for land development in Queensland, and to ensure these outcomes are met, the development approval for the project have embedded sustainability outcomes. Beyond the development approval requirements, performance against best practice approaches in sustainability is a key metric for the project that defines overall sustainability performance. CV has implemented strategies that are not development approval requirements and provide tangible benefits to the Project and the surrounding community.

Defining Best Practice Sustainability

The Strategy reviews four leading best practice sustainability frameworks to define the key areas of sustainability that CV should seek to attain. The frameworks reviewed were Green Star Communities, EnviroDevelopment, the Living Community Challenge and One Planet Living.

The review defined the categories of sustainability, and the best practice outcomes to be targeted for the project:

- Economic Prosperity and Equity
- Energy
- Materials
- Water
- Community and Health & Happiness
- Land and nature
- Travel and transport

CV sustainability strategies were compared to the defined best practice outcomes, as well as the Development Approval requirements to identify performance. Where possible milestone timings have been included for each strategy to allow performance tracking in the future.

Outcomes

Based on the strategies implemented for the project, Carseldine Village meets and exceeds the requirements outlined in the Development Approval in relation to sustainability outcomes and water sensitive urban design. Further to the Development Approval requirements, the project performed well in comparison to best practice guidelines, with the project implementing strategies that aligned with the defined category outcomes. There were some key items identified that could be implemented to further embed sustainability outcomes for the project:

- The Stormwater Harvesting Scheme should be explored for implementation to further reduce potable water demand for the open space areas within the CV Project.
- There is an opportunity to develop engagement strategies to encourage new community members to participate in sporting clubs, bushland preservation and rehabilitation efforts and other community developing groups.
- Further opportunities for land and nature outcomes can be found through enhancing the existing bushland space, through encouraging community projects to continue to assist with rehabilitation of the Cabbage Tree Creek Bushland corridor.

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1.0 Introduction

1.1 Background

Carseldine Village (CV) is a mixed-use site located within the larger Fitzgibbon Priority Development Area (PDA), which is situated in Carseldine, Queensland. CV is Precinct One in the Fitzgibbon PDA, included within this area will be residential areas, an aged care facility, a childcare facility, a retail precinct, a sporting precinct, and conservation areas. Figure shows the full Fitzgibbon PDA and Figure shows the CV Project layout plan.

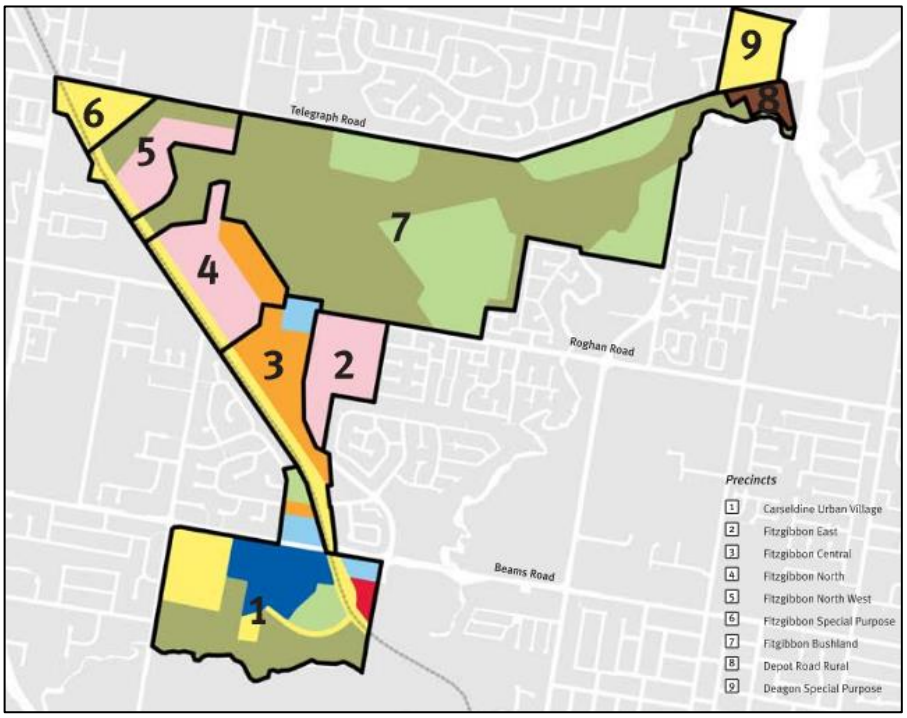


Figure 1: Map of Fitzgibbon development courtesy of Fitzgibbon Proposed Development Scheme

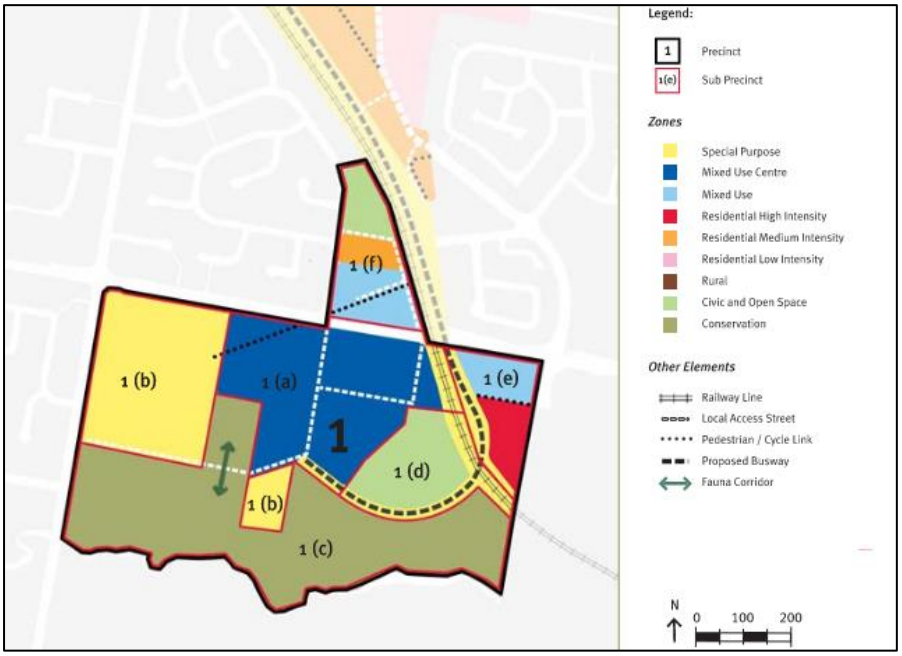


Figure 2: Map of Carseldine Village development courtesy of Fitzgibbon Proposed Development Scheme

The CV project seeks to provide affordable, sustainable homes for residents with a strong emphasis on community values. The CV community by design is established to help residents live an active and low environmental impact lifestyle, including:

- A location adjacent to 17 hectares of retained bushland, including walking tracks;
- Wide, walkable streets with trees for shade plus efficient LED street lighting;
- A mixture of sporting fields and amenities at The Green;
- All homes to be located within approximately 400 metres of parks and public transport;
- Affordable, 100% net zero energy emission terrace homes with flexible floor plans to accommodate every age and stage of living as well as supporting a variety of working-from-home scenarios;
- The community's own Village centre providing retail and dining precinct that will support and encourage new business and community activities; and
- Aged care and childcare facilities.

1.2 Purpose

The purpose of the Overall Development Strategy for Sustainability is to present sustainability strategies that have been implemented or are underway in the CV project that demonstrate:

- Best practice water sensitive urban design (WSUD) and integrated water cycle management (IWCM) throughout the entire project and in accordance with the Development Scheme.
- Detail the delivery of an Overall Site Strategy (OSS) for sustainability and innovation at CV as intended by the overarching CV Masterplan approval.
- Identify milestone date(s) for delivery and implementation of the sustainability strategies for CV.
- Validate that the proposed and existing measures are appropriate, and where relevant, exceed sustainability outcomes on a site wide basis.

2.0 Development Approval Requirements

The CV Project has embedded development approval requirements to ensure sustainability outcomes are integrated into the project across all stages. A summary of the relevant conditions of approval are outlined below. The full Conditions of Approval are provided in Appendix A.

Stage 2

- Condition 23 – Innovative Design and Materials

  To comply with this condition; supporting technical evidence, costing and maintenance requirements, and development integration information must be provided.

- Condition 29 – Sustainability

  To comply with this condition new individual buildings are required to achieve a 5 Star design rating under the applicable Green Building Council of Australia Green Star rating tool, or another recognised equivalent. Also, non-potable water demand is required to achieve a 50% reduction across the development as well as a provided development-wide water plan that addresses non-potable water demand, water reuse, and stormwater quality management.

  Evidence of compliance with the above must be submitted during development design and at As Built to verify assets were constructed as designed.

Stage 3A

- Condition 22 – Innovative Design and Materials (Public Infrastructure)

  Prior to streetscape or road construction it is required that all Water and Material Management Plans and designs are submitted. Water Management Plans must demonstrate Integrated Water Cycle Management and Water Sensitive Urban Design has been incorporated within the stage development. Material Management Plans and designs submitted must demonstrate the use of innovative and efficient use of materials and minimises impacts on climate All proposals are to integrate with the development such that the implementation does not compromise the ability to satisfy conditions of this PDA development approval and other relevant approvals or standards, unless agreed by EDQ or other relevant authority.

  Prior to survey plan endorsement it is required that supporting technical evidence and costing and maintenance requirements is provided for all non-standard designs. All works are to be carried out in accordance with civil infrastructure and streetscape plans and all As Built plans are to be submitted to EDQ Development Assessment.

Stage 4A

- Condition 21 **–** Innovative Design and Materials (Public Infrastructure)

  Prior to streetscape or road construction it is required that all Material Management plans and designs are submitted, demonstrating the use of innovative and efficient use of materials and minimises impacts on climate. All proposals are to integrate with the development such that the implementation does not compromise the ability to satisfy conditions of this PDA development approval and other relevant approvals or standards, unless agreed by EDQ or other relevant authority.

Prior to survey plan endorsement it is required that supporting technical evidence and costing and maintenance requirements is provided for all non-standard designs. All works are to be carried out in accordance with civil infrastructure and streetscape plans and all As Built plans are to be submitted to EDQ Development Assessment.

3.0 Defining Best Practice Sustainability

With best practice sustainability being a key component of the consent conditions, without definition, it is critical to define what is considered best practice. A review of the four leading development sustainability certification tools has been conducted to define best practice, namely:

- Green Star Communities (Australian-based community-scale rating tool)
- EnviroDevelopment (Australian-based development-scale rating tool)
- Living Community Challenge (North American community-scale rating tool)
- One Planet Living (British community-scale rating tool)

It is noted that these tools range in complexity and focus, the objective will be to ensure that each of the core themes are covered under best practice, with the most common themes given a higher weighting.

For each component of the certification tools, the key drivers that underpin the best practice outcomes have been extracted as a way of measuring the outcomes for the Carseldine Village project and demonstrating an Overall Site Strategy for sustainability and innovation. These are discussed in sections 4.0 to 10.0 and specific outcomes for the project are outlined to allow appropriate comparison.

3.1 Green Star Communities

Green Star Communities is a rating tool that is used for the evaluation of the sustainability attributes of the planning, design, and construction of large-scale development projects, at a precinct, neighbourhood, and/or community scale. Green Star Communities is intended to assist parties aiming to deliver large-scale sustainable developments around Australia to:

- Provide diverse, affordable, inclusive, well connected, and healthy places to live, work and play;
- Protect, maintain, and restore the natural environment by reducing the ecological footprint of developments;
- Receive recognition for demonstrated leadership and commitment to sustainability;
- Achieve real value for money through demonstrated whole-of-life cost savings; and
- Encourage opportunities for business diversity, efficiency, innovation, and economic development

Green Star Communities is measured using five categories: Governance, Liveability, Economic prosperity, Environment, and Innovation as seen below.

Rating Scale	Purpose / intent
Governance	Aims to encourage and recognise developers and projects that demonstrate leadership within the sector, by establishing and maintaining strong governance practices. The category promotes engagement, transparency, as well as community and industry capacity building. It also seeks to ensure that community projects are resilient to a changing climate.
Liveability	Aims to encourage and recognise developments that deliver safe, accessible, and culturally rich communities. The category encourages the development of healthy and active lifestyles, and rewards communities that have a high level of amenity, activity, and inclusiveness.
Economic Prosperity	Aims to encourage and recognise projects that promote prosperity and productivity. The category encourages affordable living and housing, investment in education and skills development, and community capacity building. This category also promotes greater productivity through emerging opportunities in the digital economy.
Environment	Aims to reduce the impact of urban development on ecosystems. It encourages resource management and efficiency by promoting infrastructure, transport, and buildings, with reduced ecological footprints. The Environment category seeks to reduce the impacts of projects on land, water, and the atmosphere.
Innovation	Aims to recognise the implementation of innovative practices, processes and strategies that promote sustainability in the built environment.

It is important to note that the Carseldine Village Project has achieved a 5-Star Green Star Communities Rating in April 2021.

3.2 Enviro Development

EnviroDevelopment is an industry-led national rating tool which provides independent verification of a project's sustainability performance. The EnviroDevelopment rating system was developed as an initiative by the Urban Development Institute of Australia (UDIA) with the driving intention of establishing the delivery of more sustainable communities and spaces. The incentives of getting a project certified by EnviroDevelopment include satisfying consumer and tenant demand, gaining third party verification, access to an effective communication tool, ability to measure a projects sustainability performance, attracting a premium to projects, and ensuring the needed flexibility for innovation.

The EnviroDevelopment is underpinned by the National Technical Standards which sets out the criteria for assessment and supporting documentation requirements. The program is divided into key elements to which all elements are required to be demonstrated through specific project initiatives. There are six key elements, including: ecosystems, waste, energy, materials, water, and community. Further information for each element is provided below.

ECOSYSTEMS **WASTE** **ENERGY** **MATERIALS** **WATER** **COMMUNITY**

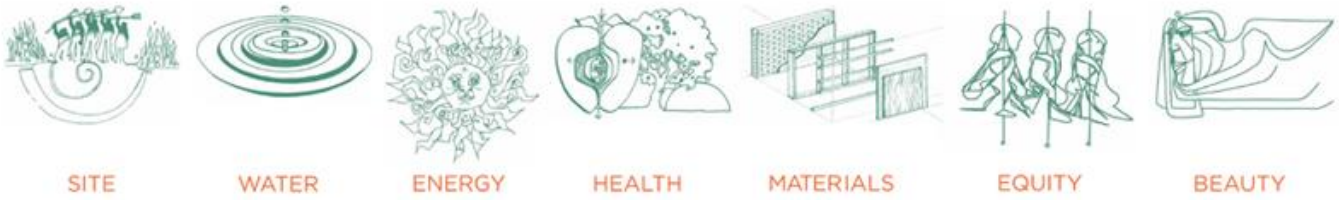
Rating Scale	Purpose / intent
Ecosystems	Aims to encourage resilient natural ecological communities and protect natural connectivity, facilitate protection and rehabilitation of riparian vegetation and wetlands, protect existing habitats for native animals or the rehabilitation of habitats where they are no longer in existence or in a healthy state, and avoid water pollution and degradation of water quality in waterways and natural systems.
Waste	Aims to encourage recycling of construction and demolition materials and reduce waste to landfill through initiatives such as minimising on-site pollution during construction, promoting the re-use of existing structures and materials, and by promoting occupancy awareness.
Energy	Aims incorporate climate responsive design by encouraging the use of alternative energy sources, energy efficient appliances, lighting, and HVAC systems and by promoting the use and implementation of demand and behavioural management devices and programs.
Materials	Aims to encourage projects to utilise environmentally responsible materials and construction methods to lower environmental impacts of material usage by incorporating the use of civil work and landscaping materials from environmentally responsible sources and improving indoor air quality through the choice of materials and finishes.
Water	Aims to encourage a reduction potable water use across the project beyond current regulatory measures by promoting the use of alternative water sources, water efficient appliances, fixtures and fittings, and water efficient landscaping in private outdoor spaces and encouraging alternative water sources or the use of drought tolerant species to meet irrigation demand for common areas of the project.
Community	Aims to encourage healthy and active lifestyles, community spirit, local facilities, alternative transport modes, and accessible and flexible design that welcomes a diversity of people and adapts to their changing needs.

It is important to note that Carseldine Village has achieved a six-leaf rating with the EnviroDevelopment rating tool.

3.3 Living Community Challenge

The Cascadia Green Building Council developed the Living Building Challenge (LBC) in 2006, and it has become an international sustainable building standard. The certification system is currently administered by the International Living Future Institute (ILFI). In Australia, there is a representative chapter of this organisation, Living Future Institute of Australia (LFIA).

The purpose of the Living Community Challenge (LCC) is to extend the values established by the LBC from the individual project site to encompass entire communities. The primary aim of LCC is to narrow the gap between current limitations on sustainable development and ideal solutions. The LCC seeks to do for neighbourhoods, towns, and cities what the LBC has done for individual structures.



Rating Scale	Purpose / intent
Place	Aims to clearly articulate in a community where it is acceptable for people to build and how to protect and restore a place once it has been developed, and to encourage the creation of Communities that are once again based on the pedestrian rather than the automobile.
Water	Aims to realign how people use water and to redefine “waste” in the built environment, so that water is respected as a precious resource.
Energy	Aims to transition communities to rely solely on renewable forms of energy and operates year-round in a pollution-free manner. In addition, it aims to prioritize reductions and optimization to reduce use of energy, resources, and cost.
Health & Happiness	Aims to create nourishing, highly productive and healthy environments incorporated into indoor and outdoor spaces throughout the Community through engagement inhabitants and owners of the community.
Materials	Aims to only use materials that are non-toxic, transparent, and socially equitable within the community.
Equity	Aims to correlate the impacts of design and development to their ability to foster a true sense of community by ensuring developments allow equitable access for all people regardless of physical abilities, age, or socioeconomic status.
Beauty	Aims to create communities that elevate people’s spirits through the meaningful integration of public art and design features.

3.4 One Planet Living

Bioregional, in collaboration with the WWF, created the One Planet Living sustainability framework – comprising ten simple principles and detailed goals and guidance – to target living with the resources of one planet. The One Planet Living framework is designed to create a 'One Planet Action Plan' that acts as a route map towards a more sustainable future for projects and organisations. It comprises ten simple principles that cover all aspects of social, environmental, and economic sustainability.

Rating Scale	Purpose
Health and happiness	Aims to increase or support high levels of happiness and wellbeing as well as the physical, social, mental, and emotional health of the community.
Equity and local economy	Aims to promote diversity and equality of opportunity across all abilities, gender, race, age, and sexual orientation, to create a vibrant and resilient economy where a significant proportion of money is spent locally, and to promote international trade that is conducted fairly and without exploitation.
Culture and community	Aims to foster a sense of place and belonging by encouraging active citizenship, enhancing local culture, heritage, and sense of place, and by nurturing a new culture of sustainability.
Land and nature	Aims to ensure a positive contribution to local biodiversity by maximising carbon sequestration in the soil and biomass, maximising the synergies between agriculture, forestry, biodiversity, and carbon storage, enhancing 'ecosystem serrvices'.
Sustainable water	Aims for everyone to have access to clean drinking water by using water efficiently and return it clean to the environment and by contributing to sustainable water management and food risk mitigation.
Local and sustainable food	Aims to make it easy and attractive for people to enjoy fresh, local, seasonal, healthy produce by promoting diets high in vegetable protein, sustainable farming which supports biodiversity and builds soil, humane farming, and by reducing or eliminating food waste.
Travel and transport	Aims to reduce car dependence and the need for daily travel by making it easy and attractive for people to walk and cycle, promoting car-sharing (including car clubs), public transport, and low/zero-carbon vehicles including electric cars, as well as raising awareness of the impacts of air travel.
Materials and products	Aims to promote sustainable living by making it easy to share and reduce consumption of natural materials, to carefully consider every material and product and select them for their positive social and environmental benefit or for reducing negative impact, and to promote nontoxic products.
Zero waste	Reduce wasteful consumption, maximise upcycling, reuse, and recycling, and for zero waste to landfall
Zero carbon energy	Ensure buildings are energy efficient compared to a stated local or national benchmark or a recognised standard and that 100% of energy consumed is supplied by non-polluting renewable energy.

3.5

3.6 Summary of Strategy

A comparison exercise has been conducted of the leading community-level green rating tools to develop a best-practice sustainability metric. Each of the strategies has been screened for inclusion in the suitable rating tools. This screening process will identify the most inclusive best practice guidance for sustainability initiatives at a community development level. Sustainable development requirements that are present in greater than two green rating tools will be used as a benchmark best practice to assess the overall sustainability strategy of Carseldine Village. The below highlighted Sustainable Development Requirements have been identified as key components of the compared community-level green rating tools.

Sustainable Development Requirement	Green Star Communities	Enviro Development	Living Communities Challenge	One Planet Living
Economic Prosperity and Equity	✓		✓	✓
Waste*		✓		✓
Energy		✓	✓	✓
Materials		✓	✓	✓
Water	✓	✓	✓	✓
Community	✓	✓	✓	✓
Health & Happiness	✓		✓	✓
Land and nature	✓	✓		✓
Local and sustainable food *				✓
Travel and transport	✓	✓		✓

**Not included in the Overall Development Sustainability Strategy*

4.0 Economic Prosperity and Equity Strategies

4.1 Best Practice Outcomes

To meet economic prosperity and equity, a range of strategies can be used to leverage the best outcome for a project. This includes strong governance processes, community and industry capacity building, affordable housing and living, investment into learning and skills development, designing for equitable access, digital economy development, promoting equal opportunities, local economy resilience and community engagement.

Best practice in this area can be measured by achieving several outcomes from this list.

4.2 Carseldine Village Economic Prosperity and Equity Strategies

Carseldine Village has been designed to develop a central district that provides for job creation, and a mix of affordable housing options for the community. To demonstrate best practice, CV have implemented or plan to implement the following strategies:

- Job creation – with a small commercial district within the project, and proximity to nearby job hubs (Chermside), CV provides employment opportunities for residents and nearby communities during the development and operation of the project. **Milestone Date (targeted): mid-2024.**
- The central district – an urban heart to the Village, with retail, hospitality and farmers markets providing opportunity for residents to shop and invest in local businesses. **Milestone Date (targeted): mid-2024.**
- NBN-connected and homes designed to allow working from home – each house has a flexible floor plan to allow a range of uses when it comes to home offices. **Milestone Date: Completed.**
- Community and industry capacity build – by providing an example of a master planned community that integrates sustainability into its design, Carseldine Village helps build capacity into the development industry, as well as demonstrate to the wider community how they can modify their living spaces to have more sustainable outcomes. **Milestone Date: ongoing.**
- Affordable housing – the project provides a housing mix for a range of entry-levels for housing affordability, as well as designing homes that consume less resources and have reduced ongoing costs. **Milestone Date: Completed.**

4.3 Summary

These strategies have been implemented to showcase how best practice economic prosperity and equity can be integrated into a development, the CV Project meets best practice outcomes with reference to the leading sustainability tools. Outcomes from these strategies will not be realised until the whole project is complete and operational, but the strategies and intention of the project exceed best practice expectations.

5.0 Energy Strategies

5.1 Best Practice Outcomes

To meet best practice for energy use and creation, CV should seek to incorporate climate responsive design through alternative energy sources, energy efficient fittings and appliances, demand management, behavioural programs, and transitioning to non-polluting renewable energy.

The primary focus is to reduce the overall energy consumption of the built environment as well as incorporation of renewable energies and electrification in projects. Reducing a buildings overall energy consumption can see benefit of conserving energy, lowering the overall ecological footprint of a development, a reduction in polluting, reduction of strain on resources, and significantly lowering cost of powering a building.

5.2 Carseldine Village Energy Strategies

Carseldine Village has implemented the following strategies to reduce energy demand and generate renewable energy:

- All homes built in Carseldine Village will be net zero in energy use, incorporating a range of systems that reduce demand and generate/store renewable energy. This is a Queensland first, with CV providing an example for future projects to follow. Each home will have energy-efficient hot water systems and air conditioning systems that are designed to maximise solar energy use to cool the home. **Milestone Date (targeted): Final house build, TBC.**
- The surrounding parkland facility (The Green) has been designed to reduce energy consumption through improved LED lighting and booking management that ensures the lighting is only used when the facilities are in use. **Milestone Date: Complete.**
- Homes are built with provision of electric vehicle charging stations, this will ensure each house can charge electric vehicles, should the residents upgrade away from internal combustion engine vehicles in the future. **Milestone Date (targeted): Final house build, TBC.**
- Further to the generation of renewable energy, the homes built in CV will be smart solar homes, creating a local virtual power plant to feed excess energy into the local grid for use (and generating an income for the resident).
- As part of the Green Star Communities Credit 25 Submission, CV met requirements to receive points for energy efficient lighting infrastructure (LEDs used across the project), and renewable energy production (resulting in a 21% reduction on baseline on greenhouse gas emissions). Refer to Document 25, Greenhouse Gas Strategy, in Appendix B for more detail. **Milestone Date: Complete.**
- As part of the Green Star Communities Credit 23 Submission, CV met requirements to receive points for reducing peak electricity demand by 29% (through the installation of battery storages for homes). Refer to Document 28, Peak Energy Reduction, in Appendix B for more detail. **Milestone Date: Complete.**
- All residential buildings in CV are required to meet a 7-star NatHERS (Nationwide House Energy Rating Scheme), which demonstrates a leading energy performance outcome for the residential buildings. **Milestone Date: Complete.**

5.3 Summary

In summary, Carseldine Village exceeds best practice requirements for energy, with the project meeting net-zero for residential buildings, an incorporation of future proofing the residences for EV charging and the ability for the community to provide energy to their neighbouring communities. With the sustainability outcomes related to energy in place, this contributes to the project meeting Condition 29 of DEV2020/1118 for Stage 2 of the project.

6.0 Materials Strategies

6.1 Best Practice Outcomes

Material outcomes that are best practice is defined by construction material choices that lower environmental impacts. The leading tools define lower environmental impact materials as those that are non-toxic, consume fewer natural resources, are socially equitable and improve indoor air quality.

Sustainability in materials aims to reduce the overall carbon used in materials as well as a reduction in harmful substances used in the process of created materials. Material sustainability also pertains to where and how materials are sourced ensure the least lasting impact is left on the environment. The overarching goal of materials is to reduce the human health hazard experienced by building user.

6.2 Carseldine Village Materials Strategies

To meet best practice outcomes, Carseldine Village residential buildings are required to meet Green Star Communities guidelines, these are detailed in Document 20, Stage 2 Design Guidelines, in Appendix B:

- Materials must be environmentally sustainable. These can be made up from a combination of reused resources, recycled resources, low lifecycle energy materials, non-toxic materials, and other environmentally responsible materials. **Milestone Date (targeted): Ongoing during residential builds.**
- Other required material guidelines include:
  - use of low emission floor coverings on all indoor covered floors
  - low emissions low-VOC and no-VOC paint is required on a minimum of 95 per cent of all internal surfaces
  - all engineered wood products (including exposed and concealed applications) are rated EO formaldehyde
  - local manufacturers and suppliers are to be considered and/or used
  - sealant for all internal door frames is required.
  - **Milestone Date (targeted): Ongoing during residential builds.**
- Carseldine Village is committed to reducing the effects of the urban heat island effect by ensuring all roofs have a solar absorptance of less than 0.5. **Milestone Date: Complete.**
- Non-residential buildings are expected to achieve Green Star Design and As-Built Ratings. Carseldine Child Care Centre and the Rockpool Carseldine Aged Care Home, have both targeting 5-Star Green Star Design and As-Built Ratings, with material selections considering the material guidelines noted above. **Milestone Date: Complete and ongoing for new non-residential buildings.**

6.3 Summary

Through requiring the use of building materials that are sustainable, Carseldine Village exceeds best practice and business as usual, with all residential buildings required to meet the Green Star Communities requirements. Further to this, major non-residential buildings have earnt best practice Green Star Design Ratings.

7.0 Water Strategies

7.1 Best Practice Outcomes

The overarching themes of water use and water quality management, taken from the best practice guides noted in Section 3, focus on the overall reduction in potable water usage (through alternative water sources, efficient appliances, and fittings) and ensuring stormwater is managed to minimise the impacts to the receiving waters (through best practice water sensitive urban design).

Added to these themes are best practice guidelines and examples that help define how CV performs against the requirements in the development approval. When it comes to best practice in the region for water use and water sensitive urban design there is limited industry-level best practice information available, the following policies, guidelines, and codes provides a benchmark for CV's performance regarding water use and stormwater quality from the project site:

- Queensland State Planning Policy
    - Urban stormwater – best practice environmental management guidelines 2009
- Chapter 7 (Stormwater Drainage) of the infrastructure design planning scheme policy of the BCC City Plan 2014
    - This policy outlines the stormwater management requirements for planning, design, and implementation of property drainage.
- Water by Design
    - A Business Case for Best Practice Urban Stormwater Management: Case Studies
    - WaterWise Street Trees
    - Integrated Water Planning

7.2 Carseldine Village Water Strategies

CV has developed the following plans which assist in the project meeting and exceeding the Conditions of Development Approval:

- Stormwater Quality Management Plan:
    - The SWQMP for CV (see Document 59, Approved SWQMP in Appendix B) details the implementation of the plan meets and exceeds the water quality objectives as defined in the Urban Stormwater – Best Practice Environmental Management Guidelines 2009. Modelling demonstrates a reduction in TSS of 80% (target 80%), TP of 70.7% (target 60%) and TN of 46.4% (target 45%). Peak water flows post the project demonstrate a negligible increase in flows attributed to runoff from the project. **Milestone Date (targeted): ongoing as project is developed.**
- Water Sensitive Urban Design and Integrated Water Cycle Management:
    - With Carseldine Village designed as a staged project, the capture and management of water runoff from the project site has been proposed to be undertaken with a whole of project approach. This is demonstrated in the Carseldine Village Guiding Principles document, which shows the management of runoff through a range of strategies, including passively irrigated trees in all stages except Stage 2 of the project precinct and bioretention basins to manage the runoff. The treatment zones as outlined in the Stormwater Management Plan show that Bioretention Basis B1 treats discharge from development stages 2 and 3, whilst Bioretention Basin B2 treats discharge from Stages 1, 3, 4 and 5. The modelling outlined for the Stormwater Quality Management Plan shows these measures meet outcomes regarding impacts to water quality of receiving waters and increases in overland flows. **Milestone Date (targeted): ongoing as project is developed.**

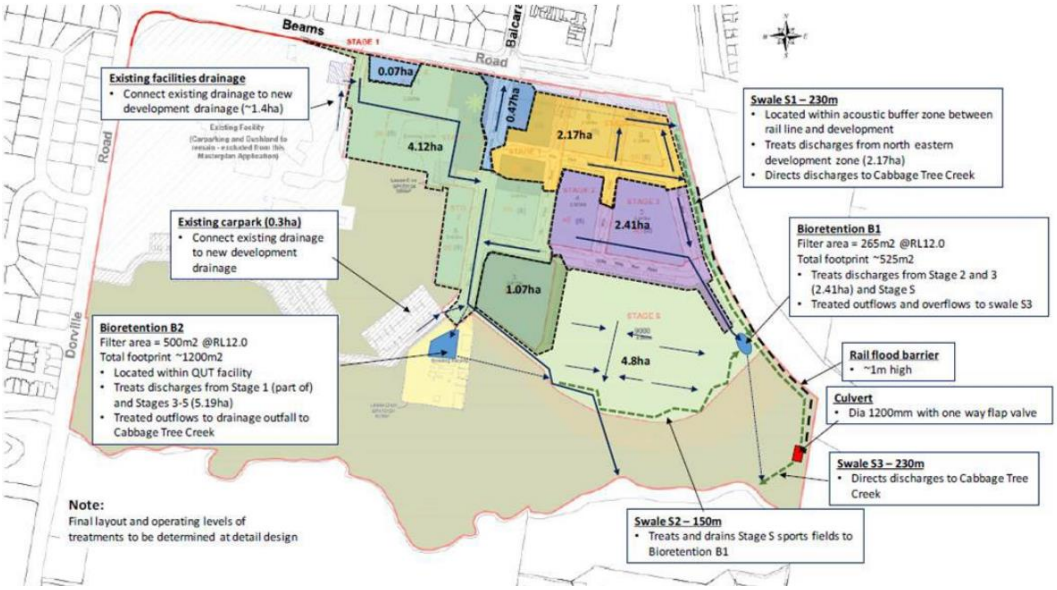


Figure 3: Stormwater Management Strategy Carseldine Urban Village

- Building Water Use
  - Residential buildings within CV are required to have shower heads/taps that are minimum three-star WELS rated, dual flush toilets rated to four-star WELS and dishwashers that consume less than 14L per use (see Stage 2 Design Guidelines, Document Number 20 in Appendix B). These requirements are standard in all new build homes within Queensland, requirements to install low-water dishwashers is not mandatory and is a demonstration of best practice. **Milestone Date: complete.**
- Smart Irrigation System
  - EDQ has implemented a smart irrigation system to better manage water use for irrigation of the CV sporting fields, this system will reduce water usage through monitoring weather and local evaporation to reflect conditions locally. This will reduce potable water demand, and in time also reduced non-potable water demand if the stormwater harvesting scheme noted below is implemented. The Sustainability, Innovation, and Industry Capacity Development Report (see Document 3 in Appendix B) provides further details on this initiative. **Milestone Date: complete.**
- Proposed Stormwater Harvesting Scheme
  - In July 2020, DesignFlow outlined the opportunities to capture and utilise stormwater runoff from the site to irrigate the sporting facilities. This opportunity has not been pursued further by EDQ due to funding arrangements (noted in Approved Strategy for Water Sensitive Urban Design / Integrated Water Cycle Management, Document 32 in Appendix B) but could be implemented in the future to reduce potable water demand. **Milestone Date (targeted): TBC, pending grant funding for sporting groups.**
- Passively Irrigated Street Trees
  - In stages 3A and 4A passively irrigated street trees have been integrated into the design to reduce the potable irrigation demands of the precinct (See document 51 in Appendix B). The inclusion of passively irrigated street trees can benefit a development by reducing the strain on the stormwater network as well as reducing the requirement of active irrigation and the costs associated (See document 66 in Appendix B). **Milestone Date: complete.**

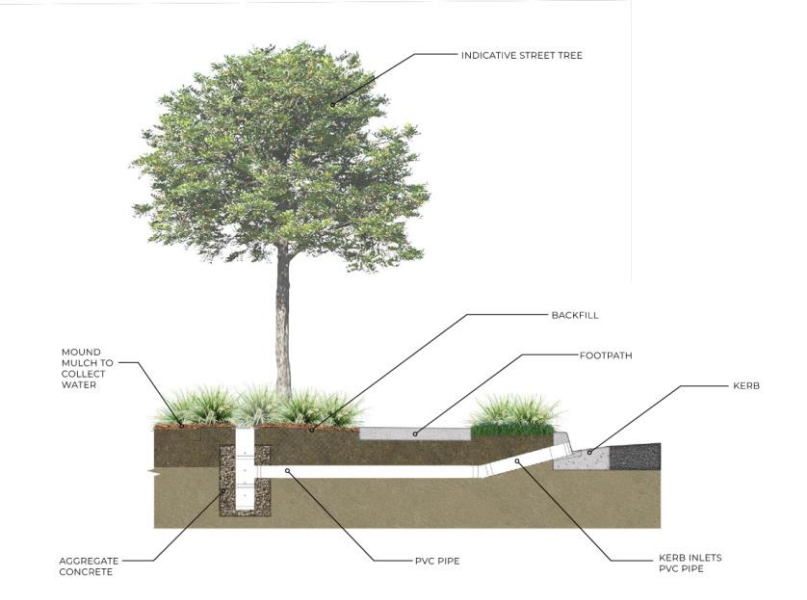


Figure 4: Passively irrigated street tree cross-section

There are opportunities to implement further strategies to further embed sustainability into the CV Project, it is suggested there are explored for future implementation:

- As noted above, the proposed Stormwater Harvesting Scheme should be explored for implementation to further reduce potable water demand for the open space areas within the CV Project.

7.3 Summary

In summary, CV has implemented the requirements to meet non-potable water demand and reuse as per the DA Conditions 23 and 29, as well as delivered best practice outcomes for potable water use and water sensitive urban design across the whole project.

8.0 Community/Health & Happiness Strategies

8.1 Best Practice Outcomes

Best practice outcomes for developing a community and their health and happiness are driven by developments that integrate accessible, alternative transport modes, provide spaces that engage inhabitants to be healthy and productive, install public art and enhance local culture, heritage, and sustainability. The goal is to develop healthy and happy communities. This can be achieved by fostering a sense of place and belonging. This can be achieved through creating nourishing, highly productive and healthy environments for residents.

8.2 Carseldine Village Community/Health & Happiness Strategies

To meet best practice outcomes for community health and happiness, the Carseldine Village project has embedded the following design features:

- Implementation of active transport (discussed further in Section 10.0). Refer to the Active Transport Strategy, Document 23 in Appendix B).
- Provision of outdoor spaces is available to all residents including The Green sporting precinct and 18 hectares of bushland with integrated walking trails.
- Access to local sporting clubs to sustain healthy development of community members.
- A residential aged care facility (Rockpool Aged Care Carseldine) is located within the project to ensure older members of the community can remain close to their families and familiar areas.
- Carseldine Village has been designed to embrace intergenerational households to enable families to age in place. All residential buildings will be wheelchair accessible, and nearby are specialised aged care facilities for more supportive care options.
- All homes are within 400 metres of parks and public transport.
- The precinct is close to the economic and employment suburb hub of Chermside, keeping employment opportunities local.
- All residential terrace buildings will meet a Silver Level under the Liveable Housing Australia rating, which ensures the homes meet base accessibility requirements.

There are opportunities to implement further strategies to further embed sustainability into the CV Project, it is suggested there are explored for future implementation:

- There is an opportunity to develop engagement strategies to encourage new community members to participate in sporting clubs, bushland preservation and rehabilitation efforts and other community developing groups.

8.3 Summary

Carseldine Village meets and exceeds best practice when it comes to providing the infrastructure to allow the community to develop and maintain health and happiness. This is evidenced through accessibility to transport options, space to encourage healthy activities and allowing intergenerational living arrangements.

9.0 Land and Nature Strategies

9.1 Best Practice Outcomes

Best practice projects that seek to minimise the impact of urban development on ecosystems do so through protecting and rehabilitating existing habitats, avoiding water pollution and degradation of water quality, sequester carbon in the soil and biomass, and by promoting infrastructure and building with reduced footprints.

9.2 Carseldine Village Land and Nature Strategies

Carseldine Village has sought to meet best practice guidelines for land and nature, through developing features such as:

- Carseldine Village has retained 17 hectares of bushland (75% of the original natural bushland) within the project with established walking tracks for community members to enjoy, these have been enhanced as the project progresses. **Milestone Date: complete.**
- Two bio retention basins have been installed in the precinct, to capture stormwater runoff to allow treatment to occur prior to release towards Cabbage Tree Creek. Currently the basins are used to capture and store water, with potential for reuse of water for irrigation in the future. **Milestone Date: complete.**
- The nearby Cabbage Tree Creek is the closest sensitive receptor for stormwater runoff from the project, modelling has been completed which demonstrates the project does not add pollutant loads to the Creek once operational. Further detail can be found in Section 7.0. **Milestone Date (targeted): confirmation of modelling outcomes TBC upon project completion.**
- A rehabilitation project was undertaken on the bushland area, including systematic weed removal, 20,000 native plants planted, and 228 fauna nesting boxes installed. **Milestone Date: complete.**
- A Bushfire Assessment Management Plan has been prepared for the site to ensure the bushland is managed in a manner that protects both nearby infrastructure and the existing biodiversity values of the area. **Milestone Date: complete.**

There are opportunities to implement further strategies to further embed sustainability into the CV Project, it is suggested there are explored for future implementation:

- Further opportunities can be found through enhancing the existing bushland space, through encouraging community projects to continue to assist with rehabilitation of the Cabbage Tree Creek Bushland corridor.

9.3 Summary

Due to the nature of the project having existing natural areas, the most important aspect for CV was to protect and enhance these areas to meet best practice outcomes. The management of runoff from the project site have ensured minimal impact to water quality in Cabbage Tree Creek, and the enhancement of the bushland area through weed species removal and increased native plantings. These outcomes exceed best practice and demonstrate how development can improve the land and nature outcomes for an area.

10.0 Transport Strategies

10.1 Best Practice Outcomes

Best practice development regarding transport access is defined by access to a range of transport options, including active transport, public transport, and car-share transport facilities. By providing accessible and flexible transport modes will encourage the community to choose lower-impact options and adapt to their changing needs.

Accessible transport has been identified as an indicator of sustainable development within a community. Reducing the dependence on vehicles as the primary mode of transport and making walking, cycling and public transport more accessible are best practice outcomes. This promotes healthy and active lifestyles for community residents and further promotes community values.

10.2 Carseldine Village Transport Strategies

Carseldine Village's Guiding Principles (see Document 57 in Appendix B) includes specific strategies to address transport within the project area, including:

- Road network and vehicle movement.
- Cycle movement.
- Pedestrian movement; and
- Public transport.

10.2.1 Road Network and Vehicle Movement

Carseldine Village has been designed with all residences located within 400m of parks, public transport, facilities, and bushland. By ensuring there are strategies in place for the above transport modes, places will be connected by multiple networks with priority shown for pedestrian, cyclist, and public transport users. The road network will consist of a main circulation road through the project that will connect Dorville Road and Beams Road. There will also be upgrades provided to three external roads and intersections, this will minimise the impacts of existing infrastructure in the area. The road network has been designed to accommodate future mobility methods with the provision for a future busway corridor considered in the masterplan. This busway will include an underpass connection to the railway station to further reduce impacts on roadways (see document 23 in Appendix B).

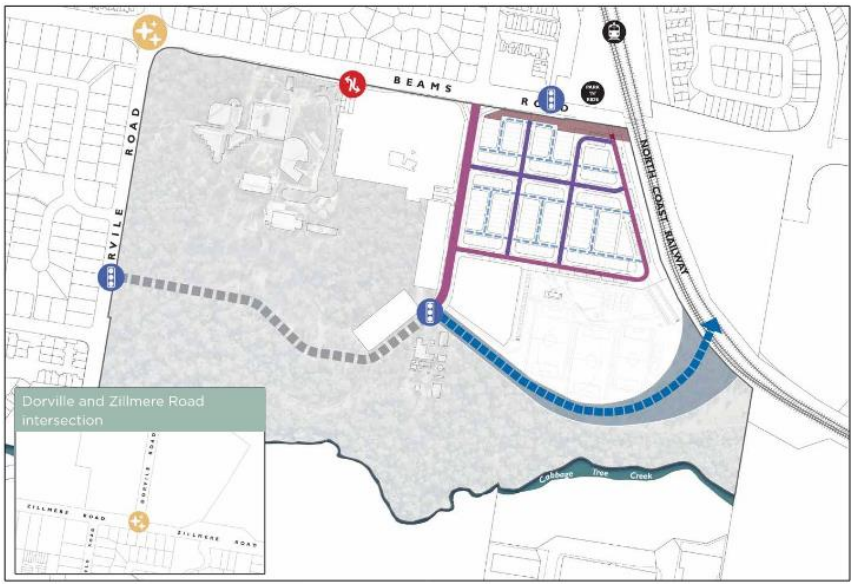


Figure 5: Transport Corridors in CV Project Area

10.2.2 Cycle mobility

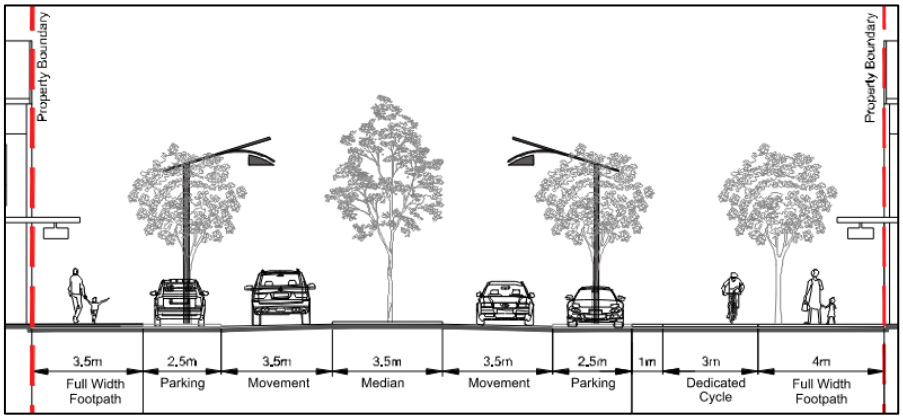
- Cycle mobility has had a particular focus in the Carseldine Village masterplan with the existing cycle way being extended on Beams Road and Dorville Road. **Milestone Date: complete.**
- Cycling pathways are to be integrated into all new roadways within the project. As seen in the figure below, the main boulevard will include a dedicated 3m separated carriageway cycle lane provided that will be separated from parking by 1m. **Milestone Date: complete.**
- The existing bushland cycleway path will undergo upgrades to improve the overall of visibility and safety. **Milestone Date: complete.**
- Bike racks will be located throughout the CV precinct and a bike repair station installed (See document 23 in Appendix B). **Milestone Date (targeted): by project completion.**
- 

Figure 6: Street Cross-section

10.2.3 Pedestrian movement

- Direct pedestrian connections to bus and train services have been made a priority within the CV development to ensure accessibility for residents and visitors. **Milestone Date: complete.**
- Pedestrian crossings are to be provided to improve safety and connectivity. **Milestone Date: complete.**
- Footpaths along the main street entry of the CV precinct have been designed to be as wide as single car lanes. **Milestone Date: complete.**
- Rear lanes have been integrated into the precinct design to remove the need for driveways to disrupt the footpath and mobility (See document 23 in Appendix B). **Milestone Date: complete.**

10.2.4 Public transport

- CV is located next to the Carseldine Station located on the North Coast Railway line that provides connection to the Sunshine Coast and Brisbane CBD. Brisbane CBD can be reached in 25 minutes via train. **Milestone Date: complete.**
- There are three bus stops located within the CV precinct, ensuring there is public transport availability for within a 400m radius of all residences. **Milestone Date: complete.**
- The site has been developed with the opportunity for the future provision of and extended bus network and busway connection between Dorville Road and behind the sport and recreation precinct (see Document 57 in Appendix B). **Milestone Date: complete.**

It is also noted that the provision of electric vehicle charging stations is to be included in all residences as a futureproofing method.

10.3 Summary

The CV development has been designed to ensure moveability within the development by focusing specifically on the ease of access to public and active transport options for residents and visitors. Provisions have been made for

pedestrian movement, cycle mobility, vehicle movement, and public transport via trains and buses with space for a future busway expansion within the development. These outcomes exceed best practice and demonstrate how development can improve the transport opportunities for an area.

11.0 Conclusion

The Carseldine Village Project was assessed against metrics determined from a comparison of the best practice targets of four community level sustainability rating tools: Green Star Communities, EnviroDevelopment, Living Community Challenge, and One Planet Living. As well as these rating tools, outcomes for water management were also assessed against best practice water management from Urban Water - Best Practice Environmental Management 2009 (a core part of the State Planning Policy for Urban Water), Brisbane City Council standards, and Water by Design to ensure Carseldine Village met and exceeded best practice WSUD and IWCM strategies.

The following best practice metrics were used to assess strategies for the overall sustainability of Carseldine Village:

- Economic Prosperity and Equity;
- Waste;
- Energy;
- Materials;
- Water;
- Community;
- Land and Nature; and
- Transport.

From and in-depth analysis of the above metrics, it can be concluded that Carseldine Village has achieved or exceeded requirements for the Conditions of Approval as noted in Section 2.0, and those defined as best practice for sustainability in each of the categories. The whole-of-project approach ensures discrete stages of the project work together to create a development that showcases sustainability, as well as ensures outcomes that enhance the area. The framework provided by Green Star Communities and EnviroDevelopment has allowed these outcomes to be achieved and encouraged implementation of region first initiatives.

Opportunities exist to further improve sustainability outcomes for the precinct, these have been outlined in the Strategy Sections. Whilst not a requirement to meet best practice guidelines on sustainability, by implementing these it would strengthen outcomes for the project and the surrounding community.

Appendix A Conditions of Approval

Conditions of Approval

Compliance with Conditions 23 & 29 of Stage 2 (EDQ Ref: DEV2020/1118), Condition 22 of Stage 3A (EDQ Ref: DEV2021/1183) and Condition 21 of Stage 4A (EDQ Ref: DEV2021/1228) is to be demonstrated in this report. Condition requirements are outlined below.

Stage 2 (EDQ Ref: DEV2020/1118)

Condition 23 – Innovative Design and Materials

Prior to survey plan endorsement:

Submit to EDQ Development Assessment, DSDTI for compliance assessment proposals for designs, technology, or material selection to address the Fitzgibbon PDA Development Scheme sustainability requirements. Innovative proposals not considered by the Development Scheme will be assessed on merit for enhancing the development outcomes.

a) Supporting technical evidence: Should designs or specifications differ from published standards the sustainability/innovation proposal must be supported by robust technical evidence (such as field/laboratory testing and a performance-based specifications) with appropriate certification by a suitably qualified person.
b) Costing and maintenance: Depending on the nature of the proposal, whole of life cost evaluation and consideration for a modified maintenance period may be required.
c) Development integration: Proposals must integrate with the development such that the implementation does not compromise the ability to satisfy conditions of this PDA development approval and other relevant approvals or standards, unless agreed by EDQ or other relevant authority. Non-compliance with conditions/standards arising as a result of the proposal must be identified prior to implementation and specifically addressed such that the proposal holistically enhances the development outcome.

Condition 29: Sustainability

Prior to survey plan endorsement

Submit to EDQ Development Assessment, DSDTI for compliance assessment, evidence that the overall development strategy and individual developments (residential buildings for use as houses and home-based businesses) meet the Fitzgibbon PDA Development Scheme requirements for Sustainability.

a) Sustainability criteria:
    i) New building sustainability rating:
        - Individual development/building requirements - new buildings within the PDA are required to demonstrate best practice in sustainability, [defined as the] development achieving a 5 Star design rating under the applicable Green Building Council of Australia Green Star rating tool, or another recognised equivalent.
    ii) non-potable water demand and reuse
        - the overall target is to achieve a 50% reduction in non-potable water demand across the Urban Village; and
        - development provides a lot/development-based water plan which addresses non-potable water demand and reuse and stormwater quality management.
b) Development strategy:

    Submit overall development strategy documents which demonstrate whole of development compliance with part a) of this condition, and which establishes the criteria and acceptable solutions for individual development Stages and lots.

c) Development delivery - Design:

Submit evidence that the development design for Stage 2 (dedicated assets and proposed lot development works) and the cumulative development to date satisfies the sustainability criteria in part a) in accordance with part b) of this condition

Sustainability requirements for individual lots must be further developed from part b) strategy, including verification that acceptable solutions are available for procurement/implementation. Prepare a post-approval process information package which details acceptable evidence for as-built verification and standard compliance documentation templates (e.g., statutory declarations and checklists)

d) Development delivery – As-built (Public Assets):

Submit as-constructed information and RPEQ certification to verify that the Stage 2 development dedicated assets were constructed in accordance with part c) of this condition

Stage 3A (EDQ Ref: DEV2021/1183)

Condition 22 – Innovative Design and Materials (Public Infrastructure)

a) Prior to streetscape or road construction

Submit to EDQ Development Assessment, DSDILGP for compliance assessment details of public infrastructure designs, technology, or material selection to address the Fitzgibbon PDA Development Scheme sustainability requirements. Innovative proposals not considered by the Development Scheme criteria will be assessed on merit for enhancing the development outcomes.

i) Water Management: Submit designs that incorporate Integrated Water Cycle Management and Water Sensitive Urban Design within stage development. Design is required to maximise infiltration to support deep rooted mature trees and provide shaded, low maintenance, climate responsive streetscapes. Solutions may include “water smart” street trees with passive irrigation generally in accordance with Water by Design guidance by Healthy Land and Water (previously Healthy Waterways) and Brisbane City Council standards (where applicable) (previously Healthy Waterways) designed by suitably qualified IWCM/WSUD and landscape design professionals.

ii) Material Management: Submit designs and/or management plans that demonstrate infrastructure design includes the use of innovative and efficient use of materials and minimises impacts on climate. Proposals required maximise responsible material usage, including reuse of materials, recycled materials, consideration of the life cycle environmental costs of material. Solutions may include recycled materials in road construction (aggregate or asphalt), concrete cement clinker substitution, geopolymer concrete and waste recycling/reduction strategies.

b) Prior to survey plan endorsement.

Pilot of Non-Standard Designs Where designs do not comply with standard local government designs the following will apply to facilitate piloting new design approaches and technology:

i) Supporting technical evidence: Should designs or specifications differ from published standards the sustainability/innovation proposal must be supported by robust technical evidence with appropriate certification by a suitably qualified person.

ii) Costing and maintenance: Depending on the nature of the proposal, whole of life cost evaluation and consideration for a modified maintenance period may be required.

c) Prior to streetscape or road construction.

Detailed Design Submit designs in accordance with parts a) and b) of this condition where applicable. Proposals are to integrate with the development such that the implementation does not compromise the ability to satisfy conditions of this PDA development approval and other relevant approvals or standards, unless agreed by EDQ or other relevant authority. Non-compliance with conditions/standards arising from the proposal must be identified prior to implementation and specifically addressed such that the proposal holistically enhances the development outcome.

d) Prior to survey plan endorsement:

Construct the works generally in accordance with the civil infrastructure and streetscape plans submitted under part c) of this condition.

e) Prior to survey plan endorsement

Submit to EDQ Development Assessment, DSDILGP 'as constructed' plans and asset register in a format acceptable to Council certified by an AILA or RPEQ (as relevant).

Stage 4A (EDQ Ref: DEV2021/1228)

Condition 21 – Innovative Design and Materials (Public Infrastructure)

Compliance assessment for condition 21 is based on the following being met:

a) Prior to streetscape or road construction

Submit to EDQ Development Assessment, DSDILGP for compliance assessment details of public infrastructure designs, technology, or material selection to address the Fitzgibbon PDA Development Scheme sustainability requirements.

i) Material Management: Submit designs and/or management plans that demonstrate infrastructure design includes the use of innovative and efficient use of materials and minimises impacts on climate. Proposals required maximise responsible material usage, including reuse of materials, recycled materials, consideration of the life cycle environmental costs of material. Solutions may include recycled materials in road construction (aggregate or asphalt), concrete cement clinker substitution, geopolymer concrete and waste recycling/reduction strategies.

b) Prior to survey plan endorsement.

Pilot of non-standard designs: Where designs do not comply with standard local government designs the following will apply to facilitate piloting new design approaches and technology:

i) Supporting technical evidence: Should designs or specifications differ from published standards the sustainability/innovation proposal must be supported by robust technical evidence with appropriate certification by a suitably qualified person.

ii) Costing and maintenance: Depending on the nature of the proposal, whole of life cost evaluation and consideration for a modified maintenance period may be required.

c) Prior to streetscape or road construction.

Submit designs in accordance with parts a) and b) of this condition where applicable. Proposals are to integrate with the development such that the implementation does not compromise the ability to satisfy conditions of this PDA development approval and other relevant approvals or standards, unless agreed by EDQ or other relevant authority. Non-compliance with conditions/standards arising from the proposal must be identified prior to implementation and specifically addressed such that the proposal holistically enhances the development outcome.

d) Prior to survey plan endorsement

Construct the works generally in accordance with the civil infrastructure and streetscape plans submitted under part c) of this condition.

e) Prior to survey plan endorsement

Submit to EDQ Development Assessment, DSDILGP 'as constructed' plans and asset register in a format acceptable to Council certified by an AILA or RPEQ (as relevant).

Appendix B Supporting Reference Documents

See overleaf

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