

## ESD subdivisions in Regional Victoria

#### Webinar - November 29, 2018







Time	Item	Time allocation
10am	Welcome and introduction	10mins
10am	Environmentally Sustainable Design (ESD) for subdivisions in Regional Victoria: presentation of report findings of Proof of Concept Study and Cost Benefit Analysis	40mins
10.50am	Q&A	20mins
11.10am	Thank you and next steps Further discussion online	20mins
11.30am	Webinar formal close	

#### Drivers for ESD subdivisions

- Regional growth
- Changing climates and weather events
- Changes in energy supply market

- Living costs and vulnerabilities
- State level transition to low carbon economy
- Reducing carbon emissions



- 1. Define 'best practice' ESD with respect to urban land subdivision and determine how it should be measured
- 2. Establish how 'best practice' ESD subdivisions are feasible in regional Victoria
- 3. Recommend a suite of tools and a model for collaborative implementation, with transferability across the State.





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#### The disconnect between subdivisions and dwellings

- Intrinsic link between subdivisions and dwellings
- Gaps between planning and building systems and lack of statutory tools to assess ESD
- Land and housing are separately developed
- Volume build housing highly competitive and price sensitive
- Resource implications for regional councils

Typical volume

dwelling

build



Substantial dwellings, smaller lots



Source: Wodonga City Council

Source: Google Street View

#### What's happening: Case studies



The Cape Cape Patterson



Armstrong Creek Geelong



Mullum Creek Donvale





Lochiel Park South Australia



YarraBend Alphington

#### **Key ingredients**

- Applicable to all scales of subdivisions
- Energy ratings
- Early adopters: smartgrids, battery storage,
- Near/fully self-sustainable- water, energy, decentralised
- Foster community , belonging and local economy through facilities and networks
- Services provided from beginning, scaled up

#### Drivers

- Non-regulatory
- Assessment tools sometimes
- Market/developer driven
- Support from councils

## The Cape, Cape Patterson, Victoria



ESD Category	Outcome	Cost
Energy	House energy ratings from 7.5 to 9.5 correlating to around 85% less costly to run.	\$\$\$
Water	Minimum 10kL tanks at each residential site 230kL rainwater tank for supply to the community garden	\$ \$\$
Waste	n/a	
Food	5000m <sup>2</sup> community garden including raised garden beds, orchards and poultry which lowers food bills	
Technology	All homes connected directly to NBN via optical fibre	
Movement	50% open space, walking trials, parks and wetlands.	
Education	n/a	
Conservation	Pet cats banned from the site to protect resident wildlife including wallabies, echidnas and coast bird species	Nil
Sustainable Enterprise	n/a	
Architecture	Sustainable building design from off-the plan minimum 7.5 star energy rated designs Maximum building allowance of 200m <sup>2</sup>	
Planning	n/a	
Community	Community gardens including compost areas, tool shed, public art and playgrounds which enhance social cohesion and wellbeing 50% Open space in the development	\$\$
Ratings/ Tools	n/a	

## Lochiel Park, Campbelltown, South Australia



ESD Category	Outcome	Cost
Energy	Minimum 7.5 Star energy ratings Minimum solar photovoltaic requirements for every dwelling of 1kW coupled with energy demand management software to reduce peak electricity loads. Solar hot water requirements for each dwelling Homes achieve a target of 74% reduction in greenhouse gas emissions when compared to an average 2004 Adelaide home	
Water	Water strategies including stormwater recycling for flushing, washing and irrigation Stormwater wetlands	
Conservation	Two-thirds of the site (10ha) has been established as an urban-forest comprising tens of thousands of trees, creating a biodiversity corridor, which also assists in offsetting greenhouse gas emissions	\$\$\$
Education	Large involvement from the University of South Australia, developing environmental targets, monitoring performance and undertaking extensive research programs. An onsite Sustainability Centre was established for 3 years to educate the community on the benefits of environmentally sustainable design.	Nil \$\$\$
Architecture	Australia's first Zero-carbon home	
Community	Community food-gardens provide a local food-bowl, reducing household food costs	
Ratings / Tools	UDIA EnviroDevelopment – 6 leaves	

## Witchcliffe Ecovillage, Margaret River, Western Australia



ESD Category	Outcome	Cost
Energy	100% renewable power generation on site including a local micro energy grid that utilises smart grid technology.	\$\$\$
	The renewable energy goals have been assessed by an energy specialist, which outlines 3 pathways to achieving the goals.	
Water	100% self -sufficiency in water through onsite rainwater harvesting (rainwater tanks and dams)	\$\$
	All waste water recycled on site	\$\$\$
Waste		
Food	All infrastructure required to enable self-sufficiency in seasonal fresh foods provided by the developer	\$\$
Technology	NBN fibre to each home and business provided	\$\$
Movement	Extensive shared path network to encourage and prioritise pedestrians and bikes	\$
Education	Education provided to all residences and businesses on how to get the most out of the local energy, water and food resources	\$
Conservation	Revegetation and protection of remnant vegetation and creek lines to create wildlife corridors	\$\$
Sustainable Enterprise	Sustainable employment, small business and education opportunities within the ecovillage	\$
Architecture	Highly efficient solar passive homes that all front public open space and/or community gardens	\$
Planning	Carefully urban master=planning for all aspects of the development include site orientation and infrastructure	\$\$\$
Community	All aspects of the development are centred around creating an integrated community	\$
Ratings / Tools	Strategic decision not to pursue environmental rating credentials	Cost Positive

#### Best practice ESD principles



#### Optimise site potential



Considering passive design principles and the local environment and site context early in the subdivision process enables efficient use of resources, minimises runoff and erosion and improves outcomes for residents.

- Design responds to the existing environment, weather conditions and terrain;
- Design prepares for the future climate and reduces impacts of the urban heat island effect (reduce hardstand area, roof reflectiveness, shade for roads, footpaths and bicycle paths; cool spaces in subdivision);
- Enable access and connection to services, open space and amenities;
- Ensure space for quality public realm (open space, shade trees, landscaping and WSUD);
- Utilise eco-system services:
  - Retains existing natural features
  - Maximise solar access
  - Maximise natural ventilation

## **Reduce Footprint**



*Increasing resource efficiency during construction and operations will avoid waste, improve amenity and reduce costs.* 

- Water: Stormwater retention and re-use (in parks, gardens and the landscape to mitigate flood risk and impacts of heat and drought);
- Drought tolerant species/landscape design zoned to minimise water use;
- Integrated Water Management/ Water Sensitive Urban Design.
- **Energy:** Reduce demand for energy through design and technology;
- Generate and store renewable energy on site or at precinct scale.
- Waste: Minimise construction waste/ maximise reuse on site, on-site separation of construction materials, use of locally sourced recycled materials (i.e. IDM SIG).

#### Create places for people



Planning with future communities in mind better supports their economic and social wellbeing. Providing access to local amenities and spaces for people to meet and gather builds cohesive, inclusive and resilient communities.

- **Dwelling and lot diversity:** Varied lot sizes and dwellings that cater to a mix of housing needs and price points.
- Local economy: Provide space for local economic opportunities (including small homebased businesses; shared spaces and incubator hubs etc).
- **Connectivity:** Safe, inclusive, well-connected and welcoming places;
- Encourage shared spaces and shared use of space (such as for ride share; community gardens and community activities); technology to support social interaction.

## Enhance ecology



Health and wellbeing and building performance benefit from ecosystem services such as shade, urban cooling, and access to open space.

- Retains existing established vegetation (especially native plants);
- Strengthen local habitat and biodiversity connections to larger ecological assets;
- Provide habitat for threatened species;
- Manage vegetation to minimise bushfire risk;
- Allocating cool spaces/refuges within subdivisions;
- Consider the inter-relationship of the public and private realm for enhancing streetscapes for biodiversity and amenity.

## Encourage adaptability and innovation



Subdivisions built with tomorrow in mind are more resilient and adaptable to future changes in climate, demographics and technology.

#### **Emerging trends and technologies**

- Consider and enable room for innovation and new technologies such as:
  - battery storage;
  - electric vehicle charging points;
  - micro-grid (energy trading within subdivision- peer to peer trading);
  - high quality digital infrastructure to the home to support the local economy;
  - working from home; virtual service delivery;
  - wind modelling to inform natural cooling.

#### CBA

Analyses the costs (upfront and ongoing) of a proposed change with the total benefits that are expected to be accrued over a set period of time.

#### **Break-even**

*Identifies the value of benefits that would need to accrue to break-even with the cost of a proposed change.* 



## **CBA** Assumptions and limitations

- Less quantitative evidence for subdivisionscale interventions
- Did not consider
  - future climate projections
  - changing water and energy prices
  - Reduced costs of emerging technologies
  - Emission intensity of electricity supply



## Cost Benefit Analysis Initiatives

#### Dwelling

- Orientation
- Installation of rainwater tanks plumbed to washing machines and toilets
- Solar panels
- Glazing and insulation

#### Subdivision

- Increased percentage of tree canopy
- Increased use of recycled road materials
- Increased use of WSUD



#### Orientation



Annual household savings on energy use for 'best' rather than 'worst' orientation:

- Approx. \$760 in Shepparton (Hot climate)
- Approx. \$300 in Bendigo, Geelong, Moorabool, Wodonga (Moderate Climate)
- Approx. \$460 in Baw Baw, Ballarat (Cold climate)

The better the orientation, the less need for energy intervention as the need has been mitigated through design.

## Cost Benefit Analysis Results – dwelling level



Climate zone	Most cost effective energy intervention	Payback period (approximate years)	
Shepparton (Hot)	Shading	4-6	
Bendigo, Geelong, Moorabool, Wodonga (Moderate)	Insulation	12-16	
Ballarat, Wangaratta, Baw Baw (Cold)	Insulation	5	
On-site Renewable Energy			
All three climate zones	Solar Panels	4	

#### Break-even analysis: Recycle road material

10 lots	100 lots	500 lots
\$606	\$561	\$561

Case study parallel: Pavement Rehabilitation

- Waurn Ponds:
- FoamMix Recycled Asphalt utilising 95% recycled materials combined with foamed bitumen.
- Saving of \$52/m2
- Project cost reduced by 30%
- Carbon savings 22,130kg CO2e



Photo source: City of Greater Geelong

## Break-even analysis: Canopy cover

10 lots	100 lots	500 lots
\$994	\$1114	\$1114

Case studies parallel:

- National Heart Foundation calculated gross annual benefit of \$171 / tree
- For every \$1 invested, created \$3.81 benefits
- Mildura water savings drought tolerant plants



Photo source: The Conversation

#### Break-even analysis: Water Sensitive Urban Design

10 lots	100 lots	500 lots
n.a*	\$3,824	\$2,037

\*Costs have not been estimated for raingardens within 10 lot subdivisions as the area of public realm space would not support this type of WSUD.

- Scale is important
- Represents approx. 1 2.5% of lot price in regional areas
- Case study parallel: Coburg Hill Redevelopment (former Kodak site) – WSUD <1% of total development cost</li>



Photo source: CRC for Water sensitive cities

#### No cost/low cost measures - subdivisions

- Appropriate solar orientation, for both public areas and dwellings
- Reduction in impervious surfaces
- Recycled materials and reduction in construction waste
- Diversity of dwellings within the subdivision
- Use of low-energy street lighting

- Installation of footpaths which are:
  - On both sides of street
  - Connect to amenities, local destinations, neighbouring areas and public transport
  - Continually shaded
- Greening and biodiversity:
  - increased canopy cover
  - drought tolerant and indigenous plants
  - retention of mature trees



## ESD in planning

- There is a clear role for ESD in planning
- Planning is suited to dealing with the 'big picture' issues in the site planning stage (i.e. orientation, layout and site development), optimising ESD outcomes building stage
- Developing local planning policies is appropriate in the absence of a state policy
- A state-wide ESD approach for built form currently under development

Source: Planning Panels Victoria/Victorian Climate Change Adaptation Plan

#### Planning tools (statutory controls)

Scale/Tools	Suitability	Resource (H,M,L)	State-wide/ local (S,L)
Precinct: Urban Growth Zone/Precinct Structure Plan	<ul> <li>Small lot Housing Code to facilitate housing diversity;</li> <li>specific conditions to subdivision building envelopes;</li> <li>comprehensive masterplanned approach for designated PSP areas;</li> <li>suitable for 500+ lots; PSP must be designated area</li> </ul>	H (PSA)	L
Municipal-wide: Residential Zone schedules Residential Growth Zone (RGZ) General Residential Zone (GRZ) Neighbourhood Residential Zone (NRZ)	<ul> <li>Influence site coverage, landscaping, dwelling and setbacks</li> <li>Locally specific application requirements and decision guidelines</li> <li>Does not apply to single dwelling on a lot over 300sqm</li> <li>Would need state changes to 'parent' zone control to achieve best practice ESD in subdivision</li> </ul>	H (PSA)	L
Neighbourhood: Development Plan Overlays	<ul> <li>information requirements for further information;</li> <li>Development Plan can be amended without PSA</li> <li>Does not trigger planning permit; triggers Development Plan preparation; not suitable for less than 10 lots</li> </ul>	H (PSA)	L
Neighbourhood/Estate: Design and Development Overlay	<ul> <li>Can create further permit triggers for subdivision</li> <li>Can specify application requirement for Sustainable Design Assessment or Sustainability Management Plan; and decision guidelines; may be suitable for estate by estate application</li> </ul>	H (PSA)	L

#### Planning and educational tools

Scale/Tools	Suitability	Resource (H,M,L)	State-wide/ local (S,L)
Subdivision: local policy	<ul> <li>Could guide 'alternate design solution' under Clause 56</li> <li>Support planners to request further information</li> <li>Applies municipality-wide at all scales, where planning permit is triggered</li> </ul>	H (PSA)	L
Subdivision: Sustainable Subdivision Guidelines (non statutory)	<ul> <li>Provide consistent guidance and easy to develop;</li> <li>Require consultation/piloting with industry</li> <li>No statutory weight, however could underpin future policy basis;</li> <li>Applicable at all scales, particularly 10+ lots</li> </ul>	Μ	S/L
Subdivision: Infrastructure Design Manual (IDM) and Sustainable Infrastructure Guidelines (SIG)	<ul> <li>IDM is a living document, amended from time to time, utilised by 44 rural and regional councils, with many set to reference in planning schemes;</li> <li>SIG 'opt in function' for councils who adopt;</li> <li>Potential further research to expand IDM landscaping clause and develop cross sections to facilitate canopy trees in road reserves</li> </ul>	Μ	S/L
Dwelling: Educational materials - Fact sheets	<ul> <li>Easy to develop, no statutory weight, educational tool for councils and developers to community key messages</li> </ul>	L	S/L
<b>App</b> to optimise site potential of dwelling design	<ul> <li>Educate and be utilised by developers, builders and home owners</li> <li>Technically complex; costly to develop and maintain, no statutory weight;</li> <li>Best developed in conjunction with State; applicable to all scales</li> </ul>	Μ	S



- There is no 'one size fits all' approach
- Significant opportunity for cost effective measures to improve ESD that are transferable across the state
- Both statutory and non-statutory measures have a clear role and are required to be tailored to local conditions
- Measures must target the subdivision, the building and its operation
- Leverage **collaborative networks** for individual and collective action
- The **ESD subdivision roadmap** and checklist can be used to guide council action



#### What happened since project

- Commendation for 'Best Planning Ideas Large Project', 2018 Victorian PIA Awards for Excellence
- Wodonga: draft Housing Strategy (sustainability)
- Geelong: Pursuing ESD LPP
- Bendigo: ESD LPP, IDM SIG 12 month trial; ESD in planning scheme review
- Wangaratta: Survey establishing community priorities
- Baw Baw –developer forum and community engagement to inform ESD policy

#### **Further research opportunities**

- Longitudinal studies
- Quantifying social and environmental benefits

#### **Collective action**

CASBE as vehicle to drive



# Thank you

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