NSW Government draft Design and Place State Environmental Planning Policy (DP SEPP) 2021 and supporting guides.

Submission on Embodied Carbon and Biodiversity
Supplementary Submission on Carbon Emissions and Waste

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Dear Ms Galvin

Design and Place SEPP: Submission on Embodied Carbon and Biodiversity

We welcome the opportunity to comment on the NSW Government's draft Design and Place State Environmental Planning Policy (**DP SEPP**) 2021 and supporting guides.

We acknowledge that the DP SEPP represents an initial step towards addressing climate and biodiversity goals through a revised policy framework. We note that there are strong levels of community concern regarding the need for decisive and ambitious action to accelerate the transition to zero emission buildings and halt biodiversity loss in urban areas.

In considering the adequacy of the provisions of the DP SEPP with regard to embodied carbon and biodiversity, we consider that the NSW Government needs to have regard to recent developments in relation to embodied carbon and biodiversity sensitive design principles. Noting the tensions that may exist between competing interests involved in developing the policy framework, the NSW Government's response should balance these interests in a manner that is reasonable and proportionate.

Rewriting our building and urban design laws is a once in generation opportunity to put in place laws that can secure meaningful and substantive outcomes for climate and biodiversity. For this reason, our submission makes the following key recommendations:

Recommendation 1: A review period of 3 years for embodied carbon targets, with progressive reduction of embodied carbon targets.

Recommendation 2: Emissions from transport and minor materials to be included in the calculation of embodied carbon.

Recommendation 3: The basis upon which 12.5 and 9 tonnes were set as embodied carbon limits should be made publicly available to form an adequate basis for community consultation.

Recommendation 4: BASIX embodied carbon design and accounting requirements should apply to all commercial buildings and industrial developments. Sections 8(2)(a)(i)-(ii) and (c) of the DP SEPP should be deleted. Embodied carbon standards should be determined and phased in for commercial and industrial buildings.

Recommendation 5: Competing provisions of an environmental planning instrument or development control plan that are more effective in reducing GHG emissions or improving the thermal performance of a building should take precedence over the DP SEPP provisions. Section 29 of the DP SEPP should be deleted.

Recommendation 6: BSUD Principles and Framework to be incorporated into in the ADG and UDG.

Recommendation 7: BSUD Principles to be required as part of Design Verification Statements under the Environmental Planning and Assessment Regulation 2000.

Recommendation 8: Biodiversity target of no in-situ loss of habitat for any threatened species to be included in the DP SEPP, ADG and UDG.

Contents

1. Embodied Carbon

1.1 Provisions

1. The DP SEPP proposes to regulate embodied carbon in prescribed residential accommodation,[1] residential flat buildings and shop-top housing through three primary mechanisms. They are as follows:

    a. The Apartment Design Guide (**ADG**) specifies that materials, landscaping building systems and construction methods that minimise embodied greenhouse gas (**GHG**) emissions should be selected;[2]

    b. Development applications for developments to which the DP SEPP applies must disclose the amount of embodied emissions attributable to those developments;[3] and

    c. Prescribed residential accommodation, residential flat buildings and shop-top housing must not exceed maximum embodied emissions standards.[4]

2. We broadly support the regulation of embodied carbon through design, disclosure and maximum standards. However, we have significant concerns that the above mechanisms are insufficient to drive deep decarbonization of the building sector. Our views are set out below.

1.2 Reviews

3. It is noted that these limits may be set in consideration of the absence of sufficient data and with the intention of hardening targets as market shifts make it more economically viable to do so. In light of this, we recommend setting a clear trajectory towards science-based targets with a more regular review period to ensure that effective limits may be set that will make a meaningful contribution toward a net-zero NSW.

Recommendation 1: A review period of 3 years for embodied carbon targets, with progressive reduction of embodied carbon targets.

1.3 Methodology

4. The new SEPP proposes to account for embodied carbon using the material coefficients provided by the EPiC database (Box A, Figure X). However, the method provided by the EPiC Database has two major components, one of which is not included in the SEPP proposal (Box B, Figure x). The exclusion of this component thus ignores emissions associated with:

    a. the transport of materials to the construction site;

    b. the construction processes, e.g., cutting of timber and machine operation;

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[1] *Environmental Planning and Assessment (Design and Place) Regulation 2021* Schedule 2, s 1

[2] Draft Apartment Design Guide 86.

[3] *Environmental Planning and Assessment (Design and Place) Regulation 2021* s 57(C)(1)

[4] *Environmental Planning and Assessment (Design and Place) Regulation 2021* Schedule 2, s 5(3)

c. embodied energy of minor materials;

d. emissions associated with the providing services needed to support the construction

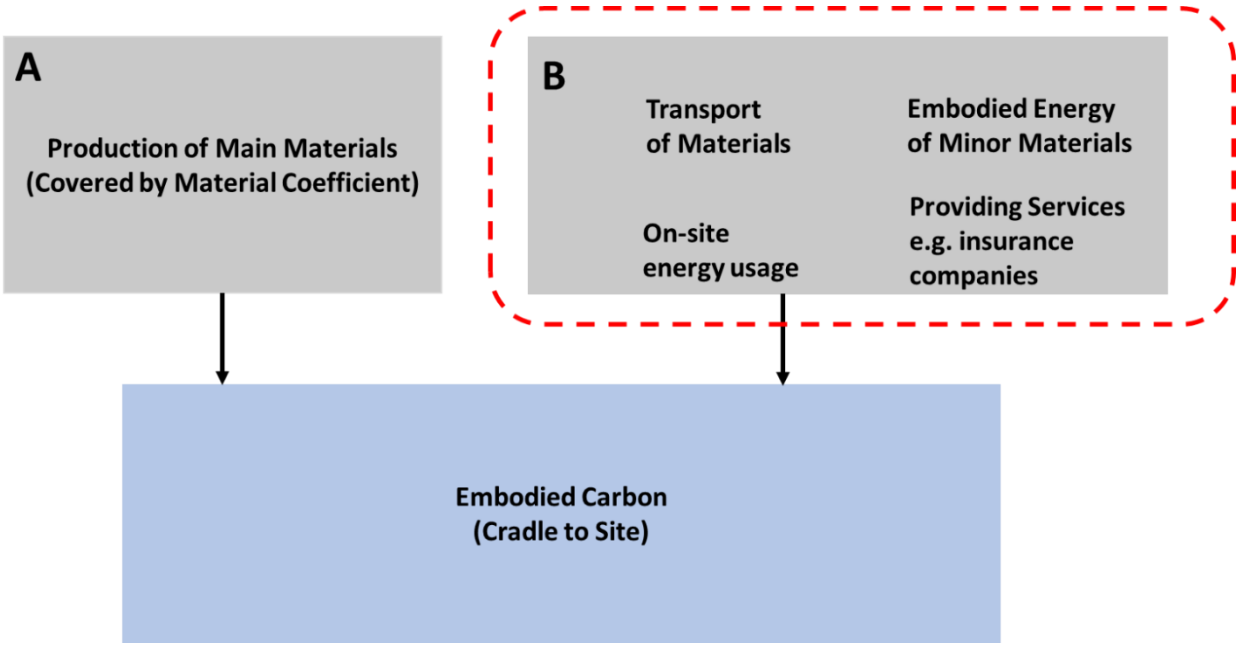


Figure 1: The EPiC Database utilises the sum of two components to calculate embodied carbon (Boxes A and B). The current proposal ignores emissions associated with the construction process. Hence, it does not account for any emissions associated with the processes listed in box B (Adapted from: Crawford, Stephan & Prideax 2019)[5].

5. The Institution of Structural Engineers considers cradle to site to be the minimum scope appropriate for assessing embodied carbon emissions (Gibbons 2020, p. 5).[6] Given that the EPiC Database supports the calculation of embodied carbon emissions from cradle to site, we strongly advocate the inclusion of the second half of the method provided by the EPiC Database.

Recommendation 2: Emissions from transport and minor materials to be included in the calculation of embodied carbon.

[5] Crawford, RH, Stephan, A & Prideax, F 2019*, Environmental Performance in Construction (EPiC) Database*, The University of Melbourne, Melbourne.

[6] Gibbons, OP, Orr, J.J 2020, *How to calculate embodied carbon*, The Institution of Structural Engineers, London, <https://www.istructe.org/sitefiles/handlers/DownloadFile.ashx?productId=9767>.

1.4 Standards

6. Section 5(3) of the DP SEPP sets out embodied carbon standards for different types of developments. It provides:

> "*(3) The standard for embodied emissions is a maximum of—*
>
> *(a) for prescribed residential accommodation—12.5 tonnes of carbon dioxide for each occupant of the building, and*
>
> *(b) for residential flat buildings and shop-top housing—9.4 tonnes of carbon dioxide for each occupant of the building.*"

7. It is currently unclear what the 12.5 and 9.4 tonne embodied carbon limits are based upon; without sufficient knowledge of the rationale behind these targets, it is not possible to have confidence in their efficacy.

Recommendation 3: The basis upon which 12.5 and 9 tonnes were set as embodied carbon limits should be made publicly available to form an adequate basis for community consultation.

1.5 Application

8. The extent to which the DP SEPP applies to different categories of buildings and developments will directly affect NSW's ability to meet climate targets. In Australia, the construction sector is currently the fourth largest source of indirect emissions from embodied carbon (21.4 MT CO_2e in 1994/95) behind manufacturing (71Mt CO_2e); electricity, gas, water and waste services (56.5 Mt CO_2e); and transport (22.3 Mt CO_2e).[7]

9. We are concerned that the DP SEPP excludes numerous categories of industrial developments and commercial buildings.[8] While certain developments are unlikely to have significant embodied carbon (eg minor realignment of boundaries for subdivisions that do not create additional lots)[9], the practical implications of such exclusions may affect the NSW Government's target to halve emissions by 2030 and reach net zero emissions by 2050.[10]

10. In light of the DP SEPP's clear intention to drive resource efficiency and emissions reduction,[11] we submit that it is appropriate for the embodied carbon requirements in BASIX to be extended to commercial and industrial buildings. This was previously recommended in the 2014 submission by Environmental Defender's Office NSW (**EDO NSW**) on the BASIX Target Review. The submission stated:

> "*By focusing mandatory targets exclusively on the residential sector, the majority of the*

[7] Man Yu, Thomas Wiedmann, Robert Crawford and Catriona Tait, 'The carbon footprint of Australia's construction sector' (2017) 180 *Procedia Engineering* 211 – 220.
[8] Draft State Environmental Planning Policy (Design and Place) 2021 (NSW) s 8
[9] *Environment Planning and Assessment Regulation 2000* s 256I (2)
[10] NSW Climate Change Policy Framework 5.
[11] State of New South Wales through Department of Planning, Industry and Environment, 'Design and Place SEPP Overview' (2021) 7.

State's energy related emissions remain out of scope of the BASIX tool. While the residential sector contributes around 25% of energy-related greenhouse emissions, the commercial and manufacturing/industrial sectors together account for 55% of Sydney's emissions…

There is considerable public support for expanding BASIX beyond the residential sector. Notably, in the 2012 Sydney Metro Strategy consultations, 'Every submission that mentioned BASIX… suggested that it should be reviewed, and many supported its expansion to commercial development.' 42 New financing incentives such as environmental upgrade agreements also highlight opportunities for mandatory sustainability targets for retro-fitting existing buildings."[12]

11. For above reasons, we submit that the embodied carbon provisions in BASIX should also apply to the following categories of buildings and developments:

    a. commercial buildings;

    b. developments on land wholly in Zones IN3 Heavy Industrial; and

    c. developments in of the following kinds specified in Schedule 1 of the *State Environmental Planning Policy (State and Regional Development) 2011* (NSW):

        i. clause 1 – intensive livestock and agriculture;

        ii. clause 2 – aquaculture;

        iii. clause 3 – agricultural produce, industries and food and beverage processing;

        iv. clause 4 – timber milling, timber processing, paper and pulp processing;

        v. clause 5 – mining;

        vi. clause 6 – petroleum production (oil and gas);

        vii. clause 7 – extractive industries;

        viii. clause 8 – geosequestration;

        ix. clause 9 – metal, mineral and extractive material processing;

        x. clause 10 – chemical, manufacturing and related industries;

        xi. clause 18 – port facilities and wharf or boating facilities;

        xii. clause 20 – electricity generating works and heat or co-generation;

        xiii. clause 21 – water storage or water treatment facilities;

[12] EDO NSW, 'Submission on the Building Sustainability Index (BASIX) Target Review' (January 2014).

xiv. clause 22 – sewerage systems;

xv. clause 23 – waste and resource management facilities; and

xvi. clause 25 – data storage.

Recommendation 4: BASIX embodied carbon design and accounting requirements should apply to all commercial buildings and industrial developments. Sections 8(2)(a)(i)-(ii) and (c) of the DP SEPP should be deleted. Embodied carbon standards should be determined and phased in for commercial and industrial buildings.

1.7 Competing provisions

12. Section 29 of the DP SEPP provides that competing provisions of an environmental planning instrument or a development control plan have no effect to the extent that they aim to reduce consumption of mains-supplied potable water, reduce GHG emissions or improve the thermal performance of a building.[13] The aim of this section is to ensure consistent application of the BASIX scheme by overriding provisions in other instruments that seek to achieve similar objectives.[14]

13. We consider that the NSW Government needs to have careful regard the trade-offs between ensuring regulatory consistency and the importance of incentivising deep decarbonization of the built environment. In our view, the DP SEPP should enable the operation of environmental planning instruments or development control plans that are more effective in reducing GHG emissions and improving thermal than the DP SEPP for the following reasons:

    a. Local government areas that are more environmentally progressive will be able to roll out more ambitious schemes than the DP SEPP, resulting in environmental gains;

    b. The DP SEPP provides limited information on, or commitments to, future reviews.[15] Further, no commitments have been made to progressively increase targets and standards under the DP SEPP. As such, making allowance for competing environmental instruments or developmental control plans enables more progressive measures to come into effect on a more dynamic basis; and

    c. It has the potential to incentivise new and innovative ideas from local communities with the co-benefit of creating ownership for such schemes. Successful schemes could serve as model for other communities to improve upon.

Recommendation 5: Competing provisions of an environmental planning instrument or development control plan that are more effective in reducing GHG emissions or improving the thermal performance of a building should take precedence over the DP SEPP provisions. Section 29 of the DP SEPP should be deleted.

[13] Draft State Environmental Planning Policy (Design and Place) 2021 s 29(2).
[14] Draft State Environmental Planning Policy (Design and Place) 2021 s 29(1).
[15] State of New South Wales through Department of Planning, Industry and Environment, 'Design and Place SEPP Overview' (2021) 9.

2. Biodiversity

2.1 Importance

14. There is currently a growing emphasis on greenspace in urban planning. This shift has been driven by recognition of the benefits provided by urban greening, improved liveability, counteraction of the urban heat island effect, and several benefits to human physical and mental well-being.

15. The current emphasis on simply providing greenspace assumes that all greenspaces are created equal. Integral to many of these benefits, however, is biodiversity, or more simply, the variety of natural environments and organisms in these greenspaces.

16. Whilst it is evident that walking through a forest, with bird calls and wildlife abound is a vastly different experience to that of a relatively bare paddock with sparse vegetation; there is scientific literature that points to the multitude of benefits provided by human-nature interactions:

    a. **Mental Wellbeing:** An extensive body of literature highlights the positive impacts of human-nature interactions on mental health. Such benefits include improved subjective well-being, stress reduction, increased positive social interaction, cohesion, and engagement.

    b. **Physical Health:** Similarly, the benefits of human-nature interactions on human health are well documented. The benefits derived include improved respiratory function and cardiac health, as well as boosted immune function.

    c. **Improved Cognitive Function:** Likely associated with the improvements in physical and mental health, human-nature interactions enhance aspects of cognitive function such as memory, attention, productivity, and creativity.

    d. **Decreased water usage:** The planting and preservation of native vegetation will align with the principles of water sensitive urban design through reduced water requirements. Moreover, native flora will be more resilient in the face of the hotter and drier climate predicted under climate change.

    e. **Increased Liveability:** As mentioned earlier, improving the biodiversity and amount of urban greenspace will significantly increase the liveability of cities through improved air quality, reduced maximum temperatures and give people a place for moment of peace and serenity in their busy lives.

    f. **Better outcomes for the environment:** Aside from all the human-centric benefits of protecting and improving in-place biodiversity, it is also far more effective than simply offsetting biodiversity losses, which rarely compensate for biodiversity losses in development.

    g. **Increased Community Engagement**: A greater diversity of bird and plant species has been directly linked to a sense of belonging and attachment to place. Moreover, see the various grassroots projects and subsequent community engagement facilitated by Green

Adelaide's biodiversity initiative.

h. **Economic effectiveness:** Given the multitude of benefits biodiversity provides, investing in urban biodiversity is an incredibly cost-effective way to improve physical and mental well-being (and reduce associated health care costs) whilst simultaneously improving environmental outcomes.

17. In short, protecting biodiversity within urban greenspaces will provide a myriad of co-benefits that will ultimately result in a happier, healthier, and more productive NSW.

2.2 Provisions

18. While the DP SEPP states that it promotes "biodiversity by design",[16] the Apartment Design Guide (**ADG**) and Urban Design Guide (**UDG**) focus on urban greening, not biodiversity.

19. Objective 9 of the UDG seeks to establish landscape features and microclimates that enhance human health and biodiversity. In particular, design guidance 9.1 sets out guidance for biodiversity. It states:

"*9.1 Use green infrastructure to improve human health and biodiversity*

- *Provide trees and landscaping in public spaces as early as possible to establish long-term amenity.*
- *Optimise local breezes and urban cooling through green infrastructure placement and street orientation to catch prevailing breezes.*
- *Ensure landscape features are appropriate for the scale, location and use of the area. Integrate urban greening, such as green roofs or green facades, to support urban ecology and biodiversity, reduce stormwater run-off, reduce urban heat and increase amenity*."

20. In effect, the UDG encourages designers to use urban greening features, such as green roofs, to support a variety of environmental objectives including biodiversity.

21. We are concerned that this approach to biodiversity restricts consideration of biodiversity to specific urban greening features. This approach is problematic for the following reasons:

a. **Principles** – There are no principles to guide designers on what improving biodiversity values means in the context of a particular site.

b. **Context** – There is no requirement for site-specific biodiversity values to be identified for conservation and improvement. For example, a site may have an area of endangered grassland present along one boundary. Under the proposed UDG, planners may focus on "feature-based" biodiversity, eg green walls and roofs, instead of considering how

[16] DP SEPP Overview, above n8, 17.

measures to reduce impacts on the grassland such as ensuring graded buffers to minimise runoff and pollution.[17]

c. **Goals and metrics** – There is no requirement to develop biodiversity goals or metrics. For example, a site may have the objective of increasing the persistence of a lizard species. The corresponding metrics for such an objective may be to ensure the residences enable cats to be kept indoors, lizard habitat improvement and movement corridors improved. Figure 2 below shows how an objective can be outcome-based and linked to specific biodiversity sensitive urban design (**BSUD**) actions.

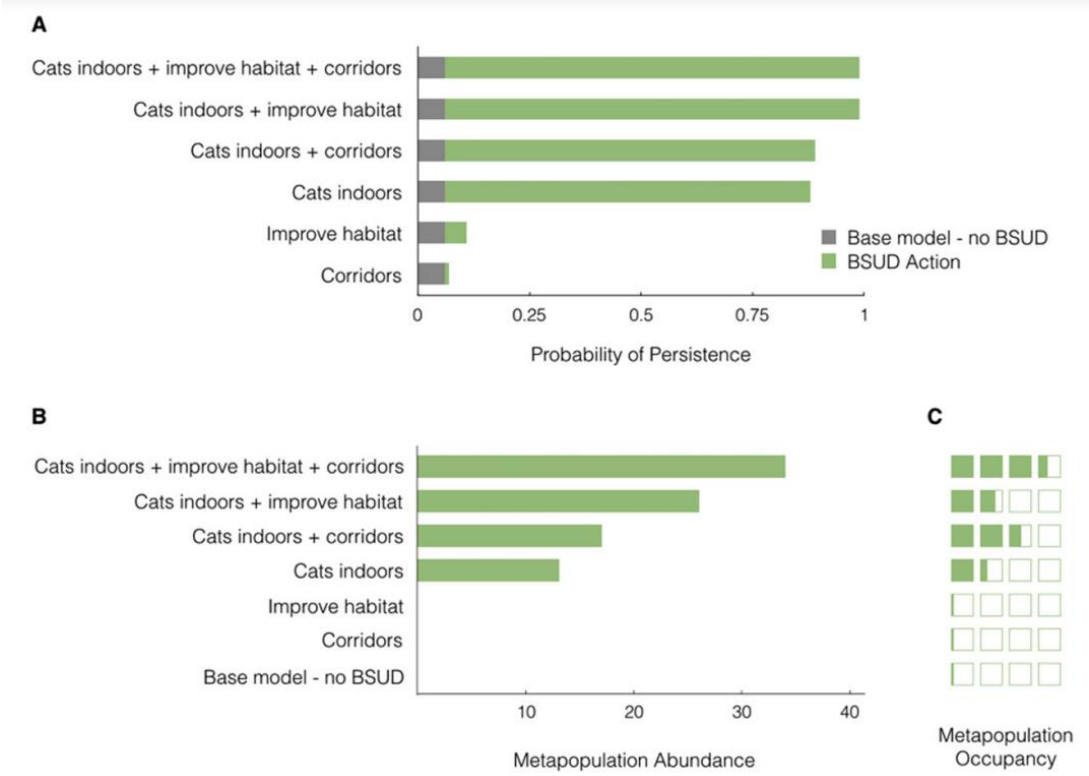


Figure 2: Example from Garrad et al. (2016) of PVA results for the striped legless lizard, Delma impar, after 25 years. (A) Probability of meta-population persistence; (B) meta-population abundance; (C) meta-population occupancy (number of filled squares indicates the number of filled populations)[18]

2.3 Principles

22. The ADG and UDG set out key principles in the design guidance sections for conservation objectives such as water (ADG objective 3.2) and tree canopies (UDG objective 10). We submit that similar principles should be set out for biodiversity in the ADG and UDG and that these principles should comprise of the BSUD principles set

[17] Georgia E. Garrard, Nicholas S.G. Williams, Luis Mata, Jordan Thomas and Sarah A. Bekessy, 'Biodiversity Sensitive Urban Design' (2018) 11(2) *Conservation Letters* 5.
[18] Ibid 7.

out by Garrard et al. (2016) from the Interdisciplinary Conservation Science Research Group (**ICON**), School of Global, Urban and Social Studies at RMIT University. These principles are as follows:

a. **Maintain and introduce habitat** – New developments should seek to avoid habitat loss by prioritizing development in areas of low ecological value, retaining and protecting existing vegetation and enhancing or creating habitat.[19]

b. **Facilitate dispersal** – Dispersal involves facilitating species to move away from their source population to other locations where they will settle and reproduce. Facilitating dispersal can mean adding animal movement infrastructure or establishing habitat connectivity. [20]

c. **Minimise threats and anthropogenic disturbances** – The effects of weeds and exotic predators can be reduced by landscaping with native species and pet containment programs.[21]

d. **Facilitate ecological processes** – We note that this principle would provide an ecologically sensitive approach to ADG Objective 1.5 (Green Infrastructure) and UDG Objective 4 (Mitigation of Place-Based Risks and Sustaining Ecological Values). It seeks to mitigate the disruptive effects of urbanisation on natural cycles, ecological processes and disturbance regimes can be addressed by provided resources for target species, protecting and enhancing pollinator habitat and planning for natural disturbance events like fires and floods .[22]

e. **Improve positive human-nature interactions** – This seeks to create opportunities for positive interactions for people with nature and encourages local stewardship of biodiversity. [23]

23. A key advantage of the BSUD principles is note that they can be converted into design guidance. We refer to the recent example of Fisherman's Bend as described in Kirk et al. (2021)[24], the largest urban renewal project in Australia, where BSUD principles are being applied (Figure 3). The Fisherman's Bend project proposes to transform five precincts from low-scale industry and warehouses to mixed-use residential and commercial neighbourhoods by 2050. Figures 4 and 5 below demonstrate how BSUD Principles have been translated into planning and design recommendations.

[19] Ibid 3.
[20] Ibid 3.
[21] Ibid 3.
[22] Ibid 3.
[23] Ibid 4.
[24] Holly Kirk, Georgia E. Garrarrd, Thami Croeser, Anna Backstrom, Katherine Berthon, Casey Furlong, Joe Hurley, Freya Thomas, Anissa Webb, Sarah A. Bekessy, 'Building biodiversity into the urban fabric: A case study in applying Biodiversity Sensitive Urban Design (BSUD)' (2021) Urban Forestry & Urban Greening 62:127176 <https://www.researchgate.net/publication/351469075_Building_biodiversity_into_the_urban_fabric_A_case_study_in_applying_Biodiversity_Sensitive_Urban_Design_BSUD>.

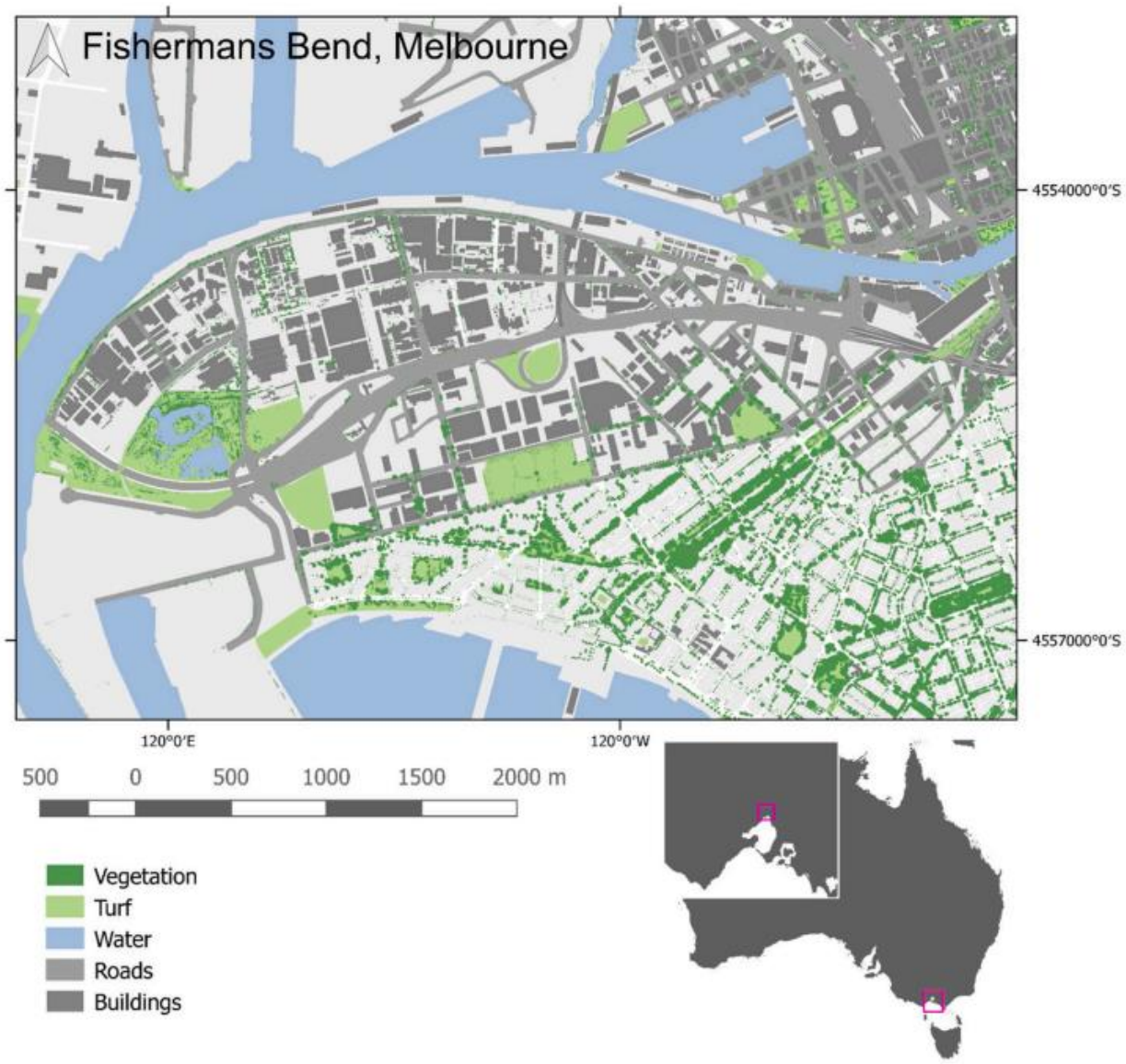


Figure 3: Map showing Fisherman's Bend Development area and location within Greater Melbourne and Australia[25]

[25] Ibid.

BSUD Principle	Ecological requirements	Example planning & design recommendations	References
Maintain & introduce habitat	Growling grass frog - wetlands/waterbodies - water-side vegetation - logs & rocks for shelter	- Permanent natural water bodies in parks - Rain gardens/vegetated swales on streets	Heard et al., 2010, 2012; Hale et al., 2013
Facilitate dispersal	Superb fairy-wren - dense native shrubs provide cover & nest sites - roads block movement between habitat patches - habitat patches < 750 m apart	- Native garden beds with diverse & dense vegetation structure in green spaces & linear parks - Vegetated "green bridge" structures for major roads - Habitat "stepping-stones" or "corridors"	Parsons, 2008; Harrisson et al., 2013; Braschler et al., 2020.
Minimize threats & disturbances	Blue-tongue lizard - Cats & dogs are predators - Vehicle collision causes mortality	- Legislate for responsible pet ownership - Roadside boundaries & crossing structures or underpasses to connect parks	Aresco, 2005; Barratt, 1997; Grilo et al., 2010; Woinarski et al., 2018.
Facilitate natural ecological processes	Blue-banded bee (pollinator) - native flowering plants - flower resources present though different seasons - limit pesticide spraying	- Provide many different plant species to supply flower food resources throughout the year - Legislate garden management plans to reduce spraying	Brown et al., 2020; Gross, 2018; Koyama et al., 2018; Wood and Goulson, 2017.
Improve potential human-nature interactions	All species - create "every day" ways to view local wildlife - integrate nature & people	- Shared spaces such as native vegetation around sports grounds or active transport links - Informative signs to promote connections & dispel conflict	Ikin et al., 2015; Miller, 2005; Ryan et al., 1998

Figure 4: Example showing how BSUD principles were linked to planning recommendations for Fisherman's Bend[26]

[26] Ibid.

Fungi

Habitat requirements:
- Damp soil
- Eucalyptus trees, fallen logs, dead plant matter/mulch
- Shade

Design implications:
- Contiguous soils with the ability to hold water or reliably damp patches of ground
- Eucalyptus trees
- Capacity to tolerate/embrace leaf litter & fallen vegetation

Blue-tongue lizard *(Tiliqua scinoides)*

Habitat requirements:
- Tussocky grasses & leaf litter
- Hiding places such as rocks/logs
- Open ground for basking
- Away from busy roads

Design implications:
- Low-storey (<50cm height) vegetaion
- Rocks or logs nearby for nesting and shelter
- Road underpasses and/or low traffic roads
- Fences/barriers along busy roads

Blue-banded bee *(Amegilla* spp.*)*

Habitat requirements:
- Diverse mid-storey flowering vegetation (ideally including native Dianella spp.)
- Vegetation in sheltered, sunny areas
- Long-stemmed plants
- Nesting areas of sandstone/mud/mortar

Design implications:
- Open garden beds planted with flowering plants (50-100cm height)
- Sandstone blocks or patches of masonry

White mangrove *(Avicennia marina)*

Habitat requirements:
- Clean saltwater & fresh water, saline mudflats
- Tidal zone allowing for both full inundation and air exposure
-Shelter from waves & root damage

Design implications:
- Edge or inlet tidal wetland areas
- Boat ramps or jetties to prevent vehicular disturbance
- Provision of boardwalks for human access

Superb fairy-wren *(Malarus cyaneus)*

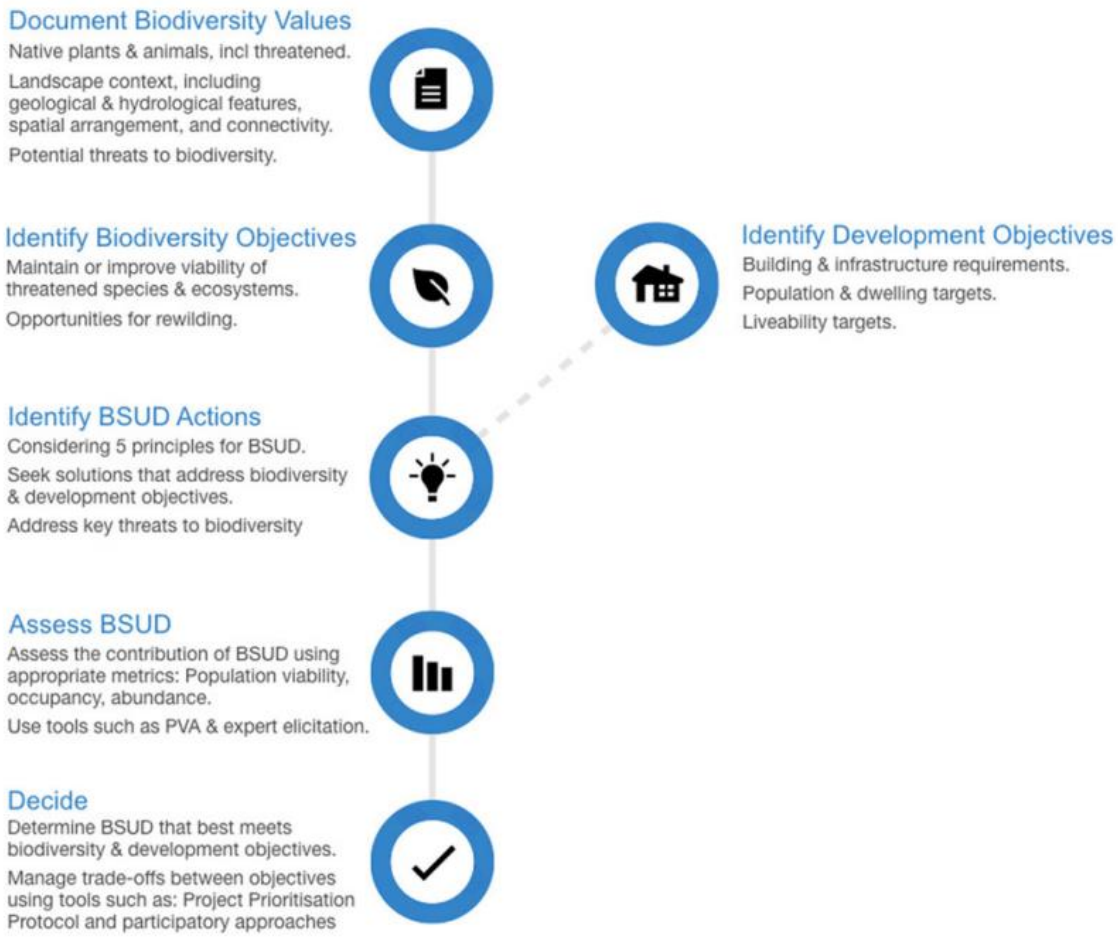
Habitat requirements:
- Dense vegetation cover including low shrubs
- Safe spaces for foraging on the ground
- Habitat connected by corridors

Design implications:
- Mid-storey shrubs & ground cover (<200cm heigh)
- Connections with parks and along quiet roads
- Place habitat to facilitate human encounters

Figure 5: Further example showing how BSUD principles were linked to planning recommendations for Fisherman's Bend[27]

[27] Ibid, Supplementary Materials A.

24. We consider that the ADG and UDG should integrate BSUD Principles as a substantive objective and also as part of Design Verification Statements as part of the Environmental Planning and Assessment Regulation 2000. The ADG and UDG should also incorporate the BSUD Framework as set out in Figure 6 below.



Recommendation 6: BSUD Principles and Framework to be incorporated into in the ADG and UDG.

Recommendation 7: BSUD Principles to be required as part of Design Verification Statements under the Environmental Planning and Assessment Regulation 2000.

Recommendation 8: Biodiversity target of no in-situ loss of habitat for any threatened species to be included in the DP SEPP, ADG and UDG.