

**DDES9014 – Imperatives for Sustainability:
Appropriate Solutions for Environmental Problems:
Regenerative or Solar Powered Buildings
by Ewen Munro (z3330746)**

Acknowledgement of Country

I would like to acknowledge that this project was created on the land of the Gadigal and Bidjigal peoples who traditionally occupied the Sydney Coast. I acknowledge Aboriginal or Torres Strait Islander people, and I pay my respects to Elders past and present.

Final Diagram

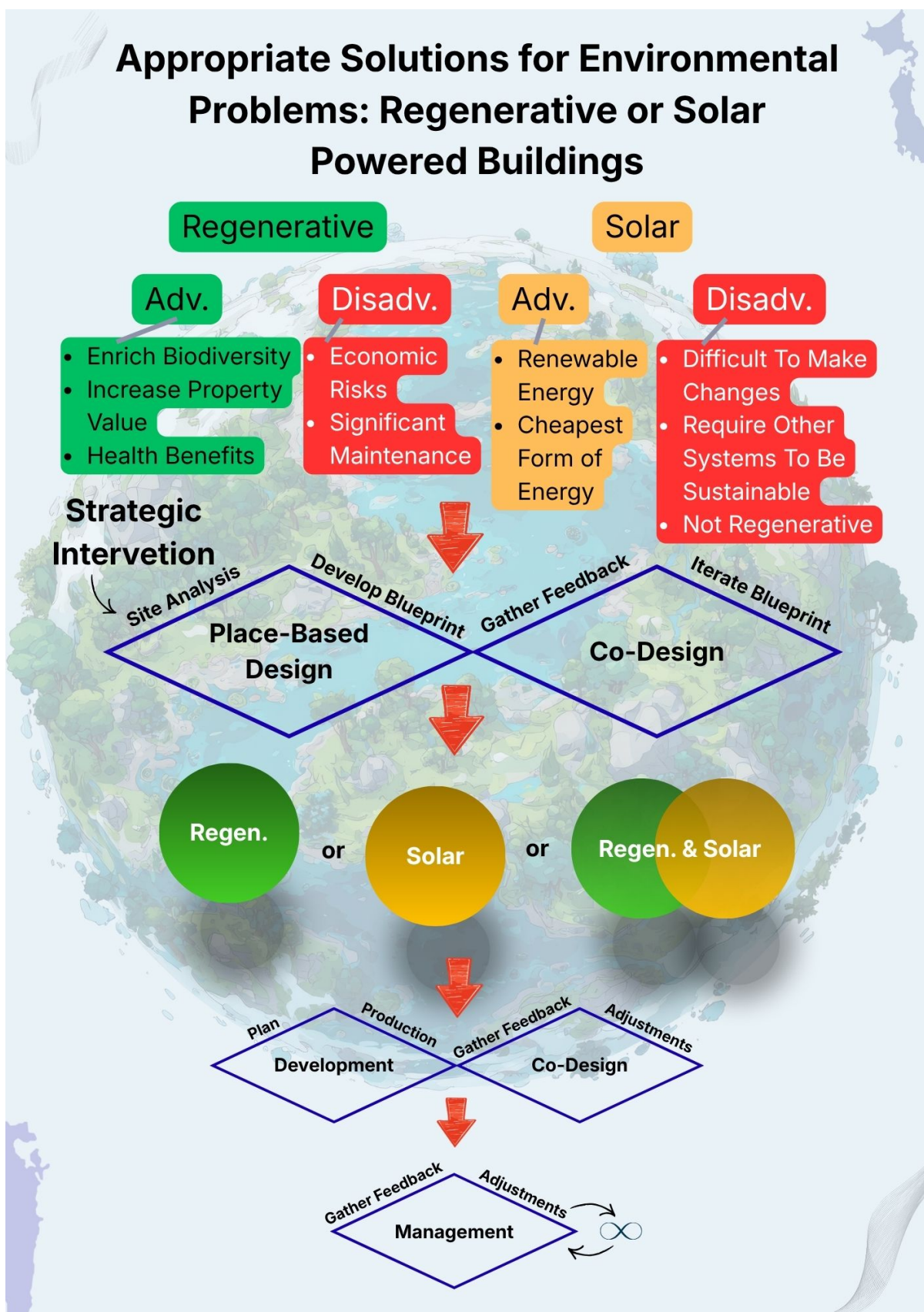
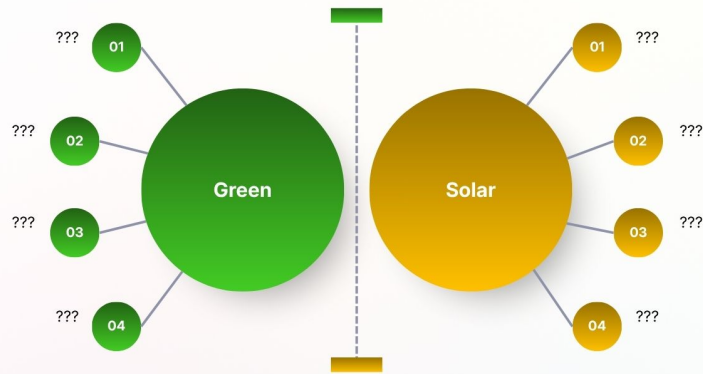
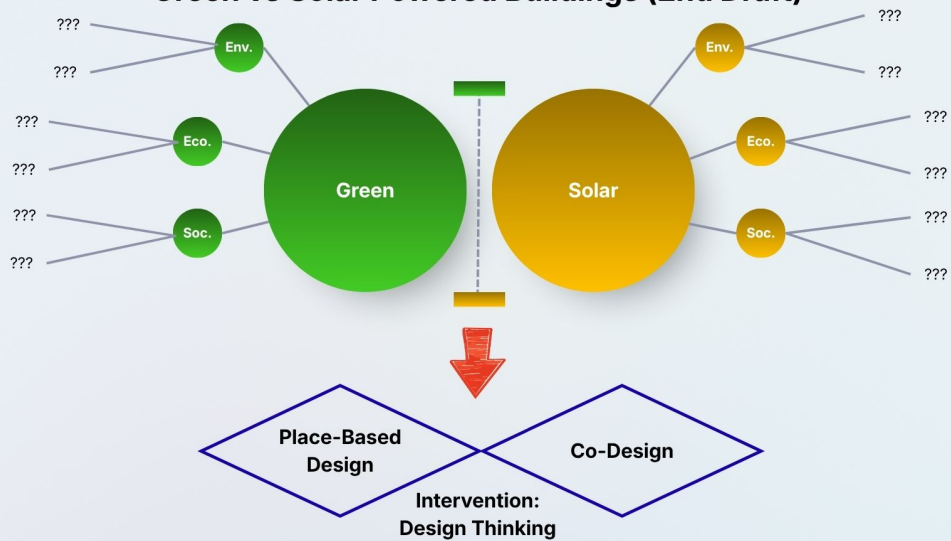


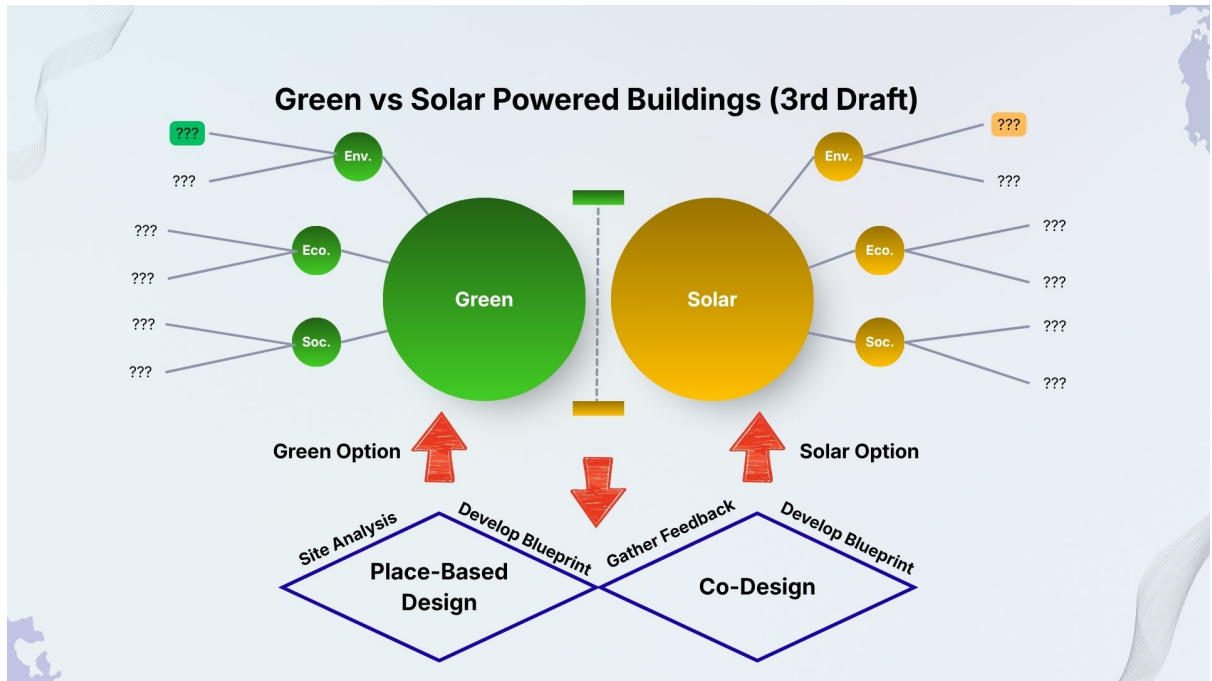
Diagram Drafts

Green vs Solar Powered Buildings (1st Draft)

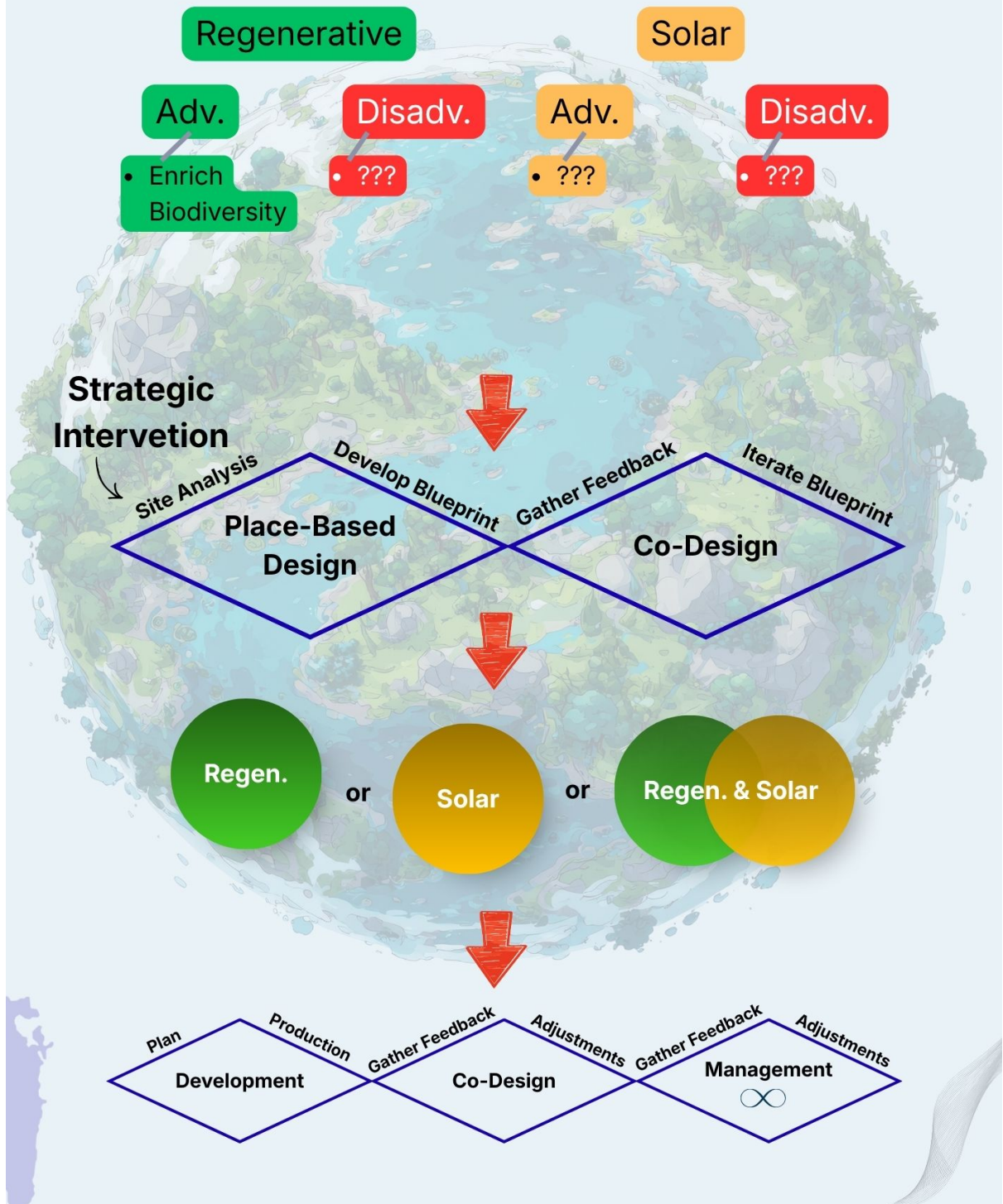


Green vs Solar Powered Buildings (2nd Draft)

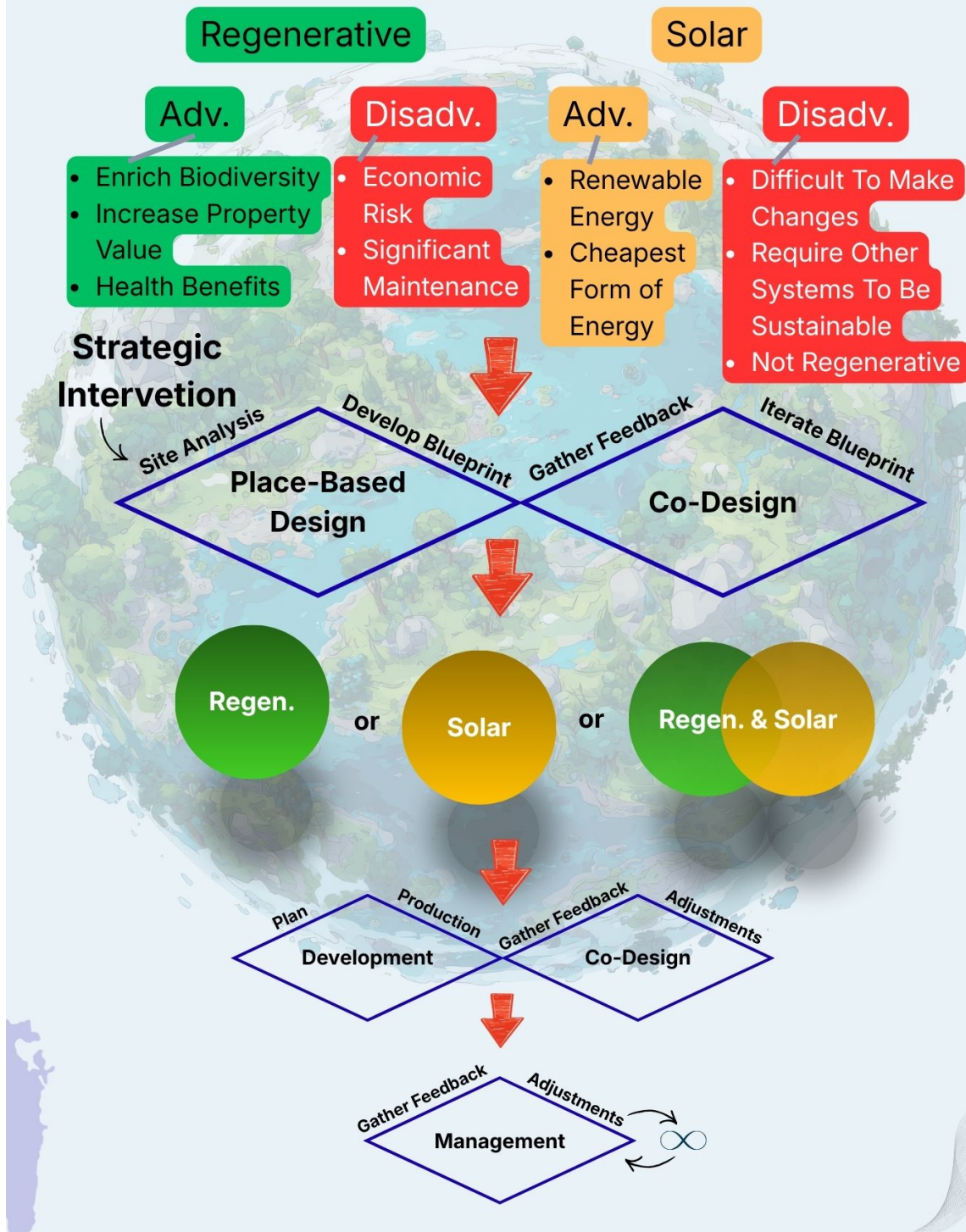




Appropriate Solutions for Environmental Problems: Regenerative or Solar Powered Buildings (4th Draft)



Appropriate Solutions for Environmental Problems: Regenerative or Solar Powered Buildings (5th Draft)



Critical Case Study

Introduction

With the Climate Crisis looming, it would be foolish for us to prescribe a singular solution to every environmental problem we face as doing so will more than likely have unintended negative environmental consequences. Thus, it would be wiser for us to analyse the environmental problem at hand and to implement the most appropriate solution for each specific context. This critical case study will compare Regenerative and Solar Powered buildings by using examples from Sydney: 28 Broadway St, Chippendale, a regenerative building, and the ICC, a building that is run by community solar power panels, to analyse the environmental trade-offs of both buildings, illustrate the importance of implementing the appropriate solution for the context at hand and produce an environmental framework that can be adopted globally to help designers more effectively identify the most appropriate solution for each environmental problem they face.

Method

We will first identify some of the environmental trade-offs that come from Regenerative buildings, using 28 Broadway St, Chippendale as the case study, before doing the same for Solar Powered buildings, using the ICC as the case study. From here, the environmental trade-offs will be compared to each other.

However, the breakdown of both Regenerative and Solar Powered buildings is not enough to determine which option would be more effective and thus, an analysis of the site is required. This is where the Strategic Intervention comes in. For the Strategic Intervention, we will utilise the Double-Diamond Method. Under the first diamond, we will use Place-Based Design, a method to analyse a site and develop an initial blueprint. We will then move to the second diamond and use a Co-Design method where we will gather feedback from various

stakeholders that are impacted by the site. All of the information gathered will help inform which solution is most viable: Regeneration, Solar Power or a combination of both.

The Double-Diamond Method will then be utilised to for the development and management process. The first diamond will plan out the build before starting production. As production gets underway, we will move to the second diamond in a Co-Design process, where we will again gather feedback from all stakeholders and make any adjustments in order to finalise the development. Moving onto the management process, we will continuously gather feedback from those utilising the site, continuing the Co-Design process, and make any adjustments as conditions change.

Case Study A: 28 Broadway St, Chippendale

After conducting a site analysis of this case study, it was clear that 28 Broadway St, Chippendale offered an environmental solution to the climate crisis, through regeneration. This was very evident with the building's green walls, as highlighted in the below photo:

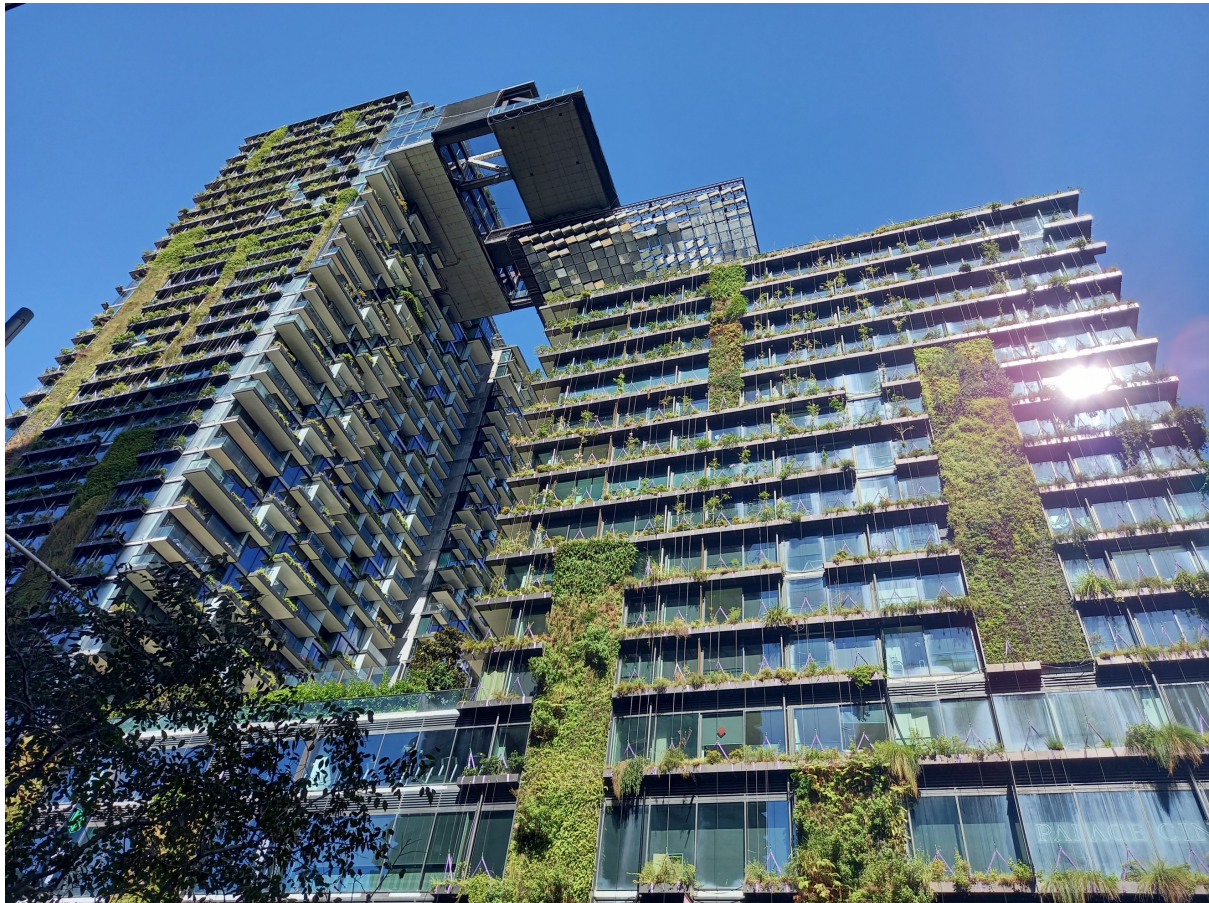


Figure 1: Photo of 28 Broadway St, Chippendale. Taken by Ewen Munro on 11th April 2026.

It is ingenious solutions like this that will go beyond Sustainability as a solution, as Sustainability does not go far enough to combating the climate crisis. This is highlighted in Qingchang & Andras' article:

“A significant number of studies have noted that sustainability represents an equilibrium point, which is insufficient to accomplish long-term development that improves the urban environment” (He, Q & Reith, A, p. 2)

However, this does not mean that environmental solutions like the one offered by this case study do not come without their trade-offs. While it is evident that Regenerative Design does help to combat the climate crisis, mainly by enriching biodiversity, as highlighted again in Qingchang & Andras' article “...and the indicator of enriching biodiversity was significantly emphasized” (He, Q & Reith, A, p. 7), in my site analysis, I observed that the wildlife,

especially the birds, were not interacting with the plant life on the building, which puts into question the effectiveness of the Regenerative solution of the building.

On top of this, after looking over a Development Application by a Local Planning Panel (Thomas, A & Wang, J), where the potential cost of works was \$5.6million, it is suggested that the upkeep or any changes to the green walls would come at a significant economic cost. What further emphasises this issue is the notable weathering of the green wall on the North side of the building, probably caused by the excessive sun exposure, which I observed during my site analysis. Green walls like the ones at 28 Broadway St, Chippendale are only effective if they can be maintained. Should there be any difficulty in maintaining the green walls, then there is a question as to whether or not Regenerative solutions like this are effective in combating the climate crisis.

Case Study B: ICC

According to ICC's Experience World Class Sustainability Highlights from 2019:

*"ICC Sydney hosts a **520kW** photovoltaic (PV) array owned by the community fund Sydney Renewable Solar. The PV array produces **545MWhr/year** which is enough energy to power 100 homes." (ICC)*

The ICC also utilises rainwater and waste management systems as highlighted in the same report (ICC). However, while these renewable systems are environmentally friendly, they also reflect an issue with Solar Panels, which is that Solar Panels on their own are not sustainable. Solar Panels must be developed along with other sustainable systems, as without these other systems, the building will continue to produce waste and continue other unfriendly environmental practices.

There is also a question around the strength of the ICC's Solar Panels. When I conducted my site analysis, the neighbouring Sofitel building cast a large shadow over the top of the ICC, which can be shown in the following image:



Figure 2: Photo of ICC Sydney. Taken by Ewen Munro on 11th April 2026.

And considering the development of the other tall building in the image above, there could potentially be another shadow cast over the ICC, implying that the ICC will have less time during the day to capture the sun's energy. This reflects a difficulty that Solar Panels have as a solution to the climate crisis, which is that they cannot foreshadow developments of any neighbouring buildings that might block the sun's rays.

There is also a question as to whether or not the rapid production of Solar Panels is not just another form of Sustainable Development, a concept that combines the terms 'sustainable' and 'development', even though these terms oppose each other:

“Sustainable development attempts to reconcile these opposing interests and aims to maximize economic and environmental benefits simultaneously. This is a contradiction in terms, because sustainability and development are based on very different and often incompatible assumptions.” (Banerjee, 2003, p. 158)

Putting into doubt whether or not Solar Panels are as environmentally friendly as they claim to be. What adds to this question is the fact that Solar Panels do not obtain any environmental yield, as all they do is extract energy from the sun.

Compare & Contrast

Looking at the environmental impacts of both solutions, at first glance, the Regenerative solution is the more favourable one for the environment. With the question around Sustainable Development in regards to Solar Panels, we are made to wonder whether or not Solar Panels are just business as usual, and that in order to actually combat the degenerative practices, sustainability is not enough, and that we require Regenerative solutions, as emphasised in the following diagram:

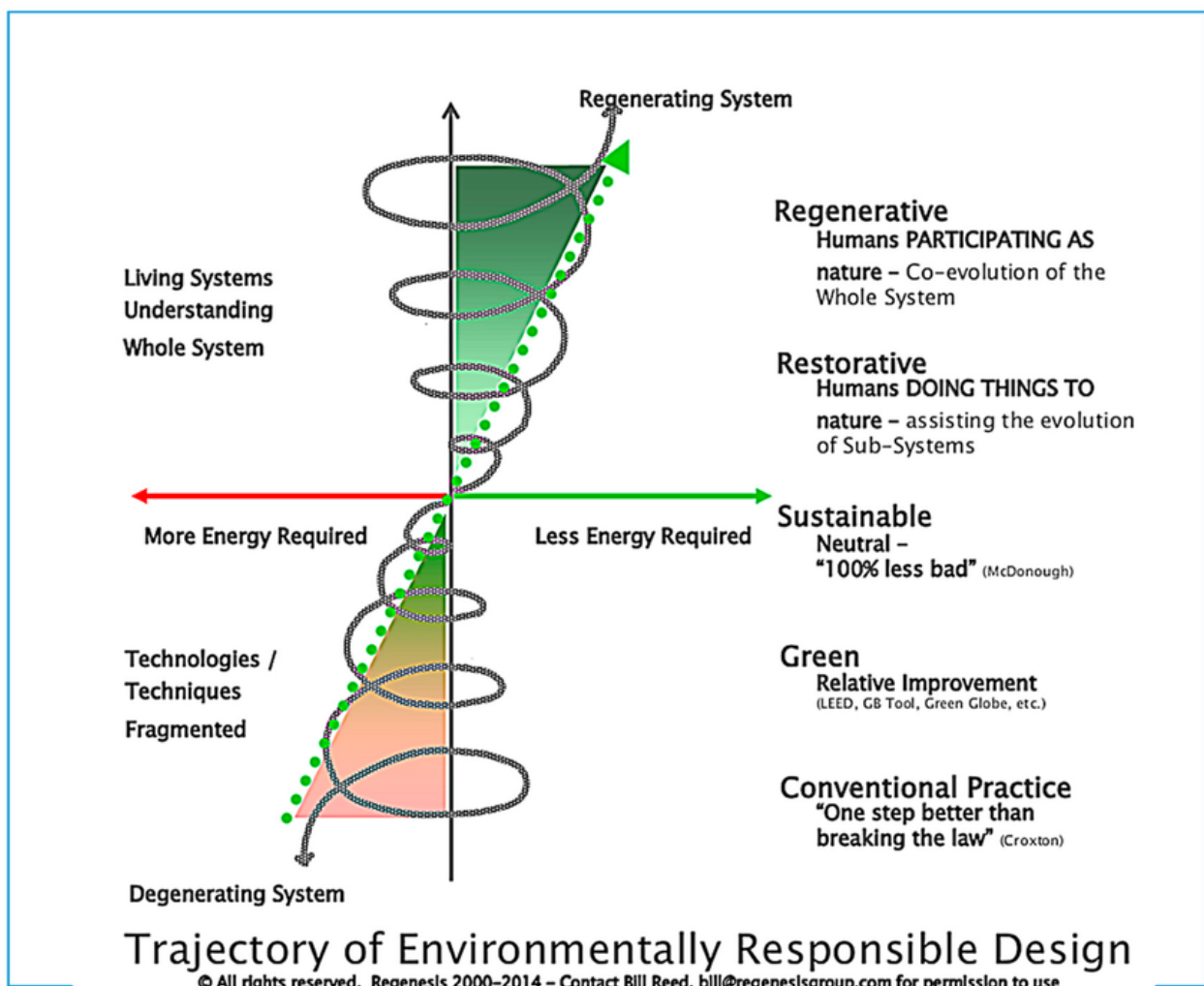


Figure 3: Diagram highlighting what Regenerative Design is and how it differs from Sustainability and Green design. Property of Regenesi, Bill Reed (2000-2014).

However, a Regenerative solution to combating the climate crisis is only a viable one if the solution is maintainable, and buildings do need energy regardless of whether their solution to the climate crisis is a Regenerative one or a Solar Powered one. It could then be argued that Solar Panels are the more feasible option for buildings, even if they are dependent on other systems, such as water and waste management systems in order for the building to be Sustainable.

What is evident here is that while Regenerative and Solar Powered solutions are both viable solutions for combating the climate crisis, despite the downsides that they do come with, to pedestalise one over the other is a fool's errand, and reflects that the only way in which we can determine which of these solutions is the more viable one is by measuring it against the given context a designer is facing.

Strategic Intervention

Using Design Thinking, we can develop a framework that'll act as our Strategic Intervention.

The Strategic Intervention will utilise the Double Diamond Method, a:

“...process to identify practices that can be targeted with the highest impact, based on objective science. It uses design thinking to develop strategies to respond to the environmental crisis in significantly reducing impacts in a participatory manner.” (Clune, S.J. & Lockrey, S, p79)

A visual understanding of the Double Diamond Method can be seen with the below image, taken from the final diagram:

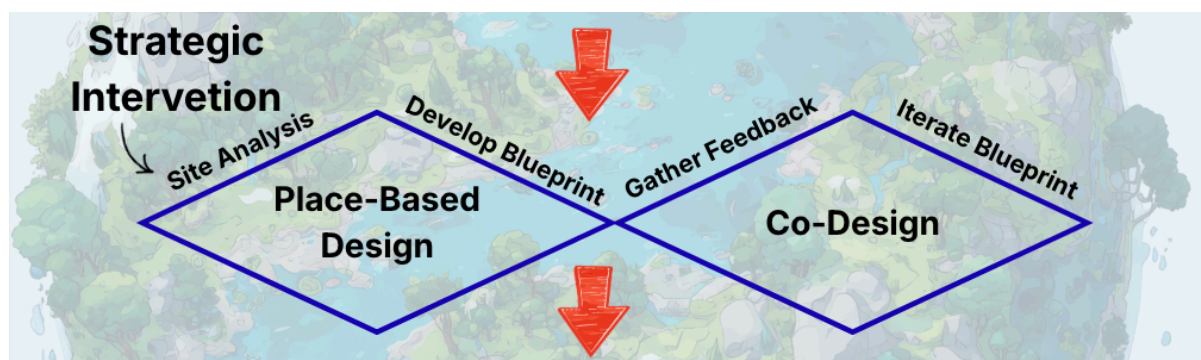


Figure 4: Image of first part of Strategic Intervention. Taken from Final Diagram. By Ewen Munro.

As is suggested by the above image, the first diamond will utilise Place-Based Design, “...a design philosophy that creates human environments by responding to the unique ecological, cultural, and social character of a specific location.” (Sustainability Directory). Place-Based Design requires the designer to firstly understand the place upon where they are about the build and develop a respect for the environment before building. This will then become the foundation for any ideas they have and enable them to develop a blueprint.

Moving on to the second diamond, the framework will utilise Co-Design, an approach that “...allows non-designers to become equal members of the design team.” (Trischler, J, et al., p1598-1599). This design approach is used here to gather information from the various stakeholders who will be impacted by the development, not only so that they can have a say, but also because it enables the designer to uncover any variables that they might have missed during their site analysis.

As the information is gathered, the blueprint is further developed to the point where they can determine which environmental solution is the most appropriate for the site they are developing on: Regenerative, Solar Powered, or a combination of both. Following on from this, the designer can utilise the Double Diamond Method for the Development and Management stages, where they, again, use a Co-Design strategy to continue to gather feedback from those utilising the development and make appropriate adjustments as needed.

The issues that might come out of this Strategic Intervention have to do with the obtaining the information of the site. To really utilise Place-Based Design for instance, the designer will not only have to know about design, but ecology, and how the site changes over time. The obvious solution to this would be to further utilise Co-Design strategies to obtain the information required. However, there is still a question as to the validity of the information being gathered. If those occupying the site don't have good information or are simply not willing to give the appropriate information, the designer could be collecting a lot of bad data that will only hamper the development of the project. Designers will have to really vet the information they are gathering through the entire development process in order for them to implement the most appropriate solution for the site they are working on.

Conclusion

As has been highlighted, both Regenerative and Solar Powered buildings are very viable solutions for combating the climate crisis, but both solutions come with their trade-offs and thus, it is wiser of us as designers to understand these trade-offs and the context at hand. It is by doing this that designers can come up with the most appropriate solution to combat the climate crisis, while also mitigating the downsides of the solution picked by working with those who are utilising the building. It is by following this framework that has been laid out in this essay that we can give ourselves the most optimal chance of combating this climate crisis.

Research Journal

Author Name(s)	Yr.	Title	Type of Lit.	Key Points	Pages	Usefulness to my research	Link to Sources
Raymond J. Cole	2011	Transitioning from green to regenerative design	Scholarly Books (chapter)	<ul style="list-style-type: none"> ○ “Regenerative design requires a fundamental re-conceptualization of the act of building design primarily in terms of imagining, formulating and enabling its role within a larger context.” – p45 ○ “While the technical strategies of green design will remain valid, the intention and language of regenerative design and 	P39-53	<ul style="list-style-type: none"> ○ This article was very useful in giving me a basis for which to understand Regenerative Design and the importance of going beyond just having green. 	https://doi.org/10.1080/09613218.2011.610608

				<p>development particularly for the partnering and coexistence of human and natural systems, offers considerable potency for a broad-based environmental approach.” – p48</p> <ul style="list-style-type: none">○ “While green design has required design team members to gain familiarity with a host of environmental strategies and to blur professional boundaries, regenerative design drives designers towards positioning these within a whole			
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				system setting” – p50			
Qingchang He and Andras Reith	2022	(Re)Defining Restorative and Regenerative Urban Design and Their Relation to UNSDGs—A Systematic Review	Journal Article	<ul style="list-style-type: none"> “A significant number of studies have noted that sustainability represents an equilibrium point, which is insufficient to accomplish long-term development that improves the urban environment” – p2 “The term “regenerative” refers to a process that repairs, recreates, or revitalizes its own sources of energy, air, water, or any 	P1-29	<ul style="list-style-type: none"> This article was the main article I used for creating a foundation for Regenerative Urban Design and helped to complement my analysis of 28 Broadway St, Chippendale This article also highlighted that one of the major benefits of Regenerative Design is 	https://doi.org/10.3390/su142416715

				<p>other matter’. In addition, regenerative urban design is also regarded as the process of replacing the present linear system with a cyclical system that aims at achieving the rebirth of life itself, and therefore provides hope for the future” – p2</p>		<p>enriched biodiversity</p>	
<p>Jakob Trischler, Timo Dietrich & Sharyn Rundle-Thiele.</p>	<p>2019</p>	<p>Co-design: from expert-to user-driven ideas in public service design</p>	<p>Journal Article</p>	<ul style="list-style-type: none"> “Co-design uses a collaborative team approach that allows non-designers to become equal members of the design team.” - p1598-1599 	<p>P1595-1619</p>	<ul style="list-style-type: none"> This article gave me the foundation and definition for Co-Design, which I used for my 	<p>https://doi.org/10.1080/14719037.2019.1619810</p>

						Strategic Intervention	
Andrew Thomas & Joe Wang	2022	Item 5. Development Application - 28 Broadway, Chippendale - D/2022/101	Reputable Report	<ul style="list-style-type: none"> “The proposal seeks to install solid perimeter wall behind the existing glazing to the entire elevation at Level 2 and part of the elevation at Level 3 of the premises. This is considered acceptable given the existing food court at Level 2 and the cinema at Level 3 also had similar solid walls behind the existing glazing. Given the scale of the building and the existing green walls on the façade of the 	P1-23	<ul style="list-style-type: none"> This report highlights the costs of a new proposal at 28 Broadway St, Chippendale and alludes to the potential costs for upkeep or any significant changes needed at the site. 	https://meetings.cityofsydney.nsw.gov.au/documents/s62502/Development%20Application%2028%20Broadway%20Chippendale%20-%20D2022101.pdf

				building, the proposal is considered acceptable. The proposal was reviewed by Council's urban designer who supports the application.” – p21			
Maria Manso, Ines Teotonio, Cristina Matos Silva & Carlos Oliveira Cruz	2020	Green roof and green wall benefits and costs: A review of the quantitative evidence	Journal Article	<ul style="list-style-type: none"> ○ “Green roofs and green walls add property value to buildings” – p5 ○ “...an average increase of 8,24% was determined” – p5 	P1-16	<ul style="list-style-type: none"> ○ This article was useful in highlighting the economic benefits of green walls. 	https://doi.org/10.1016/j.rser.2020.110111
Marcel Cardinali, Alvaro Balderrama, Daniel Arzmann &	2023	Green walls and health: An umbrella review	Journal Article	<ul style="list-style-type: none"> ○ “...demonstrated consistent positive associations...” – p12 	P1-15	<ul style="list-style-type: none"> ○ This article was useful in highlighting that there are health benefits to 	https://doi.org/10.1016/j.nbsj.2023.100070

Uta Pottgiesser.				<ul style="list-style-type: none"> “...the body of evidence is still limited.” – p12 		<p>green walls, whilst also alluding to the lack of research on the topic.</p>	
ICC	2019	Experience World Class Sustainability Highlights	Reputable Report	<ul style="list-style-type: none"> “ICC Sydney hosts a 520kW photovoltaic (PV) array owned by the community fund Sydney Renewable Solar. The PV array produces 545MWhr/year which is enough energy to power 100 homes.” 	N/A	<ul style="list-style-type: none"> This report gave me a lot of information on ICC’s sustainability practices and in particular, details about its Solar panels. 	<p>https://iccsydney.com.au/wp-content/uploads/2023/05/icc-sydney_sustainability-highlights_v7a.pdf</p>
IEA	2022	Solar PV still dominates renewable energy capacity additions	Reputable Report	<ul style="list-style-type: none"> “Despite current higher investment costs due to elevated commodity 	N/A	<ul style="list-style-type: none"> This report was useful in providing me with the 	<p>https://www.iea.org/energy-system/renewables/solar-pv</p>

				prices, utility-scale solar PV is the least costly option for new electricity generation in a significant majority of countries worldwide.”		latest data on Solar Panels.	
Subhabrata Bobby Banerjee	2003	Who Sustains Whose Development? Sustainable Development and the Reinvention of Nature. Organization studies	Journal Article	<ul style="list-style-type: none"> “Sustainable development attempts to reconcile these opposing interests and aims to maximize economic and environmental benefits simultaneously. This is a contradiction in terms, because sustainability and development are 	P143-180	<ul style="list-style-type: none"> This report was useful in giving me a definition and explanation of Sustainable Development and enabled me to critique Solar Panels and questioning whether or not the use 	https://journals.sagepub.com/doi/pdf/10.1177/0170840603024001341

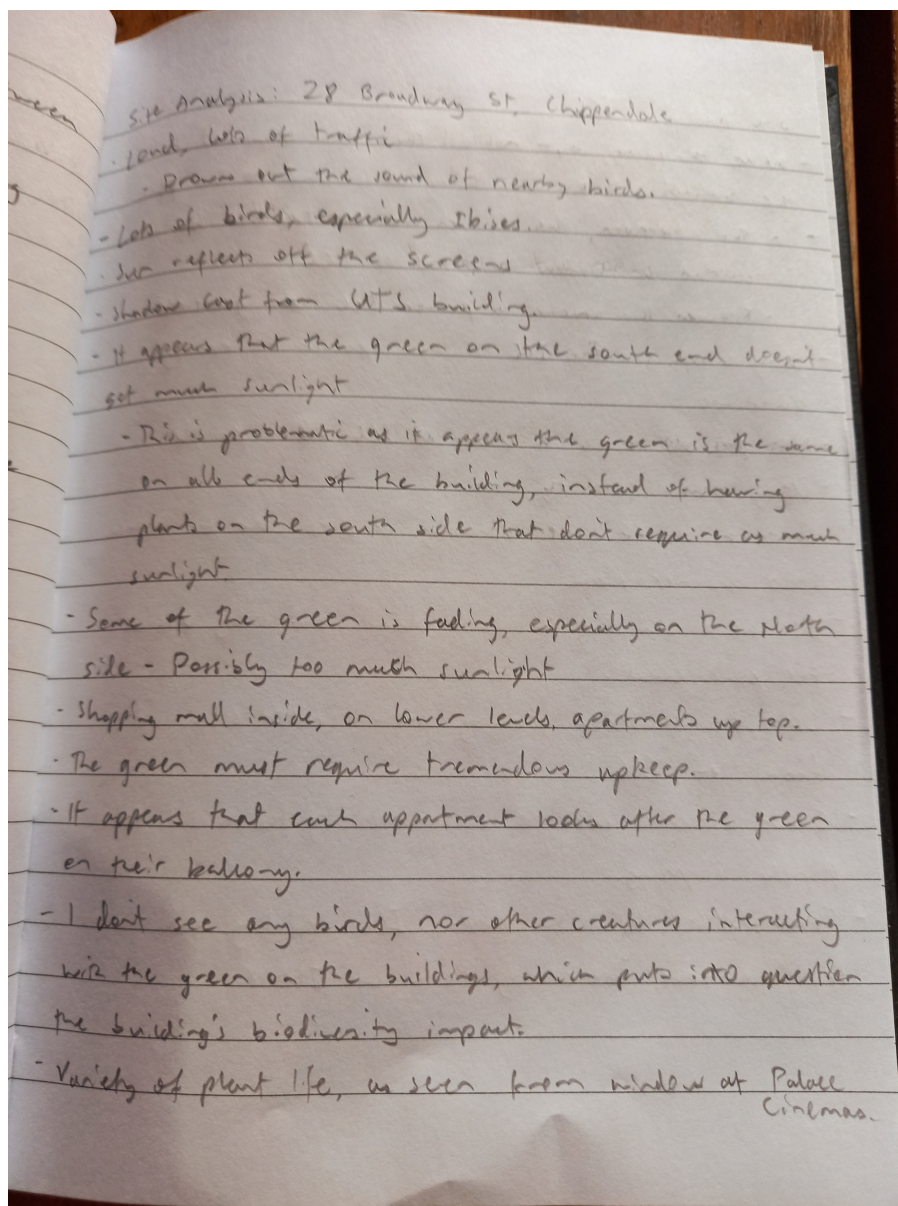
				based on very different and often incompatible assumptions.” – p158		of Solar Panels is a business as usual scenario.	
Stephen J. Clune & Simon Lockrey	2014	Developing environmental sustainability strategies, the Double Diamond method of LCA and design thinking: a case study from aged care	Journal Article	<ul style="list-style-type: none"> “...process to identify practices that can be targeted with the highest impact, based on objective science. It uses design thinking to develop strategies to respond to the environmental crisis in significantly reducing impacts in a participatory manner.” – p79 	P67-82	<ul style="list-style-type: none"> This article gave me a good explanation of the Double Diamond Method and used its definition to help explain it in my Strategic Intervention. 	https://doi.org/10.1016/j.jclepro.2014.02.003

<p>Lifestyle Sustainability Directory</p>	<p>2025</p>	<p>Place-Based Design</p>	<p>Reputable Report</p>	<ul style="list-style-type: none"> “...a design philosophy that creates human environments by responding to the unique ecological, cultural, and social character of a specific location.” 	<p>N/A</p>	<ul style="list-style-type: none"> This report gave me a good definition for Place-Based Design and helped me to explain the process in my assessment. 	<p>https://lifestyle.sustainability-directory.com/term/place-based-design/</p>
<p>Government Architect NSW</p>	<p>2023</p>	<p>Connecting with Country</p>	<p>Reputable Report</p>	<ul style="list-style-type: none"> “Adopting a Country-centred approach creates better places, informs sustainable designs, integrates with the broader landscape to form place-based design responses, and promotes strong community 	<p>P1-92</p>	<ul style="list-style-type: none"> This article was a very good example of Place-Based Design and as it’s utilised throughout the Connecting with Country framework. 	<p>https://www.planning.nsw.gov.au/sites/default/files/2023-10/connecting-with-country.pdf</p>

				engagement to create welcoming and accessible places.” – p51			
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Site Analysis

28 Broadway St, Chippendale (All images supplied by Ewen Munro -
Taken on: 11th April 2026)



Notes Typed Up:

Site Analysis: 28 Broadway St, Chippendale

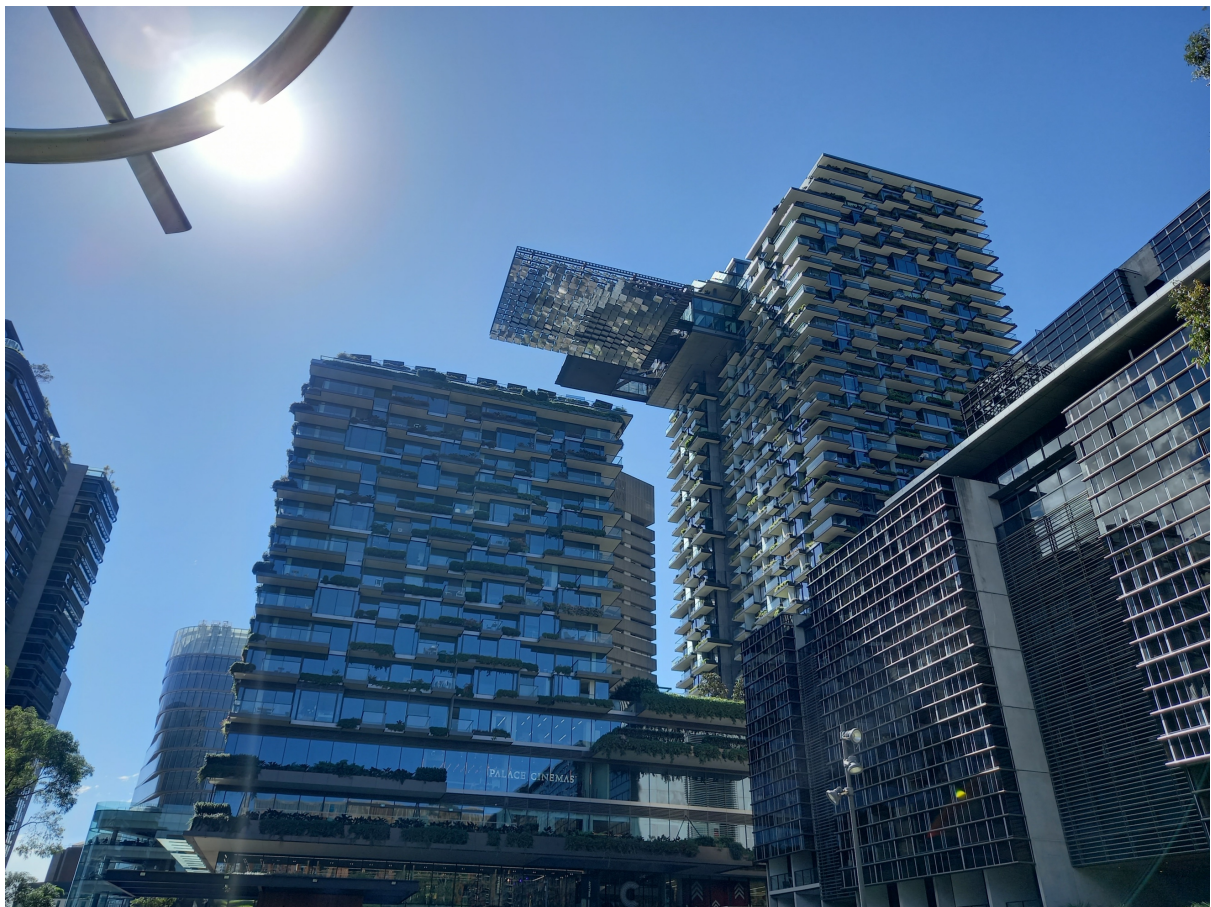
- Loud, lots of traffic
 - Drowns out the sound of nearby birds
- Lots of birds, especially ibises
- Sun reflects off the screens
- Shadow cast from UTS building
- It appears that the green on the south end doesn't get much sunlight
 - This is problematic as it appears the green is the same on all ends of the building, instead of having plants on the south side that don't require as much sunlight

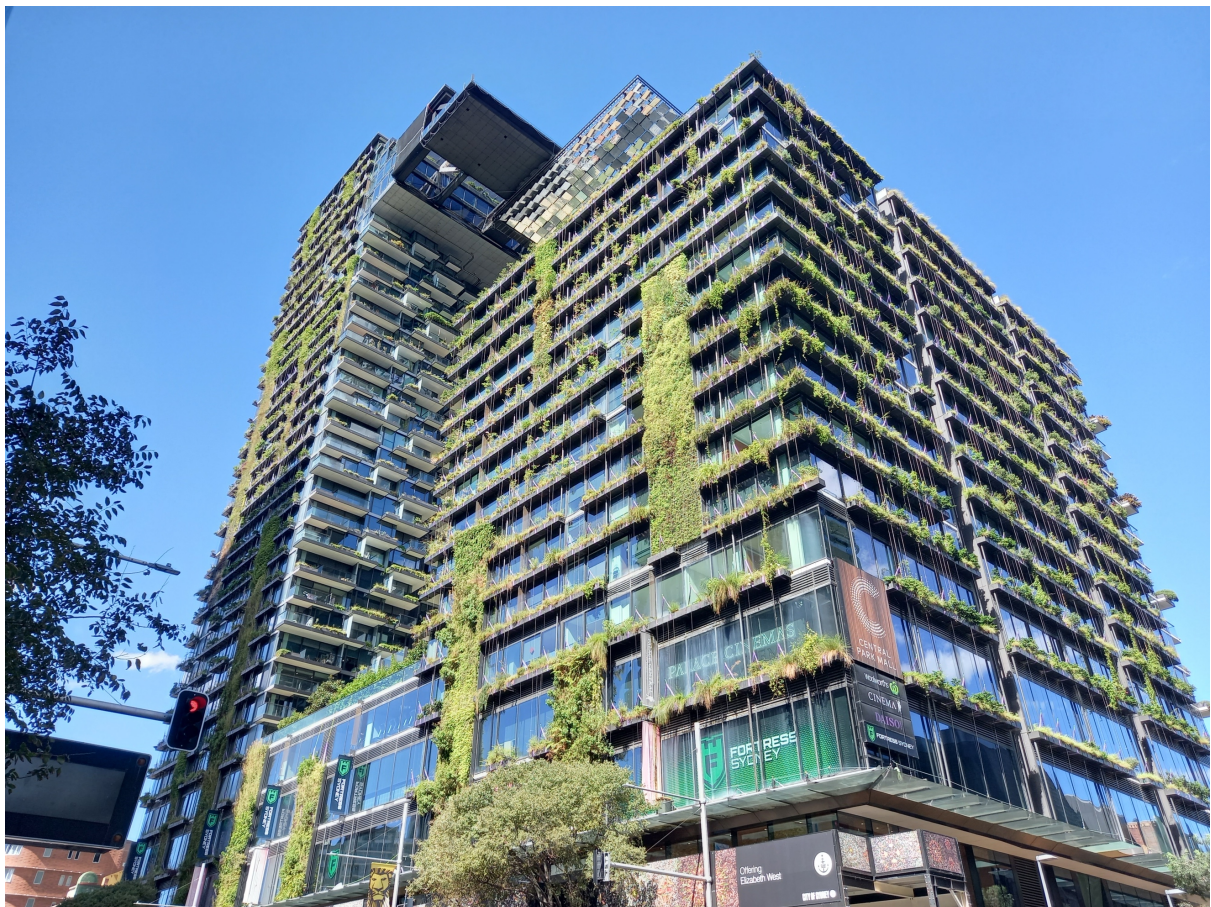
- Some of the green is fading, especially on the North side – Possibly too much sunlight
- Shopping mall inside, on lower levels, apartments up top
- The green must require tremendous upkeep
- It appears that each apartment looks after the green on their balcony
- I don't see any birds, nor other creatures interacting with the green on the buildings, which puts into question the building's biodiversity impact
- Variety of plant life, as seen from window at Palace Cinemas

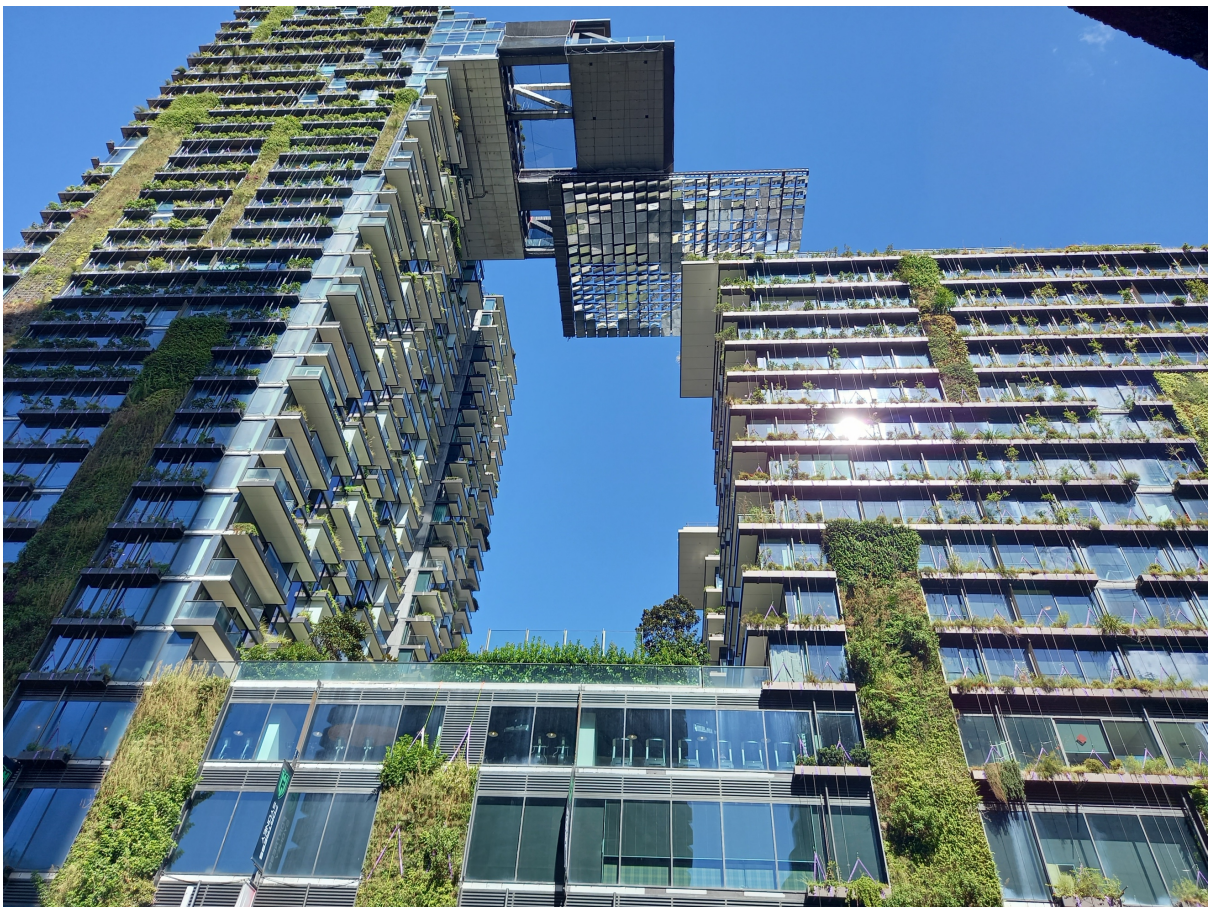
Images of Site:



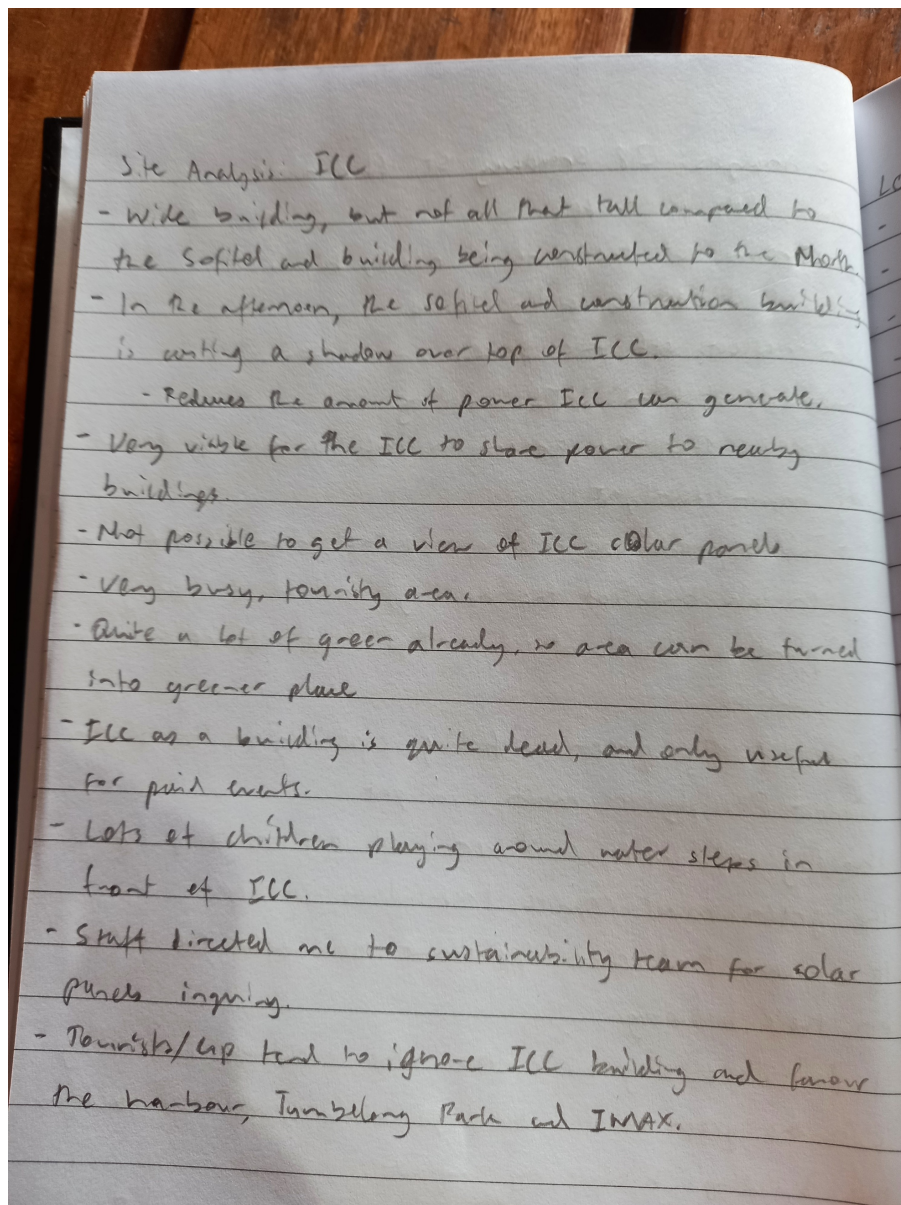










ICC (All images supplied by Ewen Munro - Taken on: 11th April 2026)

Notes Typed Up:

- Wide building, but not all that tall compared to the Sofitel and building being constructed to the North
- In the afternoon, the Sofitel and construction building is casting a shadow over top of ICC
 - Reduces the amount of power ICC can generate
- Very viable for the ICC to share power to nearby buildings
- Not possible to get a view of ICC solar panels
- Very busy, touristy area
- Quite a lot of green already, so area can be turned into greener place
- ICC as a building is quite dead, and only useful for paid events
- Lots of children playing around water steps in front of ICC
- Staff directed me to sustainability team for solar panels inquiry
- Tourists/GP tend to ignore ICC building and favour the harbour, Tumbalong Park and IMAX

Images of Site:

















References:

- 1) Banerjee, S.B. (2003). Who Sustains Whose Development? Sustainable Development and the Reinvention of Nature. *Organization studies*, 24(1), 2003-01, p143-180.
<https://journals.sagepub.com/doi/pdf/10.1177/0170840603024001341>
- 2) Clune, S.J & Lockrey, S. (2014). Developing environmental sustainability strategies, the Double Diamond method of LCA and design thinking: a case study from aged care. Elsevier, p67-82. <https://doi.org/10.1016/j.jclepro.2014.02.003>
- 3) He, Q & Reith, A. (2022). (Re)Defining Restorative and Regenerative Urban Design and Their Relation to UNSDGs—A Systematic Review. *Sustainability*, p1-29.
<https://doi.org/10.3390/su142416715>
- 4) ICC. (2019). *Experience World Class Sustainability Highlights*. ICC Sydney.
https://iccsydney.com.au/wp-content/uploads/2023/05/icc-sydney_sustainability-highlights_v7a.pdf
- 5) Sustainability Directory. (2025). Place-Based Design. Lifestyle Sustainability Directory.
<https://lifestyle.sustainability-directory.com/term/place-based-design/>
- 6) Thomas, A & Wang, J. (2022). Item 5. Development Application - 28 Broadway, Chippendale - D/2022/101. P1-23.
<https://meetings.cityofsydney.nsw.gov.au/documents/s62502/Development%20Application%2028%20Broadway%20Chippendale%20-%20D2022101.pdf>
- 7) Trischler, J, Dietrich, T & Rundle-Thiele, S. (2019). Co-design: from expert- to user-driven ideas in public service design. *Public Management Review*, p1595-1619.
<https://doi.org/10.1080/14719037.2019.1619810>