

ICONIC BUILDING:

SUSTAINABLE DESIGN & THE LIVING BUILDING CHALLENGE

UNIT PLAN (YEARS 9-10)

CONTEXT

This unit introduces students to sustainable architectural and systems design through the Living Building Challenge (LBC) framework: [Living Building Challenge - Living Future](#) and the Archi ED “What is Sustainable Design?” workshop. Students explore the environmental, social and technological implications of design decisions and develop a conceptual proposal for a sustainable iconic building in Adelaide.

ACARA ALIGNMENT DESIGN & TECHNOLOGIES (YEARS 9-10)

KNOWLEDGE & UNDERSTANDING

- [AC9TDE10K01](#) - analyse how people in design and technologies occupations consider ethical, security and sustainability factors to innovate and improve products, services and environments
- [AC9TDE10K06](#) - analyse and make judgements on how characteristics and properties of materials, systems, components, tools and equipment can be combined to create designed solutions

PROCESSES & PRODUCTION SKILLS

- [AC9TDE10P01](#) - analyse needs or opportunities for designing; develop design briefs; and investigate, analyse and select materials, systems, components, tools and equipment to create designed solutions
- [AC9TDE10P02](#) - apply innovation and enterprise skills to generate, test, iterate and communicate design ideas, processes and solutions, including using digital tools
- [AC9TDE10P04](#) - develop design criteria independently including sustainability to evaluate design ideas, processes and solutions

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LEARNING INTENTIONS

Students will be able to:

- Understand what sustainable design is and how the Living Building Challenge petals contribute to holistic sustainability.
- Apply sustainability principles when designing buildings and built environments.
- Generate, justify and communicate design decisions that consider environmental, social and aesthetic impacts.
- Use design thinking methods (research, ideation, iteration) to propose a small-scale architectural concept aligned with at least three LBC petals.

SUCCESS CRITERIA

Students can:

- Explain key sustainability concepts using correct design terminology.
- Apply the LBC petal questions to guide decision-making.
- Produce drawings, models or digital artefacts that show purposeful sustainable design choices.
- Justify how their building enhances environment, community and well-being.
- Present their concept clearly using annotated visuals and spoken or written explanations.

This resource was developed by **Archi ED**, [Archi ED - Australian Institute of Architects](#) an initiative of the Australian Institute of Architect's SA Chapter, based on a workshop designed by Brychan Asaris (committee chair), Senior Architect, Russell and Yelland SA, and mapped to curriculum by Ella Camporeale (committee member), Curriculum Leader for Art, Design and Digital Technologies, Westminster School, SA.

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TOOLS/MATERIALS REQUIRED

- Sketching equipment (e.g. paper, pencils, markers)

Optional Materials/Tools

- Model making equipment (e.g. cardboard, scissors, tape, lego, 3D printers)
- Printed maps/site plans
- Digital Tools e.g. CAD software (free for education) - e.g. [SketchUp for Schools](#), [Minecraft Education](#), [Tinkercad](#), [Autodesk Fusion 360](#)

TEACHER PRE-LEARNING

Some familiarisation with knowledge/concepts is recommended.

Iconic Buildings

- [Buildings archivo - WikiArquitectura](#)
- [Timeline of architectural styles - Wikipedia](#)
- [10 Best Architectural Buildings in Adelaide, Australia: Icons of Design and Innovation - Engineers and Architects of America](#)

Sustainable Design (e.g. water, energy, materials)

- [yourhome.gov.au](#)

Regenerative Design (Petals and “Living Buildings”)

- [Living Building Challenge - Living Future](#)
- [Living Building Case Studies](#)

UNIT OVERVIEW (4-5 WEEKS)

Task:

To locate a site in Adelaide for a new sustainable iconic building. Using the “petals” of the living building challenge as a guide, find a location, philosophy and some basic ideas for this new building. Students can choose how many petals to align with, but we encourage that at least 3 are looked at. How students choose to present their project is up to them and you as their teacher. This isn't meant to be a fully realised design, the goal is to help students understand how the different elements are combined into a single building and how we can think about the buildings around us and how we can make them better.

Constraints:

The total footprint of the building is 3000m². This can be in one large block, or this could be vertical with 3000m² split across floors to reduce the footprint e.g. 6 floors of 500m². Or, the footprint can be split, for example across 6 smaller buildings. The buildings can be as tall or as short as desired. This is the only size requirement, but the choice needs some justification alignment to a petal.

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WEEK 1 INTRODUCTION TO SUSTAINABLE DESIGN

Focus: What is sustainable design? Why does it matter?

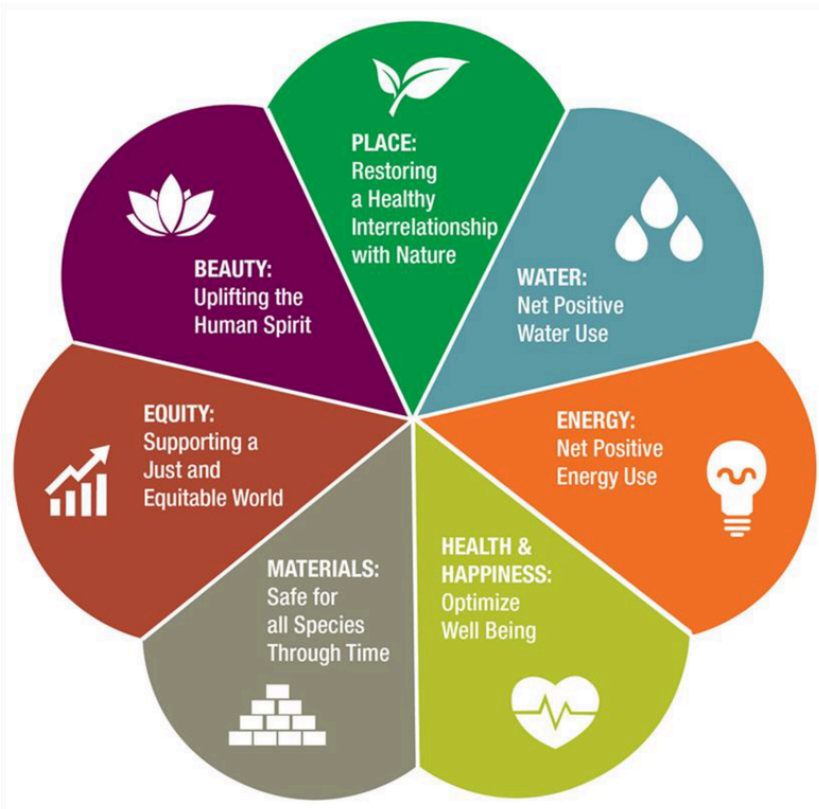
Lesson Components

Unit Introduction

- Overview of sustainability in architecture.
- Discussion of iconic buildings: global, national, local.
- The Living Building Challenge (LBC) Overview

The Living Building Challenge is an international sustainable building certification program created in 2006 by the non-profit International Living Future Institute. It is described by the Institute as a philosophy, advocacy tool and certification program that promotes the measurement of sustainability in the built environment. It can be applied to development at all scales, from buildings— both in new constructions and renovations—to infrastructure, landscapes, neighborhoods, both urban and rural communities. [Living Building Challenge - Living Future](#)

- Introduce the 7 petals: Place, Water, Energy, Health & Happiness, Materials, Equity, Beauty.
- Project the LBC petal diagram



- Small-group discussion: How do these differ from typical building standards?

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WEEK 1 INTRODUCTION TO SUSTAINABLE DESIGN

Student Activity

- Students respond to guided petal questions to build baseline understanding.

PLACE	Place questions for students...
<p>This petal is created with the purpose of having designers analyse the location of a site and the impacts the construction will have on the nearby environment and society before being built and during its operation. It focuses on creating a connected community that is more pedestrian focused, protecting and restoring existing nature, and encouraging a healthy level of density.</p>	<p>What impact does your location have on the surrounding environment? Do you need to demolish something existing? Remove trees? Remove natural elements e.g. creeks, rivers. Does the location help promote a reduction in cars? Is it close to public transport? Bike lanes? Does the building incorporate ways to get to it other than cars? Is the building far away from the CBD or closer?</p>
WATER	Water questions for students...
<p>This petal directly addresses the scarcity of water. A certified building is required to be designed to only use the amount of water that can be harvested onsite and purify the water without the use of chemicals. Projects achieving this petal often employ rainwater catchment cisterns, greywater or closed-loop systems, compostable toilets, and other techniques to reduce and recycle water.</p>	<p>How does your building capture water? How does it store water? How can it clean and reuse water? Does the building affect any water around them e.g. beaches, rivers etc. Is it positioned on the site to maximise water capture e.g. from rain/wind?</p>
ENERGY	Energy questions for students...
<p>This petal focuses on the reduction and efficiency of energy by requiring the building to produce on-site 105% of the energy it needs year round. It also aims to shift the grid the building is connected to towards more renewable energy.</p>	<p>Can your building capture energy? Can it produce energy? All year around? Day and night? Is it positioned on the site to maximise energy capture e.g. orientated towards the sun, or wind direction? Can the building heat and cool itself without the use of aircon? (see health and happiness for some clues). Does it have any unique ways it generates energy e.g. do all the staff in the building have treadmills connected to generators to help make electricity?</p>



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WEEK 1 INTRODUCTION TO SUSTAINABLE DESIGN

HEALTH AND HAPPINESS	Health and Happiness questions for students...
<p>This petal focuses on improving the source of health problems such as indoor air quality, thermal comfort, visual comfort, and integration of nature in order to increase the quality of human health and productivity. Projects often employ biophilic design, daylighting, operable windows, and other techniques to achieve this petal.</p>	<p>What are some biophilic elements of the design? Does the building let in enough light during the day so it uses less lights? Can the windows open to let air into the building? Are the windows shaded enough to not let the hot sun overheat the building? Are there any natural elements near it to help regulate its temperature? Trees to shade windows? Water to cool the building down e.g. sea, lake, creek.</p>
MATERIALS	Materials questions for students...
<p>This petal's intention is to focus on eliminating the use of construction materials that have adverse environmental, health, and social impacts. These impacts include pollution, resource depletion, habitat loss, deforestation, toxic chemical use, and large embodied energy use. The goal is to push the industry towards transparency and transform extraction and production practices.</p>	<p>What do you think your building's façade will be made off? Glass? Concrete? Metal? Bricks? Stone? Wood? Plastic? Where will these be produced? E.g. can you produce metal locally? Are the materials reusable, recyclable or recycled? Can their building reduce waste in the community?</p>
EQUITY	Equity questions for students...
<p>This petal aims to change society's mindset in which property ownership allows owners to externalise negative environmental impacts on others. This is done by creating spaces where people of all capabilities, disabilities, ages, and economic status have equal access. It also requires that the project must not disturb another site's access to sunlight, fresh air, and clean water.</p>	<p>What will this building be used for? Can everyone of any age use it? How about access to someone in a wheelchair? Visually impaired? Hard of hearing? Does it let anyone of any culture, race or identity use it, or does it discriminate? Does your building cast shadows on buildings around it? Does it block fresh air?</p>
BEAUTY	Beauty questions for students...
<p>Lastly, the Beauty petal focuses on encouraging project teams to put in genuine and thoughtful efforts into beautifying the project. Although beauty is not subjectively defined in the framework, it is stressed that beauty should be a goal in order to inspire and elevate the lives of the occupants, visitors, and neighbours.</p>	<p>How is your building more beautiful than a regular building? How does it add positivity to the community around it? How does this building inspire people when looking at it? Would they be happy to have this built in front of their house for them to look at every day? Does it inhibit their neighbours views?</p>

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Exit ticket: "Which petal do you think is most important and why?"

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WEEK 2

RESEARCHING SITE & SUSTAINABILITY STRATEGIES

Focus: Site analysis + sustainability strategies.

Lesson Components

Site Selection (Adelaide)

- Students choose a site within greater Adelaide for their sustainable iconic building, using Place petal prompts (e.g., transport, demolition, biodiversity).
- Students justify selection based on the environmental + social impact prompts.

Mini-Workshops: How Buildings Capture Resources

- Water systems: rainwater harvesting, greywater reuse.
- Energy systems: solar orientation, passive heating/cooling, on-site energy generation.
- Materials: low-embodied energy, reclaimed materials, local sourcing.
- Teacher provides real-world examples.

Research Portfolio Start

Students compile a research folio including:

- Site photos/maps
- Climate/solar data
- Water capture possibilities
- Public transport & access
- Materials available locally
- Biophilic and cultural considerations

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WEEK 3

DEVELOPING THE SUSTAINABLE ICONIC BUILDING CONCEPT

Focus: Ideation, sketching, modelling, applying LBC petals.

Lesson Components

Design Thinking Session

- Brainstorm & sketch sessions with teacher roaming (rotate between groups to support participation).
- Students must reference at least three LBC petals explicitly.

Concept Development

Students develop:

- Bubble diagrams
- Floor area distribution (e.g., allocation of 3000m² requirement)
- Initial façade & material palette
- Environmental logic diagrams (sun, wind, shade, water)

Peer Review Round

Using the petal question sets, students give structured feedback.

Example prompts:

- “How does your design capture/store/clean water?”
- “How do materials reduce waste or environmental harm?”
- “How is the building accessible to all community members?”
- “What biophilic elements improve health and happiness?”

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WEEK 4-5 FINAL DESIGN + PRESENTATION

Focus: Solution development, evaluation, and communication.

Final Design Requirements

- 3000m² conceptual building footprint (can be vertical, split, or distributed).
- Evidence of at least three LBC petals meaningfully addressed.
- Visual representation: drawings, models (physical or digital), Minecraft, SketchUp, Lego, collage, etc.
- Written or oral justification.

Assessment Task | Sustainable Iconic Building

Students must submit:

1. **Design folio** with ideation, petal justification, sketches, decisions.
2. **Final presentation** including annotated plans/elevations or models.
3. **Reflection:**
 - What sustainability decisions did you prioritise and why?
 - What trade-offs were required?
 - How does your building contribute positively to Adelaide's future?

Assessment Criteria (Mapped to ACARA)

Criterion	ACARA Link
Quality of sustainability analysis	AC9TDE10K01
Effective application of material + systems knowledge	AC9TDE10K06
Creativity and detail of design ideas	AC9TDE10P01 / AC9TDE10P02
Quality of justification referencing LBC petals	AC9TDE10P04
Communicating design ideas in chosen media	AC9TDE10P02

Optional Extension

- Align the design to 5 or more LBC petals for a "Mastery" challenge, to map their designs to Regenerative Design principles in detail.
- Students investigate an actual LBC-certified building and compare their design

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SUSTAINABLE DESIGN ASSESSMENT RUBRIC (A-E) ACARA DESIGN & TECHNOLOGIES (YEARS 9-10)

Criterion	Grade A	Grade B	Grade C	Grade D	Grade E
Quality of sustainability analysis <u>AC9TDE10K01</u>	Demonstrates comprehensive and insightful analysis of sustainability considerations; shows sophisticated understanding of environmental, social, and technological impacts.	Provides well reasoned and detailed analysis with clear sustainability connections; minor gaps in depth.	Demonstrates sound analysis of sustainability factors; explanations are generally clear though not always detailed.	Shows basic awareness of sustainability; analysis lacks depth or contains misconceptions.	Shows minimal or inaccurate understanding of sustainability; analysis is incomplete or unclear.
Effective application of material + systems knowledge <u>AC9TDE10K06</u>	Applies highly accurate, well researched understanding of materials, systems, and technologies; choices show deep sustainability reasoning.	Applies mostly accurate knowledge of materials and systems with appropriate sustainability considerations.	Demonstrates adequate functional knowledge of materials and systems; sustainability links are present but limited.	Shows limited understanding of materials and systems; sustainability connections are weak or generic.	Shows little to no understanding of materials or systems; choices lack justification.
Creativity and detail of design ideas <u>AC9TDE10P01 / AC9TDE10P02</u>	Produces highly original, detailed, and innovative design ideas demonstrating sophisticated creativity and problem-solving.	Produces well-developed and creative ideas with thoughtful detail.	Produces solid and clear design ideas that meet requirements with some creativity.	Ideas are simple, under-developed or inconsistent; creativity is limited.	Ideas are unclear, minimal, or incomplete with no evident creativity.
Quality of justification referencing LBC petals <u>AC9TDE10P04</u>	Provides thorough, highly convincing justifications directly aligned with multiple LBC petals, showing excellent integration of sustainability principles.	Provides clear, accurate justifications aligned with selected LBC petals; minor gaps in depth.	Provides adequate justification referencing at least 3 LBC petals; some connections may be superficial.	Justifications are basic, brief, or loosely connected to petals; often descriptive rather than analytical.	Justifications are minimal, inaccurate, or missing; little or no connection to petals.
Communicating design ideas in chosen media <u>AC9TDE10P02</u>	Design ideas are communicated with exceptional clarity, using high-quality drawings/models / annotations; highly professional presentation.	Communication is clear and effective, using appropriate media with good detail.	Communication is satisfactory; media are functional though may lack detail or refinement.	Communication is unclear or inconsistent; visuals lack detail or coherence.	Communication is minimal or ineffective; media do not convey the design.

