**Ngargee - A place of song and celebration.**

**INTRODUCTION**

**Our response goes beyond creating a physical installation. It is an experience-driven activation of a much loved beach precinct that keeps sustainability and cultural values at its core.**

The concept addresses sustainability in two ways; firstly, the installation is environmentally sustainable by design, self-sufficient and generates energy for a net-zero carbon future. Secondly, the installation provides a cultural platform to educate and engage the community on the Indigenous history of St Kilda and Port Phillip Bay; which in essence is a story of sustainability.

Our design utilizes the energy-capture capacity and cultural activation of the installation to generate revenue for cultural programming within the precinct. The form also acts as a backbone connecting the land and sea. The place in and around the sculpture supports an array of cultural events, ranging from music concerts to children’s education experiences, play spaces and cultural workshops.

The large sculptural form acts as a beacon of land and sea, history and culture, people and country, past and present.

To realise the creative vision we formed a multidisciplinary team of experience and place-making strategists, industrial and graphic designers and an emerging Indigenous artist. We engaged and collaborated with first people, and through this consultative process we distilled our narrative into the form of the feather, which holds great significance.

To ensure the installation would generate energy with minimal environmental impact we consulted with sustainability, energy efficiency and environmental impact engineers. We have ensured that the design process payed respect to our history, in order to create the best possible artistic vision for the future of the precinct and the city of Melbourne.

**BACKGROUND**

Prior to the arrival of Europeans in 1835, the City of Port Phillip was occupied by the Yalukit Willam clan of the Boon Wurrung people. In creation stories from our first people Bunjil (a creator deity embodied in the form of an eagle) was angered by the neglect of the land, the wasting of fish and yams and the breaking of the laws of nature. As a consequence; the seas were rising and flooding the land. After the Boon Wurrung people promised to change their ways and respect the land and its resources, Bunjil walked out to sea, raised his spear and directed the sea to stop from rising; thereby creating Port Philip Bay.

With the onset of climate change our seas are rising and once again posing a threat to the land. In our current climate the narrative of Bunjil protecting the land remains pertinent, as we must repair the broken relationship between humans, the land and the sea.

This informed the driving principle behind the creation of Ngargee which is firstly creating a sculptural instillation that generates renewable energy to power the site as well as put energy into the grid. Secondly we wanted to create additional cultural benefits using designed experiences to educate the community how Ngargee contributes to a sustainable future; socially, environmentally and economically. By adhering to these principles Ngargee will become an example of culturally and environmentally sustainable development for generations to come.

**DESIGN SOLUTION**

CONTEXT & CULTURE

Ngargee is a sustainable and cultural installation responding to the rich indigenous history in the form of an immersive sculptural experience. The challenge of this design was to create a distinctive artwork to compliment the landscape without dominating it. Ngargee is a series of feather-like forms that represent the feathered wings of Bunjil. The forms are aligned with space in between to create the appearance of an enclosure (or arbour) without closing in the landscape. The design of the installation is visually striking and gives consideration to existing structures such as the Palais. The spacing’s between the feather-like elements enable visitors to travel across the site without visual obstruction.

CREATING ENERGY

We conducted a thorough review of the site with a renowned renewable energy expert and investigated wind and solar technologies available in the near future and today. Given the sunnybeach location, Photovoltaic (PV) film and cells offer efficient returns. The ‘feathers’ that create the structure of the installation are coated with a PV film on all surfaces to maximize energy production. In addition, further PV cells are embedded in the pathway to amplify the energy production. This energy will power a range of functions including LED lighting, events and electric bicycle charging.

The surplus energy is then transferred back into the grid to help the St Kilda region towards a net zero-carbon future. The revenue generated from this is then used to fund a vibrant array of activations envisioned for the precinct including live music and community events, mist for the water feature and interpretive platforms for educating visitors.

EDUCATION

School age children across Victoria are learning about Indigenous history Ngargee provides the opportunity to learn how Bunjil created Port Philip Bay. Through the use of soundscapes and guided tours Ngargee will provide an immersive educational experience to provide depth to the story and more. The educational experience is designed to include both locals and visitors to Melbourne.

SURPRISE AND DELIGHT

The misted water feature provides a sense of surprise and delight that will become an attraction for families visiting the beach. Much like the children’s garden water play area of Melbourne’s botanical gardens, or the NGV ‘car wash’ installation. By using mist, the water feature is a resource-efficient and new way of providing cooling as global temperatures rise.

On the grassland the feathered forms of Ngargee form a pavilion to house cultural events. The feathers glow with LED lights; creating a striking backdrop. Inspired by MPavilion, this will give St Kilda a permanent pavilion to host an array of community and cultural events.

**TECHNICAL SPECIFICATIONS**

The main source of energy production is done using Unisolar film which is a tried and tested way of producing energy. The film will cover 70% of the 87 feathers which will result in 10 SQM of film per feather totaling to a surface area of 870SQM. Photovoltaic cells will also be embedded into the 235M of pathway that has an average width of 4 meters giving 940qm of PV cells. The total amount of energy that can be produced per annum would equate to 175464 Kwh.

An important part of Ngargee generating income to fund a cultural program. This is done by using a combination of revenue raised from the sale of net energy to the grid and ticketed activations. We would anticipate that the sale of energy would raise $40,000.00 this combined with a projected $750,000.00 from general revenues equates to a $790,000.00 cultural program that would be run each year.

We have calculated the embodied energy of Ngargee using an EU study of a bridge project where embodied emissions were 0.29 tonnes CO2 per square metre. Based on this Ngargee is likely to produce 300-500 tonnes of CO2 – this would be offset through energy exports and encouraging different forms of transportation to the site over a period of less than 5 years.

Ngargee will be constructed locally using recycled steel and aluminum. To reduce the amount of materials required the ‘feathers’ have been designed using structurally efficient methods of production.

We have provided a further summary and CO2 impact of the site in the below table.

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| **Energy Calculation Table** |
|  |  | **Avoided tonnes CO2** |  |
| **Item** | **Ann kWh** | **Today** | **2025** | **Estimates details**  |
| General lighting | 3650 | 4307 | 3113 | Assumed 2000m2 lit to average 50 Lux using LED @ 100 lumens/watt for 10 hours/day (std for stairs, carparks 40 Lux) |
| Info screens | 4745 | 5599 | 4048 | 10 217cm screens 10 hours/day using most efficient model from energy rating site. |
| concerts | 405 | 478 | 345 | Based on advice from an expert who has built several stand-alone systems – 150 3 hour concerts with efficient sound and stage lighting. |
| mist cooling offset | 5000 | 5900 | 4265 | Based on 5 kWh/kilolitre produced from Melbourne’s desalination plant (worst case energy cost of water) to mist cool 1000 m2 for 1000 hours/year at 1 litre/m2/hr |
| e-bike charging | 36500 | 43070 | 31135 | Assumes 200 e-bike charges/day @ 0.5 kWh (enough for 20-40 km) |
| **TOTAL consumption** | 50300 | 59354 | 42907 |  |
| **Energy Production** |
| **Item** | **Ann kWh** | **Today** | **2025** | **Estimates details**  |
| **Generation** | 175464 | 207048 | 149673 | Based on 70% of sculptural shapes covered with Unisolar film at 30degree slope with equal amounts facing all directions. All of pathway (940 m2) covered with PV based on output of recent Chinese project |
| **Embodied Energy** |
| **Item** | **Ann kWh** | **Today** | **2025** | **Estimates details**  |
| **Embodied energy and emissions** |  | 300-500 tonnes | 0 | Based on EU study of a bridge project, embodied emissions were 0.29 tonnes CO2 per square metre. So embodied emissions are likely to be 300-500 tonnes CO2 – this would be offset by energy exports over less than 5 years – but project design could reduce embodied energy through reduced material use by smart design, and use of low emission materials. |
| **Vehicle Transport** |
|  | **Ann kWh** | **Today** | **2025** | **Estimates details**  |
| **Car offset** |  | 912,500 |  | Notional estimate of emission benefits of reducing car trips to site (kg CO2 for 100 trips/day @ 10km and 250g CO2/km) |

**ENVIRONMENTAL IMPACT SUMMARY**

We consulted with a Senior Associate Environmental Consultant at a leading engineering consultancy who assessed our design and provided to following Environmental Impact Summary -

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| --- | --- |
| **Environmental aspect** | **Potential impacts and benefits** |
| **Flora and fauna** | * Port Phillip Bay is home to a wide range of threatened species, including the Little Penguin, who have a long established colony in St Kilda. The installation would not directly impact on the colony, which is located at the breakwater northwest of the installation. The installation has been designed to allow for the passage of penguins.
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| **Visual** | * An important aspect of St Kilda is the views of St Kilda Beach and Port Phillip Bay. The installation has been designed to maintain and enhance these views.
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| **Water** | * St Kilda is highly prone to flooding. Our design has been developed to allow for the passage of water between the elements of the installation to avoid increasing flooding to the surrounding properties.
* Port Phillip Bay is subject to complex coastal processes. Our design is sensitive to this and will allow for the movement of sand and ocean around the elements of the installation.
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| **Indigenous cultural heritage** | * There is a low chance of the installation impacting on cultural heritage values such as shell middens and artefact scatters due to the previous disturbance to the area.
* There is a rich history of Indigenous cultural heritage around the installation site. Our design seeks to create awareness of the cultural heritage and significance of the area.
* There are Indigenous sensitivities associated with the place that have been considered and consulted on.
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| **Historic heritage** | * Since the mid-1800s St Kilda has been a busy seaside suburb. Key heritage features includes the Palais Theatre, built in 1927. Our design seeks to protect and enhance the heritage value of the Palais Theatre.
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| **Waste** | * We have sought to be as close to zero waste as possible. Both the design and approach to manufacturing have been based on maximising the use of recycled materials and ensuring that at the end of its life, the installation is itself recycled.
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| **Utilities** | * There is a wide range of existing infrastructure in the St Kilda Triangle precinct, including power, communications, lighting, stormwater and road infrastructure. Our proposal avoids impacting on any of these utilities. The foundations would be located away from existing utilities.
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| **Community** | * The design has been developed to allow for users of the beach to pass between and interact with the sculpture on the beach and in the water.
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