PROJECT DESCRIPTION In a city such a Melbourne, where the daily life is full of strenuous activities, it is important to slow down every so often and take a breath of fresh air. This is now possible because of Woven Ecologies. Woven Ecologies brings together the vast flora of Australia to one place. By bringing a large amount of landscape to the site it not only becomes a cooler place to be temperature wise but it is also a good place to wander around and experience Australia. The key component of this site design are the three green roof terraces of the Cultural Center, featuring four rare or endangered flowers from the state of Victoria. Each terrace is a different environment in order to situate the flowers. They are organized in a way in which the sun exposure is adequate for each environment. The rare flowers are exhibited in a protected space on these terraces so that they are not harmed in any way. Since the green roofs are so large, they have a great capacity to harvest water that can be used to flush toilets and water the plants that are scattered all along the primary site amongst other things. Since St Kilda is a drought stricken place it is important to not be wasteful with the water and by providing a way to capture the rain water the use of clean water is greatly reduced.

 Along with the terracing there is a series of teaching gardens on the ground level that educate the citizens of Australia on how to grow an authentic Australian garden. In doing so, the site is hoping to extend its flora in to the city and its residents homes and turn their gardens in to ones that are more manageable and easily cared for. The series of teaching gardens uses native plants that require little water. As mentioned before, since this area of Australia has suffered through a strong drought watering plants is not a priority but that does not mean that there cannot still be a lush and colorful garden! The teaching gardens are a prime example of beauty at a low effort.

Woven into the teaching gardens there is a recessed lawn with an over head canopy in which performances or markets can be held. The space is flexible and can accommodate various performers or vendors are the same time. It also provides a large shaded area where people can sit and relax when there is not a performance going on. The large 2,000 square meter overhead also provide protection from the sun during the day and casts a large shadow over the recessed lawn when the sun is at its strongest. The overhead is composed of a steel space frame and an energy generating fabric. The fabric wraps around the frame thus doubling the amount of fabric used and thus the energy that can be generated as well.

MATERIAL PALETTE

 The whole driver of the site was to create a green, both literally and environmentally, experience which people can enjoy at any time of the day or year. Because of this the materials chosen for the built portions of this project are considered “green materials.” The Cultural Center mainly consists of this new material called Ferrock. It is a substitute for concrete that is made up of steel dust and other discards of the steel industry. This material has a positive green impact because it absorbs CO2 because it needs it in the hardening process. The wood detailing on the Cultural Center is made of a native Australian wood, Spotted Gum. The Cultural Center also has large windows made up of large panes of glass that look out towards the lawn. For the 3 meter wide sidewalks and large plaza sitting areas a material called Grasscrete will be used. This material is also a substitute for concrete but it I permeable and therefore storm water can go through it and be collected.

ENERGY GENERATION The featured overhead is a 2,000 square meter canopy made out of an energy harvesting fabric, as mentioned before. The fabric reacts to both solar and wind in order to generate energy. It works in the following way. Fiber-based triboelectric nanogenerators and photoanodes are woven together with a cotton or wool material. The wind blowing constantly causes the triboelectric nanogenerators to rub against the wool and photoanodes. This motion creates energy which is collected and then stored for later use. In order to harvest power from the sun, photoanodes made in a wire-shaped fashion were woven together with the fibers mentioned above. The photoanodes are similar to solar cells and just depend on the sun hitting them in order to gather the energy that is going to be stored for later use as well.

ENERGY OUTPUT CALCULATION When this energy generating fabric was first created its potential output was measured. It seemed to be able to produce a fair amount of energy even if the day was over cast or not extremely windy. A 4 centimeter by 5 centimeter piece of fabric was able to charge a 2mF capacitor two volts in under a minute. The span of fabric being used in this site is 2,000 square meters on just one surface! Since the fabric wraps around it is doubled up. That means that the energy output will be multiplied greatly. If one were to use the same capacitor as the one used in the initial trial then that would mean that the fabric canopy will be able to generate around roughly 4,000,000 volts in less than a minute. The energy created would be able to power lights along the site and inside the Cultural Center, power some machinery, and provide phone charging stations that are integrated in to the site.

ENVIRONMENTAL IMPACT STATEMENT

Woven Ecologies goal is to provide a cleaner, cooler place at St Kilda. By landscaping almost the entirety of the site, the temperature while being there is cooler and fresher than in any other parts of St Kilda. The plants will also take in much of the CO2 that they need in order to produce oxygen for us. Similarly, the materials chosen also have a positive impact on the site and the environment. By using Ferrock, more CO2 is being taken in by the building process. This is due to the fact that Ferrock needs CO2 to harden and in turn absorbs it as it dries. Grasscrete is another material that is being used that has a positive impact on the site and the environment. It is a material that is similar to concrete but it is porous and allows for storm water to filter thought and be collected. This, paired with water collecting green roofs, provides water for irrigation and the flushing of toilets which would otherwise have to be done with fresh water.