

LLOYD GODMAN

✧ studio LAB xeric ✧

Ecological Art
Extreme Gardening

where plants fly beyond the vertical garden



α space (alpha space) is published in two versions

- Free version - low-resolution PDF - MB
- High quality - high resolution interactive PDF - Mb - email for purchase

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Art and the built environment cannot be viewed in isolation from each other. The functionality of our finest public and private spaces has always rested on solid aesthetic and spiritual principles; our greatest buildings either showcase challenging artworks or incorporate artistic designs into their very fabric, reminding us that buildings without art are mere shelters.

Artist Lloyd Godman is at the forefront of a modern trend to bring an appreciation of the natural world into our structural domains. Buildings do not rest 'above' or 'outside' a landscape, separated from the surrounding environment. On the contrary, structures interact with the natural world as objects that cast shadows, consume resources and provide rich habitats for life.

Godman's living, plant-based artworks reinforce the necessary connectedness of buildings and the wider environment. Not only do these artworks convey powerful messages and philosophies of sustainable and ethical physical interaction, but they also reach out beyond ideas to become part of the actual structure – as physical objects, Godman's artworks are purifiers of the air as well as the soul, suppliers of colour as well as calmness, and filters of water as well as the human spirit.

..... it is highly unusual for an artist to forge new aesthetic, philosophical and architectural directions through his work; Godman, however, has managed to use his diminutive plants to convey global concepts, and in the process participate in a new wave of appreciation for plants in the built environment.

John Power - October 2011

John Power - Editor of Facility Management Magazine Aug 2011

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Imagine

Imagine plants requiring no soil, no maintenance, and no reticulated water or nutrient systems.

Imagine plants living on roofs in conditions exceeding 70 degrees Celsius.

Imagine plants growing atop of skyscrapers in extreme wind speed.

Imagine plants thriving on moving screens that create shade, mitigate heat, and offer privacy.

Imagine plant sculptures suspended in urban spaces that rotate with the wind.

Now imagine gardens that move with the ebb and flow of the sea's tide.

Now imagine gardens that move to the randomised flow of programmed robots.

And then imagine all this as reality, because all these imaginings actually exist in the work and ideas of Ecological Artist Lloyd Godman.



Art and the built environment

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LLOYD GODMAN

studio LAB xeric

The name - studio LAB xeric - combines the creativity of a studio, the experimentation of a laboratory and encompasses the xeric Tillandsia plants I work with (xeric - plants that grow in dry environments and do not require auxiliary water)

“Lloyd Godman is one of a new breed of environmental artists whose work is directly influencing ‘green’ building design.....” Godman’s installations are the result of a unique blend of botanical science, environmental awareness and artistic expression. All three elements are intrinsic to the practical realisation of his polymathic vision”. John Power

For decades Lloyd Godman has been involved in the arts and creativity. From photographing acts like Rolling Stones, Led Zeppelin, Joe Cocker in the early 1970s, then establishing and heading the photographic section at the Dunedin School of Art for 20 years, his own creative practice has always asked searching questions and pushed, conceptual, aesthetic, and technical boundaries.

After an arts expedition in 1989 that he instigated to the subantarctic Islands of New Zealand, he began using camera-less photography (photograms) in his work. The technique continued for several series until he began exploring photosynthesis as a photographic process to create ephemeral images on the leaves of Bromeliad plants. “Rather than photographing or drawing plants, plants became the photograph”

He conceived the earth as a 3 dimensional photograph. “The largest photosensitive emulsion we know of is the planet earth. As vegetation grows, dies back, changes colour with the seasons, the “photographic image” that is our planet alters. Increasingly human intervention plays a larger role in transforming the image of the globe we inhabit”. Lloyd Godman 2006

This work evolved into intricate, interactive installations of living plants in galleries including, 101 Collins St Melbourne 1998, Temple Gallery Dunedin N.Z. 1999, Blue Oyster Gallery Dunedin N.Z. 2002, and MOCA Ga, USA

in 2005, Chateau de Blacons France 2007, Burrinja Gallery Victoria 2008. With the growing climate crisis came the realization, around 2010, that the xeric Tillandsia plants he was working with were ideal to integrate into architecture in a fully sustainable manner consequently he moved from a traditional approach and focused all his energy on plants as a living medium.

“I aim to create works that not only speak to the climate crisis but are environmentally active – that is they clean the air and absorb CO2. Rather than art works that require the climate-controlled storage of a gallery vault, I aim to create living works that live out-doors and control the climate while they are in storage”.

From 2011, he developed a series of suspend wind rotating plant sculptures, the concepts of the Urban Dead Pixel, and of Alpha Space where plants in urban environments could grow on sites suspend between buildings. His xeric plant work and concepts are now gaining great interest and traction. He is currently experimenting with 100% plastic free plant integrations on urban structures and creating vertical gardens and other urban biophilic applications that are designed to out live the life of the building. Installations that can be moved, adapted to a new location or even relocated back to a new building on the very same site.



Perhaps these words from John Power offer a succinct description of his work.

“Art and the built environment cannot be viewed in isolation from each other. The functionality of our finest public and private spaces has always rested on solid aesthetic and spiritual principles; our greatest buildings either showcase challenging artworks or incorporate artistic designs into their very fabric, reminding us that buildings without art are mere shelters. Artist Lloyd Godman is at the forefront of a modern trend to bring an appreciation of the natural world into our structural domains. Buildings do not rest ‘above’ or ‘outside’ a landscape, separated from the surrounding environment. On the contrary, structures interact with the natural world as objects that cast shadows, consume resources and provide rich habitats for life. Godman’s living, plant-based artworks reinforce the necessary connectedness of buildings and the wider environment. Not only do these artworks convey powerful messages and philosophies of sustainable and ethical physical interaction, but they also reach out beyond ideas to become part of the actual structure – as physical objects, Godman’s artworks are purifiers of the air as well as the soul, suppliers of colour as well as calmness, and filters of water as well as the human spirit. it is highly unusual for an artist to forge new aesthetic, philosophical and architectural directions through his work; Godman, however, has managed to use his diminutive plants to convey global concepts, and in the process participate in a new wave of appreciation for plants in the built environment”.

Lloyd has an MFA from RMIT and is credited with over 40 solo exhibitions and 200 group exhibitions.

He is a proficient and entertaining speaker and has lectured at many institutions including: Architecture Dept University of Auckland, St Martins School of Art London, L’Université Sorbonne Paris Nord, Architecture Dept Melbourne University, The Art Institute of Atlanta, RMIT, Deakin University, BKK Architecture. Lloyd is available for speaking engagements.

STUDIO: Involved in fine arts for decades Godman is well informed about the roll a studio space plays in the creative act. In fact, he lives with his partner Tess at another creative studio, the [Baldessin Studio](#), a print making studio in the bush about 40 km outside Melbourne. He is skilled in developing ideas through the design process to resolve projects, both in the real and virtual worlds

LABORATORY: Plants have played an important role in Godman’s life since 1973 when he lived in a 3-story tree house in Hawaii. Through the project Tillandsia SWARM he has experimented with the resilience of Tillandsia plants in the built environment. Another aspect of his experimentation with these plants is developing more resilient plants through hybridization using cross pollination techniques.

XERIC: Xeric plants are plants that grow in dry hot climates. They have evolved many biological processes like using a CAM cycle to grow and trichome leaf cells to uptake all moisture and nutrients rather than using roots.

[All his projects are available as free PDFs](#) - click the green text box to view and enjoy



CH2 Building - 2022

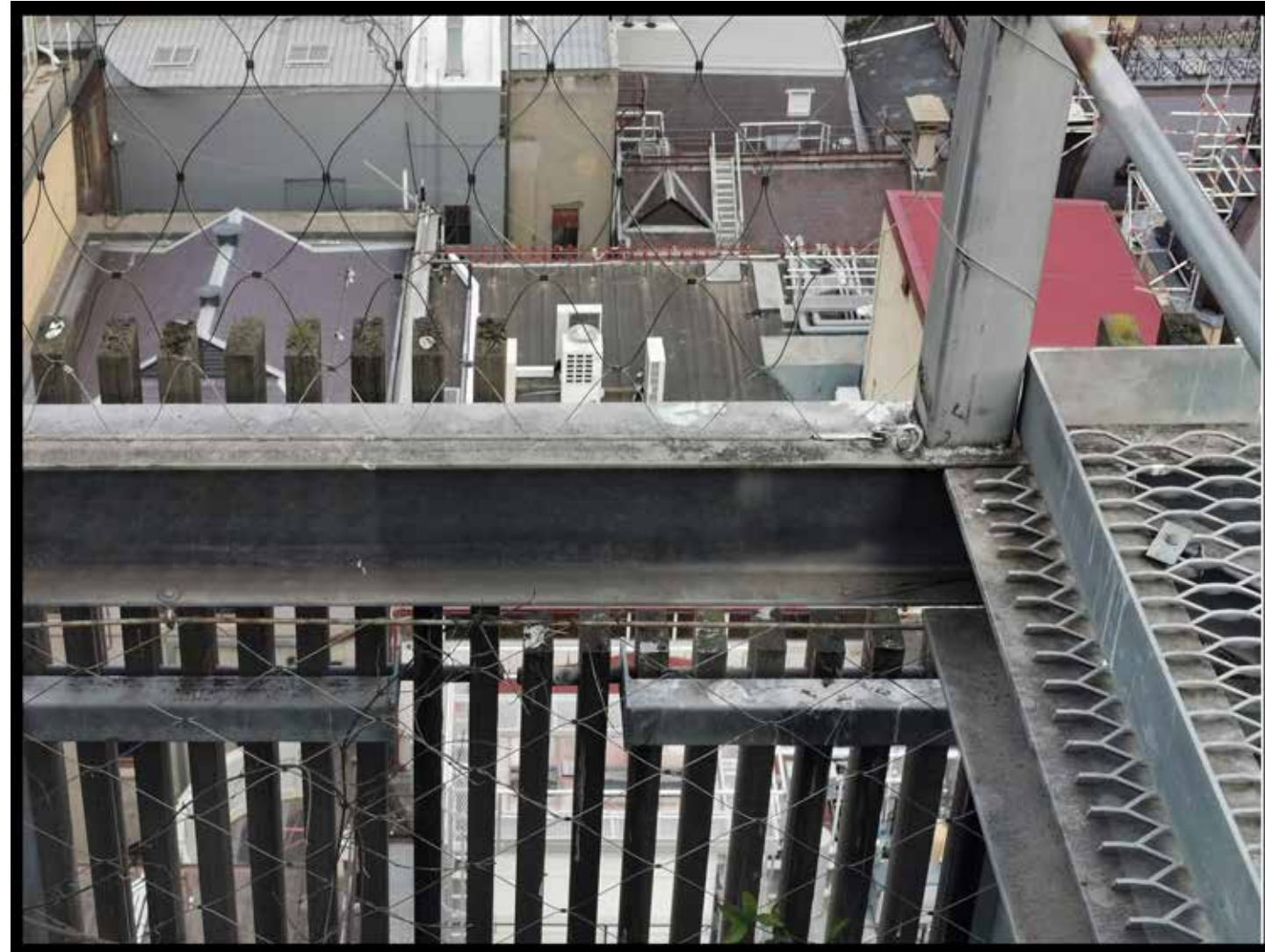
Tillandsia xeric screen, CH2 Building (Council House 2 Building), Melbourne installed October 3rd 2022.

The building was built by Hansen Yuncken and was Australia's first building to be awarded a six star green star design rating and was officially opened in August 2006.

The building had many experimental green systems that were tried at scale, but in practice proved unworkable.

While previous plantings over 15 years failed to establish on this expandable mesh screen, as part of the [Tillandsia SWARM](#) project, we tested some Tillandsias which did survive.

City Architect Rob Adams approached me with the concept of a much larger project on the building, but it was decided to use this as a pilot project to see how the plants performed.



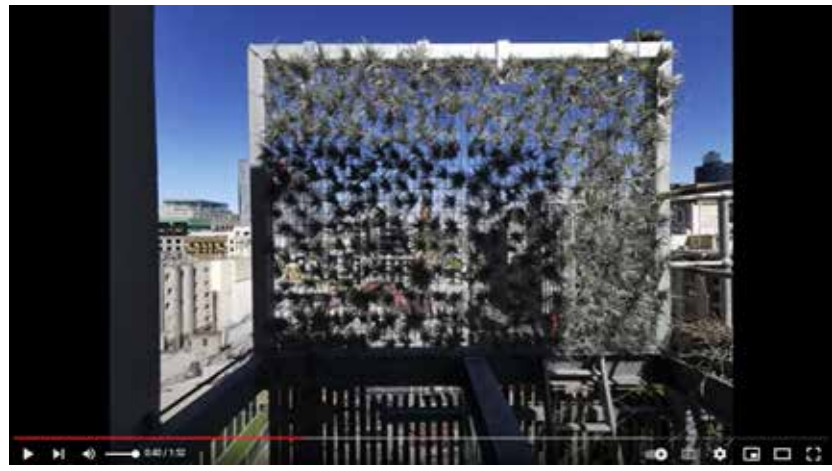
The screen site is 10 levels from the ground on the corner of the building



After more than 16 years climbing plants had failed to fully establish



The supporting infrastructure to secure the screens to was already part of the designed structure



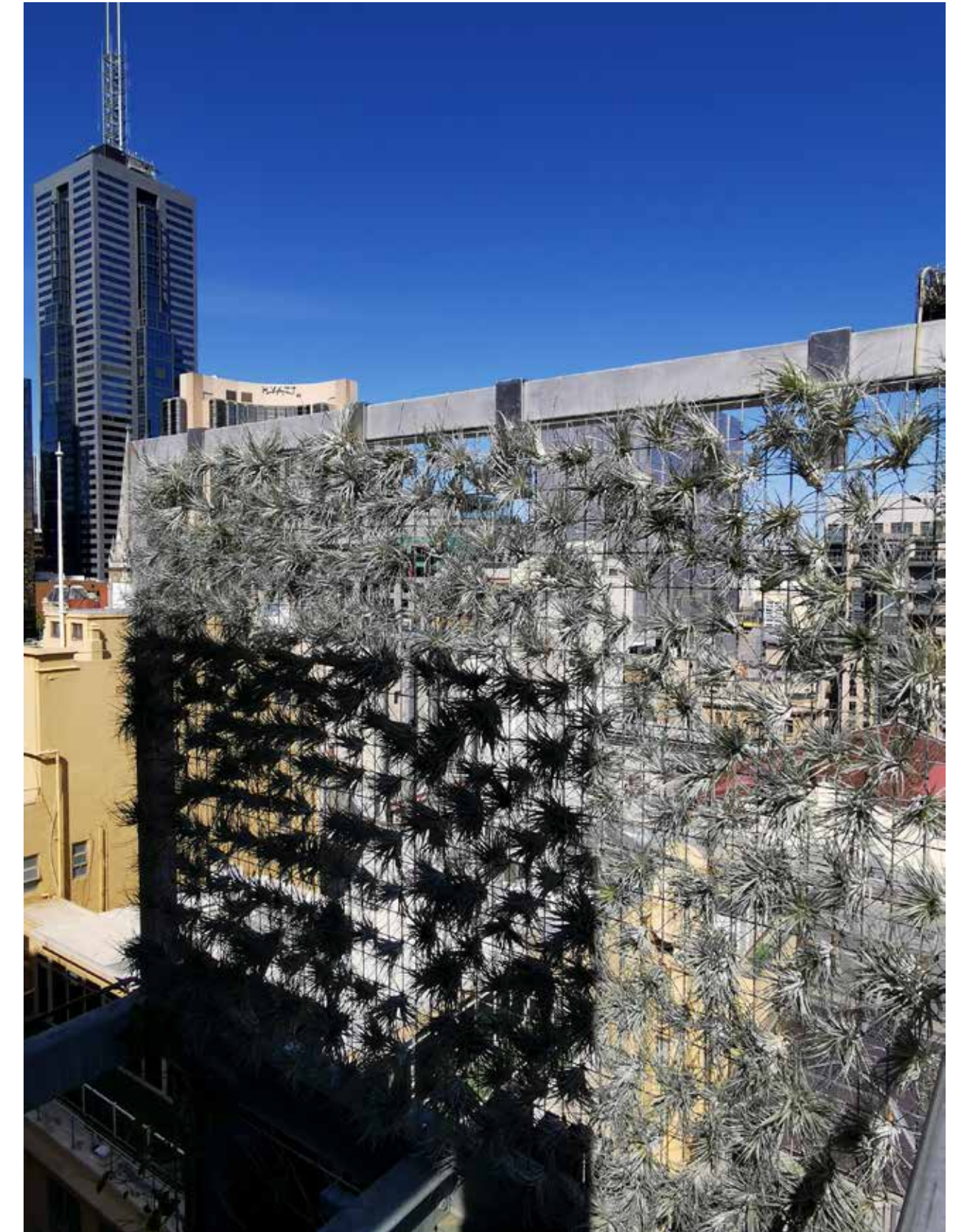
[CH2 Youtube video](#)



Completed xeric Tillandsia screen has no watering fertilizer system, no root medium, and is 100% plastic free. Notice the raven nest on the far right.



Over timer the plants will multiply to fill the gaps



At the time of the CH2 xeric screen installation, a test grid of Tillandsia plants were also suspended between existing tensioned stainless steel wires. Since the building was opened in 2006 climbing plants intended to cover the wires have struggled to establish.

The idea is to test the Tillandsia plants in a location where full xeric Tillandsia screens can be installed at a later time to create shade for the open roof area below in the future. Test plants included *T. Cotton Candy*, *T. bergeri*, *T. bergos* and *T. Confusion*.



Along side the Tillandsia screen a select number of test species were mounted on the guard rail at the top of the building.

Residence East Melbourne 2020 - 21



The proposal is to cover the upper wall on this residence to create a living insulation layer to cool the west wall in the heat of the afternoon summer sun. The panels would be covered with a mixture of proven hardy Tillandsias which would mean that no watering system would be required. Although the planting appears dense, from inside the rooms there is a veiled view of the environment outside similar to the photograph of the screen in the [photograph lower right](#) on this page.

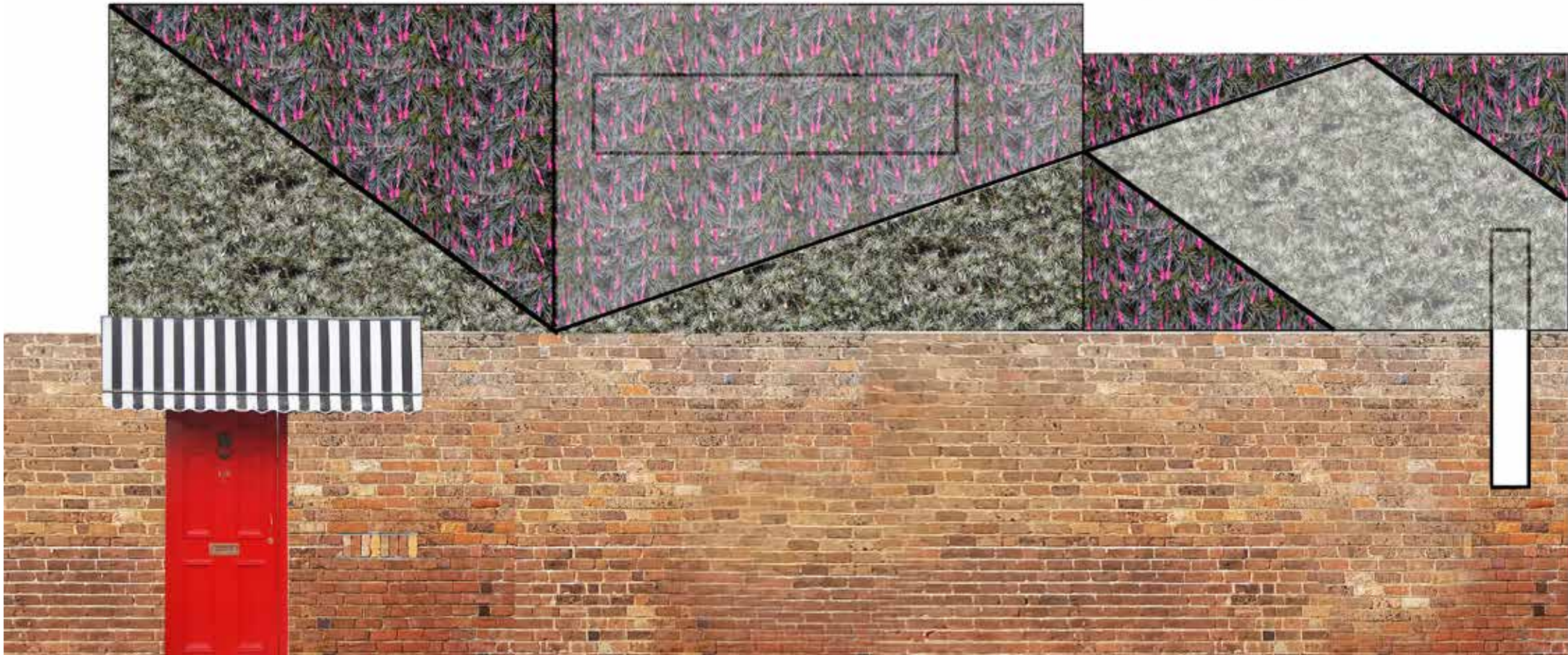


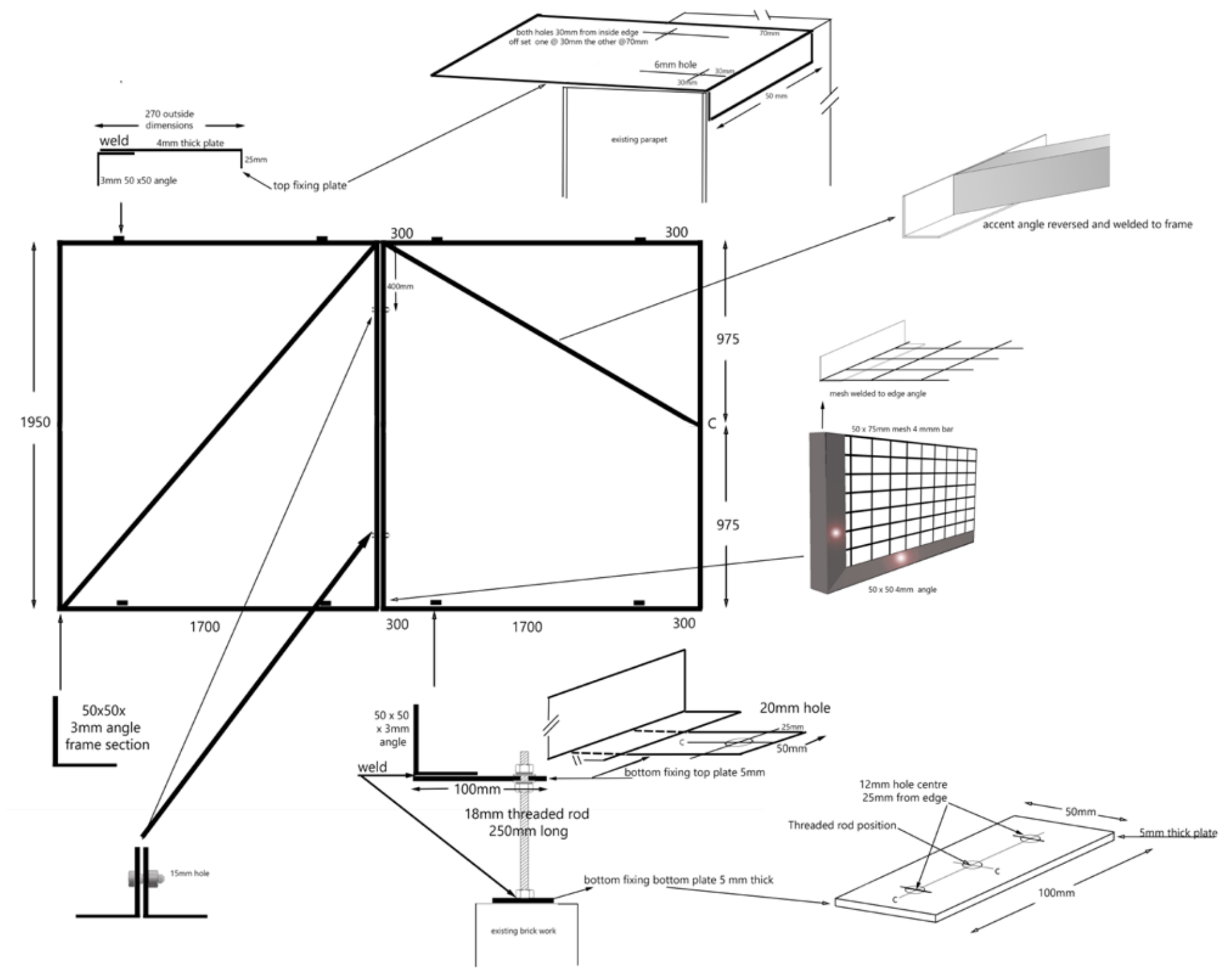
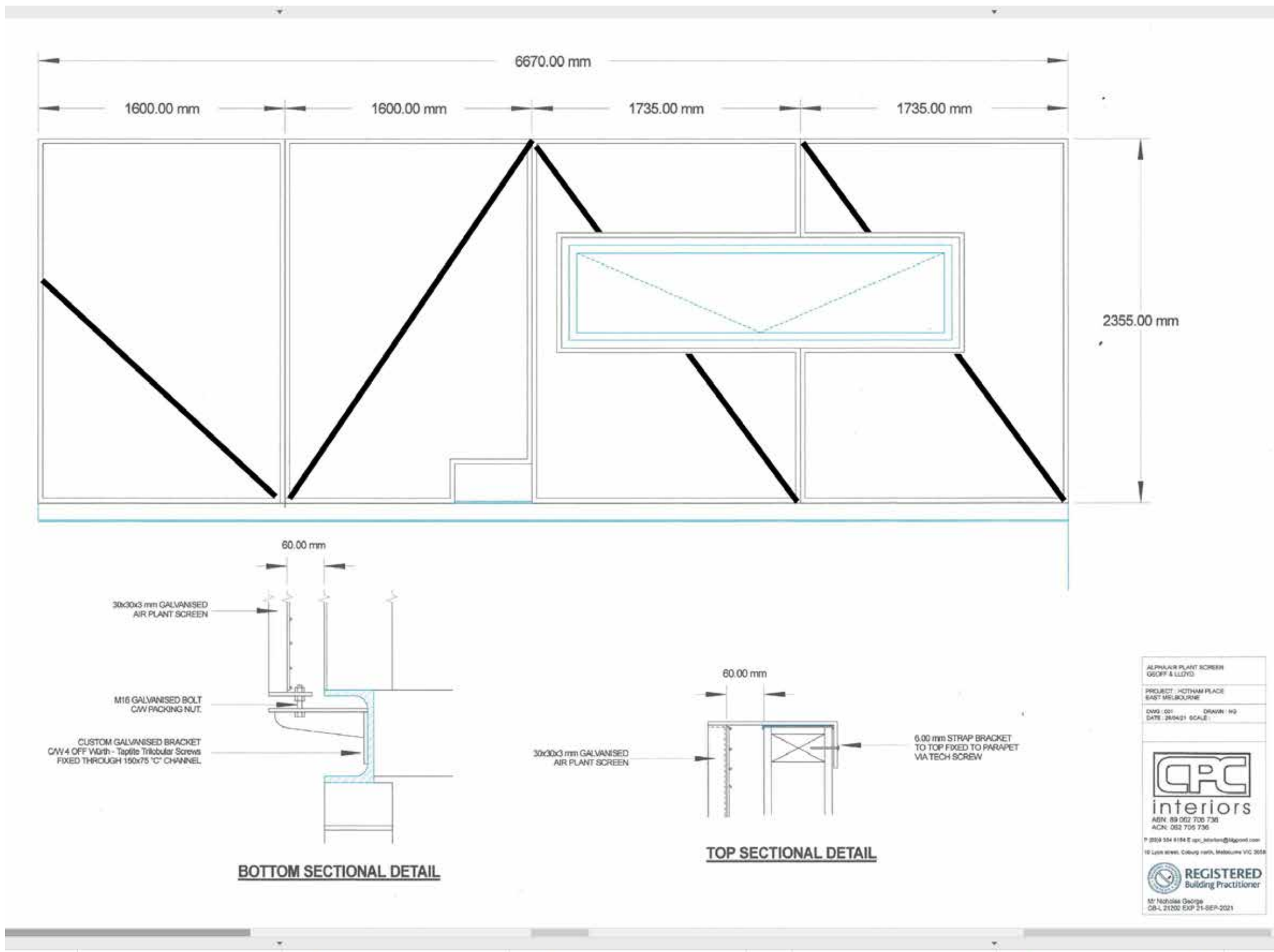
The initial concept for the project was to offer a sense of a third dimension by setting the various plant panels at different angles. Also to extend the screens higher than the facade of the building. However both these ideas had to be abandoned. The first because the lane way is very narrow and the building sits hard against it, so any projection could become a hazard. The second because of an aerial power cable is suspended close to the top of the building.

The project got delayed for nearly a year due to the 2020 Covid lock down in Melbourne. We looked at ways to break up the rectangular facade into triangular sections demoted by the silver lines of galvanized steel which offer a zigzag line.

However, the delay in installing the first screens allowed a valuable data set of temperatures to be taken, both of the exterior wall surface and also interior of the dwelling. While recent summers in Melbourne have been hot with at times temperatures over 45C recorded, the summer of 2021 in Melbourne was not extreme with a maximum temperature of 38C recorded in January. At this point, the temperature of the exterior wall reached 70C.

It is expected the effective heat mitigation of the Tillandsia air garden will reduce the temperature of the wall dramatically.





Technical specifications for the support screens



Screen fabricated and ready for hot dipping galvanized in the fabrication workshop.



First two screen delivered ready for the installations of Tillandsias - the screens weigh in at 35 kg each.



Installation of Tillandsias on mesh screens. The plants are tied onto to mesh. As the biology of the plants allows all water and nutrients to be taken into the plant via trichome cells on the leaf there is no medium or watering system which dramatically reduces the weight. Total weight with the screen infrastructure and wet plants is 52 Kg - 7.8 Kg/M2. Comparatively a reticulated vertical garden when loaded with plants and water weighs in at over 100 kg/M2



Completed screen section ready for installation.



First two panels of Tillandsia screens installed March 2021..





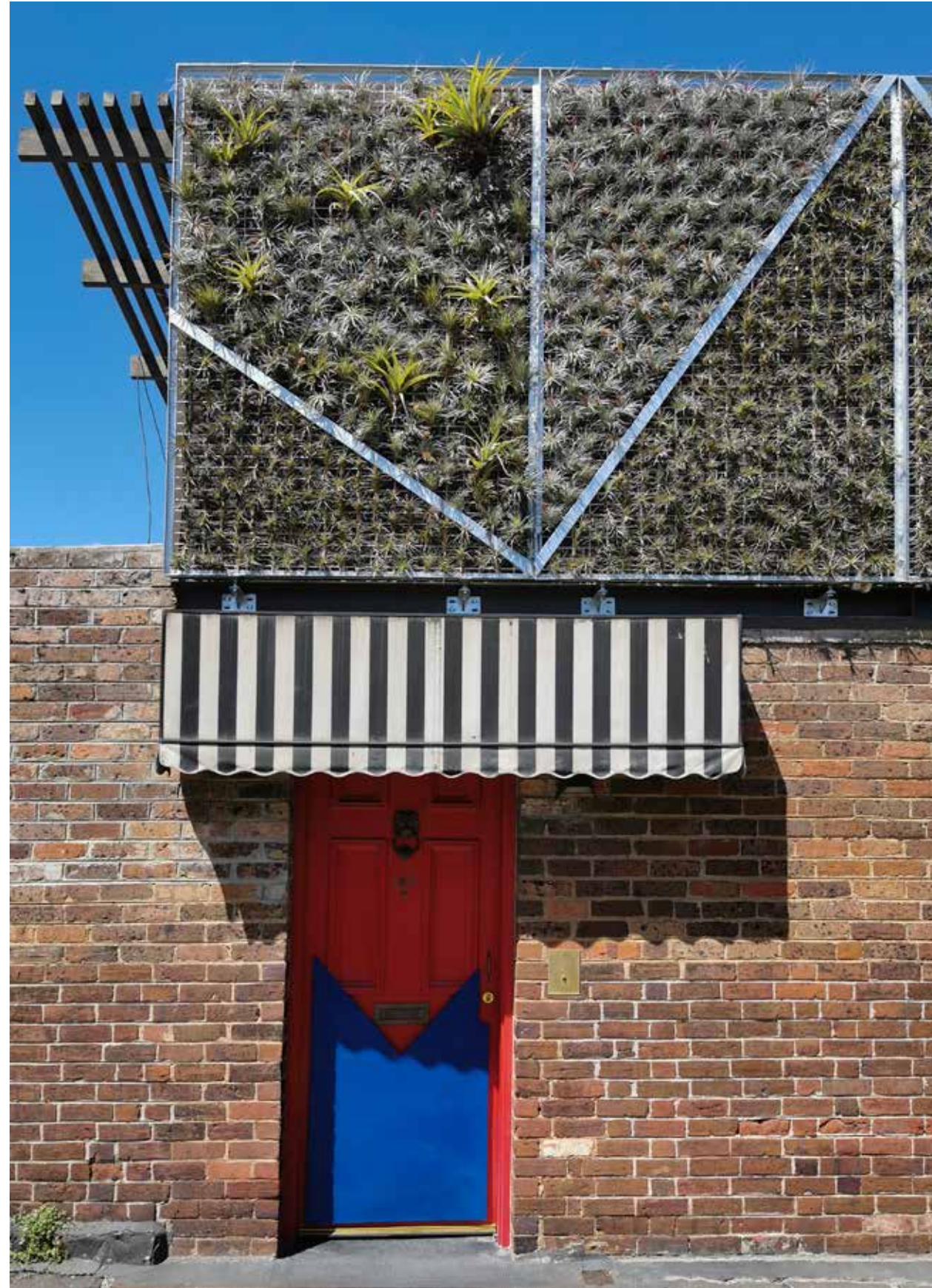
Second four panels of Tillandsia screens ready to be installed July 2021..



Second four panels of Tillandsia screens ready to be installed July 2021..

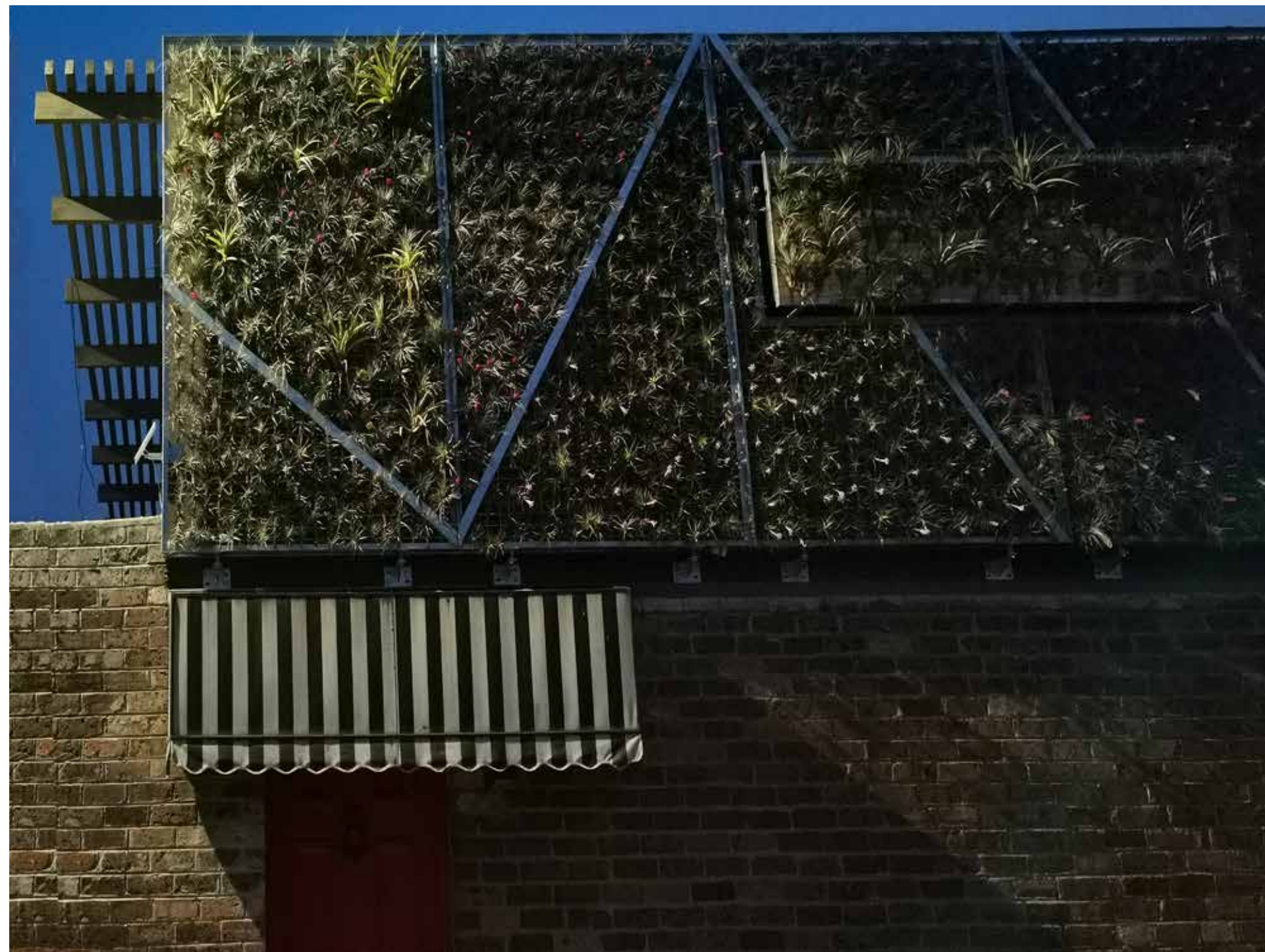


Second four panels of Tillandsia screens installed late October 2021. (due to Covid lock down installation was dramatically delayed)



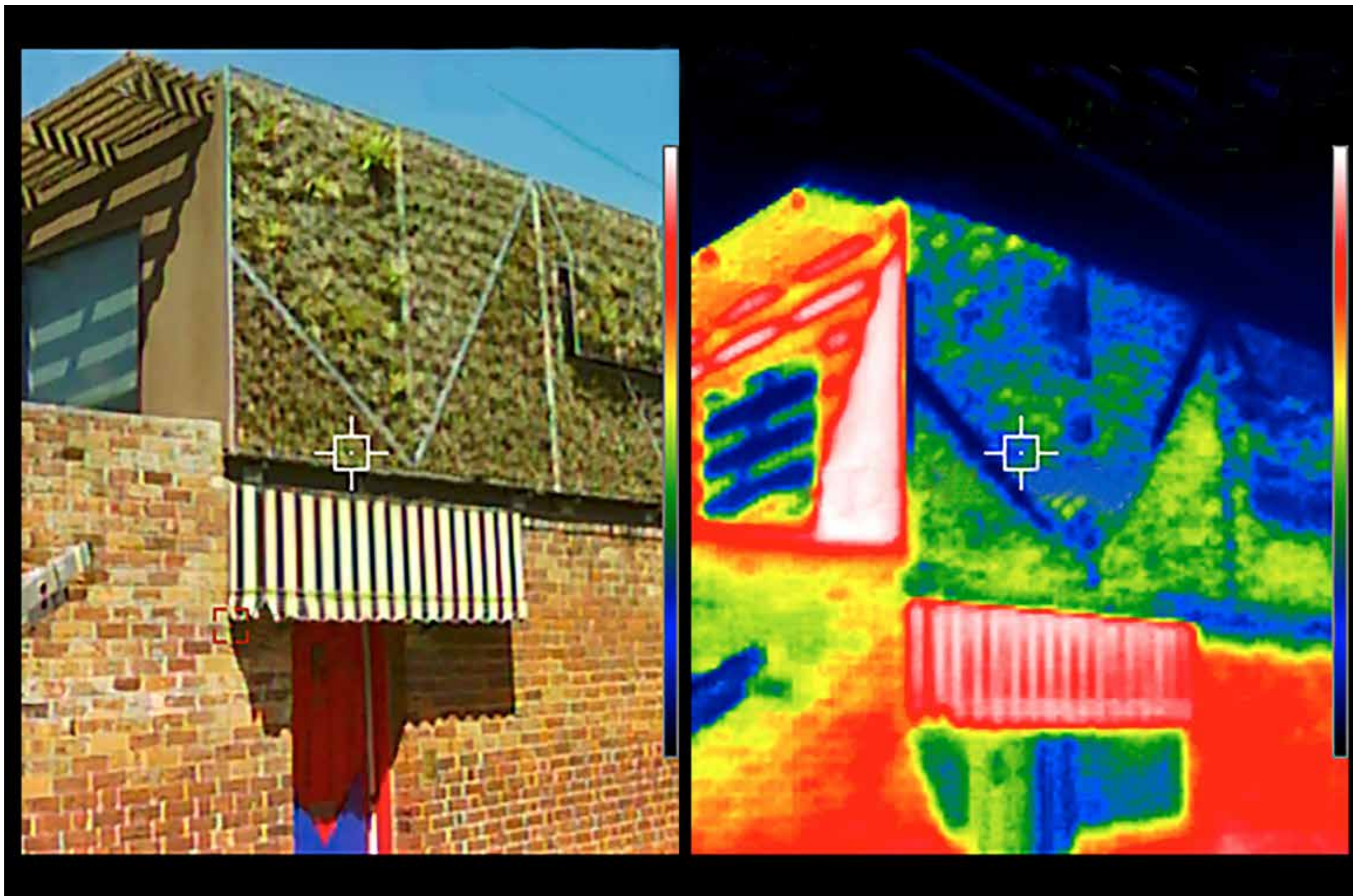


Composite image of completed tillandsia screens.

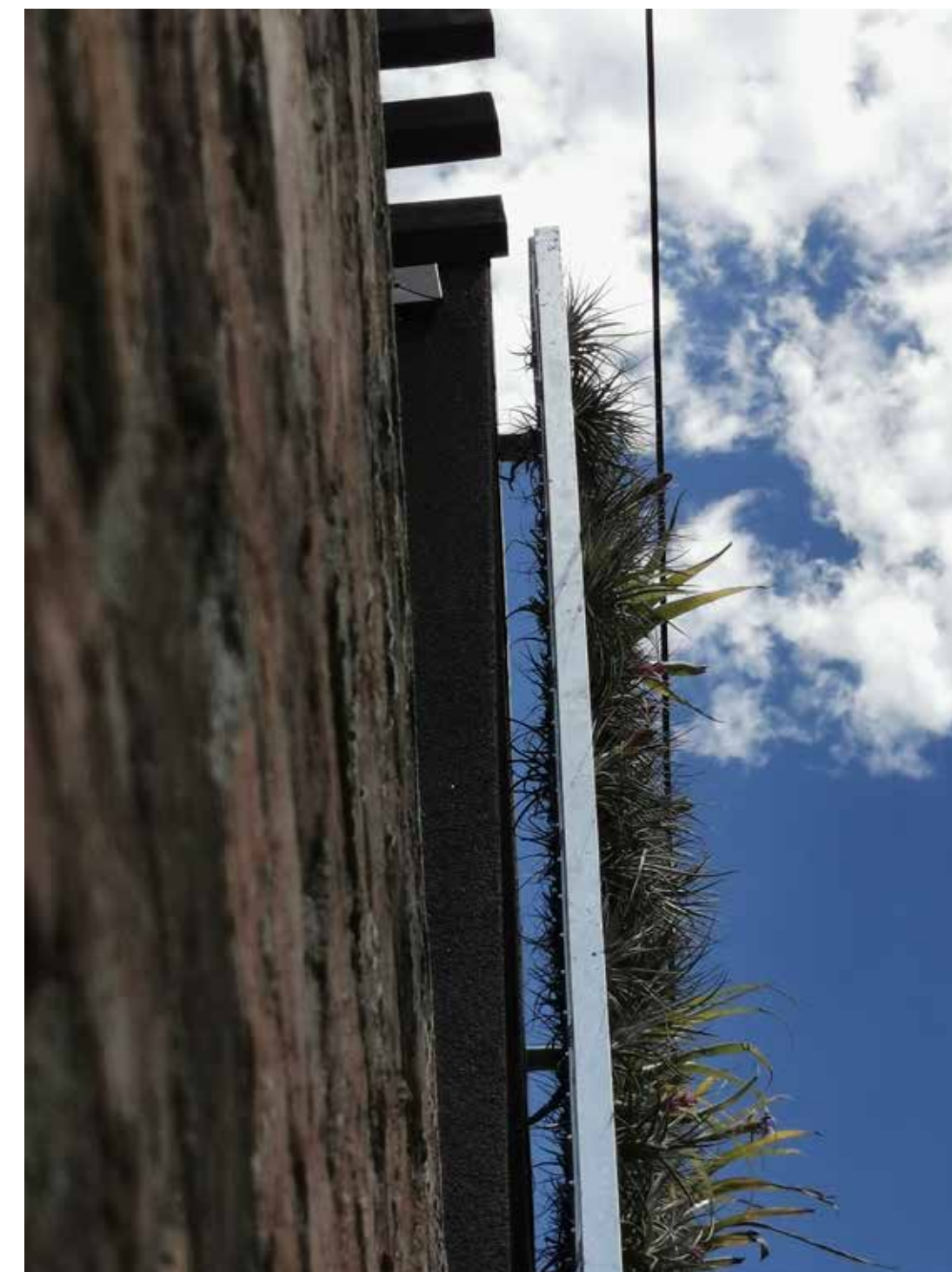


Nocturne photographs of the Tillandsia screens November 2021.





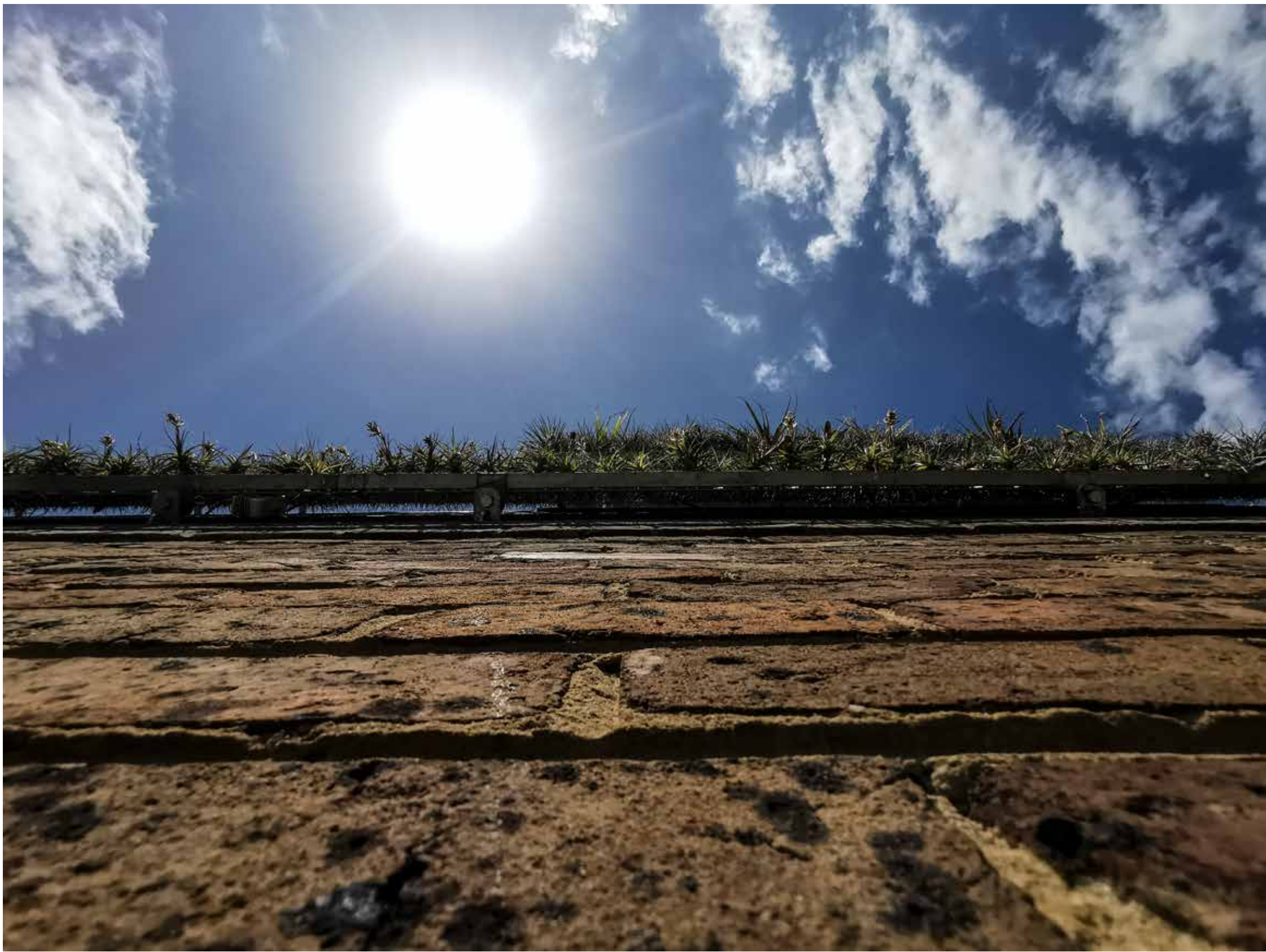
Graphic illustration of heat mitigation. Thermal imaging camera photograph on the right which clearly shows the cooler areas where the plants are against the brick wall.



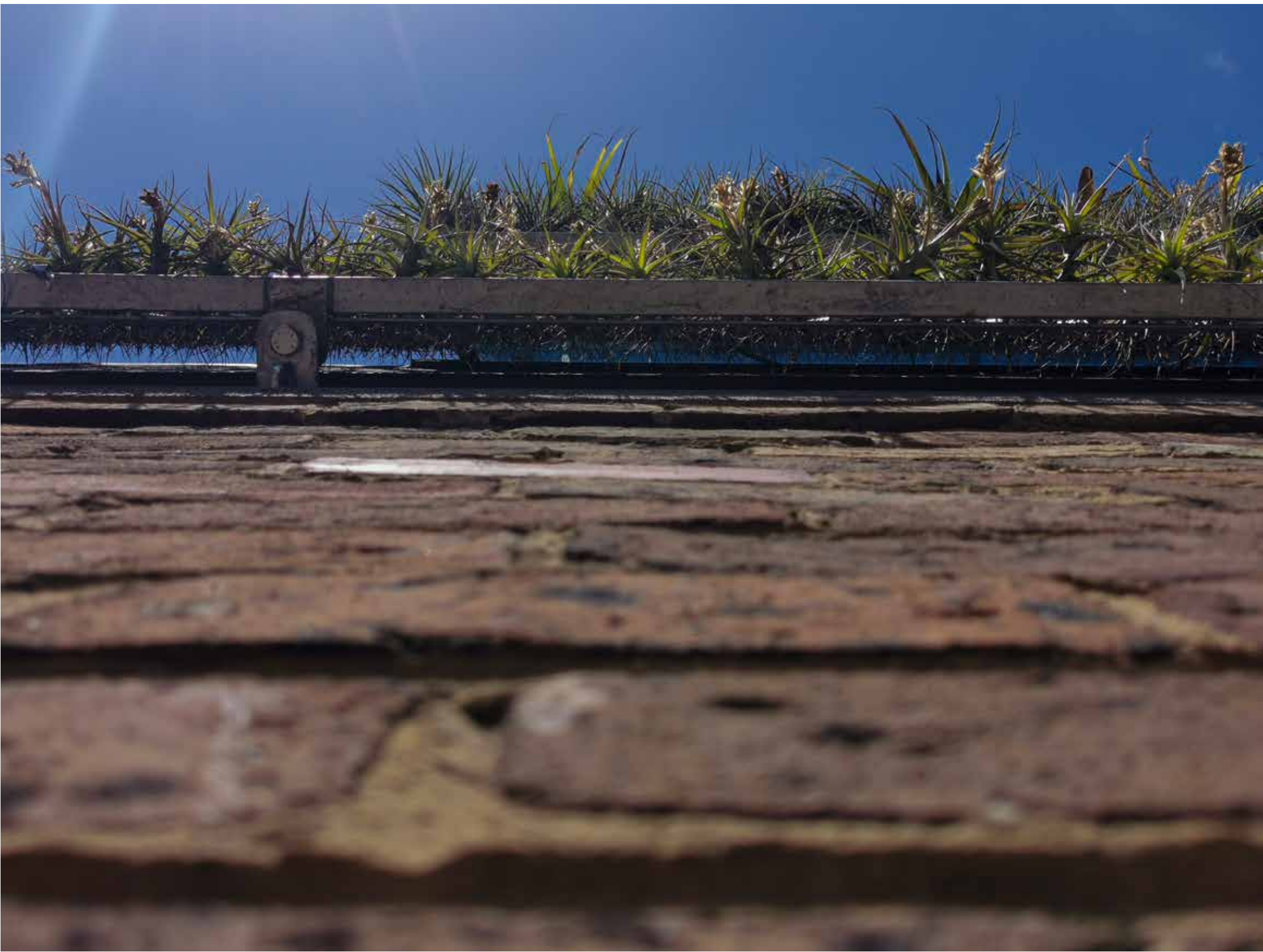
An insightful photograph of a cross section xeric tillandsia vertical wall. No plastic water proof membrane required. NO medium for roots. (many vertical gardens use compressed plastic micro fibres) NO fertilizer. NO reticulated water system. Very light weight



This side view gives a good idea of shade cover on the wall to mitigate heat.



View looking directly upwards from the brick wall to the xeric wall garden.





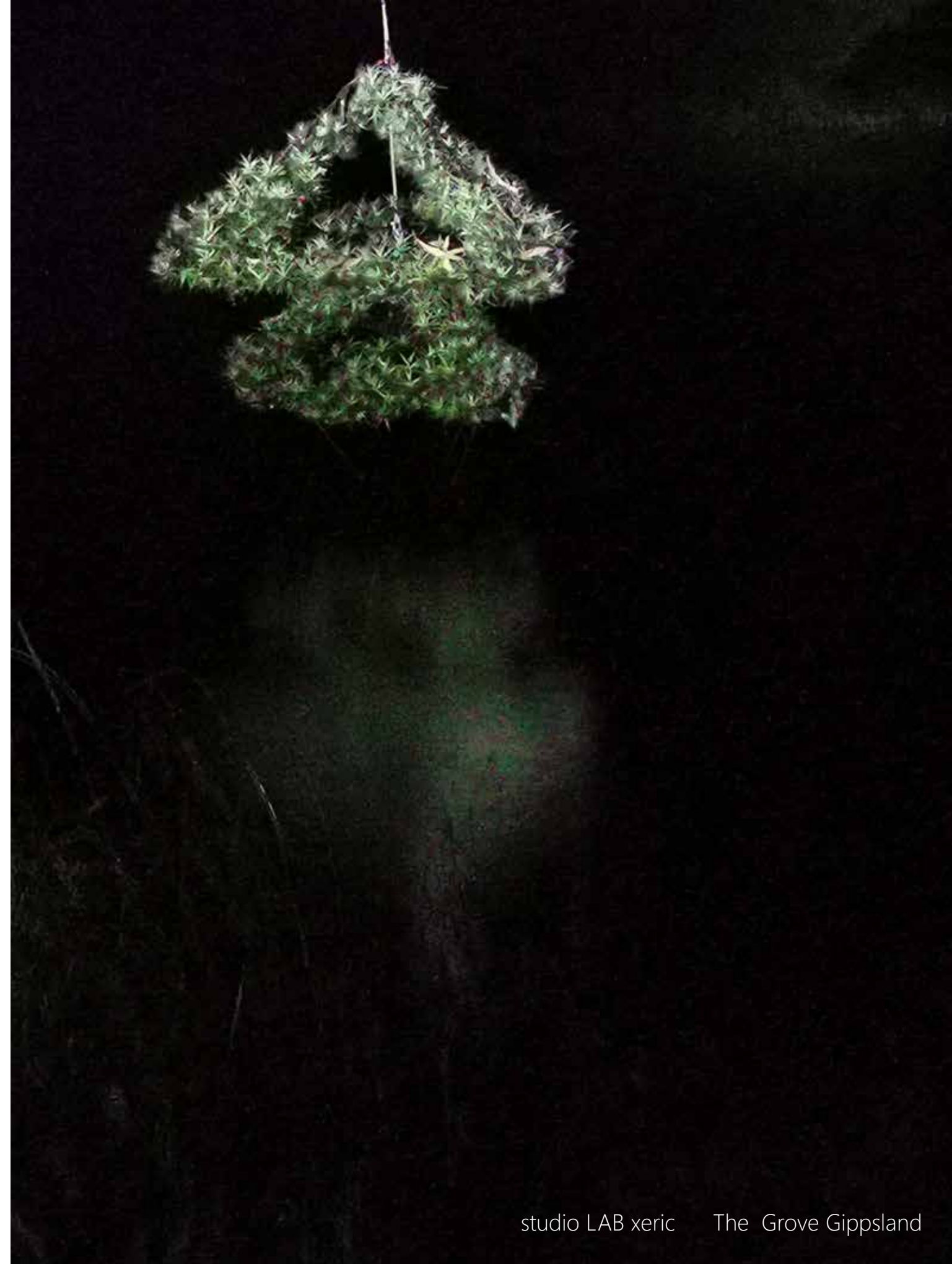
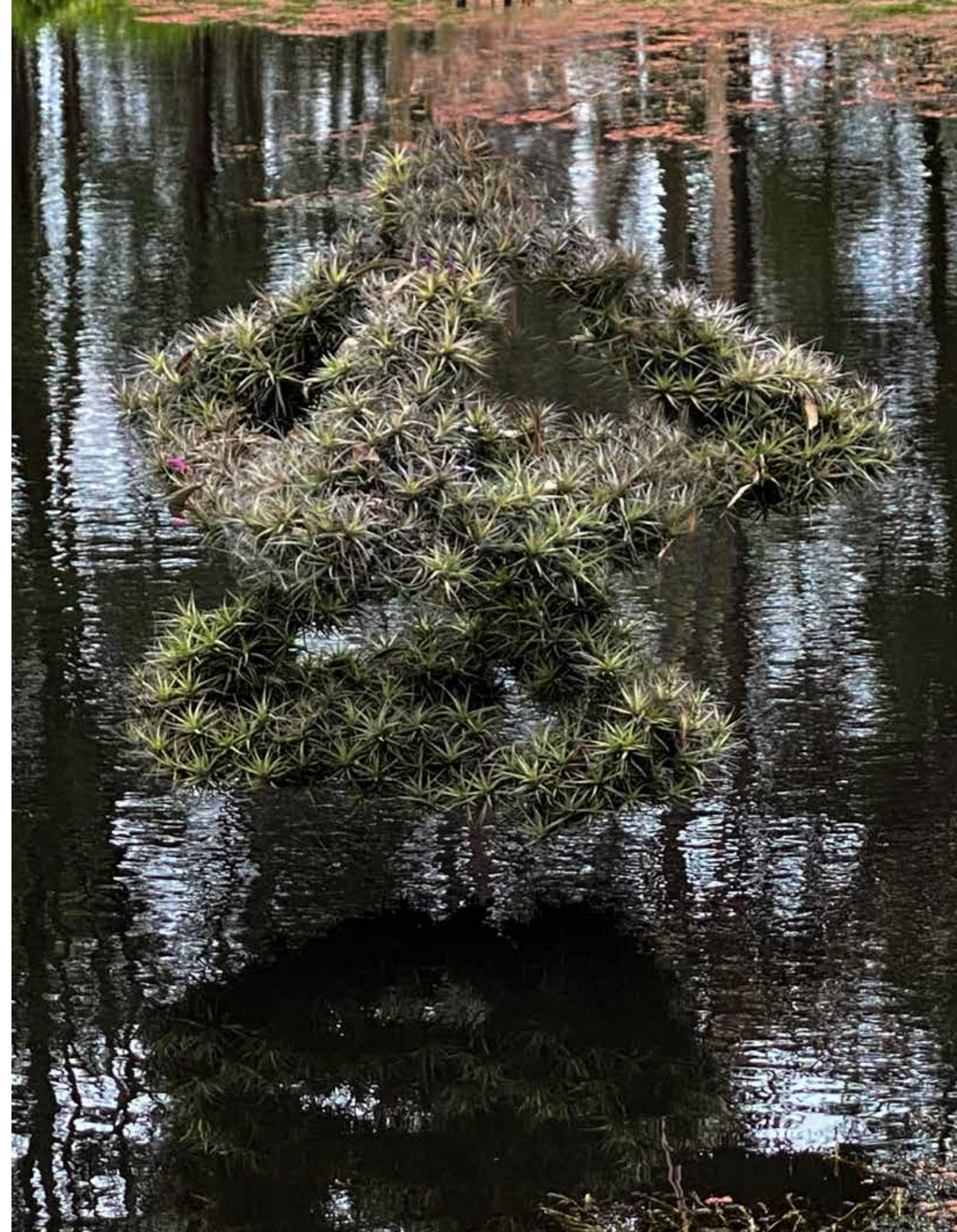
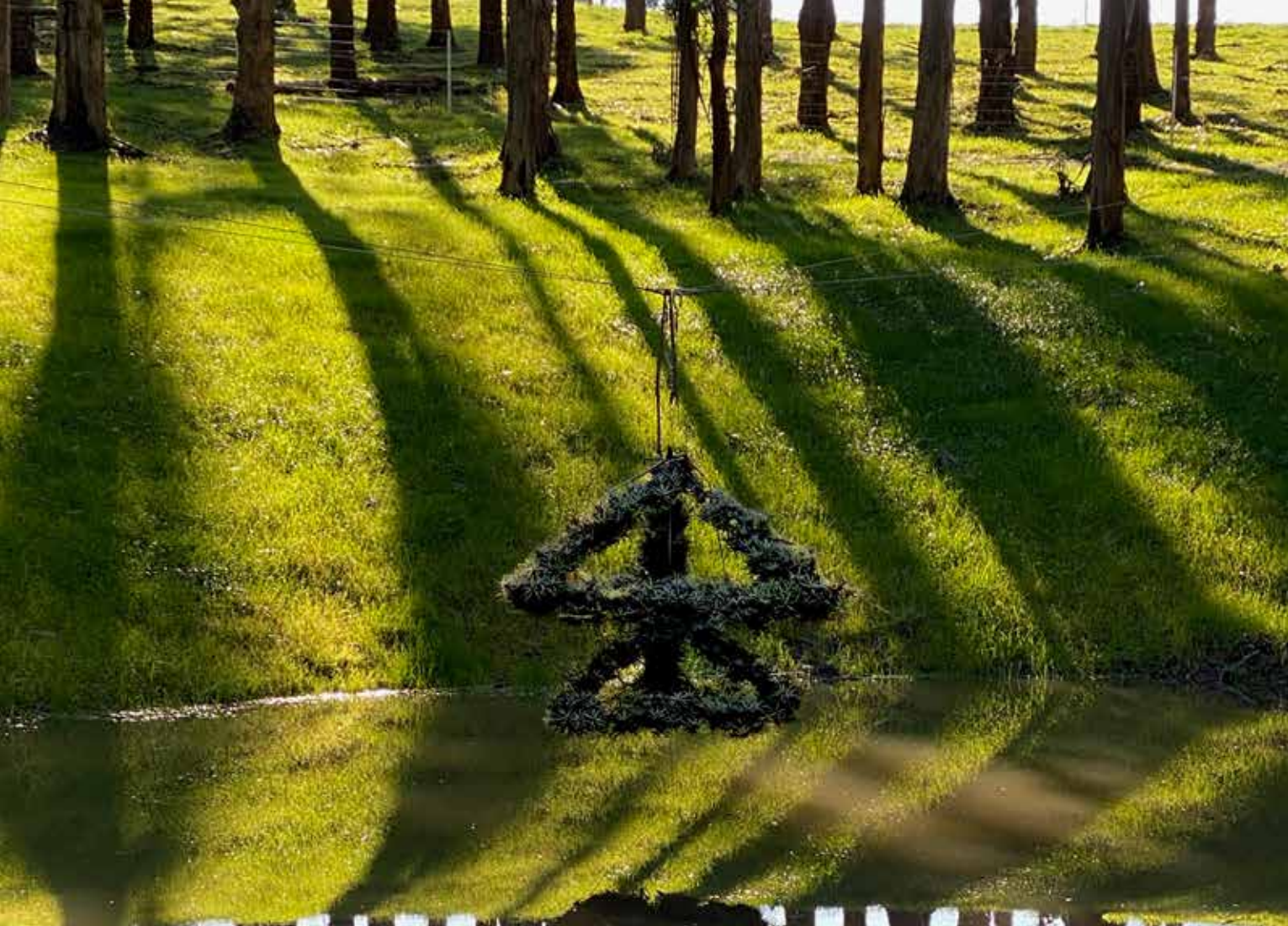
Detail of protruded window screen section with opening window behind the Tillandsia screen

The Grove Gippsland - 2020



The Grove is perched atop the rolling hills of Bass Hinterland, The Grove Gippsland is an immersive food and nature destination comprising an Olive Grove and Trufferie, Market Garden, Restaurant and Function Space, and Nature Walks across our sprawling 60 acre property. The owner and director, David Erlich was in the process of creating a series of nature walks incorporating sculptures. Over a few years I have watched the project evolve and together we conceived the idea of suspending a rotating Tillandsia sculpture over a newly formed dam.

Before the Tillandsia sculpture was installed 250 plants were harvested from the sculpture to lighten the loading and provide a resource to create another plant sculpture for a second location at the Grove. The photographs show the dramatic transformation from the newly formed dam to when it was full a few months later and the grass had grown.







Flat screen



Nose screen, projects outward at the bottom which allows light to enter the room from below but screens direct



Jib screen, similar to a set of jib sails on a yacht, the screen projects outward at the bottom and the one side which allows light to enter the room from both below and from the side, but screens direct summer sun. The project did not proceed.



Visual screening - Melbourne University 2019



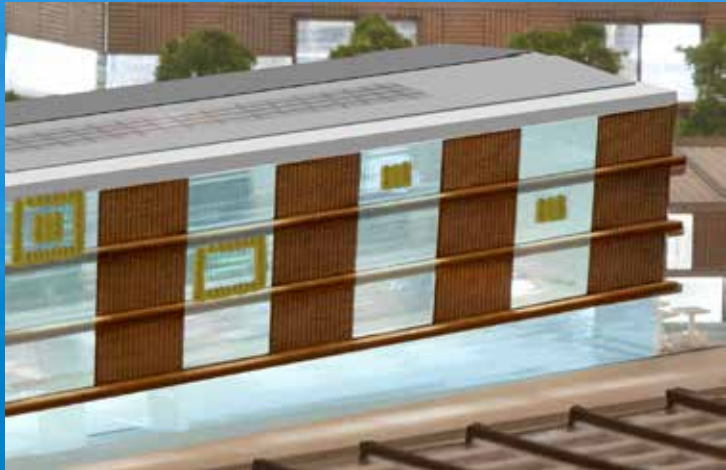
Just before Covid hit Melbourne University were interested in how we might be able to use Tillandsias to visually screen off a number of vent on an adjacent building. We suggested a series of receding upright screens as the render.



Detail of area to be screened



Tidal air plant gardens - 2012



In 2012 Matt Blackwood and Lloyd submitted a proposal for a major commission for the new City of Melbourne Library building that was positioned on the wharf above the water at Docklands.

The project was titled Echology: Making Sense of Data initiative and was a partnership between Carbon Arts, the Australian Network of Art and Technology and developer, Lend Lease. The proposal for the commission was for the worlds first tidal garden of air plants that would rise and fall up the facade of the building driven by the tide.

Like *Code Green*, the work would include a large QR code created from Tillandsias. Scanning the code would direct an audience to a short story contributed by a range of local writers. As the brief was to utilize data from the library the proposal explored an innovative means of using data relating to items being loaned

from the library at the point the code was scanned.

The series of air gardens would be located on the front facade of the building. As the library was positioned over a wharf with the water below the site was perfect for a project like this. The animated gardens would be driven by a series of floats and levers.

Unfortunately the proposal was not successful, is unrealized but remains a potent conceptual idea. In fact in late 2016, the winning proposal - The Melbourne Musical Choir, by artist Natalie Jeremijenko has never been completed.



Fixed plant screens - 2016



Even the most refined architecture can have awkward areas where utilitarian facilities like water and other services sit on the exterior of the facade. As this experiment shows, in this situation Tillandsias are used to screen a spouting down-pipe. When access is needed the structure supporting the Tillandsias is simply hinged away from the pipe.



In this situation, the Tillandsia screen is fixed and used as a screen to break one space from another affording privacy to both. There is a mix of Tillandsia species that offer flowers at various times of the year. At the base is Tillandsia *lajensis* growing containers. Photograph 2016 left - 2021 right



Edendale Farm - 2019

As part of the 2017, Nillumbik Practically Green Festival at Edendale Community Environment Farm Gastons Road, Eltham, I was commissioned to create a moving Tillandsia plant sun screen to be permanently installed on a building. As the festival is a community event, members of the public attending the festival were able to select a Tillandsia and wire it onto the screen with an aluminium tag where they could write their name. The screen was later installed July 2018. Edendale offers many examples of sustainable systems and the work adds to these.

- Title: Alpha screen – animated
- Date: 2017-18
- Medium: Aluminium, galvanized mesh, Tillandsia plants
- Dimensions: H 1100mm x L 1500mm X D 300mm

The plants suffered a minor setback in Oct 2018 when a severe frost descended upon the area and a few plants were lost. However since then and despite the driest two years ever recorded the plants have grown well, are beginning to multiply and cover the screen.



Pulse was also installed as a temporary ground based sculpture for the duration of the festival



Private residence - nose cone 2017

Installed March, 2017

Animated nose shaped Tillandsia sun screen
Commission for private residence St Andrews, Victoria

Friends who live close by saw the experimental skylight plant screens at home and wanted one for their house to rise and fall over a triangular window on the west wall. During summer the setting sun would pour through the glass and screening the sun was a priority.

The light weight screen is raised and lowered via a series of pulleys, a hand winch and moves on wheels that run in a track to guide the screen into place.

A hybrid Tillandsia Houston was selected for the install and the plants have continued to provide shade, grow, produce colourful flowers at regular intervals. The owners are more than happy that the plants can sustain themselves without a watering system and the screen has never required maintenance.



Armature frame for movable Tillandsia sun screen. Rather than creating the screen as a 2d shape, the triangular shape is formed like a nose which screens the sun but also allows light to enter from the bottom while adding a third dimension that creates changing shade patterns.



Frame for movable Tillandsia screen on triangular window lowered.



Frame for movable Tillandsia screen on triangular window raised.



The screen is held in place during the installation before the wire cable and pulleys were installed. Notice how the screen is projected out from the wall at the bottom to allow light to enter the space. Photograph 2016



Photograph 2019 - Over three years the screen required no maintenance, and despite hot dry conditions, no plants died - the 2 photographs demonstrate the growth in the plants over this period. One plant far right bottom has slipped the mount but is still attached.



Geoff Beech and I installed this xeric Tillandsia moving nose cone screen on a neighbor's house in March 2016. The wall faces west and breaks the heat entering the house. It is exposed to a lot of heat, but it does get rain. There is No watering system, No root medium, No fertilizers and it is light enough to move up and down over the window. Vertical gardens most often require regular maintenance every 3 months. Reticulated systems often require new plants to replace those that have died, but after nearly 5 years not one Tillandsia was dead.

By December 2021 the Tillandsia plants had become very thick and today we did our first maintenance call to thin the plants.

The maintenance took 30 minutes. We took clumps of 3-4 plants off, in all over 150 large plants. Over the same period a typical reticulated vertical garden may have required 14 maintenance calls. In a truly sustainable manner, the clumps of Tillandsia plants removed which have been used on another wall.



The xeric Tillandsia nose screen with the plants removed. ready to re-install



Harvested plants ready to be mounted on another wall garden.

Within You Without You



This Tillandsia living plant work *Within You Without You*, was created for BALDESSIN STUDIO - THE STORY exhibition at Montsalvat, Eltham curated by Christine Johnson, July 2019. The work consisted of two curved pieces where one was installed outside while the other was installed inside. It appears that the plant sculpture enters the space from the outside through a window in a door, then curves down the wall inside the space.

To augment the work *Nature Reclaims the Helix* was installed outside in the courtyard and *Double Pyramid Power* was installed inside the gallery space. While both these works had been exhibited in the in previous times, the growth of the plant in the intervening years presented them as new works.





Part of the work was hung at Collectors Corner for a few years.



Tillandsia Swarm - from 2014

Swarm Tillandsia



Although only four meters from the ground, Airborne was juxtaposed against the second tallest building in Australia which called out for our next experiment. After contact and one meeting with the Fender Katsalidis designed Eureka Tower management, we had consent to proceed with a Tillandsia experiment. On 17 June 2014 Grant, Stu and myself installed some Tillandsia plants in wire cages attached to fixing points at four locations on Melbourne's tallest building Eureka Tower. A simple experiment - plant cages with two species in each cage were installed at level 56, 65, 91 and 92.

As far as we know this is the tallest plant install on a building in the world. Marina Bay Sands Singapore, is at 55 stories, so it is a significant step upwards and opens a new but effective way of incorporating plants on high rise buildings.

Tillandsia SWARM is an experimental art/science project where selected species of Tillandsias (air plants) are installed without soil or axillary watering at a range of exposed urban locations and monitored to gauge their success through extreme seasonal conditions. As the concept of *α space* extends to the utilization of existing urban infrastructure as a means of support for plants like Tillandsia, the proj-

ect involves finding suitable sites, negotiating with the management or authorities to gain permission and backing for the install.

To date 42 plants are installed at 20 sites - 5 locations, including Eureka Tower, CH2 building, Essendon Fields, Montsalvat and The Friend's School (Hobart). The plants on Eureka have been installed at level 92 (295m) for more than 2 years, which is the tallest building in the world with plants atop and is a testimony to the resilience of these amazing plants.

As Tillandsias have the ability to uptake heavy metal particulates from the atmosphere through their complex trichome cells into the leaf tissue, they can be used as bio-monitors to measure comparative pollution levels.

Tillandsia SWARM is inspired by German artist Joseph Beuys 7,000 Oaks - City Forestation Instead of City Administration project at Kassel presented at 1982 Documenta 7.



Tillandsia SWARM map

As the number of exquisite landscape, paintings, prints, photographs - (images) - expands by acres each day, the acres of real landscape shrinks proportionally. With diminishing of biodiversity, the medium for artists to embrace in the 21st century is nature itself. Not to strive for reproductions, expressions and interpretations of nature, but to work with the living, to work in the REAL!

Urban Experiments

Tillandsia SWARM

In 2014, after the **Airborne** project, we decided to experiment with Tillandsias on a range of demanding locations within the urban environment around Melbourne. The first was at various locations on Eureka, which at level 92 is the tallest building with plants on top. Selected species were placed in a mesh cage and mounted to a hand rail at the top. There was no soil medium and no watering system. The plants were exposed to extreme weather, heat, long dry periods and salt winds that regularly reach over 200 kph. Over years, the plants have proved resilient, they have adapted to the harsh environment growing in a more compact form and producing a great number of pups than they would in a kinder environment. (compact growth and a higher pupping fate is the plants protection because of the higher stress levels)

The project continues to expand.

The mesh cages were developed as a means of securing the plants to the building infrastructure in a way that guaranteed they would not fall off. The cylindrical cages, now termed as cells, became emblematic of the project and reference the cells bees store honey and lay their eggs in.

A project evolved titled **Tillandsia SWARM** and in the past few years other cages have been included in the experiment which now includes, many more plants. .

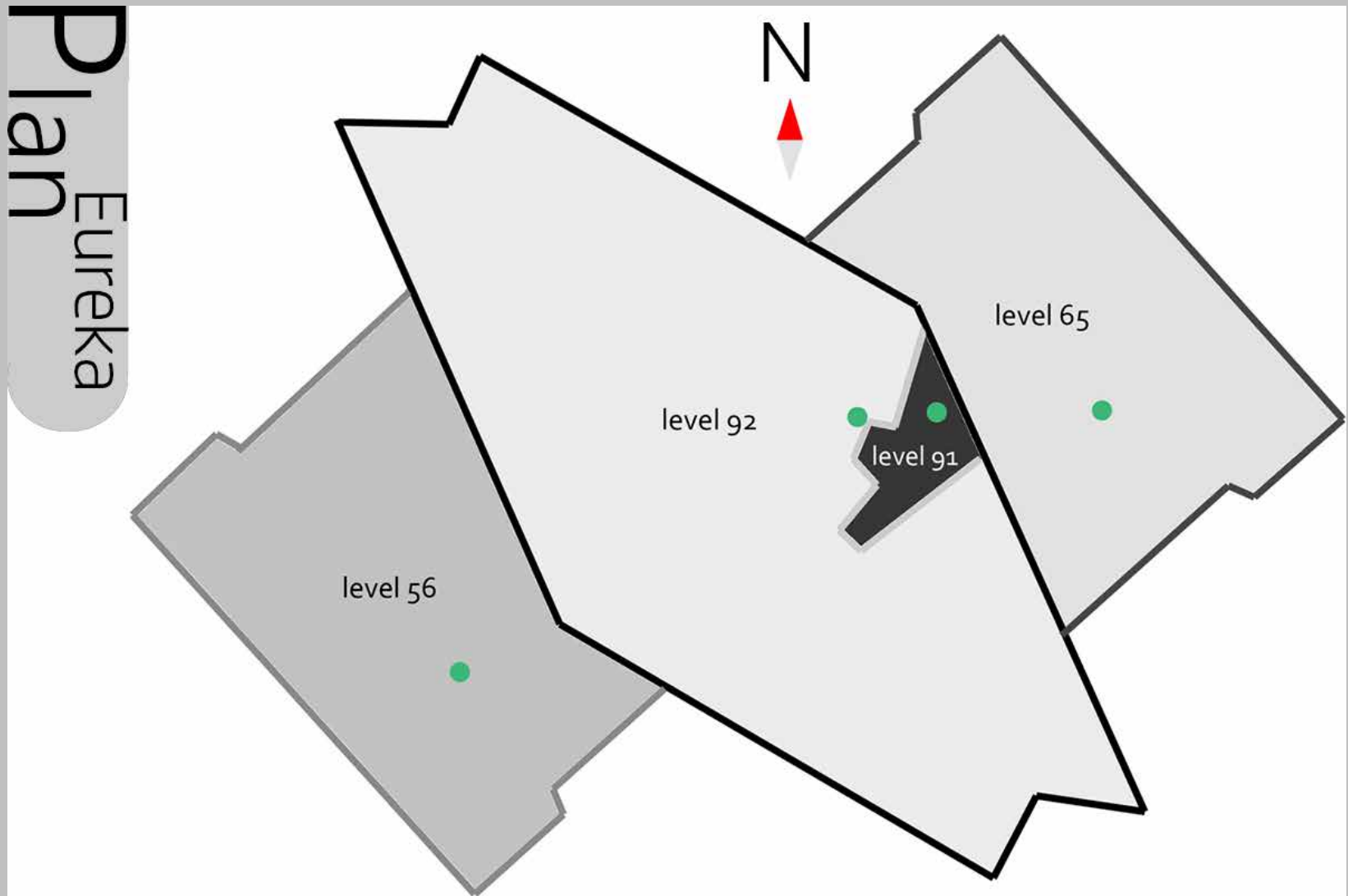


Tillandsia SWARM

- A ground breaking art/science experiment with Tillandsia plants that need no soil or watering system
- After a period of time the plants can be used as biomonitors to log comparative urban pollution levels
- The plants use a CAM cycle and grow in darkness cleaning the atmosphere at night
- They uptake all water and nutrients through trichome cells on their leaves
- Like bee swarms, the plant cells grow in number. Currently there are - over 40 Tillandsia SWARM cell sites - on 21 buildings, across 3 states - within 2 countries – at 1, 2, 3, 11, 56, 65, 91 and 92 (295 m above base)

Although many of the plant cells are in obscure and inaccessible locations, and appear to sit covertly, all plant cells are installed with approval by the building owners.

Eureka Tower



Plan of Eureka Tower - the green dots show the location of the Tillandsia plants on level 56, 65, 91, 92. Level 91 is an access way to the higher level 92.

On 16 Oct 2014 we checked the plant experiments on Eureka Tower. It was wild weather with fine saturating rain driving in on a strong wind and not the most pleasant place to be at that height. The plants had survived the past four months of winters cool, wild salt winds and apart from some old leaf die back (these are the leaves farthest from the growing tip) which is probably attributed to the acclimatization to the plants to the new environment, they are fine. The Tillandsia

at all four locations are growing well. Everything is secure, nothing has blown away and one plant at level 91 is even flowering. The next phase is to see how the selected species of Tillandsia perform in the dryer and hotter months ahead. On 25 February 2015, Stuart and myself visited the plants on all four locations with Angela Fedele, a writer for Sourceable, from which she published a piece in titled "Air Plant Experiment Happening Atop Melbourne's Eureka Tower."

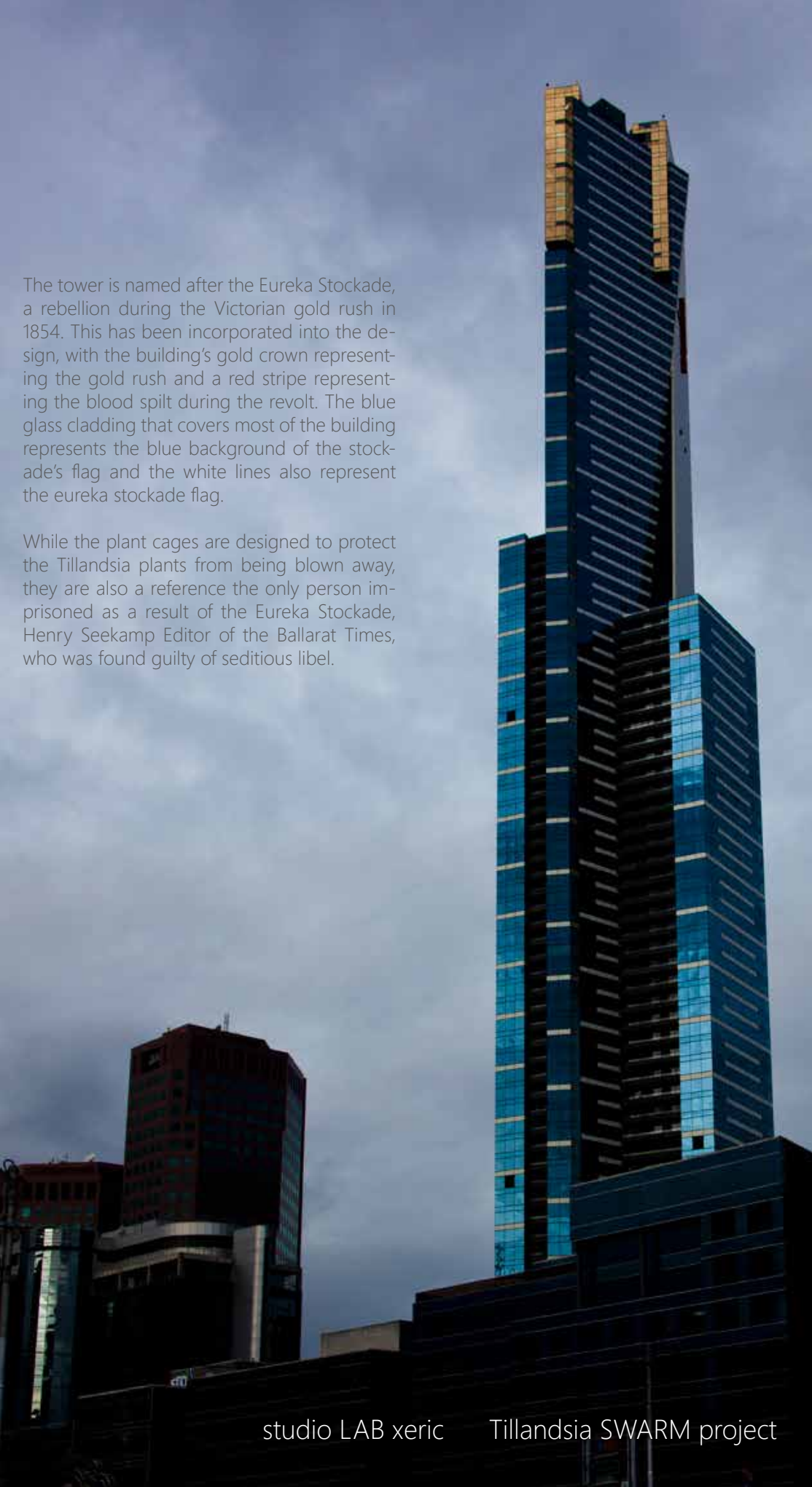
Grant Harris works on fixing a Tillandsia plant cage while Stuart Jones and Lloyd Godman look on.



Grant Harris environmental scientist, Lloyd Godman ecological artist and Stu Jones structural engineer, on Eureka Tower level 92 about 300m at the top - 200km plus winds. Now we wait to see how they grow! (the air plant cage is above Stu's head).

The tower is named after the Eureka Stockade, a rebellion during the Victorian gold rush in 1854. This has been incorporated into the design, with the building's gold crown representing the gold rush and a red stripe representing the blood spilt during the revolt. The blue glass cladding that covers most of the building represents the blue background of the stockade's flag and the white lines also represent the eureka stockade flag.

While the plant cages are designed to protect the Tillandsia plants from being blown away, they are also a reference the only person imprisoned as a result of the Eureka Stockade, Henry Seekamp Editor of the Ballarat Times, who was found guilty of seditious libel.



S Eureka Tower Site 1



Location: Eureka Tower, Melbourne CBD
Site: 1
Latitude: 37.821545 S
Longitude: 144.964477 E
Aspect: Open, exposed to all elements, direct sun all day
Level: 92 (295m) This is the tallest building in the world with plants growing at this height.
Install date: 17 June 2014
Public Visibility: No - restricted private access only

Eureka Tower



Eureka Tower
 Site 1



Eureka Tower
 Site 1

Location: Eureka Tower, Melbourne CBD
 Site: 1
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 Aspect: Open, exposed to all elements, direct sun all day
 Level: 92 (295m) This is the tallest building in the world with plants growing at this height.
 Install date: 17 June 2014
 Public Visibility: No - restricted private access only

Site visit 20 May 2015 with architect Toby Reed, Lloyd Godman, Stu Jones, and State MP Cindy McLeish.

Site visit - 11 May 2017 - Lloyd Godman, plants have put on good growth. Species one has 12 pups

Site visit 7 June 2019 - Lloyd Godman and Geoff Beech despite the driest 2 years recorded the plants are alive and have expanded to a point where they are growing outside the cage. *T. bereri* has now expanded to 14 plants and are growing outside the cell mesh.

Site visit 29 Jan 2020 - Lloyd Godman, Geoff Beech and Jane Clark Senior Research Curator MONA. The plants were removed from the galvanized mesh cell and placed in a much larger plastic mesh cage. The reason for the plastic cage is that the metal can give a false heavy metal contamination reading.

Full documentation of the SAWRM project is available in the PDF [Tillandsia SWARM](#)



Eureka Tower
 Site 1



Eureka Tower
 Site 1

Eureka Tower



Lloyd Godman: A PHOTO: synthetic pathway - 2014 Deakin University Art Gallery



In 2010, when Expanding Dimensions Tillandsia sculpture was exhibited as part of the Deakin University Small Sculpture Award, the director of the gallery Leanne Willis not only became aware of my work, but intrigued. Sometime later she visited and invited me to have a survey show at the gallery.

As part of the major survey exhibition Lloyd Godman: a PHOTO: synthetic pathway in 2014 at Deakin University Art Gallery curated by Leanne Willis, several of the Tillandsia sculptures were installed. One inside the gallery, the others suspended along a walk way adjacent to the gallery.

The exhibition tracked the journey from traditional photography through, the exploration of photosensitivity, to the use of photosynthesis and the Tillandsia plant sculptures.

Included in the exhibition was a selection of works from:

- The Last Rivers Song - 1984
- Secrets of the Forgotten Tapu - 1986
- Codes of Survival - 1990
- Adze to Coda - 1992
- Evidence from the Religion of Technology - 1994
- Aprorian Emulsions - 1996
- Equivalence - 2005
- Entropy - 2010





From 22 - 29 March 2015 I was invited to be Quaker in Residence at the Art department in The Friends' School Hobart. As part of this residency I spoke to many groups of students about how Quakerism informs my ecological art.

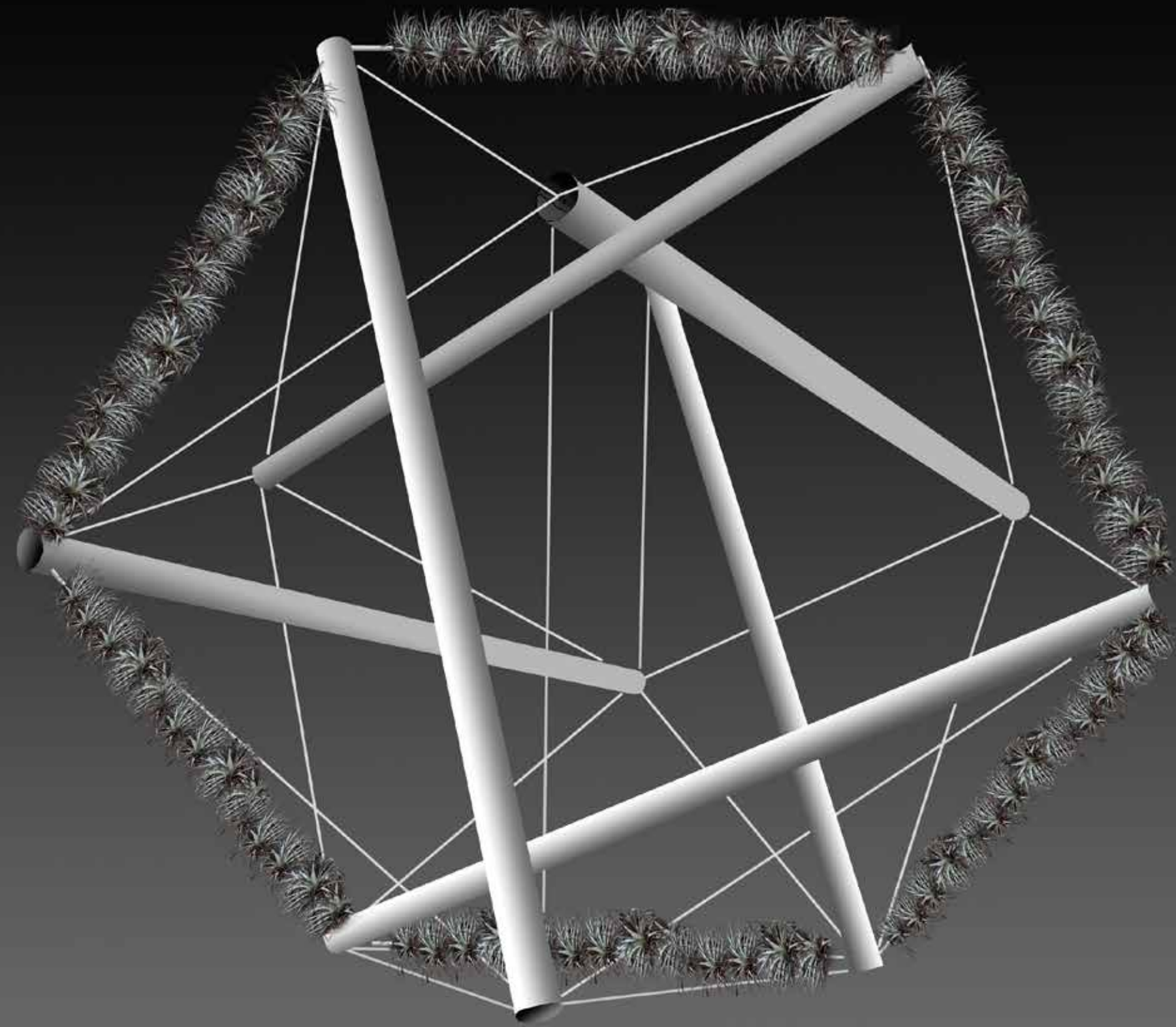
As part of the residency I also worked with students to create a living Tillandsia air plant sculpture SPICEE that was installed, and will remain, at the school continuing to grow. This was the first permanent installation of these living art works. When the plants have grown in a few years time, we are planning to harvest the excess growth to create more living air plant art works with another group of young enthusiastic creative art students. As an ecological artist in an age of pressing environmental concerns, the greatest legacy I can leave to future generations is an art work that cleans the environment, feeds the spirit and grows to offer the next generation of young artists a living medium to harvest and then create their own living plant sculptures. The work utilizes tubes and cables to retain its physical integrity in a tensegrity form. The wires that hold the structure in place then have the air plants attached. The final work is constructed from stainless steel and uses six tubes, one for each of the acronym SPICEE - this represents the Quaker testimonies and bear witness to **Simplicity, Peace, Integrity, Community, Equality, Earth Care**. A testimony is neither a rule nor a creed, but is both an ideal to strive for and a way for our lives to speak.

No testimony stands alone. They are like threads which we weave in and out of each other to create the material of our lives. I spoke to the students about the metaphor of this in the tensegrity model. When these testimonies are strong in our lives and an event or situation places pressure on the ideals of one testimony, the tensional integrity of the oth-

ers pushes back to resolves the equilibrium of the one in stress.

The Tensegrity Tillandsia work at The Friends' School Hobart which I made last year had been restored and was installed at a new location at Friend's School on Wednesday - due to a series of crazy events it got cut up and thrown in a skip rescued by one of the art teachers and thanks to Nelson, Nick, Stuart and others has now been rebuilt

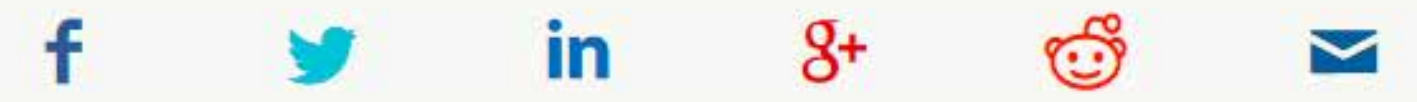




Gardening guru's uplifting experience building suspended, living sculpture

MICHELLE PAINE • MERCURY • MARCH 29, 2015 4:41PM

BE THE FIRST TO RESPOND



Friends' School artist in residence Lloyd Godman with Year 10 students, from left, Samson Blain, 15, Mirrin Stronach, 15, and Ella Smail starting work on the air plant sculpture.

STUDENTS have been working with a renowned ecological artist to make the world's first living plant sculpture of its kind.



SPICEE - the first permanent suspended rotating living air plant sculpture, The Friends' School, Hobart, Australia - left photograph July 2016 Photograph Nick Maxwell
Centre photograph plant check July 2019 reveals the growth over 3 years - Right photograph - reflection of Lloyd speaking about the work at the Quaker yearly meeting July 2019 photograph courtesy of Anna Wilkins



SPICEE - the first permanent suspended rotating living air plant sculpture, The Friends' School, Hobart, Australia __ July 2019

Experimental - Skylight screens - 2013

At home there are double glazed skylights on the galvanized iron roof. Despite the double glazing, the heat of summer when temperatures reach over 40°C, still allow excessive heat to enter the building through the glass.

Two Tillandsia plant screens were constructed from recycled materials and can be lowered or raised on wire cables over the glass. The screens have an old scooter wheel on each corner and sit about 250 mm above the roof. This allows the skylights to be opened for air circulation and also allows some light to enter the room below even when the screens cover the skylight.

Metal cables run up to the ridge line of the roof through a pull and down the opposite side where they can easily be moved by hand. The screens were installed in 2013 and have had no maintenance since, however some plants were lost due to a -6°C 60 year frost.

Metal is highly conductive and temperatures on a roof like this can quickly rise and fall within a short period of time.

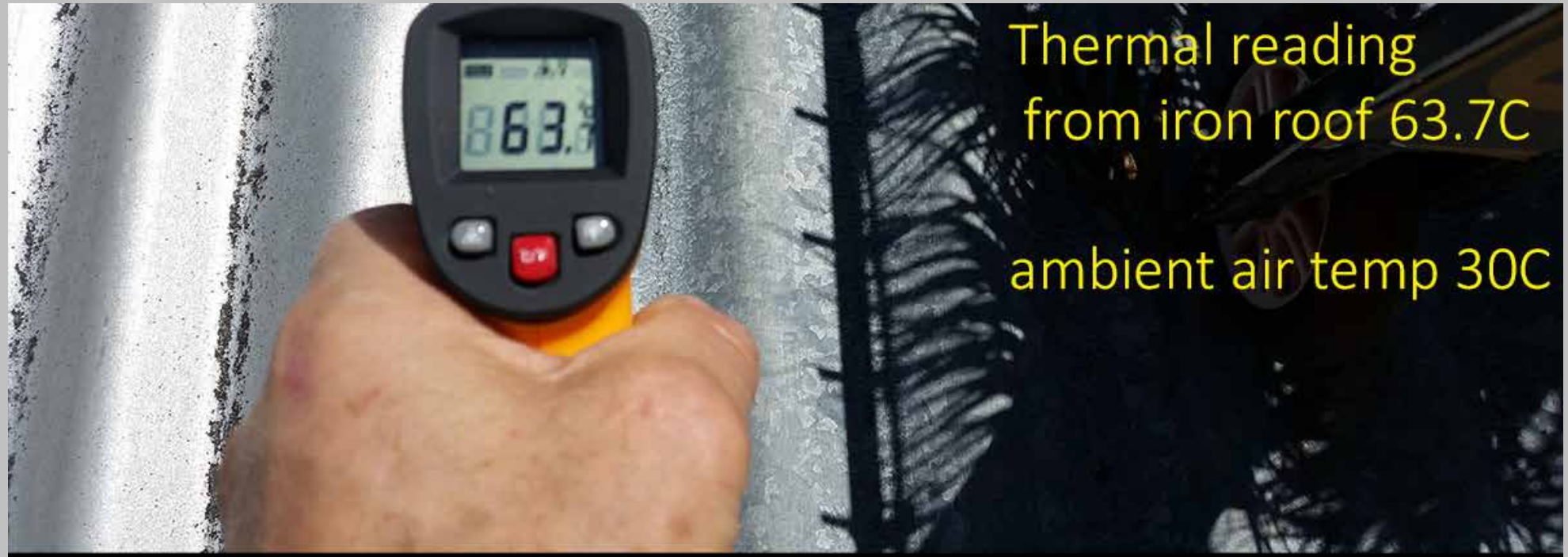


Tillandsias respond well to small but frequent exposure to morning dew as seen on this roof.



Above: the Tillandsia screens over and away from the skylights.
Right: Tillandsia screen in flower.





Thermal reading
from iron roof 63.7C
ambient air temp 30C



Thermal reading
from Tillandsia
plant shadow
200mm away
38.4C

Temperature reading summer 2018 ambient air 30°C, iron roof 63.7°C shade from Tillandsias 38.4°C - heat mitigation on iron roof of 25.3°C



Tillandsia skylight screens



Ambient air temp 42 C
Iron roof 84.5 C



Temperature reading summer 2018 ambient air 42°C, iron roof 84.5°C, shade from Tillandsias 53.1°C - heat mitigation on iron roof of 31.4°C



shade from plants 53C

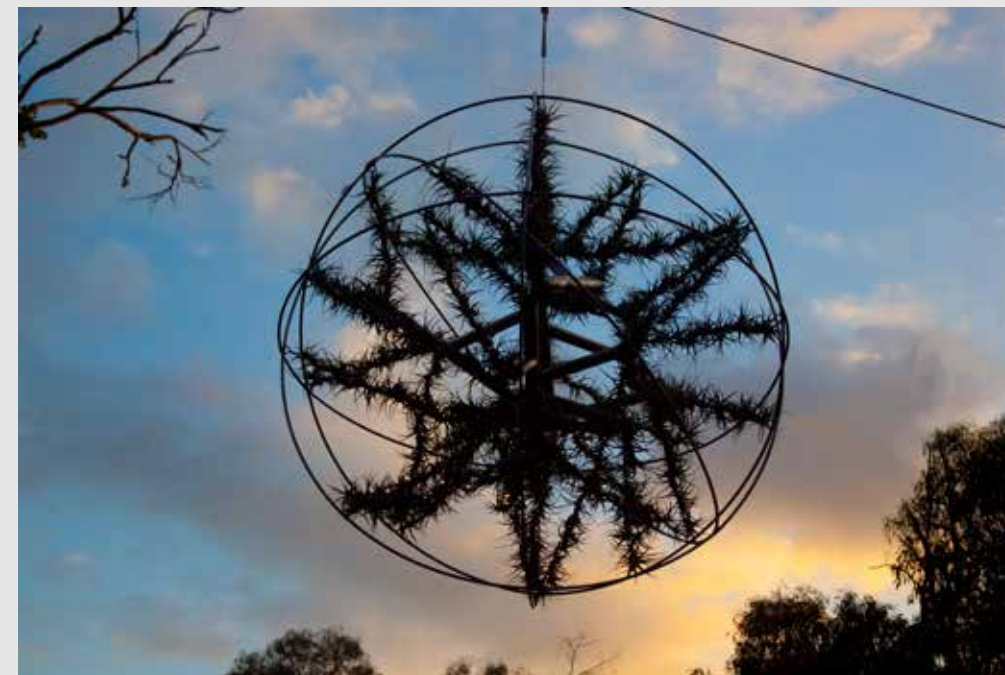


Aerial - 2016



Aerial - Tillandsias (aerial plants) re-purposed television aerial - 2016

The work connects with Tillandsia SWARM on page 102 and the dysfunctional tv aerial pole on the Walpole Building, The Friends' School Hobart.



Pulse explores tubular structures like; stomata, veins, bronchi, arteries, capillaries, pipes etc. Vascular systems where essential elements like water, blood, sugars, urine, waste etc. are transported through tubes from one place to another. Embedded in the work are references to macro, micro, atoms, planets, living cells, photosynthesis, balance, cycles, super-sustainability.

Pulse is a super-sustainable, suspended, rotating air plant sculpture. The crucial concept behind these works is that slowly, over time the diminutive Tillandsia plants grow exponentially to create a resource that can be drawn upon to create further work. This sculpture is constructed from 5 large stainless steel rings which suggest the trajectories of excited electrons. These make up the outer dimension and are fused at the intersections. Within this outer globe, are two stainless steel structures made of branching tubes independently suspended on thin tensioned wires. Hundreds of Tillandsia air plants are attached to the wires and continue to grow. The entire work is suspended via a high quality swivel which allows the work to rotate under the natural force of the breeze. (Experience has shown that high winds do not affect the work in a negative manner).

Left: Time exposure of *Pulse*

Right top: Twilight *Pulse*

Right centre: Twilight *Pulse*

Right bottom: Grant Harris and Stu Jones install *Pulse* for the Green Cities Conference in the Ball Room of the Grand Hyatt, Melbourne 2014 - Lloyd was commissioned by the Property Council to create a feature work for the Green Cities Conference

Animated plant screens - 2013



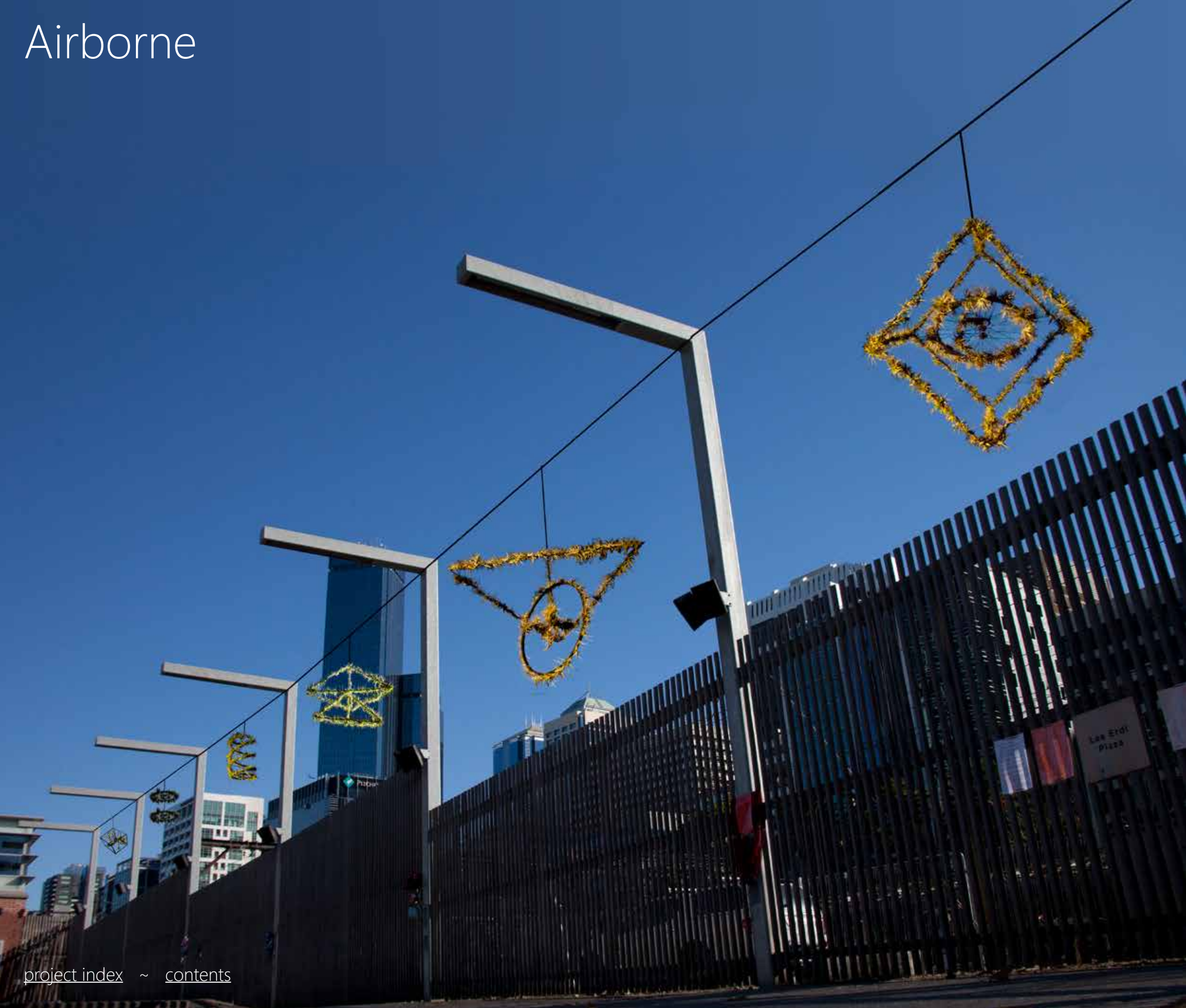
Experimental movable living Tillandsia plant screens

In 2013, the South China Morning Post, based in Hong Kong, were about to publish an article on the *Airborne* plant works in Melbourne which had been installed since the beginning of Feb 2013 with no life support system at all (watering system etc and were thriving). After the interview, the editor also wanted a shot of the experimental movable air plant screens I have at home but I had just a few hours to get a photograph to them.

As I did not really have a good photo and the setting was not aesthetically sympathetic, I took the plant curtain at the house added some more plants at the base then set it up on a neighbors new house a few km away. The house already had a sun screen system so it offered a great comparison to the Tillandsia plant screens. After an hour or so setting it up I managed to get the photograph and e-mail to the news paper. The screens can be moved from the widow to the façade of the building to screen the sun as required. This is a prototype and they need more development but it gives a good idea of the concept. Of course the screens could easily be applied to a multilevel building.

[SCMP life style article](#) - Dec 2013

View from inside of experimental movable living Tillandsia plant screens. While the 3 dimensionality of the Tillandsia plants offer shade they also allow light to enter and offer a sense of the space outside.



Following the Code Green proposal, I was successful in gaining support by the City of Melbourne through the Arts Grants Program 2013 to complete another project, Airborne. project - first installation at Les Erdi Plaza, Northbank, 9 Feb 29 2013, with Melbourne's tallest building Eureka tower in the background

Supported as a temporary art installation by the City of Melbourne, through the Arts Grants Program - the work was installed for 13 months and removed early 2014

Air garden one installed Feb 2013 - Queensbridge Pedestrian precinct, Northbank, of the Yarra River, Melbourne. The work is located on the fenced boundary between the public concourse and Platform 10 at Swanson St Station - intentionally the site is a difficult location to install living plants. The series of rotating air gardens extend between 8 existing lighting columns from SIGNAL towards Swanson St. As an urban concourse with high daily foot traffic, this is an area of significance to the inner city environment.

Right: Rendered image of installation for Les Erdi Plaza, Northbank

Supported through a City of Melbourne Arts Grants 2013, Airborne was an important test for the Tillandsias where air plant sculptures were installed for 13 months in central Melbourne with no soil or auxiliary watering system in a demanding location. The installation was to have a limited install life and to be removed by the end of 2013, but because the site was on Vic Rail land we gained an extension to leave the works installed for a few extra months. This allowed us to have the works in situ for more than a year as a trial through all seasons. The location was beside a busy rail line at Flinders St Station, at Les Erdi Plaza, Northbank, Melbourne. The work consisted of eight suspended rotating air plant sculptures and withstood prolonged periods of dry including record heat (five consecutive days over 41 degrees Celsius). Despite the conditions, the plants grew, flowered, and reinforced the concept of a new space plants could occupy in the built environment beyond the roof top, beyond the vertical garden in what we termed Al-

pha Space. At home, honey eating birds like the Eastern Spine Bill, honey bees and other small insects frequent the flowers so it was not surprising that some of the flowers set seed. Praying mantis seed casings had also been laid on some leaves, which was evidence that even in this central city location, other species were benefiting from the installation of the plants.

The eight works were suspended between lighting posts along the rail corridor where the diesel trains leave Flinders St Station. There are eight metres between each post so the works spread out for 64 metres. When the trains depart the nearest platform, there is a loud roar of the engine with large clouds of black diesel fumes as the train engages with its load; so it was no surprise that when the works were removed, the Tillandsias on the work closest to where the trains leave from were covered in black particles. The particulates became less obvious on the plants as the distance away from the platform increased. However the particulates did not appear to hinder the growth of the plants. While the plants for the installation were hardened off before the install, after 13 months the growth habit of the plants had changed to a much more compact structure with shorter harder leaves. However the plants produced about seven or eight pups (vegetatively produced new plantlets) per plant, many more than one might see in a less stressful location where pup production might be two or three. We attribute the prolific pup production to the plants biological insurance - if one or more pups die then the plant has more reserves growing shoots to prosper from. Of several thousand individual Tillandsia used on the eight sculptures, only two plants had died during the 13 month install. It is difficult to ascertain the exact cause. During the installation period, the living sculptures experienced strong winds of up to 115 kmph a storm that ripped a large sculpture of a dog from its mounts but a few hundred meters away and brought down a brick wall that tragically killed three people in Melbourne city. As the suspended works are able to rotate on swivels they can dissipate the energy and do not become excited as a sail might.

Atmocycle I



Atmocycle I, first installation at Les Erdi Plaza, Northbank, 9 Feb 29 2013

Left: *Atmocycle I*, suspended between lighting poles, with Eureka Tower in the background

Right top: Time exposure of *Atmocycle I*, with three independently rotating elements, illustrating wind driven rotation.

Right centre: *Atmocycle I*, suspended

Right bottom: Cast shadow of *Atmocycle I* on the pedestrian thoroughfare Les Erdi Plaza, Northbank, when the work rotates on the wind the shadow plays on the ground



Atmocycle I, Image sequence of daylight time exposures shows the rotation with the two elements moving at various rates on the wind. Photographs taken at St Andrews before the work was installed in Melbourne.



In the context of rising CO2 levels, *Atmocycle* references the atmospheric cycle, the exchange of atmospheric gases, particularly CO2 and Oxygen. The role plants play in this cycle is crucial, with Tillandsias which can uptake CO2 and expel oxygen at night offering a special place. With two living sculptural elements that can rotate independent has.

Atmocycle I



Atmocycle i - Installed at The Incinerator Gallery Moonee Valley - ARTECYCLE exhibition - 2012

Atmocycle I - Installed at Yering Station for the 2012 Yering Station Sculpture Exhibition and Awards - 2012

Atmocycle i - Installed at The Incinerator Gallery Moonee Valley - ARTECYCLE exhibition - 2012

Atmocycle i - Six rotating positions - 2012

Double Pyramid Power



Double Pyramid Power, first installation at Les Erdi Plaza, Northbank, 9 Feb 29 2013

Left: *Double Pyramid*, with two independently rotating elements, Ernst & Young Building in the background

Right top: *Double Pyramid*, with the tower of Flinders St Station in the background
Right bottom: Flash lighting on *Double Pyramid*, Eureka Tower on right



Double Pyramid Power, Image sequence of time exposures shows the rotation with the two elements moving at various rates on the wind. Photographs taken when the work was installed in the court yard at Monstsalvat as part of the Nillumbuk Art Award

Atmocycle II



Atmocycle II, second installation at Les Erdi Plaza, Northbank, May 30 2013

Left: *Atmocycle II*, note the flowers of one species of Tillandsia

Right top: *Atmocycle II*, with three independently rotating elements, with the tower of Flinders St Station in the background

Right bottom: Flash lighting on *Double Pyramid*, Eureka Tower on right



Atmocycle II, Image sequence of daylight time exposures shows the rotation with the two elements moving at various rates on the wind. Photographs taken at St Andrews before the work was installed in Melbourne.



Expanding Dimension 2013



Expanding Dimensions, second installation at Les Erdi Plaza, Northbank, May 30 2013



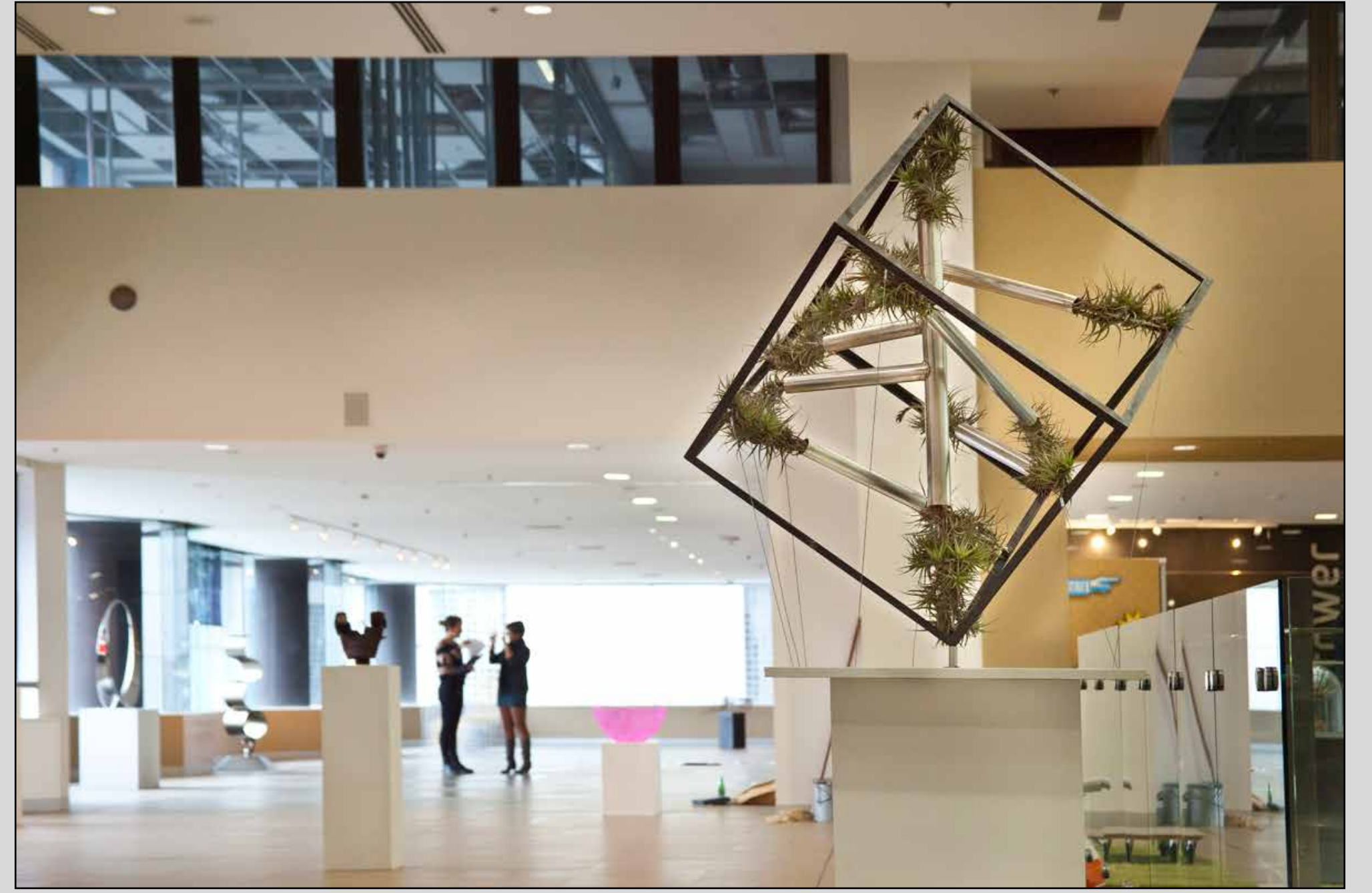
Left: *Expanding Dimensions*, Eureka Tower in background

Right top: *Expanding Dimensions*
Right Centre: *Expanding Dimensions*
Right bottom: *Expanding Dimensions*





Expanding dimension - WTC Melbourne July 2014 - Artists Emerge at WTC Atrium gallery, curated by MARS gallery 2014



Expanding Dimensions

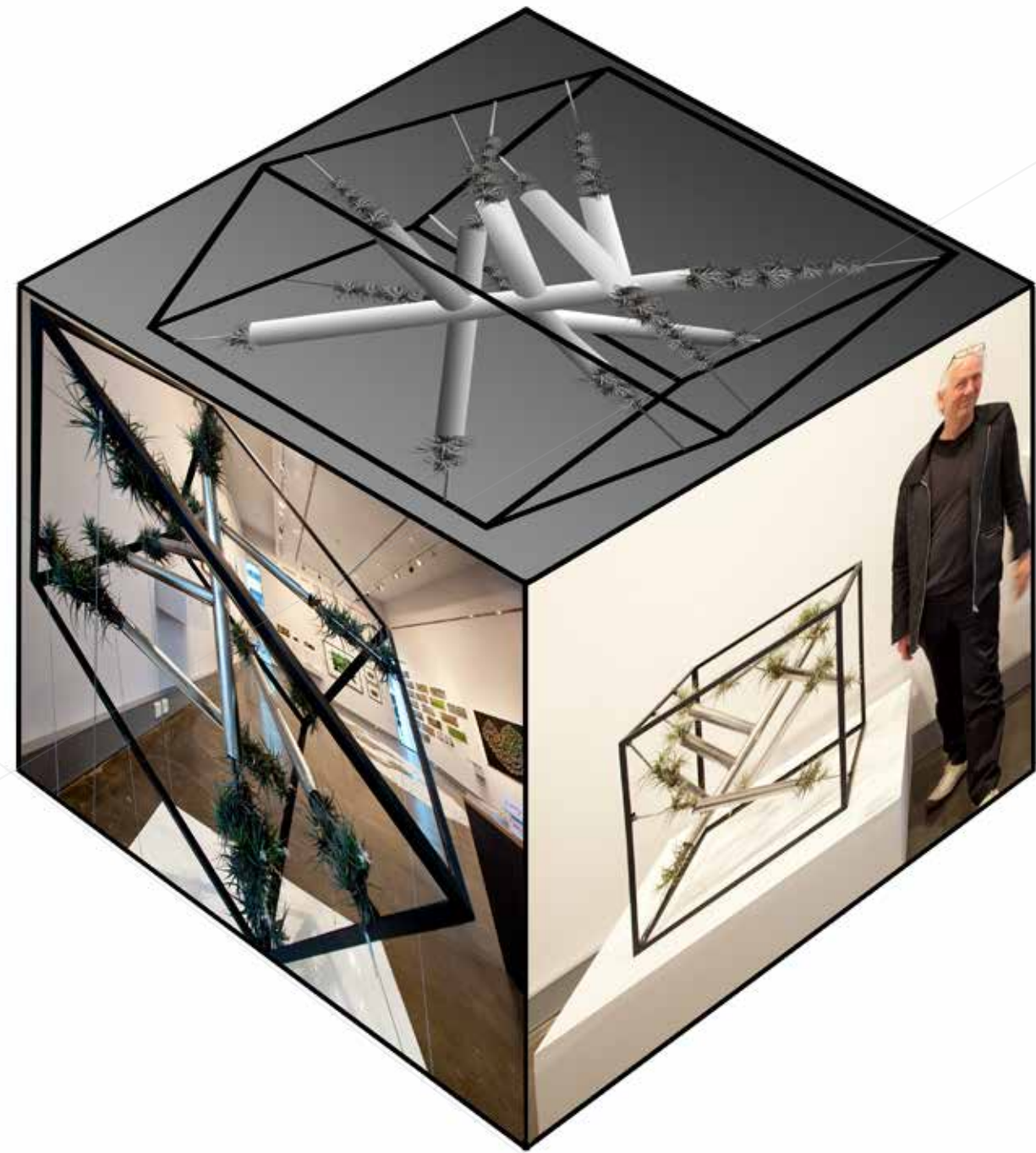
For a number of years, Deakin University had offered a small sculpture acquisitive award and I contemplated submitting work combining Tillandsia plants and the concept and application of super-sustainability. Initially I looked at the idea of a series of stainless steel tube structures suspended between that gallery and adjacent buildings. The concept was that over time the plants would grow and break the allowable physical limit of the award entry - 900 x 900 x 900. However after some discussion with Leanne Willis the director of the gallery, who was intrigued with the concept, it became obvious that the work would have to be free standing or sit on a plinth. So I decided to create a linear steel cube to suspend the tubes from via tensioned cables and attach to the plants to the cables. This would allow the work to be placed on a plinth for the duration of the exhibition but would afford other presentations like suspension in the future while retaining the potential of the plants growing beyond the dimensions of the sculpture award rules.

Expanding dimension is a super sustainable plant sculpture that combines the incongruity of industrial conduits, drains, pipes, exhausts, with Tillandsias, which are unusual xerophytes; epiphytic plants that reverse the day night cycle of photosynthesis and have special moisture absorbing cells called trichomes. Obliquely the super-sustainable work, also references organic structures of

arteries, veins, membranes and epidermis. The work is a suspended living and growing garden.

To fulfil the dimensions of an entry into the 2010 Deakin University small sculpture Art Award the work needed to be no larger than 700 w x 700 L x 700 H. However over a period of years the Tillandsia plant aspect of the work will grow larger than the original dimensions. The plants will grow down the wires that may ultimately suspend the work between buildings at an exponential rate.

Expanding dimension - An installation for FM magazine photo-shoot Camberwell Grammar School, Melbourne - 2011 (the image was used as a double spread in the magazine)



Cube top: *Expanding dimension* - rendered drawing
 Cube left: *Expanding dimension* Deakin University Art Gallery, solo exhibition, *Lloyd Godman: A PHOTO: synthetic pathway* 2014
 Cube right: *Expanding dimension* - Deakin University Contemporary Small Sculpture Award, Deakin University Gallery, 2010



Expanding dimension - installation for FM magazine photo-shoot Camberwell Grammar School, Melbourne - 2011



Expanding dimension - installation for FM magazine photo-shoot Camberwell Grammar School, Melbourne - 2011 (the image was used for the cover)



Expanding dimension

Tipping point



Tipping point, recycled stainless steel pipe and gravy boat, the three elements can rotate independently while the gravy boat acts as a bucket fountain and tips the water out once it fills during rain. Third installed, 27 July, 2013

Left: *Tipping Point*, with three independently rotating elements

Right top: *Tipping Point*
Right Centre: *Tipping Point*
Right bottom: *Tipping Point*

Alpha Space Station I



Alpha Space Station I, recycled stainless steel pipe, rice spoons, large galvanized spring, the three elements can rotate independently. Third install 27 July, 2013

Left: *Alpha Space Station I*, with three independently rotating elements, IBM building in background

Right top: *Alpha Space Station I*

Right Centre: *Alpha Space Station I*, long time exposure in daylight showing rotating elements

Right bottom: *Alpha Space Station I*, time exposure showing rotating elements

Alpha Space Station II



Alpha Space Station II, recycled stainless steel woks, soup spoons, the three elements can rotate independently. Third install 27 July, 2013

Left: *Alpha Space Station II*, with three independently rotating elements, Eureka Tower background

Right top: *Alpha Space Station II*

Right Centre: *Alpha Space Station II*, long time exposure in daylight showing rotating elements

Right bottom: *Alpha Space Station II*



Alpha Space Station II, recycled stainless steel woks, soup spoons, the three elements can rotate independently.

Left: *Alpha Space Station II* from below
Alpha Space Station II 2013 in center and right 2018 demonstrate the slow but steady growth of the Tillandsia plants



Alpha Space Station II, recycled stainless steel woks, soup spoons, the three elements can rotate independently. Image sequence of daylight time exposures shows the rotation with the three elements moving at various rates on the wind.

Nature Reclaims the Helix - 2013



Nature Reclaims the Helix, recycled bicycle wheels, stainless cups, steel, a single rotating element based on the DNA Helix. Third install 27 July, 2013

Left: *Nature Reclaims the Helix*, Eureka Tower background

Right top: *Site view, Atmocycle II, and Expanding Dimensions*

Right Centre: *Site View from Expanding Dimensions*

Right bottom: *Detail Nature Reclaims the Helix*



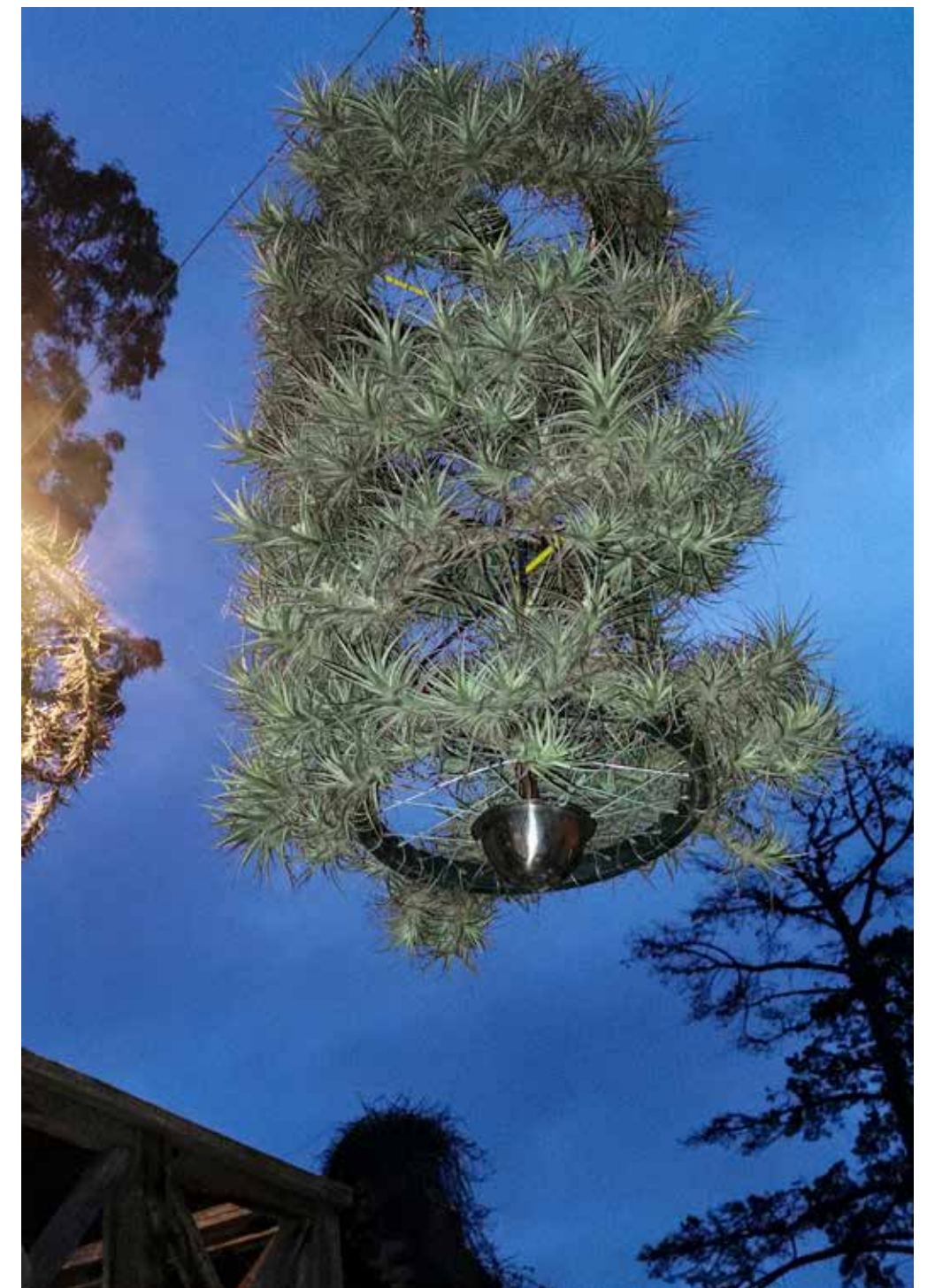
Nature reclaims the Helix - rotating air plant sculpture 2013 left



Installed for Montsalvat festival 2016 Montsalvat right



Left: Baldessin Press - 2018



Right: Installed at Montsalvat for Baldessin Press exhibition - The Story 2019

Nature Reclaims the Helix

"Nature reclaims the helix" is a super-sustainable, naturally rotating air garden.

Like Joseph Beuys, "7,000 Oaks", the work moves beyond Art as environmental comment towards Art as active solution. But further to this, the materialization of a rotating air garden challenges and dislocates our perceptions of plants: no soil, no roots, no water system, suspension and motion.

Since 1996, I have been working with living plants as art and in particular Bromeliads and air plants, my new work with air plants is based on super sustainability. These plants grow very slowly, but over years they produce a resource to create further living sculptures. In fact many of the plants that form "Nature reclaims the helix" have been harvested from earlier living plant

sculptures.

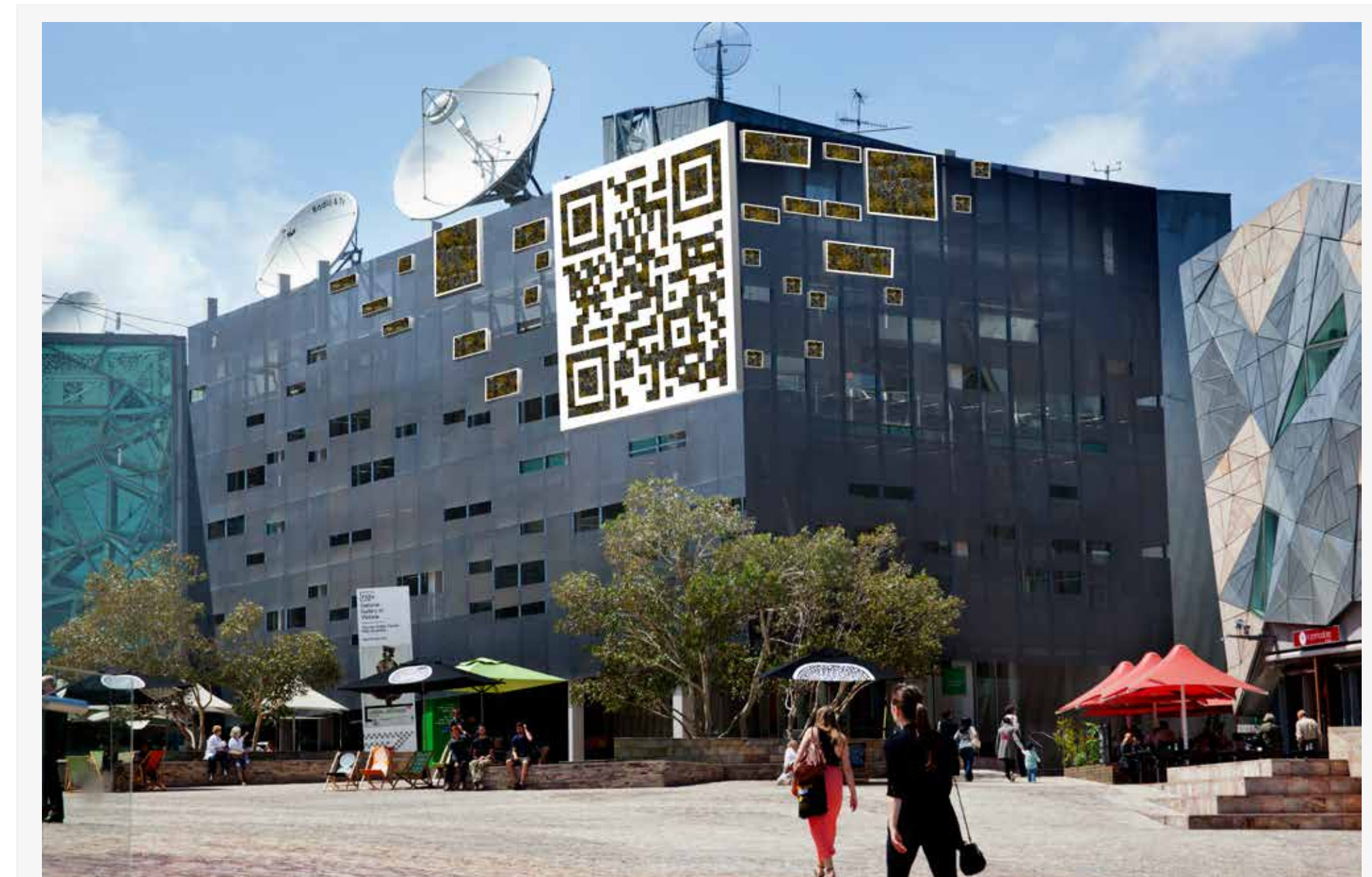
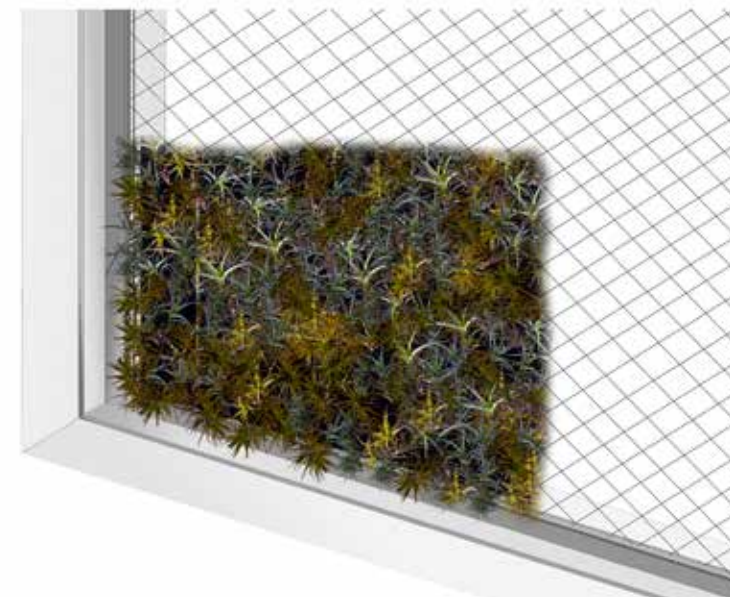
Through science humans have learned to understand and even control DNA. While the double helix adorned with Tillandsias represents this, over time the plants grow distorting the helix form. The plants replicate as in as cells.



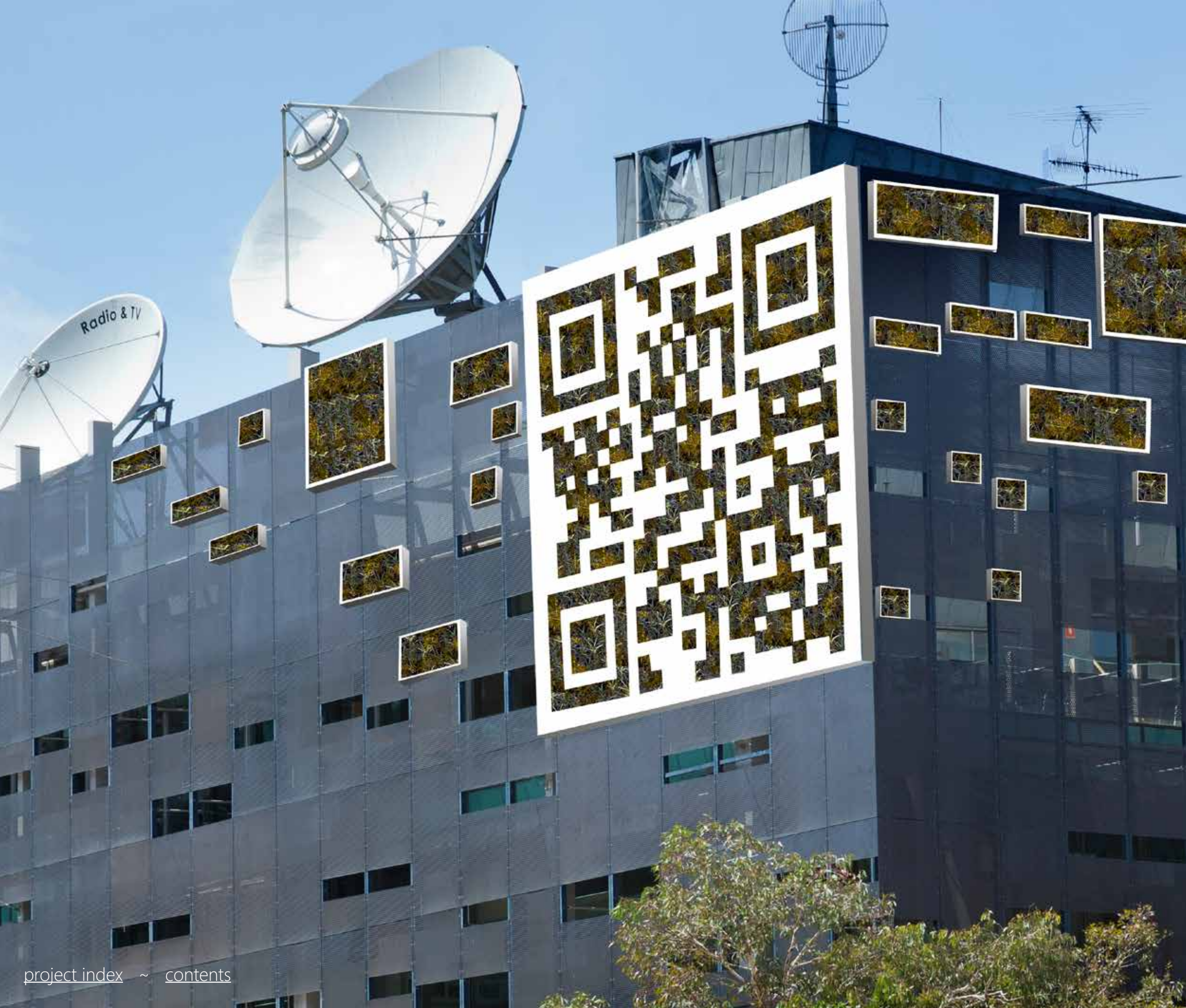


In 2011 I collaborated with artist and writer Matt Blackwood to work up a proposal, Code Green would combine a living sculpture with digital literature into a suspended scannable code. This project proposed a super-sustainable sculpture using Tillandsias would be suspended on the cross bar building Federation Square Melbourne and could be scanned by any brand of smartphone, which will trigger a series of narrated short stories set in that exact spot where the audience is standing. The living QR code was an extension of the original concept of a bar code, the in-cuts on the facade of the building designed by the architect. Matt is a writer at the forefront of locative literature and he would design and organize this aspect of the project. With Melbourne as a city of literature it seemed an innovative combination.

While we had Donald Bates – one of the two architects who designed Federation Square and director of LAB Architecture, as the Supervising Architect for *Code Green*, and also Stu Jones the senior structural engineer who built the structure the proposal made the final 5 proposals for the \$360,000 project but was not commissioned.



Rendered image for *Code Green* proposal, Federation Square, City of Melbourne Arts Commission 2011

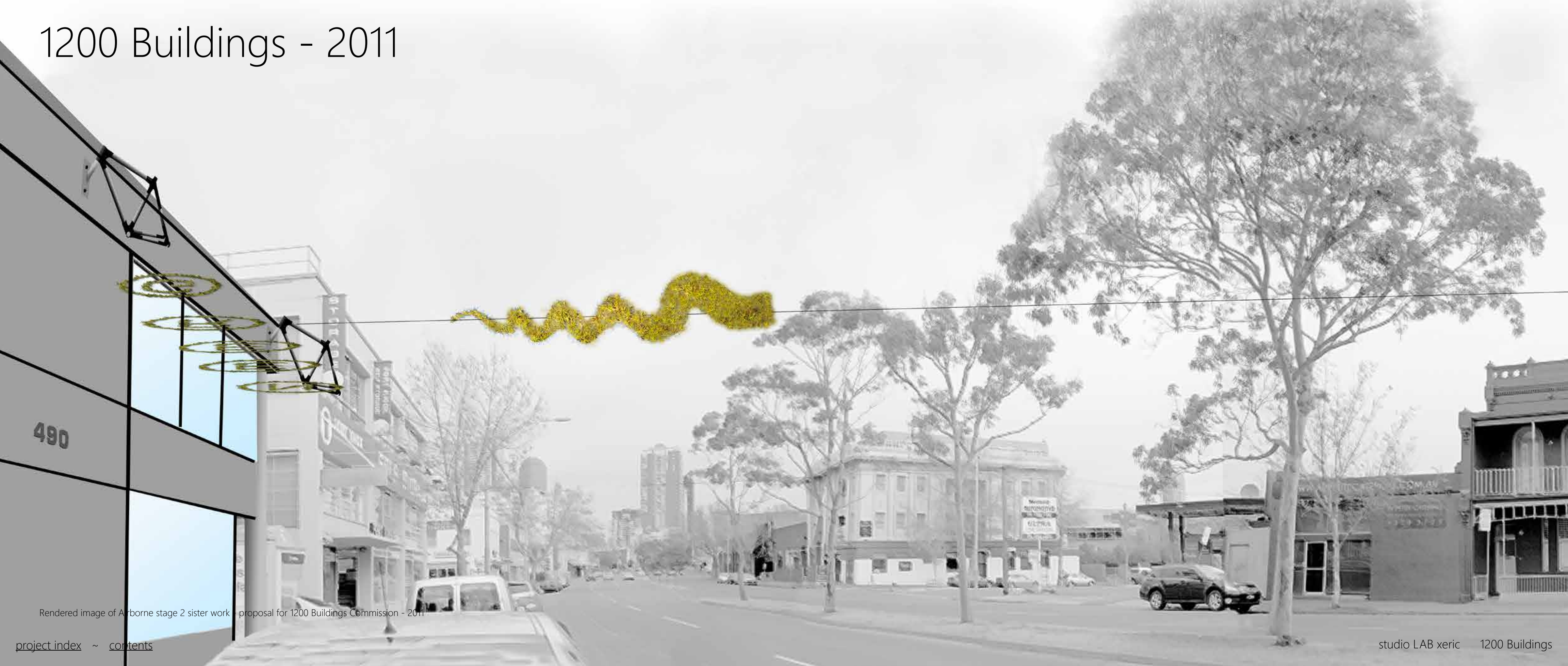


Above: Interior detail - Rendered image for *Code Green* proposal

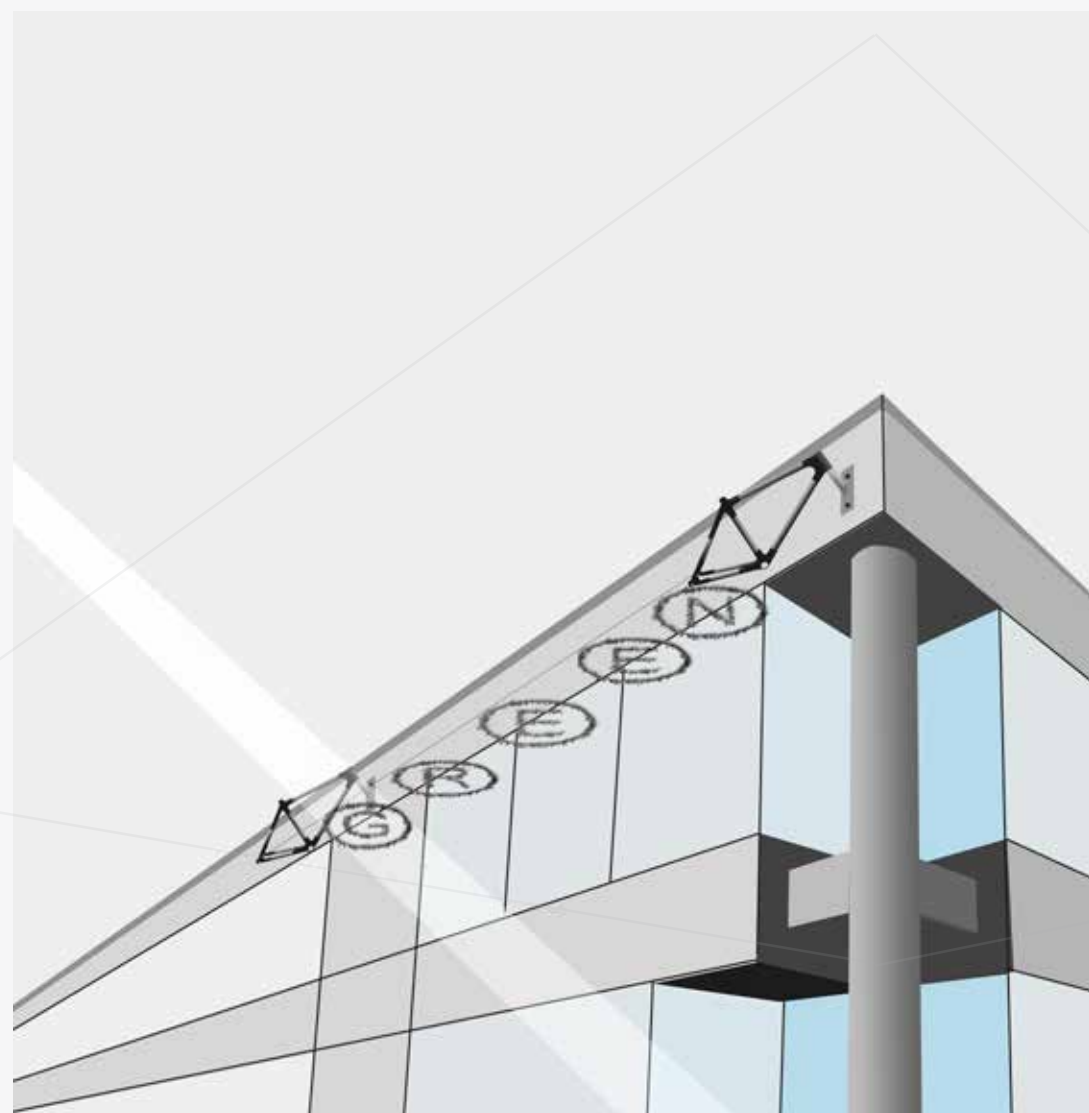


Below: Interior detail *Code Green* - 'Angled Garden' in Bokchoy Tang courtyard looking outward to the square

1200 Buildings - 2011



Rendered image of Airborne stage 2 sister work proposal for 1200 Buildings Commission - 2011



Rendered image of Airborne proposal for 1200 Buildings Commission - 2011

Commissioning the installation of this living sculpture carries the strong environmental ethos of the artist's recent work based on super sustainability or totally carbon minus, meaning more green output than input. While in situ, the Tillandsias (air plants) continue to grow and self replicate raw materials for future work. Through natural processes the plants offer a carbon positive impact, purify the air, cast shadows creating sun screening, while the intriguing installation challenges the viewer's perceptions of what plants are and how they grow.

In the spirit of the Green Spaces sustainable retrofit and the philosophy and active lifestyle of the staff who work there, the process of making the living art sculpture would include the use of as many recycled bicycle parts as possible. Potentially the frames and wheels that make up the support structure could actually come from the staff's old bicycles. With such a high percentage of staff within the building using bicycles, the staff would not only identify with the work, but take ownership in a connected and meaningful manner.

The specialised plants used in this living sculpture require minimal maintenance and in the practice of super sustainability the intention is that by 2014 the plants will have grown enough to divide and create another "sis-

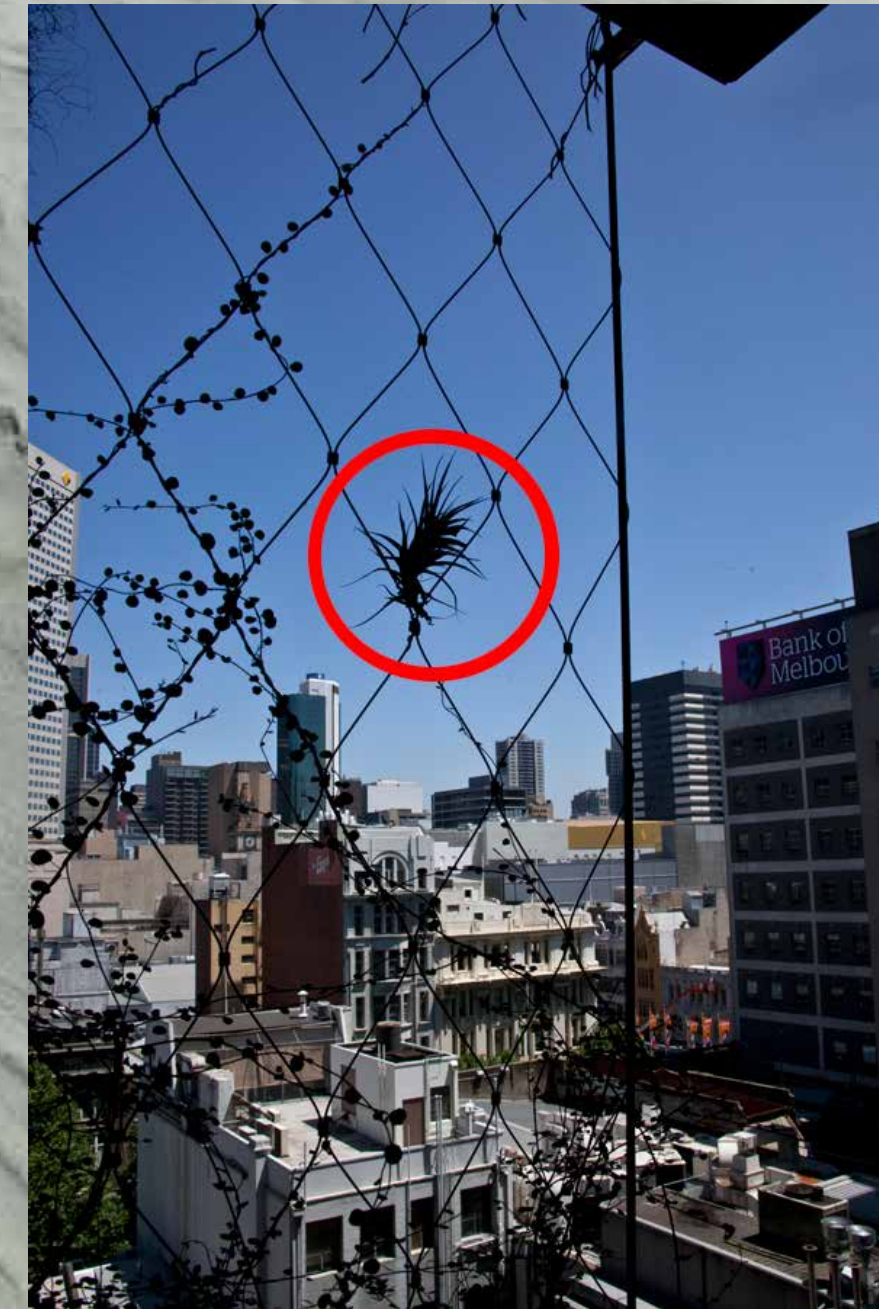
ter" work. The physical form, installation, and location of this new plant sculpture would be developed in the future in consultation with the building owner. There may develop the potential to suspend a tensioned wire from the building to a lamp pole across Spencer Street, allowing a dynamic plant spiral to suspend airborne above the traffic.

While Airborne was not selected for the commission, (it was awarded to ARUP International), the deadline of Nov 2011 was not met, and by the time of writing, Aug 2016 the work was still not installed. More than this the budget on Carbon Arts webs site had been increased from \$30,00 to \$50,000

CH2 Building experiment - 2011

In terms of sustainability Melbourne City Council are aware of the need to create a sustainable city, in some areas they lead Australia. One of the cities proactive developments I was interested in was the new green CH2 building the council had completed which was promoted as a great example of cutting edge green architecture. In 2011 I engaged in an experiment with Ralph Webster, Senior Architect with Melbourne City Council on the new CH2 building located at 240 Little Collins Street, Melbourne. CH2 was designed as a green building to not only conserve energy and water, but improve the wellbeing of its occupants through the quality of the internal environment of the building. Since its completion in 2006, climbing plants had been planted in water fed boxes on the north side of the building with the intention of growing them up metal netting.

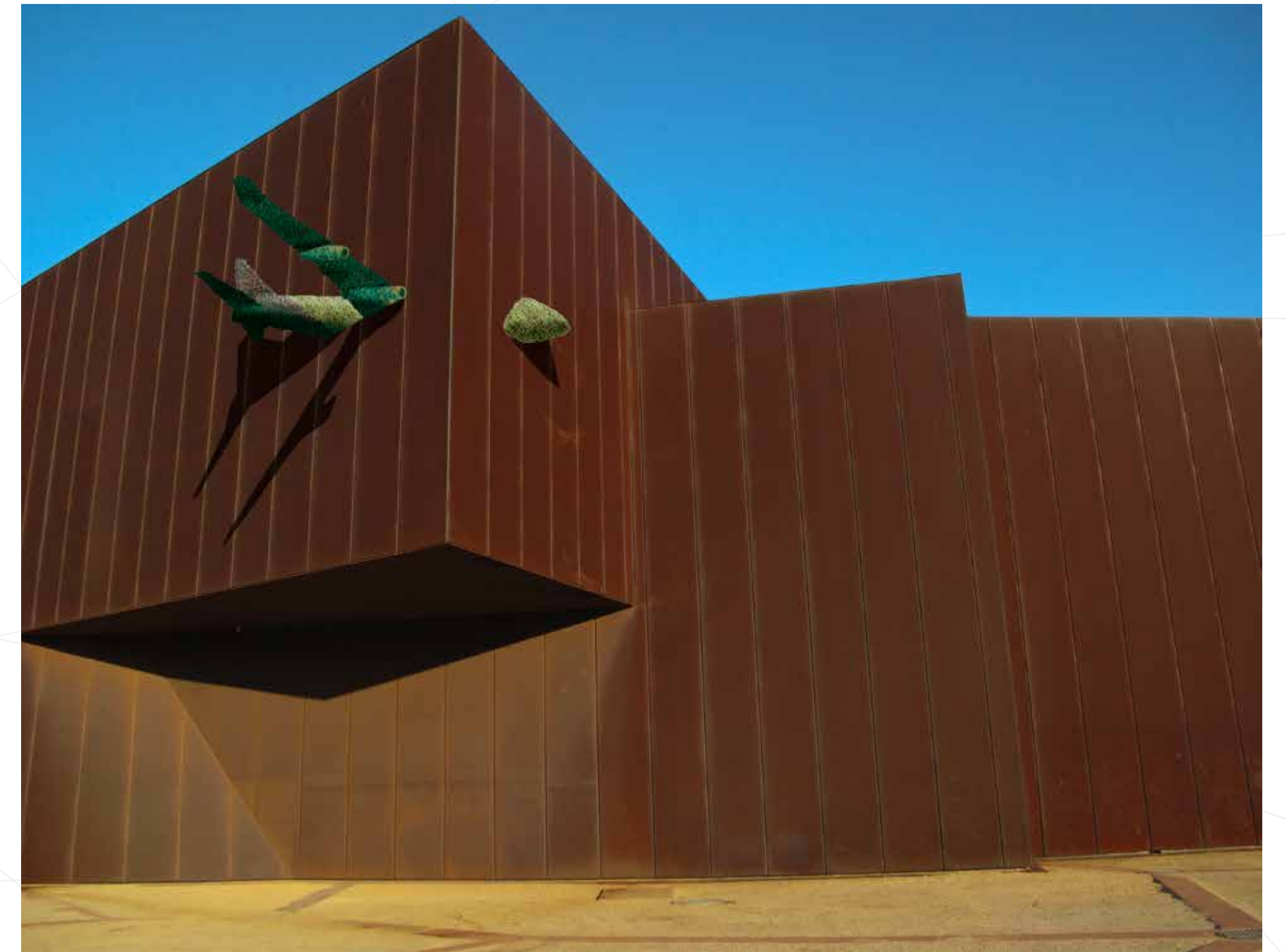
However the aspect is subject to very hot dry winds and the narrow alley way acts as a wind tunnel, extenuating the effect, which was drying out the plants and killing them. Ralph mentioned the problem of growing plants in this location and I suggested mounting a hardy Tillandsia in the netting with no soil or water and simply leave the plant to its own devices as an experiment. The plant was left in this situation for 18 months and checked several times to prove that while they grew slowly they were thriving with no soil or reticulated watering system, whereas the climbing plants continued to struggle. While Ralph moved from his position at the council and this experiment was not followed after his departure, the experiment did lay the way for a larger project with City of Melbourne - "Airborne". In February 2015, I returned to check if the Tillandsia was still in place on the CH2 building, but it had disappeared. The climbing plants were still in place but covered much less of the netting than in 2011, suggesting the effort to replant and maintain them exceeded the ESD reward. In 2022 a full Tillandsia screen was installed on CH2.



CH2 building North façade 2011. The location of the Tillandsia is marked with the red circle. Note the inconsistent growth of the climbing plants. The garden has been replanted many times since its opening in 2006

Plain air - 2009

In 2009 I began exploring ideas of how air plants might be used to cover armatures with these two renders. The idea was to embed the plane into the side of the building with the missing components formed inside the gallery space.



Plain Air - Digital sketch for a living Tillandsia plant jet air plane embedded in the corner of ACCA, Victoria, Melbourne. 2009

Plain Air - Digital sketch for a living Tillandsia plant jet air plane embedded in the corner of the National Gallery of Victoria, Melbourne. 2009

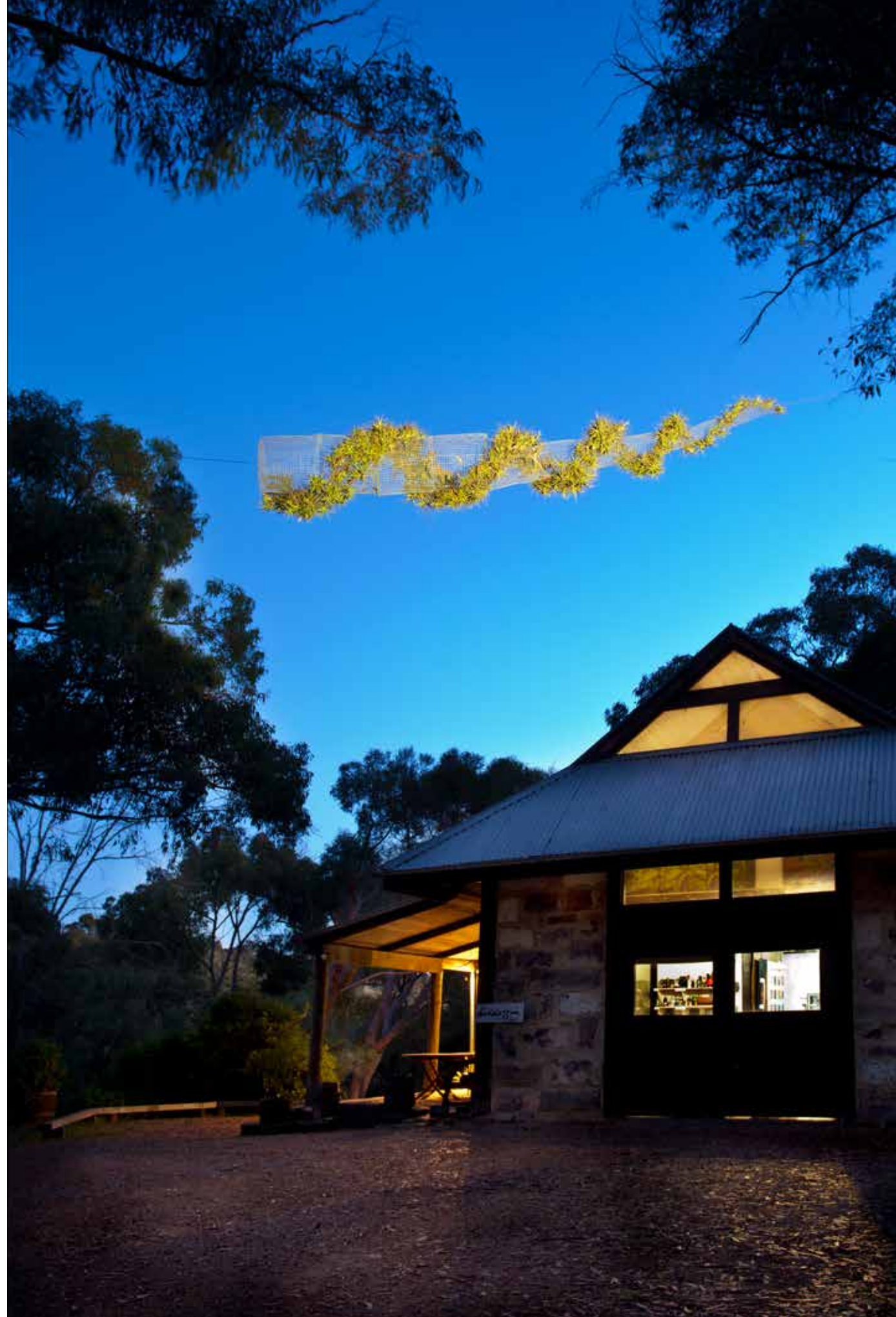
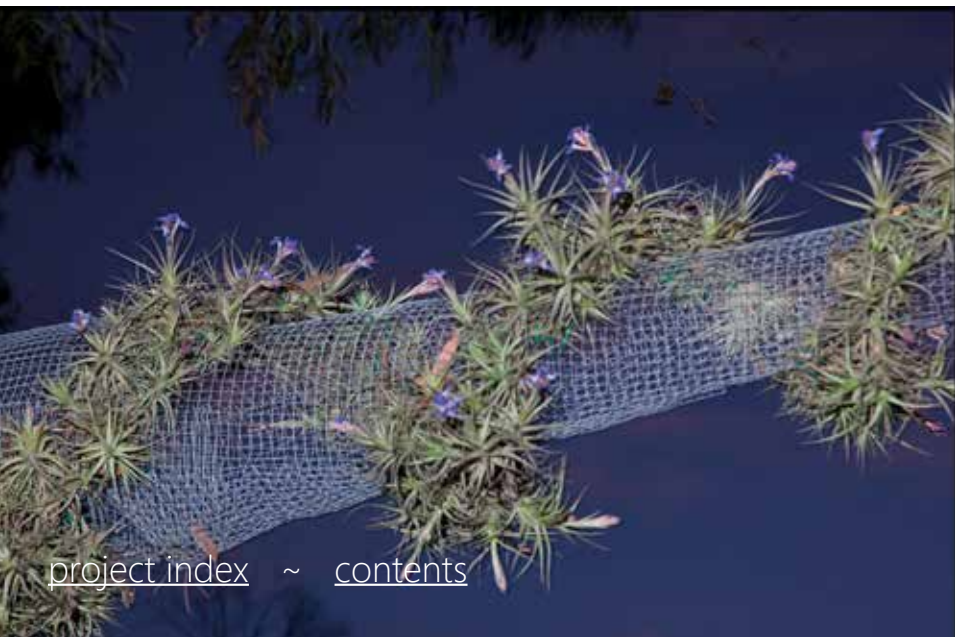
Entropy Spiral I-II-III - 2008



As xerophytes it was not surprising that experimentation with the Bromeliads was proving that various Tillandsia and Billbergia species were growing well in the heat and extended dryness of the St Andrews climate at the Baldessin Press where now lived. I retrieved a section of galvanized mesh from the local recycle shed - or as we called it Gods Drop Box, and was urged to create a structure to fix the plants to in the form of a spiral and suspend this high in the sky. The elongated cone shape was made quite quickly and in some regards flippantly, but has proved durable to the wild wind and elements. As the Tilland-

sia have continued to grow they have attached themselves via aerial roots not only to the structure but to each other. From installation in 2008 until 2014 no plants have been lost from the form and apart from removing plants with seed heads, no maintenance has been need during this time. The experiment has proved a model for moving my work art as an action and a super-sustainable practice.





Entropy Spiral, living plant work, Baldessin Press Studio. The center photograph, taken in 2011 gives a comparison of growth to the photograph above taken in 2016 where the Tillandsias are forming great clumps and destroying the spiral form by almost merging. As the spiral morphs into a cone, I find it intriguing how nature will eventually subvert and over take our intentions. At this point the sculpture consists of thousands of plants can be left to grow on or can be harvesting to not only retain the original spiral form but to create new sculptures from.

Left top & centre: An early version of *Entropy Spiral* when it was broken in 2 segments
Left bottom: *Entropy Spiral* in flower

Energy Architecture - 2008

Early in 2008, while on a trip to Adelaide I called in to see Stephanie Britton, Editor of Artlink at her office. Just down the hallway is another office, here Stephanie introduced me to John Maitland of Energy Architecture who is interested in Green Architecture and for some time we talked over the potential of integrating Tillandsia into the façade of buildings.

Later in the year John was in the process of designing a multi story building at Mawson Lakes with a green atrium in the center of the building that he was considering using plants as a means to cool the building.

He emailed me the plans and asked me to sketch out some ideas on how Tillandsias might be integrated into the façade. The building was an innovative design in that on the north side it lent forward and was angled, which would allow light and sun in winter to strike the facade, but created shade in the hottest time of day in summer. He was wondering how it might be possible to use Tillandsia on this façade. I worked on the idea of a series of blocks of plants on the façade, each with a cable adorned with Tillandsia suspended to a central point at the top right. These would span across the open space created by the angled façade.

This would have created changing shadow patterns across the window, but also allowed the residence to experience the plants as they grow, and flower. John actually won an architect's award for the design, but did not get the contact, so unfortunately we never got to realize the project.

However it did open the way for a number of future projects with the plants attached to suspended cables. Tillandsias used in this manner can offer a means of heat mitigation within the urban environment. The silver trichome cell which adorns many Tillandsia species is also a great reflector of radiation; in some species the cell can reflect 93% of the radiation falling on it.

John and I continue to communicate and trust that sometime in the future we can complete a project together.



Initial experiments in Melbourne, Australia

Experiments with Bromeliads continued on simple wire screens, testing the plants to see how they preformed on different aspects of a building. Some were covered with a wider range of species across many genera, like Aechmea, Neoregelia, Billbergia, while others were adorned just with Tillandsias. At this time I also began creating simple recycled structures like bicycle wheels adorned with plants that suspended and naturally rotated on the wind. Adding to the visual complexity, when these rotated abstract animated shadows were case on the ground,

In 2005 I moved to Melbourne and once again began collecting and experimenting with Bromeliads in a quite different environment. While it took years to re-establish my collection, I directed more of my experiments to xerophitic Tillandsias which were drought and heat tolerant. At the Baldessin Press where I live, about 40km north-east of Melbourne, I created modest plant sculptures which are suspended in the air between buildings and trees adorned with Tillandsia, like the first version of "Entropy Spiral", 2008. These works have largely been left to their own devices to grow over several years. The "Entropy Spiral" work has constantly endured hot periods up to 46 degrees Celsius and long periods of little moisture, but thrived while demanding no maintenance for 8 years.

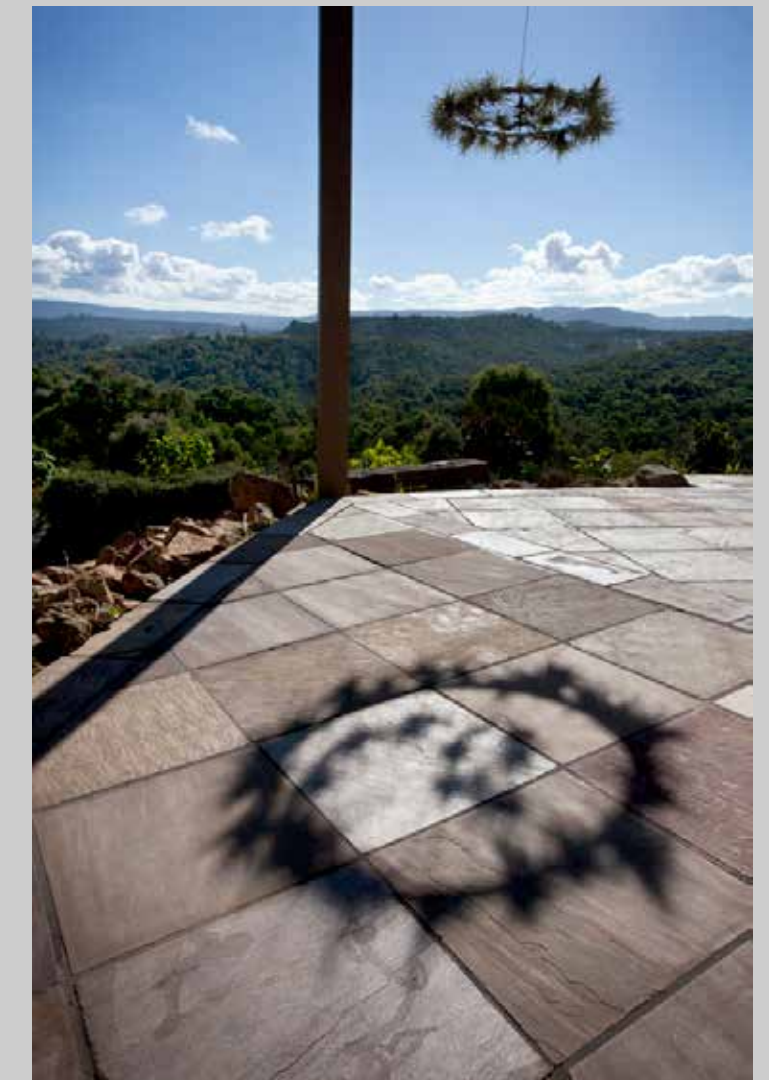
In early 2010 the first suspended rotating air plant sculptures were developed. These were simple structures utilizing recycled bicycle wheels embellished with Tillandsias suspended on swivels that rotated on the breeze casting animated shadows onto the ground. From this success, I was inspired to experiment further with these living plant sculptures, to bring them into the public domain in urban environments.



A suspended screen of Bromeliads. Note the screen sits out from the wall and at certain times of the day throws abstract shadow patterns against the rendered wall. 2011



Entropy Rotation I - Rotating suspended tillandsia plant work
Baldessin Press Feb 2011



Entropy Rotation I - Rotating suspended tillandsia plant work
Private Garden June 2011

Initially these were simple rotating wheels but developed into works that had three elements that could rotate independently via the wind.

Tillandsias

- Tillandsias are a genus of over 700 species of flowering plants in the Bromeliad family. In nature they range from sea level to elevations of 18,000 ft and from the lower latitudes of South America, through Central America to Florida and Texas.
- Their evolved biology enables them to absorb water and nutrients via special leaf cells called trichomes which allows them to grow without a rooting medium and the requirement of regular root watering or nutrients.
- The trichome cells also have the ability to uptake heavy metal particulates from polluted atmospheres in urban environments.
- Many are xerophytic which means they are resilient to long periods of heat and drought.
- Like Cactus and some other plants, they utilise a CAM cycle to grow which means they absorb CO₂ at night and close their stomata to conserve moisture during the heat of the day.
- The trichome cells are silver and reflect 90% of light.
- Many are salt tolerant and can survive harsh salt winds.
- There are a wide range of plant forms, textures and flowers
- While they grow slowly, growth rates are exponential, and maintenance is minimal.
- They are light weight and are easily adapted to a wide range of urban environments.





Plants as living texture

Plants as weather shields & moving screens

The future: A “flight manual” for air plants

Buildings are statements; architects define surfaces and geometries within the overall structure through the integration of metals, concrete and metals like coloured steel, stainless, zinc, copper each have their own aesthetic quality and contemporary architects use these to design stunning structures that most often relate the materials to a defined geometry within the overall structure.

However, responsible architecture of the 21st Century not only considers the advantages of plants within the urban environment by simply “tacking” on a vertical garden onto a wall, but draws from the diverse array of possible living textures of green, juxtaposing them against existing materials and textures, into the overall visual design of the structure at the concept design stage. Plants become another material to draw from and the addition of this new living material offers an exciting potential for the future, where imagination can soar to greater heights.

Imagine tidal gardens with multiple screens that move independently at various rates up and down a building’s façade. Imagine whole façades of plants that shimmer on the wind and move from aspect to aspect on a building. Imagine a modular system, where Tillandsias suspend across an open public space like a plaza during summer, creating dappled shade, and then simply moved onto a building’s façade for the cooler winter months when the sun is welcome. Imagine roof gardens with suspended Tillandsia screens designed to create modulated shade patterns to complement other, less stress-tolerant plants that might grow on the roof surface below.

The results of these experiments with tillandsia over the past few years have shown that designers can act with the knowledge and confidence that these systems work. Air gardens break new ground, offering fresh dimensions by incorporating plants in our cities for high environmental benefit. They write a “flight manual” for plants to escape their earthly confines in the urban habitat and occupy new and existing space within our cities.

Tillandsia screens could be:

- moved horizontally or vertically in parallel from the building’s facade across a window

- rotated on a curved axis, so while they can be set to block direct sunlight, they can also allow a clear view out the window
- set on a swivel off the building and rotated
- positioned horizontally out from the building for shading or hinged upward.

Because there is no need for reticulated liquid, screens of Tillandsia can defy gravity in ways that are restrictive for other vertical garden systems. They can be mounted on façades that overhang or have complex, intricate geometric or organically curved surfaces. For future green architecture, they offer a flexible living texture which, with little maintenance, can be juxtaposed against glass, steel, or concrete. In fact it is possible to create living facades that alter their shape and form during the day.



As bromeliads grow asexually, over time they can be harvested to provide a bio-resource to create new material. A significant advantage of integrating Tillandsias into a green building design is that a “living wall” can be completed in sections, along which, over time, the plants are harvested and assigned to the next section of a wall. A high-rise façade might be completed several levels at a time. Unlike current vertical gardens, there is no operating cost of water, pumps, and no need for replacement plants.

As the silver Trichome cell which adorns much of the leaf surface of Tillandsias reflects up to 93% of the light that falls on them, these plants are excellent for living heat mitigation screens. Because of their very light weight and adaptive biology, Tillandsias are ideal plants to use for weather shields and sunscreens, even on the highest facades. Whereas vertical gardens weigh up to 90kg/sqm a screen mounted with Tillandsias weighs about 3kg/sqm. While the weight per sqm depends upon the density of the plants on the screen, the extraordinarily light weight of these living structures affords applications that are unimaginable to reticulated systems that cannot overhang a vertical axis.

Unlike vertical gardens that demand reticulated water and nutrient systems and most often sit directly against a building’s facade, with air plant systems there is very reduced infra-structure required, Tillandsia screens can be set off the building by up to a meter or even more. We have experimented with Tillandsia screens which can be moved across windows for heat mitigation. From inside the building looking outside these screens have a lace like effect allowing dappled diffused light to enter the building. Rather than attaching the plants to a fixed screen, they can be designed in various configurations.

On Lloyd’s St Andrews house, two double glazed skylights sit on a steep inclined roof letting welcome light into the room during winter and cooler days. However, on days 35°C to 40°C+, despite the double glazing, excessive heat enters the room.

In terms of comparative costs it is difficult to offer exact figures, but depending upon the system and complexity of an installation, a reticulated vertical garden system can run anywhere from \$1200 to \$3500 per sq meter where as a Tillandsia screen system costs \$1200 sq meter for the plants plus infrastructure and installation. Where a huge cost disparity arises is in the on going maintenance. Reticulated systems require regular maintenance which can run from 15% to 30% of the install cost per annum. This equates to a maintenance bill of \$30,000 - \$45,000 per annum for an install cost of \$350,000.

Vertical gardens with large areas of dead plants look dreadful. With reticulated systems much of the cost is in replacing dead plants on a regular basis. While the manager of a vertical garden business told me they only have to do maintenance once or twice a year, his installation supervisor had a different story that the same garden required attention every 2 months.

On the other hand, Tillandsia screens can be left for 3-4 years with no maintenance at all. Simply fix and forget. However the screens do need harvesting where excess growth is trimmed and the plants reset every 4-5 years.

Surfing - Air plant meets air mat



Surprisingly many Tillandsias can tolerate salt winds etc. I have often wondered how much salt they can withstand. I grew Tillandsias on the coast in the south of New Zealand at Dunedin where they would often be exposed to strong salt winds. As a further test, I could easily have dunked the plant in a container of salt water to see the result. But as a surfer who often rides an inflatable air mat, for sometime I had been fascinated by this and wondered about taking an air plant for a surf. It took over a year for the conditions to align. I wanted a smallish swell on an overcast day in autumn. Easter 2018 proved perfect. On Easter Friday 2018 I put a Tillandsia to the acid test. Air plant meets surf mat meets the ocean.

David Benzing generously offers these comments
I personally found that members of a healthy colony of Tillandsia paucifolia growing on mangroves in south Florida were full of sodium probably from salt spray. I'll have to rely on speculation to try to explain why your surfing tillandsias remain alive five weeks after what was definitely a novel marine experience. The grey tillandsias do grow and die slowly but if that ride was lethal all its botanical participants should have expired by now.

You've probably noticed that the leaves of bromeliads, especially those of the tank forming species, often die back beginning at the tip, the oldest part of a monocot type leaf. Why they die back this way probably has multiple explanations/causes. Irrigation with hard (lots of calcium/magnesium carbonates present) water seems to be one cause. Being the oldest part of a bromeliad leaf this is where buildups of substances such as these that at some point reach toxic concentrations will occur first. Highest buildup occurs here because this is the part of the leaf where water loss through stomata has been occurring longest and accordingly where substances in the water vascular stream will build up to highest levels within that organ as it expends moisture while acquiring CO2 to support photosynthesis. It wouldn't

be difficult to check for circumstantial evidence for or against this hypothesis. Simply section leaves that exhibit this dieback and assay each for comparative buildups of potentially problematic substances. It's possible of course that as leaf tissue ages it become more vulnerable to injury caused by this or that ion or other substance in which case the concentration of the substance of interest would be doing its damage despite being evenly distributed across the entire leaf.



Lloyd Godman MFA : Ecological artist
www.lloydgodman.net lloydgodman@gmail.com 001161448188899
“Lloyd Godman is one of a new breed of environmental artists whose work is directly influencing ‘green’ building design.....Godman’s installations are the result of a unique blend of botanical science, environmental awareness and artistic expression. All three elements are intrinsic to the practical realization of his polymathic vision”.
John Power - Editor of Facility Management Magazine Aug 2011



Geoff Beech - Technical director and Tillandsia grower - Geoff trained a a jeweller then later moved to the construction industry in Melbourne. He offers extensive expertise in the construction and installation of the Tillandsia sculptures and screens while as a grower and enthusiast of Tillandsias he fully understands how the plants grow.



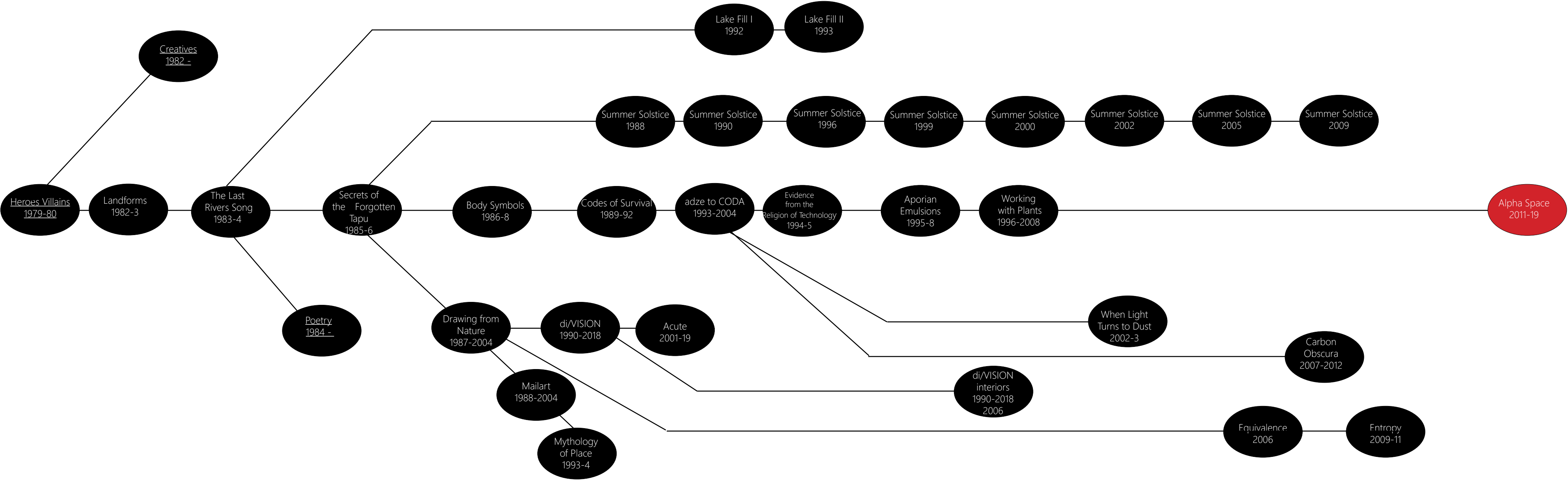
Stuart Jones:
Structural Engineer BE(Civil & Computing), FIEAust, CPEng, NPER
Stuart Jones has recently been appointed Technical Director for Hyder Consulting (now Arcadis) in Melbourne. Previous to this he was the Owner/Director of Point 5 Consulting in Melbourne for 14 years.
Stuart has over 25 years professional experience in all phases of project delivery and specializes in creative structural design with extensive experience in Australia and throughout Asia.



Grant Harris:
Environmental Scientist & Arboricultural Consultant
Grant Harris is the principle of Ironbark Environmental Arboriculture, with over 12 years experience in the arboricultural sector he also holds a degree in Environmental Science (Wildlife and Conservation Biology). His particular areas of interest are the use of green infrastructure to mitigate urban heat island effects and urban ecology.

Lloyd Godman Project EPublications

gives free access to the large body of creative work by this artist. The schematic outlines the various projects and pinpoints where *Alpha Space* sits within the oeuvre.





Lloyd Godman with his grand parents and their grandchildren, Lloyd is in the bottom row centre in the dark clothing with Auguste Rodin's, The Thinker pose. Grand father Harold Kindley is on the left, Grand mother Rachael Kindley is on the right.