



# Seeding Biodiversity:

A Biodiversity sensitive redesign of Kirrip Park, Melbourne,  
for a strengthened human-nature friendship

Vera Linn Karlsson



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Swedish University of Agricultural Sciences, SLU  
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Seeding Biodiversity: A Biodiversity sensitive redesign of Kirrip Park, Melbourne, for a strengthened human-nature friendship

Sådd biologisk mångfald: En biodiversitets-känslig omgestaltning av Kirrip Park, Melbourne, för en stärkt vänskap mellan människa och natur

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Division of Landscape Architecture

## ABSTRACT

The urbanisation of cities since the mid-twentieth century has created challenges such as the reduction of urban green spaces, weakened natural biomes, and a decline in the connection between people and nature. By 2050, it is estimated that 6.7 billion people will reside in cities. Streetscapes have for a long time been prioritised over landscapes, and Western ideologies, where humans dominate over nature have thus influenced urban planning in Australia, diverging from First Nations Worldviews where humans and nature are seen as one. To foster healthy and sustainable cities for both nature and humans, a mindset emphasising the importance of urban nature and biodiversity is required. This necessitates designs that consider the needs of plants, animals, and humans in outdoor spaces, facilitating their coexistence and interaction.

This thesis aims to explore how design proposals can prioritise biodiversity as early in the design process as possible but also to challenge Western ideals by exploring and learning from First Nations peoples' ways of seeing nature. By doing this, the study aims to review and find ways to create more inclusive and biodiverse landscapes, break the dichotomy between human and nature, and foster a harmonious relationship.

The research site for this project is Kirrip Park (9,356 sqm) in Fishermans Bend, Melbourne. Fishermans Bend, covering 800 hectares, is Australia's largest urban renewal project, set to accommodate 80,000 residents by 2050.

The method (Research by design) is employed concurrently and interactively with research, analysis and design. This has revealed that complementary ways of working, with biodiversity, target species and human dimensions as the main focus, guided by the framework "Biodiversity Sensitive Urban Design", can enhance and highlight biodiversity in Kirrip Park, and also create a park that promotes a strengthened friendship between people and nature. While the design proposal represents just one approach to addressing the purpose of the thesis, it demonstrates that urban green spaces have the potential to enhance biodiversity through Biodiversity Sensitive Urban Design. The study offers a perspective on biodiversity that seeks to underscore its value for both humans and non-humans, aiming to cultivate a mindset regarding the intrinsic value of nature.

### **Acknowledgment of Country**

*I would like to respectfully acknowledge the Traditional Owners of the land where I currently study, and where the site for the project is situated. The Wurundjeri Woi-wurrung and Bunurong/ Boon Wurrung peoples of the Kulin are the rightful owners of this land and I would like to pay my respect to their Elders past and present. I thank First Nations people around Australia for sharing knowledge on how to care for Country.*

## SAMMANFATTNING SVENSKA

### Inledning

I skrivande stund är jag baserad i Melbourne (Narm), Australien. Efter en termin som utbytesstudent inom landskapsarkitektur i Perth (Boorloo) tog jag beslutet att flytta till Melbourne, en stad jag besökt några gånger tidigare. Under min vistelse i Perth fördjupade jag min kunskap om australiensisk landskapshistoria, vilket väckte ett intresse kring komplexiteten i stadsplaneringen i Australien. I takt med att stadsområden blir allt tätare, ökar betydelsen av urbana grönområden för både människor och andra arter. Detta arbete utgår ifrån en övertygelse om att om landskapsarkitekter, i större utsträckning, prioriterar en gestaltning som även gynnar andra arter som bebor vår planet, kommer detta vara fördelaktigt även för människan. Utifrån detta valde jag att fokusera på hur en gestaltning kan utformas, utifrån tre specifika arters behov i ett område, och samtidigt skapa hållbara och intressanta grönområden även för människor.

### Bakgrund

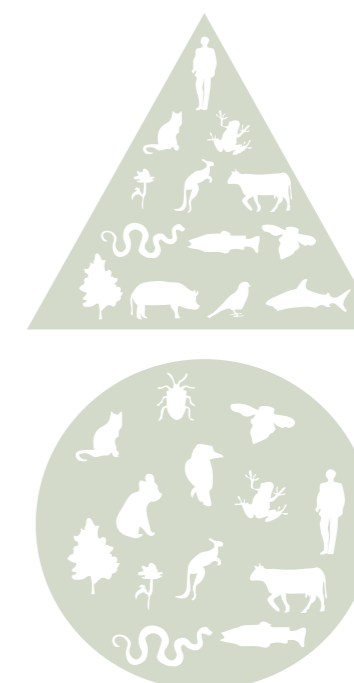
Sedan mitten av nittonhundratalet har urbanisering lett till flera utmaningar, däribland minskning av urbana grönområden, försvagade naturliga biomer och en försämring i kontakt mellan människor och natur (Ignatieva et al. 2023). Trots att städer bara täcker cirka 2-3 % av jordens landyta bor cirka 57 % av världens befolkning i städer. Det beräknas att denna siffra kommer att öka med två tredjedelar till år 2050, med 6,7 miljarder människor som bor i städer över hela världen (UCN n.d.).

Idag påverkas hela jordens yta av människans sätt att leva, vilket enligt vissa har skapat en ny geologisk epok- antropocen (Prominski 2019). I århundraden har detta koncept i västvärlden inneburit en tydlig uppdelning mellan natur och mänsklig kultur (ibid.), vilket har lett till ett tankesätt där vi människor ser oss själva som en högre stående art, och därför har rätt att använda jordens resurser för egen vinning (Hedenus et al. 2018).

För att få en mer omfattande förståelse för den specifika plats där jag för närvarande studerar, har jag behövt utforska Australiens och Melbournes sammanhang ytterligare. I Australien har landskapen utvecklats under helt andra förutsättningar, både kulturellt och miljömässigt, än i Europa, med minst 60 000 år av mänskliga förändringar av landskap och ekologi, innan europeiska kolonistörer kom (Roberts et al. 1994). De hållbara sätt som ursprungsbefolkningen hade hanterat landskapen under tusentals år stördes då koloniala styrkor avancerade över hela kontinenten (Hromek 2020). Genom västerländskt jordbruk och trädgårdsodling kom främmande arter till Australien (Hromek 2020; Ignatieva et al. 2023), och många har sedan dess förklarats invasiva, vilket lett till artutdöende bland inhemska arter (Ignatieva et al. 2023). En motsats till västerländska, antropocena tankesätt är ursprungsbefolkningens "Land-centrerade" (Country-centred) sätt att se på naturen, där både människa och andra arter har rätt till samma positioner och platser, livsmiljöer och land (Hromek 2020).

Urbanisering är en av de största drivkrafterna för förlusten av biologisk mångfald och en välmående sådan är inte bara viktig för dess egenvärde (Dearborn & Kark 2010), utan även för människors hälsa (Morton & Hill 2014) och ursprungsbefolkningens kulturella sedvänjor (DELWP 2017). Att återinföra inhemska biologisk mångfald till urbana miljöer i Australien kan ske genom att skapa nya livsmiljöer, eller förbättra befintliga med hjälp av inhemska arter (Ignatieva et al. 2023).

För att undersöka hur biologisk mångfald kan gynnas i stadsplanering och gestaltning har ramverket "Biodiversity Sensitive Urban Design (BSUD)" (Garrard et al. 2017), som här översätts till "biodiversitets-känslig urban gestaltning" tillsammans med hållbarhetsmål för området använts.



Figur 1 visar det människocentrerade sättet att se världen i triangeln och det Land-centrerade (Country-centred) sättet i cirkeln. Inspirerad av tyska arkitekten Steffen Lehmann's "Eco v Ego" diagram (2010).

## SAMMANFATTNING SVENSKA

### Området

Den valda parken för detta projekt, Kirrip Park, ligger i Fishermans Bend, ett område i södra Melbourne, Australien. I Australien bor över 26,6 miljoner människor (Australian Bureau of Statistics 2023) och Melbourne är huvudstaden i delstaten Victoria (City of Melbourne 2016).

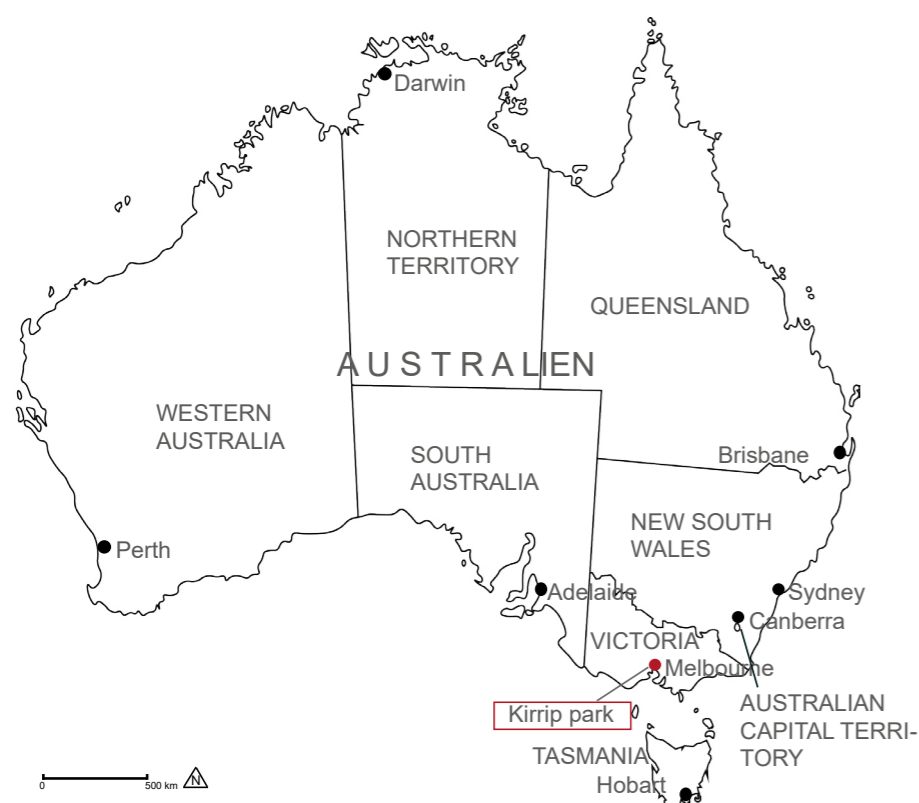
Melbourne har den snabbast växande befolkningen i hela Australien (ibid.), med en befolkning på över 5 miljoner

(Australian Bureau of Statistics 2021) och beräknas nå 8 miljoner år 2050 (Goodman et al. 2016). Folkgrupper ur den Aboriginska urbefolkningen har under lång tid bott i Port Phillip Bay-området, som Melbourne senare blev del av (Johnson 2017). Snabb kolonisering av området ledde till skapandet av "the Hoddle-grid", ett rutnät som fortfarande kan ses i Melbourne (Lewis 2008).

Grönområdena i Melbourne har präglats av brittiska sätt att se på naturen, med införda arter från England och under 1930 talet nämndes ofta Melbourne som "Trädgårdsstaden". Många av Melbournes parker gjordes senare om för att inhysa en rad sporter och fritidsaktiviteter, vilket har utgjort ett hot mot eventuella kvarvarande inhemska landskapselement. Medan det finns små kvarlämningar av inhemska vegetation i Melbournes parker och trädgårdar, har ansträngningar gjorts för att återställa områden till deras ursprungliga landskap (Context Pty Ltd 2011).

Fishermans Bend ligger söder om Yarra River (Birrarung), och var ursprungligen jaktmark för ursprungsbefolkningen, där den ständiga översvämningen av Port Phillip Bay (Nerm) skapade våtmark och sandåsar (DELWP 2018) och blev senare plats för främst industrier. Fishermans Bend är Australiens största förnyelseprojekt, cirka 800 hektar stort och kommer år 2050 att omfatta arbetsplatser, bostäder och tjänster i nära anslutning till varandra, med öppna ytor, infrastruktur och aktivitetscenter för att inhysa omkring 80 000 människor (DELWP 2018).

Kirrip park öppnades officiellt i oktober 2018 och byggdes på tidigare industrimark. Parken är gestaltad kring hållbara dagvattensystem, med regnbäddar och svackdiken (ODS 2020). Boon Wurrung Foundation lämnade in namnet "Kirrip park" till kommunfullmäktige i april 2018 och efter samråd lämnades namnet in för registrering i juli samma år. Ordet Kirrip betyder vänskap eller kompis på de inhemska språken Woiwurrung och Boon Wurrung (Have your say Port Phillip 2024).



Figur 2 visar en karta över Australien och dess territorier. Kirrip park ligger i Melbourne och är markerat i rött.



Figur 3 visar parkens placering i Melbourne. Baskarta © 2024 Nearmaps.

## SAMMANFATTNING SVENSKA

### Avgränsning

Arbetet utgår från metoden "Research by design" (Roggema 2017) och har utifrån detta delats in i faserna Förstudie (Pre design), Koncept (Design) och Gestaltning (Post design) (fritt översatta från de engelska orden). I förstudien gjordes en litteraturstudie på ämnena biodiversitet och mänskliga dimensioner och en platsanalys med platsbesök i Kirrip park utfördes. I studien om biodiversitet användes även ramverket "Biodiversity Sensitive Urban Design (BSUD)" (Garrard et al. 2017) som en guide för att skapa en gestaltning utifrån biodiversitet. Utifrån detta valdes tre fokusarter för parken, ett bi, en groda och en fågel: blue banded bee (*Amegilla ssp.*), growling grass frog (*Litoria raniformis*) och superb fairy wren (*Malurus cyaneus*).

Platsmässigt har projektet avgränsats till Kirrip park i Melbourne, för att kunna komma med ett konkret förslag och utföra platsanalyser.

Tematiskt har uppsatsen avgränsats till faktorer kring biologisk mångfald och hållbarhetsmål för hela området. För att även se över människors användning och behov av urbana grönytor har även mänskliga faktorer undersökts.

### Syfte och mål

Syftet med denna masteruppsats är att utforska potentialen av att göra en omgestaltning av en urban park i Melbourne som fokuserar på biodiversitets-känslig urban gestaltning (BSUD se Garrard et al. 2017), och ta hänsyn till biologisk mångfald så tidigt som möjligt i processen. En del av syftet är också att utmana västerländska ideal genom att

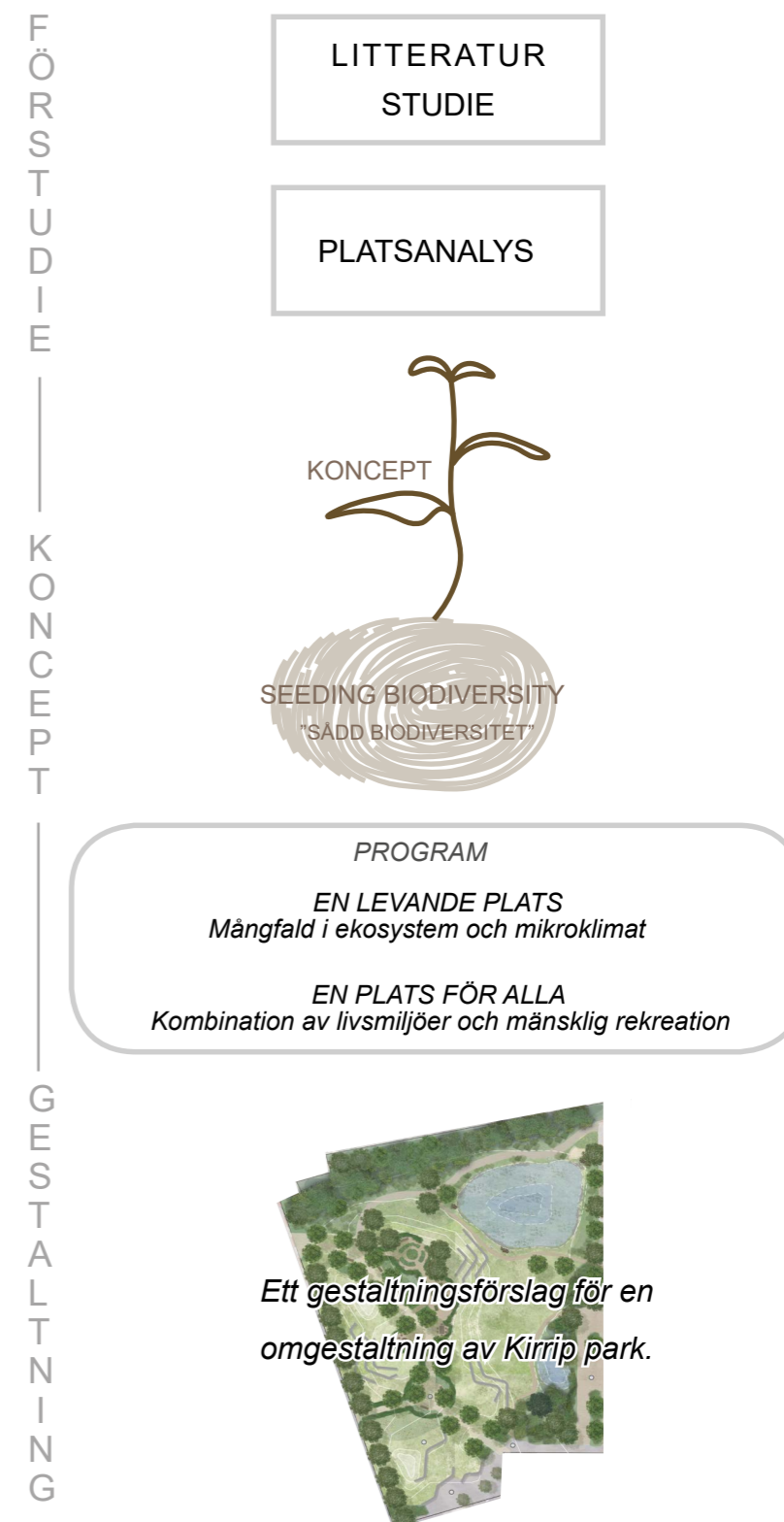
utforska och lära av ursprungsbefolkningens sätt att se naturen. Genom att införliva detta syftar studien till att skapa landskap med hög biologisk mångfald, som är inkluderande, bryter dikotomin mellan människa och natur samt främjar ett harmoniskt förhållande mellan dessa. Genom detta tillvägagångssätt undersöks hur landskapsarkitektur kan informeras av närvaron av specifika djurarter för att skapa mer inkluderande och hållbara miljöer för både natur och människor. Målet är att genom ett gestaltungsförslag, baserat på uppsatsens undersökning, svara på frågan:

*Hur kan Kirrip park omgestaltas baserat på biodiversitets-känslig urban gestaltning för att förbättra miljön för vilda djur och människor, och främja ett hälsosammare förhållande mellan människa och natur?*

### Resultat: en omgestaltning av Kirrip park

Insamlad information från litteraturstudie och platsanalys sammanfattades i koncept och programpunkter i konceptfasen, som sedan övergick till ett gestaltungsförslag. Denna process visas förenklat i figur 4. Konceptfasen kan ses som en del av utforskningen av hur områdets befintliga karaktär kan utnyttjas, samtidigt som den stärker den biologiska mångfalden.

Konceptet "Seeding Biodiversity" ("Sådd biodiversitet") fokuserar på integrering av biologisk mångfald i de tidiga stadierna av gestaltning för att skapa en gynnsam miljö för både djur och människor.



Figur 4 visar metoden för arbetet, med Förstudie, Koncept och Gestaltning (Pre design, Design och Post design av Roggema 2017).



Figur 5 visar en visionsbild över gestaltungsförslaget för omgestaltningen av Kirrip park.

För att besvara uppsatsens frågeställning skapades ett gestaltungsförslag utifrån konceptet. Detta delar in parken i sju olika typologier. Områdena utgår från de valda fokusarterna samt funktioner för stadens befolkning och visas genom mer detaljerade förslag i text och bild. Strategiska val av inhemska växtarter som gynnar fokusarterna har gjorts för att stödja ekosystem som med tiden blir självgående.

Genom att prioritera biologisk mångfald från början, blir parken en plats där naturen kan frodas och samtidigt erbjuder en rad fördelar för både djur och människor som använder parken. Detta kan vara ett steg på vägen till ett hälsosammare förhållande mellan människa och natur.



Figur 6 visar skisser av de tre fokusarterna; en fågel (*Malurus cyaneus*), en groda (*Litoria raniformis*) och ett bi (*Amegilla ssp.*).

### Diskussion:

Utmaningen med arbetet har varit att hantera flera olika perspektiv, i en helt ny kontext. En viss förståelse krävs för att förhålla sig till flera mänskliga/ sociala dimensioner, vilka stundvis har varit svåra att utveckla i arbetet. Dessutom är det alltid svårt att försöka vara helt inkluderande då man själv kommer med egna erfarenheter och värderingar till ett projekt. Metoden har fungerat bra för att skapa ett gestaltungsförslag, men hade kunnat stärkas av mer möten med kunniga människor och användare av platsen, vilket har försvårats på grund av brist på kontakter och tid. Gestaltungsförslaget är dessutom bara ett av många sätt att svara på frågeställningen.

Med det sagt, kan ändå uppsatsen i sin helhet, med undersökning och resultat bidra till inspiration för liknande uppdrag inom planering, landskapsarkitektur med mera, samt om Kirrip park någon gång i framtiden ska göras om.

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## ACKNOWLEDGING, LANGUAGE AND TERMINOLOGY:

### **Acknowledgment of Country:**

Or Acknowledgement of Traditional Owners can be done by anyone and is a way of showing awareness and respect for Traditional Owners of the land on which a meeting or event is being held, and can be adapted to reflect different contexts (Reconciliation Australia 2024; State Government of Victoria n.d.). The Acknowledgement of Country in this thesis is made to make recognition of the Traditional owners on whose land I am currently on, and also making a design proposal on. Even though this proposal is just a suggestion and is not going to be realised, I think it's important to recognise this fact, especially as someone coming from another context.

### **Positionality statement:**

When working in Indigenous contexts, it is of importance to position oneself. Reflecting over our own identity, purpose and role in Indigenous communities supplies an understanding over our position in regard to community and Country, and can indicate how we relate and are related to others (Hromek 2024). Since I am a non-Indigenous person from Europe, writing my thesis in Australia, I feel that there's a need and importance for me to make a positional statement, which is provided further on in the thesis.

### **First Nations peoples:**

There are no unanimously terminology agreed upon when referring to all the diverse groups of Aboriginal and Torres Strait Islander peoples in Australia (Hromek 2020), so in this document, First nations peoples are used to refer to people and groups who identify as being Aboriginal and/or Torres Strait Islander. Some words, like peoples, are written as plurals, to acknowledge the diversity in between and of First nations peoples. The word Indigenous is sometimes used; when something is not specifically referred to Aboriginal and/or Torres Strait Islander peoples, but used more generally, such as non-Indigenous people and Indigenous nature and land or when it is used by other sources. When a name, such as a place name, has a word in parentheses, the name within the parentheses is the Indigenous name. An example of this is Melbourne (Narrm).

### **Country:**

Country with a capital C has a different meaning than country in a Western understanding. In the Indigenous worldview, Country is a way of seeing the world, where everything is living and there is no separation between nature and people. Country isn't only related to land but also the sea and the sky. Country is the place of origin in spiritual, cultural and literal ways (Page & Memmott 2021).

### **Knowledge:**

When Knowledge is written with a capital K it is relating to the diversity of Knowledge held and continually developed by First Nations peoples (Australian Government n.d). When words are capitalised in this thesis, it is to communicate that they relate to the Aboriginal meanings of these words.

### **Biodiversity:**

Biodiversity refers to the wide range of living organisms on Earth, with genetic diversity, species diversity, and the variety of ecosystems found in marine, terrestrial, and aquatic environments. This also includes the ecological and evolutionary processes associated with these life forms (Morton & Hill 2014).

### **Decolonisation:**

Decolonisation is a way to replace Western interpretation of history with Indigenous perspectives, and restores the Indigenous cultures, traditions and worldview (Joseph 2018). This is not deeply delved into in this thesis, but is mentioned when referring to me trying to decolonise my mind from Western ways and values in some sense.

# INTRODUCTION

While working on this project, I am currently based in Melbourne (Narm), Australia. Following a semester as an exchange student in Landscape architecture in Perth (Borloo), I made the decision to move to Melbourne, a city I had visited a few times previously. Growing up and studying in a county in Sweden with a population of around 400.000, has affected my values and perspectives on landscape architecture. I therefore see it as intriguing to explore new perspectives in a big city like Melbourne, which completely differs from what I am used to. During my time in Perth, I learnt more about the history of Australian landscapes, sparking a curiosity of the intricacies of urban planning in Australia. As urban areas become increasingly dense, the significance of urban green spaces grows for both humans and non-human species, particularly as natural habitats decrease. This realisation prompted me to delve into my research. By prioritising designing for the non-humans that inhabit our planet, surely benefits will come to humans as well? Therefore, I decided to focus on how design can be done based on the non-humans in an area- and still reach goals around urban spaces, as well as create values for the humans using these spaces. In Europe, initiatives have been made in creating animal- focused design (Apfelbeck et al. 2019, 2020) and as I am currently in Melbourne, I looked to find similar initiatives, and came across the framework “Biodiversity Sensitive Urban Design” (Garrard et al. 2017). This has been used as a starting point in this thesis, when investigating how animals and biodiversity can be introduced early in the design process. This thesis will be an investigation using the method of “Research by design” (Roggema 2017), research on relevant topics, and site visits, to propose a redesign of Kirrip park in Melbourne, focused on biodiversity, to strengthen the friendship between humans and non-humans in an urban green area.

## Purpose and scope

The purpose of this master thesis is to explore the potential of redesigning an urban park, in Melbourne, by considering biodiversity and non-humans as early in the design process as possible, with the help of Biodiversity Sensitive Urban Design (Garrard et al. 2017). Part of the purpose is also to challenge Western ideals by exploring and learning from First Nations peoples' ways of seeing nature. By incorporating this, the study aims to create more inclusive and biodiverse landscapes, break the dichotomy between human and nature, and foster a harmonious relationship between humans and non-humans.

Through this approach, the research seeks to showcase how landscape architecture can be informed by the presence of specific animal species to create urban environments that can strengthen the friendship between humans and non-humans.

The scope of this thesis involves a study of the needs of three targeted species within the urban context of Melbourne. The research will also investigate the current design and functionality of the selected park to identify opportunities for improvement and integration of wildlife focused elements. The design proposal will involve creating a conceptual plan that incorporates habitat enhancements, nesting sites, food sources, and other features tailored to the needs of the chosen animal species, and by extension, also human needs.

The research is carried out as a proposal for the redesign of Kirrip park by answering the following question:

*How can Kirrip Park be redesigned based on Biodiversity Sensitive Urban Design to enhance the environment for wildlife and humans, and foster a healthier human-nature relationship?*

## Background

To gain a better understanding of urban planning in Australia and human attitudes toward nature, the background research has focused on these aspects as well as biodiversity to provide the foundation for exploring the research question.

### Biodiversity in urban environments

The concept of 'biodiversity' originated in the 1980s within the conservation movement to highlight the importance of the natural world in the face of human-driven environmental changes and resource exploitation (Morton & Hill 2014). Biodiversity refers to the wide range of living organisms on Earth, encompassing genetic diversity, species diversity, and the variety of ecosystems found in marine, terrestrial, and aquatic environments. This includes the evolutionary and ecological processes associated with these diverse life forms. Appreciating biodiversity underscores the invaluable benefits of the natural world, many of which are threatened by human activities and resource exploitation (ibid.)

Nature in cities delivers a range of benefits not only for flora and fauna, but also for humans, by delivering ecosystem services. These are divided into four, which are regulating, that controls climate and diseases, providing, which includes water and food provisions, supporting such as pollination, and cultural, which includes recreational and spiritual benefits (Morton & Hill 2014). When it comes to the wellness benefits of urban biodiversity, research has shown that areas with higher biodiversity have created more benefits than those with less diversity (Garrard n.d.).

There are many positive aspects and reasons to conserve and promote urban biodiversity. These are often divided into goals or values and while Morton & Hill (2014) talks about the values of biodiversity being economic, scientific, cultural, recreational and ecological- life support, Dearborn & Kark (2010) suggests seven more specific goals, where fulfilling ethical responsibilities is one of them. While the values mentioned by Morton & Hill (2014) are directed towards humans, Dearborn & Kark (2010) mentions "ethical responsibilities". This can relate to the understanding of an intrinsic value of biodiversity, where flora and fauna has a value by itself, regardless of the benefits provided to humans. Conserving biodiversity in urban environments, leading to easier exposure, can help individuals without a sense of responsibility for the environment to get an understanding of the importance of the ethics around conservation (Dearborn & Kark 2010), especially if it is combined with education around environmental issues. Many people have never used the term biodiversity, and maybe don't even know the meaning of it, but still appreciate landscapes, seascapes, animals and plants for their different qualities and spiritual importance, since these values also matter to humans (Morton & Hill 2014).

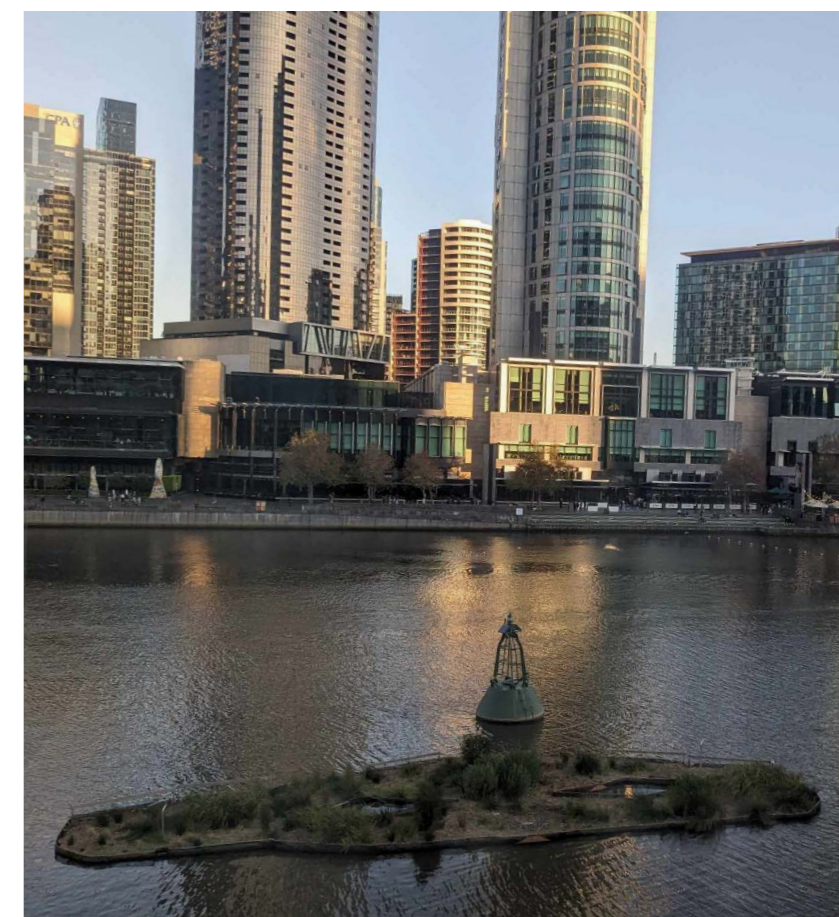
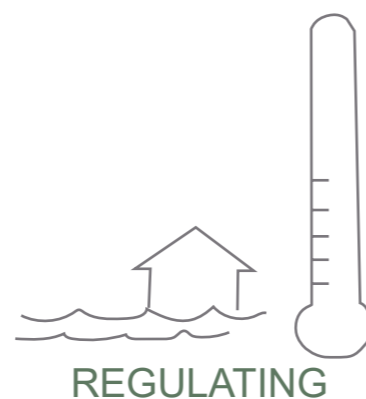


Figure 7 showing a photo of a constructed wetland in the Yarra river (Birrarung).

Figure 8 showing a sketch of the ecosystem services provided by nature.

According to Morton & Hill (2014) there is an existence of a negative value system based on fear or hostility towards biodiversity. Colonialists coming to Australia often exhibited such anti-values, which continued to influence attitudes towards some animals and plants in today's society. It is therefore important to teach people about non-humans' right to exist, as well as biodiversity-benefits for humans.

Conserving biodiversity in urban settings are as previously mentioned important for humans, but also for the biodiversity itself. The English colonists brought their values of nature, trying to recreate what was seen as beautiful back home, by bringing alien species to Australia. Many of these species have become invasive, competing against the ancient flora of Australia that aren't strong competitors against these plants (Ignatieva et al. 2023). There are still remnants of native nature in Australian cities, such as grasslands, wetlands, shrublands and forests. Due to the colonial activities and values, the nature has been divided into the bush, which is the Australian term for remnant vegetation, and the city, where the "beautiful, civilised and familiar" nature was planted by the colonialists, such as decorative gardens, and parks with lawns (ibid.). This neat and lush nature was seen as the antithesis of First Nations landscapes and cultures, and also superior to it (Gaynor 2017). There has to be a shift in the way of seeing nature, meaning that this colonialistic way of seeing non-native species as the superior, needs to change towards a stewardship of Australian native nature, with realisation of its importance, and the importance of saving the declining of native ecosystems.

In the 1970s there was a strong environmental movement in Australia, drawing attention to the unique native biodiversity in Australia, which had degraded because of urbanisation (Davison & Ridder 2006). Understanding the uniqueness of Australian native biodiversity and importance of conservation is crucial, due to rapid loss of biodiversity because of urbanisation. Today, the Australian ecosystems are important in creating a sense of place and inspire environmental design. In Melbourne, restoration of the unique, native grasslands has grown since the 1980s (Instone 2014) and national programs and community driven initiatives related to conservation efforts have since then focused on preservation and restoration of native urban nature (Dhakal 2011).

These initiatives aims to bring native nature back to cities (Mata et al. 2020) which can be made by designing new habitats (by restoring wetlands and waterways for example) or by modify and reconstruct habitats by planting native species in parks, verges and more (Ignatieva et al. 2023)

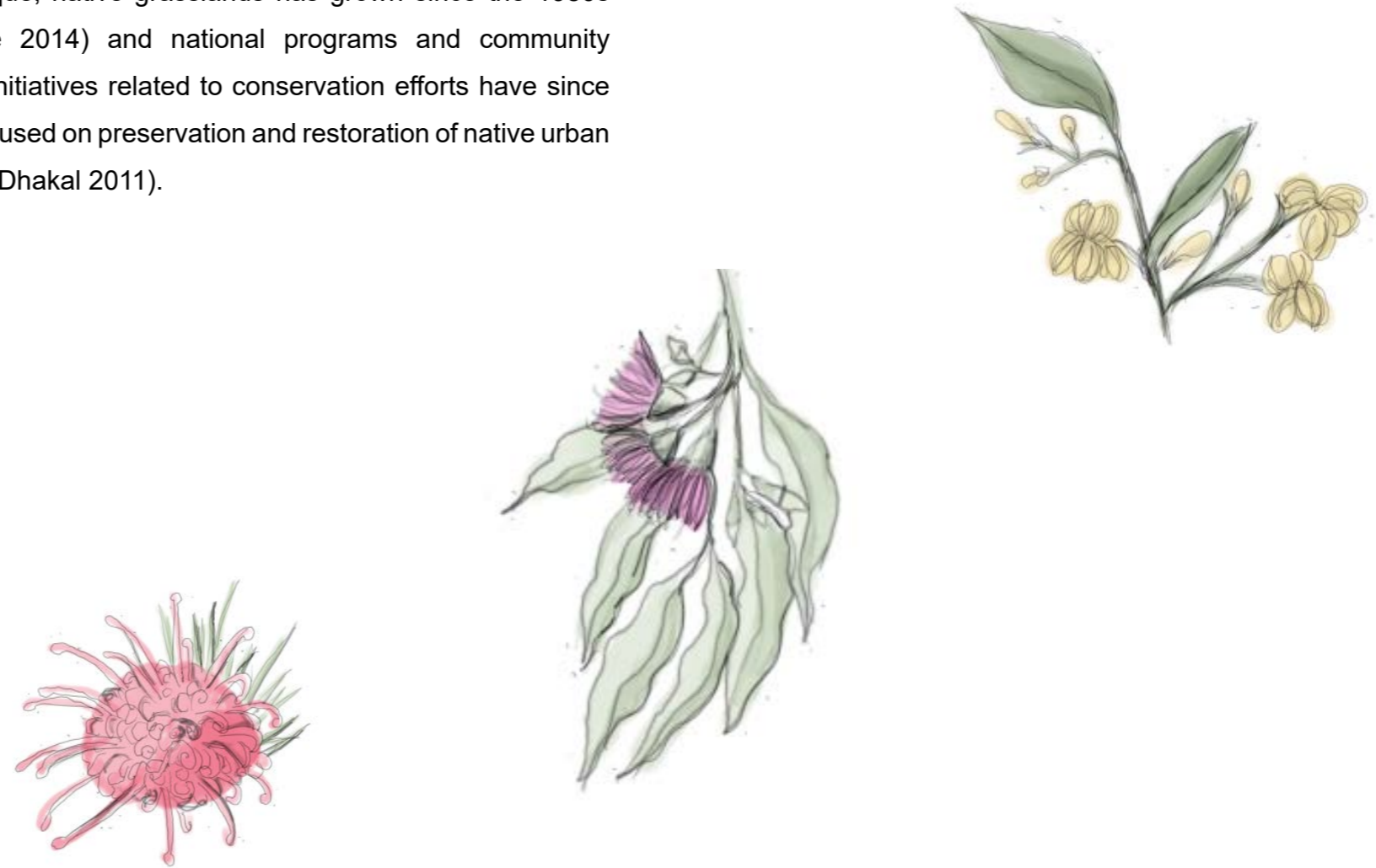


Figure 9 showing sketches of plants native to Australia; woolly grevillea, caesia/ gungurru and hop goodenia, which can be planted in Victoria.

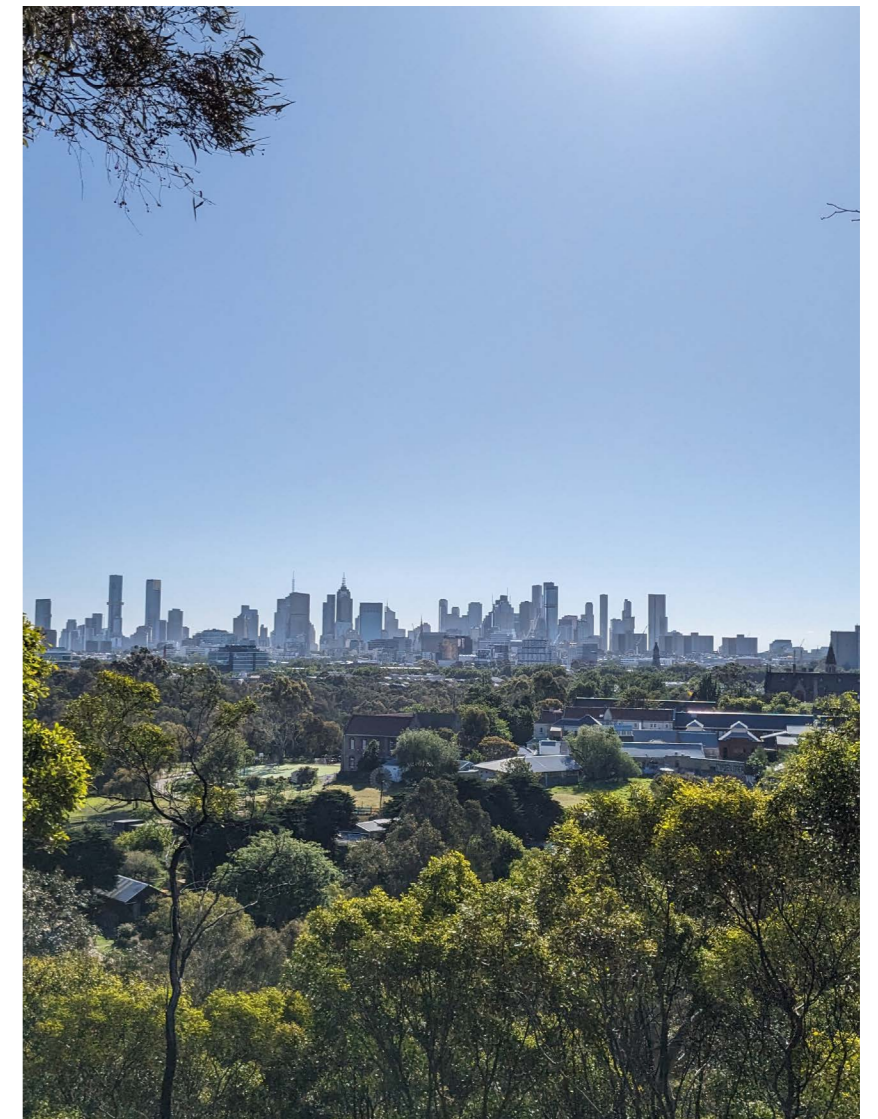
## Human- nature relationships

Since the middle of the twentieth century, urbanisation of cities has created challenges such as a decrease in urban green spaces, weakened natural biomes and a deterioration in contact between humans and nature (Ignatieva et al. 2023). Cities inhabit the majority of humanity, and even though cities only cover around 2-3% of Earth's land surface, around 57% of the world's population live in cities. By 2050 it is projected that this number will have increased to two thirds, having 6.7 billion people living in cities all over the world (UCN n.d.).

The human ways of living today, where every single part of the earth's surface is being influenced by humanity, has, according to some, created a new geological epoch- the anthropocene (Prominski 2019). For centuries, this prevailing concept in the Western world suggests a clear division between nature and human culture, acknowledging nature as a potent force with intrinsic value that exists autonomously, separate from human impact (ibid.). This has led to a way of thinking, where humanity considers ourselves to be a higher standing species, and therefore have the right to use the earth's resources for our own gain (Hedenus et al. 2018). This way of thinking, as well as global urbanisation, intensified agriculture and biotic homogenisation, has led to degradation in ecosystems, a decrease in biodiversity and species extinction (Pett et al. 2016), which is putting the pressure on sustainable methods in urban development as well as creating good and healthy environments through the help of urban design (Haaland & van den Bosch 2015).

These are universal challenges that manifest in various scales worldwide, but to gain a more comprehensive understanding of the specific location where I am currently studying, I must further explore the unique context of Australia and Melbourne. In Australia, the landscapes were created under different conditions, both culturally and environmentally, than in Europe, with at least 60.000 years of human changes to landscapes and ecology, before European colonialists came (Roberts et al. 1994). The sustainable ways that Aboriginal people had managed the lands over thousands of years were disrupted as colonial forces advanced throughout the continent (Hromek 2020). Through Western agriculture and horticulture came foreign species (Hromek 2020; Ignatieva et al. 2023), and many have since been declared invasive, leading to native species not being able to compete with these (Ignatieva et al. 2023). In addition to this, the Western principles led to exploitation, consumption, perishing of ecosystems and disconnection from the Laws of the land. This led to anthropocenic ways of understanding the connection between earth and humans, with a hierarchy where humans are disconnected from Country, and where the land was to be used for human gain (Hromek 2020).

The colonialist blanketed Indigenous lands with steel, glass and concrete, which can be seen in the form of grid layouts in today's urban areas. The streetscapes were favoured over landscapes and still are in many ways today (Page & Memmott 2021).



*Figure 10 showing a photograph with nature in the foreground and the skyline of Melbourne showing in the back.*

The anthropocentric approach to land management has proven inadequate in fostering essential relationships between humans, non-humans and Country. This approach is increasingly vulnerable in the face of today's global challenges such as climate change, extreme weather events and more (ibid.).

On the contrary, First Nations peoples' ways of connecting with Country, implies an understanding of humans as a part of a bigger ecosystem, where each member's health in this system is dependent on the health of the whole. Humans are therefore seen as being nature, and both humans and non-humans are entitled to the same positions and places, habitats and Country. First Nations peoples understand the importance of caring for Country in all actions, and as Country is shared by non- Indigenous peoples as well, this obligation now falls on all people (Page & Memmott 2021). The Aboriginal worldview can, when it comes to planning and designing, contribute to a more sustainable future, with humans and non-humans living as one, instead of humans in the centre of design decisions, and landscape and biodiversity as a second order priority (Government Architect New South Wales 2020). The difference in these two approaches are shown in figure 11.

Cities have been shown to be important when it comes to the conservation of some threatened species in Australia, as they are hotspots for some of the species who occurred before urbanisation (Garrard n.d.). In the state of Victoria, which is 227,444 km, and where Melbourne is the capital, there are more than 1200 native vertebrate animals and 5000 native plants. Over one third of these are classified as threatened, near-threatened or rare. There is a continued decline in habitats for native species in Victoria and climate change is a huge factor regarding this problem (DELWP 2017a).

Bringing back native biodiversity to urban settings in Australia can be done by creating new habitats or enhancing existing ones by planting native species (Ignatieva et al. 2023), leading to improvements on human health, prosperity and wellbeing. Garrard et al. (2017) mention that urbanisation is one of the greatest drivers of biodiversity loss and that this loss can be mitigated by improvements to the design and construction of new developments, or through the redesigning of existing development. Healthy biodiversity is also very important for the cultural practices of Aboriginal Victorians (DELWP 2017).

Australia's biggest urban renewal project "Fishermans Bend" in Melbourne, is planned to at 2050 accommodate 80 000 residents, in an area of 480 hectares (DELWP 2018). This is the area where Kirrip park is located, which I'm suggesting a redesign of. When cities become densified like this, there is a risk that the remaining green spaces will be rigidly designed with homogeneous structures, impacting social and biological diversity. The reduction of green spaces in cities necessitates the development of innovative solutions to address ecological and social requirements within urban environments (Hedblom et al. 2017).

According to Prominski (2018) Nature protection laws, like those in the European Union, try to prevent or prohibit connections between people and animals or plants. This approach, known as "fortress conservation," aims to separate nature from human activities, leading to a conflict between preserving biodiversity and meeting human needs.

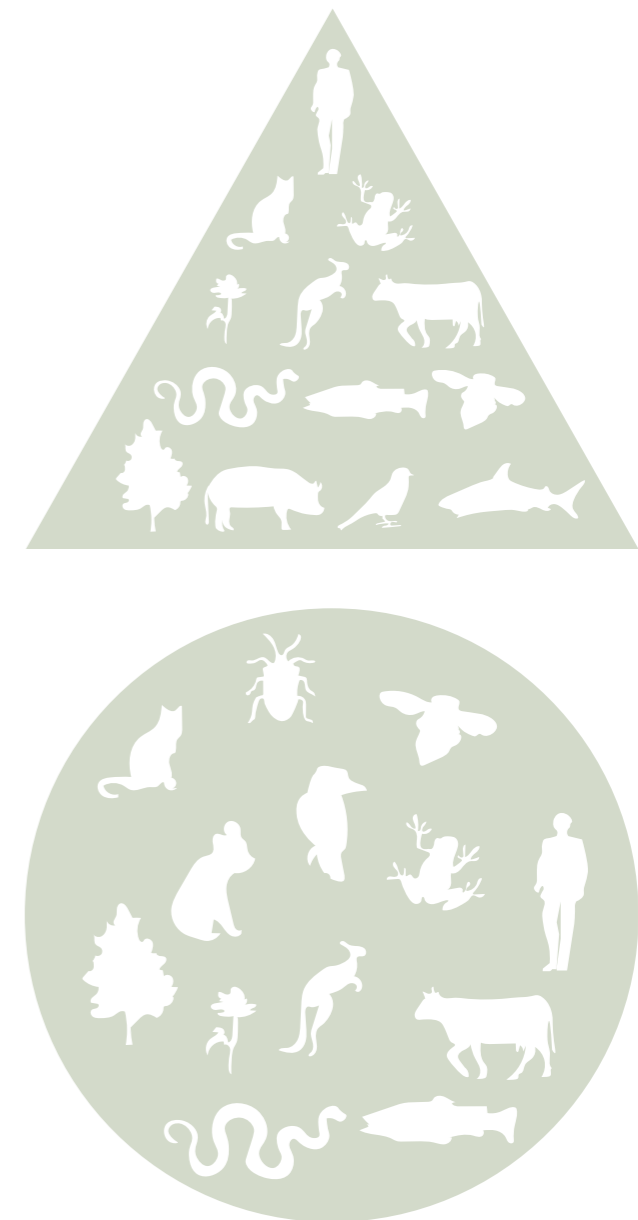


Figure 11 showing the human- centred way of seeing the world in the triangle, with humans at the top and the Country-centred way in the circle, with humans as a part of nature. Inspired by German architect Steffen Lehmann's "Eco v Ego" diagram (2010).

Instead, there is a call for designs that consider both the needs of plants and animals and those of humans in outdoor areas, allowing them to coexist and interact with each other.

## About the chosen area

To enable this thesis investigation and analysis, a park in Melbourne has been chosen for a proposed redesign. The chosen park for this project, Kirrip park, is situated in Fishermans bend, an area in the south of Melbourne, Australia. Australia inhabits over 26,6 million people and is divided into 8 territories (Australian Bureau of Statistics 2023), as seen in figure 12.



Figure 12 showing a map of Australia, with the eight territories and each of the capitals of each territory. The chosen site, Kirrip park, is located in Melbourne and is bordered in red.

## Melbourne (Narrm)

To get a better sense of the area where I currently study, some background information is presented about Melbourne, also known as Narrm in the Boonwurrung/Woiwurrung languages (Nicholson & Jones 2020). Therefore, the following chapter gives an overview of some important elements related to this thesis, to create a better understanding of the history, planning and urban green areas of Melbourne.

### *Melbourne today and in the future*

Melbourne is the capital of Victoria, and consists of 32 local government authorities forming the metropolitan area (City of Melbourne 2016). Melbourne has the fastest growing population in all of Australia (ibid.), with a population of over 5 million (Australian Bureau of Statistics 2021) estimated to reach 8 million by 2050 (Goodman et al. 2016). This increase creates a need to provide for 1.6 million homes until 2050. Melbourne is spreading relentlessly outwards but also upwards in the inner city areas, with high rise buildings. This places Melbourne in the forefront of high rise development internationally. The urban expansion observed in Melbourne is leading to persistent and significant structural challenges. There is a developing agreement among proponents of metropolitan planning, advocates for sustainable urban development, and ecological city proponents that the proliferation of low-rise developments in the outer urban areas is causing notable social and ecological issues. However, it is anticipated that high-rise construction in the 21st century presents similar challenges (ibid.).

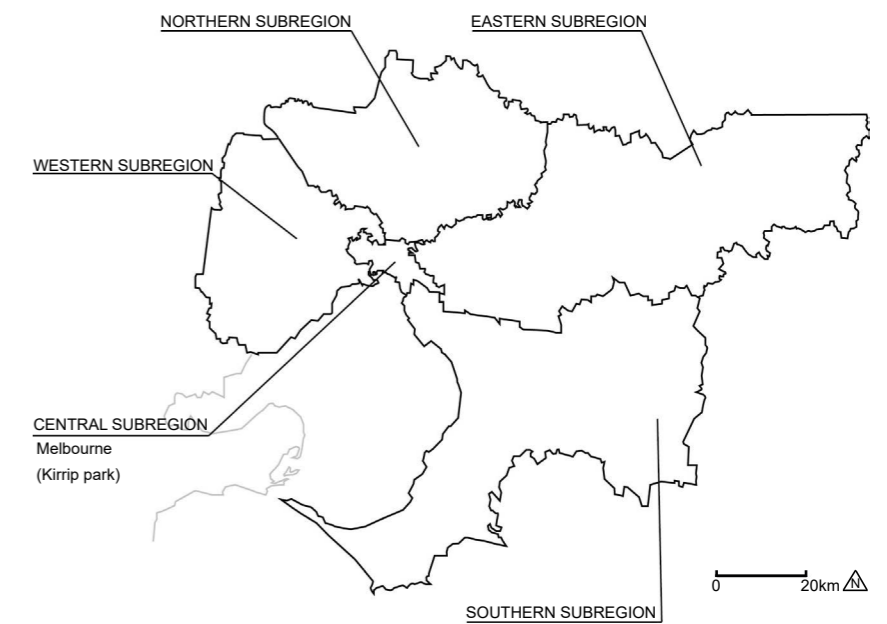


Figure 13 showing a map of the regions of Metropolitan Melbourne, with 32 local government authorities over the regions. The central subregion is where Fishermans bend and Kirrip park is located.

### *Colonisation of Melbourne*

First Nations peoples have for a long time lived in the Port Phillip Bay area, which later became the township of Melbourne (Johnson 2017). Due to violence associated with colonisation, and failures when planning the settlement in Sydney, a treaty in 1935 with First Nations peoples in the Port Phillip Bay area was formed. This occupation was the start of one of the most rapid invasions of any region of Australia (Critchett 1998).



In 1837, Governor Bourke and Sydney's chief surveyor Robert Hoddle started working on the details for the urban layout of the town. The grid pattern of Melbourne's plan, which is still part of Melbourne's central district today, was oriented towards the river, with rectangular blocks and principal and secondary streets as well as laneways (Lewis 2008). The Hoddle grid imposed imperial power and allowed for the sale of Crown lands. It also meant to promote the European concept of private property, that excluded all others (Johnson 2017). Later on, the First Nations peoples who occupied these lands continued to move through, using camps and meeting places, leading to removal to camps out of the city bounds. The more Melbourne grew, the further away the camps were moved, as agitation and the settlers' will to use the land for something they perceived as more valuable grew (Christie 1979).

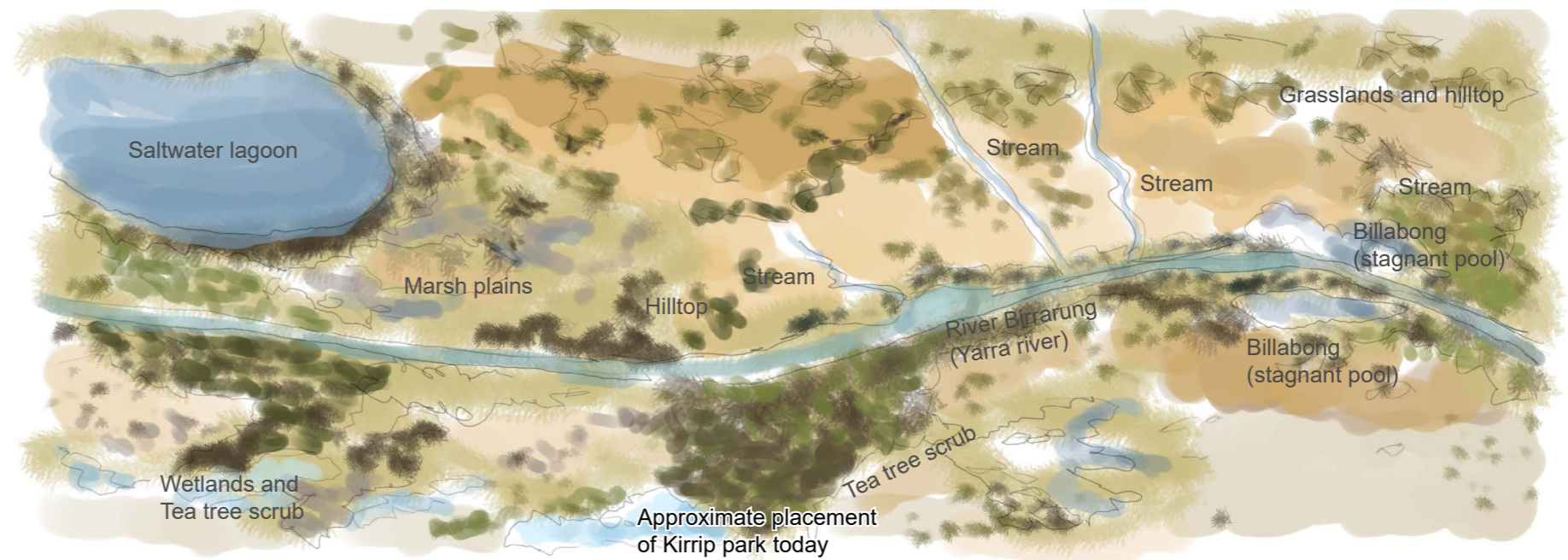


Figure 14 showing a sketch of Melbourne before colonisation, inspired by an artistic impression by The City of Melbourne (2023).

After the settlement of Port Phillip District was declared open by the British in 1836, immigration was encouraged (Context Pty Ltd 2011). The population was by 1850 20,500 in Melbourne (Tout-Smith 2009 see Johnson 2017) and by the mid 1850s, it had the largest population in Australia, which remained the case for 40 years. From the 1890s to the 1920s there was a decrease in population in the central part of Melbourne, as people moved to the new developing suburbs (Johnson 2017). After World War II, the city experienced a significant population boost as the immigration policies got less restrictive, bringing immigrants from southern Europe. The development in the city took new turns with traffic lights, multi level car parks and high rise office buildings (Context Pty Ltd 2011).



Figure 15 showing a sketch of Melbourne after colonisation, where the "Hoddle grid" is laid out. Inspired by an artistic impression by The City of Melbourne (2023).

### Green areas of Melbourne

When it comes to the green areas of Melbourne, there was a romantic appreciation for nature during the mid-19th century, commonly linked to pastoral pursuits, which led many to admire the new country for its lush vegetation, diverse landforms, and plentiful fresh water. However, some viewed the land as unwelcoming and unfamiliar (Kunz 1969 see Context Pty Ltd 2011).

The preservation of open spaces and the establishment of public parkland were driven by utilitarian reasons, and in the 1830s, in Britain and other places, public parks were promoted as essential for public health. Superintendent C.J. La Trobe strongly supported this idea, influencing the reservation of significant parkland areas near the central township. By the 1840s, progressive town planning principles led to the inclusion of reservations for parks,

gardens, and public open spaces in the early planning of Melbourne. Inspired by the growing appreciation for the aesthetic and health benefits of parks and public gardens in London and other European cities, Melbourne followed. Although Hoddle's 1837 plan for Melbourne did not include officially designated parks and gardens, the vast open land surrounding the settlement provided ample opportunities for public recreation (Context Pty Ltd 2011).

Locations like Batman's Hill, known for its lush greenery and diverse bird population, became popular spots for picnics and leisurely strolls. By 1850, several government reserves to the east and north of the city were earmarked for public use, eventually evolving into iconic parks like Yarra Park, Royal Park, and Princes Park. The first public gardens to be designed and cultivated in Melbourne included the Botanic

Gardens, established in 1846, as well as the Carlton Gardens and Fitzroy Gardens. Initially, the natural environment of these reserves was prioritised, but their deterioration over time necessitated their transformation into planned landscapes. In the 1850-60s the Botanic Gardens, Carlton Gardens and Fitzroy Gardens were often used for grazing livestock or repurposed for activities like night-soil dumping (ibid.).

In the 1930s, Melbourne was being promoted as the "Garden city" in tourist guides, but many of Melbourne's parks were repurposed for a range of sports and recreational activities, posing a threat to any remaining Indigenous landscape elements and impacting existing designs. While some pockets of Indigenous vegetation persist in Melbourne's parks and gardens, efforts have been made to restore parts of Royal Park and other areas to their original landscape (ibid.).

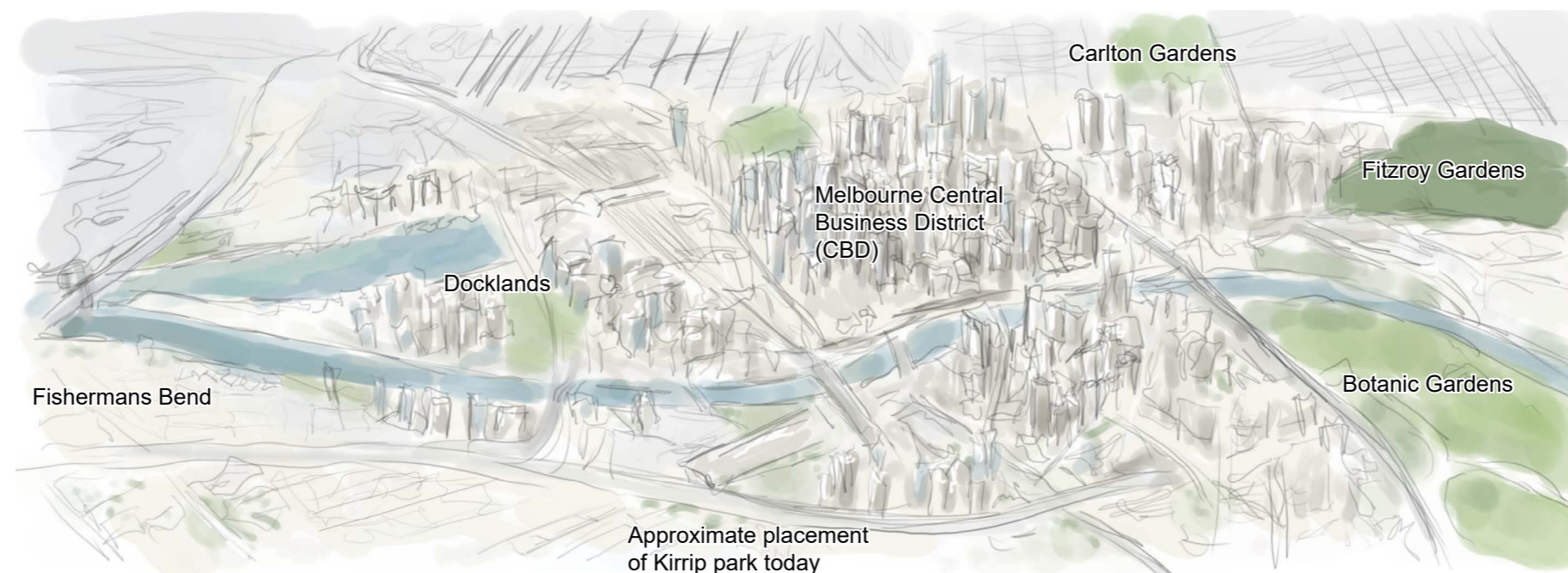


Figure 16 showing a sketch of Melbourne today, inspired by an artistic impression by The City of Melbourne (2023).

## Fishermans Bend

Fishermans Bend is located south of the Yarra River (Birrarung) (Context Pty Ltd 2017). Fishermans Bend was originally a hunting ground for First Nations people of the Bunurong and Woiwurung languages, where the constant flooding of Port Phillip Bay created wetland and sand ridges, modified by fire management (DELWP 2018).

Much of the Fishermans Bend area is situated on the Coode Island silt deposited by the Yarra and Maribyrnong Rivers, layered with sand ridges from old beach dunes, and interspersed with swamps. The wooded Batman's Hill and Emerald Hill were the initial elevated areas upstream, providing a fertile environment for a variety of plant and animal species that sustained First Nations Communities for thousands of years while simultaneously being a haven for wildlife. The sand hills and swamps supported a diverse range of bird species, as well as snakes, small mammals, and some of the last remaining salt marshes and natural wetlands in the estuary (DELWP 2018).

When European colonialists came in the 19th century the area became a settlement for fishing and the population of around 11,500 First Nations peoples in

Victoria, is thought to have been decreased to 2000 after the introduction of European diseases and frontier violence (National Museum of Australia 2015). In the early 1860s many First Nations peoples from in and around Melbourne were relocated to the Coranderrk Aboriginal reserve, further up the Yarra river (Context Pty Ltd 2017).

From the 1850s, the area was heavily industrialised which had a damaging effect on the natural environment, with waste material and smells playing a big part in the character of the area. Westgate park then played an important role for naturalists and bird observers who regularly visited to document and study the unique ecosystem in Fishermans Bend. This can still be appreciated through the recreated wetlands of Westgate Park, which were established in the 1980s from former sandpits. The Westgate park was designed with fresh and saltwater lakes, with planting of Australian flora and improvement of bird habitats (Context Pty Ltd 2017).

With around 800 hectares of land, consisting mostly of industries, as well as a proximity to the central business district (CBD) of Melbourne, the western suburbs and the Port of Melbourne, Fishermans Bend is predicted to play a

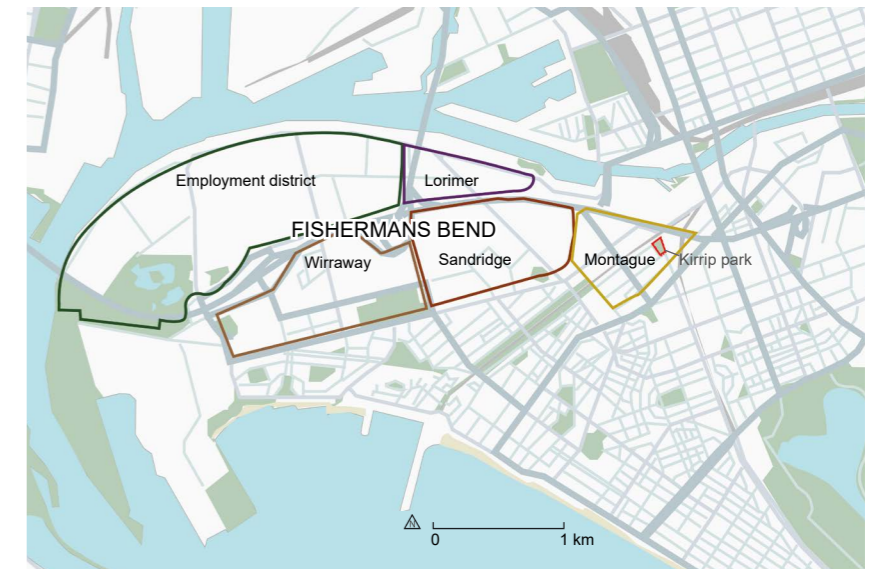
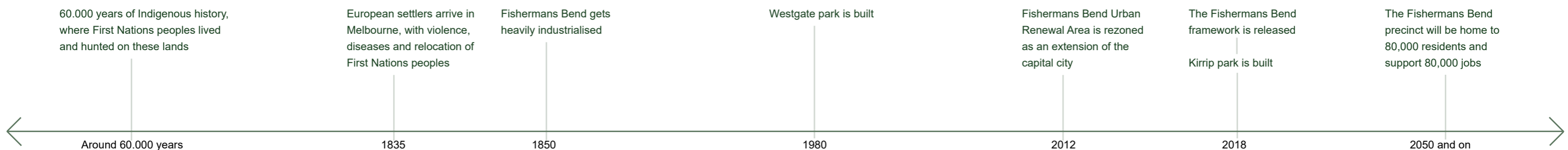


Figure 17 showing Fishermans Bend's location in relation to Melbourne as well as the five districts. Kirrip park is located in the district of Montague and is outlined in red.

crucial role when it comes to the prosperity and growth of the city. Over 250 hectares will be mixed use development, ranging from medium to high density, and the area is divided into five districts, Lorimer, Wirraway, Sandridge, Montague and Employment precinct, as shown in figure 17. The whole area will by 2050 include workplaces, dwellings and services in close proximity to each other, with open space, infrastructure and activity centres throughout each area and will be able to inhabit around 80,000 people (DELWP 2018).



Timeline showing some of Fishermans Bend's history, inspired by DELWP (2017).

## Kirrip park

Kirrip park is located in the area of Montague, which was formed in the 1860s, with timber cottages built on what used to be regularly flooded marshland (DELWP 2018). It was a dense residential area laid out in a small grid with more than 200 homes. It was a working- class neighbourhood with cheap housing which got strengthened by the opening of the Montague State School and Montague Railway Station in the 1880s. Most of the area was regularly flooded due to its low position in the landscape, which led to the area earning a bad name and inhabiting the poor, as the rents were cheap. Despite these conditions, this poor neighbourhood came together to help one another. The population of the area declined in the post-war

period and much of the original fabric was taken over by workshops and industrial buildings (Context Pty Ltd 2017).

Kirrip park was opened officially in October 2018 and was built on former industry land jointly purchased by the Victorian government and The City of Port Phillip. This park includes four lawn areas, native garden beds, several seating areas, led lighting and a paved entrance and is situated across from South Melbourne primary school (ibid.).

The park was designed around sustainable stormwater systems, with rain gardens and swales to, by the help of passive irrigation, improve the quality of the runoff water

travelling towards the Yarra river. The open areas of the park are meant to create usable recreational areas as well as act as flood storage. The land was contaminated from earlier use of the site, and therefore, clean fill capping of potentially contaminated material created usable areas above the zone of flooding, while also minimising its removal offsite (ODS 2020).

The Boon Wurrung Foundation submitted the name Kirrip park to council in April 2018 and after community consultation the Council submitted it for registration in July the same year. The word Kirrip means friendship or mate in the Woiwurrung and Boon Wurrung languages (Have your say Port Phillip 2024).

### About:

*Project location:* Australia, Victoria, Melbourne, Fishermans Bend, Montague. 2/4 Buckhurst St.

*Client:* Port Phillip City Council (Tract 2017).

*Design team:* Tract Consultants, Hayball Architects, Wallbridge & Gilbert (ibid.).

*Project size:* 9,356 sqm (Port Places 2022).

*Completed:* 2018 (Tract 2017).



Figure 18 showing Kirrip parks placement in Melbourne. Aerial map © 2024 Nearthmaps.



Figure 19 showing Kirrip park in its surroundings. Aerial map © 2024 Nearthmaps.

## Limitations

The thesis has been limited down in terms of methods, themes, and the specific area of focus. This deliberate narrowing is influenced by my current location in Melbourne, the time constraint of a 19-week course for thesis completion, and the intention to maintain a focused and manageable scope for the research theme.

## Method and themes

The thesis is based on the method of “Research by design” (Roggema 2017), which has helped in providing a structure in planning, and also in developing a design proposal that addresses the research question. Regarding the research, a thematic delimitation has been made, to fit the time frames of this work. This has therefore been narrowed down to primarily focus on biodiversity but also secondarily on human dimensions. I based biodiversity factors around the BSUD framework (Garrard et al. 2017) and sustainability goals for Fishermans Bend (DELWP 2018), as well as general research through a literature study. The human dimensions are based on research around the benefits of green areas for humans, as well as ways of analysing open spaces and designing for humans. As I have not have the opportunity to have dialogues with the community and possible end users of the park, I have looked at the Swedish authors Stoltz and Grahns’ (2021) method of Perceived Sensory Dimensions (PSD), which has helped me analyse the park regarding to what type of qualities could best meet peoples aesthetic needs connected to greenspace.

## Chosen area

The area of Fishermans Bend is under development, and can therefore act as a good area for place- based design focused on biodiversity. Based on analyses of maps regarding green spaces in Fisherman’s Bend, along with conversations with Todd Berry<sup>1</sup>, Kirrip Park was chosen for the design. The decision to focus on one park rather than a larger area of green infrastructure has been made in order to meet the time constraints of this thesis, as well as to be able to address the research question in a structured and narrowed manner.

Why Kirrip park was chosen was because Kirrip Park has only been designed “temporarily” , according to Berry, and is likely to be redesigned in the future, which aligns well with my proposal for a new design. It is also an already existing park, which enables me to do site visits and analyse what is there today. Kirrip park is rather isolated from major roads, which make it fit reasonably well in terms of location as Kirk et al. (2021) mention that biodiversity enhancement actions should not be prioritised in places with high noise and light pollution and heavy vehicular traffic. Kirrip park is surrounded by calm neighbourhood streets and an upcoming green link (DELWP 2018) with trams, and after talking to Holly Kirk<sup>2</sup>, the close by Westgate highway shouldn’t be too big of a worry, and if designed right, Kirrip park can work as a positive spot for biodiversity.

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<sup>1</sup> Todd Berry, Senior Project Manager - Fishermans Bend Taskforce, Depart of Transport and Planning, Phone conversation on 31-01-2024

<sup>2</sup> Holly Kirk, Ecologist, Post Doctoral Fellow, RMIT University, Video conversation on 05-02-2024

## **Target group**

The target group is primarily landscape architects, planners, policy-makers and students in Melbourne and other places, who are interested in creating more biodiverse areas. It can also help people to see how goals can be reached through the help of Biodiversity Sensitive Urban Design. Hopefully, the themes of the thesis can also help in widening the ways of seeing human-nature relationships when designing urban landscapes, and the redesign of Kirrip park could be used as inspiration for a future redesign of this, or other parks.

## **Positionality statement**

As I am doing this thesis in Australia, which is not my home country, I wish to acknowledge my positionality as an author, shaped by the cultural perspectives that influence my life, research, and practice. As a white, non-Indigenous woman from Sweden, my educational background in Landscape Architecture from Uppsala has equipped me with a strong understanding of design principles and environmental considerations within the context of Sweden and Europe. However, I am aware that my upbringing has exposed me primarily to Western perspectives and ways of thinking. This places me in a position that may constrain my ability to fully comprehend diverse cultural perspectives and experiences outside of my own. Having previously lived and visited Australia due to family connections, I have developed an appreciation for the unique landscapes and natural environments, and in a sense a broader way of seeing the world. My studies in Perth from June to November 2023 further strengthened my awareness of environmental and societal challenges, igniting a profound interest in exploring these complex issues. I recognise that this master thesis will be influenced by my current knowledge and position, and that there is much more to learn. I am committed to furthering my knowledge in order to, hopefully, contribute meaningfully to the field.

# METHODOLOGICAL APPROACH

The chosen methodology of this thesis is “Research by design” (Roggema 2017), which has brought a way to explore a problem not only by research but also by sketching, looking at maps, creating a design and more. This has been divided into three steps: Pre design, Design and Post design and is accompanying the entire process of the thesis.

## Research by design

Research by design is an academic investigation that delves into the exploration of design as a method of inquiry. This approach is suitable especially when planning for the future and environmental challenges, as the conditions are constantly changing and can therefore be in need of a reflexive and multiple feedback process. As problems in planning and designing, such as social, economic and environmental, do not have a one single solution, they are so-called wicked problems (Roggema 2017). Design is an appropriate approach to these problems, and the proposal in this thesis is only one out of many solutions. The process of research by design is not linear, even though it is divided into three steps, it is allowed and encouraged to jump back and forth through the process (ibid.), which is shown in figure 20. Therefore I worked in this iterative way throughout this thesis, where a combination of sketching, researching, discussion and planning was made throughout.

In the first phase, the Pre design phase, research is done before the actual design is created (Roggema 2017). In this phase, I researched the subject of biodiversity, which included some of the City of Melbourne's planning strategies, goals and more (City of Melbourne 2011; 2018; 2020). This was done to get a picture of how biodiversity is mentioned when it comes to future development. I also dived deeper into the Biodiversity Sensitive Urban Design (BSUD) (Garrard et al. 2017) framework to learn how a biodiversity focus can be brought into planning and design in early stages. I also researched some human dimensions, undertook site analysis and studied maps and frameworks (including sustainability goals for the area by DELWP 2018). Reflections around the different parts of the Pre design

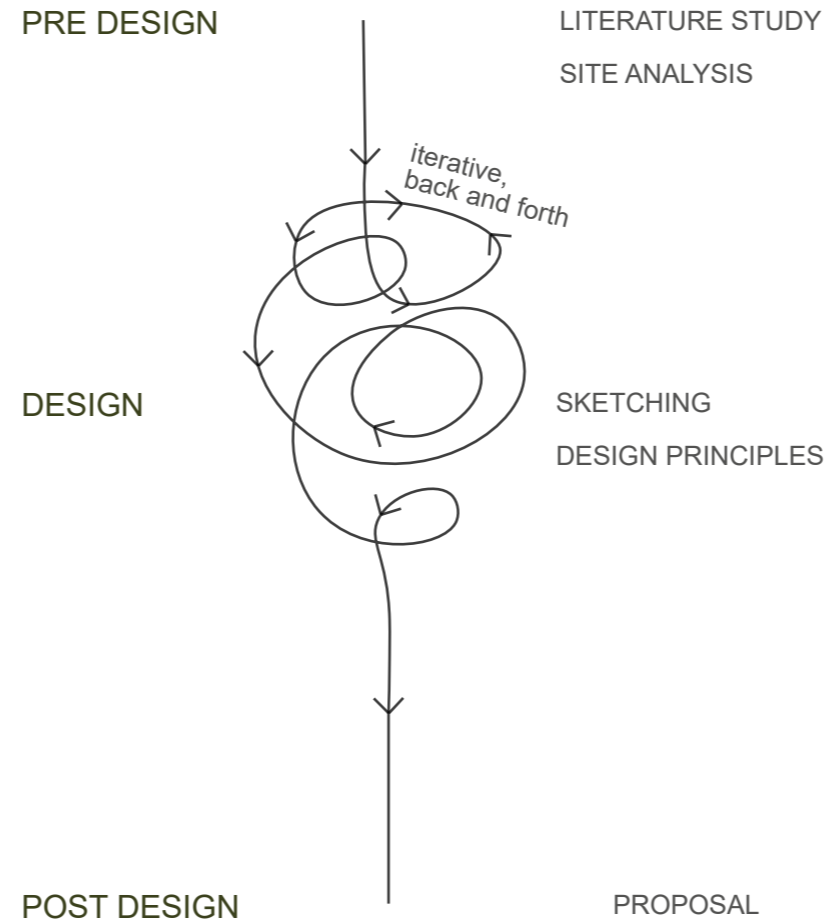


Figure 20 showing the iterative process of research by design and how it was used in this thesis.



Figure 21 showing some sketches and thoughts that have been produced in an iterative process throughout the thesis.

phase, and my way of working, are showcased throughout, to get a sense of the reasons for decisions made to answer the question of the thesis. This phase is showcased in the chapter "Literature study and Site analysis".

In the second phase, the Design phase, the designing and research gets more interwoven as there is a connection between assessment, comparability and evaluation. Different solutions to the problem can be tried, and the designer is researching through practice (Roggema 2017). Answers for the design problem are sought for and proposals are developed by the help of programmatic demands. The different options for the future design are evaluated and modified through a reflective process, where refining and improvements are made to the design, by the help of sketching and assessment of the connection between the problem and final solution (ibid.). In this phase I was constantly going back and forth between this phase and the previous, as the recommendations I created were based on the literature study and site analysis. Sketches were made from ideas connected to the Pre design phase, which are showcased throughout. All figures (sketches, sections, photographs etc) are made by me if nothing else is stated.

In the final stage, the Post design, the results of the work are shown in a coherently presented manner. How the future is seen and what it will be like, is shown in these results and the new knowledge that has been developed through the earlier stages has to be communicated in a clear way for a wide audience (Roggema 2017). This is showcased as text and illustrations in the part of the thesis called "Post design: a proposal for the redesign of Kirrip park".



# PRE DESIGN: LITERATURE STUDY AND SITE ANALYSIS

In this part, a literature study is firstly presented, to provide a comprehensive understanding of the theoretical framework and existing knowledge in the field, on suitable topics to help towards answering the previously asked research question. Secondly, the site analysis is presented, with firsthand observations together with applications of the literature study on the site which informs thoughts on the potential for a redesign in relation to the various themes explored in both these parts.

## Literature study

The literature study serves as a base for the research of subjects connected to the redesign of Kirrip park. It is started by looking at the Biodiversity Sensitive Urban Design (BSUD) framework (Garrard et al. 2017) which this work is based on, to further address biodiversity in urban settings. Further on, Nature based solutions are researched as possible solutions when bringing biodiversity into cities. As humans will be using the park, human dimensions are also taken into consideration, to see how the redesign can benefit human users as well.

### Biodiversity Sensitive Urban Design (BSUD)

The Biodiversity Sensitive Urban Design (BSUD) framework was produced as a means to guide urban planners, local governments and architects in more biodiversity-positive developments in Australia. A set of principles were set to ensure inclusion of biodiversity early in the decision-making process (Garrard et al. 2017). Literature around urban biodiversity has been distilled by the authors into five principles for sensitive urban design (ibid.) which are shown on the next page, in figure 22. Biodiversity is frequently considered secondary or as a last-minute inclusion as an urban project approaches its conclusion. Consequently, measures for biodiversity are usually superficial and fail to deliver the daily connection with nature that individuals require. By integrating biodiversity considerations at the outset of urban planning, it enables deliberate and strategic design to enhance biodiversity effectively (ibid.).

This framework is based in an Australian context which is helpful to me, coming from a whole other context. Based on this, the BSUD framework is a good guide when designing for biodiversity in Kirrip park, Fishermans Bend, to propose a redesign with enhanced qualities for non-humans leading to positive aspects for humans as well, and strengthening the relationship between these. Balancing ecological and human functions in urban environments is not an easy task (Breed 2020) and in trying to do this I will use an approach to design where both ecological and social factors are parts of the concepts of the design.

Out of the five principles mentioned in the framework, some parts are possible for me to strive for with my proposal for the redesign of Kirrip park, but some are more difficult due to the time constraint of this thesis, or it is simply not in the topic-area of this thesis. One factor of this is also that the park is just a part of a bigger picture, with many projects all over Fishermans bend, hence, some more overall planning is needed for some of the parts, which is not included in the frames of this project.

Because of this, the parts of the principles possible for me to strive for, have been written in bold letters in figure 22, on the following page.

Five BSUD principles:

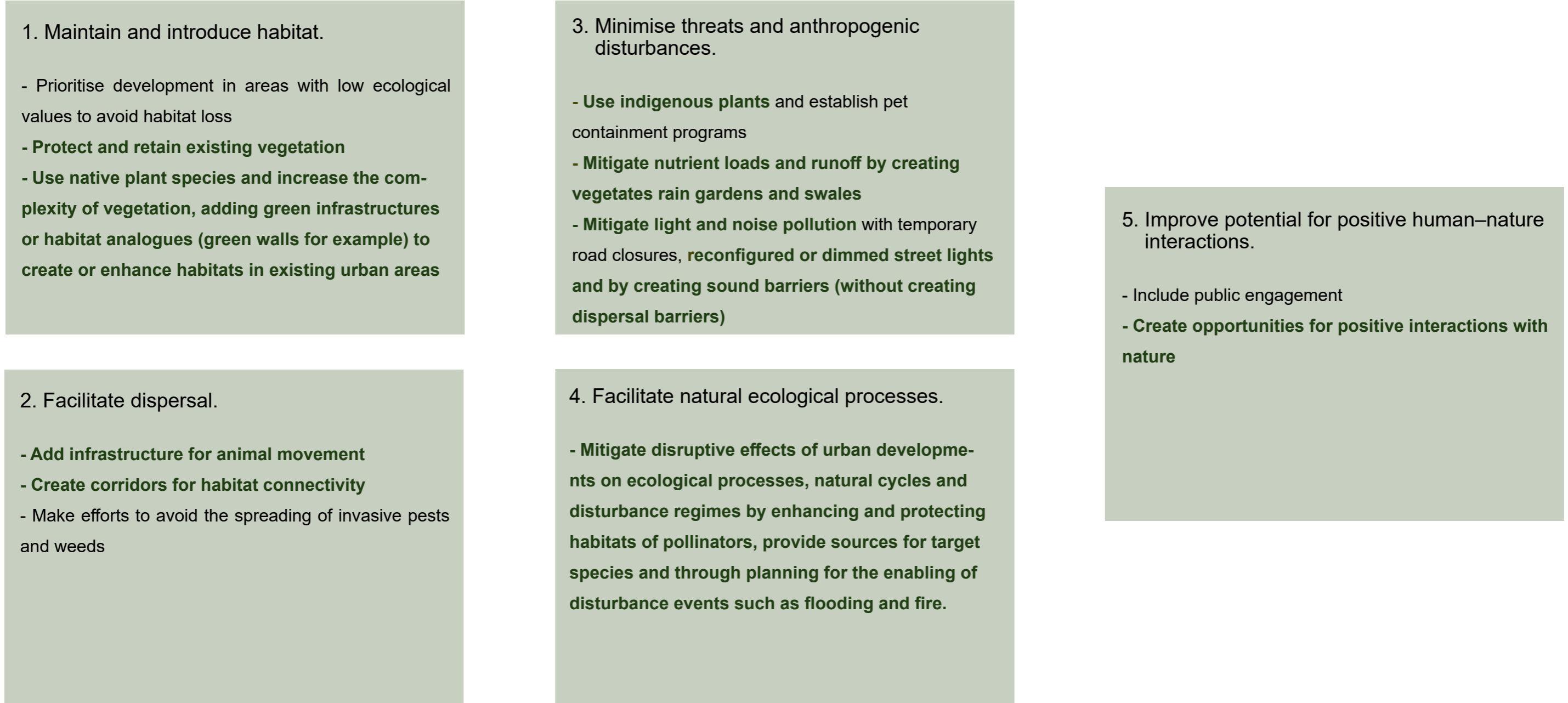


Figure 22 showing the five principles, a figure created by me based on the five principles of the BSUD framework (Garrard et al 2017). The bold parts are goals that can be achieved in this thesis.

Based on the earlier mentioned principles, the authors then present a way of implementing BSUD, which is applicable in different types and densities of urban development, creating benefits for biodiversity (Garrard et al. 2017). As development objectives and biodiversity often compete, the authors guide the users of the BSUD framework when combining biodiversity and urban development objectives (ibid.).

To implement the framework, there are five stages that include documenting biodiversity values, identifying biodiversity objects and BSUD actions, assess the BSUD and decide on BSUD actions (ibid.), which are shown in figure 23, together with my way of following the steps.

The BSUD steps were also interwoven with other parts of the work process, and when it comes to the methodology of Research by design (Roggema 2017), the first parts of the BSUD actions were part of the Pre design, and the last step, which was to determine which actions best satisfy all objects, were part of the Design phase. After that, in the Post design phase, the proposal of how to actualise these actions were made.

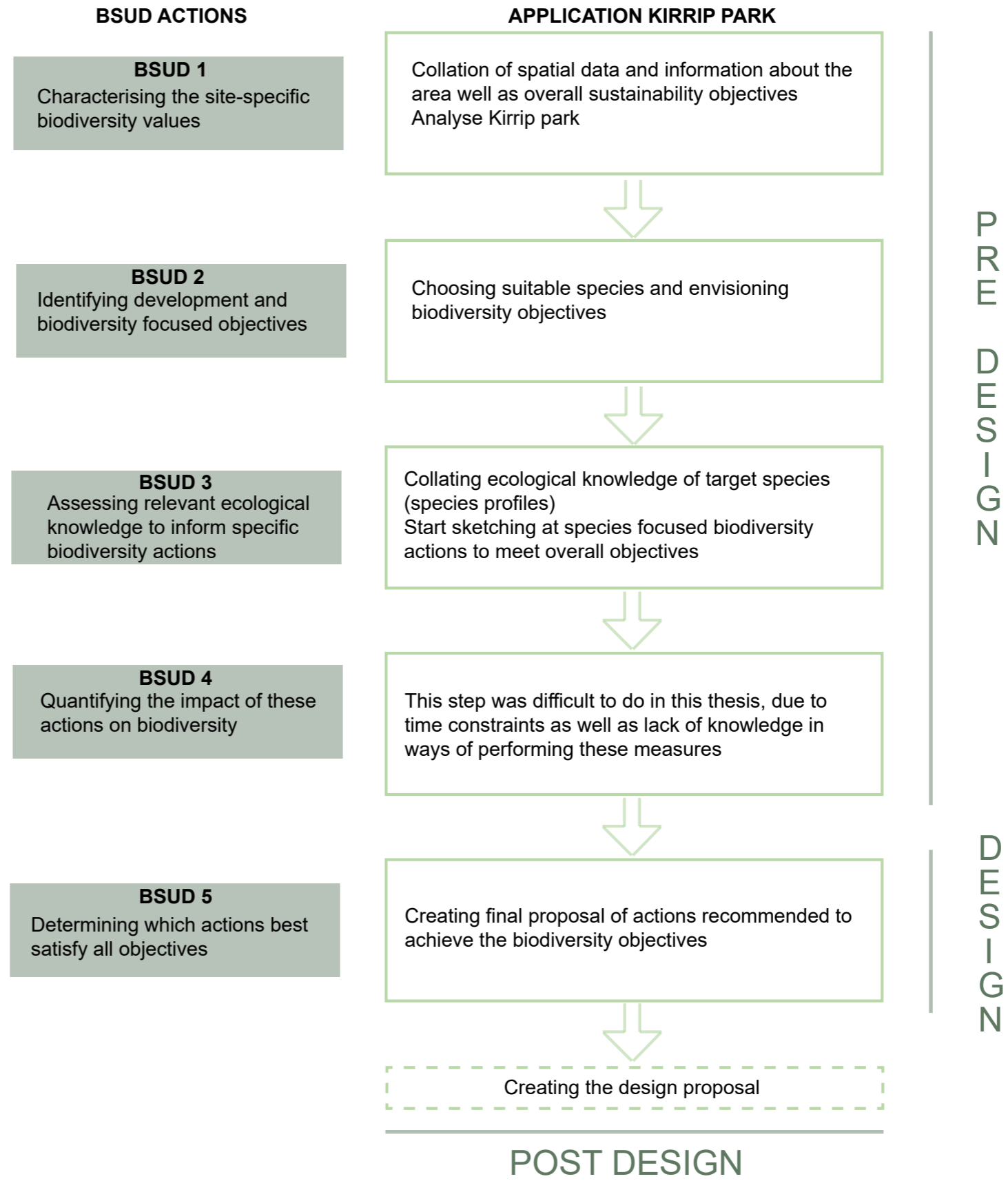


Figure 23 showing a flow diagram of my way of working with the five steps. This is also combined with the used method "Research by design" (Roggema 2017) to show which part of the BSUD framework connects to which part of the methodology.

### Bringing nature to cities with nature based solutions

Urban nature, nature based solutions and green infrastructure are three convolute concepts (Ignatieva et al. 2023) and in this thesis, a setting of urban nature is being analysed and nature based solutions are being suggested as a means to bring more biodiversity to this area.

Nature based solutions (NBS) are an often used concept when planning and designing for nature positive cities, by bringing nature into cities and therefore also people closer to nature (Ignatieva et al. 2023). These solutions are inspired by and use nature as well as supported and/or strengthened by nature (Frantzeskaki 2019). According to the IUCN (2023) NBS are to address societal challenges, such as climate change, biodiversity loss, food and water security, human health and risk of disasters by actions meant to manage, restore and protect ecosystems for the benefit of both humans and nature. With that said, some mean that planning based on NBS is largely human centred, and that implementing NBS in urban planning is lacking an approach that supports representation and inclusivity of non-human species (Bush and Doyon 2019; Pineda Pinto 2020 see Pineda-Pinto et al. 2021), and that there is a lack of research when it comes to planning for NBS in a non- anthropogenic way (Pineda-Pinto et al. 2021). Pineda- Pinto et al. (2021) further argues that a reframing of Nature based solutions, and thereby improving how multifunctional landscapes are designed can be made by including the non-instrumental value and agency of nonhuman nature by a relational value focus as well as approaches on multiple scales. This is one of the reasons

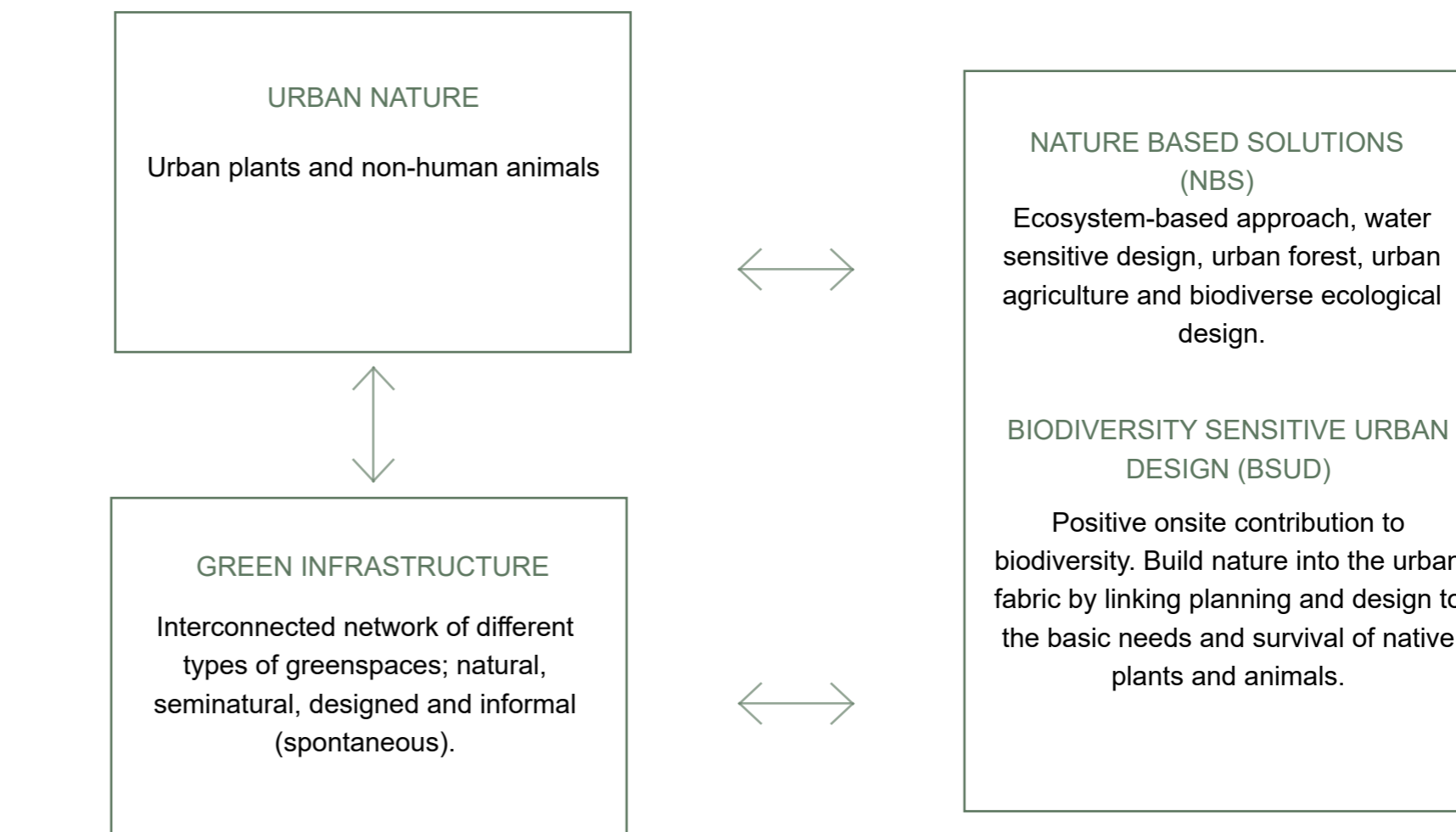


Figure 24 showing the connections between urban nature, nature based solutions and green infrastructure, as inspired by Ignatieva et al. (2023), but with BSUD (Garrard et al. 2017) added in the hope of bringing another, even less human centred layer to this context.

that this thesis uses the Biodiversity Sensitive Urban Design (BSUD) framework (Garrard et al. 2017) as a foundation, and NBS to reach goals for biodiversity, to see if the shift of focus from non-humans to humans can bring design that in the end can actually benefit both. The use of BSUD is therefore brought in as a fourth concept to the trinity that Ignatieva et al. (2023) suggests, as a part of nature based solutions, which is shown in figure 24, in the hope of bringing an even higher focus on non-humans when designing.

According to Ignatieva et al. (2023), NBS in Australia has a high focus, at least from an ecologist perspective, on conservation and restoration, while in Europe it also includes spontaneous and designed nature. In this thesis, there is a high focus on restoring and conserving the biodiversity in Kirrip park, but as it is a quite newly developed park, created on old industry land, there will be newly added design that will hopefully bring higher biodiversity to the area, and new habitats for many species.

Using nature based solutions, or other ways of designing with nature, is a way to try to re-apply ecological processes into planning and design, and green spaces are often inspired by the surrounding nature, as the ecology of a place are more and more recognised as important in landscape architecture (Ignatieva et al. 2023). The site is, as mentioned earlier, part of a former wetland, and the current design has a high focus on flood management. Because of this, designing for wetlands and other ways of storing water, such as ponds, swales and rain gardens (see figure 25) can be a way to connect to the former typologies of the area, while also bringing habitats and food sources for the target species.

In Australia, the biota has rapidly changed since European colonisation, with degradation and disturbance to at least 60 000 years of First Nations culture. New biota was introduced through agriculture and urbanisation, whereas a lot of these species have been declared invasive, and many Australian species have not been able to compete with them (Ignatieva et al. 2023). All over Australia, the importance of restoring native nature has risen, and in Melbourne, initiatives such as the restoration of grasslands, implementing green roofs and facades, Urban forest strategy, Woody meadow pilot project (City of Melbourne 2011, 2018, 2020) and more, are being implemented as means of bringing nature into the city, and in many of the cases also native flora and fauna.

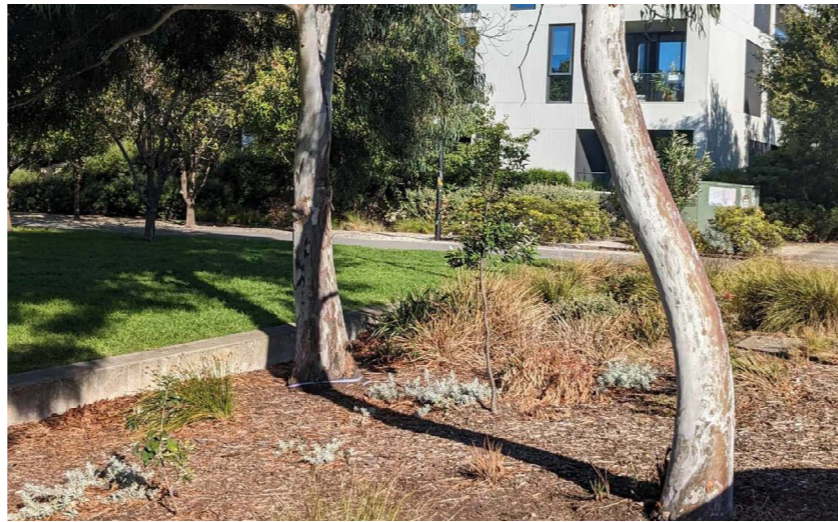
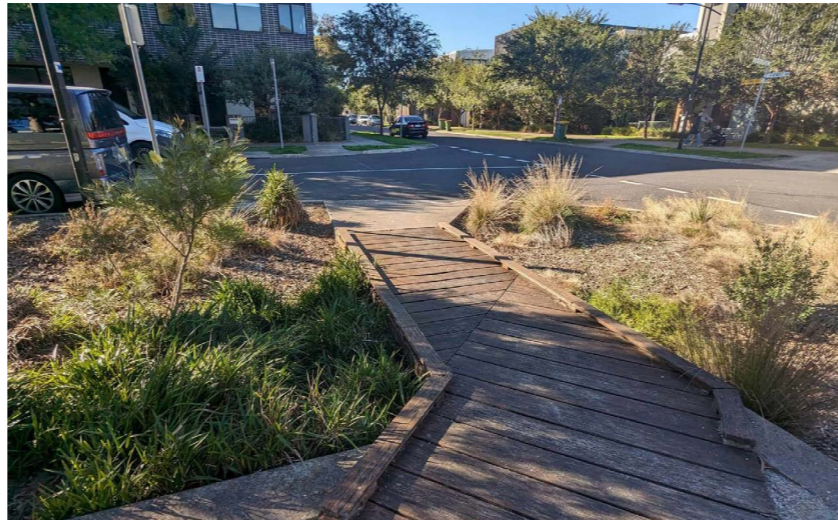


Figure 25 showing a collage of photos of raingardens in West Footscray, Maribyrnong, Hawthorn and Yarraville, Melbourne.

### Woody Meadows

The Woody Meadow Pilot project (City of Melbourne 2020) was started as a way to bring in more high quality landscapes in Melbourne, to create biodiversity habitats, community engagement, increased plant cover and resilient plantatings. Flowering meadows are usually highly appreciated by humans and several other species, such as some pollinators, and the concept of flowering meadows where therefore adapted to an Australian context. These where based on natural shrub lands, hence the name “Woody meadows”, as these ecosystems use woody perennials. In the project, 21 species were carefully chosen based on their ability to regenerate after coppicing, thrive without additional irrigation post-establishment, and flourish with minimal upkeep. The plantings were designed inspired by the ecosystems of natural shrubs and were therefore divided into three layers, the base layer, which is ground covering and minimises weeds, and is less than 1 metre high, the bump layer, which is 1-2 metre high and brings a visual quality, and the emergent layer, that is more than 2 metres tall and less species used, as they are larger in size. This project has shown success in bringing a novel planting style with low maintenance needs, and demonstrates how Australian shrubs can be used when creating diverse and resilient green areas (City of Melbourne 2020), and is shown in figure 26.

### Flowering meadows

In 2022, the “Flowering native meadow” (Tract n.d.) was tried out, where Tract consults engaged with the School of Biological sciences to create a flowering meadow from Victorian native species. The project connected to the loss of remnant grasslands around and in Melbourne and showed



Figure 26 showing a photo collage of the Woody meadow pilot project site in Birrarung Marr, Melbourne. This is quite a small site, but you can see the three different layers as well a sign explaining the project.

a huge success (ibid.). This can inform other landscape designs with the aim of creating biodiverse landscapes, that reminds of what used to exist to a greater extent in Victoria, while also bringing ornamental and sustainable design.

This project use native species, and protecting the nature in Australia is of high importance to local and First Nations cultures, and are often highlighted as part of goals regarding sustainability in urban settings. The benefits of nature, both to humans and non-humans

have long been known to First Nations people, and have now gotten an uprise in research regarding management of the existing nature in urban areas (Mata et. al 2020).

Restoration of biodiversity in an area such as Kirrip park, which has had many different layers, from wetlands to industries, can be hard to do, because of the lack of remnant vegetation. Due to this, nature based solutions can be used as positive measures to address anthropocenic threats to biodiversity and to enhance the biodiversity to the area.

## Human dimensions

Even though the starting point of this thesis is biodiversity, and designing based on target species that can bring biodiversity to the site, the human factor should not be fully overlooked. Humans are an important part of designing a park, and enhancing the quality of life is at the core when it comes to the design profession. Different environments influence humans in many ways, such as in behaviour, social interactions and emotions (Eubanks Owens et al. 2023).

How people might use a place, and how the biodiversity-focused design could provide opportunities for co-existence and mutual benefit between humans and animals are important to look into. Designing without humans in mind could risk having the park looking neglected and therefore not appreciated by humans.

The functions and importance of biodiversity might be hard for people to understand and relate to, and some of the values important for non-humans might not be aesthetically pleasing for humans. Landscapes high on ecological quality, including biodiversity and heterogeneity, have a tendency to look messy, and can be mistaken for a lack of care (Nassauer 1995). This can create problems when designing urban landscapes directed to non-human users.



Figure 27 showing a sketch of a "Cue to care", where a mowed path relates to the cultural needs of signs that someone cares.

For humans to appreciate nature, there is a certain cultural need to display care in landscapes (Nassauer 1995). To combine a "messy" biodiverse landscape with aesthetics for humans, Nassauer (1995) proposes "cues to care", which are means that gives a cultural context for ecological

function. These include things that create a sense of human presence, such as a mowed path in tall grass, as shown in figure 27, or educational signage explaining the values of the places as shown in figure 31 on page 34.



*Perceived Sensory Dimensions*

One way to look at aesthetic features of a place is by the help of Perceived Sensory Dimensions (PSD) (Stoltz & Grahn 2021). According to the authors Stoltz & Grahn (2021), the aesthetic of green areas has long been noticed as important for the wellbeing and health of human beings, and therefore, they have gathered evidence through quantitative and qualitative research between the years 1984-2018 of the most important perceived qualities supporting people's needs. Based on this, they created a model with eight qualities, divided into four axes of opposites (Stoltz & Grahn 2021), which are shown in figure xx.

Regarding these qualities, the three qualities of Natural, Shelter and Diverse, seems to fit in well with the goals of the thesis, to create biodiversity focused design when redesigning Kirrip park. With that said, some of the less adjacent qualities might have to be present in the design as well, such as the Social and the Open quality, as the park is in near connection to a school, it means that even though shelter for example might be needed to feel protected and to enforce the vegetation in the park, there can also be a need for open and social areas of the park, for kids to play, and neighbours to meet. The main qualities focused on in the project of this thesis is shown in figure xx.

When it comes to the Diverse quality, it is perceived as a varied environment, often with an abundance of colours, shapes, textures and smells. This also means that a great variation in structural elements is often present, such as water, vegetation, stones etc. This quality is also often linked with species richness and biodiversity (ibid.) and often

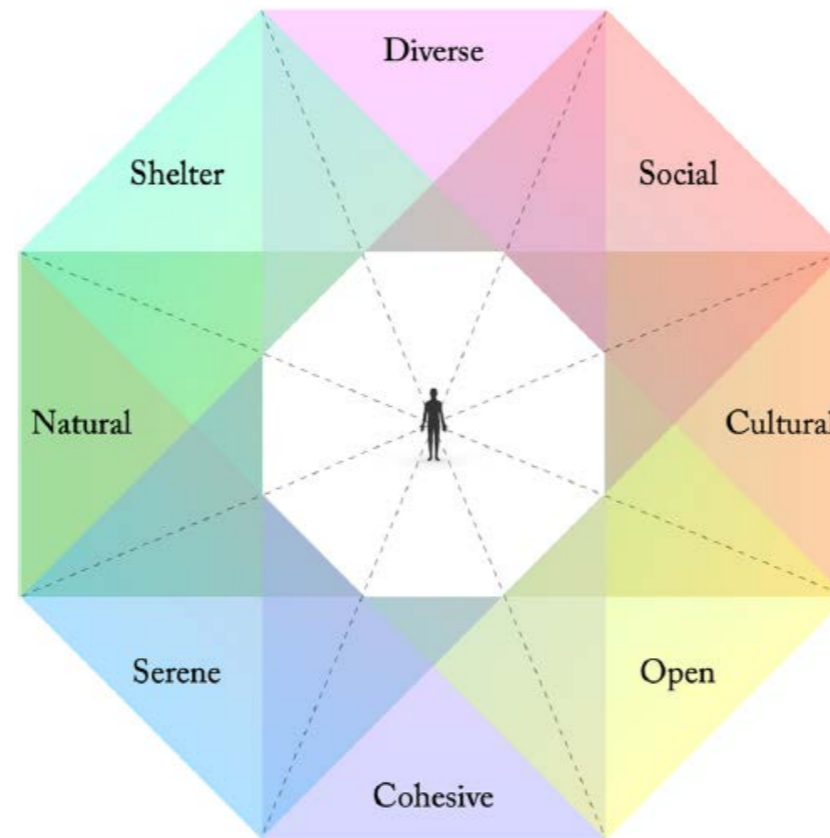


Figure 28 showing the relations of the Perceived Sensory Dimensions (PSDs), with four axes of opposing PSD qualities. The closer to each other each quality is, the closer are the associations between them (Stoltz & Grahn 2021).

appreciated by preschools, schools and nursing homes (Bengtsson & Grahn 2014). Due to all these factors, this quality can be very much needed in a project like the redesign of Kirrip park, which is focused on biodiversity. Since there is a school in near connection to the park (DELWP 2018), this creates a possibility to educate about biodiversity and the importance of flora and fauna. The Diverse quality could also connect to a lot of different users and preferences, such as people from different cultural backgrounds, as outdoor design should consider cultural uses and backgrounds

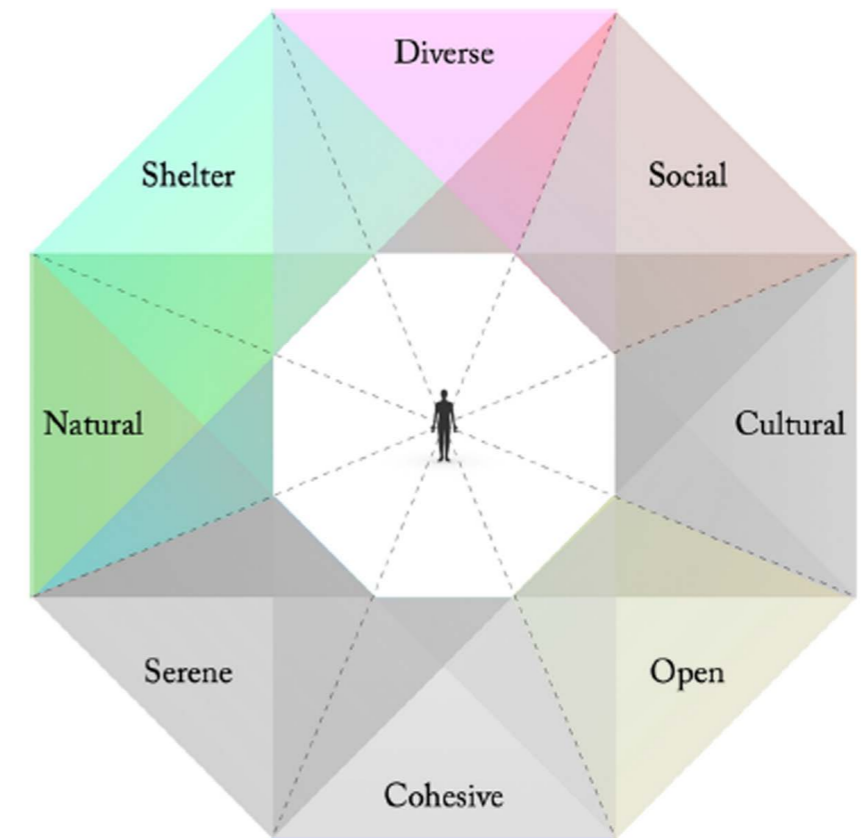


Figure 29 showing the Perceived Sensory Dimensions (Stoltz & Grahn 2021) with greying out of the qualities that will probably be least sought after in Kirrip Park, the more colourful the more sought after.

(Eubanks Owens et al. 2023). However, no single design can address every need and aspiration of people of different backgrounds (ibid.), and as the main focus of this thesis is biodiversity, going into different types of cultures is too big of a project, but inclusive and welcoming environments are always important to strive for, and therefore, a Diverse quality of the park can hopefully help bring something of liking for everyone. The high focus on biodiversity can hopefully relate to the diverse cultures of First nations peoples, as connection to Country often includes native biodiversity.

The Natural quality is described as the “self-made” nature, rather than “man-made”, hence, nature that feels untouched by humans, natural rather than cultivated. This type of nature seems wild, and developed spontaneously, with animals and plants that can be associated with the wild, with old trees, dead wood, mosses and large boulders for example (ibid.). In areas where this quality is strongly perceived, there is an expression from informants of feeling a freedom from the pressures of everyday life and society (Grahn et al. 2010). This is a quality that interconnects well with the biodiversity motives of the redesign of Kirrip park, as the primary focus is non-humans, with a secondary focus on humans. What is difficult though, is if it’s possible to create a natural aesthetic in an environment that is a huge renewal project with a high density of buildings. It might be difficult to create a natural feeling, but it can still be something to strive for as it can be very much needed in a dense, urban area with some distance from nature.

As the area is going to be highly urbanised with a high density of buildings, it can be important for humans to feel protected and sheltered, which fits well with the Sheltered quality, which can create a feeling of “see without being seen” (Stoltz & Grahn 2021, p.5). This quality has similarities to the Natural PSD, as they can both be strengthened by dense vegetations or trees, as well as similarities to the Diverse PSD, as a variation in structures can often facilitate shelter (Stoltz & Grahn 2021). This also relates to the biodiversity focus of this thesis, as a variation in vegetation can be brought to the site to create shelter.



Figure 30 showing an entrance with First nation art. This can bring meaning, inclusion, aesthetic and more for humans. Photo taken in Birrarung Marr, Melbourne.



Figure 31 showing a pond with a sign in front of it, creating a “Cue to care”, as well as bringing education and information. Photo taken in Cruickshank Park, Kingsville, Melbourne.



Figure 32 showing dead wood that can be a part of the Natural quality brought to a place. It can be used for insects to live in but also humans to sit on. Photo taken in Cruickshank Park, Kingsville, Melbourne.

### Site analysis Kirrip park

The analysis is primarily based site visits to Kirrip Park, as well as through an iterative process influenced by insights presented earlier in this chapter, in the part “literature study”. Impressions and documentation have been continuously processed, leading to a progressively deeper understanding of and relationship with the place and the investigation itself.

The site visits were supported by the background information and the literature study, looking into ecological and social approaches to design. The reflections, associations, memories, and ideas that emerged and are reported are a result of my previous experiences and encounters shaped by the physical experience of place, as well as insights from literature, documents, and map studies related to the thesis.

### Fishermans Bend framework

When analysing the park, I also had to look at the landscape surrounding the park, and therefore did not only look at information about the area, but also at goals created for the whole area under development, Fishermans Bend, where Kirrip park is situated. The sustainability goals in the Fishermans Bend framework are therefore summarised and taken into consideration for the redesigning of the park.

The Fishermans Bend framework is a strategic plan for the development of Fishermans Bend to 2050. It works to guide developers and investors in the private sector, local governments as well as the Victorian Government. It is based on the earlier published Fishermans Bend Vision and has been developed in collaboration with the community,

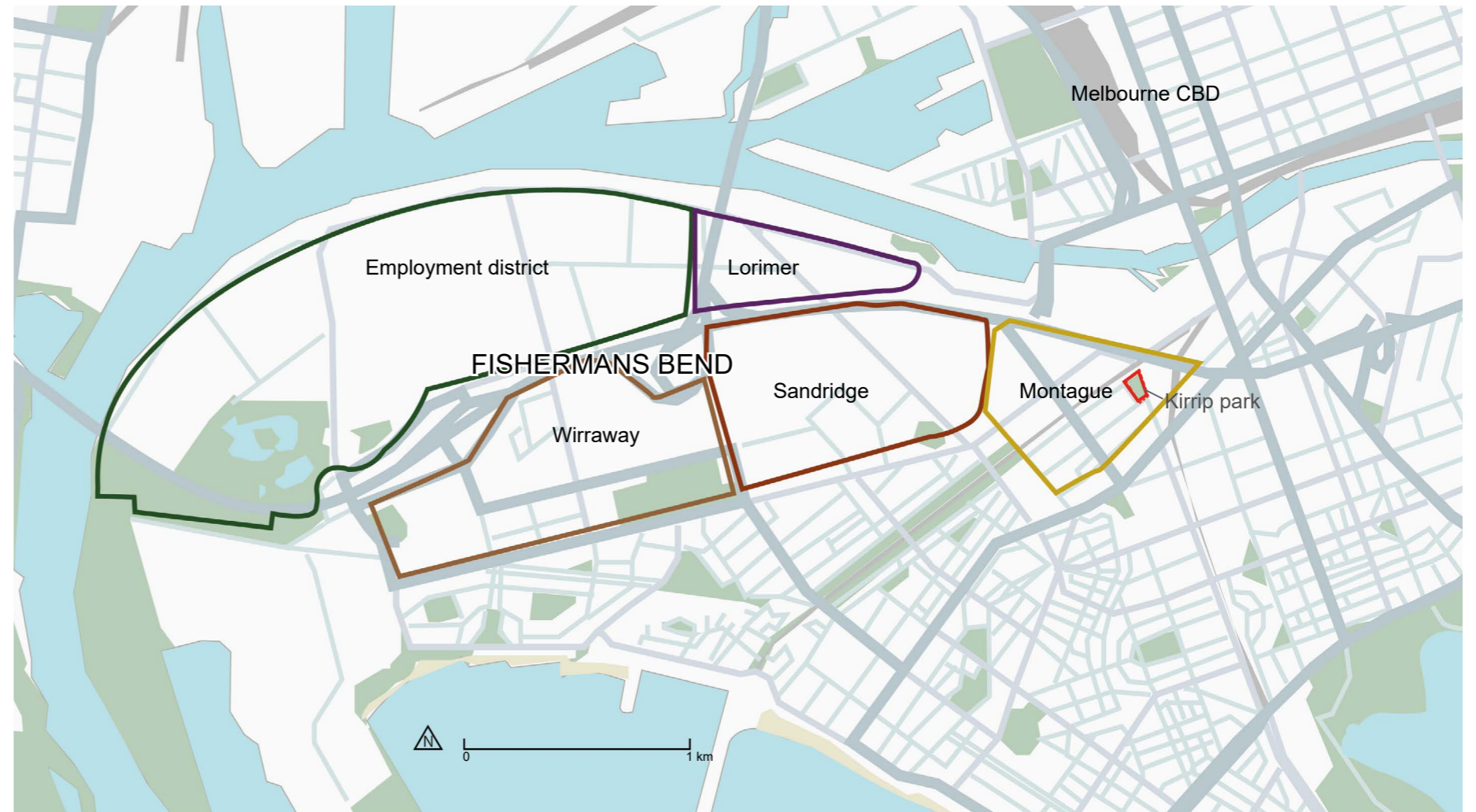


Figure 33 showing Fishermans Bend’s location in relation to Melbourne as well as the five districts. Kirrip park is located in the district of Montague and is outlined in red.

industry, local councils and key stakeholders. It aims to steer the transformation of Fishermans Bend into a vibrant, cohesive, thriving, inclusive, healthy, and environmentally sustainable community, which includes the five precincts of Fishermans Bend; Lorimer, Montague, Sandridge, Wirraway and the employment district (DELWP 2018).

The framework is based around eight sustainability goals, to push the environmental, social and economic planning (ibid.)

These goals are:

- “1. A connected and livable community
  - 2. A prosperous community
  - 3. An inclusive and healthy community
  - 4. A climate resilient community
  - 5. A water sensitive community
  - 6. A biodiverse community
  - 7. A low carbon community
  - 8. A low waste community”
- (DELWP 2018, p. 25).

*Goal 3. An inclusive and healthy community*

- Public spaces of high quality
- Permanent and temporary installations, together with innovative design can enhance, protect and activate unused spaces

*Goal 4. A climate resilient community*

- Nature based solutions
- Tree and plant selection that consider future climates
- A diversity of indigenous, native, and exotic species to create a resilient urban forest

*Goal 5. A water sensitive community*

- Water to be visible part of the area by the help of water sensitive urban design

*Goal 6. A biodiverse community:*

- Identifying, protecting, enhancing and utilising the existing biodiversity and habitats
- Create habitat opportunities for native flora and fauna
- Green roofs and walls on buildings
- Enhancing ecological connectivity
- Multi-layered vegetation
- Indigenous trees when possible  
(if exotic species are needed, they should bring sources for biodiversity)
- Water features, artificial habitats, logs for habitats, mulch and more
- Positive human interactions with nature

*Figure 34 showing the Fishermans Bend sustainability goals (DELWP 2018) to bring to the redesign of Kirrip park.*

All goals can be touched upon when redesigning a park such as Kirrip park, but goals 3, 4, 5 and 6 are the ones most connected to the aims of this thesis. These goals are summarised and shown in figure 34 as the parts of the goals that can be brought into the redesign of Kirrip park.

*Goal 3. An inclusive and healthy community* can relate to the redesign of the park, as it aims to bring many services to all city dwellers, including public spaces of high quality, that can lead to the healthy lives of the human inhabitants of the area. It is also mentioned that permanent and temporary installations, together with innovative design can enhance, protect and activate unused spaces.

A use of native plants as well as inspiration from the surroundings and history of the site can connect to this goal, as well as the importance of connection with Country for First Nations peoples. As installations are a part of this sustainability goal, these can also connect to Aboriginal and Torres strait islander culture, by promoting First Nations art and artists.

The redesign can also touch upon goal 4. *A climate resilient community*, but as this is quite intricate and needs cross-disciplinary collaborations, I won't go in too deep into this subject. With that said, this goal mentions creating areas resilient to extreme weather events such as flooding, heat waves, drought and more, and bringing biodiversity and nature based solutions into this area can be one step towards more resilient open spaces. This goal also mentions the importance of plant and tree selection that considers future climates, with a combination of native and exotic species. When possible, native species are to be preferred (DELWP 2018).

*Achieving Goal 5. A water-sensitive community* presents a challenge for me due to the time constraints and the central theme of this thesis. Emphasised in this goal though, is the importance of incorporating water as a visible element within the area through the application of water-sensitive urban design (ibid.) and this part of the goal can therefore be helped to reach through a biodiversity focused design, as water is important for many species.

*Goal 6. A biodiverse community* can be related directly to my work with redesigning Kirrip park. According to this goal, the development of Fishermans Bend will support biodiversity with the help of public spaces and buildings that create habitat opportunities for native flora and fauna.

Well designed parks and streets will help reach this goal, as well as by using green roofs and walls on buildings. The surroundings will also be linked through the help of green

links, connecting biodiverse areas such as Port Phillip Bay and Westgate Park to Fishermans Bend (DELWP 2018). This goal also mentions the importance of identifying, protecting, enhancing and utilising the existing biodiversity and habitats when designing for open spaces in Fishermans Bend, as well as enhancing ecological connectivity (ibid.).

This is basically the core of this thesis and what I aim for with the redevelopment of Kirrip park. It is also mentioned that open spaces should be designed with multi-layered vegetation, with a great variation of species and scales, from ground governing plants to bushes and trees, and for the trees to be native when possible, but if needed, exotic species that bring sources such as pollen, nectar, flowers and rough bark, as well as water features, artificial habitats, logs for habitats, mulch and more can be used. The public spaces should also be designed for positive human interactions with nature (ibid.).

These goals play a crucial part in the redesign of Kirrip park, as they are created through interdisciplinary collaborations and are set for the whole area of Fishermans Bend, which Kirrip park is a part of. Therefore, Kirrip Park contributes to the overall sustainability efforts of the Fishermans Bend area, and the outlined goals serve as a pathway towards achieving a more sustainable environment.

## Site visits Kirrip park

Methods of reading the landscape are founded on the principles of intentional observation, sketching, and questioning the ordinary. To reveal the narratives woven into a location or terrain, it is essential to dedicate time to on-site observation and exploration (Eubanks Owens et al. 2023). The three fundamental components of landscape reading methods include:

*“(1) Slow, deliberate, well-planned transportation routes with frequent lengthy stops for observation;*

*(2) field journaling, including observational notes, sketches, and photos; and*

*(3) follow-up research on historical and current day information (Owens, La Rochelle, & McHenry, 2015).”*

(Eubanks Owens et al. 2023 p.155).

The first two parts of this way of reading the landscape is done in this thesis through repeated site visits to Kirrip park. Something important to take with you when you do site visits is that the values you bring with you affect how you experience the place and many opinions about a place are completely personal. That's why I thought it was important to include a positionality statement earlier and I want to bring this up again. I am a new person to this place, and my previous experiences from Sweden influence how I see the place. The site visits are shaped by my personal values and past experiences, as well as the knowledge acquired during my time in Australia. The aspect of follow-up research, which has been a consistent

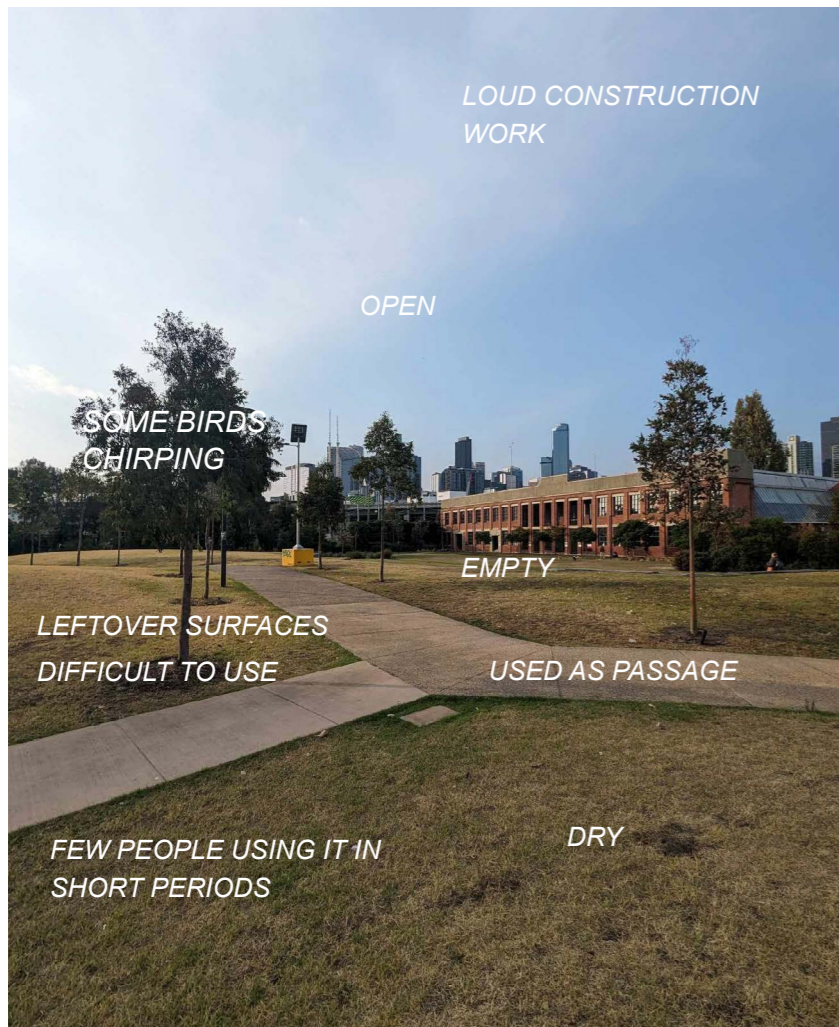


Figure 35 showing a photo of Kirrip park, the words represent my first impressions of the park.



Figure 36 showing the aerial map (© 2024 Nearmaps) of Kirrip park, with notes from the first site visit.

focus throughout the thesis, is therefore very important in gaining a better understanding of the landscape beyond my subjective observations, but are of course influenced by these, as a total decolonisation of the mind takes time.

My first impression when visiting Kirrip park was that the area had a lot of noise disturbance, mostly from the nearby construction. This was prominent throughout the whole site visit, which created stress and reduced the sense of

calm at the site. There was also a presence of city noises and bird chirping, but the ongoing construction activities overshadowed these sounds. It can be anticipated that once the construction is completed, the ambiance of the space will be less dominated by these disruptive noises.

The site was also very open, with lots of seating, but had a shortage of places to feel protected. Many areas felt underutilised and lacked purposeful design, making

them difficult to effectively use. The park was quite open, but framed by vegetation, and had a bigger path going through it to create sort of a passage through the park, with not many opportunities to sit down next to this path.

There were some visitors in the park during my visits, a few who sat down on the existing benches, and a few walking their dogs. Most visitors seemed to use the park as a shortcut to go to the other side of it.

The park was, after a couple of visits, divided into 6 different character areas, which are shown in figure 37.

The character areas are:

1. The square

Stone paved surfaces with sunken rain gardens and a few trees. These areas can be used as square areas, for different events, or just to socialise.

2. The passage

A wide path going through the park, with very few opportunities to sit down. Functions mostly as a passage or shortcut through the park. Bordered by trees.

3. The underutilised areas

Throughout the park there are areas of cut lawn that appear to lack a clear purpose. These areas are not conducive to activities and are positioned in a way that does not encourage users to linger or engage with them.

4. The hills

These parts of the park are constructed hills that can be used if the lower parts of the park are unavailable, in the case of floods for example. The rounded shape does not allow many activities and there is a feeling of exposure when moving through these parts of the park, which makes it uninviting to sit down and relax. These are covered in low cut lawn so they are lacking a bit in biodiversity as well.



Figure 37 showing different characters of Kirrip park on top of an aerial map © 2024 Nearmaps.

5. The green zones

Big plantings that serve as buffer zones, rain gardens and swales. They bring greater biodiversity to the site, as well as shelter for small animals.

6. The open lawn

This area is user friendly, with a flat surface for activities, and has a lot of seats. It has damage to the grass, probably due to low maintenance and high pressure from users.



Figure 38 showing area 1. The square, with photo points 1A- 1B. Aerial map © 2024 Nearmaps.

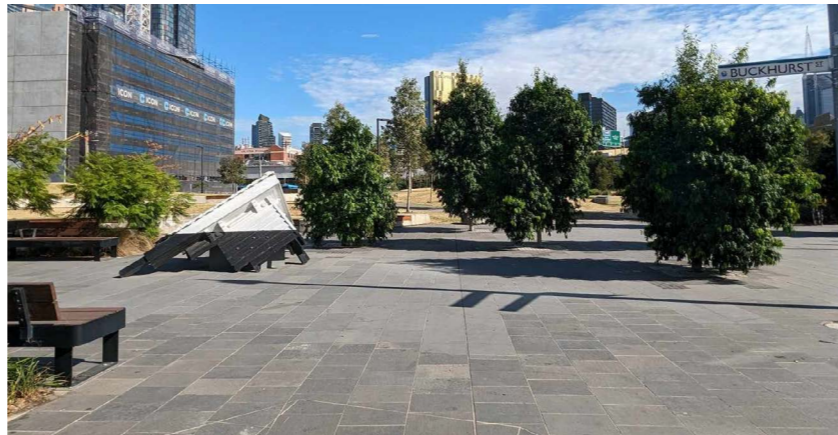


Figure 39 showing photo point 1A, with an open, paved area with planted trees, benches and an art piece, which seems to be a corner of an old house, however without any information about it.

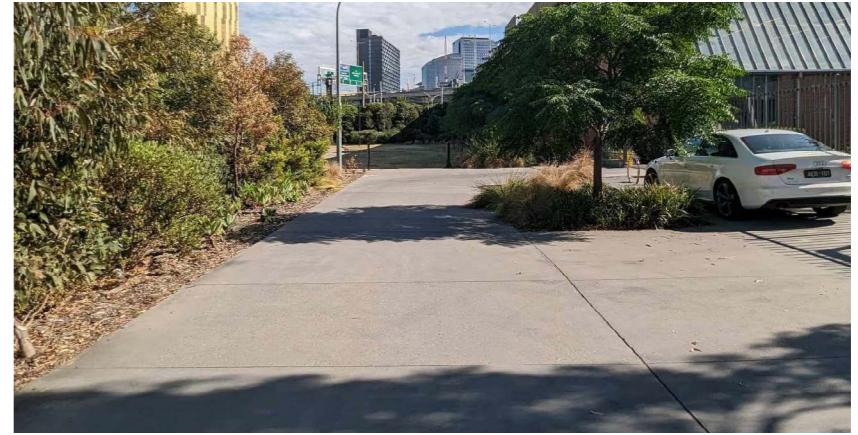


Figure 40 showing photo point 1B, a flat, paved surface that can be used as a service area to the nearby buildings, or maybe for square activities.



Figure 41 showing area 2. The passage, with photo points 2A- 2B. Aerial map © 2024 Nearmaps.

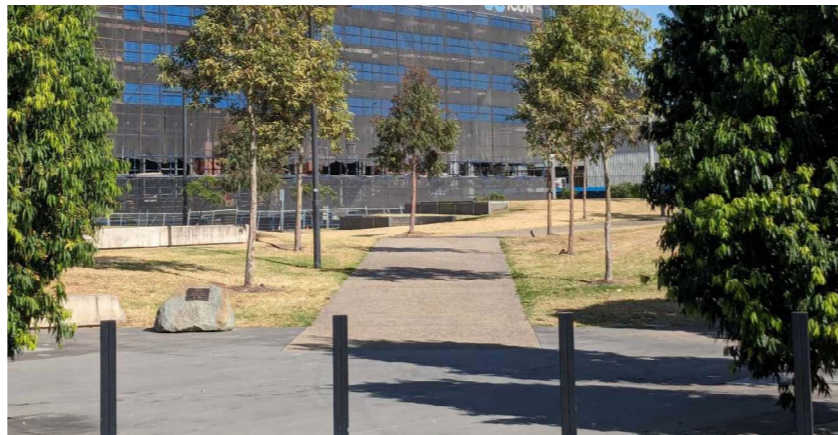


Figure 42 showing photo point 2A, with the southern entrance of the park, which allows for a shortcut through the park.

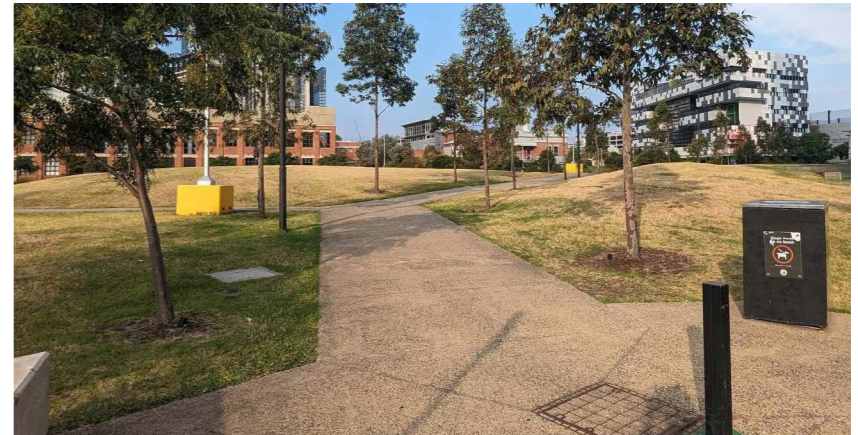


Figure 43 showing photo point 2B, the middle of the passage, which leads the user through the park, without any opportunities to sit down or any interesting parts to discover near the path.



Figure 44 showing area 3. The underutilised areas, with photo points 3A- 3B. Aerial map © 2024 Nearmaps.



Figure 45 showing photo point 3A, where an area has been marked in white, as it seems underutilised without any clear design or purpose.

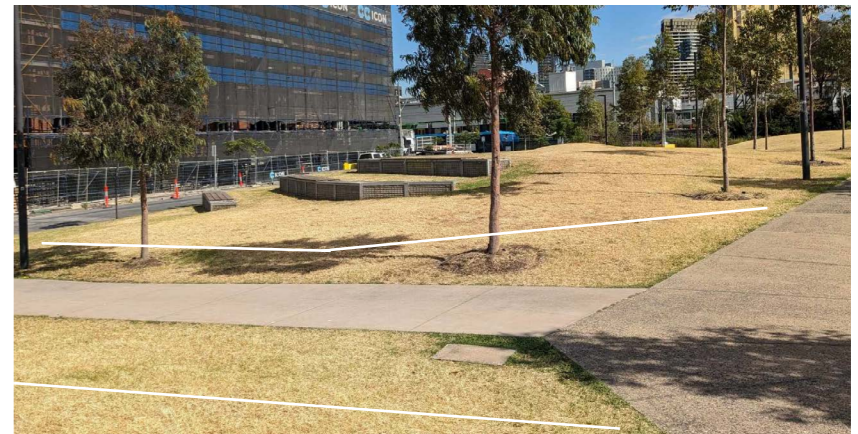


Figure 46 showing photo point 3B, where two paths are meeting but the area marked with white seems to lack purpose. This creates an opportunity to make something interesting happen, where two paths meet.





Figure 47 showing area 4. The hills, with photo points 4A- 4B. Aerial map © 2024 Nearmaps.



Figure 48 showing photo point 4A, where a hill is shown, and at the bottom of the hill are plantings and seatings.

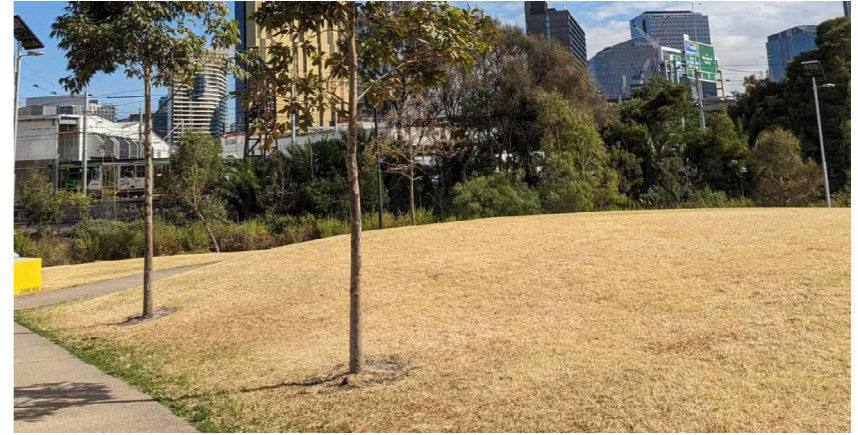


Figure 49 showing photo point 4B, where a quite big area of hill is shown. This creates an area available to use if the lower parts of the park gets flooded, but the question is what it could be used for.



Figure 50 showing area 5. The green zones, with photo points 5A- 5B. Aerial map © 2024 Nearmaps.

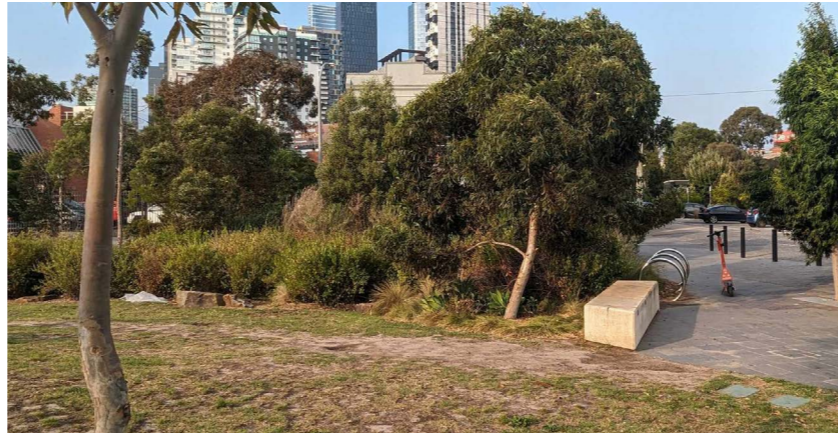


Figure 51 showing photo point 5A, a swale with a high density of vegetation in different layers, from low to high.



Figure 52 showing photo point 5B, a green buffer zone, protecting the area a bit from noise pollution as well as creating a thick green wall. A variation in vegetation, from lower bushes to taller trees in the back.



Figure 53 showing area 6, the open lawn, with photo points 6A- 6B. Aerial map © 2024 Nearmaps.

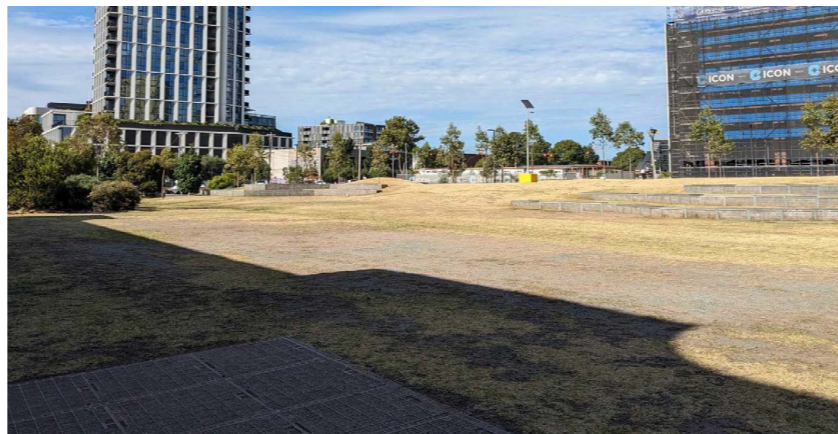


Figure 54 showing photo point 6A, a big, flat open area for recreation, framed by a lot of seatings, similar to stands in an arena. The high level of wear on the grass indicates that the surface is being used.

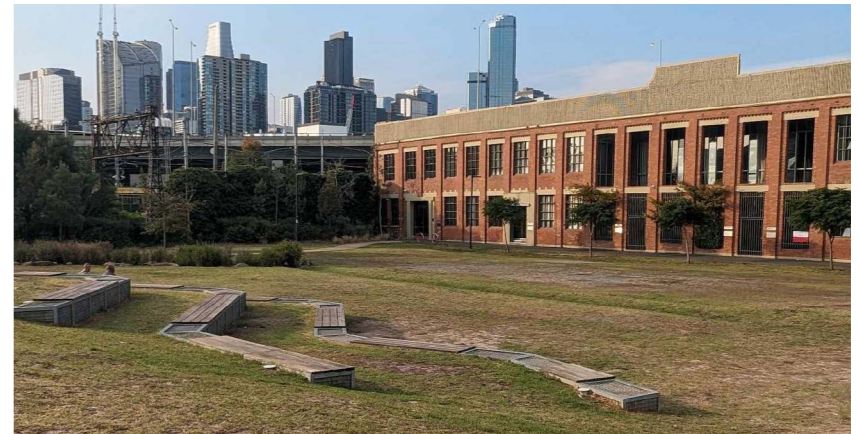


Figure 55 showing photo point 6B, a low point of the park, acting as an open recreation area as well as flood storage in extreme weather events.

## Biodiversity in Kirrip park

### Target species

When looking at the biodiversity of Kirrip park, I also looked into the first four steps of the BSUD framework, starting off with choosing the target species for this park. The three chosen species were chosen through a meeting with Holly Kirk<sup>3</sup> who is one of the authors of the BSUD framework (Garrard et al. 2017) and have been implementing the framework on the whole area of Fishermans Bend before (Kirk et al. 2021). The three species chosen were the blue banded bee (*Amegilla ssp.*), the growling grass frog (*Litoria raniformis*) and the superb fairy wren (*Malurus cyaneus*). These target species were three out of 12 produced through a stakeholder workshop (Kirk et al. 2021) and we chose these three target species as they exist in the area today and as they can act as umbrella species, meaning that conserving based on their needs and habitats can be expected to protect and benefit a large number of other species that occur together in nature (Roberge & Angelstam 2004).

Today, Fishermans Bend consists of industrial, residential and commercial areas and except for the Westgate park, the existing habitats are fragmented and with low quality, mostly consisting of lawns (Kirk et al. 2021), just like in Kirrip park. The need to create areas for the chosen target species, with a focus on biodiversity is therefore of high importance. The information about these target species are shown in figures 56-58 , and then afterwards summarised into measurements to bring to the design proposal.

<sup>3</sup> Holly Kirk, Ecologist, Post Doctoral Fellow, RMIT University, Video conversation on 05-02-2024.

**Species profile:** *blue banded bee (Amegilla ssp.)*



**Appearance:**

The blue banded bees contain fourteen species in Australia, which range from 9-14 mm in size. The name Blue banded bee comes from their blue bands on a black abdomen, but some species have white, red or green looking stripes (Dollin 2020).

**Distribution:**

Known throughout Australia, except in Tasmania (ibid.).

**Ecology and habitat:**

Lives in urban areas as well as in woodlands, forests and heath. It builds a solitary nest in sandstone to create tunnels where the eggs can be laid (The Australian Museum 2024), but also in mud or mortar (Kirk et al. 2021 Appendix A, p.2, Dollin 2020). As it is a pollinator it thrives where there is diverse mid-storey flowering vegetation and sheltered sunny areas (Kirk et al. 2021 Appendix A, p.2). The Blue banded bees are buzz pollinators, meaning they can reach pollen where most other bees can't, through the help of vibrations, releasing the pollen from the inside of capsules. This makes these bees extra valuable, as some crops and wildflowers need to be visited by buzz pollinators for their fruits and seeds to properly develop (Dollin 2020).

**Breeding:**

The eggs are laid in cells at the end of built tunnels sealed away and hatched between spring and autumn. Eggs that still hasn't hatched can stay as a pre-pupa until the next spring (ibid.).

**Conservation status:**

Least Concern (ReWild Perth n.d)

**Threats:** Habitat fragmentation, competition from introduced species, predator birds and insects (Bank Australia 2018).

**Measures:**

Mid-storey (50-100cm high) flowering plants in open garden beds. Patches of masonry or blocks of sandstone for habitats (Kirk et al. 2021 Appendix A, p.2).



Figure 56 showing a species profile with information and sketches of the Blue banded bee.

**Species profile:** growling grass frog (*Litoria raniformis*)



**Other names:**

southern bell frog, warty bell frog

**Appearance:**

Large frog (females can be more than 100 mm in length), from olive- green to bright green colour, warts on back, distinct tympanum (ear) and dorso-lateral folds (ridges in the back) (Swift 2015).

**Distribution:**

Parts of south eastern Australia (Victoria, Tasmania, New South Wales (Riverina area) and south-eastern South Australia) (ibid.).

**Ecology and habitat:**

Need of slow moving or still water, vegetation around and in the water. They can live in artificial water bodies but the most favourable features include water bodies that hold water for at least six months/ year. Minimal tree canopy cover, abundant aquatic vegetation and clusters of waterbodies within 700 meters are also preferred. They usually move on rainy nights (ibid.).

**Breeding:**

Eggs are laid in the spring, so the frogs need enough water over the summer for their tadpoles to develop (ibid.).

**Conservation status:**

Since around 1990 it is considered uncommon and listed since 2001 as threatened under the Victorian Flora and Fauna Guarantee Act 1988. Its conservation status went from endangered to vulnerable in 2020 (ibid.).

**Threats:**

Movement barriers, filled or drained water bodies, increased salinity, lowering of groundwater, loss of terrestrial habitats used for movement, shelter and over wintering and reduced quality in habitats (Swift 2015). Some fish species, aquatic invertebrates, birds, and turtles are known predators (DELWP 2017b).

**Measures:**

Need of slow moving or still water, vegetation around and in the water. Minimal tree canopy cover. Combinations of vegetation types such as tall emergent vegetation for predator protection of the adult frogs, emergent and submerged (and feathery and non-feathery) vegetation for egg laying sites and protection for tadpoles as well as floating attached vegetation also protects the tadpoles. On the banks, shrub and grass cover is important as predator protection and for insects which are a food source (Swift 2015). Fallen logs and ground debris can also provide shelter and hibernation sites (Commonwealth of Australia 2009). Create corridors or underpasses to enable movement of the frog (Swift 2015).

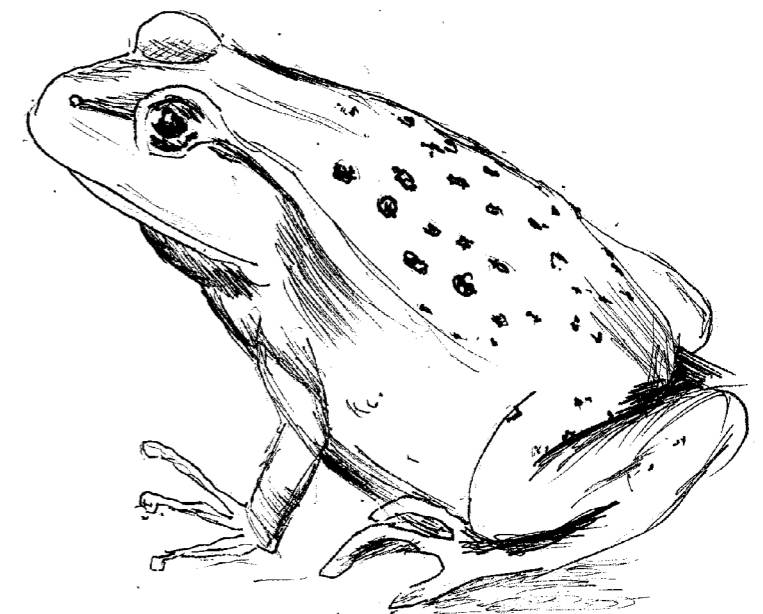


Figure 57 showing a species profile with information and sketches of the Growling grass frog.

**Species profile: superb fairy wren (*Malurus cyaneus*)**



**Appearance:**

A small, round bird with a long upwards pointing tail. The male is bright blue during the breeding season (spring-summer) and the juveniles, females and males that are not breeding are mid-brown in colour (Field of Mars Environmental Education Centre n.d.).

**Distribution:**

Most of south eastern Australia (Tasmania, South Australia, Victoria, New South Wales and Queensland) (ibid.)

**Ecology and habitat:**

Insectivorous birds that also eat small amounts of seeds or fruits. They usually feed on areas of grass but keep near to undergrowing vegetation and thick bushes that they use as shelter from predators (ibid.)

**Breeding:**

Usually lay two to four eggs in a nest made out of spiderwebs and grass (ibid.)

**Conservation status:**

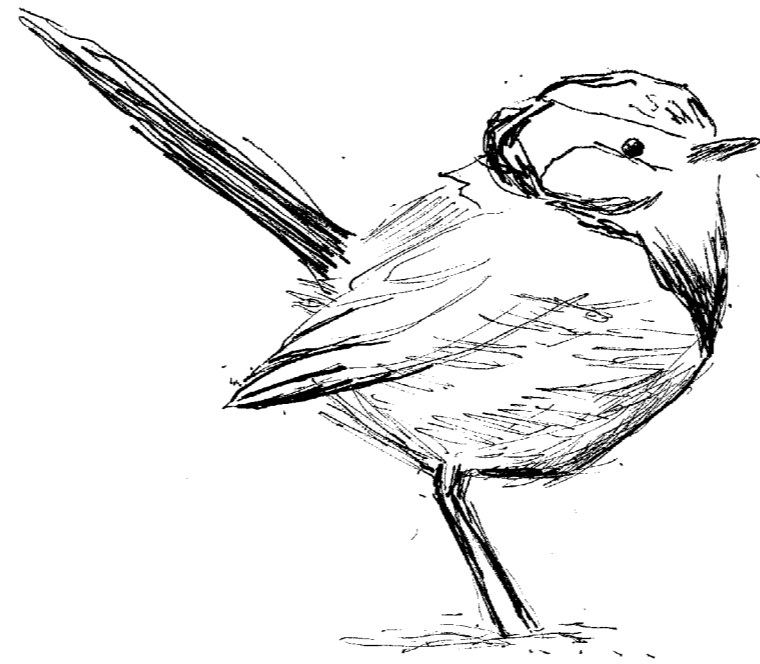
Listed under the Nature Conservation Act 1992 (NCA) with the status Least concern (The State of Queensland, 2024)

**Threats:**

Bigger, carnivorous birds and introduced species such as foxes, rats and cats (Field of Mars Environmental Education Centre n.d.)

**Measures:**

Thick bushes for hiding. Ground coverage and mid-storey bushes (up to 200cm high), connections with parks as well as along quiet roads, habitats can be placed to encourage human encounters (Kirk et al. 2021 Appendix A, p.2).



**Measures to bring to the design:**



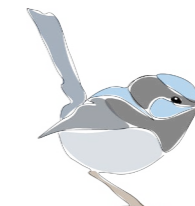
*Blue banded bee*

- Mid-storey (50-100cm high) flowering plants in open garden beds
- Patches of masonry or blocks of sandstone for habitats



*Growling grass frog*

- Need of slow moving or still water
- Fallen logs and ground debris for shelter/hibernation sites
- Corridors or underpasses
- Shrub and grass cover
- Submerged (and feathery and non-feathery) vegetation
- Floating, attached vegetation for protection of tadpoles



*Superb- fairy wren*

- Thick, native ground coverage and mid-storey bushes (up to 200cm high) for hiding
- Connections with parks
- Habitats can be placed to encourage human encounters

Figure 58 showing a species profile with information and sketches of the Blue fairy wren.

*Reported findings and green connectivity*

To find out where the species has been sighted in the area, I looked at Atlas of Living Australia (2023) and created a map based on these sightings of the species in Fishermans Bend, as shown in figure 59. This aims to illustrate the distribution of species in Fishermans Bend. It is important to note that the data is based on sightings reported by individuals in the area, which may not capture the full extent of each species present, as not all sightings are reported. Conversely, there may be an abundance of data due to multiple reports of the same individual of a species. Furthermore, the high number of reported Superb Fairy-wrens could be attributed to a strong interest in birdwatching in the area, potentially leading to more bird sightings compared to observations of other species like frogs and bees.

As the park is only one green area in a big urban renewal project, it is also important to consider possibilities for movement of species, as their dispersal can be affected by barriers and distances between other green patches and areas. Ecological connectivity is therefore important to look at when planning, and can mitigate fragmentation and habitat loss. Connectivity is a measure of the possibilities for an animal to move around a landscape (Tischendorf & Fahrig 2000) and better connectivity can improve the persistence of species (Kindlmann & Burel 2008). As I am focusing only on Kirrip park, I haven't looked deeper into the connectivity of Fishermans Bend, but did look at a map for green spaces of the area to see how Kirrip park could be a part of a bigger picture, connecting different habitats and enabling movements between them. Figure 60 therefore showcases my thoughts on how Kirrip park could act as



Figure 59 showing the reported finds of the target species for this thesis.

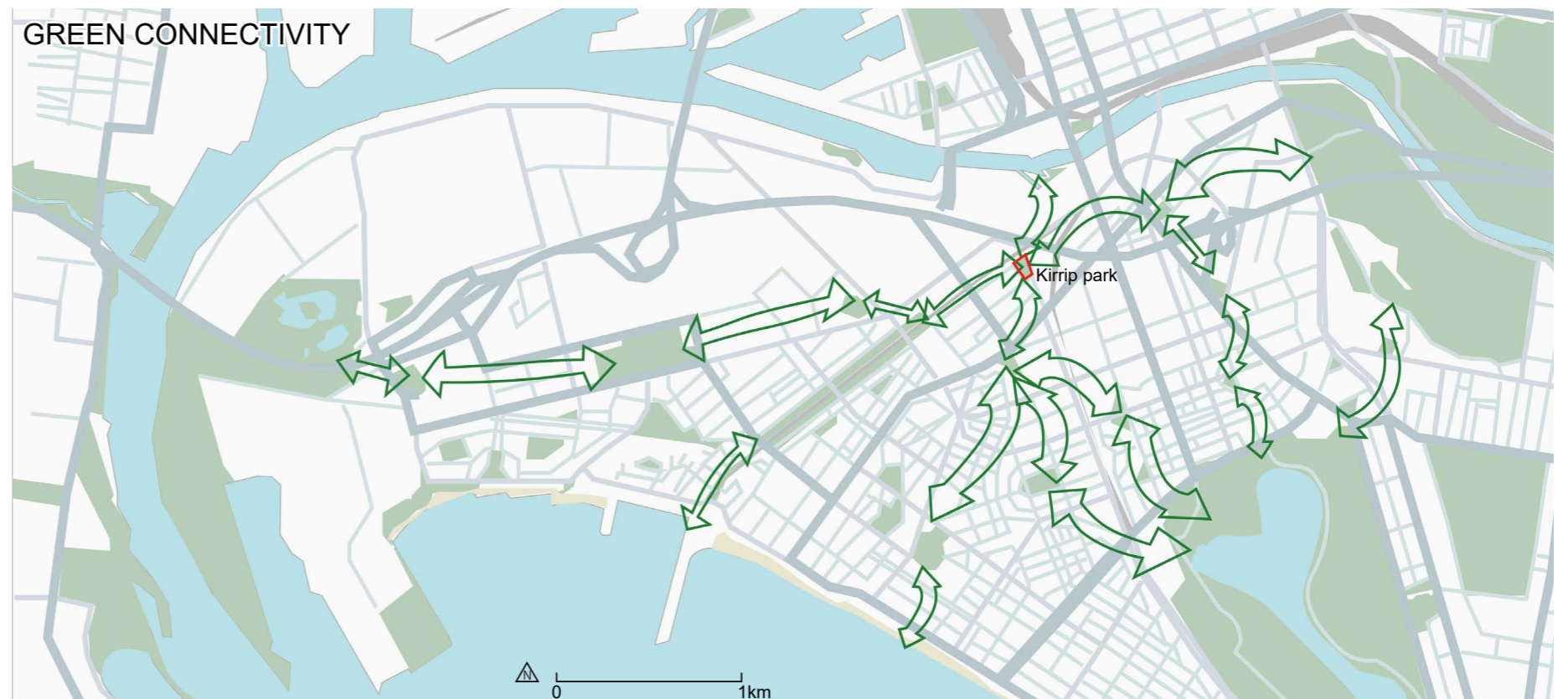


Figure 60 showing the proposed links between green spaces, to enhance connectivity to and from Kirrip park.

a resource patch in a bigger context, to help the species movement through Fishermans Bend. As this thesis mainly focuses on the park, and not the whole area, there can be of high importance to create working ecosystems based on the target species (especially the less mobile species, like the growling grass frog) in the park it self, so that in case there are barriers created outside the park, which disables movement, the species can thrive and reproduce in the park.

### *Lawns*

It is clear that low cut lawn is a typology that dominates in Kirrip park. When it comes to green areas of cities, lawns are dominating around the world, with it covering around 50-70 % of such areas (Ignatieva et al. 2020). This creates a recreational value, especially the east part of the area, which is flat and open, and can be used as flood storage as well. The created hills do not create the same usage though, and even though they can be used if the rest of the park is flooded, they can not be used for ball sports for example, but could be used for picnics, dog walks and other things that don't necessarily need a flat surface. The negative parts about having these big areas of low cut lawn, is that it can be very resource consuming (Ignatieva & Ahrné 2013).

To keep the cut lawn lush, a lot of maintenance is needed, but since the grass is very dry and yellow in this park, this might not be an issue, but can instead pull down the aesthetic value, as it might look neglected according to some people. Lawns are usually also very similar when it comes to species composition and can therefore greatly

contribute to homogenisation of urban green areas, as well as decreased biodiversity (Ignatieva, Stewart 2009, Ignatieva 2011 see Ignatieva & Ahrné 2013). Regardless of this, there are of course positive factors of lawn, such as water infiltration, carbon sequestration, mitigation of soil erosion, and more, but this is when compared to the absence of any vegetation (Ignatieva & Hedblom 2018). The sequestration of carbon has for example been shown to be negated by the gas emissions created through management such as irrigation, fertilisation and mowing (ibid.).

The big areas of lawn at Kirrip park can according to me when going through these factors be reduced. The social factors of lawns as well as the previously mentioned positive climate factors still weigh heavily, so therefore some lawn may still be necessary in Kirrip park. However, the parts that feel redundant and difficult to use can instead be transformed into something else (meadows, raingardens, wetlands for example), with a greater focus on biodiversity and the target species.

Something clear, both when looking at the design intentions of the park, as well as on the site visits, were that there was a high focus on the risk of flooding. The created hills all over the park were to enable usage of the park even when flooded (ODS 2020) and at a few places in the park, you can see both a swale (see figure 62) and rain gardens that can take care of water. These are planted with native vegetation (ibid.) and can therefore be of high interest to conserve to some extent.



*Figure 61 showing a photo of a big lawn in Kirrip park, which is very dry and damaged. This shows that it is being used, but can be considered aesthetically displeasing according to some.*



*Figure 62 showing a photo of a swale in Kirrip park, planted with native vegetation, and a wooden bridge for crossing.*

## Human dimensions in Kirrip park

When looking at a site for characteristics such as vegetation, location, health and more, the designer must also consider existing and potential patterns of uses, as well as such that are missing (Eubanks Owens et al. 2023). Therefore, during my site visits, I looked at how the park was being used today, which is shown in figure 64, but also at what type of qualities seemed to be adjacent in the park. The main path is lined with uniform trees and links the southern and northern areas, establishing a unified thoroughfare. This path feels more like a passage through the park, as shown in figure 63, with not many possibilities to sit down. There are other smaller paths enabling movement through the park, and since the benches are not placed next to the path, it enables people to move around the park more freely, to get to the seating areas for example.

The big open lawn shows evidence of use, as I could see a lot of dog walkers on it, as well as worn down areas. There are also created shortcuts, called “desire paths”, created by the wishes and feet of the walkers (Bramley 2018), which could be seen through higher wear on these surfaces.

When looking at the Perceived Sensory Dimensions (PSD) (Stoltz & Grahn 2021) at the site, I started off by weighing each opposite quality against one and another, to see which was the dominant one. The dominant PSDs in my opinion are the Social, Cultural, Open and Cohesive, as seen in figures 65-66. The park has a lot of open space, which can work as areas for social activities, such as sports, fitness, dog meetings, picnics and more.



Figure 63 showing a sketch of the path going through the park, which seems to be used mostly as a quick way to pass through the park.



Figure 64 showing an analysis made over the walking patterns that had traces of them in the park.

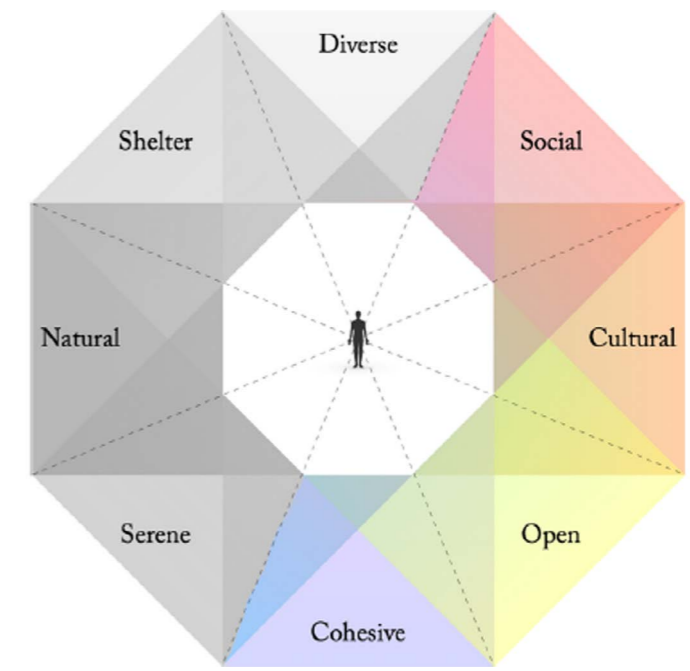


Figure 65 showing the strongest PSD qualities at Kirrip park as bright colours. The grey qualities are the ones that were not prominent in Kirrip park. Adapted from Stoltz & Grahn 2021.

**NATURAL- CULTURAL**  
Feels very programmed and designed and nature does not take over

**COHESIVE- DIVERSE**  
Consistent feeling throughout the park, with seating and walkways shaped in a certain way. Rows of plantings.

**SHELTERED- OPEN**  
Very open park, not many places to be alone and feel protected. Dense vegetation mainly planted at the edges, but there are no opportunities to settle down under the protection of these. The long benches that are everywhere in the park are placed very openly. Many seem to use the park as a thoroughfare.

**SERENE- SOCIAL**  
Opportunity for social meetings, many seats and entrances. Open areas can be used for activities, but some of them are hills and therefore more difficult to use for, for example, ball sports.

Figure 66 showing the PSD qualities in Kirrip park weighed against each other and documented. The word marked in a colour is the quality that I thought was most prominent when visiting the park.

The park exudes a sense of intentional design, reflecting its Cultural quality. While some parts, like the vegetation in the park's northern section, offer a more organic feel, the overall ambiance remains distinctly man-made. The park's design is notably coherent, relating to the Cohesive quality, which is exemplified by the consistent layout of long seats that serve as a prominent design feature.

The Open quality of the park creates recreational opportunities in some areas, but reduces the quality of Shelter, and the feeling of protection. There are many places to settle down, as can be seen in figure 67, but these do not give a sense of protection. There are a few places that do feel a bit more protected, as seen in figure 68, but these seats are placed very open and on a hard surface outside of the park so it still doesn't feel completely private. The Open quality of the area also connects to the Social quality, which enables social meetings and activities.

There is one art piece at the southern entrance of the park, seen in figure 69. This can represent a "cue to care" (Nassauer 1995), as it gives the park a human presence. There is no information about the art piece though, which makes it feel less important and a bit neglected. There is however a sign on a rock at this entrance, seen in figure 70, telling about the name of the park, and when it was built, which contributes to a human presence.

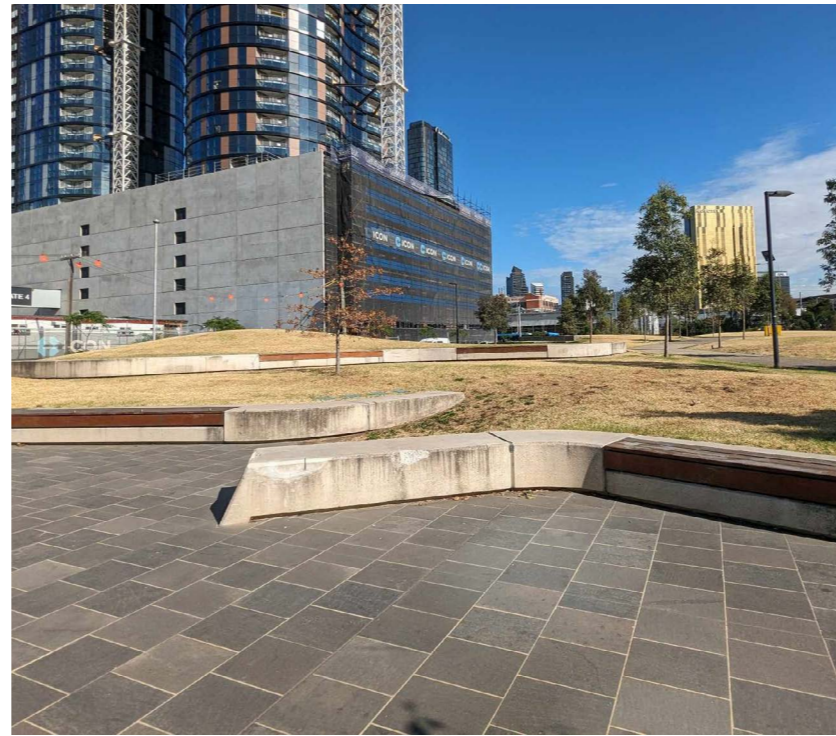


Figure 67 showing a place to sit down, which feels very open and not protected by vegetation for example.

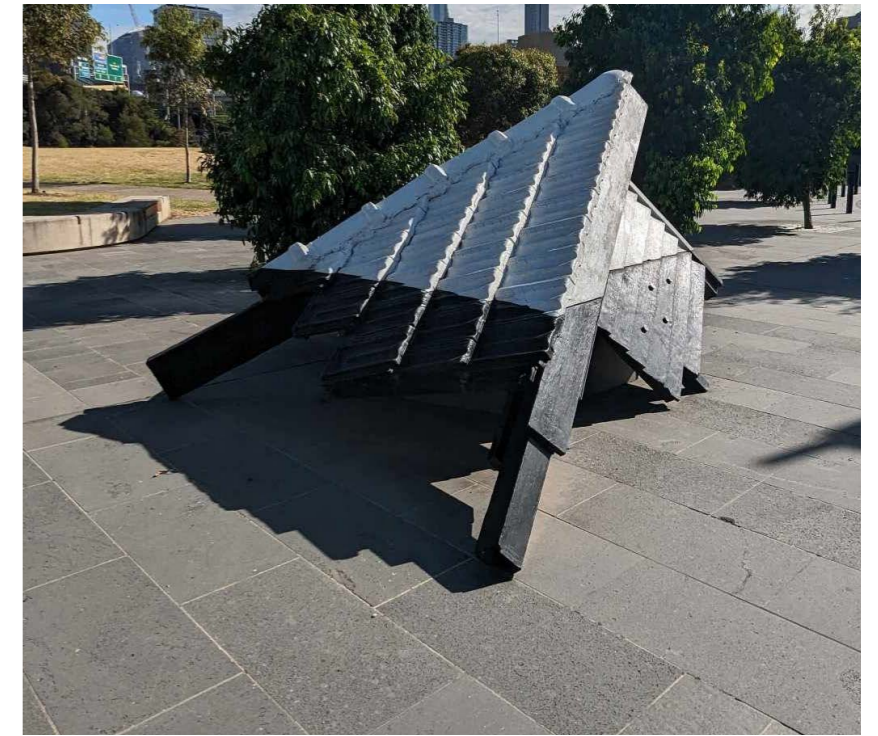


Figure 69 showing an art piece at the southern entrance of the park, bringing culture and a human presence to the area.

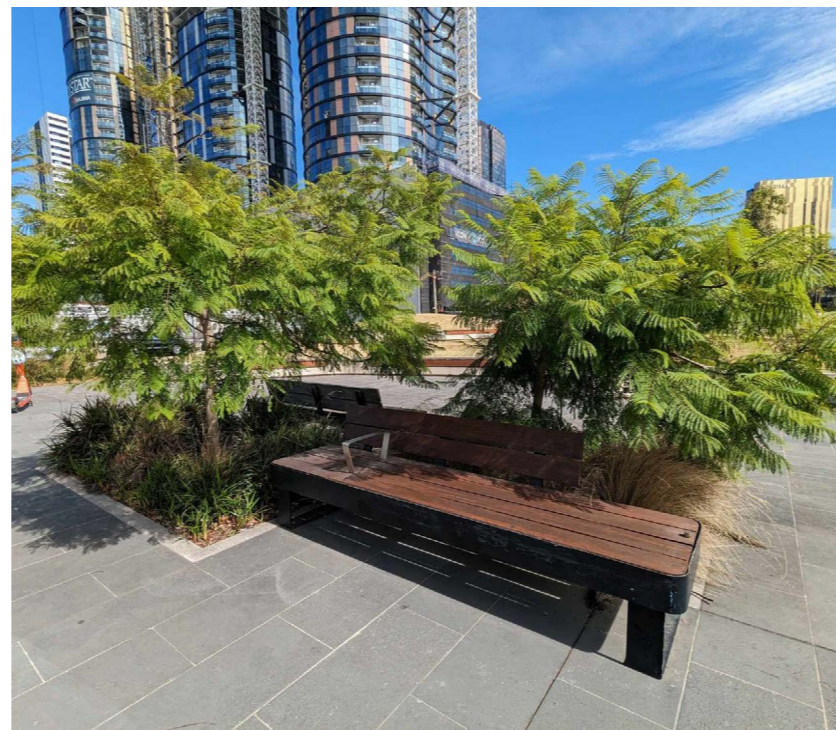


Figure 68 showing seatings that are protected by vegetation, but could be even more framed, to create a more private setting.



Figure 70 showing a rock with information about the park, which can act as a "cue to care" (Nassauer 1995), showing human presence.

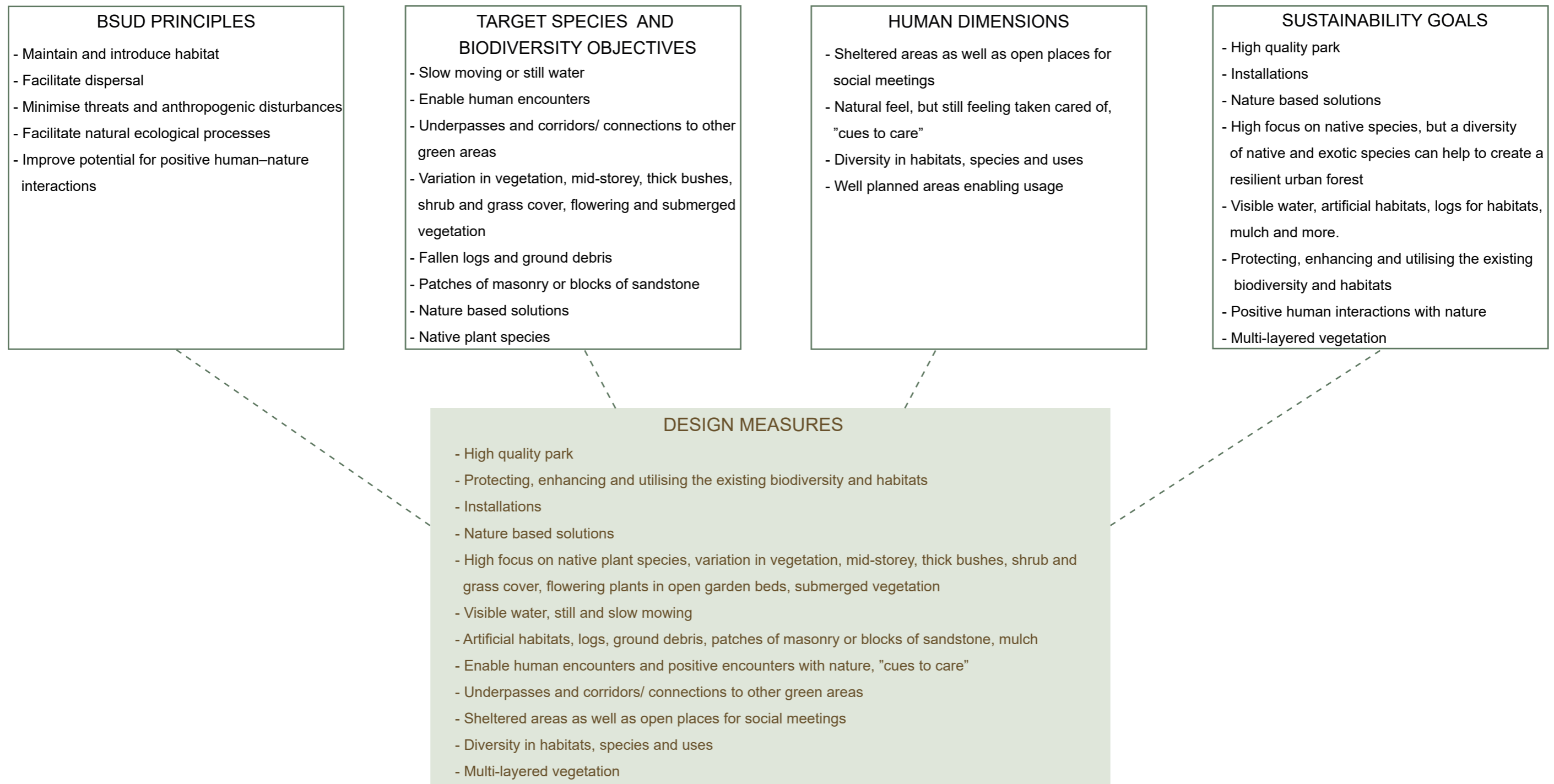


# DESIGN: OVERALL DESIGN MEASURES

In the following section, the thoughts behind the design proposal for the redesign of Kirrip park is presented, first as a summary of the research made through the literature study and site analysis and then in the form of a concept and design principles. The iterative process of Research by design (Roggema 2017), where the solution is developed in parallel and in harmony with the problem formulation, is the base for the design. The design can be seen as part of the investigation of how the existing character, ecological and recreational values are made visible and strengthened as well as new ones added. All this then results in one design proposal presented in the Post design chapter.

## Summary of recommendations for the design

Here, the earlier chapters are summarised to give an even clearer view of what is brought from the Pre design phase to the Design phase and finally to the proposal in the Post design phase.



### Design principles

The design principles describe the goals the design must achieve to answer the questions of the thesis, where the redesign of Kirrip park will focus on biodiversity and at the same time encourage human use and appreciation. The design principles are created based on the literature study and the site analysis and work as a guide when choices are made in the design process and are based on the summary of recommendations.

PRE-DESIGN

LITTERATURE STUDY

SITE ANALYSIS

#### A LIVING PLACE

*Diversity in ecosystems and microclimate:*

- Increase the health and biodiversity of the park by re-establishing native ecosystems and habitats
- Create local, diverse habitats and food resources for target species, including wet to dry, open to shaded and sheltered
- Prioritise Native plant material
- Promote the ecological value of existing trees along with supporting tree succession
- Variation in vegetation- low to tall
- Slow moving water for frogs
- External hiding and living places such as logs, sandstone, masonry and more

#### A PLACE FOR EVERYONE

*Combination of habitats and human recreation:*

- Positive human-nature actions
- Let humans experience nature
- Preserve current design and create Cues to care
- Sheltered areas by the help of vegetation, as well as open places for social meetings
- Natural feel, but still feeling taken cared of
- Installations, to bring art and Knowledge
- Well planned areas enabling usage
- Vegetation for the senses that offers both colours and scents
- Connection to the past, former swampland and wetlands, bring education to the site

### Concept

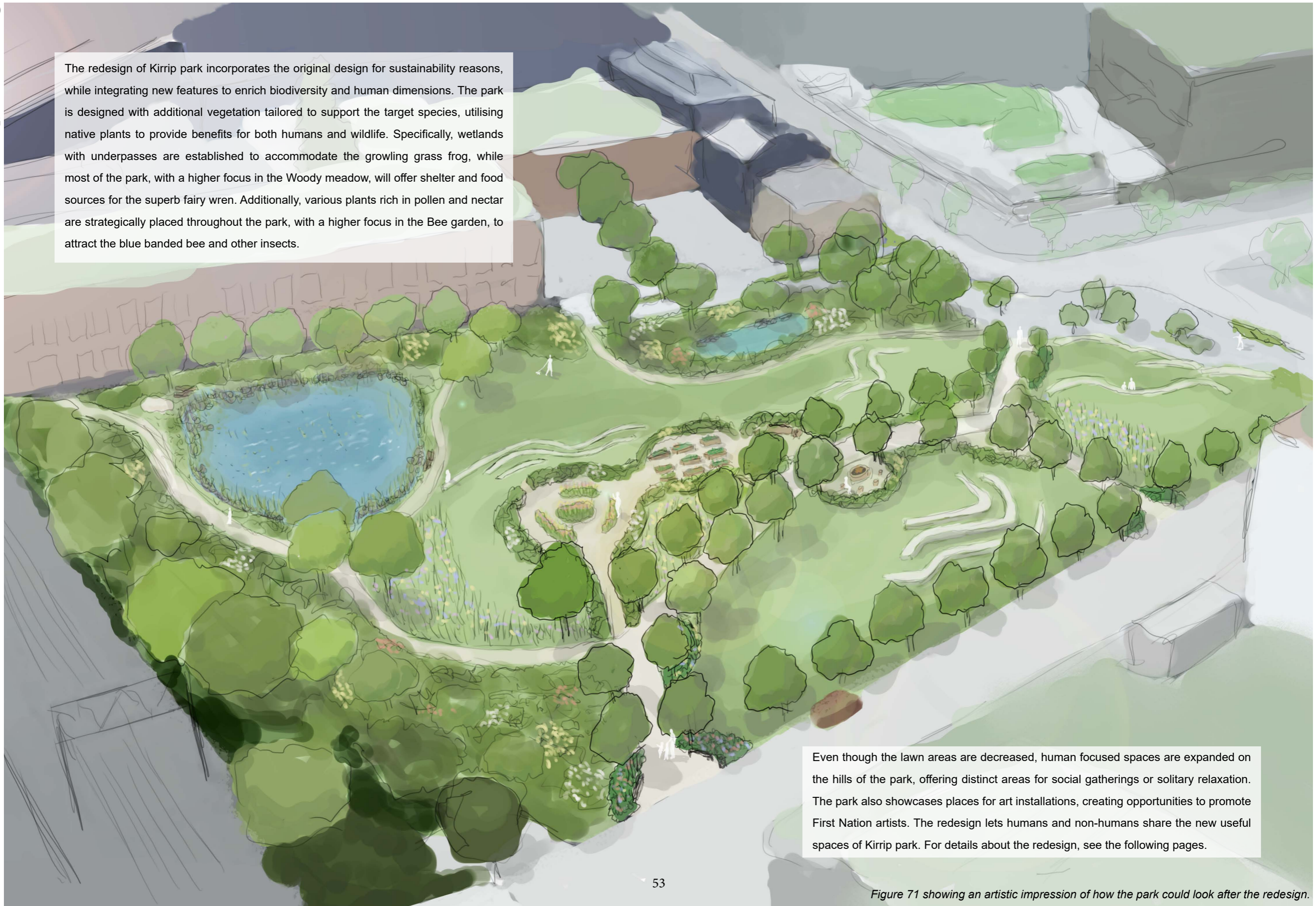


The concept of "Seeding Biodiversity" focuses on integrating biodiversity into the early stages of park design to create a beneficial environment for both wildlife and park visitors. By strategically selecting and planting a variety of native plant species benefiting the target species, the park aims to support a thriving ecosystem that can sustain itself over time. By prioritising biodiversity from the beginning, the park becomes a place where nature can flourish, offering a range of benefits for both non-human inhabitants and human users. Through thoughtful design together with as many saved elements as possible, "Seeding Biodiversity" seeks to create a balanced and sustainable park environment that enhances the well-being of all species that interact within it. "Kirrip" means friendship, and through the concept of "Seeding biodiversity", Kirrip park can be a park that promotes the friendship not only between humans, but also between humans and nature.

# POST DESIGN: A PROPOSAL FOR THE REDESIGN OF KIRRIP PARK

The proposal that was developed during the design phase is presented in the following pages in image and text to answer the question “How can Kirrip Park be redesigned based on Biodiversity Sensitive Urban Design to enhance the environment for wildlife and humans, and foster a healthier human-nature relationship?”. The chapter starts with a presentation of the overall design as well as the new master plan of the park. After this, a spatial map with typologies are shown, followed by detailed information, sketches and thoughts about each new typology of the park. The design has a relatively high level of abstraction and the intention has been to create one of many examples of how design for biodiversity could conceivably look, with a higher focus on the research work rather than a static design proposal. This is to create frames for how designing for biodiversity can be developed, to then show ideas of one way to design a park like this.

The redesign of Kirrip park incorporates the original design for sustainability reasons, while integrating new features to enrich biodiversity and human dimensions. The park is designed with additional vegetation tailored to support the target species, utilising native plants to provide benefits for both humans and wildlife. Specifically, wetlands with underpasses are established to accommodate the growling grass frog, while most of the park, with a higher focus in the Woody meadow, will offer shelter and food sources for the superb fairy wren. Additionally, various plants rich in pollen and nectar are strategically placed throughout the park, with a higher focus in the Bee garden, to attract the blue banded bee and other insects.



Even though the lawn areas are decreased, human focused spaces are expanded on the hills of the park, offering distinct areas for social gatherings or solitary relaxation. The park also showcases places for art installations, creating opportunities to promote First Nation artists. The redesign lets humans and non-humans share the new useful spaces of Kirrip park. For details about the redesign, see the following pages.

Figure 71 showing an artistic impression of how the park could look after the redesign.

### Master plan: the redesign of Kirrip park

Here, all the different parts of the redesign are showcased in a master plan with an accompanying legend as well as the old design. Further on, each part of the park is divided into a spatial plan, and followed with details of each typology.



Figure 72 showing the old design of the park, to clarify the additions. No certain scale. Aerial map © 2024 Nearmaps.

### LEGEND

- Trees
- Bushes
- Stepping stones
- Logs
- Suggested placement of art
- Benches
- Saved, long benches
- Barbeque
- Piles of rocks
- Information signs

1 - 4 Different typologies, shown in more detail in the following pages

Scale 1:500/A3

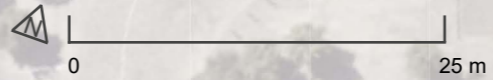


Figure 73 showing the new masterplan of the park. Aerial map © 2024 Nearmaps.

## Spatial plan of typologies

The spatial plan shows how the area is divided into smaller areas with different focus. All species can benefit from each area, but there is a sort of hierarchy in which animals have the highest focus in each area, which is shown by a bigger sized figure next to each area below. The different typologies that are presented in each area are later on zoomed into and explained further.

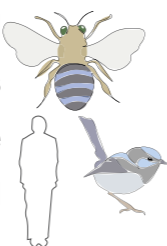
**1** The wet areas. High focus on frogs with benefits for other species as well. No access for humans, but aesthetic features and more are brought to humans. These areas are presented in the typology "Growling grass frog wetland".



**2** The Woody areas. High focus on birds and insects. The access into these areas are limited for humans, but some access is available. Benefits regarding health, aesthetics and more are brought to humans as well. These areas are presented as the "Superb fairy Wren woody meadows" in typologies.



**3** The Social areas. High focus on activities and meetings for humans, in close connection to insects and birds. These areas are presented as the "Blue banded bee garden", the "Community garden" and the "Fire and BBQ area".

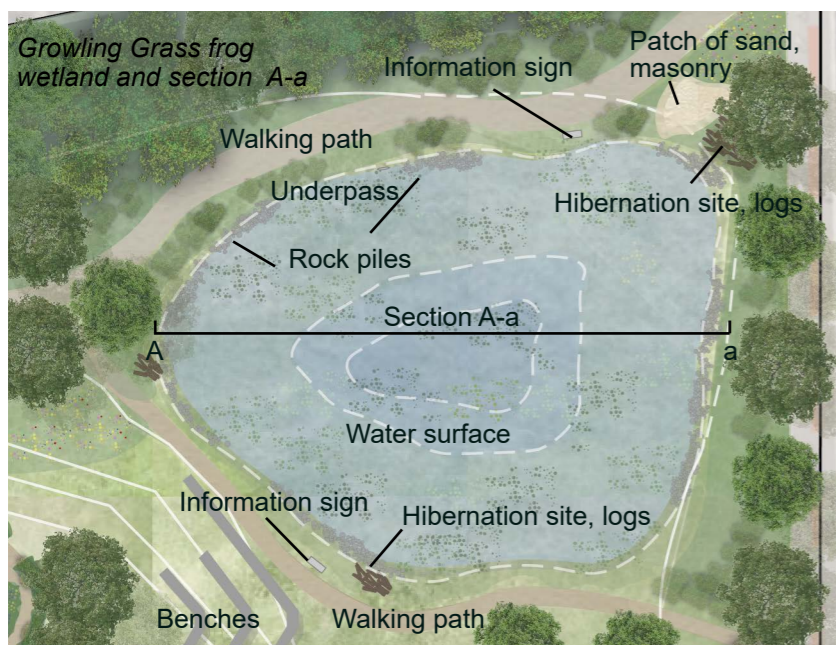


**4** The Open areas. These are areas for the usage of human activities, as well as for pollinators and birds. These are showcased in the typologies "Flowering meadows" and "Raingardens".



Figure 74 showing the spatial masterplan, with the different areas shown as different colours and numbers. Aerial map © 2024 Nearmaps.

## Growling grass frog wetland



The Growling grass frog wetland is developed to create a habitat for the Growling Grass Frog, which can lead to other species using the wetland as well. To have water features is also part of the sustainability goals, and brings aesthetic features to the park.

The recommended size for a wetland is 0.3 ha where space allows, and at least 0.15 ha where space is limited. They need both shallower and deeper zones, up to 2 metres deep (DELWP 2017b). The proposed wetland for Kirrip park is approximately 0.15 ha, to still reach these recommendations, but still not jeopardise too much of the flat surfaces used by human visitors. There are rock piles adjacent to the water, as well as hibernation sites and shelter in the form of logs and rocks. There is a combination of vegetation structures, from open grassy vegetation for foraging to denser shrubs

for protection. There are a few trees next to the wetland, but not too many, to prevent the wetland from being too shaded. In the north part, underpasses can be created to connect future green areas to this one. There is also a smaller wetland/ swale in the southern part of the park which is seen in figure 75. This can be filled during rainy seasons, and enables movement between two sites.

There is no human access to the wetland, but a path south and northwest of it creates recreational functions, and the wetland itself brings aesthetic and educational features. Information signs are put up next to the wetland, both as a “cue to care” but also to teach people about the wetland and the species using it. The saved long benches in the south of the wetland can be used by the nearby school as an outdoor classroom when learning about the functions of the wetland.



Figure 75 showing a sketch in photo showing the smaller wetland/swale.





Figure 76 showing a sketch of the 'Growling grass frog wetland', with a flowering meadow in the foreground, seatings overlooking the wetland, different types of vegetation and hibernation sites.

**Chosen native plant species:**

**Submergent plants (S):**

- Cycnogeton procerum*- water ribbons (I/F)
- Potamogeton crispus*- curly pondweed
- Potamogeton ochreatus*- blunt pondweed
- Vallisneria australis*- eel-grass

**Floating plants (F):**

- Myriophyllum crispatum*- upright water-milfoil (I/S,E)
- Utricularia australis*- yellow bladderwort (I/S)

**Emerged plants (E):**

- Alisma plantago-aquatica*- water plantain
- Baumea arthropphylla*- fine twig-sedge
- Eleocharis acuta*- common spike-sedge
- Juncus flavidus*- golden rush
- Marsilea drummondii*- common nardoo

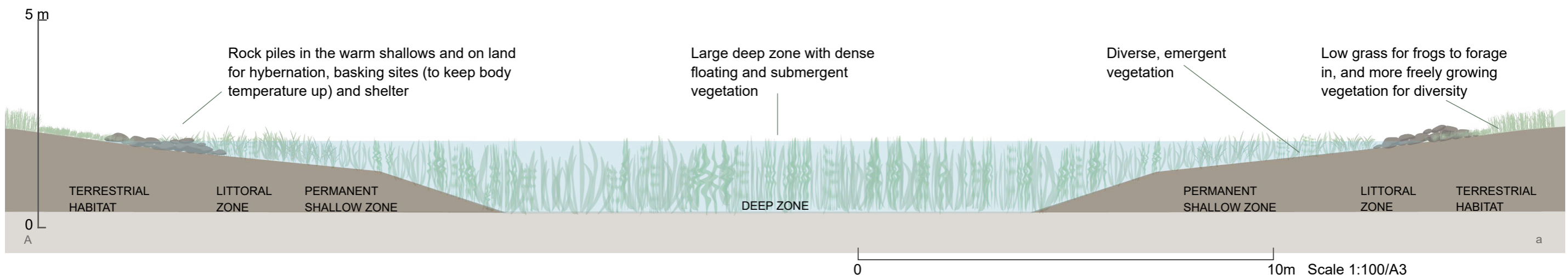


Figure 77 showing section A- a of the suggested 'Growling grass frog wetland' in Kirrip park, with information from The City of Melbourne (2017b).

## Superb fairy wren woody meadows



The thickness of the bushes creates hiding spots for the superb fairy wren, and the flowering plants can work well for the blue banded bee and other pollinators. The three layers creates a diversity as well as an aesthetic feature as it frames the site without making it too dense. The variation in foliage, scent and flowering plants also brings values to the city dwellers. By creating woody meadows, a greater biodiversity is brought to the site, with low management and full usage of unused areas, such as corners of mowed lawn.

### Suggestions when creating Woody meadows are:

- Preferably plots of 3 x 3 m or larger.
- 61 plants to be used per 3 x 3 m plot, 7 per square metre:
  - 48 base layer plants (6 species x 8 individuals)
  - 12 bump layer plants (3 species x 4 individuals)
  - 1 emergent layer plant (City of Melbourne 2020)

### Chosen native plant species:

#### Base layer:

*Atriplex semibaccata*- creeping saltbush  
*Correa reflexa*- native fuchsia  
*Dampiera alata*- winged-stem dampiera  
*Grevillea lanigera* 'Mini Prostrate'- woolly grevillea  
*Grevillea preissii* 'Seaspray'- gilt dragon  
*Philotheca myoporoides* 'Profusion'- long-leaf wax flower

#### Bump layer:

*Acacia boormanii*- snowy river wattle  
*Goodenia ovata*- hop goodenia  
*Leptospermum polygalifolium* 'Cardwell'- jellybush, tanton, yellow tea tree

#### Emergent layer: (variate between in bigger plots)

*Eucalyptus caesia*- caesia, gungurru  
*Alyogyne Huegelii*- blue hibiscus

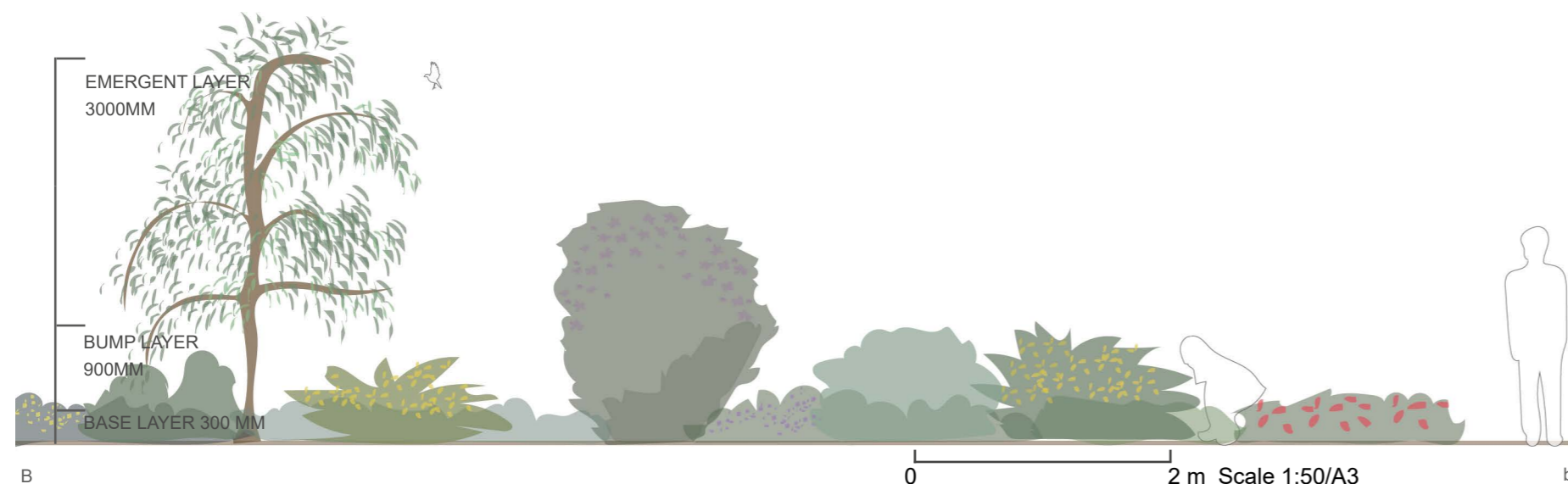


Figure 78 showing section B-b, with the three layers of vegetation in different heights.

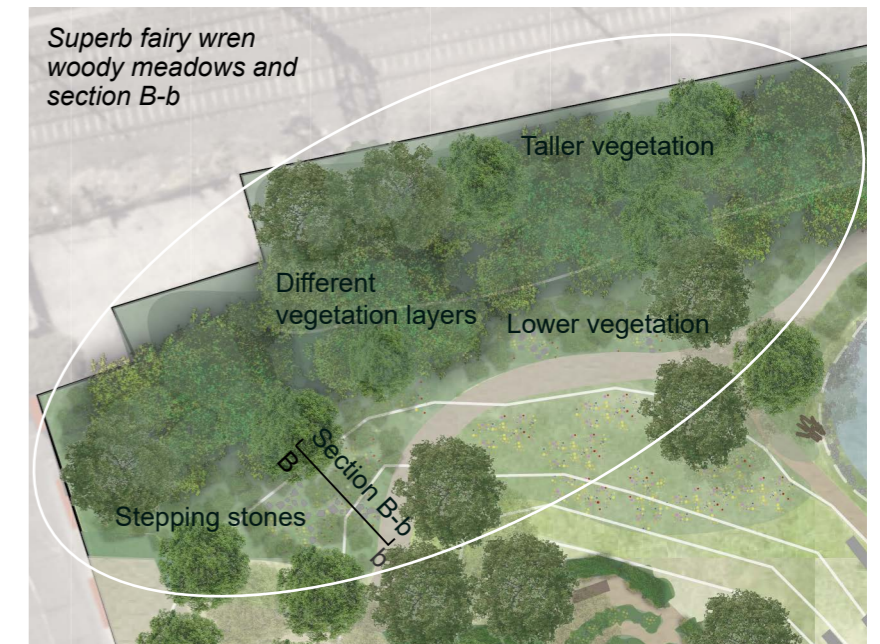



Figure 79 showing a sketch of a woody meadow, with stepping stones to allow human-nature contact and to show cues to care.

Blue banded bee garden 

The blue banded bee garden is not only creating a wonderful way to support pollinators like the blue banded bees and other beneficial insects but is also a tranquil space that engages human senses. By carefully selecting plant species that are attractive to the blue banded bee and other pollinators, a thriving ecosystem is boosted, while also bringing visual beauty and aromatics to the park. Framed by vegetation, the blue banded bee garden allows people to feel protected, slow down their pace, walk around the plantings and sit down and relax.



Figure 80 showing an early conceptual sketch of what the bee garden could look like, which is not fully in scale.

**Suggested native plant species:**

**Trees:**

*Leptospermum*- tea tree  
*Eucalyptus, Angophora, Corymbia*- gum trees

**Shrubs:**

*Callistemon sieberi*- alpine bottlebrush  
*Lasiopetalum*- velvet bushes

**Perennials:**

*Senna artemisioides*- silver cassia  
*Syzygium*- lilly-pilly  
*Arthropodium milleflorum*- vanilla lilies  
*Cullen australasicum*- tall scurf-pea  
*Dianella species*- flax lilies  
*Goodenia albiflora*- white goodenia  
*Linum marginale*- native flax  
*Tetratheca thymifolia*- black-eyed Susan, thyme  
 pink-bells  
*Thysanotus tuberosus*- common fringe-lily

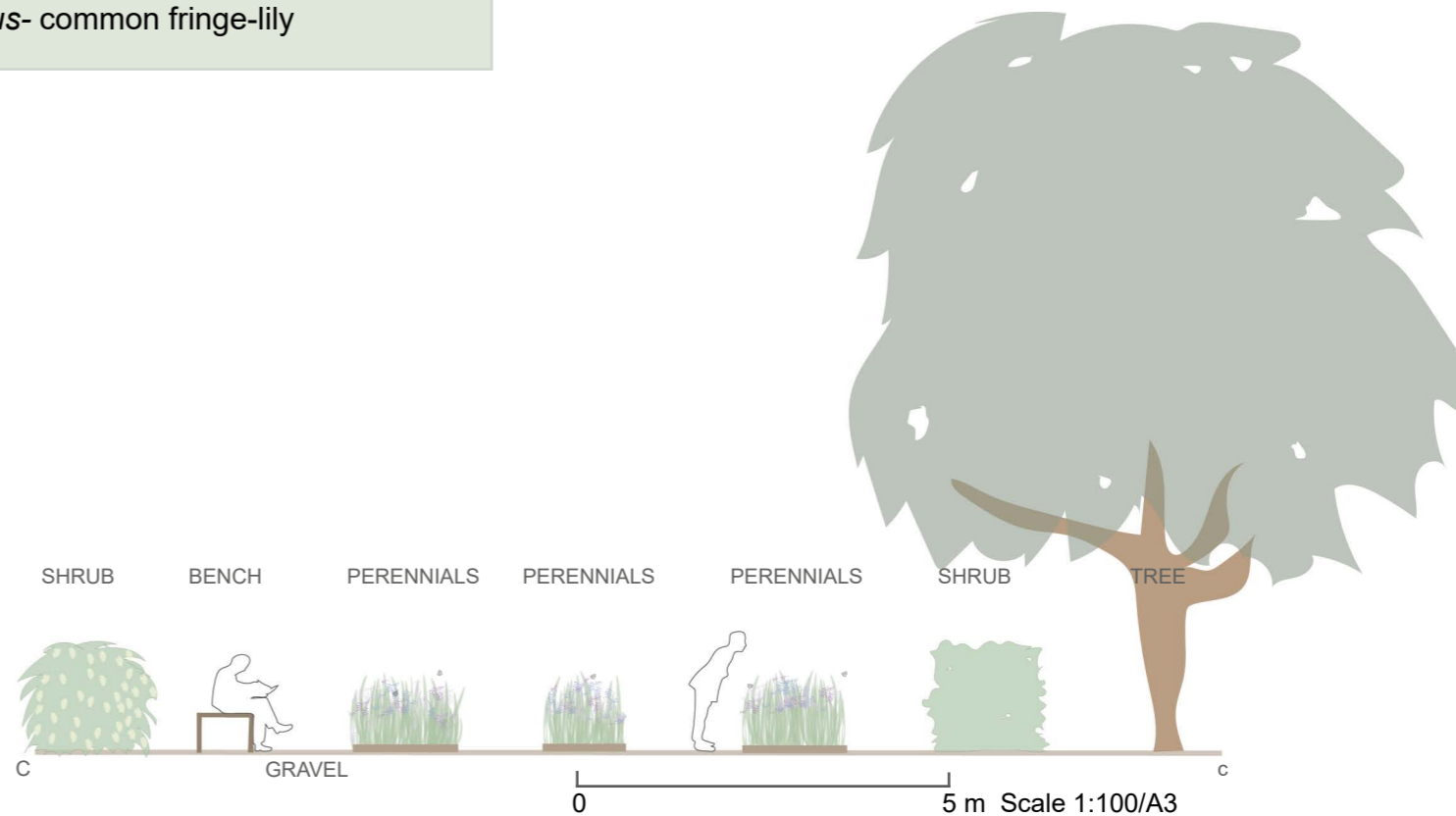
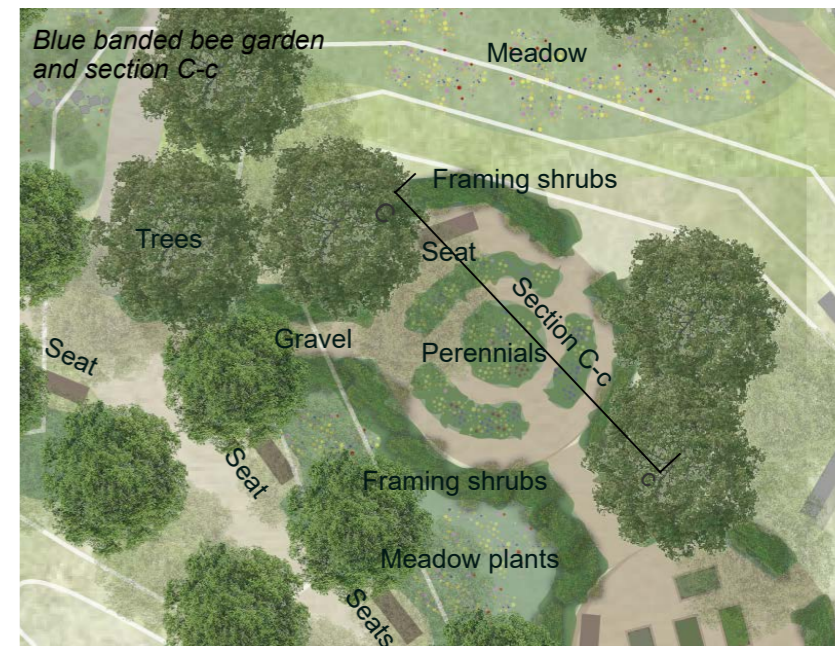


Figure 81 showing section C-c, with the created room of the bee garden, with a tree, shrubs and perennials.

### Community garden

The small community garden serves as a gathering place where community members can come together to cultivate shared green space, fostering a sense of belonging and connection among residents. This also provides a platform for learning about gardening, sustainability and a deeper understanding of nature. In close connection to the bee garden, this promotes biodiversity and advantages for pollinators. The presence of the community garden can enhance the overall aesthetic appeal and stewardship of the park, working as a sort of “cue to care”, showing that the park is also for and used by humans. In addition, the community garden can bring several ecosystem services, such as serving fresh, locally grown produce, while cultivating social connections, educational opportunities, and sustainable practices.



Figure 82 showing a sketch of a community garden, where humans and non-humans can collaborate.

### Fire and BBQ area

In close connection to the community garden is the Fire and BBQ area, a designated space within the park that offers visitors the opportunity to enjoy the park during both day and night, providing a setting for storytelling around a cosy fire. On the other side of the pathway, movable chairs and tables enable more people to sit down and enjoy today’s harvest or picnic. Surrounding the fire pit are log chairs that evoke the feeling of sitting by a bushfire, offering a rustic escape from the urban environment. The fire and BBQ area is thoughtfully framed by lush vegetation, enhancing the site with greenery and creating a sense of privacy. There are opportunities for art, for example First Nations’ art connected to Fire, to be placed here.



Figure 83 showing a sketch of the fireplace in a night scene.

Flowering meadows



The Flowering meadows offer numerous advantages both for animals, the environment and for people. These vibrant habitats provide essential food and shelter for pollinators such as bees, butterflies, and birds, contributing to biodiversity and ecosystem health. The Flowering meadows also enhance the aesthetic appeal of the area, and a mowed path is created in some of them, to enable human visitors, while also creating a “cue to care”. Additionally, these meadows require less maintenance compared to traditional lawns, reducing the need for mowing and chemical inputs while promoting sustainability and conservation. Overall, the Flowering meadows serve as beautiful and ecologically beneficial additions to Kirrip park.

**Suggested native plant species:**

- Austrostipa scabra ssp. Falcata*- rough spear-grass
- Calocephalus citreus*- lemon beauty-heads
- Chrysocephalum apiculatum*- common everlasting
- Coronidium scorpioides*- button everlasting
- Correa 'Dusky Bells'*- native fuchsia
- Craspedia paludicola*- swamp billybuttons
- Orthrosanthus multiflorus*- morning iris
- Pelargonium rodneyanum*- magenta stork's bill
- Wahlenbergia communis*- tufted bluebell

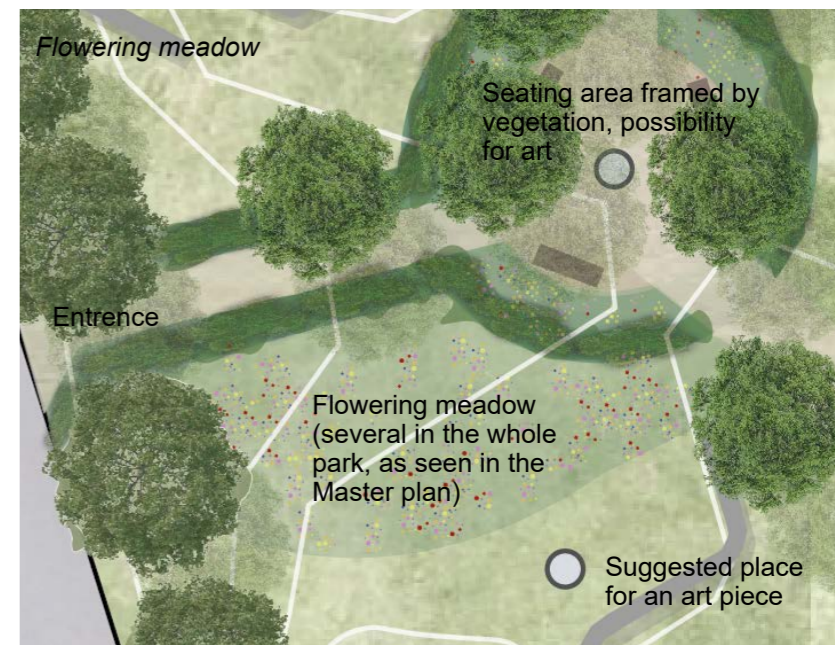


Figure 84 showing a sketch of a flowering meadow with native species, and a “cue to care”, a path allowing human- nature encounters.

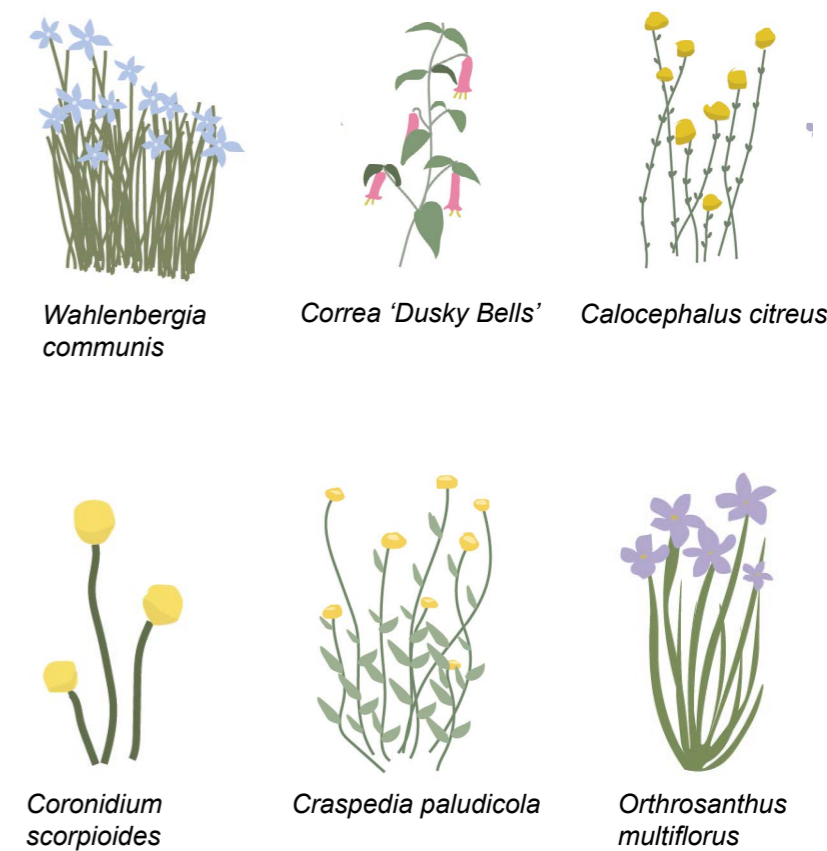
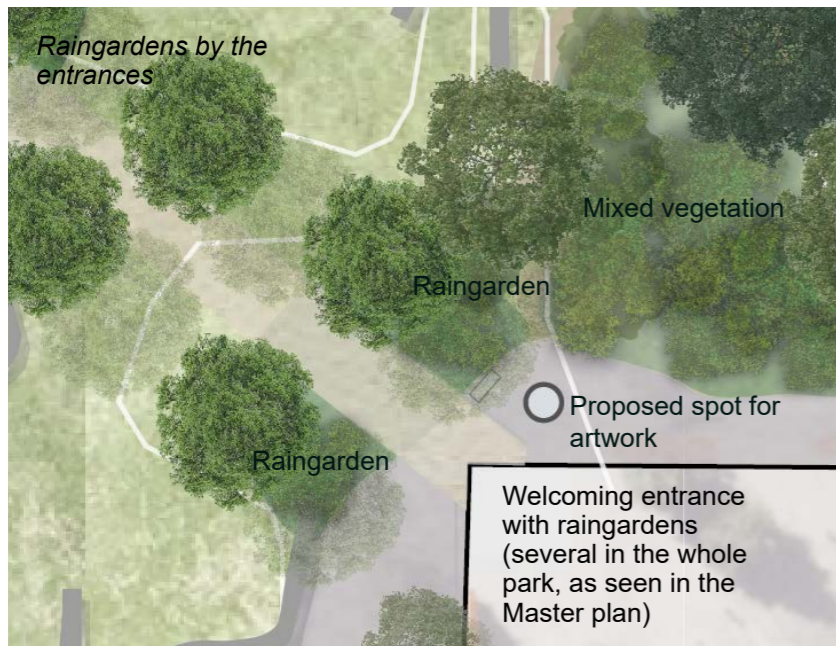


Figure 85 showing a sketch of some native species suitable for grassy meadows, inspired by Tract (n.d).

Raingardens



The rain gardens within the park serve as sustainable plantings that offer both aesthetic appeal and environmental benefits. Positioned strategically near the park entrances, these gardens do not only enhance the visual charm of these areas but also play a vital role in filtering and purifying polluted water runoff from roofs and hard surfaces surrounding the park. The incorporation of rain gardens means an increase in aesthetic values but also in plant diversity.



Figure 86 showing a sketch of the raingardens in the south entrance, to create a more welcoming entrance, as well as bringing new benefits to the park.

- Outer wall
- Stormwater
- Sediment and pollutants get filtered, roots absorb unwanted nutrients
- Filter media of soil, gravel and sand
- Treated stormwater moves to storage tank through final drainage

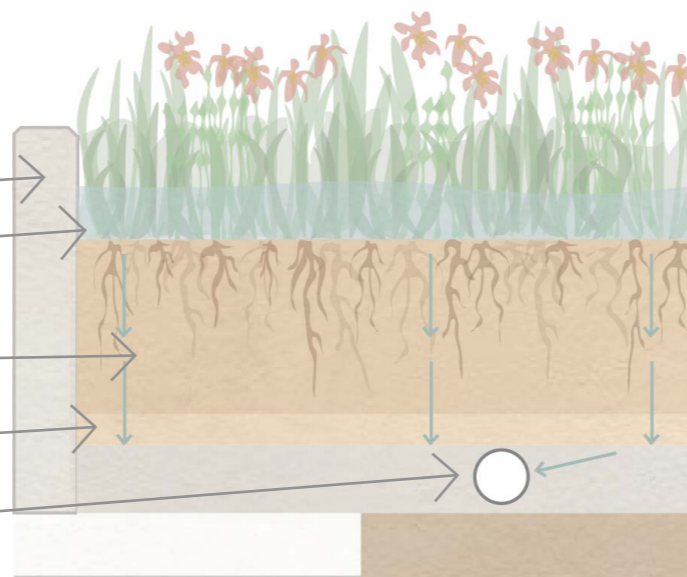


Figure 87 showing a section of a raingarden in no certain scale inspired by City of Boroondara et al. (n.d).

**Suggested native plant species:**

- Carex appressa- tall Sedge
- Juncus flavidus- tufted perennial rush
- Ficinia nodosa- knob Grass
- Anigozanthos species- tall kangaroo paw
- Brachyscome multifida- cut-leaved daisy
- Carpobrotus modestus- inland pigface
- Leucophyta brownii- cushion Bush
- Lomandra longifolia- spiny-headed mat-rush

# DISCUSSION

The aim of this thesis has been to explore approaches for creating a landscape architecture design with a focus on biodiversity. This has been made possible through a comprehensive methodology that incorporates sketching, literature study, and site analysis. The gathering of knowledge and approaches related to designing for biodiversity has served as the foundation for a design proposal that also aims to address unsustainable nature-human relationships. The goal of the thesis was to address the research question of "How can Kirrip Park be redesigned based on Biodiversity Sensitive Urban Design to enhance the environment for wildlife and humans, and foster a healthier human-nature relationship?" The discussion evaluates how effectively the results address this question and assesses the efficacy of the methodology in achieving this goal. Additionally, other important subjects are discussed, including potential limitations of the methodology, chosen topics and results.

## Method

The purpose has been to investigate how to design for biodiversity in urban environments in Australia. This has been based on an understanding of Australia's history and attitudes towards nature, in order to create a broader picture of landscape architecture in the country where I am currently studying. To answer how design focusing on biodiversity can be done, Fishermans Bend, Australia's largest renewal project, was chosen as the starting point, as it is a good example of an evolving urban environment. To help narrow down the work further, to be able to focus more on design and knowledge gathering, Kirrip Park was chosen as the location to apply the study. In addition to literature studies and site visits at the location, to gain a greater understanding of the chosen place and knowledge on the subject, "Research by design" (Roggema 2017) was also used as a method to structure the work.

The method of "Research by design" worked well to get a structure throughout the thesis, and it helped with the time management. The Pre design phase was very useful in a thesis like this, since it was where all the lessons learned and information was being gathered and summarised. The Post design was also a good way to showcase the design suggestions that helped answer the question of the thesis. Since the questions are being answered through a design proposal, this way of working felt reasonable. It also allowed me to try out different ways of sketching both my ideas but also other things, such as

maps and more, which are shown throughout the thesis. Something difficult with this way of working is how to differentiate the Design part from the Post design part, since design is a constant work in process, but also a form of result. Therefore, the Design part came as a bit of an "in between" stage, where not as much is being showcased as in the Pre design and the Post design stages. With that said, the Design phase helped with ideas for the concept and typologies in the park, and an iterative way of working between the Pre design and Design phases helped with the flow when designing, as sketches and thoughts emerged as a collaboration between these two phases. These could then be further realised in the Post design phase. In this way, even though the Design phase isn't as clear as the Pre and Post design phases, it can be seen as a bridge between these two, where the knowledge from the Pre design phase is being developed into design and further showcased in the Post design phase.

As the research question involves "Biodiversity Sensitive Urban Design", a big part of answering this question was with the help of the BSUD framework (Garrard et al. 2017). This was quite hard for me to follow, as there were many aspects of it that were hard for me to do, and understand. A simpler way to showcase the steps of the BSUD framework would be great, to make it easier for anyone working with these issues to use it. One important part of the framework, which was not easy to do as someone arriving in Melbourne alone and without many contacts, was talking to the community,

ecologists, Elders etc. I got in contact with a few people, which was very helpful, but to create an as inclusive redesign as possible, more people would have needed to be involved.

The lack of involvement of more people has been a key limitation throughout the thesis. While the method has been effective, all aspects would have been further strengthened with the inclusion of more individuals, given the interdisciplinary nature of the work. I want to emphasise once again the importance of collaborations, and due to time constraints and limited contacts in Melbourne, a future project with a similar structure to this could benefit from citizen dialogues, more involvement of ecologists, urban planners, landscape architects as well as First Nations people with the appropriate Knowledge about Country and all that it entails. This would have made the final design proposal more inclusive and multidimensional.

That being said, the literature study has played a significant role in this thesis by challenging my perspectives, originating from a landscape architecture background in a different context. I am undoubtedly influenced by Western ways of thinking, and the decolonisation of my mind has been a present theme, challenging my values and perspectives, even though they are of course still part of this thesis. It has been difficult to let go of my learned ways of seeing things, making it crucial to learn about entirely new perspectives and histories. While this has only been touched upon, and



I still maintain many of the values I had previously, I have developed a broader outlook on landscape architecture and the world. The literature study explored theoretical perspectives that continuously influenced and were influenced by the methodological approach, analysis, and design. These theoretical perspectives have thus helped me to explore, understand, and interpret the site, as well as to motivate and shape the design. Nonetheless, I have approached this thesis based on what I have learned during previous years in the landscape architecture education in Sweden, and thus, what I have learned during those years has been consistent throughout this thesis. For example, the Perceived sensory dimensions (Stoltz & Grahn 2021) are based on Western perspectives, but were a way of understanding human dimensions that I thought could be suitable in an Australian context as well. With that said, would I have more time to learn even more new perspectives, I could have gone away more from my values and ideas from my education in Sweden and done even more research about similar topics in an Australian context. However, the social dimensions weren't the main focus in this thesis, and the literature study and the background study of Australia have helped me gain new perspectives and values that I hope to carry with me regardless of where I work in the future.

## Results

The culmination of this study resulted in a design proposal focused on exploring the integration of ecological and social dimensions into a site design based on biodiversity. The design proposal answers the thesis question "How can Kirrip Park be redesigned based on Biodiversity Sensitive Urban Design to enhance the environment for wildlife and humans, and foster a healthier human-nature relationship?" by encompassing various aspects that benefit both non-human and human entities. This thesis can therefore work as an inspiration for similar projects and hopefully create an awareness of the importance and benefits of designing for biodiversity.

A big part of the thesis is humans' attitude towards nature, with colonial values still affecting humans' way of devaluing nature. The importance of information and education around nature's intrinsic values and a Country centred worldview is therefore brought up several times and represented in the proposal with a focus on target species, native plant species and with the help of "Cues to care" (Nassauer 1995), such as information signs and possibilities for education.

The design proposal can therefore work as a didactic landscape, that can contribute to knowledge and reverence for nature. Some parts of the park can work as living classrooms, where people can learn about ecosystems, biodiversity, and sustainable practices while fostering a healthier human-nature relationship. This is just one small

way to approach this problem, and a major shift needs to be made, which might have to start at a political level.

One thing about the design is that since the park was recently developed, I did not want to make too many big changes because of the ethical and sustainability aspects of blanketing the current park. I thought it was enough to focus on how to bring in habitats and biodiversity without risking someone else's design to be fully overlooked. Therefore the park's overall design isn't fully changed, and the differences of the before and after can therefore be seen on page 54 in the figures 72-73.

One challenge in addressing a research question through design is that while an example may provide a glimpse of how the question could be answered, it represents just one possible solution. The research question is somewhat answered through the redesign of Kirrip park as the design visually captures aspects of the biodiversity enhancement and the healthier relationship, by showing how the park can be shared by humans and non humans, but a real-world evaluation would be beneficial to assess its practical implementation and impact if the park were to be constructed and utilised.

Presenting a design proposal as the result worked well, but it is important to acknowledge that this proposal has been heavily influenced by my values as a landscape

architecture student and could have taken numerous forms depending on the individual behind it. Nevertheless, this is the intriguing aspect of landscape architecture: design is a dynamic process that can be presented in countless ways based on the individuals involved, their values, and the purpose of the design. I believe the objective of the thesis is well-reflected in the outcome, the proposal, as it demonstrates an enhancement of the park's biodiversity focusing on the target species, while also adding multiple dimensions for both wildlife and humans. While the design proposal addresses the thesis's questions, it is crucial to emphasise the significance of the Pre design phase in this thesis. This phase laid the foundation upon which all decisions presented in the proposal were based.

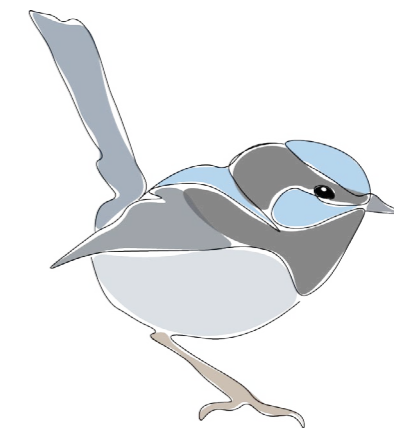
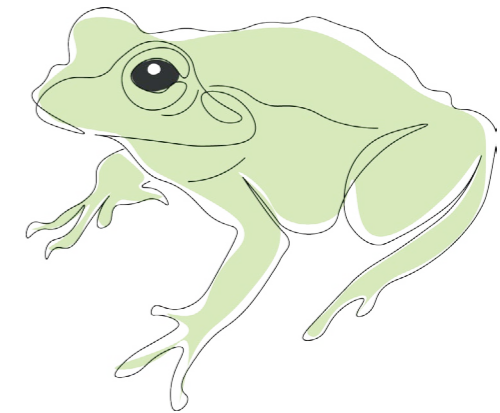
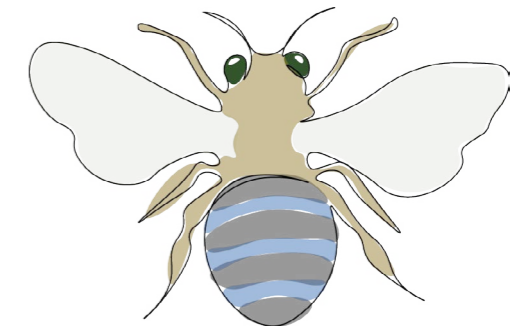
The challenge in designing a site lies in considering the multitude of perspectives involved, and in this case this was especially difficult since the thesis is made in a country which I don't originate from. It is always difficult to make choices about what to focus on, and therefore some trade offs need to be made. This thesis would focus on biodiversity and target species, but as the proposal was made at a community park in Melbourne, the people of the city cannot be overlooked, nor the background of the site being studied. Balancing these diverse viewpoints is complex, and this work has concentrated on human-ecological and European- Australian/First nations perspectives, but has required constant compromises since satisfying everyone

is unattainable. While these topics have been addressed, they can always be explored in even greater depth. Delving deeply into a design question like this is challenging due to the myriad factors at play. This means a risk of prioritising quantity over quality, with many aspects that need deeper exploration only being briefly touched upon.

Because of this, the "BSUD framework" (Garrard et. al 2017) guided me in designing for the chosen target species, and how to think about biodiversity in urban settings in Melbourne, since this is made in Melbourne. Had I been in Europe, a lot of the things learnt from the BSUD framework could still be useful, but other frameworks for creating animal focused design targeted towards European contexts could be more suitable.

Moreover, approaching a design project in a country without comprehensive knowledge of its nuances presents difficulties. Social factors have therefore not been delved deep into, but only touched upon to gain an understanding, but of course there is much more to go into about this.

In conclusion, even though this thesis only presents one way to design for biodiversity, I hope that it can be used as an inspiration and bring a light to the complexities when planning in Australia. It touches on important topics for planning urban green spaces and can hopefully guide people in how design proposals with similar problems can be made, both in Australia but also as in other parts of the world.



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### Personal communication:

Holly Kirk, Ecologist, Post Doctoral Fellow, RMIT University, Video conversation on 05-02-2024.

Todd Berry, Senior Project Manager - Fishermans Bend Taskforce, Depart of Transport and Planning, Phone conversation on 31-01-2024.

## FIGURES

All photos, sketches, diagrams and other figures that are not being mentioned in the figure list below are taken or made by the author of this thesis ©Karlsson.

Figure 1&11: Inspired by Lehmann S. (2010) “Eco v Ego” [diagram]. [https://www.researchgate.net/figure/Diagram-Ego-Eco-Humankind-is-part-of-the-ecosystem-not-apart-from-or-above-it-This\\_fig1\\_330697869](https://www.researchgate.net/figure/Diagram-Ego-Eco-Humankind-is-part-of-the-ecosystem-not-apart-from-or-above-it-This_fig1_330697869) [2024-04-29]

Figure 3: Nearmap (2024). [Aerial map Melbourne]. [https://apps.nearmap.com/maps/#/I-P\\_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203](https://apps.nearmap.com/maps/#/I-P_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203) [2024-04-29]

Figure 14-16: Inspired by The City of Melbourne (2023). *Country through time. The Greenline Project Master Plan December 2023*. [Framework]. City of Melbourne. <https://hdp-au-prod-app-com-participate-files.s3.ap-southeast-2.amazonaws.com/5917/0175/5235/Greenline-Project-Master-Plan.pdf> [2024-04-29]

Figure 18&19: Nearmap (2024). [Aerial map Melbourne]. [https://apps.nearmap.com/maps/#/I-P\\_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203](https://apps.nearmap.com/maps/#/I-P_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203) [2024-04-29]

Figure 28: Stoltz, J. & Grahn, P. (2021). [Perceived sensory dimensions]. Perceived sensory dimensions: An evidence-based approach to greenspace aesthetics. *Urban forestry & urban greening*, 59, 126989–. <https://doi.org/10.1016/j.ufug.2021.126989> [2024-04-29]

Figure 29: Adapted from Stoltz, J. & Grahn, P. (2021). [Perceived sensory dimensions]. Perceived sensory dimensions: An evidence-based approach to greenspace aesthetics. *Urban forestry & urban greening*, 59, 126989–. <https://doi.org/10.1016/j.ufug.2021.126989> [2024-04-29]

Figure 36, 37, 38, 41, 44, 47,50,53: Nearmap(2024). [Aerial map Melbourne].[https://apps.nearmap.com/maps/#/I-P\\_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203](https://apps.nearmap.com/maps/#/I-P_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203) [2024-04-29]

Figure 65: Adapted from Stoltz, J. & Grahn, P. (2021). [Perceived sensory dimensions]. Perceived sensory dimensions: An evidence-based approach to greenspace aesthetics. *Urban forestry & urban greening*, 59, 126989–. <https://doi.org/10.1016/j.ufug.2021.126989> [2024-04-29]

Figure 72-74: Nearmap (2024). [Aerial map Melbourne]. [https://apps.nearmap.com/maps/#/I-P\\_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203](https://apps.nearmap.com/maps/#/I-P_4A9uQxmFE0LLErODtw/@-37.8236958,144.9464988,14.00z,0d/V/20240203) [2024-04-29]

Figure 85, inspired by Tract (n.d). [Flowering meadow] <https://tract.com.au/projects/monash-university-flowering-meadow/> [2024-04-29]

Figure 87: inspired by City of Boroondara, Melbourne Water and the Victorian Government (n.d). [Grace park rain garden].chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/<https://www.boroondara.vic.gov.au/media/12126/download?inline> [2024-04-29]



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