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The Role of Aesthetics in Advancing Material Circularity in Landscape Architecture

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Landscape Architecture for Global Sustainability



THE ROLE OF AESTHETICS IN ADVANCING MATERIAL CIRCULARITY IN LANDSCAPE ARCHITECTURE

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ABSTRACT

With growing interest in sustainability across industries, there is growing interest in how sustainability will be manifested in our outdoor spaces. The aesthetics of sustainable principles are being explored within landscape architecture projects globally. These involve a number of methods which incorporate circular economy concepts through reimagining the design process. Discussions regarding the aesthetic in landscape architecture, reveals wider discourses and shifting values in the perception of the built environment. Methods for circularity and sustainability in landscape architecture and the connections to landscape aesthetics, are explored through researching existing literature from a variety of architectural fields. This encouraged the development of circular design principles and conceptual landscape typologies to aid the landscape architect in imagining a circular landscape. In addition to the importance of material circularity, the benefits for implementing a circular landscape architecture project meet several sustainability goals, including cultural heritage preservation and the strengthening of ecological resilience.

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Introduction

Landscape architecture is evolving to meet the environmental conditions of an era characterised by the impact of humans on nature through globalisation (Pollack, 2004, pp. 14–18; Prominski, 2014). Globalisation is the ‘interconnectedness’ of trades and cultures (Cambridge Dictionary, 2022b; National Geographic Society, 2022). As a result, the growth of many economies and the growth of their built environment is based on a trajectory which is reliant on maintaining unsustainable global supply chains. (UNEP, 2012, p. 11) The COVID-19 pandemic revealed fragile dependency on globalisation: within the construction industry alone, there were supply chain disturbances which resulted in a scarcity of materials, increased prices, delays in construction, and the exclusion of groups from pursuing building-projects all-together (Arkitektnytt, 2022; Pedersen and Thonhaugen, 2022).

On top of this, the conventional practices in the built environment are a contributor to the climate crisis. Construction uses vast amounts of resources, and production of these materials is a ‘significant source of CO₂’ (Ruby and Ruby, 2020, p. 33). Due to the

physical scale of the work, this industry is also responsible for millions of tons of waste every year (Altamura and Baiani, 2019; Chaudhary and Skjerpen, 2021). Waste, or rather the prevention of waste, will be a key theme in this research, set within the context of building and construction, landscape architecture, and global sustainability. On reflection of the global situation of resources and consumption within the face of disruptions, the Journal of Landscape Architecture (JoLA) contemplates a shift to prioritising local production:

‘Globalism and its unbridled transport of goods and people are triggers for both the Covid-19 and climate crisis, and it is plausible that the climate will benefit from the raised awareness and ‘demystification’ of globalism (and for that matter, neoliberalism) during the pandemic. As more localized means of production and consumption (of food and other resources) as well as low-impact transportation methods are related to decrease in air pollution, how does it reflect in our discipline? How can the design of our cities and open spaces accommodate systemic change, for example through ‘urban mining’, local production of energy or reuse of water?’

(Gill et al., 2020)

An example of systemic change is the adoption of a circular economy, a method of circularity is urban mining. In response to the climate crisis, more and more industries are introducing principles of sustainability and the circular economy (Ellen MacArthur Foundation, 2022). This requires a revaluation of current practices and initiatives have been set up to further investigate these opportunities. The New European Bauhaus, for example, seeks to create possibilities for networking, sharing concepts and projects, and access to funding, in order to encourage the shift towards sustainability. Interestingly, the aesthetic is a part of the programme alongside sustainability and inclusivity as the three core values (New European Bauhaus, 2022).

This piqued my interest, for two reasons. Firstly, in my research into the existing literature on circular landscape architecture techniques (Krogh, 2014; Myklebust and Gagnat, 2021), there was discussion of scepticism of the aesthetics of reuse. In 2014, Even Reinsfelt Krogh conducted a survey asking landscape architects in Norway about their opinions on reuse-projects:

‘... the results showed great commitment. It pointed out several

*important challenges based on the respondents practical experience. It was also shown that there can be different attitudes towards reuse between the private and public sectors... **Many stated that they were uncertain about the benefits of reusing materials and that it could not be justified aesthetically’***

(Krogh, 2014, p6, format emphasis by M, Andrews)

Secondly, the New European Bauhaus described the aesthetic as the ‘quality of experience and style, beyond functionality’. Once more, there was a conflict in the perception of the aesthetic. In this case, existing literature within the field of landscape architecture suggested that the aesthetic itself has function, particularly in the sustainability agenda (Meyer, 2008, pp. 8, 17; Woltz, 2020, p. 13).

These conflicts of perception signify a discourse, which requires further investigation. This leads to me to my research question for this thesis. **What are the limitations and opportunities, as well as the significance of the aesthetic in the sustainable, and circular landscape?**

METHODOLOGY

Sustainability Themes

I examined the global to local levels of governance to search for recommendations and principles for improving sustainability of practices, that would translate into the landscape architecture profession. Through this search I found organisations, agendas, deals, initiatives, and statements that outlined intentions and the necessity for addressing climate crisis. I began to connect the themes that I found throughout each of these scales of governance, to demonstrate how the intentions were being addressed at each level. I then contemplated the next step, how this connected to the profession of landscape architecture and the execution of landscape architecture projects today. To do this I searched for existing literature in the field of landscape architecture, I found various documents which explored the implementation of the sustainability themes.

The Circular Framework

A key theme that emerged at the regional level is circularity, which was mentioned in several deals as a framework which can be applied to several industries for sustainable development (Ellen MacArthur Foundation, no date). At the local level this manifested itself as infrastructure, as both guidance and facilities. The circular economy and its principles, applicable to landscape architecture (and architecture), are demonstrated in the work of theses which were used as the starting point for the continued research of this thesis.

Aesthetics

The recurring references to the aesthetic, amongst conflicting perceptions of its role in sustainability, formed the core line of inquiry for the thesis. The theme appeared across the scales of governance as well as within the existing research into the sustainability agenda in landscape architecture. To establish the role of aesthetics in landscape architecture, I initially conducted literature searches on the history of aesthetics, and the history of aesthetics in the landscape, including the representation of landscapes in art movements. This indicated shifting aesthetic perceptions which was supported by the evidence of discourses in contemporary aesthetics. Discussions on the relationship between aesthetics and sustainability in landscape architecture also revealed conflicting interpretations. This conflict

centres around the aesthetic of sustainable projects, such as concerns of the visual appearance whilst neglecting to consider the experience of the aesthetic. Yet the evidence of initiatives that advocated for increased sustainability with the aesthetic consideration (New European Bauhaus, 2022) as a part of the agenda, signified progression towards understanding the scope and opportunities of reuse.

Case Study Area

Norway was selected as the case study area as this was the local context to the thesis. This thesis was written at NMBU, the Norwegian University of Life Sciences, thus the opportunity to explore the local context from the perspective of an international student allowed for me to explore the subjects without prior knowledge influencing the research. In addition to this, theses written by students from the same faculty provided a steppingstone for further investigation into the field of circularity landscape architecture. The work of Kominska (2020) also informed this selection of the Norwegian context, the paper explores the circular practices in Nordic architecture with indications that the Nordic countries are best placed to introduce more circular economy principles. Socially, these countries have a high awareness of sustainable practices, and social responsibility in policies to support these practices (Kozminska, 2020, p. 4) Thus there was the opportunity to investigate the subject in an area with great potential for circular practices.

Discussions

The landscape architecture practice Studio Oslo Landscape Architecture (SOLA) provided the opportunity for an informal discussion regarding their recent re-use project, Vollebekk Torg. Through using this site as a case study, I was able to highlight a variety of methods and strategies for sustainable material use that are being implemented in a live project in Norway. The discussion was also attended by another landscape architecture firm, EDIT, and the reuse designer Olaug Storlid from Circular Ways. This allowed for a conversation and questions that were posed by persons with architectural and design experience in Norway. Their contributions informed the development of principles that are practically suitable for application in landscape architecture practice.

Principles

In response to the research into circular methodology and future aesthetic concepts in landscape architecture, I created a set of principles for a circular landscape architecture project. Each principle was structured to highlight existing methods and proposed concepts for circularity in landscape architecture. The evidence of these principles being used in existing landscape architecture projects, both historical and contemporary, supports and illustrates their use. In response to some of the issues raised in earlier sections, I created a series of drawings of landscape typologies. The drawings demonstrated that the principles could eliminate these concerns, and address the themes raised at the global level of governance.

ABBREVIATIONS

ACAN - Architects Climate Action Network

JOLA - Journal of Landscape Architecture

NGBC - Norwegian Green Building Council

UN - United Nations

UNEP - United Nations Environment Programme

SDGs - Sustainable Development Goals

SECTION 01: SUSTAINABILITY ACROSS SCALES

Exploring the sustainability discussion and connecting themes, actions and solutions across scales of governance

In this section, I will explore the sustainability agenda across the scales of the global, regional, and local. Taking into consideration the title of the programme in which this thesis has been undertaken, Landscape Architecture for Global Sustainability. I wish to build an understanding of where landscape architecture exists within the current sustainability frameworks across scales and governmental or organisational structures.

From a glance there are many initiatives and campaigns pushing for sustainable development. Yet how do these impact the field of landscape architecture? I will be beginning at the global level. I will explore the conferences, agreements and initiatives that shine a spotlight upon the climate crisis, how it can be addressed through the different areas of industry, and which items can influence and support sustainable landscape architecture development. This investigation will then be explored through smaller scales until I reach the local levels for an investigation into how the themes, present at the global level, are implemented locally.

This framework will also include agendas relevant to the wider building sector and not purely the field of landscape architecture. This is to keep an open mind during research to explore concepts that could be appropriate for landscape architecture, but perhaps they have not been applied to the field. This isn't to say that the field is lacking in sustainable initiatives. Rather, it is that there are many interesting concepts within the wider field of construction, mostly concerned with the design of buildings and spaces inside. These concepts could, in their abstractness, be applied to the field of landscape architecture.

Beginning with the global.

At the global level, the issues that are affecting every nation are examined and actions to be taken are outlined in agreements and goals. The UN Sustainable Development Goals, the Paris Agreement, and the UNESCO World Heritage Convention have been selected as pivotal objectives for recognition of the necessity for sustainability.

PARIS AGREEMENT

The Paris Agreement sets out a global framework to avoid dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. It also aims to strengthen countries' ability to deal with the impacts of climate change and support them in their efforts.

(European Commission, no date b)

UN SUSTAINABLE DEVELOPMENT GOALS

17 Sustainable Development Goals (SDGs) were developed for the United Nation's 2030 Agenda for Sustainable Development. These goals were created to align all members of the United Nations in tackling serious concerns regarding social and environmental wellbeing. In particular, I am interested in those goals regarding the development of the built environment and the use, or rather the unsustainable exploitation of the earth's natural resources. The field of landscape architecture can be related to related to each of

these goals in some way. However, the goals that are the most strongly linked to the profession are listed in greater detail below along with a couple of highlighted targets that are especially important to landscape architecture development:

GOAL 9 Industry, Innovation, and Infrastructure

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

GOAL 11 Sustainable Cities

Make cities and human settlements inclusive, safe, resilient and sustainable

GOAL 12 Responsible Consumption and Production

Ensure sustainable consumption and production patterns

GOAL 13 Climate Action

Take urgent action to combat climate change and its impacts

GOAL 14 Life Below Water

Conserve and sustainably use the oceans, seas and marine resources

for sustainable development

GOAL 15 Life on Land

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

UNESCO WORLD HERITAGE CONVENTION

‘The convention recognizes the way in which people interact with nature, and the fundamental need to preserve the balance between the two’ (UNESCO, 2022a)

UNESCO aims to protect and preserve sites of global significance through designations to form the World Heritage List. The organisation also has a List of World in Danger which catalogues ascertained and potential danger to cultural and natural sites (UNESCO, 2022b). Dangers include: ‘significant loss of historical authenticity’, ‘severe deterioration of the natural beauty or scientific value of the property’, ‘threatening impacts of climatic, geological or other environmental factors’.

What are the sentiments of the global level frameworks, and how does this affect the landscape architect?

The landscape architect can help design spaces that address the impacts of climate change that have been highlighted by the Paris Agreement and the UN SDGs. Climate change alters our environments and the systems that occur within our landscapes. As these changes occur, the landscape architect must respond but also anticipate changes, thus creating a resilient landscape as per SDG 13. In a lecture given by Kathryn Gustafsson, the role of the landscape and the landscape architect, has been shifting to reflect global changes. The landscape must respond to environmental issues and incorporate initiatives that conserve and enhance ecosystems for biodiversity as per SDG 15. (Kathryn Gustafson, 2012). A presentation delivered by Elin Sørensen emphasised that the landscape architect need not stop their designs at the water edge. Instead, the landscape architect has the opportunity to assist in conservation of marine life within their project, making the marine environment more resilient to climate change and encroaching development, as per SDG 14.

As the urban environment develops, the landscape architect can be involved in the shaping of connections and accessibility between the existing and proposed development. This involves careful consideration of the environment that will be built upon, the signifiers of heritage and existing systems (for example ecological or municipal) within this area. These features can be interpreted as opportunities for resilience within the landscape as per SDG 11. Important actions that are noted in SDGs 9, 11 and 12, involves sensitivity in the built environment towards the design and construction process. Through enhancing connectivity, improving infrastructure and constructing new environments, there is reference to the resources, materials and products that are required to create these spaces. There is a necessity for using innovative materials and methods for improving sustainability in the urban environment: SDG 9 suggests that the life cycle of a material is analysed, and that progress should be a cyclical, rather than linear, approach through recycling and reuse.

Moving on to the regional, Europe.

At this scale, the initiatives set out by the European Commission have been outlined, with particular attention being paid to portions that reflect the global level and those actions that could influence the landscape architect. Here we examine the European Green Deal (and associated facets), the New European Bauhaus and the European Landscape Convention.

The European Green Deal

It was announced in 2019, that the European commission aims to create the first climate-neutral continent by 2050. The Green Deal is considered a 'lifeline out of the COVID-19 pandemic' (European Commission, no date a).

'We will reduce emissions by at least 55% by 2030'

Ursula Von Der Leyen, President of the European Commission

The deal has a list of actions in order to achieve these reductions in emissions whilst also transforming lifestyles and economies for more sustainable practices. These are organised into themes which include: Climate, Energy, Agriculture, Industry, Environment and Oceans, Transport, Finance and regional development, and Research and innovation.

The action I would like to highlight for the direction of this thesis is: *Protecting the environment and oceans with the Green Deal*, which seeks to prioritise:

- *protecting our biodiversity and ecosystems*
 - *reducing air, water and soil pollution*
 - *moving towards a circular economy*
 - *improving waste management*
 - *ensuring the sustainability of our blue economy and fisheries sectors*
- (European Commission, no date c)

Within this action, there are a series of further actions pertaining to this theme, I shall highlight a few of these:

Environment Action programme to 2030

This is the action which I believe is significant in informing the practices of landscape architecture. 'Biodiversity loss, climate change, resource use and pollution' are listed as some of the key challenges affecting the continent (European Commission, 2021).

European environmental policy is to be informed by the 8th Environment Action Programme (published in 2020). The objectives of this programme include:

- regenerative growth model
- zero pollution ambition
- protecting, preserving and restoring biodiversity, and enhancing natural capital.

To summarise, countries shall shift towards a circular economy, recognising the value of eco-system services. This means rehabilitating polluted areas, and conserving, establishing areas of biodiversity.

Waste and Recycling

Regarding 'improving waste management', the Green Deal acknowledges that there are opportunities within wasted materials. The European Commission argues that there are varying degrees of value as a resource in these discarded materials, yet there is the potential to recreate new materials 'easily'. It continues, stating that there is the technology to harvest these materials from demolition projects, (European Commission, no date a) This leads us to another one of the themes, the Circular Economy Action Plan.

The Circular Economy Action Plan

The Circular Economy Action plan is a part of The European Green Deal, aiming to reduce waste through reflecting on the lifecycle of products and implementing initiatives for reuse, thus improving sustainability across multiple

sectors. In this action, it is also acknowledged that there are opportunities in bringing used materials 'back into the economy'. The goal of this initiative is to protect the environment from the destructive nature of raw material extraction (European Commission, 2020b).

The plan also mentions construction and buildings, creating a 'Strategy for a Sustainably Built Environment, promoting circularity principles for buildings' (European Union, 2020). It is emphasised that the construction sector, due to the scale of the projects, often use large quantities of materials and produce large quantities of waste when sites undergo demolition.

Construction and buildings accounts for about 50% of all extracted material. The construction sector is responsible for over 35% of the EU's total waste generation.
(European Commission, 2020a, p. 11)

The plan outlines the strategy for this sector, focusing on not just the lifecycle of materials but also the lifecycle of the building. Numerous software and assessment methods are suggested to assist in developing a circular built environment.

European Landscape Convention

Perhaps one of the most directly linked to the field of landscape architecture, the European Landscape Convention acknowledges that developments across many industries are ‘accelerating the transformation of landscapes’ (Council of Europe, 2000, p. 2). The convention outlines the significance of the landscape in cultural identity and in the quality of life, thus determining the necessity of protecting environments and cultural heritage through sustainable development.

New European Bauhaus

Based on the values, aesthetics, sustainability and inclusivity, the program had been developed to ‘connect the European Green Deal to our living spaces and experiences’ (New European Bauhaus, 2022) Through creating a space for networking, sharing concepts and projects, access to funding, ‘The New European Bauhaus Initiative offers an opportunity for a participative approach to the many issues surrounding materials and their use’ (Gkoltsiou et al., 2021, p. 12).

Examples from the New European Bauhaus will be explored in section 04, Circular Principles.

Reflections on the themes within the regional level?

At the regional level, a concerted effort has been made for strategically interpreting the global themes. As a result, initiatives have been published in order to accelerate the move towards sustainability. The theme I find most interesting at this level is the discussion of the circular economy which is mentioned in many of these deals and actions as the framework that should be adopted across the region. The aesthetic is also mentioned as another value to be recognised in sustainable development. Within the European Landscape Convention there is consideration of the visual as well as experience of the landscape, in addition to this is the New European Bauhaus highlighting the aesthetic as a core value on the agenda. Circularity provides a frame within which to focus the design process, meanwhile, scrutinising the aesthetic of the sustainable design is providing an additional layer to the landscape for the architect to reflect upon when designing. Therefore, it must be queried, what is the role of the aesthetic within sustainable landscape architecture? I will return to this question in the next section of the thesis.

Norwegian Focus.

At this scale, the agenda of the regional level is manifested in local initiatives, organisations, and communities.

As discussed, many of the global and continental initiatives indicate a transition to a circular economy will help to tackle the severe climate issues outlined in these agreements. Looking at a smaller scale once again, I examine the local context of Norway. Although the country is not a part of the European Union, there is still a connection through the Schengen area. Kozminska (2020, p.1) illustrates that the country has already adopted circular principles, and there are case study sites that, ‘*prove the principles of the circular economy can be successfully incorporated in the built environment and serve as an inspiration for further development of circular architecture and sustainable cities.*’

Through informal discussions with practicing planners and urban designers – based at the UK landscape, planning and urban design firm DEFINE – their key concern with sustainable initiatives is the ‘push-back’ for ‘non-standard’ projects. They voiced the difficulties with advocating for more sustainable practices within systems that are organised to manage existing practices,

which do not necessarily match the circular economy principles. There can be issues with insurance procurements, legal culpabilities, uncertainty over construction efficiency and costs when adopting new sustainable methods or products. All of these issues may be possible to resolve, but as mentioned in our discussion, the risks can be off-putting to the client and or local governing bodies. There is a lot to unpack from this informal discussion, and many factors that will be context dependent. However, it did highlight an interesting aspect that will be hugely influential to the advancement of circular economies, the national and local systems that form the contextual framework.

Returning to Kozminska’s work, the Nordic countries have been identified as the area with the most suitable existing frameworks that would allow for an easier transition to a circular economy. There are various organisations that are already researching and advising on circular economy initiatives within Norway:

Circular Norway

The Circular Norway group is responsible for creating the Circularity Gap report. This document details the areas in which Norway could make gain in advancing to a circular economy. The report demonstrates that Norway 'has one of the highest global rates of consumption per capita' (Circular Norway, 2020), this is despite the country having high awareness of sustainable practices and responsibilities (Kozminska, 2020).

Norwegian Green Building Council

The NGBC aids uptake of environmental building certifications, such as BREEAM. The organisation also publishes guides for projects to help them select the healthiest products and methods for reducing their carbon footprint. One such document is the Green Material Guide (version 3 published in 2021), this document outlines categories of materials, before articulating the pros and cons of each material through gradient scales.

Neighbourhood Level

Following the thread from the global down to the local scale, there are projects occurring at the city level and the neighbourhood level that reflect the objectives of the UN SDGs, European

Commission, and the national circular initiatives. An example of these projects are Pådriv, who also have projects within the Hovinbyen Area, such as Sirkulær Ressursentral. This area is under development with the intentions of creating a new district that adheres to these sustainable principles.

Pådriv Sirkulær Ressursentral

An initiative based in the Hovinbyen redevelopment area in Oslo. The project hopes to create a space in which circularity within the construction industry can be developed and increased within Norway. The site will consist of 'warehouses, offices, workshops, teaching and conference rooms' (Pådriv, 2022)

Resirqel AS

A company which maps, surveys and stores materials for reuse. They provide support and expertise to projects seeking to reuse materials and contribute to a circular economy. (Resirqel, 2022)

Vollebekk Fabrik

An initiative revitalising unused spaces to create spaces that support sustainable community development. This includes facilities which help to promote a circular economy. (Vollebekk Fabrikker, 2022a)

How can the landscape architect engage with the local institutions?

These local organisations can provide assistance in implementing a project with sustainable and circular principles. Through utilising their experience and knowledge of materials, the landscape architect can learn and adapt a project for the circular economy without having to research the process from scratch.

By connecting with these local groups can also embed a project within its local context, something which responds to the sustainable development, strengthening resilience, through creating a space which has had the input and care of the local community.

Reflection on the objectives found across the global and local scales

These examples on global, regional, and local scales, are just a small sample of initiatives and organisations that are addressing issues around sustainable development. However, these examples were selected to illustrate that there is a call for circularity across all these scales. Through examining these proposals, the reasons for circularity touch upon several themes not just the construction industry. It also includes the conservation and preservation of nature, which is why it seems so appropriate for the landscape architect to be engaged with circular processes. It is with this understanding that I now search for existing research and examples of circularity in landscape architecture.

'... the "landscape approach" as a way of helping address such challenges is evident'

(Fairclough, 2021, p. 208)
- on the UN Sustainable Development Goals

Existing Research into Material Circularity in Landscape Architecture

The intention for this is to reflect on the investigations of my peers before choosing areas which I would like to explore further. These theses have been selected for their relevance in my area of interest: materials, the design cycle and their interviews with practitioners in the field. I believe that it is particularly important to have the perspectives of those working within the field of landscape architecture in Norway as this gives insight into the industry in the local context of this research.

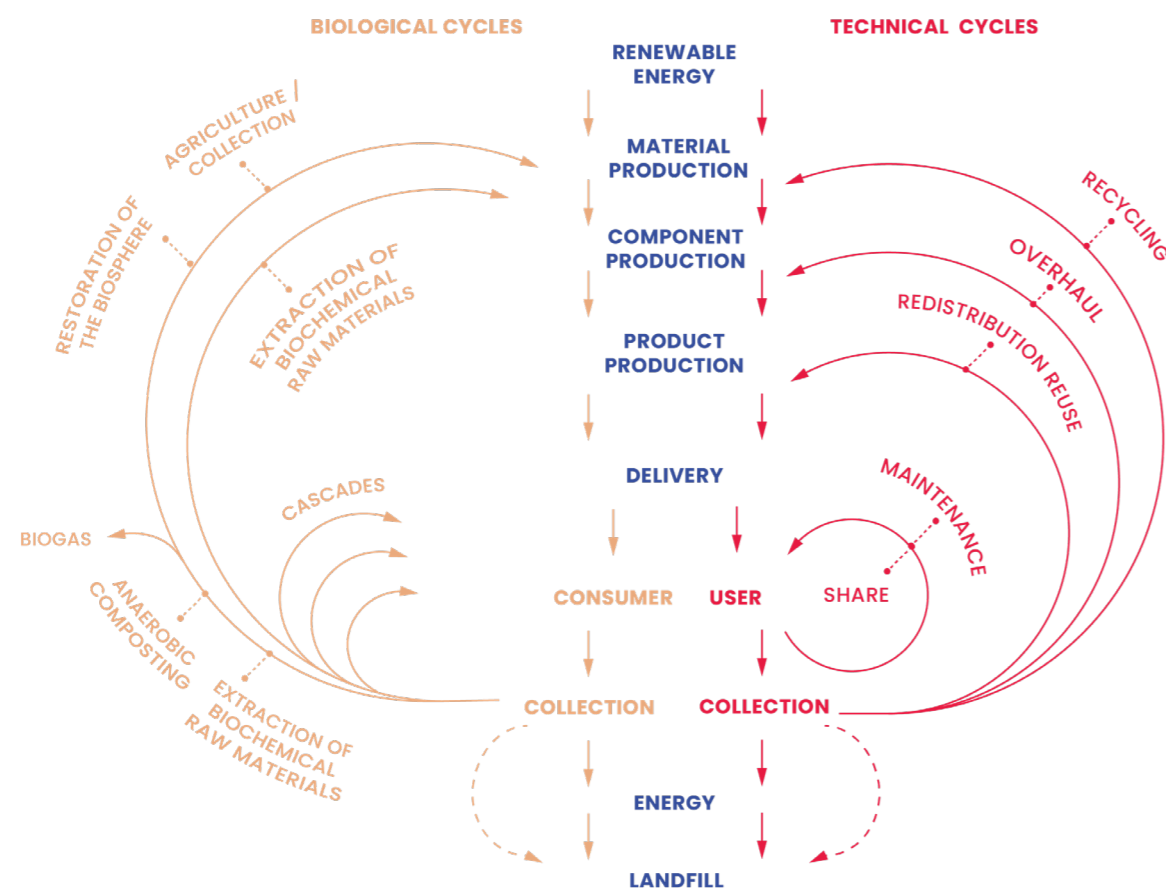


FIGURE 01: The Circular Economy Butterfly Diagram, based on diagram by Myklebust & Gagnat (2021, pp. 30-31) and Ellen MacArthur Foundation's Butterfly model (2019)

The Circular Economy

Within their thesis research, Myklebust and Gagnat (2021) explore the incorporation of the circular economy principles into the design process for landscape architecture. The circular economy is best explained through its comparison with a linear economy. A linear economy is the extraction, processing of resources and use of products before they are discarded as waste. The circular economy prevents the products becoming waste, instead encouraging reuse or re-processing the re-sources from the product, thus creating a cycle (Myklebust and Gagnat, 2021, pp. 26-27). This cycle is explained in figure 01, which is a translation of Myklebust & Gagnat's own diagram which was based on the Ellen MacArthur Butterfly Model. This diagram explains that biological and technical cycles in circularity operate differently but share the same principle that materials flow through a closed loop. Through this concept, the perception of materials, and how we design with them, can be reevaluated. Once something reaches the end of its life cycle in a project, is it really waste? Alternatively, how can it be reimagined and reused? To answer these questions, Myklebust and Gagnat (2021, pp. 30-34) describe the necessary reflection on the design cycle as reimagined in figure 02. This

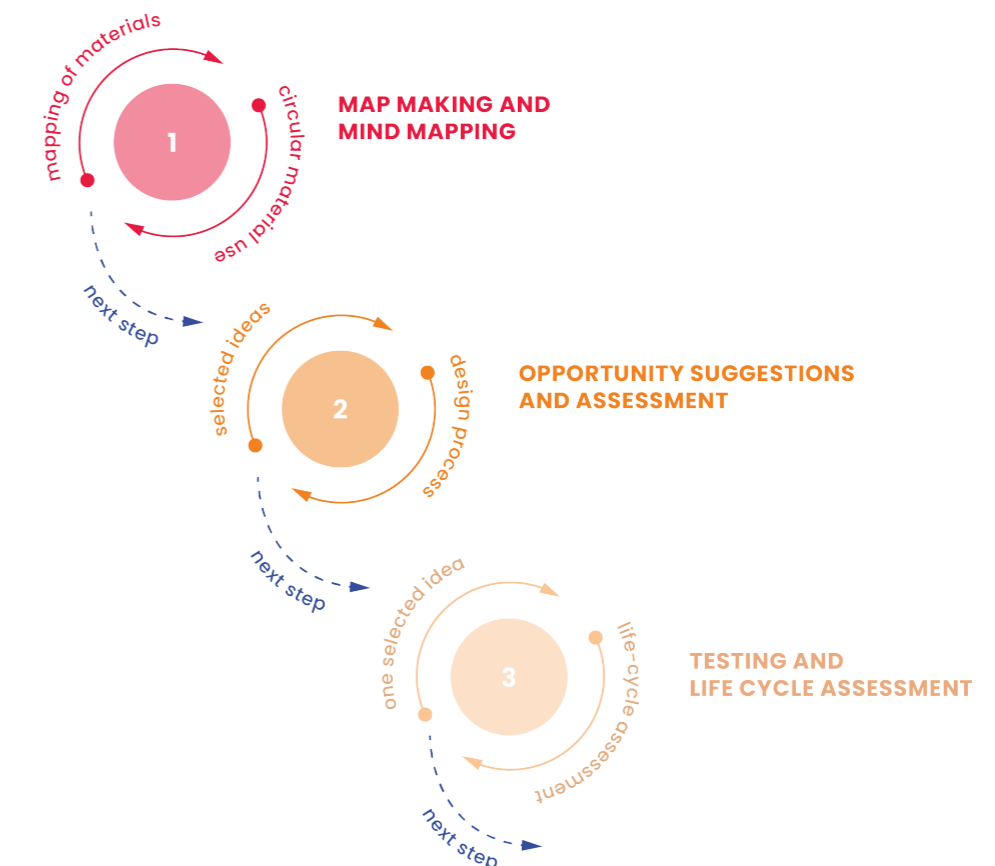


FIGURE 02: The design process for circularity, based on diagram by Myklebust & Gagnat (2021, pp. 18-19) Translated by Molly Andrews.

process indicates a stage before and after the design process. As opposed to selecting materials at a later stage. This first involves the mapping of materials, then once the design has been confirmed, the life-cycle of the materials requires documenting for future use.

Myklebust and Gagnat also query the aesthetic of materials within circular design (2021, p 35). The authors present a positive and opportunistic case for reuse materials, noting the historical and cultural benefits. As noted earlier, the aesthetic has been a recurring theme within sustainability discussions. It is described as valuable component, but I would like to understand to what extent?

Reuse in landscape architecture

Similarly to Myklebust and Gagnat, Krogh examines in depth the connections between circular reuse of materials and the opportunities for improving both social and environmental sustainability. Krogh also discusses the aesthetic component in reusing materials, acknowledging that this is 'subjective'. He highlights the concerns over the appearance of worn materials being perceived as 'unsightly', and a globalised societal preference for polished, stainless surfaces (Krogh, 2014, p. 20).

This perception was demonstrated in a survey which was conducted to understand the attitudes towards material reuse by landscape architects, the concerns about reuse was summarised as follows:

'Many stated that they were uncertain about the benefits of reusing materials and that it could not be justified aesthetically.'
(Krogh, 2014, p6)

This statement is contested by Krogh, who also presents the historical and cultural aesthetic benefits of reusing materials, and the worn appearance should be celebrated instead. His sentiments are echoed by Rotor, a design practice which has researched the perception of wear of materials. The wear of material or surface can signify many things to the individual experiencing a space: *'As a trace of use, wear reminds us that most of the time other users have gone before us, and still more will follow.'* (Boniver et al., 2010, p. 17). Rotor explore the concept of 'negotiating wear' through our design, sometimes wear signifies disrepair which evokes unease (Boniver et al., 2010, p.96). However, Rotor explain that there are other instances, such as a worn hiking trail, is a comfort to the user (Boniver et al., 2010, p.91-92). How can we anticipate these perceptions of wear in design?

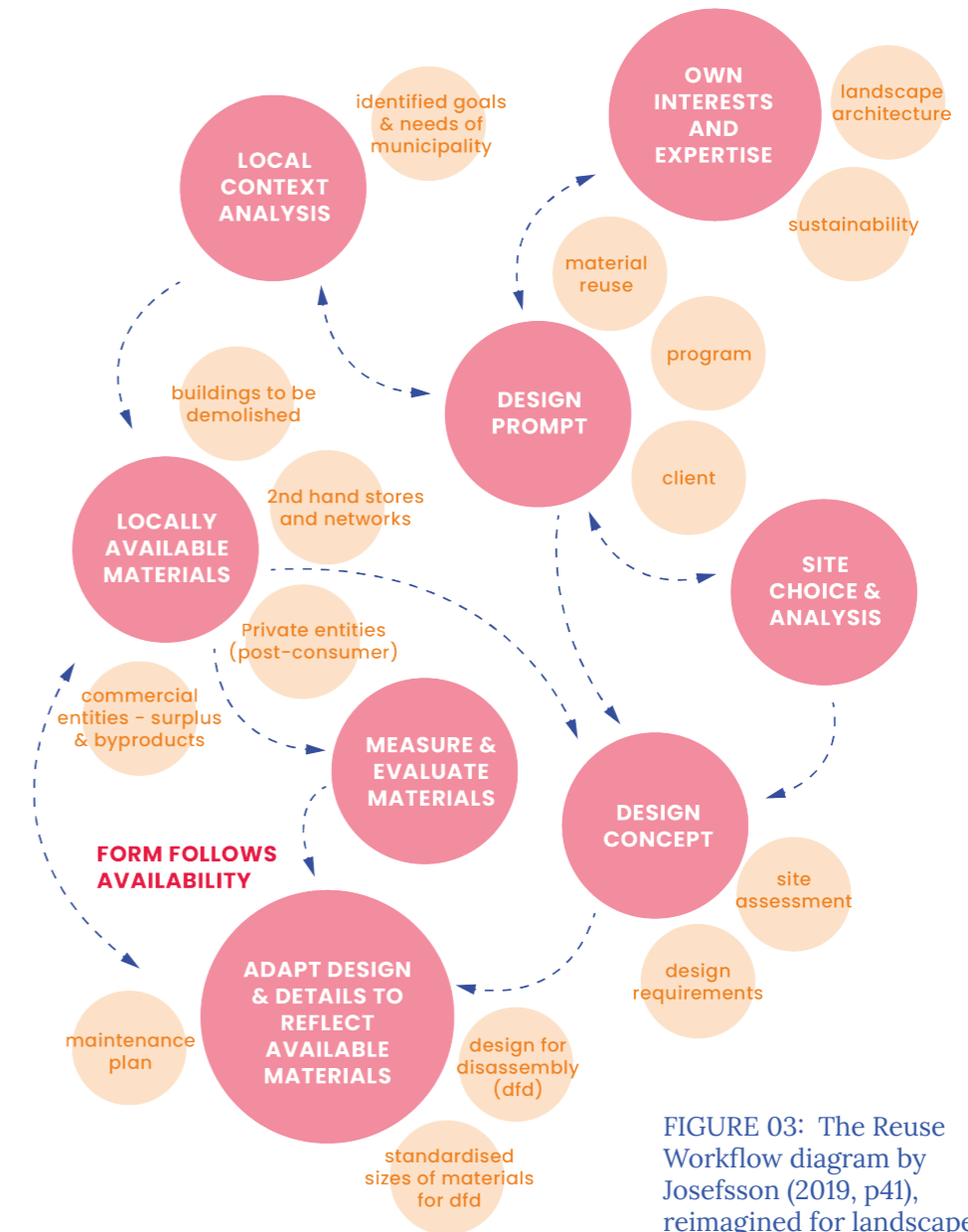


FIGURE 03: The Reuse Workflow diagram by Josefsson (2019, p41), reimagined for landscape architecture

System design for circularity

Perhaps one way to anticipate or negotiate wear is through the strategic design of a space, creating spaces that intentionally incorporate wear. In her research, Josefsson (2019) uses a framework of systems thinking, as illustrated in figure 03, and analysis to examine the material flows within a region. Then, using a harvest map and Life-Cycle Assessments of materials, determines the most appropriate materials for constructing a new office building (Josefsson, 2019, pp. 40-63). Some of these materials are collected from forecasted local demolition sites, old barns no longer in use, and local sustainable materials within a certain radius from the site. The assessment of these materials, allowed for Josefsson to create a design strategy 'form follows availability', the title of the thesis. This meant that the final design of the building was shaped by the palette of materials and their capabilities, rather than selecting materials to serve the design.

Summary of Section 01: Sustainability Across the Scales

To summarise the research in this section, I have created a diagram which highlights the themes and actions across each scale.

At the global scale, there are instructions for tackling sustainability, then throughout the scales these actions are interpreted as actions, solutions and interpretations. These actions are then facilitated through infrastructure at the local level, before being utilised and incorporated into disciplines which directly shape the environment (in this example, landscape architecture).

Whilst this is an illustrative impression of the cascading connections of sustainability, each scale will have more wider reaching examples of themes than those shown here. The key idea that this diagram illustrates, is that there is a global to disciplinary framework for implementing more sustainable development. The next step after the landscape architecture column is, how are these ideas being realised in the physical environment?

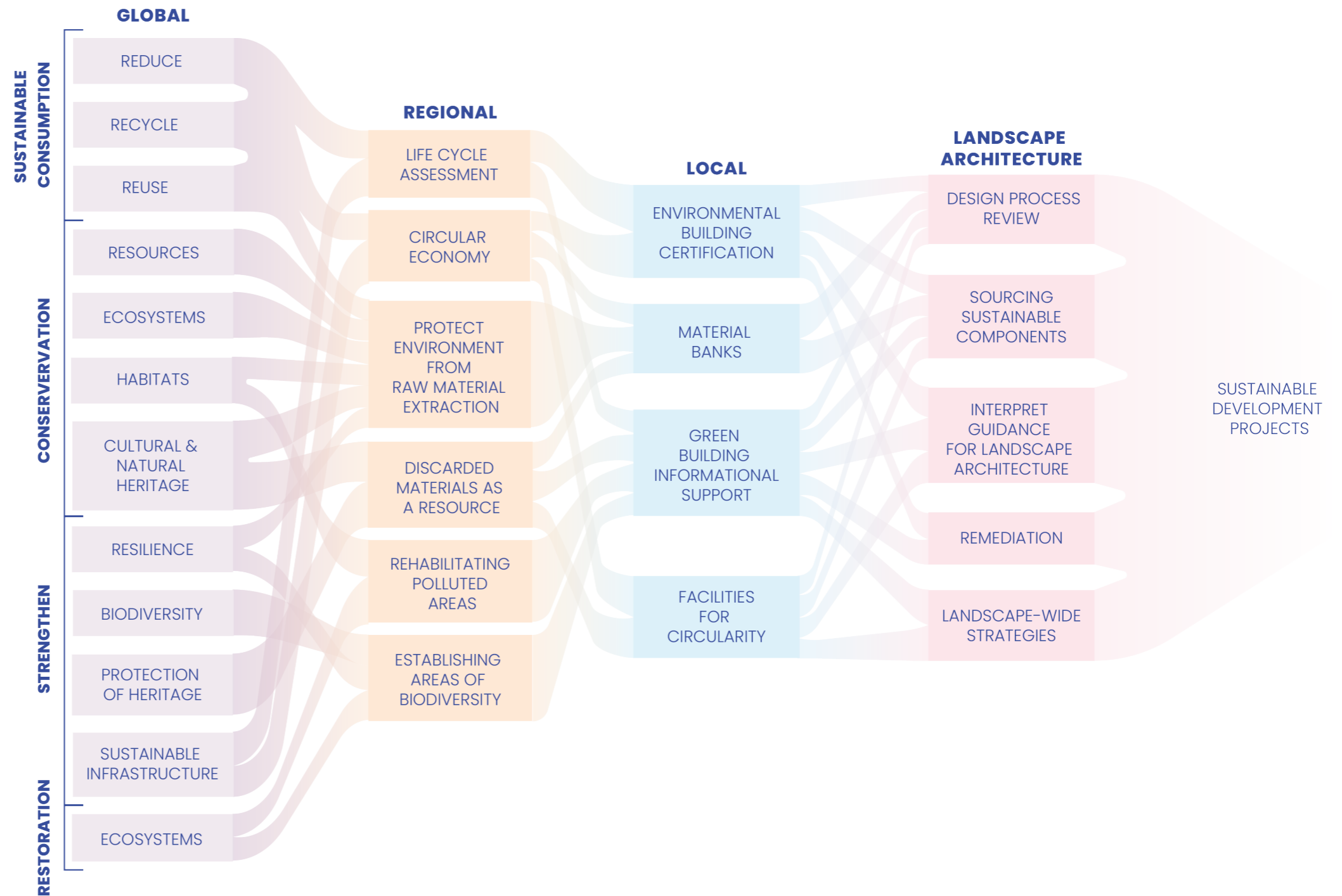


FIGURE 04: Global to local connections of sustainability. Diagram by Molly Andrews

Reflecting on this research thus far, I believe that there is room for discussion regarding what aesthetics, qualities and value mean within the landscape, especially in relation to the development of sustainable practices. These terms have appeared throughout the literature thus far regarding material reuse and aspirations for change in the construction sector.

My questions are:

What is the significance of aesthetics in the sustainable landscape?

Does the future landscape reflect the shifting values and perceptions of the content in the landscape?

To begin, I feel that it is necessary to explore the meaning and context of the term aesthetics. Simply reading through literature in preparation for this writing revealed that there are many interpretations. Some of these are dependent on the writer, field of research and the time of writing. Generally speaking, the term aesthetic means the experience of beauty (Scruton, 2020; Cambridge Dictionary, 2022; Merriam-Webster

Dictionary, 2022), and its origins are in the Greek word *aisthesis*, meaning 'sensory perception' (Hvattum, 2010, p. 139; Scruton, 2020).

In philosophy, the subject of aesthetics has been expressed through various 'realms' of experiences; 'of the beautiful, the ugly, the sublime, and the elegant; of taste, criticism, and fine art; and of contemplation, sensuous enjoyment, and charm' (Scruton, 2020). These realms reflect the development of aesthetic theory, some of these still influence the perception of the built environment today (Bakshi and Gallagher, 2020, pp. 26–27; Fairclough, 2021, p. 205). These developments have been due to cultural movements. An example of this is the romantic movement within art, landscape, and architecture in Norway in the 1800s (Berg, 1996, pp. 40–41; Lysholm and Berre, 2010, p. 23; Haverkamp, 2021). During this time, art captured peaceful, rural scenes (figure 05); wild, idyllic nature – the experience of the beautiful (as seen in figures 06 & 07); and dramatic depictions of mountains – the experience of the sublime (as seen in figures 08, 09 and 10).



FIGURE 05: 'Fra Løkkeveien i utkanten av Stavanger' by Lars Hertervig, drawing from 1858. Image source: Nasjonalmuseet (Hertervig, 1858)



FIGURE 06: Drawing by Lars Hertervig from 1863, Image source: Nasjonalmuseet (Hertervig, 1863)



FIGURE 07: 'Landskap med elv' by Hans Gude, 1863. Image source: Nasjonalmuseet (Gude, 1863)



FIGURE 08: 'Island Borgøya' by Lars Hertervig, 1867.
Image source: Nasjonalmuseet (Hertervig, 1867)



FIGURE 09: 'Fra Aurland i Sogn' by Thomas Fearnley
1832. Image source: Nasjonalmuseet (Fearnley, 1832)



FIGURE 10: 'Fjellidal' by Hans Gude 1848.
Image source: Nasjonalmuseet (Gude, 1848)

These images presented a romanticised version of reality which have since been argued as non-existent and certainly something that we cannot replicate today (Hvattum, 2010; Fairclough, 2021). If the same scenes were depicted today, these scenes might feature elements of modern infrastructure or urbanisation. Yet, these images from the 19th century still influence our own perception of the landscape, and what we nostalgically assume it should be (Bakshi and Gallagher, 2020, pp. 26–27). From this bias, we will identify landscapes that do not fit our idea of a beautiful landscape, as unpleasing. However, as these paintings presented an idea of nature that cannot be restored – as it did not exist – (Miles, 2014, p. 34) this complicates our relationships with nature and constructed landscapes today as we strive for nostalgia over reality (Meyer, 2008, p. 16; Bakshi and Gallagher, 2020, p. 25).

Recent interpretations of aesthetic, concentrate on the visual, 'artistic problems' (Scruton, 2020). Hvattum (2010, p140) goes as far as to say that context has been ignored and aesthetics debates have been reduced to a simplified 'ugly vs

nice'. This does not reflect the origins of aesthetic as something more than the visual, as embedded knowledge.

Reflecting upon the romantic period and contemporary aesthetics, I believe it is possible to draw parallels between the romantic period with images displayed on social media today. The ways in which images are representing landscapes, also influences our expectations of our environments. In the same way that painting could create a certain impression, the editing of images can also create a biased impression of a landscape. In both instances, the actual experience of the landscape in person could be very different to the curated image presented through social media or in an 18th century painting. Does this mean that the knowledge expressed through the aesthetic experience of the landscape is being overlooked?

Landscape Aesthetics

Within landscape and architecture theory, aesthetics is considered to be the experience of knowledge, a sensory learning through the environment surrounding the individual. (Nohl, 2001; Murphy, 2005; Hvattum, 2010). Therefore, aesthetics is of significance to the field of landscape architecture, a field which shapes the environment, that is then *'interpreted as a bodily experience'* (Lysholm and Berre, 2010, p. 25).

There have been interpretations of landscape aesthetics that organises the overall appearance and function of the landscape into categories. For example, in 2000, John Dixon Hunt established the concepts of first, second and third nature (Williamson, 2021, p. 151). Each category represents a landscape typology which contains varying degrees of human intervention:

First Nature	'primal nature wilderness unaffected by humans and comprised of raw materials 'from which "second nature" might be fashioned.'
Second Nature	'nature transformed as a consequence of practical human activity.' 'The cultural landscape: agricultural, urban developments, roads, bridges, ports and other infrastructure.'
Third Nature	'created by aesthetic landscaping, by conscious design – gardens and ornamental parks.'

(Text from Williamson, 2021, p. 151)

FIGURE 11:
An example of First Nature.
Photograph by Molly Andrews

Norwegian wilderness, this photograph shows little indication of human interference apart from a trodden pathway.



FIGURE 12:
An example of Second Nature.
Photograph by Molly Andrews

Rural Scotland, this image displays agricultural nature: ploughed fields enclosed in a hedgerow and fenced boundary.



FIGURE 13:
An example of Third Nature
Photograph by Molly Andrews

The Italian Garden on campus at the Norwegian University of Life Sciences. Featuring ornamental planting, ponds and a fountain.



Upon reading about these categories, I was struck by the thought that these categories may no longer exist. It has been determined that ‘the earth is so profoundly changed’ that we have left the ‘12,000 years of stable’ geological epoch of Holocene: around the 1950s we entered The Anthropocene (Carrington, 2016). The Anthropocene now implies that first nature no longer exists due to the impact of humans on the environment (Prominski, 2014, p. 7), therefore, there is no longer a nature that has been ‘unaffected by humans’. (Williamson, 2021, p. 151)

Meanwhile, second and third nature are now entangled, by necessity. Landscape architects advocate that the conscious design (third nature) now needs to incorporate the functions and infrastructure of second nature to address the Anthropocene (Kathryn Gustafson, 2012; Gill et al., 2020, p. 5; Fairclough, 2021, p. 209) Thus, second and third nature cannot be recognised as separate categories.

These thoughts have already

emerged in recent debates in landscape architecture which seek new concepts of nature to reflect the new epoch. Anita Bakshi and Frank Gallagher (2020), discuss the concept of a Fourth Nature, which is ‘representing adaptation to the forces shaping the environments of the Anthropocene’ (p. 26).

Within their discussion, they mention several discourses, or parallels, which the new nature concept addresses. These parallels reflect the concerns of humans versus nature, they include ecology and aesthetics, as well as culture and nature. These notions have been historically separate fields, (Spirn, 1995, p. 250; Miles, 2014, p. 34; Prominski, 2014, pp. 6–19), yet the fourth nature creates a space which accommodates these equally.

Sites of fourth nature contain remnants of human activity, they might be considered derelict sites which are undesirable and unattractive. However, the existence of these remnants is a signifier of cultural and social

Fourth Nature

‘Sites of formerly intensive human use that have been recolonized by plant communities’
(Bakshi and Gallagher, 2020, p. 24)



FIGURE 14: An example of Fourth Nature, Südgelände Park in Berlin, where the old railway lines have been preserved and converted into pathways, the nature has been left wild. Photo by Matthew Gandy (Poon, 2022)

heritage, a window into the past functions of the area. Now abandoned and overgrown, nature has reclaimed the area. In these spaces, plants have thrived in unusual conditions, possibly even contaminated spaces (Kirkwood and Kennen, 2015, pp. 3–8; Bakshi and Gallagher, 2020, pp. 28–29).

Bakshi and Gallagher feel that it is important to recognise these conditions, and the impressive perseverance and adaptive power of nature in spaces that have little to no interference from humans. They propose that the unique situation of Fourth Nature sites, demonstrates the blending of *'natural, cultural and social aspects'* (Bakshi and Gallagher, 2020, p. 26), which can be utilised to inform a new design aesthetic. As opposed to the romanticised image of past nature, this would accurately reflect contemporary issues in our landscapes. The design concept involves the appreciation of the context and legacy of the site. This includes its current conditions, understanding that landscapes are temporal (Meyer, 2008, p. 19), the site heritage is ever evolving, rather than a fixed era in time which cannot be restored. Yet, there is still demand for the naturalistic and picturesque, even if this means creating landscapes that require intensive amounts of maintenance:

'and pursuing visions of purity as defined by a legacy condition requires huge and constant investments of time, energy and money will stop this becomes a fight against nature, rather than design with nature. Designing with forth nature landscapes must balance dynamic trajectory and processes within human use.'

(Bakshi and Gallagher, 2020, p. 30)

Breaking away from these ideals, there is an opportunity in the fourth nature aesthetic for education and experience of a nature which accurately reflects the Anthropocene era. By adopting this concept, the landscape architect may allow public access into these spaces. Through landscape architecture interventions, people are presented with an honest landscape aesthetic in which the experience, of the embedded knowledge, educates the individual on the true human impact of nature, its resilience and hopefully advocacy for better care of our landscapes.



FIGURE 15: Example of Fourth Nature, disused railway in Sarpsborg. Photograph by Molly Andrews



FIGURE 16: Example of Fourth Nature, vegetation growth in industrial area, Sarpsborg. Photograph by Molly Andrews

Future Landscape Aesthetics



FIGURE 17: Østre Aker Church in 1937 (Image source: Finn Kart)

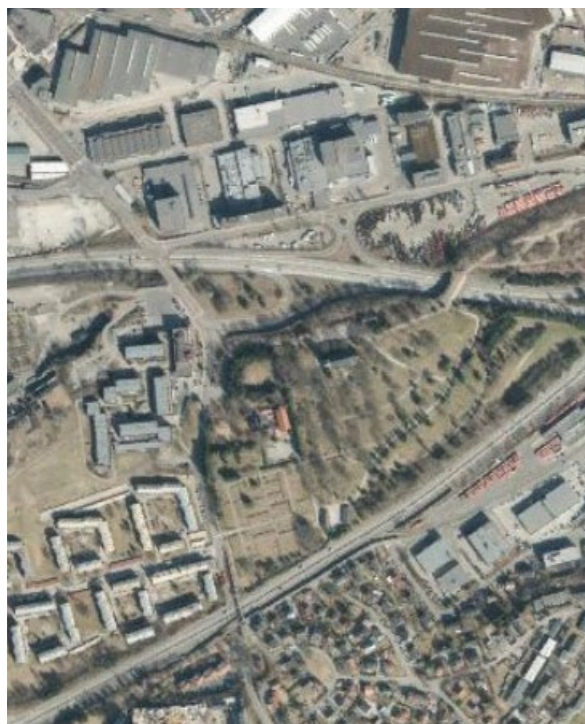


FIGURE 18: Østre Aker Church in 1984 (Image source: Finn Kart)

Continuing to investigate new concepts of nature, I would also like to explore the work of Werner Nohl (2001), who has created a set of categories for future landscape aesthetics ‘under sustainable landscape conditions’ (p. 230). I have selected this work for this reason, in connection with the sustainable development and circular principles outlined in section 1.

Nohl explores landscape aesthetics through a reflection on the development of aesthetics and landscape features over time. He argues that historic landscape features and local identities are becoming lost in the landscape, through the interruptions of new, larger scale additions, creating imbalances. To summarise, the globalisation of industries requires expansion of production and infrastructure which results in a larger scale of features in the landscape. The perception and understanding of the landscape changes as the original, smaller scale cultural landscape features are either lost or overshadowed:

‘This separation of functions ensured that the original comprehensive character of landscape was lost’

(Nohl, 2001, p. 224),

The beholder is alienated from their surroundings, ‘expected to relate visually to an abstract overscaled and repetitive landscape’ (Nohl, 2001, p. 226).

His critique of the modern landscape leads Nohl to a contemplation of the aesthetics in the future landscape, with a comparison to the balanced aesthetic scenery of the traditional landscape. If the traditional landscape was compiled of functional infrastructure that created pleasing aesthetic qualities, then, there is an opportunity in the future landscape – which must be fundamentally compiled of sustainable functions – to also be aesthetically appealing.

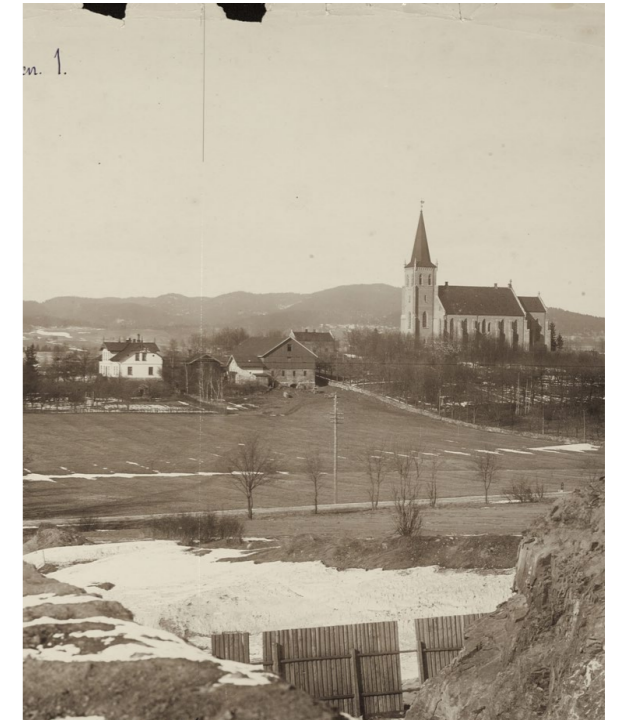


FIGURE 19: Østre Aker Church, ‘Fra Raskeløkken ved Strømsveien 1. Fotografering - 1899’ (Image source: DigitaltMuseum and Oslo Museum, 2016)

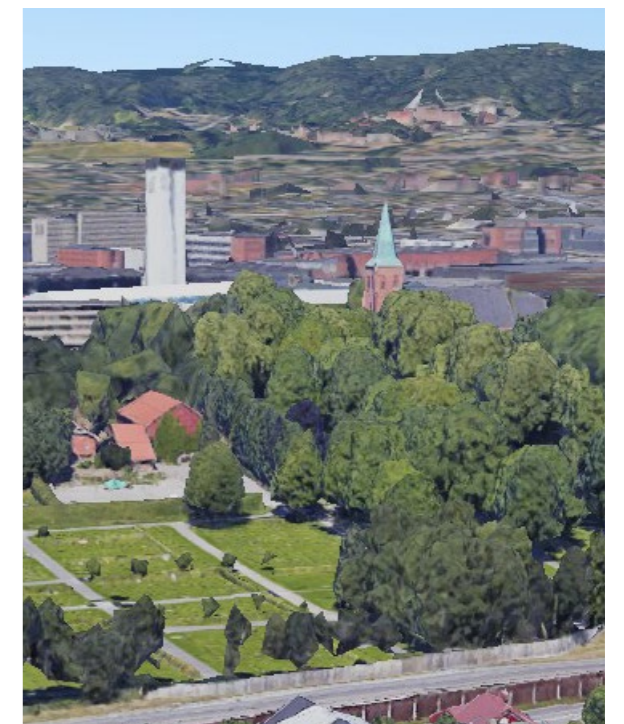


FIGURE 20: Østre Aker Church in the present day. (Image source: Google Earth image capture)

To address the imbalances in the landscape whilst also acknowledging sustainable developments, Nohl's aesthetic categories (figure 21) create a framework in which the composition of our landscape can spark 'aesthetic joy' once again. I have selected images to represent each of these categories which can be found on the following pages. I am introducing these categories now within the discussion of landscape aesthetic theories; however, I will return to these later when I explore the aesthetic opportunities in sustainable, circular design.

Similarly, to Bakshi and Gallagher's work, Nohl reflects on the role the romanticised image of the overwhelming, humbling landscape, using the term 'the sublime'. The category called 'The (new) sublime' can be compared to the concept of Fourth Nature, featuring 'patterns of spontaneous, wild or overgrown nature' (Nohl, 2001, p. 230). The (new) sublime inherits the intentions of the original sublime, nature humbles the beholder. To reiterate, the effects of fourth nature is also

humbling, demonstrating the power and capabilities of nature. Whilst the (new) sublime might share the same principle as the sublime, the key difference is the state of the nature being experienced. Nature in the (new) sublime humbles the beholder through their understanding the scale of human impact on the environment..

Throughout the work of Anita Bakshi and Frank Gallagher, and Werner Nohl, it was interesting to see the culture, aesthetics, and sustainability themes that were identified in section 1. The significant role of aesthetics in our landscapes, our perception and experience of these spaces, indicates it has the potential to have a positive impact on sustainable development.

FIGURE 21: Table on right page, 'Aesthetic perceptual categories under sustainable landscape conditions' Text from Nohl, 2001, p. 230.

Aesthetic perceptual category	Narrative aspects of landscape as aesthetic percept (perceptual and symptomatic effects of landscape)	Poetic aspects of landscape as aesthetic percept (expressive and symbolical effects of landscape)	Landscape prototype
The beautiful	Culturally caused typical patterns of order, consisting of natural and man-made elements, allowing an easy recognition	<ul style="list-style-type: none"> - blissful feelings (eudaimonic feelings) of harmony, identity, of being part of a whole, - symbol of 'home', safety, and of being socially integrated 	Traditional cultural landscape
The (new) sublime	Unusual patterns of spontaneous, wild or overgrown nature, demonstrating self-dynamics, self-organisation and self-productivity of landscape	<ul style="list-style-type: none"> - pleasant feelings towards „disharmony”, „disorder”, unsteadiness, and surprisingness, - symbol of freedom, of the alien and the different 	Succession landscape
The interesting	Chaotic multiplicity of (apparently) disintegrated elements and structures mostly of technical origin	<ul style="list-style-type: none"> - Thrill (exciting feelings) for risk, uncertainty, and (limited) „catastrophe”; - Symbol of necessary technical progress 	Urban-industrial landscape
The plain	Simple, coarse-meshed patterns with repetitive, yet rich and natural (subdividing) structures	<ul style="list-style-type: none"> - Comforting feelings of contentment, of gratitude; - Symbol of existential usefulness, of the reconciliation of technical progress with nature 	Rural functional landscape (e.g. modern agricultural landscape)



FIGURE 22: Example of 'the beautiful'
UNESCO World Heritage Site Abbey Lorsch, by hg merz Architekten and Topotek 1
(Image source: Joosten, 2021)



FIGURE 24: Example of 'the interesting'
Jewellery Quarter Station, Birmingham, 2020. (Photograph by Molly Andrews)

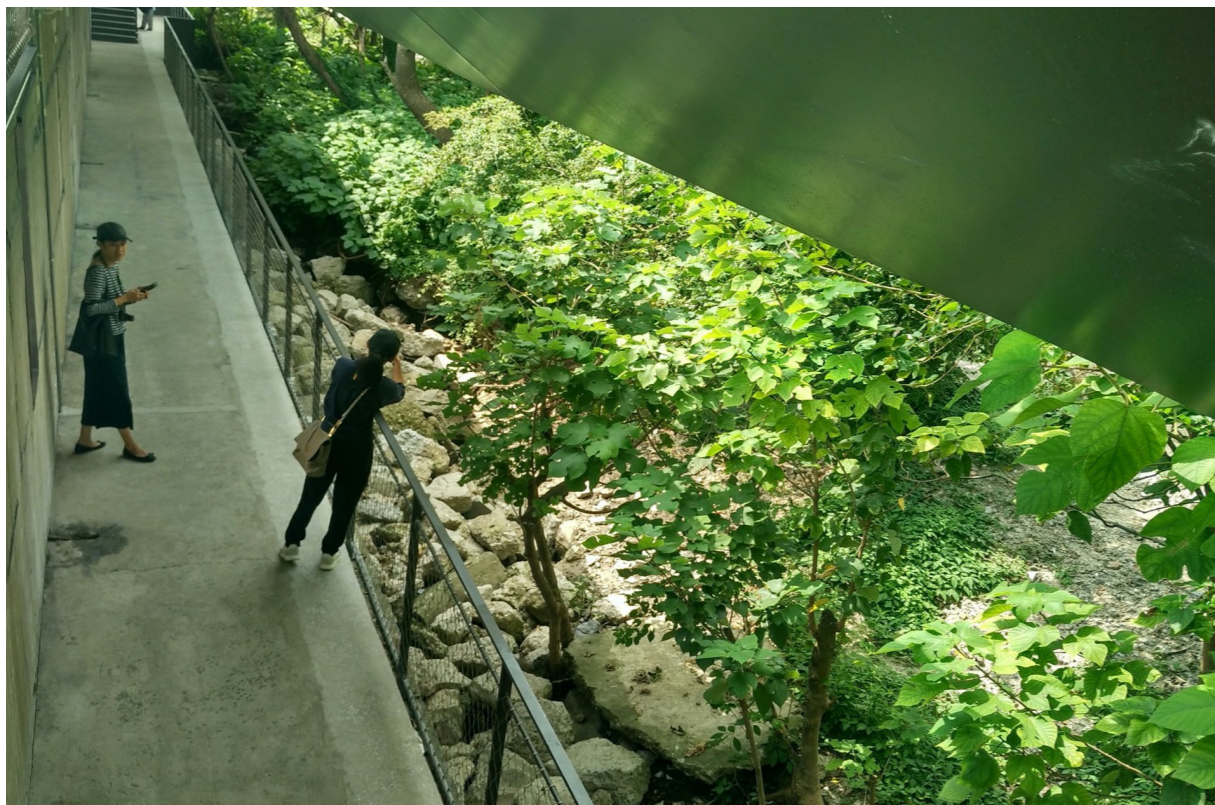


FIGURE 23: Example of 'the (new) sublime'
Edge Garden by YIYU design, 2019. (Image source: YIYU design, 2022a)



FIGURE 25: Example of 'the plain'
Ås, Norway, 2021. (Photograph by Molly Andrews)

Reflection on the relevancy of aesthetics within landscape architecture

As the leading line of research, I was intrigued to see that the term aesthetic and its synonyms are mentioned throughout documents associated with the various climate agreements and deals, as well as local building legislation (Myklebust and Gagnat, 2021). The New European Bauhaus initiative places aesthetics centre stage as one of the three ‘inseparable values’ of the competition. The project hopes to ‘to imagine and build together a sustainable and inclusive future that is beautiful for our eyes, minds, and souls’ and describes aesthetics as: ‘aesthetics, quality of experience and style, beyond functionality’ (European Commission, 2022)

Interestingly, the aesthetic is being valued within the sustainability development process, yet it was only in 2008 that there were concerns that this component was overlooked:

‘Sustainability stands on three pillars, we are told: ecology, social equity and economy. and the ecological operates in relationship to social justice and capitalist profit, but not aesthetics.’

(Meyer, 2008, p. 7)

This demonstrates a shift in the understanding of sustainable



FIGURE 26: Tile print design inspired by William Morris. (Image source: The William Morris Society, 2022a)

development, moving away from a perhaps limited concept of the sustainable aesthetic, towards the recognition of many aesthetic opportunities in sustainability. Yet the excerpt from the New European Bauhaus reveals that the contributions of the aesthetic experience towards sustainability has not been fully recognised. Through describing aesthetics as a notion ‘beyond functionality’, this discredits its significance and impact through experience. These concepts are not unrelated, and I would like to question the perceived polarisation, similarly to the discourse between beauty and utility. Meyers has highlighted the importance of beauty and aesthetics within landscape design, to the extent that they are a part of functionality. (Meyer, 2008, pp. 6–23) Although beauty and utility, or aesthetics and function, are

framed as opposites, there have been design movements which see these terms interlinked. The Arts and Craft movement, an ‘English aesthetic movement of the second half of the 19th century’ (The Editors of Encyclopaedia Britannica, 2021), of which William Morris was a leading designer (The William Morris Society, 2022):

“have nothing in your houses that you do not know to be useful or believe to be beautiful”

William Morris quoted in (Fairclough, 2021, p. 203)

Within landscape architecture terms, how might the components in the landscape be useful and beautiful, in other words, how might the components in the landscape have function and be beautiful?

I have already established that aesthetic means the experience of knowledge, that it has function as an educational and communicative tool. Therefore, I believe it is important that our landscapes create experiences that communicates the concerns of the Anthropocene and the climate crisis. I am not alone in this belief, Elizabeth Meyer wrote about the power of beauty and aesthetics in furthering the sustainability agenda:

.... we can already see how crucial beauty and aesthetics are to an ecological design agenda ... They promise to expand the public’s, and many de-signers’, conceptions of sustainability beyond the ecological health realm, and into social practice and the cultural sphere.

(Meyer, 2008, p. 8)

Meyer referenced other landscape architects who acknowledge this also, even referencing the work of Frederick Olmstead from the 19th century, to demonstrate that this is not a new concept (Meyer, 2008, p. 17; Woltz, 2020, p. 13).

However, how do these concepts translate into the development and construction of a landscape?

Aesthetics are important to many, if not all, stakeholders within a building and construction project (Murphy, 2005, p. 155). Each stakeholder will also have their own version of their ideal aesthetics, which can bring complications to the project. These stakeholders can include local governing bodies, builders, craftspeople, building developers and designers, who tend to have the most influence over aesthetic decisions. Upon completion of the building or landscape, the users of the space will also perceive it according to their own sense of aesthetics. Thus, there are a multitude of people

who will experience the space with their individual interpretations and opinions, i.e., differences in tastes (Lysholm and Berre, 2010, p. 26).

In terms of sustainable landscape aesthetics, this might physically be manifested in the choice of building materials and practices, the selection plants, and the creating spaces and importantly, context specific design. By choosing to focus on the existing conditions on site, this indicates another cultural shift, away from the ‘*tabula rasa or clean sheet (of paper) approach*’ (Fairclough, 2021, p. 210). The context specific design is something that is central to sustainable development. The landscape design responds to an existing environment rather than the nostalgic, idealised image of a landscape (as discussed earlier) that is unsustainable to maintain, let alone construct.

Regarding the choices to be made in the design and construction stages, further discussion can be found within The Materials Book (Ruby and Ruby, 2020). The book has been created from a summit in which the opportunities within sustainable practices were explored. This summit result in the creation of a series of propositions and chapters to illustrate the importance of the material within a project. There are a couple of these propositions that I would like to highlight for illustrating the

connection between sustainability and aesthetics.

MAKE IT DESIRABLE

Desire is a strong mobilizer. Adding beauty, a way to make the joy of sustainable materials more tangible.

(Ruby and Ruby, 2020, p51)

EMBEDDED KNOW-HOW

By using local-techniques, (which create a local aesthetic) there is less dependence on external materials and expertise, promoting self-sufficiency.

Techniques that require periodic maintenance, like rammed earth, stone masonry, or thatched roof construction, keep know-how alive through regular cycles of repair.

(Ruby and Ruby, 2020, p50)

As mentioned in Krogh’s survey for landscape architects in Norway, there was debate on the use of sustainable materials coming at a cost of the desired aesthetic. Here, Ruby and Ruby contest that this need not be the case, the aesthetic must be seen as a powerful tool of the designer or landscape architect. Recalling back to Joseffson, Myklebust and Gagnat, they each perceive this concern as a lost opportunity that can be addressed through changing the design process- By beginning with materials as a guide throughout the development stage, there are no lost design principles in the material selection stage. In fact,

	Time Code	E-ARK	E-TEK	E-BYG	E-BER	E-UTE	E-KRK	E-MAR	E-FAR	E-RUI
1800-1824	181	246	123	1133	0	129	53	8	0	0
1825-1849	182	496	170	1774	0	96	99	22	2	0
1850-1874	183	384	240	3390	0	342	276	80	5	0
1875-1899	184	553	777	8374	2	694	277	118	9	0
1900-1924	191	959	979	6477	0	752	206	210	12	0
1925-1949	192	2665	1421	4767	0	679	128	95	26	0
1950-1974	193	226	498	2397	0	248	298	17	18	0
1975-1999	194	58	210	647	1	78	45	2	3	0
2000-2025	201	3	12	61	0	9	3	1	1	0

FIGURE 27: The category of cultural monuments from 1800-present day. Table by Molly Andrews, data from Geonorge (no date)

		EARTH	WOOD	STONE	BRICK	METAL	CONCRETE	GLASS	CAST STONE	OTHER	NATURAL
	Code	1	2	3	4	5	6	7	8	11	12
1800-1824	181	0	681	40	29	1	1	0	0	1	177
1825-1849	182	3	856	52	147	0	2	0	1	5	318
1850-1874	183	2	1632	74	634	2	4	0	1	7	533
1875-1899	184	1	2696	67	3436	7	23	0	2	12	1124
1900-1924	191	4	2573	76	1640	6	89	0	13	15	2182
1925-1949	192	1	1322	47	529	7	386	0	2	59	2497
1950-1974	193	1	1020	15	217	11	381	1	1	38	970
1975-1999	194	0	226	4	75	9	91	0	4	27	242
2000-2025	201	0	35	2	0	0	7	0	0	2	16

FIGURE 28: The main material of cultural monuments from 1800-present day. Table by Molly Andrews, data from Geonorge (no date)

through utilising the aesthetics of sustainable practices, there is opportunity for both environmental and social sustainability in the implementation of a project.

Through reflection - on the designing with rather against the site conditions - there is an aesthetic issue which must be addressed. Within Nohl’s discussion of the past and future landscapes, he criticised the modern landscapes, describing them as ‘*anaesthetic*’ as opposed to ‘*aesthetic*’ (Welsch, 1993; referenced in Nohl, 2001, p. 226), I believe this to be an indication of discontentment with present aesthetics in the built environment. The desirability for certain aesthetics shifts over time, reflecting design movements and the creation of new methods

in construction and material manipulation. To illustrate this, I have used the data from designated cultural monuments across Norway, which are subject to numerous conservation and preservation efforts. The quantities of cultural sites and the material usage overtime can be seen in the shift in figures 27 and 28, a gradient from red to green has been used to highlight aesthetic preferences. There are a higher number of buildings preserved from the 19th-early 20th century than the late 20th-21st century. Interestingly, for the landscape architect, there is an increase in designated outdoor spaces from between 1875-1949, then this decreases significantly by 1975. Moving on to the main materials of these sites, many are made from wood and brick. There

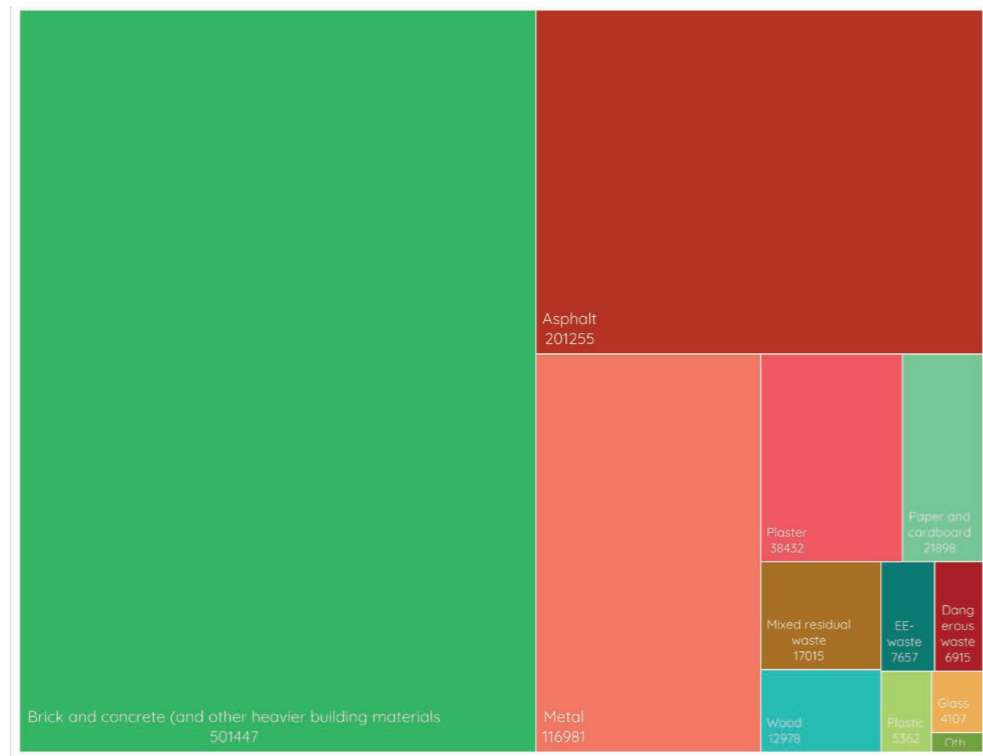


FIGURE 29: The quantities of waste (in tons) in Norway 2020. (Image by Molly Andrews, data from Statistics Norway, 2021)

is also large number of natural sites were designated around the turn of the 20th century. It is worth pointing out that there is also an increase in the number of concrete sites after 1925-1974, whereas the sites mainly consisting of wood, stone, and brick, begin to decrease. Most importantly, I would like to highlight that after the peak in 1875-1899, there is a decrease in the number of sites from these time periods that have designated as cultural monuments. Particularly after 1975. Whilst there may be other reasons for these fluctuations, there has been contention over the aesthetics of modern and contemporary sites (the built environment). Tastes change and shift, certain styles

fall out of fashion and spaces feel outdated. Alternatively, sites might no longer serve their purpose and perhaps it is decommissioned and demolished. This presents both sustainability and aesthetic issues. Through the demolition process, large quantities of waste can be produced (see figure 29) which can end up in landfill sites (see figure 30). From an aesthetic standpoint, the identity and heritage of the site is erased, particularly with the demolition of industrial sites. The identity of a community that once surrounded these spaces is 'abandoned' (Miles, 2014, p. 107).

The basis of this comment of abandonment, is that aesthetic knowledge is embedded



FIGURE 30: The destination of materials by category, in Norway 2020 (Image by Molly Andrews, data from Statistics Norway, 2021)



FIGURE 31: The amount of waste (in tons) from new construction, rehabilitation and demolition, in Norway 2018, 2019 and 2020. (Image by Molly Andrews, data from Statistics Norway, 2021)

information in the visual sphere, and within landscape architecture, 'aesthetic perception involves extracting information, knowledge and stories from the landscape as much as possible' (Nohl, 2001, p. 227). Thus, the destruction of parts of the landscape with certain aesthetic qualities is the destruction of the embedded knowledge. Nohl expands on this, highlighting features of the contemporary landscape which reflect the modernised systems of operation. For a generalised example, the technological advances across industries meant a shift in types of power uses, as well as the scale of the machinery that is employed to match the scale of production within the globalised world. The scale of this land use was no longer local, rather national or global, local areas lost self-sufficiency and became dependent on the larger scale systems. 'This separation of functions ensured that the original comprehensive character of landscape was lost' (Nohl, 2001, p. 224) Nohl argues that these scales alienate the individuals experiencing the landscape, through disassociation from the functions within the landscape, thus his writing begs the question, what knowledge are we embedding in our landscapes? My concern is that with increasing levels of demolition (see figure 31), there is increasing detachment from the

embedded know-how.

As I have already reflected on the images from the romantic era in Norway, is it possible here to reflect on the romanticised images of ruins in the 19th century? I have drawn the comparison visually in figures 83 and 84 (pages 100-101). There are already examples in landscape architecture of contemporary 'ruins' being retained. These are some of the remains of industrial structures that are no longer in use, instead they provide thresholds and insights into the prior functions of the site.

With this in mind, it is at this point that I will examine case studies which use sustainable, circular principles to demonstrate the importance of the functional landscape aesthetic in retaining heritage and embedding new knowledge through furthering sustainable practices. I would also like to address the concerns of the 'sustainable aesthetic' producing visual limitations, and demonstrate that in fact there is perhaps more creativity and design possibilities through adopting these principles. To begin, I present the case study of Vollebekk Torg by SOLA in Oslo, Norway. I had the very fortunate opportunity to learn more about this project through a discussion about the site and the process of re-use.

SECTION 03: CASE STUDY VOLLEBEKK TORG

CASE STUDY

Vollebekk Torg by Studio Oslo Landscape Architecture
In partnership with OBOS Nye Hjem, SL Steinlegging,
Resirqel, Circular Ways and Vollebekk Fabrikker.

Informal discussion with Studio Oslo Landscape Architects (SOLA),
EDIT and Olaug Storlid from Circular Ways.

Background

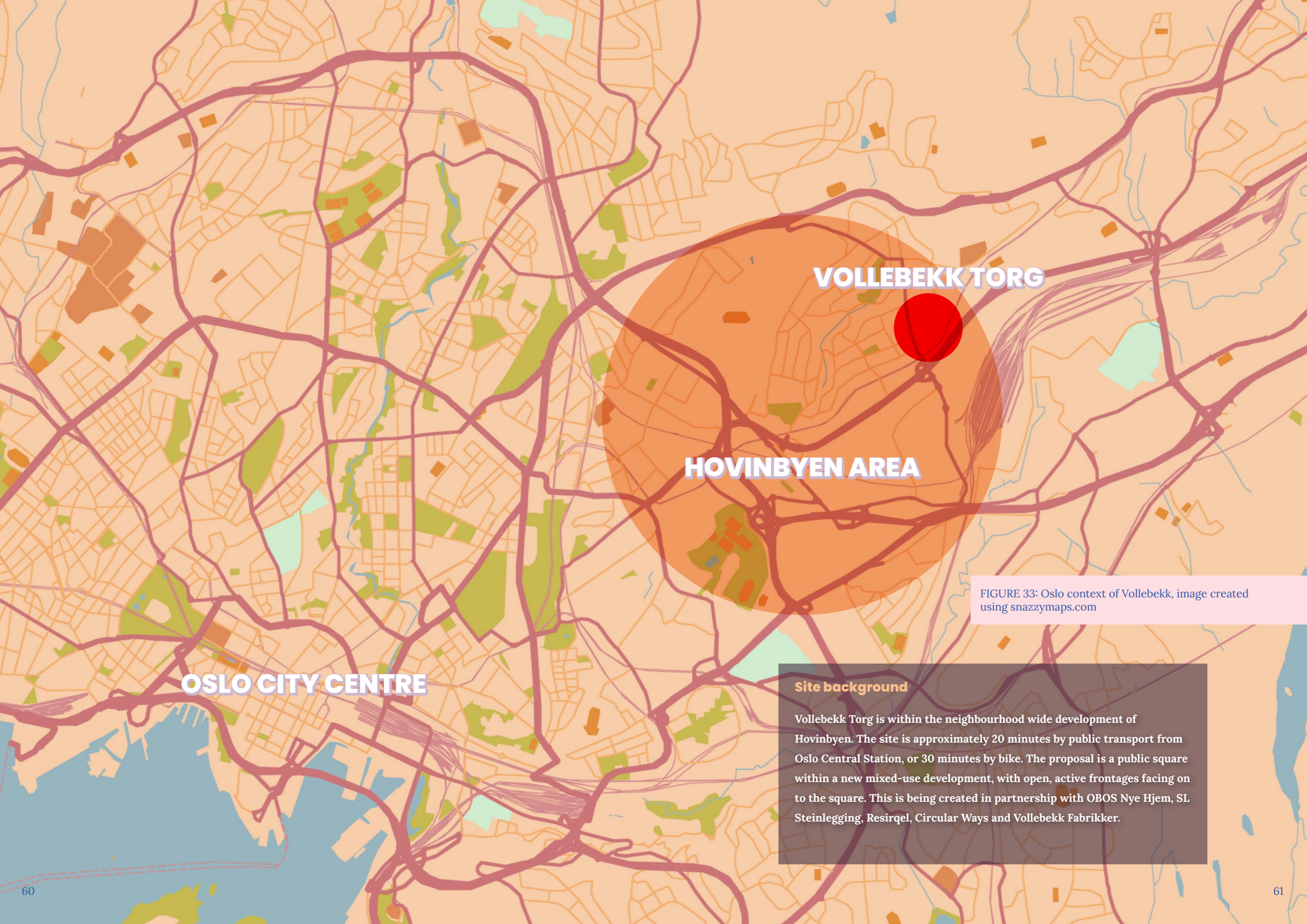
It has been addressed that the landscape architecture field is evolving, perspectives and values are shifting to reflect the climate crisis. As a result, the building and construction industry is adapting to meet these changes. Some of this is discussed in the previous sections of this thesis, so in this section, I will explore the perspective of the landscape studio practice working with circular project goals.

SOLA, a landscape architecture studio based in Oslo, was established in 2015 to be a group which adapts and grows with the ever-evolving role of a landscape architect. I attended an informal discussion about a project at

Vollebekk Torg, which has been developed with the concept of material reuse. Olaug Storlid, a reuse designer from Circular Ways, was present for the discussion, Storlid is collaborating with SOLA to develop new materials for the Vollebekk project. Also in attendance was EDIT, an Oslo-based landscape studio formed in 2018. EDIT is also working on reuse projects and thus Ashely Conn, creative director and co-founder of SOLA, invited everyone together for a discussion about the process of reusing materials within a landscape project.

FIGURE 32: Vollebekk Torg visual, looking towards the central structure. Image courtesy of SOLA, created by Oxivisuals.





OSLO CITY CENTRE

HOVINBYEN AREA

VOLLEBEKK TORG

FIGURE 33: Oslo context of Vollebekk, image created using snazzymaps.com

Site background

Vollebekk Torg is within the neighbourhood wide development of Hovinbyen. The site is approximately 20 minutes by public transport from Oslo Central Station, or 30 minutes by bike. The proposal is a public square within a new mixed-use development, with open, active frontages facing on to the square. This is being created in partnership with OBOS Nye Hjem, SL Steinlegging, Resirqel, Circular Ways and Vollebekk Fabrikker.



FIGURE 34: Vollebakk Torg concept plans. Image courtesy of SOLA

Concept and Principles

To begin, SOLA held public consultations with various stakeholders and age groups to understand what the local community needed from their new space. This consultation revealed several important findings that the project would be guided by. The local community voiced that they wanted a space to be a social meeting place for cultural events and activities, a place for play that is suitable for all ages. The square needed to have with a strong identity, with both green areas and a green agenda.

Using these principles, SOLA developed a series of concepts plans that manifested the feedback spatially (see figure 34), before creating a plan which combined these concepts together within the square. The final design features two axis, social and green, which overlap in the middle for a central meeting space. See figure 35 for

the site concept diagram. Around the periphery are a series of flexible zones which meet with the active frontages. Across the whole site are layers of sustainable (social and environmental) functions and solutions for ecology, water flows, play, and material reuse.

SOLA sought out circular methods for executing the reuse project, with the intention of creating a site that can be declared as 100% reuse. From this research, the material pyramid was devised. The pyramid, as seen in figure 36, demonstrates the scales of material quantities and complexities, according to circular methods: surplus recycling, recycle, reuse, and upcycling.



FIGURE 35: Vollebakk Torg concept plan. Image courtesy of SOLA

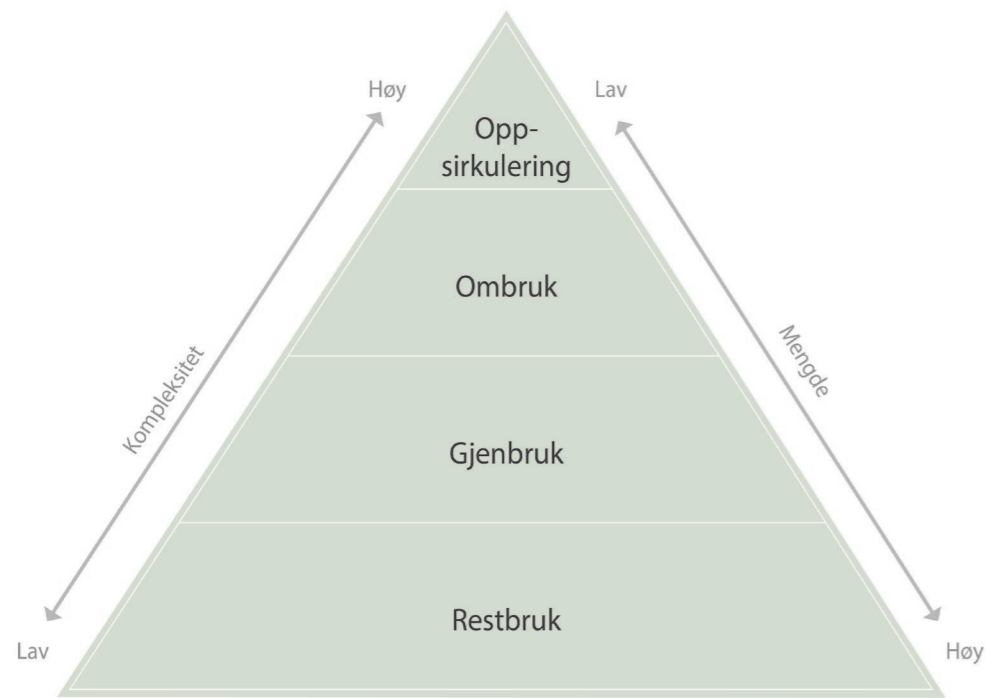


FIGURE 36: The Reuse Pyramid, Image courtesy of SOLA

The Reuse Pyramid Description

Upcycling (Oppsirkulering)

Composition of low-quality materials into a high-quality product. For example scaffolding for bench – Medium / high complexity, medium / high price risk, extra treatment is expected.

Reuse (Ombruk)

Other use in a new location. For example, concrete elements from buildings such as retaining walls. - Low / medium complexity, Low / medium price risk, extra treatment is expected (removal / cleaning / storage / treatment / etc.)

Reuse (Gjenbruk)

Same use, new location. For example, granite from a street to a square –Low complexity, low price risk, some extra treatment (cleaning / storage / etc.)

Residual use (Restbruk)

New, unused materials from stock. For example, surplus stock of ground bricks. - No extra complexity, no price risk, no extra treatment.

Information from SOLA (n. translated from Norwegian)

SURPLUS

Both SOLA and EDIT discussed the existing culture of 'restbruk' (surplus materials from other construction projects) within the construction industry in Norway. This practice was also mentioned in the interviews conducted by Evan Krogh (2014, pp 43-47). Restbruk is acknowledged as a simple method to prevent the waste whilst also procuring a material that will meet building-material regulations. The challenge for this method is in designing with materials that have been sourced from several projects, as there may be differences in quantities, scales, durability, and colours.

SOLA sourced left-over materials from local building projects in

Oslo, Ås and Drammen, to use in the paving across the site. These pavers were then categorised and quantified, before design (and construction) principles for these categories were established (see figure 37). The intricate and cohesive site surface is a result of the thorough research and development (see figure 38). In addition to left-over paving stones, SOLA demonstrates that there are other opportunities in the residual waste from other industries. That is, materials that are not necessarily intended to be used in a landscape project. SOLA has identified stone and wood offcuts that can be used creatively to create playful, textural surfaces.

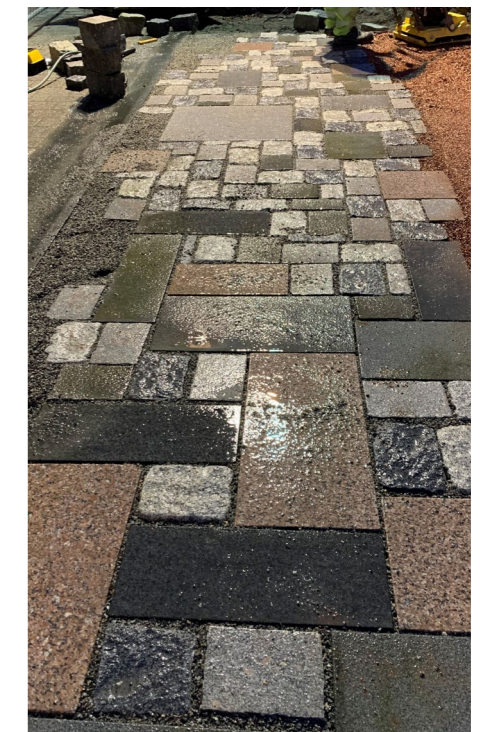
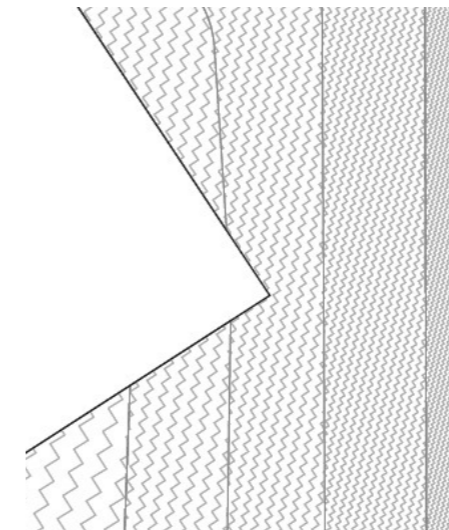
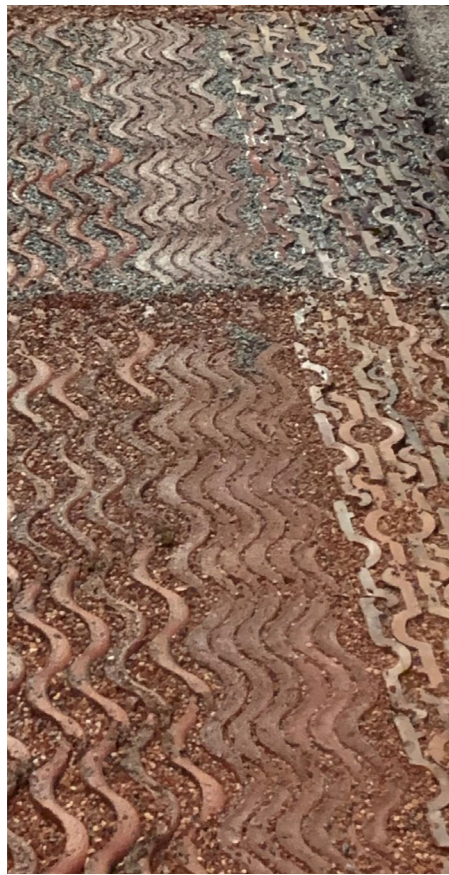


FIGURE 37: Gradient of the paving size matrix.
FIGURE 38: Surplus paving testing.
Images courtesy of SOLA

RECYCLING

The recycling of roof tiles is just one example of recycling within the project. SOLA has organised these in various formations to produce varied surface patterns (see figure 39) The gaps are then filled in with crushed brick, producing a playful surface with rich warm tones. In the site design, this technique has been used for pedestrian pathways and accent edging around planted areas.



REUSE

To create a gravel, bricks were crushed into varying degrees of fineness (see figure 40), which creates different aesthetic effects as well as alternative functions. These functions include infill between paving stones and repurposed roof tiles, and a soft surface in the play spaces.

Another example of material reuse on the site is sheet piling. Steel sheet pilings are a common occurrence in building and construction projects, both as temporary and permanent fixtures. Within this project, these have been repurposed to create a honeycomb structure which helps support levels changes, the planting beds, and the management of water across the site. (See illustrative in figure 41).



FIGURE 39: Testing of roof tile recycling
FIGURE 40: Brick recycling grades
Images courtesy of SOLA



UPCYCLING

This method is particularly excitingly for future aesthetics. Olaug Storlid is working with creatively with various materials, using second hand and found items. These objects have been broken into pieces for terrazzo surfaces, cut to lay into paving stones or melted to create a new material. These totally bespoke surfaces provide an opportunity to embed a narrative, perhaps cultural or historical, this contributes to establishing the identity of the site.

FIGURE 41: Upcycled materials reconfigured into new paving tiles created by Olaug Storlid – Circular Ways. Photograph by Molly Andrews

Concerns and opportunities

Risks

Throughout the Vollebekk project, SOLA encountered things that would not occur during a traditional landscape project. Creating and testing materials, or excluding other materials in favour of more sustainable choices – even if this product or solution did not exist already. The unknowns in a project such as this could be a concern for some stakeholders, however SOLA was able to justify and demonstrate the possibilities in reuse, and guide these partners through the process. This means that all these actors are equipped with new knowledge and expertise to share with new projects.

Storage

The query of material procurement and storage was addressed, as this is considered an aspect of material reuse that differs from the traditional landscape project. The materials need to be sourced early, stored, and worked into the design, rather than selecting and ordering a material to fit the design. It was noted that this is dependent on building phases, there is perhaps the opportunity for on-site storage, there has also been occasions where contractors had the facilities to store materials.

Facilities

The material manipulation was achieved through the facilities at Vollebekk Fabrikk. Local to the project is Vollebekk Fabrikk, 'is a concept that uses unused premises to stimulate sustainable urban development where we promote / support / promote circular economy, social entrepreneurship and the neighborhood' (Vollebekk Fabrikker, 2022, n. translated from Norwegian). The organisation is a partner of the project and it also participated in the public consultations. This created a practical solution for material creativity whilst also embedding the project in its local community.

Aesthetics

Throughout the discussion, the question of aesthetics was ever present. From the aesthetic opportunities for embedded knowledge and story telling in material reuse, to the discussion of compatibility of sustainable aesthetics within the urban realm with modern constructions. Everyone around the table agreed that there was no compromise on aesthetics when reusing materials. In fact, the group was excited by the possibilities for creating landscapes that have been designed and constructed with a strong contextual basis. Everyone also agreed that the aesthetics of reused materials is also vitally important in communicating the sustainability agenda, something which has been echoed in reuse and landscape architecture literature. (Vandkunsten Architects and Manelius, 2016; Bakshi and Gallagher, 2020; McGuire, 2020)

FIGURE 42: Vollebekk Torg visual, looking towards the central structure. Image courtesy of SOLA, created by Oxivisuals.



Reflection

Vollebekk Torg demonstrates that there are many possibilities in reuse materials.

To make the most of materials, it is important to have strategies that support the landscape architect in implementing a reuse project. I believe that most of these strategies indicate that material literacy is essential to a circular landscape. I have summarised some of these strategies as the following:

Management

The overarching strategy for circularity is flexible, thoughtful management. There are unforeseeable risks in circular designs, an example given by SOLA was in the stage of sourcing materials, when there were items that became unavailable. Rather than resorting to an off-the-shelf product, the design accommodated another reuse alternative instead.

Creativity

The material palette does not need to be constrained to the existing form or uses of the materials. SOLA showed that some materials can be altered to increase their durability and strength, such as, reducing the surface size of the material, or creating a support. Objects can also be transformed to create entirely new materials and surfaces.

Context

Through understanding the demands of the surface, the suitable materials can be applied to these areas. For example, movement be organised through levels of traffic: services, vehicular, cycles and pedestrians. Each of these require different levels of durability and weight load. The context of the project was also beneficial for implementing a reuse project, there was evident support from the local community for creating a space with sustainable principles. This support is probably a driving factor which counters the contention over uncertainty of reuse projects (Krogh, 2014, pp. 44-46; Myklebust and Gagnat, 2021, p. 62).

Concluding Thoughts

Ultimately, the circular landscape requires a shift in values, moving away from purchasing raw or newly processed materials. Instead, moving towards appreciating the possibilities in reuse, utilising skills and craftsmanship for making the most out of materials. The next section will begin to examine SOLA's material principles within the realm of the future landscape aesthetic, whilst also exploring other examples of reuse methods within landscape architecture.

FIGURE 43: Vollebekk Torg illustrative overview. Image courtesy of SOLA, created by Oxivisuals.

SECTION 04: CIRUCLAR PRINCIPLES

Guiding principles
for the landscape
architect that have
been created on
reflection of existing
circular methodology.

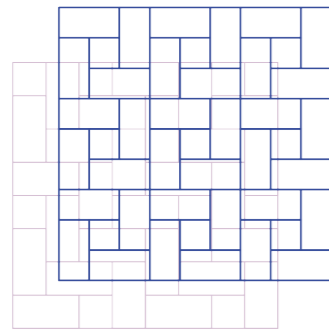
Landscape Components

Several components are involved in forming the landscape. I have categorised these in order to choose a focus for this thesis.



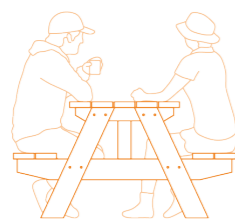
Living

(Softscapes) Plants, trees, the wildlife that altogether create an ecosystem.



Surfaces

(Hardscapes) Pathways or open spaces, this accommodates the movement through the landscape and allows for interactions between the living things and people.



Structures

Additional items that are added to the landscape, this could include furniture and shelters.

FIGURE 44: Illustrative component symbols created using drawings from dimensions.com, compiled by Molly Andrews

Surface

I will be focusing on the surface as the threshold for ecological, cultural, and social interactions (McGuire, 2020, p. 22). The surface is the in between space for the systems that take place above and below the ground; infrastructure can be embedded in the surface; communicative signs can be patterned on the surface. In terms of sustainability, there are a lot of opportunities including the reuse of materials to be explored. The surface area can be a large portion of the constructed landscape, thus the life cycle and waste of the materials within this component ought to be scrutinised.

In this section I will outline some of the methods that have been developed for increasing circularity within construction. This will include case studies to illustrate the existing execution of these methods. Some will be architectural projects; however, I have included these as I believe the process can be interpreted for landscape architecture purposes. Whilst there are materials that have been developed with reduced embedded carbon (Grønn Byggallianse and Context AS, 2021), and new technologies that are creating entirely new materials (Hebel and Heisel, 2021), I have chosen not to include these at this time. Instead, this thesis aims to examine the aesthetic opportunities in reusing

existing materials, although this can entail creating 'new' materials through the processing and recycling of 'old' materials.

Whilst I have chosen to focus on the surface component, I feel it is important to illustrate the possibilities for increased circularity and sustainability within the living and structural components and why there is a need for further research:

Within the realm of the living components, involving the vegetation and ecosystems, relating the plant growth to the construction phases might be beneficial to plant selection and stability. Within the discussion at SOLA, a practitioner from EDIT contemplated the possibility of growing plants on site prior to installation. This would mean that the plants would acclimatise to the environment where they will be situated. The plants would be more mature when planted. If the plants are sourced according to the construction and planting timeframes in mind, then the plant could reach a suitable size for planting by the time the site is prepared - possibly reducing costs if they are purchased at a smaller size. Finally, the presence of plants on the site presents the

opportunity for visible vegetation earlier in the building process, akin to a temporary garden to benefit the local community.

Regarding the structural components, SOLA demonstrated several opportunities in reuse and upcycling. The furniture at Vollebekk Torg is bespoke, using waste materials to create frames and surfaces that are composed as chairs or chairs. The central space features a large frame which shelters the area whilst also functioning as a structure that can be used for various occasions.

Another consideration for structures, is the use of living components to create structures.

Hedges create a living fence which provides a corridor for wildlife, although these require maintenance, any surplus material from plant maintenance can be used to create structures as well, as seen in figure 45. This image was taken at the Norwegian Folk Museum, an open air museum which features traditional practices, many of which demonstrated circular opportunities.

FIGURE 45: Fence constructed by a timber frame layered with cut branches to create a barrier (Photograph by Molly Andrews)

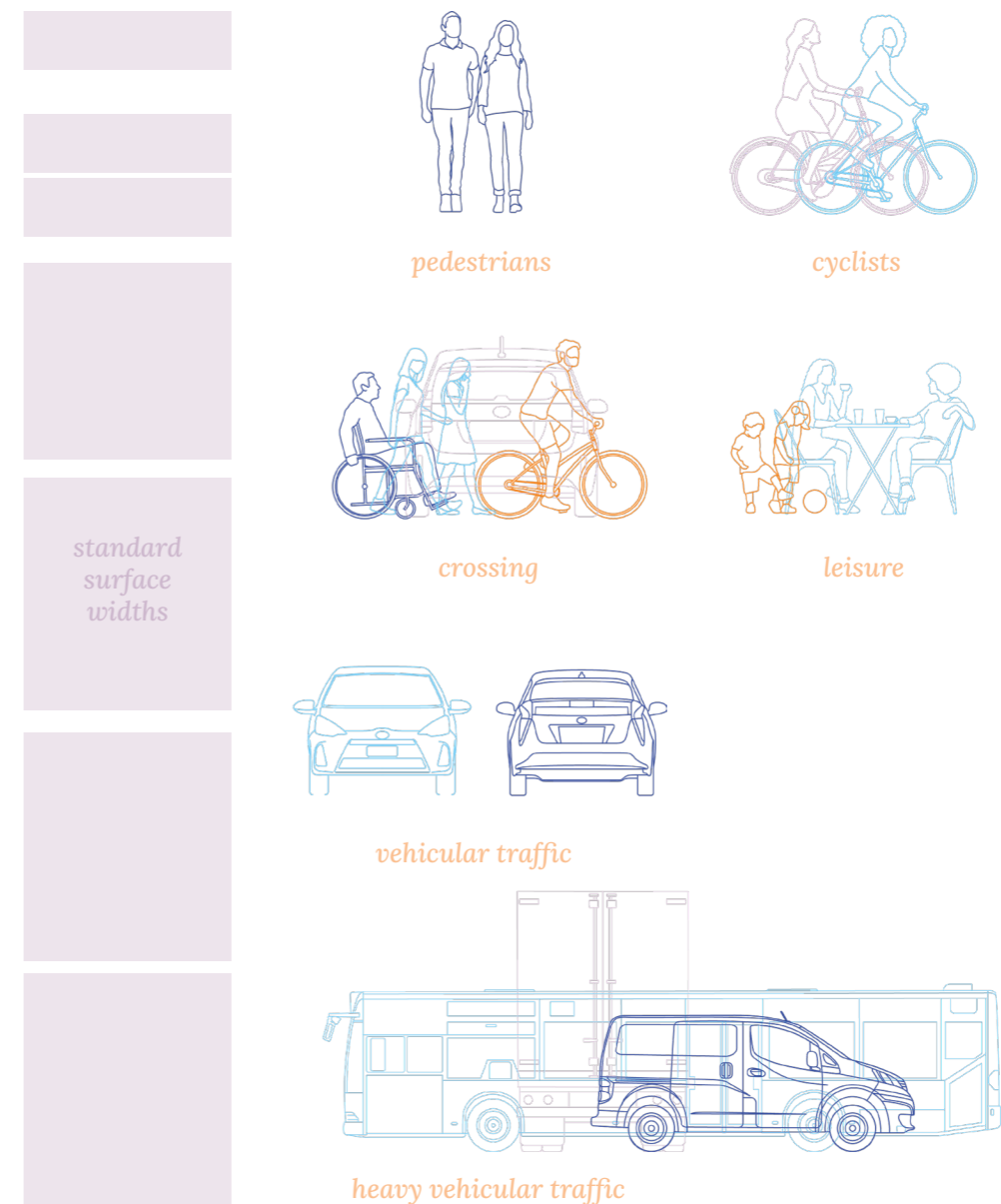


Types of surfaces

As the focus of the following sections is to be examining the surface, it is necessary to understand the types of surfaces that could be scrutinised through a circular perspective. It was mentioned in the case study section that SOLA categorised surfaces and surface use to inform their material decisions. This is important to understand the demands of the site surface, for example, the

areas that will receive the most traffic would require more durable materials to reduce the frequency of maintenance. The use of the surface is also subject to standard dimensions (Vernon, Tennant and Garmory, 2013, pp. 219–246) to suit the user's needs.

FIGURE 46: Illustrative surface use symbols created using drawings from dimensions.com. Compiled by Molly Andrews



Introduction to reuse principles

Within this section, five principles to guide designers in reuse have been created. Within each of these principles are various methods for increasing circularity and sustainability within landscape architecture. The selection of these methods has been guided by circularity concept; how can the materials be used again in the future? Each principle is not intended to be a stand-alone concept, rather there is overlap with the other categories, and they could all be applied to a project to varying degrees of scale.

The information in this section has been sourced from guidance developed by IFLA Europe, the work of SOLA at Vollebakk Torg, the Architects Climate Action Network, thesis concept ideas, and additional landscape architecture publications such as Land8. With this collation of this research I hope to answer the questions:

Where and how to source materials?

How to make the most out of these materials?

Who has been using these tools already?

PRINCIPLES

1. local

Sourcing materials from the local vicinity, and repurposing components beyond their original function

2. utilize

Embracing sustainable and circular materials and construction methods

3. use less

Use strategies for prioritising to maximise the material use

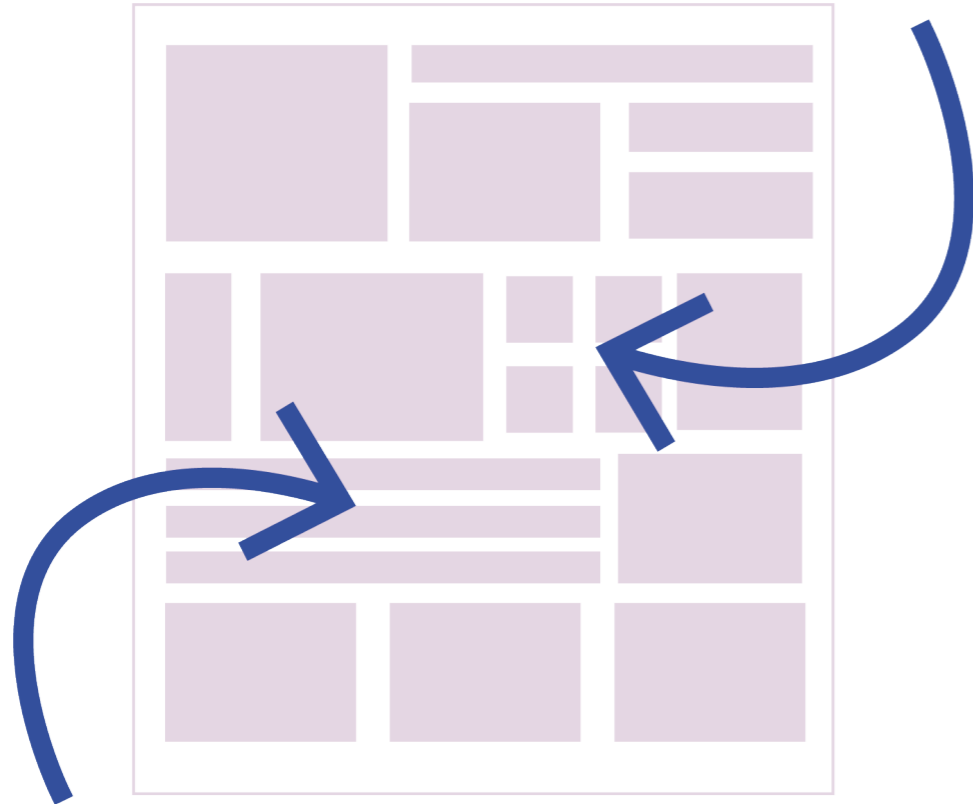
4. reconfigure

Source materials from the site itself, tuning in to the site conditions and metabolisms

5. use even less

(you use it best, when you use nothing at all)
Question the necessity for drastic site interventions, balance the needs of the site nature with those of the users.

FIGURE 47: Local principle diagram by Molly Andrews



PRINCIPLES
1. LOCAL

*Sourcing materials from the local vicinity, and repurposing components beyond their original function
Main aesthetic impact: increased connection to local identity*



Source local. The local materials are a piece of the local identity, by using these in the landscape, the connection to the locality is strengthened. Furthermore, there is creativity in using existing materials, how can these be configured within the design?

FIGURE 48: Carved stone piece repurposed in wall construction (Zoran, 2018).

Use Local

The harvest map, detailed on the following pages, is the analytical tool which embodies this concept. It is vital that we appreciate the significance of using local and that there is much more to the local material than its physical properties.

This is reiterated by the New European Bauhaus Initiative, by using local materials and local skills, the project is 'harmonious' within the community, economy and nature. (New European Bauhaus, 2021)

'Don't Forget the Leftovers'

(Something Fantastic, 2021, p. 322)

Use the surplus and by-products of local industries. This retains the materials locally for future use and creates distinct and interesting surfaces. For example, the materials can be organised by the size and colour to form patterns. The Vollebekk Torg project used this method of sourcing and using the



surplus materials leftover from other construction projects.

'the beauty of rubble'

(Something Fantastic, 2021, p. 360)

There is a risk of wasting materials by viewing rubble as an unwanted resource. As discussed on page X, there are large amounts of building and construction materials that are being discarded. Whilst some materials are sent for recycling, and some materials can be hazardous, there are still materials that go to landfill unnecessarily. Once processed and sorted, these materials could be used for a multitude of purposes.

(Below left) FIGURE 49: Detail of repurposed rubble in planters at URBAN DRY DOCK NO. 1 (D.I.R.T. studio, 2009)

(Below) FIGURE 50: Planters at URBAN DRY DOCK NO. 1 (D.I.R.T. studio, 2009)



Urban Mining

Superuse Studios based in the Netherlands, have developed a process for increasing the circularity of materials in architecture. Whilst this tool is for architecture, this process can be adapted for landscape projects as well. Most projects start with investigating the different relevant flows in a Material Flow Analysis. Important layers are: existing location, context, energy sources, water, food systems, existing built structures, natural structures, climate, materials, functionality, ergonomics, available budget, capacity of the project team (Superuse Studios, 2022) Following this, the practice expands on their process using circular methods (see figure 51).

Harvesting Materials

This strategy considers the flows of materials throughout the life cycles of nearby structures. The materials that are available for reuse are mapped and catalogued for consideration in the development of the project. In addition to using second-hand materials, the carbon footprint generated in transporting the materials is typically limited due to the proximity of goods. The harvest map is also a mapping process in itself, similar to the processes of analysing the area local to a site. Creating a map

1. *Inventory*
2. *Sketch design*
3. *Harvest*
4. *Preliminary Design*
5. *Building Permit*

DYNAMIC FINAL DESIGN

6. *Collect*
7. *Building preparation*
8. *Construction*
9. *Environmental impact*
10. *After care*

FIGURE 51: Superuse Studios's circular design process. Text from Superuse Studios, (2022a)

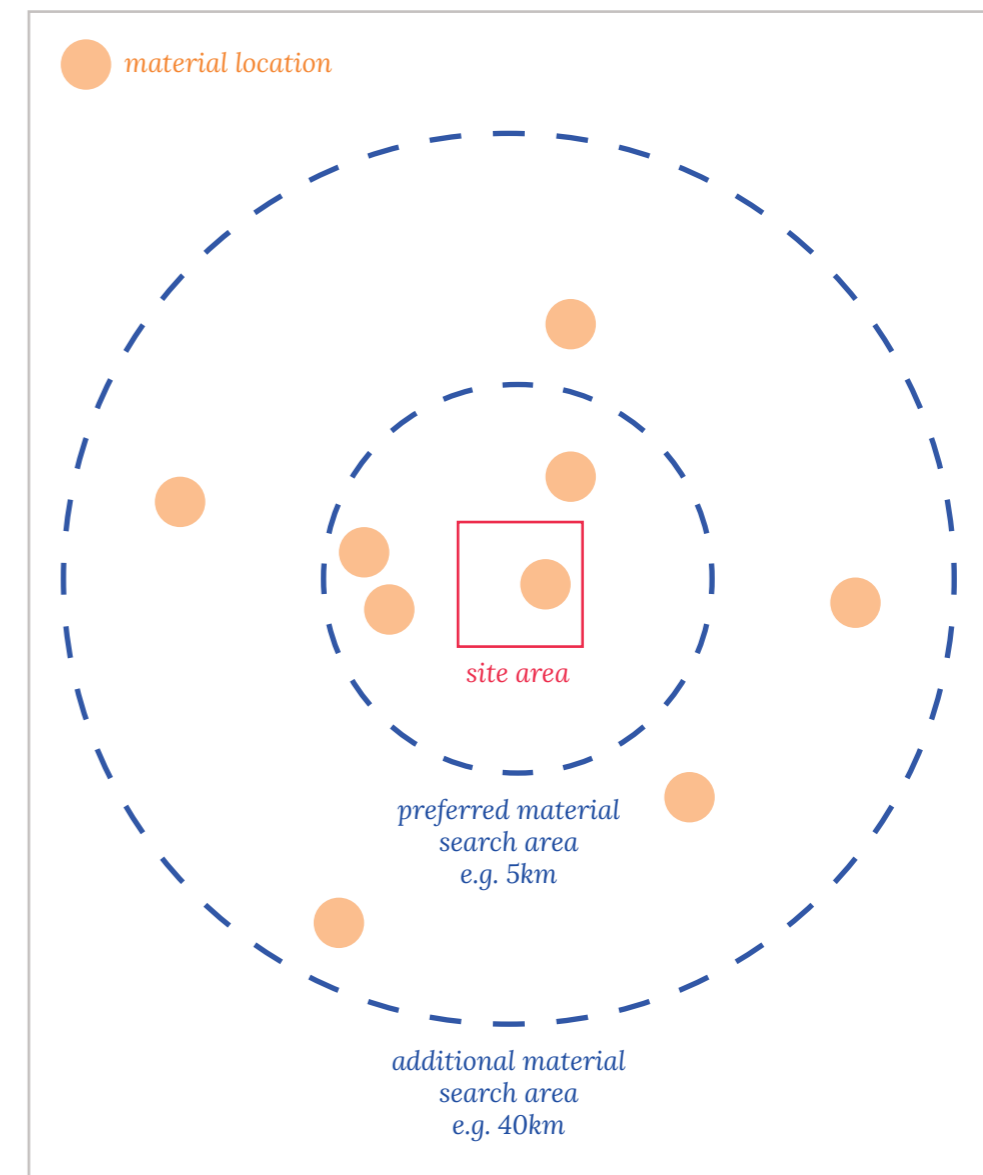
which analyses the available resources can be a part of the initial site analysis that informs the subsequent design stages. The harvest map is integral to the thesis by Taleen Josefsson, Form Follows Availability, in which the design process is reliant on the materials that are mapped through this strategy. (Figure 52)

Taking this concept further, Superuse created an online platform or 'marketplace for reusable building materials' which maps the locations and details of materials that are available for reuse within the Netherlands.

The website calls this platform 'the urban mining potential of the Netherlands'. (Superuse Studios and New Horizon Urban Mining, no date). Urban mining is the process of using the resources in the built environment (Ruby and Ruby, Green Lab, p15). This concept is vital to the circularity process, using resources we already have rather than raw materials; 'By reusing the materials already deposited in our settlements rather than extracting

new raw materials, the rate of material accumulation would slow down and the amount of building materials removed and redeposited as waste would be reduced.' (Ruby and Ruby, 2020, p. 39)

FIGURE 52: Diagram demonstrating the harvest map technique. By Molly Andrews



Storage and facilities

This concern was raised in the discussion with SOLA, EDIT and Circular Ways. Whilst there are methods for sourcing circular materials, the sourcing time frame might conflict with the construction time frame. Being able to collect and store the materials until they are ready for installation, is something that must be feasible to create a circular economy. Furthermore, retaining the materials locally to building projects ensures that transportation (and emissions) is minimised, and the local materials are intended for strengthening local identity.

Looking at the Hovinbyen area as an example, there are a couple of existing organisations that are harvesting and storing materials, as well as providing the space to process materials. (See page 20) These spaces create nodes in the community as circular infrastructure.

I would like to highlight a project called Eco-cathedral, which demonstrates how these nodes for storage of materials, could become aesthetic landmarks. The Eco-cathedral started in 1983, in the Netherlands at Mildam and Heerenveen by Louis Le Roy (Stichting TIJD, no date; van Es, 2022). By 2001 the site features structures such as towers, platforms and walls constructed from stacked surplus building materials that have been methodically organised (van Es, 2022).

Perhaps in addition to the facilities in Hovinbyen, there could be nodes of materials located around the green ring project, as circular landmarks that will increase and decrease with the flows of materials and projects.

FIGURE 53: Detail of the stacking methods used at the Eco-cathedral Heerenveen. (Eco-kathedraal, 2021)



FIGURE 54: Landscape at the Eco-cathedral Mildam. Photograph by Elly Bloot Van der Plas (2021).

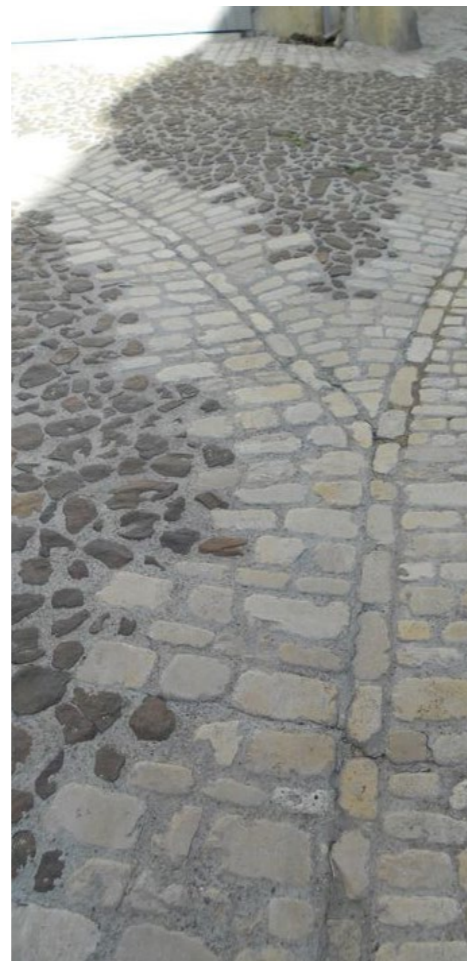




(Above) FIGURE 55: Pebbles are used to fill the gap in the pavers, Photograph by Molly Andrews



(Above right) FIGURE 56: A path is created with a matrix of paving sizes in Place d'Youville by Claude Cormier and Associates. (Vézina, 2004)



(Right) FIGURE 57: Street drainage created from contrasting bricks, note how the edge is not linear, rather follows the form of the bricks as they are (Barton Howe Associates, 2021)



FIGURE 58: Acropolis gutter detail (Malawski, 2017)

ACROPOLIS LANDSCAPE BY DIMITRIS PIKIONIS

Between 1954-1957 (Malawski, 2017), Pikionis designed and constructed the park area surrounding the Acropolis in Athens. Pikionis used the remains of classical stones, 'lintels, stoops, clay roof tiles' (Malawski, 2017) among other things, in the design of the park around the Acropolis (Holden and Liversedge, 2011, p. 160; Chevroulet, 2020, pp. 32-53) Despite the path being constructed in the 1950s, the use of the stones give the path a historical appearance which blends into the ancient landscape.



FIGURE 59: Acropolis paving detail (Binet, 2017)

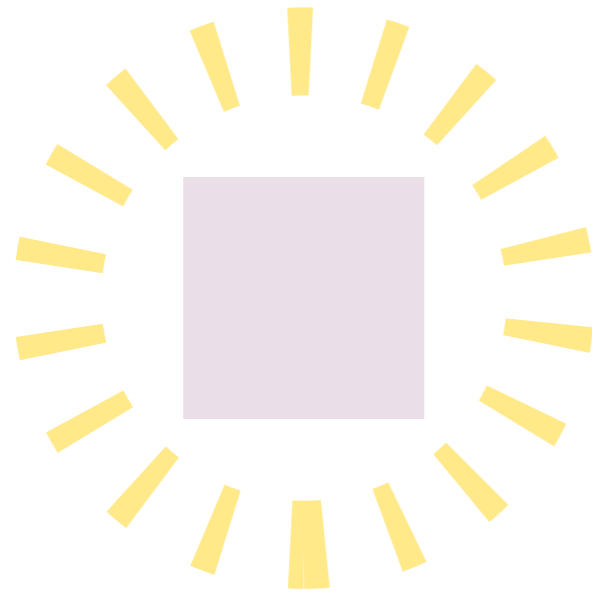


FIGURE 60: Local principle diagram by Molly Andrews

PRINCIPLES
2. UTILIZE

*Embracing sustainable and circular materials and construction methods
Main aesthetic impact: increased visibility of sustainable methods and materials*

Make the most of new and old technologies. There are techniques that have been tried and tested for centuries that are ‘symbiotic’ with nature (Watson, 2019, p. 397). There are also new technologies which seek to tackle waste concerns through recycling (upcycling and downcycling). There is opportunity for appreciating and even showcasing the use of sustainable methods and the diversion from conventional landscape architecture techniques. The components constructed with these methods become a feature of the project and become a part of the site identity and narrative.

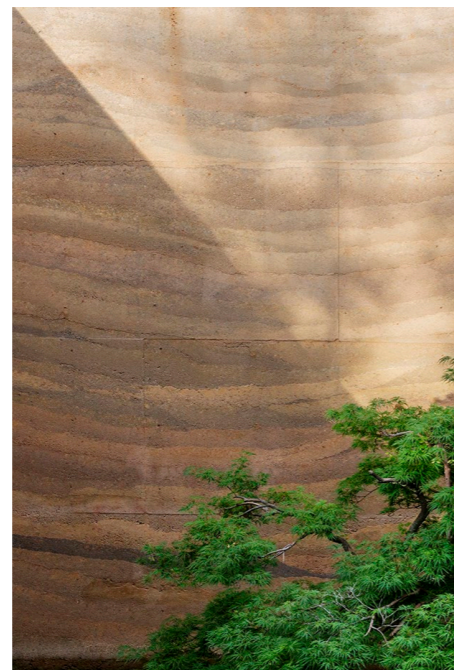


FIGURE 61: Rammed earth wall at Taohuayuan Mountain Park by CLD (2019)

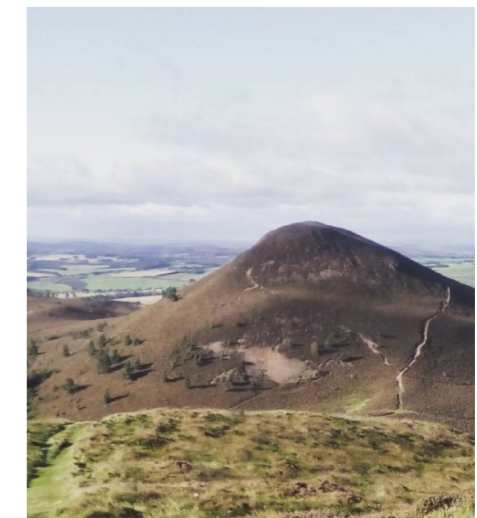


FIGURE 62: Palayan Rice Terraces of the Ifugao (Scott, 2006)
FIGURES 63: Eildon hills in the Scottish Borders.
Photograph by Molly Andrews

Rammed earth

Within her book LO-TEK (2019) Julia Watson has described the use of rammed earth walls since 100CE in the Palayan Rice Terraces of the Ifugao people in the Philippines. Water, soil and stones are used to create the steep walls which retain the water and crops whilst also providing a pathway across the terraces.

Recent examples of rammed earth construction sees this method being used to create pre-fabricated modular systems (Something Fantastic, 2021, p. 296)



Aesthetically, this practical technique can be implemented using the earth on site, this would connect the project to the site identity. For example, the soil on the Eildon hills in the Scottish Borders are a rich red colour (see figure X), to build a rammed earth wall from this soil would be a striking connection to the local identity.

create new construction materials

There are companies that specialise in reclaiming waste and upcycling these pieces to create new bricks. Developed from a student project in the Netherlands, Stonecycling crushes waste materials to create new bricks for construction, these are now being used in projects across the world. (StoneCycling®, n.d.)

Another example that has been highlighted by the New European Bauhaus Initiative is a project by Akna Marquez titled Reincarnation (Marquez, 2020; New European Bauhaus, 2021b). Seeking to connect 'local identity and material stories' within the circular economy, Marquez has upcycled bricks and ceramics from sites in Barcelona. These are used to create new tiles which retain the colours and textures of their origin, thus retaining site heritage.



(Top) FIGURE 64: StoneCycling® (n.d.) bricks made from crushed waste materials.

(Bottom) FIGURE 65: Reincarnation project by Akna Marquez (2020).



Seoul Urban Pinball Machine by Studio Heech

This landscape installation was created using upcycled wood, bioplastics made using duck egg yolk (a by-product from the pharmaceutical industry) and a healthy-eco-friendly MDF boards, these materials were selected as 'tangible confrontations against the climate crisis our city is facing in the aftermath of the pandemic' (ArchDaily, 2021). Some of the other examples I have chosen for this section feature post-industrial landscapes. I selected this example to show a reuse aesthetic which is a bright, playful, and visually contemporary-looking.

FIGURE 66: Studio Heech installation (ArchDaily, 2021)

FIGURE 67: Studio Heech installation close-up (ArchDaily, 2021)

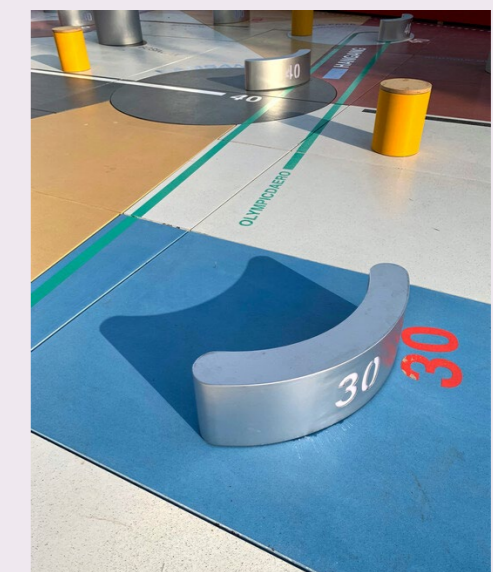
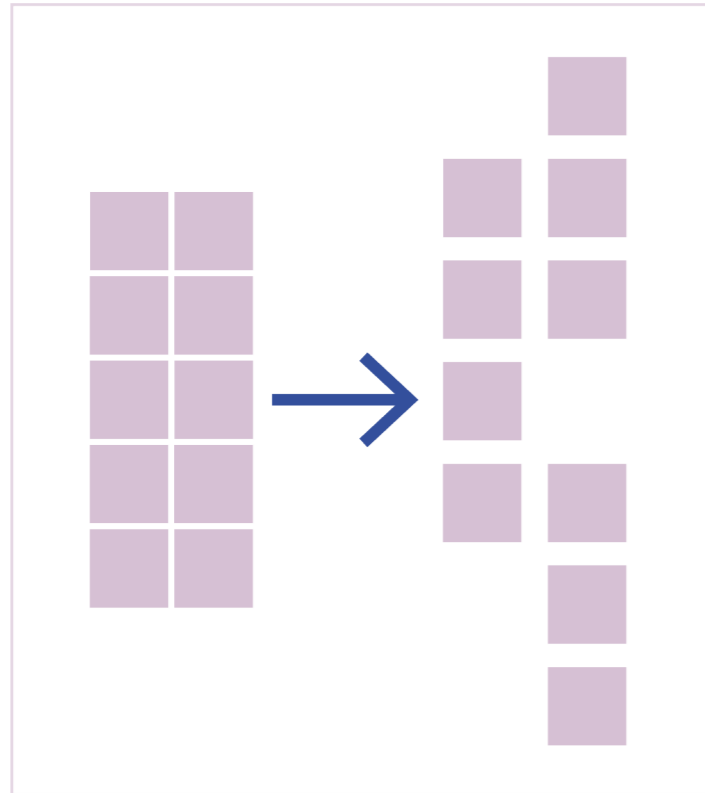


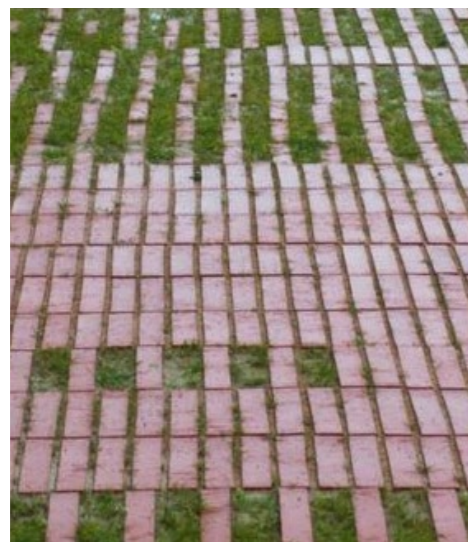
FIGURE 68: Use Less principle diagram by Molly Andrews



PRINCIPLES

3. use less

*Use strategies for prioritising to maximise the material use,
Main aesthetic impact: increased vegetation*



Question the conventions and traditions, this requires site specific design that reflects the context. Where will the movement routes be, and what kind of movement will be taking place? Does this require paving? Perhaps the quantities of sourced materials are limited, the design can be informed to make the most of these and the need for more materials is the factor that is limited instead.

FIGURE 69: Niel Garden by Michèle & Miquel (Minaya, 2018)

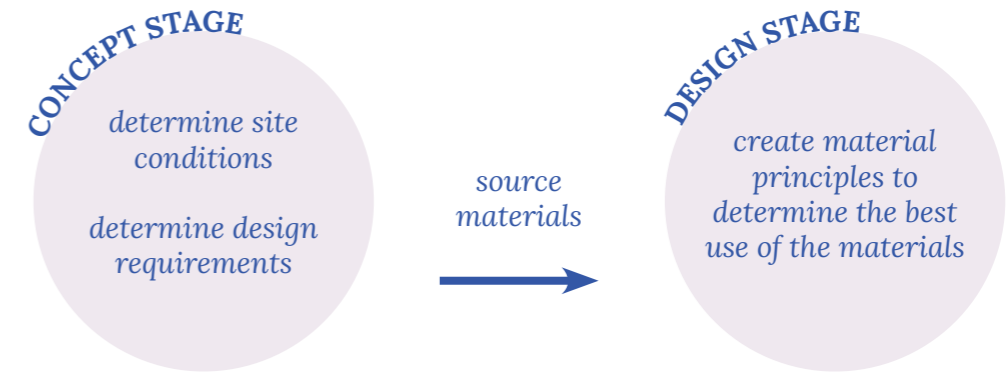


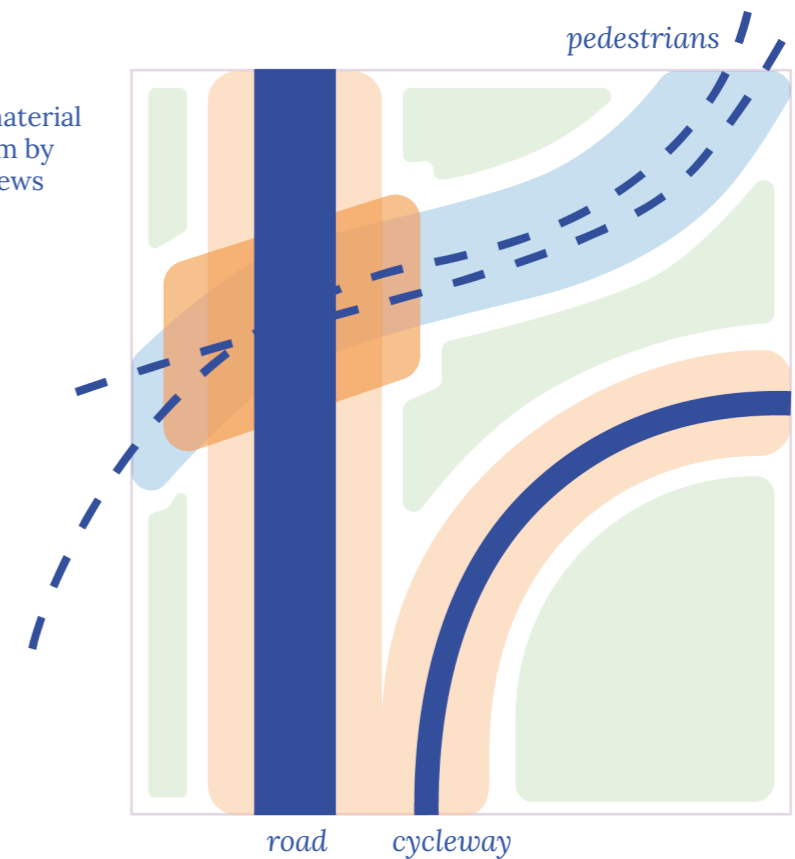
FIGURE 70: Concept to design stage, diagram by Molly Andrews

Material Driven Design

This principle was inspired by the work of SOLA, Taleen Joseffsson's 'form follows availability', and Myklebust and Gagnat's reflection on the design process (2021, pp. 18-20). The research from these projects indicates that the design of the site is informed by the material palette. The material palette has been informed by concept development and determined before the design stage.

The diagram below illustrates the material principle developed by SOLA for Vollebekk Torg, in which areas were mapped out according to material durability requirements to suit the traffic of pedestrians and cyclists, and

FIGURE 71: Strategic material use, diagram by Molly Andrews



vehicular traffic. By doing this, it was determined where suitable materials needed to be installed, thus material application was prioritised in these areas. This principle encourages increasing the amount of nature in the urban realm, therefore apart from areas of traffic, perhaps other spaces that do not necessarily need a hard surface application, can be retained for nature instead?

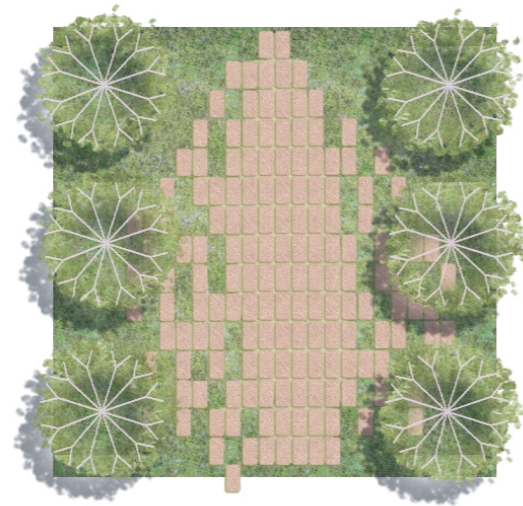


FIGURE 72: Illustrative examples of the Use Less principle. Drawings by Molly Andrews



CAL METRE'S PATH (2015-2017)
by Carles Enrich Studio

I have selected this example to display the use of paving with permeating vegetation. Whilst the centre of the path has little variation, the peripheries of the pathway around benches have paving set with green joints. 'At the edges, the intervention is softened by a greenway, with joints of 5 and 15 cm, providing transition and protection.' (for the existing vegetation on the heritage site) 'Along the avenue, five patterned "carpets" are created, paved with reused cobblestones from the streets in the old town of Gironella' (Carles Enrich Studio, 2017)

FIGURE 73: Cal Metre's path, a landscape project in a heritage area. (Carles Enrich Studio, 2017)

FIGURE 74: Cal Metre's path from above. (Carles Enrich Studio, 2017)

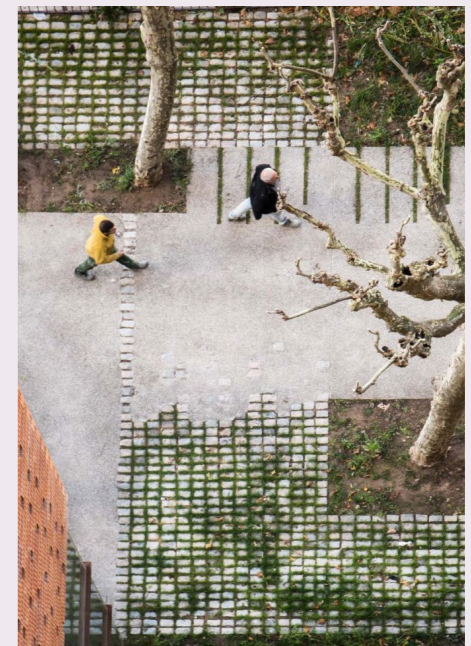
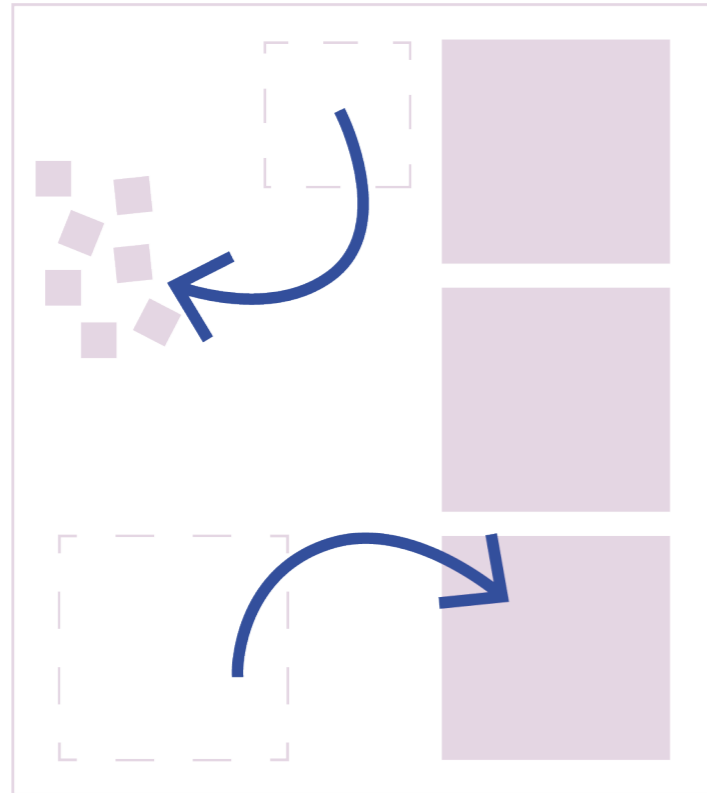


FIGURE 75: Reconfigure principle diagram (Molly Andrews)



PRINCIPLES

4. RECONFIGURE

Source materials from the site itself, tuning in to the site conditions and metabolisms

Main aesthetic impact: worn materials and features are retained

FIGURE 76: Detail at Turtle Creek Waterworks by D.I.R.T Studio (D.I.R.T. studio, 2002)



The existing materials on site can be the most sustainable choice (Gkoltsiou et al., 2021, p. 9; Lacaton, 2021; Something Fantastic, 2021, p. 351), there is no transportation or raw material extraction. Instead, the efforts are redirected into the craftsmanship in creatively reconfiguring the materials into a new design (Gkoltsiou et al., 2021, p. 12). This requires getting to know the materials, what are they, what are the opportunities? (Something Fantastic, 2021, p. 32)

Making do is about using what we already have. It is about considering

the existing as a valuable resource, not as unsatisfactory or constraining ...Make do with a minimum of materials to provide more space for use, to spend better and less. (Lacaton, 2021, pp. 58, 67)

The existing site might contain features indicative of its former purpose, the principle of 'reconfigure' means analysing the site and its contents for circular possibilities. This could mean reimagining and retaining disused structures or breaking them down into components for reuse.

In the event of earthworks on site, there are likely to be stones that are excavated or rubble from construction or demolition. There are several possibilities for using these rather than having them removed from the site entirely. The images on these pages demonstrate the possible uses for such material.



FIGURE 77: Detail at Core City Park Detroit by D.I.R.T Studio (2019)

FIGURE 78: Core City Park Detroit, by D.I.R.T Studio (2019)





FIGURE 79: The Gashoudervijvers, retained basins at Westergas park in Amsterdam, NL. Photograph by Molly Andrews

Ruins of industry

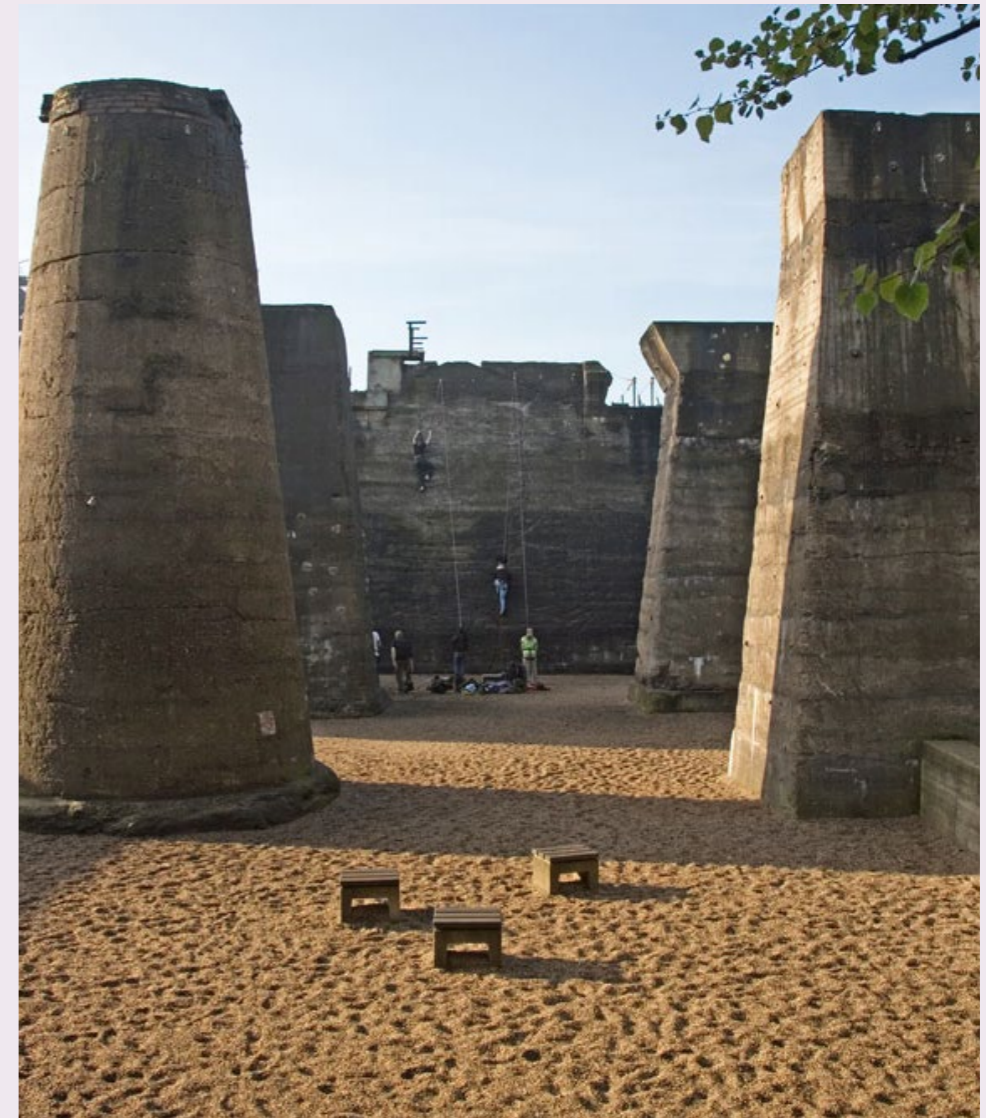
As mentioned in the previous section (page 0), ruins were once the subject of drawings and paintings in the romantic movement. It can be argued that ruins today are not valued to the same extent, but there are landscape architecture examples that would challenge this perspective (Krogh, 2014, p. 20). In reconfiguring the materials on the site, the possibility of retaining disused structures should be advocated for as a means of sustainability. For the sake of furthering the reuse aesthetic, is there an opportunity for romanticising these structures again?

Worn Materials

Often seen as a detriment to the incentives for reuse of materials, the wear observed on materials after years of use should in fact be celebrated (Boniver et al., 2010). The intentional and unintentional markings on materials indicate the life of the material. These features embed the history and culture within its appearance, the legacy is retained in a new project if these are kept and cherished.



FIGURE 80: Detail of planting and reclaimed pavers at the Urban Outfitter Dockyard by D.I.R.T Studio (2011)



LANDSCHAFTSPARK DUISBURG NORD BY LATZ + PARTNER

A former industrial site which was converted into a series of parks in 1992 (completed 2002) (Landezine, 2011). The image above displays one of the 'playpoints' which uses the retained structures as climbing walls. In the image to the right, bunkers once used for storage have been converted into walled gardens, these can be viewed from a walkway attached to an old railway structure.

FIGURE 81: Climbing walls at Duisburg Nord (Landezine, 2011)

FIGURE 82: Walled gardens and promenade at Duisburg Nord (Landezine, 2011)





FIGURE 83: Piranesi, Giovanni Battista (c.1800) *Ruins of the Xystus, the central hall of the Antonine Baths.* (Image source: Nasjonalmuseet: Piranesi, c.1800)



FIGURE 84: Tanja Lincke Architekten, *RUIIN GARDEN.* (Original photograph by Noshe (2020). Illustration by Molly Andrews)



Breaking surfaces

This has been successfully explored in a number of landscape architecture projects, Wagon Landscaping has had several projects which explore breaking asphalt surfaces and encouraging vegetation amongst the rubble. (See figures 86, 105 and 106)

One of the most iconic projects is the Alter Flugplatz Frankfurt am Main by GTL Landschaftsarchitekten. The runway features were retained but experimentation of crushing the asphalt was conducted across the remains of the old airport infrastructure.

(Left) FIGURE 85: Illustrative example of the Reconfigure principle by Molly Andrews.

(Below) FIGURE 86: Jardin Joyeux created over broken asphalt, (Landezine, 2018).



URBAN OUTFITTERS HEADQUARTERS BY D.I.R.T. STUDIO

Julie Bargmann formed the studio in 1992, an acronym for 'dump-it-right-there', D.I.R.T. studio seeks to examine the site context and develop designs that respond to these conditions. The Urban Outfitters Headquarters retained the materials from the site and reconfigured these to create a new landscape which reflected the industrial past of the site: 'Rebranded demolition debris is lovingly converted into patterns of porous pavement' (D.I.R.T. studio, 2011)

FIGURE 87: Urban Outfitters Headquarters construction

FIGURE 88: Urban Outfitters Headquarters completed site

FIGURE 89: Harvested materials organised

(Images source: D.I.R.T. studio, 2011)





In the event of earthworks on site, there are likely to be stones that are excavated or rubble from construction or demolition. There are several possibilities for using these rather than having them removed from the site entirely. The images on these pages demonstrate the possible uses for such material.

FIGURE 90: Dry-stone wall, photograph by Molly Andrews.

FIGURE 91: Boulders organised in a circle around the tree base. (Yiyu design, 2022b)

FIGURE 92: Stones set in a meadow as steppingstones. (Nelson Byrd Woltz Landscape Architects, 2016)

FIGURE 93: Stones fill a plant border. (Havetid, 2014)



FIGURE 94: Vestre Parklet 3D render (Vestre Street Furniture, 2019)

MODULAR

An essential principle of the circular economy is that there should be consideration for how the materials will be used the future, this is usually called design for disassembly (dfd) (Gkoltsiou et al., 2021, p. 9). Modular construction is one method that ensures that the components can be easily removed from site and reassembled elsewhere (Vandkunsten Architects and Manelius, 2016; Gkoltsiou et al., 2021, p. 9). It is also important to show consideration in the installation of materials, by avoiding

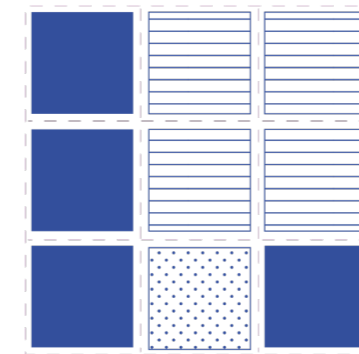


FIGURE 95: Concept diagram for modular construction by Molly Andrews

casting or gluing which reduces the possibilities for reuse in the future (Gkoltsiou et al., 2021, p. 9).

Whilst modular construction already has applications in structure and furniture design, the key concepts from these designs is ensuring adaptability and flexibility. These themes can be applied to landscape architecture, perhaps in the organising of the site surface, see figure 95. Components such as pavers, can be set within a frame, this could minimise disturbances to the materials in other frames when disassembling.

One such design that uses the modular principle is Parklets, by Vestre. The parklet fits within the dimensions of a standard carparking space, thus it can be fitted into the existing environment without disturbing the surface materials. There are numerous configurations of the parklet to create spaces that fit the requirements of the local area, demonstrating adaptability and flexibility.

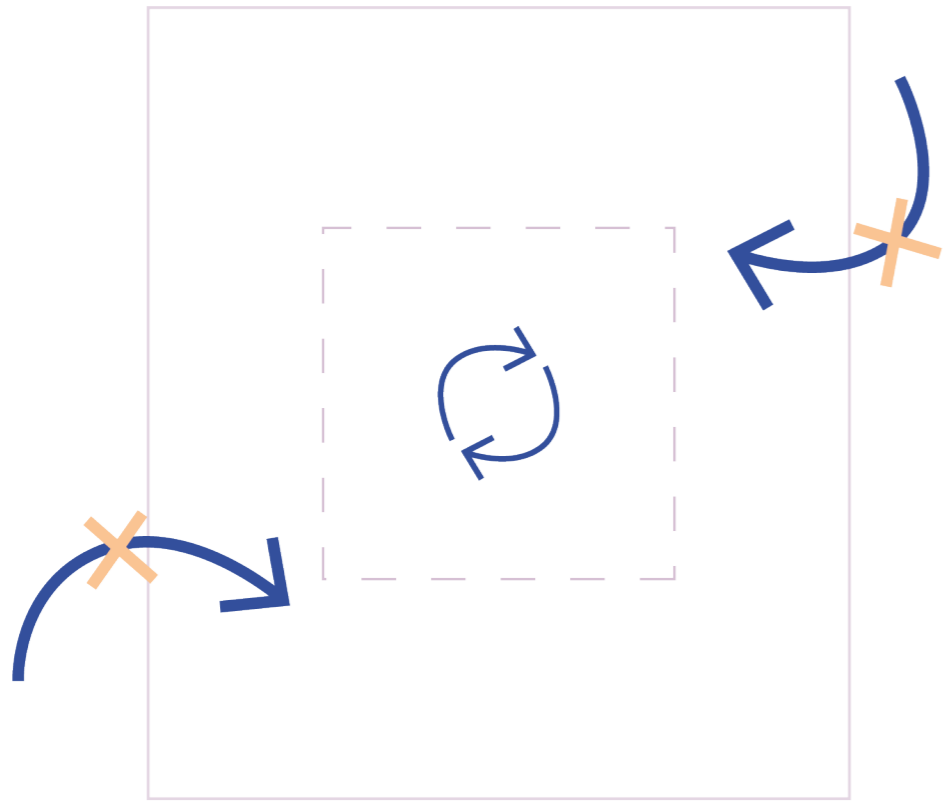


FIGURE 96: Illustrative example of the Use Even Less principle (Molly Andrews)

PRINCIPLES

5. use even less

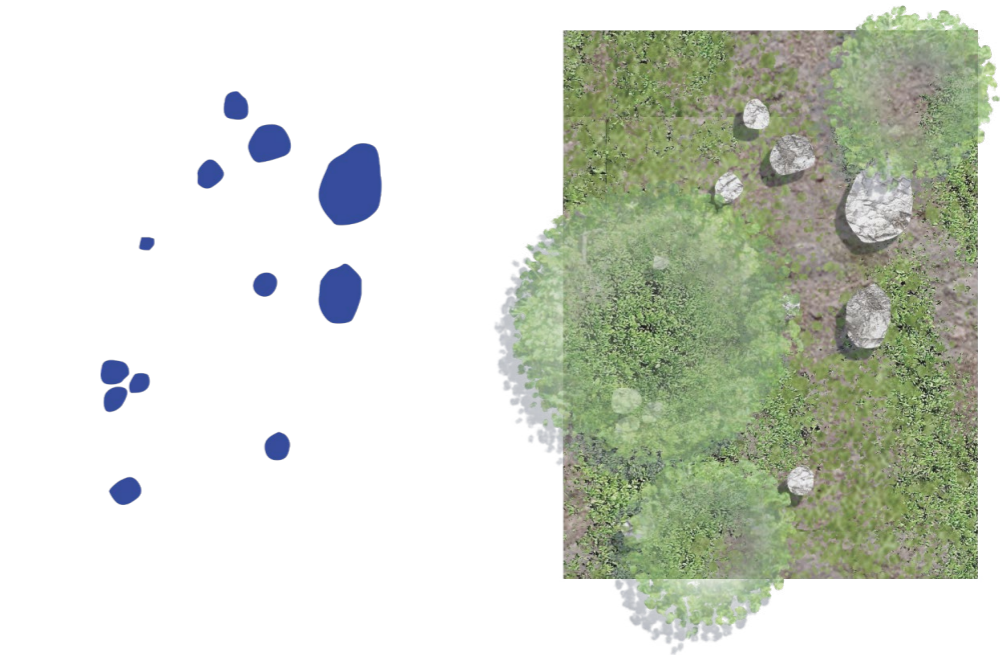
*Question the necessity for drastic site interventions, balance the needs of the site nature with those of the users.
Main aesthetic impact: nature is prioritised over the human but culture is preserved*

‘Less is More, Maybe Nothing is Everything’

(Something Fantastic, 2021, p. 52)

Perhaps the most radical and the most sustainable. This involves identifying the core requirements for the project, and identifying if these needs are met by the site, if they already are: is intervention necessary? (Lacaton, 2021) This principle is about considering the balance between humans and nature: minimal interventions decided upon through careful consideration of the local ecologies, culture, and social realms.

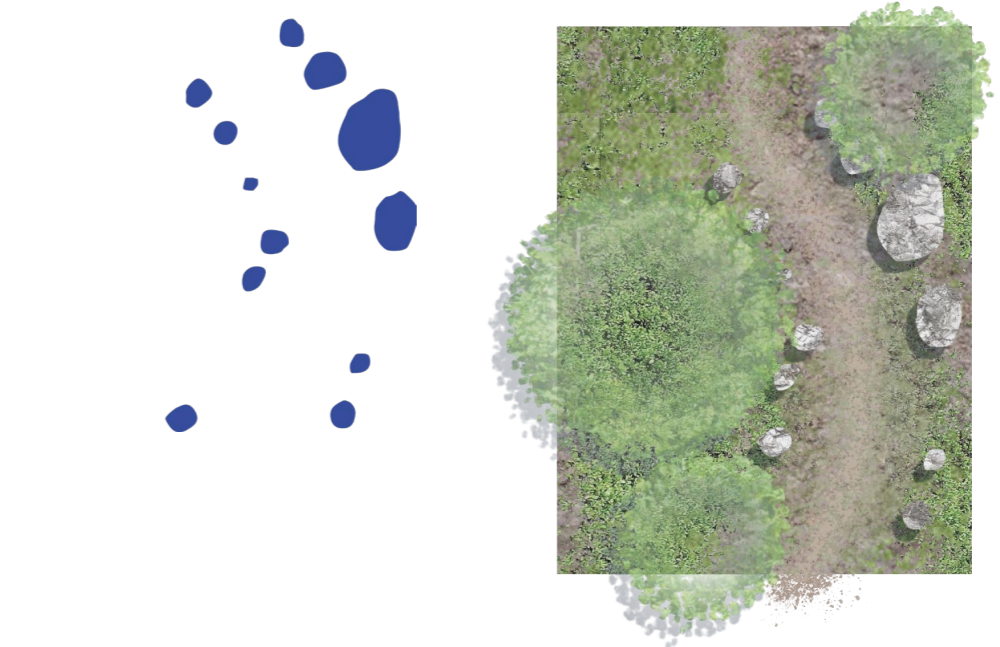
FIGURE 97: Illustrative example of the Use Even Less intervention, drawings by Molly Andrews



Example of a small intervention

Site materials

Existing trees left undisturbed, softly defined movement route





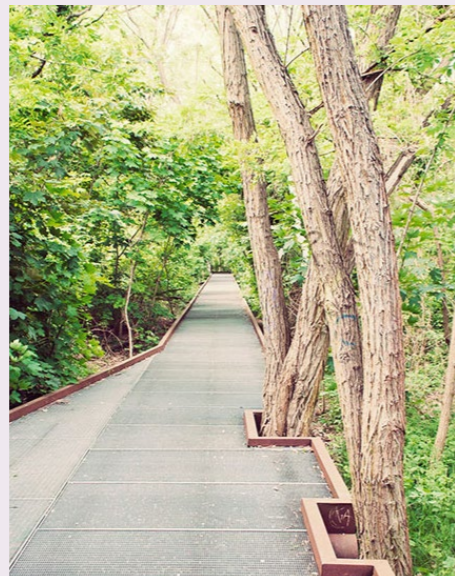
**SCHÖNEBERGER
SÜDGELÄNDE PARK BY
GROUP ODIOS**

A former railway infrastructure site, the area was converted into a park which allows visitors to experience the 'a diverse, species-rich natural oasis' (Landezine, 2013), that has re-established itself once the industry was removed.

Pathways are suspended above the ground using the old railway lines, with cut-outs around the existing trees. This landscape intervention demonstrates the possibility in protecting nature on site whilst still allowing humans to explore.

FIGURE 98: Pathway and visible railway remnants. (Landezine, 2013)

FIGURE 99: Elevated pathway moving around the existing trees (Landezine, 2013)



**SECTION 05:
APPLIED FUTURE
AESTHETICS**

Illustrated examples of future landscape aesthetics using circular construction principles

Introduction to applied future aesthetic

Within this section I will explore the creative possibilities in the circular principles outlined in the previous section. These will be applied to the Green Ring in Hovinbyen using the concepts of future aesthetics outlined in section 02. Through combining principles and concepts, I hope to demonstrate how these ideas translate into a landscape architecture project.




The Green Ring is a loop for pedestrians and cyclists in the Hovinbyen neighbourhood which was mentioned in section 03 in the Vollebekk Torg case study. The ring passes through parks, newly developed neighbourhoods (such as Løren), historical neighbourhoods (such as Risløkka) and the industrial area around Haraldrudveien.

To begin I will outline my thoughts regarding the possible physical attributes of aesthetic categories to create typologies. I will then assess how and where the principles might be applied. This will culminate in the illustrations of these typologies and a wider landscape strategy across the Green Ring.




Types of spaces

Nohl's categories of future landscape aesthetics (as discussed on pages 46-47) will provide the framework for exploring the creative possibilities of circular materials. I have outlined these categories in terms of their  narrative,  movement, and the  nature of the materials to be found in the landscape design.




The beautiful *traditional cultural landscape*

-  Traditional techniques preserved and practiced
-  All vehicles but limited traffic (typically narrower roads in historical districts)
-  Natural materials prioritised

The (new) sublime *succession landscape*

-  Creating space for fourth nature and new plant communities
-  Less movement, no vehicles, only cyclists and pedestrians to limit disturbances
-  Materials are chosen to reflect site history and development

The interesting *urban-industrial landscape*

-  Creating spaces for intrigue, making production and functions visible
-  Increased vehicular traffic and number of crossings
-  Mixture of durable materials that have been reclaimed from the locale

The plain *modern agricultural/rural functional landscape*




-  Facilitating the functions and agricultural operations
-  Full spectrum of movement and traffic
-  Practical materials: durable and renewable



FIGURE 100: Green Ring future aesthetic landscape strategy by Molly Andrews

Green Ring opportunity areas for:

- The beautiful
- The (new) sublime
- The interesting
- The plain

Determining aesthetic areas

The locations for these aesthetic areas around the Green Ring were decided through research conducted into investigating the past, present and future functions of the area. I looked at present landuses (using site visits and open street map data compared to Oslo kommune maps), planning documents for the Hovinbyen Development (using the Oslo planning website and VPOR documents for Haraldrudveien, Økern and Hasle) as well as the site history (using Kulturminner data and the Digital Museum archives). The information from these sources indicated matches to the future landscape aesthetics, therefore the Green Ring has the potential for many aesthetic experiences using the circular principles. One can move through sites of historical churchyards, sites of existing fourth nature to bustling urban industrial zones. This research produced the composite map in figure 101, this collated information then informed the map in figure 100.



FIGURE 101: Green Ring research compiled by Molly Andrews (data from Open Street Map, Kulturminner and Digitalmuseum)

Landuse:

- | | | |
|--|--|--|
| ■ Park | ■ Residential | (Landuse categories provided by Open Street Map users) |
| ■ Wood | ■ Recreation Ground | |
| ■ Green | ■ Railway | |
| ■ Grass | ■ Industrial | |
| ■ Garden | ■ Facilities or services | |
| ■ Churchyard | ■ Commercial | |
| ■ Water | ■ Buildings | |
| ■ Flowerbed | ■ Brownfield sites | — Green Ring |

Anticipated landuse changes

It is important to note that there are plans for development in this area which will change some of the landuse, notably from industrial to residential. However, the materials that exist in these areas reflect their present use. This begs the question, if these materials evoke the impression of an industrial area, how could these be used recycled in a residential setting?



FIGURE 102: Green Ring surface material, map by Molly Andrews, data from Open Street Map (OSM)

Asphalt	Metal	Unpaved
Compacted	Metal grid	Wood
Concrete	Paved	Railway
Dirt	Paving stones	Green Ring
Gravel	Sett	
Ground	Stepping stones	

Local opportunities

There is evidence for opportunities in using this principle in the Hovinbyen Green Ring Area. This map indicates there are large quantities of asphalt around this area, thus the method of breaking surfaces would be a viable option. The map above was created using open street map (OSM) data which was then colour coded to display the categories of surfaces around

the green ring area. This illustrates the variety of the materials that one would experience when walking around the ring.

The categories are supplied through OSM data. For future research, I would collate some of these together to avoid confusion (e.g. ground and unpaved)

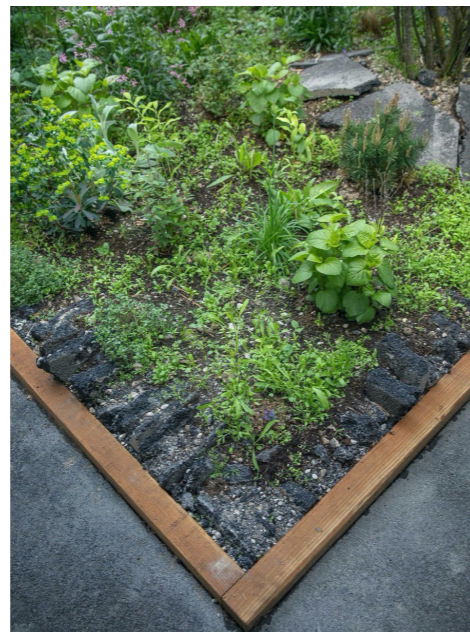


FIGURE 103: Photographs of locations around the Green Ring in Hovinbyen, the numbers correlate to those on the map on the opposite page, Images 1-6 taken by Molly Andrews

Aesthetics of Asphalt

As seen on the previous page, asphalt makes up a large portion of the surfaces in the modern, urban environment. Asphalt is conventionally used for vehicular surfaces, or low maintenance pathways. As a low cost, fully recyclable material, upkeep can be localised to the areas that need it (von Birgelen et al., 2015, pp. 221–223).

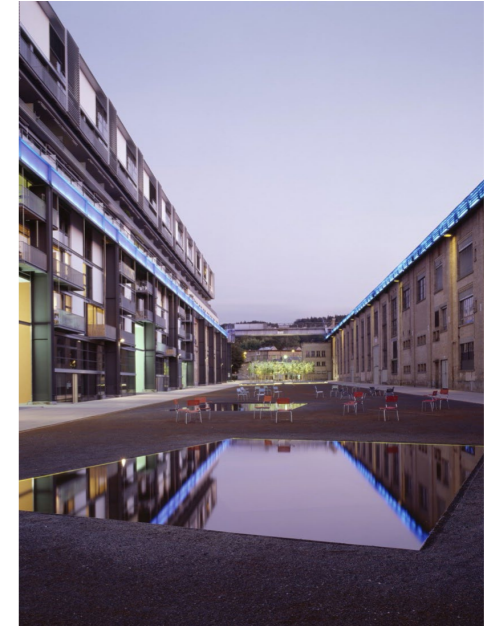
Through applying the circular principles, how might asphalt be retained on site, and reimagined to create different aesthetic experiences? This question has already been explored in several landscape projects. Pioneering this research is Wagon Landscape, who have tested breaking the asphalt into rubble or cutting out sharp geometric shapes, before establishing meadows, tall grasses and ornamental planting in these areas. A selection of examples is displayed on these pages, to demonstrate the variety of existing asphalt landscapes.



Top, FIGURE 104:
Boerenhol' [Park]ing by
Wagon Landscaping, 2012.

Middle, FIGURE 105:
Asphalt Jungle by
Wagon Landscaping, 2022.
(Monel, 2022)

Bottom, FIGURE 106:
Jardin des Joyeux, by
Wagon Landscaping, 2018.



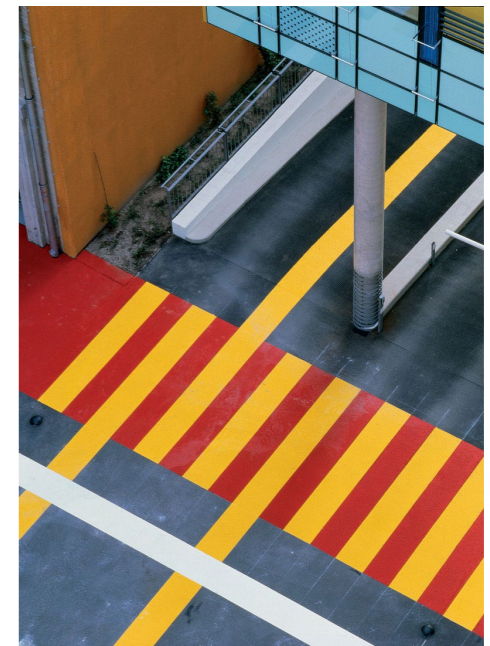
Top left, FIGURE 107: Texture
by Studio Basta and Wagon
Landscaping (Studio Basta, 2015)

Top right, FIGURE 108:
Shoreline Park by MARELD
landskapsarkitekter, 2020.

Above left, FIGURE 109: Parc
Blandan, Lyon. (Lucky Sophie,
2014)

Above right, FIGURE 110:
Sulzerareal, Winterthur by
vetschpartner. (Bauer & Feiner,
2010)

Right, FIGURE 111: DKV
Insurances, Berlin by Topotek 1
(2021)



The beautiful

(traditional cultural landscape)

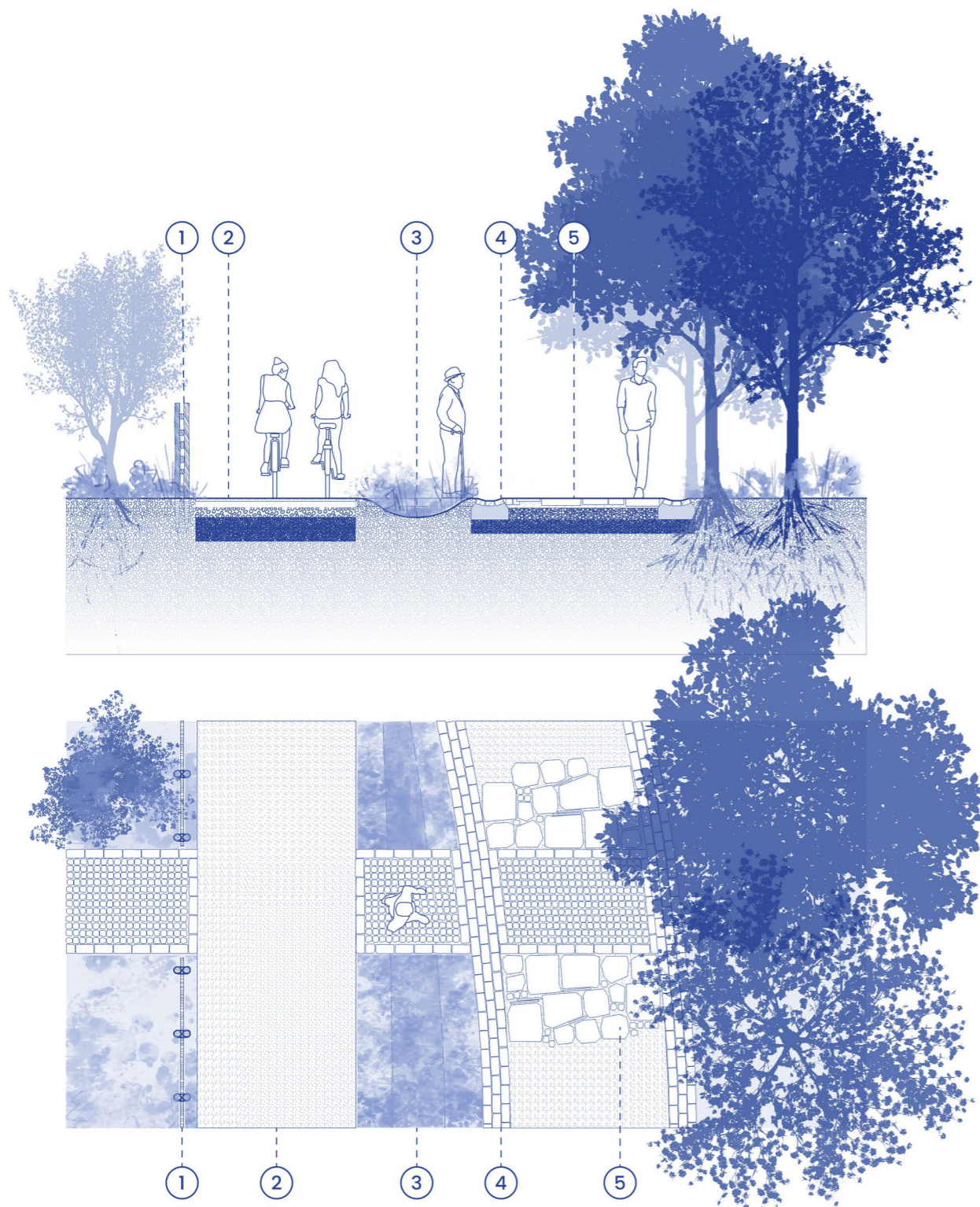


FIGURE 112: The beautiful concept typology by Molly Andrews

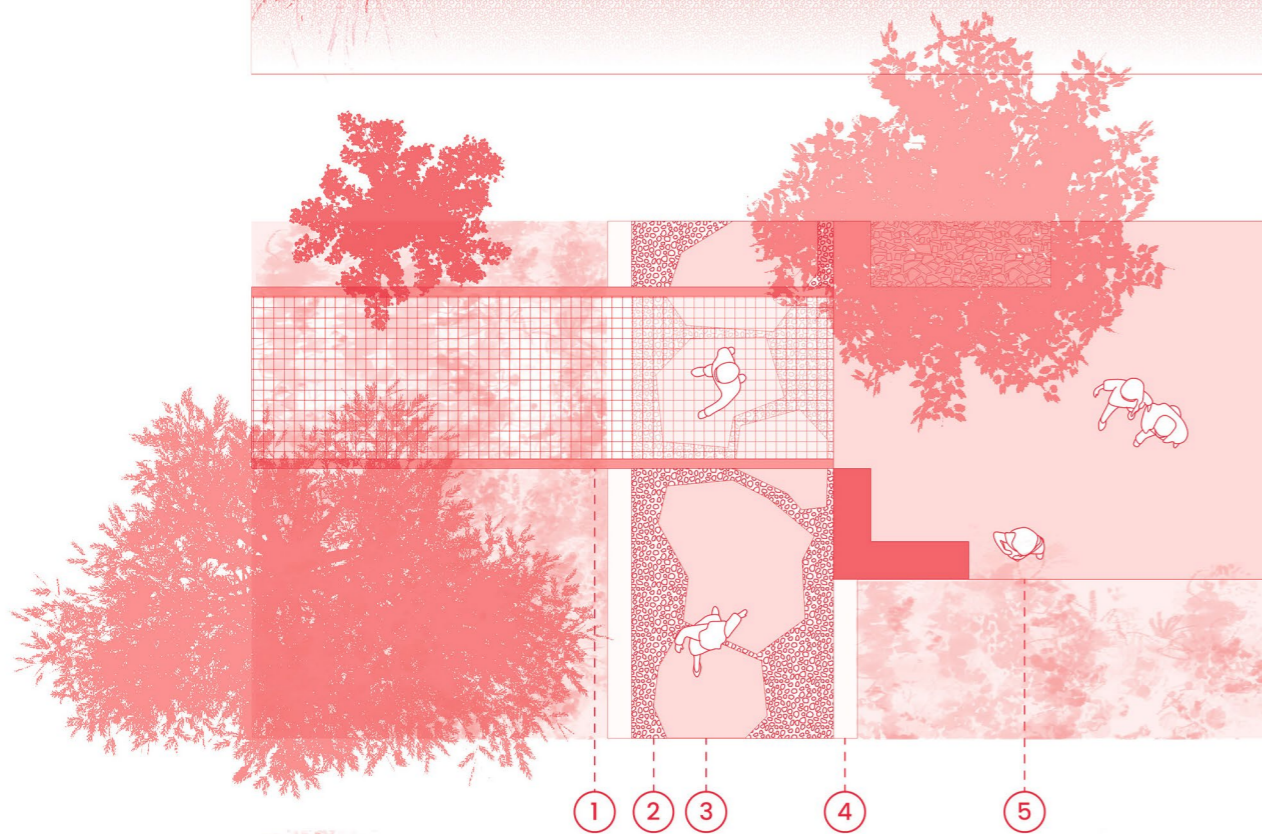
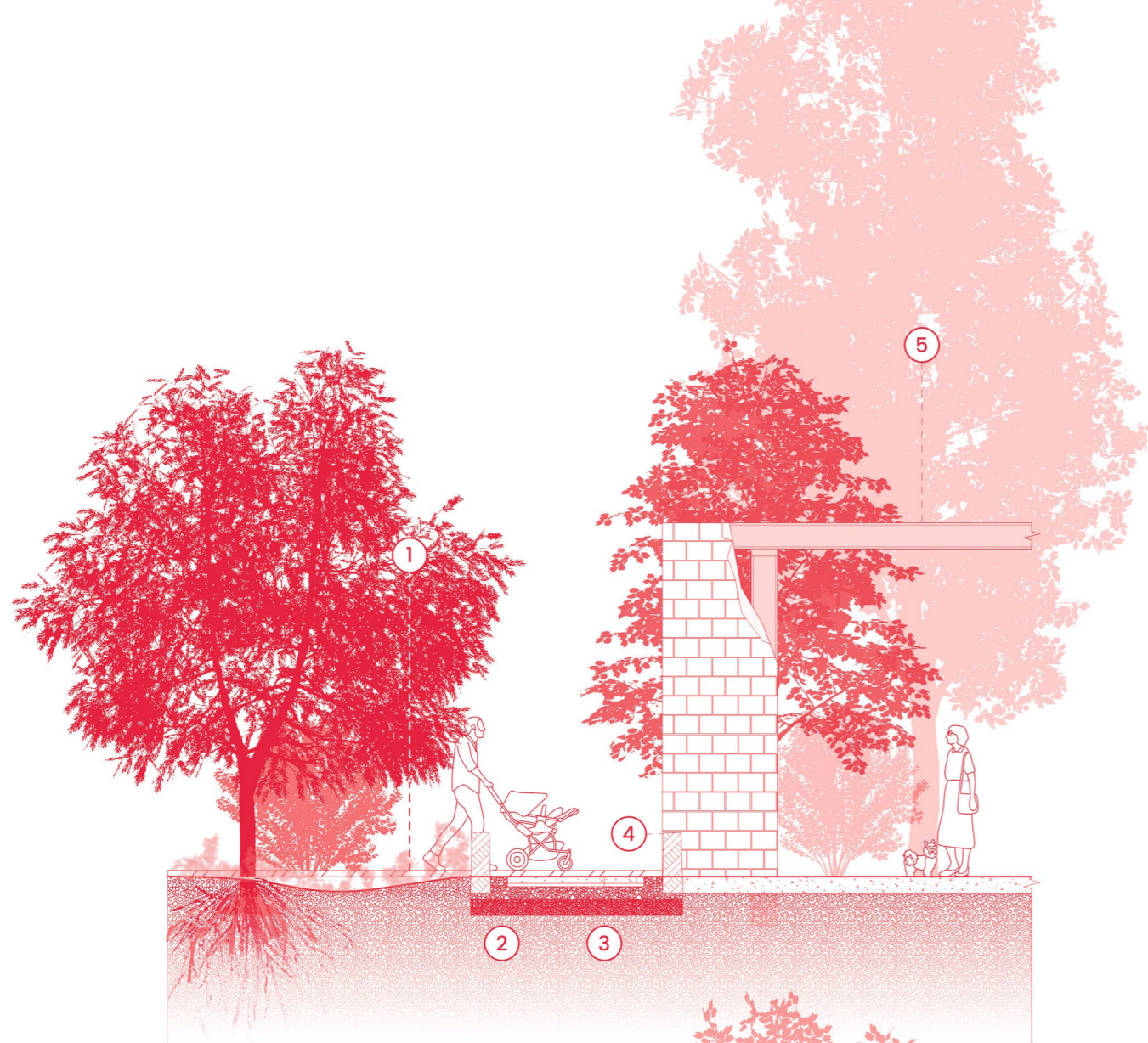
Using the principles: reconfigure and use less.

To preserve the cultural identity of these spaces, there is the opportunity to use traditional skills, and local, natural materials. Through using existing materials, the non-uniform shapes and evidence of wear, this supports the narrative of site history and heritage.



FIGURE 113: Traditional fence at Folk Museum. Photograph by Molly Andrews

- ① Fence constructed using traditional techniques. This example was informed by Norwegian wooden fences called, 'Skigard'.
- ② A water-bonded path, using a three layer construction technique for durability as a cyclepath.
- ③ Sustainable drainage, using swales to also separate pedestrian and cycling traffic.
- ④ Using reclaimed bricks set in a mortar base to provide an edge for the footpath.
- ⑤ Bands of reclaimed and reused stones as a threshold where paths cross over.



**Using the principles:
reconfigure and use less,
use even less.**

**The (new) sublime
(The succession landscape)**

This landscape represents the spaces which have experienced human interaction and require rehabilitation. Pathways restrict movement so to encourage plant growth and processes for nature to heal. This does not necessarily mean removing the evidence of our presence, rather reusing those materials and avoiding introducing anything new into the environment.

- ① Elevated walkway, this allows the pedestrians to move through the area without disturbing nature and the development of plant communities.
- ② Rubble from the decommissioned buildings is crushed to create an aggregate suitable for a pathway.
- ③ The larger pieces of rubble, and concrete slabs, are positioned to create stepping stones.
- ④ Rammed-earth walls provide an edge to the pathway as well as protection to the planted areas.
- ⑤ The disused building is preserved as a pavillion from which the protected nature can be viewed.

FIGURE 114: *The (new) sublime* concept typology by Molly Andrews

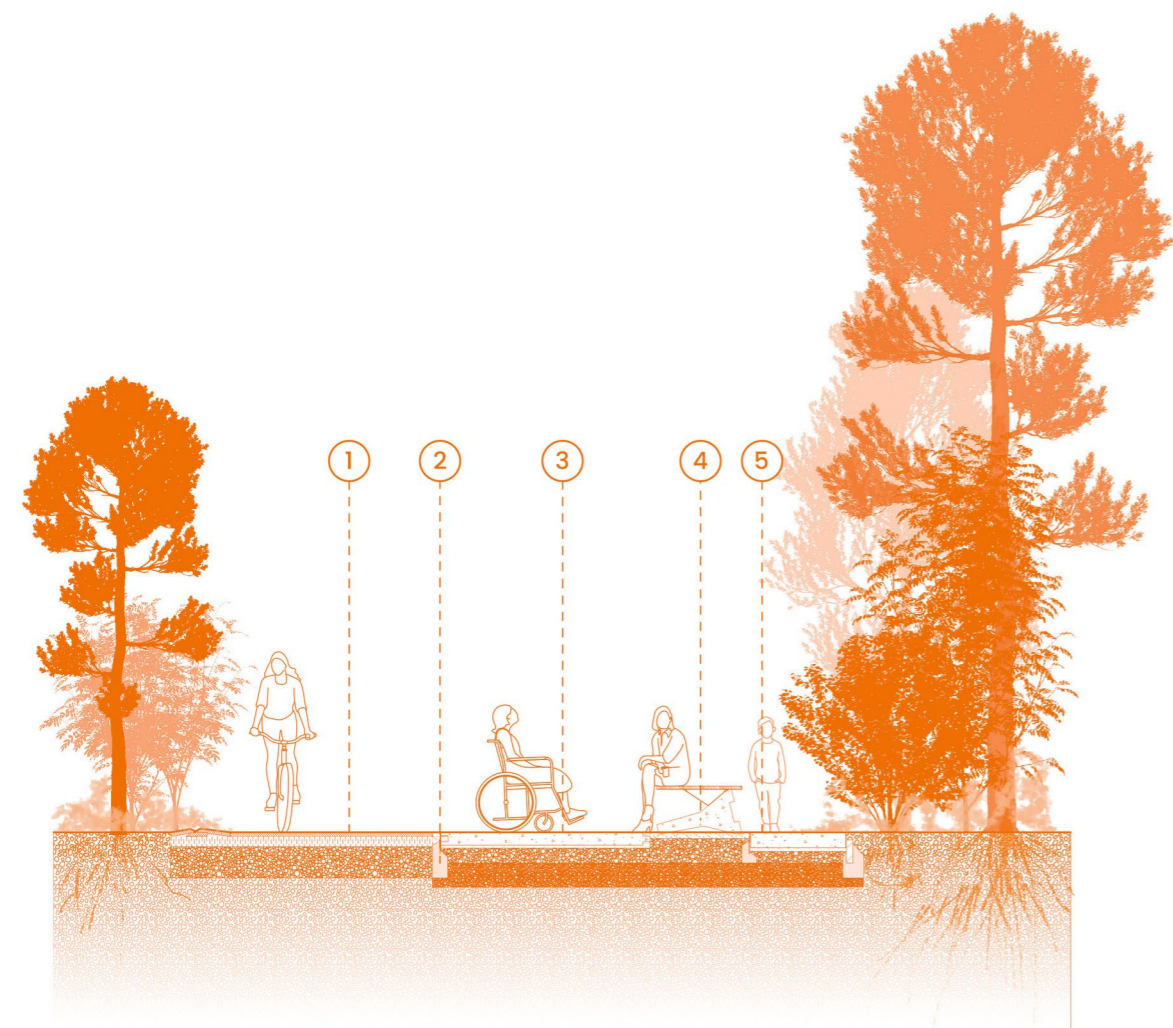


FIGURE 115: *The interesting concept typology* by Molly Andrews

**Using the principles:
reconfigure and utilize.**

The reuse, recycling and upcycling of materials in an urban environment requires that we use components that are maybe considered mundane. However, the weathered and recognisable qualities of these pieces retains the heritage of the site context.

The interesting

(urban-industrial landscape)

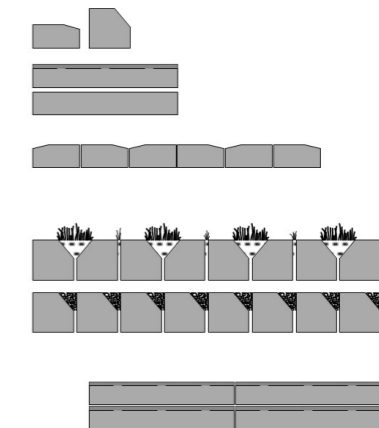


FIGURE 116: *Testing configurations of curb edges* by Molly Andrews

- ① Asphalt cycle path. As a common material in urban-industrial areas, this could be created from a retained and preserved asphalt area on site.
- ② Edges to the new paved areas could be constructed from reclaimed metal (posts in chain-link fences as an example).
- ③ Concrete paving. Modular concrete divider walls used as boundary fences could be reused as such, or in this example they are laid flat as paving slabs
- ④ Recycled bench. Similarly to number 03, this bench concept uses a concrete car-park divider as a base.
- ⑤ Curb edges as a planted surface. Inspired by SOLA's use of roof tiles, I searched for components in the urban landscape. I decided that curb edges have a modular quality as well as a shape that could create opportunity for creative surface solutions (see figure 116)

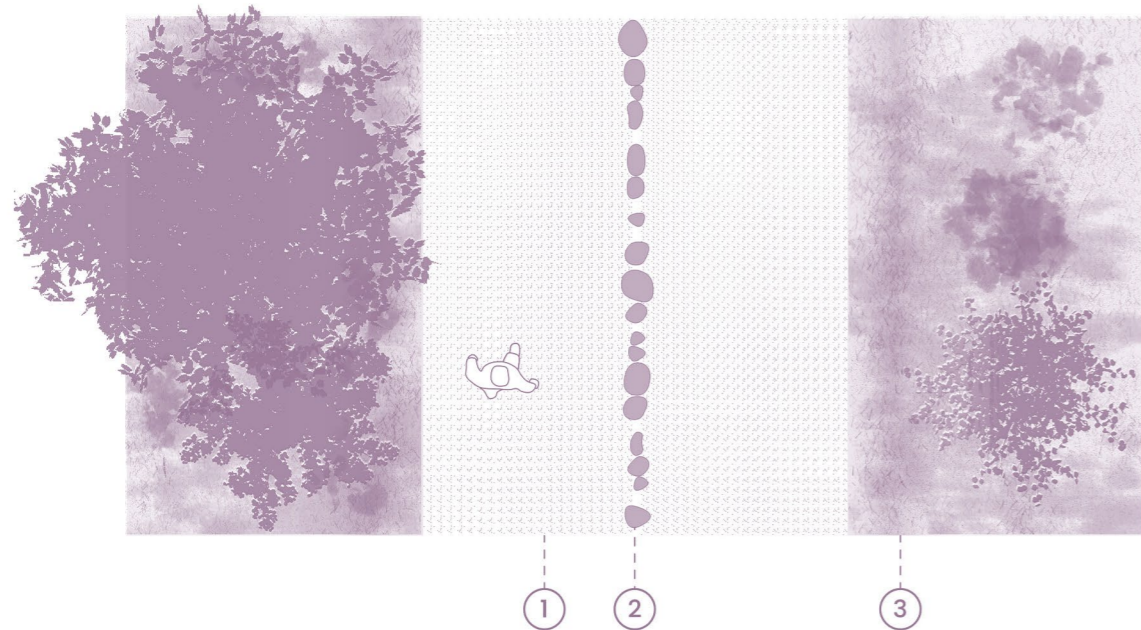
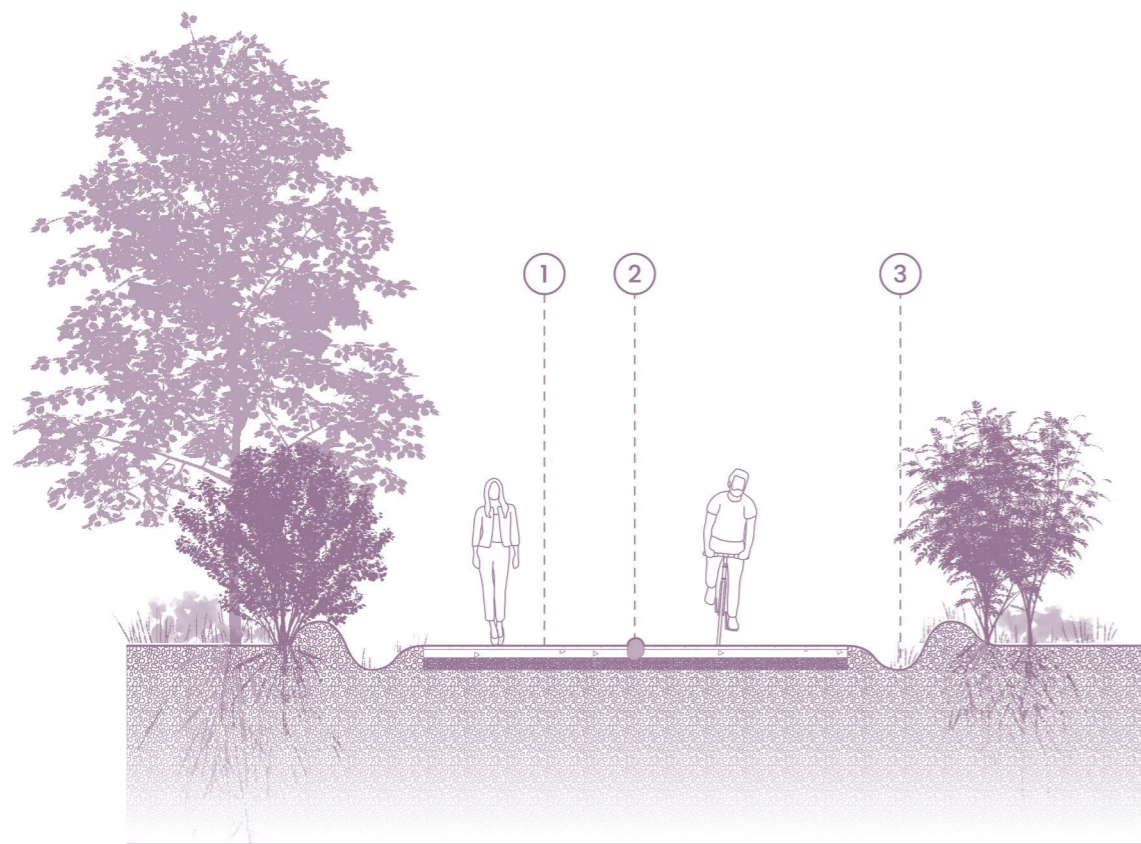


FIGURE 117: The plain concept typology by Molly Andrews

**Using the principles:
reconfigure and use less.**

In the rural landscape, the footpaths and cycleways could be kilometers long, which involves using large quantities of material. This could also be creating a new component in the landscape, thus this requires sensitive selection of materials.

The plain

**(Modern agricultural/rural
functional landscape)**



FIGURE 118: Stone border at the Bygdøy Folk Museum. Photograph by Molly Andrews

- ① The cycle and footpath are a water-bound using a three-layer construction method for durability. The construction layers involve: compacted earth, an aggregate and a fine gravel. Each of these layers can be sourced sustainably, and it is not introducing any synthetics into the rural environment.
- ② If required, a divider between the cyclists and pedestrians has been created from the found rocks and boulders around the path and during path construction. These can be creatively positioned across the site as a playful feature.
- ③ Boundaries are created through creating swales that also function as site drainage. The height on these can be adjusted to the requirements of the site.

CONCLUSION

The final thoughts and discussion on the function of aesthetics in the future landscape.

Across the scales of governance: global, regional, local and at neighbourhood levels; there is a call for sustainable development and adoption of the circular economy (UNEP, 2012; Circle Economy (PACE) and Circular Norway, 2020; European Commission, 2020a; European Union, 2020; Architects Climate Action Network, 2021c; Vollebekk Fabrikker, 2022). There is also a call for valuing the aesthetics in sustainable development (European Commission, 2021b).

Through research into circular economy principles in landscape architecture, I discovered discussions in landscape aesthetic theory which connect to sustainability advocacy. Landscape theory, dating back to the 19th century, indicates that the aesthetics of the landscape could be utilised to increase sustainable development, or in recent discussions, circular principles (Meyer, 2008, p. 17; Woltz, 2020, p. 13). The experience of a landscape can showcase the reuse of materials, the choice and visibility of reuse communicates the circular narrative. However, sustainable development is multi-faceted, for example there concerns for cultural preservation, conservation of ecologies, as well as reducing waste (United Nations, no date). Theories which discuss the future landscape aesthetics, demonstrate a review of

the present landscape typologies in favour of aesthetic categories which more accurately reflect the landscape experience within the Anthropocene (Nohl, 2001; Bakshi and Gallagher, 2020).

In terms of seeing these ideas being realised in the landscape, there are concerns over the lack of suitable infrastructure for adopting circular methods. The various actors involved in a construction project must all be engaged in the process, yet there is scepticism over the aesthetic outcome, and concerns over risk in undertaking a project which does not use conventional methods. I was also able to discuss these concerns with persons involved with circular landscape projects, which indicated that through using a framework of circular principles they were able to mitigate these risks. The strategies reassured the other stakeholders, who were guided through the process whilst exploring creative methods for reuse to challenge the scepticism regarding a 'sustainable aesthetic'.

This thesis sought to demonstrate that there many aesthetic opportunities for future landscape architecture projects. Through researching methods and concepts in the circular economy, I outlined circular principles for the landscape architect. I was then

able to identify several successful existing projects which exemplified these ideas. This indicates that the aesthetics of a landscape are not limited by circular methods. To illustrate this further, I determined how the future landscape aesthetic categories, together with the circular principles, might be applied to a project. This resulted in identifying locations for these aesthetic concepts then creating circular typologies to reflect the narrative of the aesthetic.

In researching circularity in the built environment, it was evident that there is scope for further investigation in the application of the principles to landscape architecture. For a more in-depth inquiry, I chose to separate the landscape into three components (the living, surface, and structures) before selecting one of these to focus on (the surface). Unfortunately, this means that my final illustrative typologies are incomplete. They lack the additional components to create the full picture of the aesthetic possibilities in a circular, sustainable landscape. Whilst these other components have been indicated conceptually, I would like to investigate these further to fully realise my research and conclusions. However, due to the scale and variations of the surface in the landscape, there is a large

scope for aesthetic experiences and circularity of materials.

Therefore, I would conclude that there are no aesthetic limitations when using circular economy principles in landscape architecture. Not only does the aesthetic experience communicate the requirement for circularity in the built environment, but it can also be utilised to simultaneously provide a narrative for other sustainability concerns. This indicated that the function of the aesthetic in landscape architecture must be valued as a tool for sustainability.

Thank you to my family and friends for all their support. Many thanks to my supervisor Jorg Sieweke for the great guidance and advice through the process.

List of figures:

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FIGURE 03: The Reuse Workflow diagram by Josefsson (2019, p41), reimagined for landscape architecture

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FIGURE 18: Østre Aker Church in 1984 (Image source: Finn Kart)

FIGURE 19: Østre Aker Church, 'Fra Raskeløkken ved Strømsveien 1. Fotografering - 1899' (Image source: DigitaltMuseum and Oslo Museum, 2016)

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