Zwartkoppies Dairy

celebrating the uncanny affair of milk

darryn nicolas botha

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

ZWARTKOPPIES DAIRY

celebrating the uncanny affair of milk

by

DARRYN NICOLAS BOTHA

Studio Masters:

Dr. Jacques Laubscher / Dr. Arthur Barker

Study Leader:

Prof. Karel Bakker

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Building Function: Friesland Cattle Dairy
Research Field: Heritage & Cultural Landscapes

In accordance with Regulation 4(e) of the General Regulations (G.57) for dissertations and theses, I declare that this thesis, which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this dissertation is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.

Darryn Nicolas Botha

WITH SPECIAL THANKS TO:

My loving and supportive parents - James & Mignon,

My love & strength - Sarah Jane Milton,

My dear friend - Dieuwke Nightscales,

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Jacques Laubscher and Arthur Barker - for their dedication and productive insight,

Karel Bakker - for his support and guidance through the year.

"For I know the plans I have for you," declares the Lord, "plans to prosper you and not to harm you, plans to give you hope and a future"

Jeremiah 29:11 (NIV)

COWS & THE EARTH

As a child, I drank milk delivered daily, fresh from cows on the local farm. With my sisters I ran through the fields without fear of the languid beasts that grazed all around us.

The meadows, rich with cowslips and yellow celandine, were scattered with their cowpats. The cows were part of the earth.

Their smell, their mooing, the swish of their tails as they waved away the flies; mingled with the dense foliage of trees and hedgerows alive with the song of birds and the buzz of insects.

If the earth was to rise up and take a living form, it would have been a cow, whose steamy breath carried the warmth of the sun, whose mouth and rasping tongue savoured the pasture, whose dung merged with the soil under our feet, and whose creamy milk fed us each morning.

Prime (2009: 1)

Figure 01: Discovery of the land (Author: 2012)

abstract

This dissertation addresses the relationship between life, time and architecture. It places the notion of memory within a changing landscape that stimulates remembrance; manipulating physical, functional, and sensorial experiences.

As time changes and memories blur; there is a nostalgic longing for the creation of place to be used as a tool which both captivates and exhibits history and memory – a mnemonic machine exuding adaptation over time.

The conceptual exploration sets a platform for celebrating the beauty and delight found in the poetics of the dairy production process, employing architecture as a tool to physically manifest the mystifying realm of the engagement between man and beast.

The proposed site is identified within the historical precinct of Zwartkoppies, on the original farmstead of Sammy Marks, located on the eastern periphery of Pretoria. Situated in the life of the everyday - the site offers a platform for transformative practice within a mutable and flexible landscape.

Through superimposing a highly mechanised process within a historic and weathered fabric of industrial memory, the programme intends to highlight the notion of a model farm typology, allowing the farmstead to once again be activated as a platform for training and experimentation.

contents

01

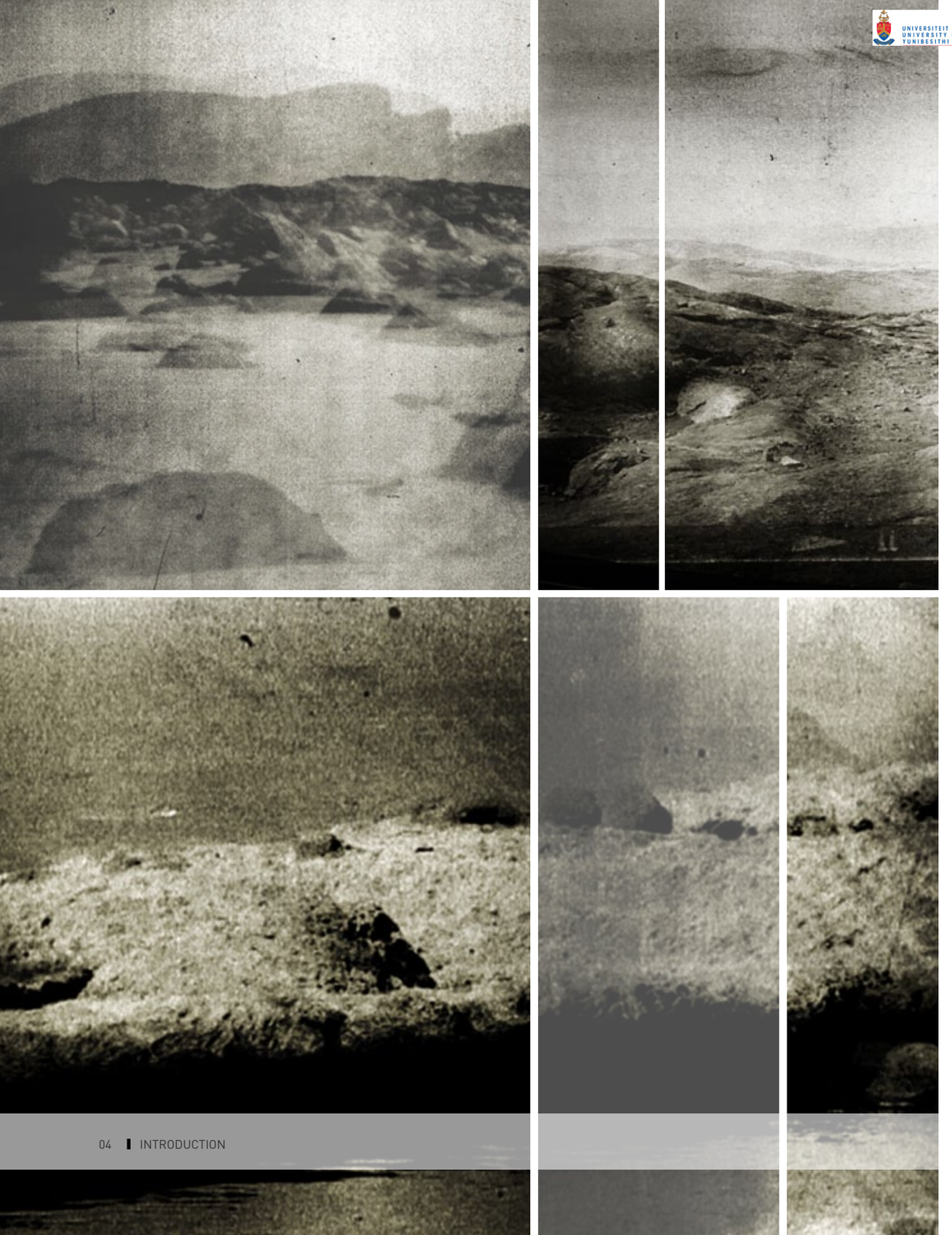
introduction

Chapter one focuses on introducing the normative position and conceptual approach to the dissertation, whilst outlining the problem statement set forth to ground the scheme on a practical level.

The proposed site and background is further presented to contextualise the research questions and practical objectives of the dissertation.

Memory is constantly on our lips because it no longer exists.

Nora, P (1996: 12)



1.1 INTRODUCTION

Before it can be the repose for the senses, landscape is the work of the mind. Its scenery is built up as much from strata of memory as from layers of rock.

Schama, S (1995: 6)

Man continues to mark the land, relentlessly shaping the surface from wilderness to civilisation. With contemporary strategies of mechanization, the necessity of irrigation, and the demands of inhabitation, a new order is introduced. The landscape, which has transformed and evolved over centuries, can therefore be described as being under the volatile influence of nature but under the predictable control of man (Allen 2007: 3).

The natural landscape has taken on an artificial and forcefully imposed patination. Alien materials interrupt the process of growth and decay. New and evolving features created by man are, to an extent, absorbed by the fluid and yielding nature of our surroundings. What results is a hybrid environment, a utilitarian topography, a sustained artifice.

This dissertation explores the role of architecture within the context of the cultural landscape and proposes that the intrinsic features associated with it - such as topography, geography, climate, and man's manipulation of rural and urban environments through time - provides a platform for informing design.

◄ Figure 02: Landscapes layered with the memory of time & transformation (Author: 2012)

1.2 PROPOSED CONTEXT

The proposed site is identified within the historical precinct of Zwartkoppies farm, located on the eastern periphery of Pretoria. This area has always been considered a landmark in the Pretoria landscape, even though it is located approximately 20km from the city centre.

Rich in heritage and grounded in a landscape layered in memory and time, Zwartkoppies offers an opportunity for facilitating the notion of a mutable, changeable, and flexible landscape, engaged in an emotional inter activity; a triad inter-relationship woven between man, nature and creation.

The farmstead, once belonging to Sammy Marks - best known in South African history as a pioneer industrialist - used to be a hive of activity and a model for new and innovative ways to approach farming. The farm was mentioned in several agricultural journals and magazines as a model of modern day farming during the beginning of the 20th century (Mendelsohn 1991: 13). Although these farming activities are no longer practised on the farm today, they have been well recorded in diaries, letters and photographs written by Sammy and his wife. The dairy on the farm was in particularly well known in Pretoria during the early years of the 20th century (Mendelsohn 1991: 26).

Layered with memory and a past presence of an industrial typology, the historic farm buildings form the core of the productive farmstead, and provides an engaging and dialectic foundation for the design.

Within the context of a productive landscape, currently abandoned and forgotten; the scheme sets forth to commemorate the history of Zwartkoppies through celebrating one of the original practises that took place on the farm - dairy production.

◄ Figure 03: Aerial photograph of Zwartkoppies, taken in 1939 (Adapted by author: 2012)

1.3 PROBLEM STATEMENT

According to Marschall (2005: 103), post-apartheid South Africa is “bordering on obsession, with the identification, celebration, evaluation, reassessment and, not least, commodification of heritage”. The lack of guidance and understanding in South African heritage legislation has resulted in the emergence of static monuments with little or no regard to the intangible aspects of living heritage (Bakker, K 2011: 6).

The celebration of living heritage provides a platform for narration, a physical manifestation of the intangible, a setting for unearthing the untold stories of the past. Muller (2008: 8) states that “these stories are, however, often buried deep inside the rich soil or hidden between the rocks, with the people, whose footsteps helped shape the landscape, holding the only key to unlock its meaning.”

In exploring the mutable exchange between architecture and landscape and fusing the two categories, the opportunity arises for the ‘natural’ and ‘man-made’ to be combined in critical and inventive dialogue of living heritage. Dynamic environments are constructed again and again responding to continuously fluxing forces, different cycles and varying speeds. Partly becoming and partly vanishing – the architecture and landscape subtly change through everyday occupation, weathering, climate, and cultural reasons.

On one side, landscape is reclaimed by architecture, it provides a substitute materiality, and adds a dynamic flavour to the site where one state is transformed into another. On the other hand, architecture can provide a benign equivalence, a complementary element to a fluid landscape by which the complexity of our relationship with a place and its memory is measured.

1.4 RESEARCH QUESTIONS

The research questions identified and presented below arise from the theoretical background and the problem statement of the dissertation.

How can the mechanical process of a contemporary model dairy farm provide a platform for responding to or interacting with existing heritage?

What are the regenerative possibilities of sustainable development within the scope of agricultural developments.

How does an industrial typology facilitate a dialogue of constructive engagement with the public?

How does architecture act as a mediating condition between built heritage and the archaeological layering of the cultural landscape?

1.5 OBJECTIVE

Through exploiting the conditions that physically and perceptually shape the chosen landscape, the scheme seeks to augment architectural design through illuminating this sense of nature and environment. The work scrutinises and interprets the dynamic and fluctuating surrounding environment, and its reaction and adaptation to natural as well as superimposed influences.

In this dissertation, the forces of environmental transformation, past and present form the focus of the investigation. With the ephemeral character and dynamic forces of the environment in these marginal territories similarly influencing the architectural landscape - the normative position provides a platform for an architectural intervention through which the mutability of nature is exposed.

02

premise

Chapter two focuses on the theoretical premise - used as a platform to guide and enrich the proposed scheme. The notion of a mutable landscape intertwined with the memory of physical and metaphysical heritage is explored in relation to the context and programme. The landscape, in essence, becomes an integral and foundational part of celebrating the history of the site, the culture, and the process of remembering.

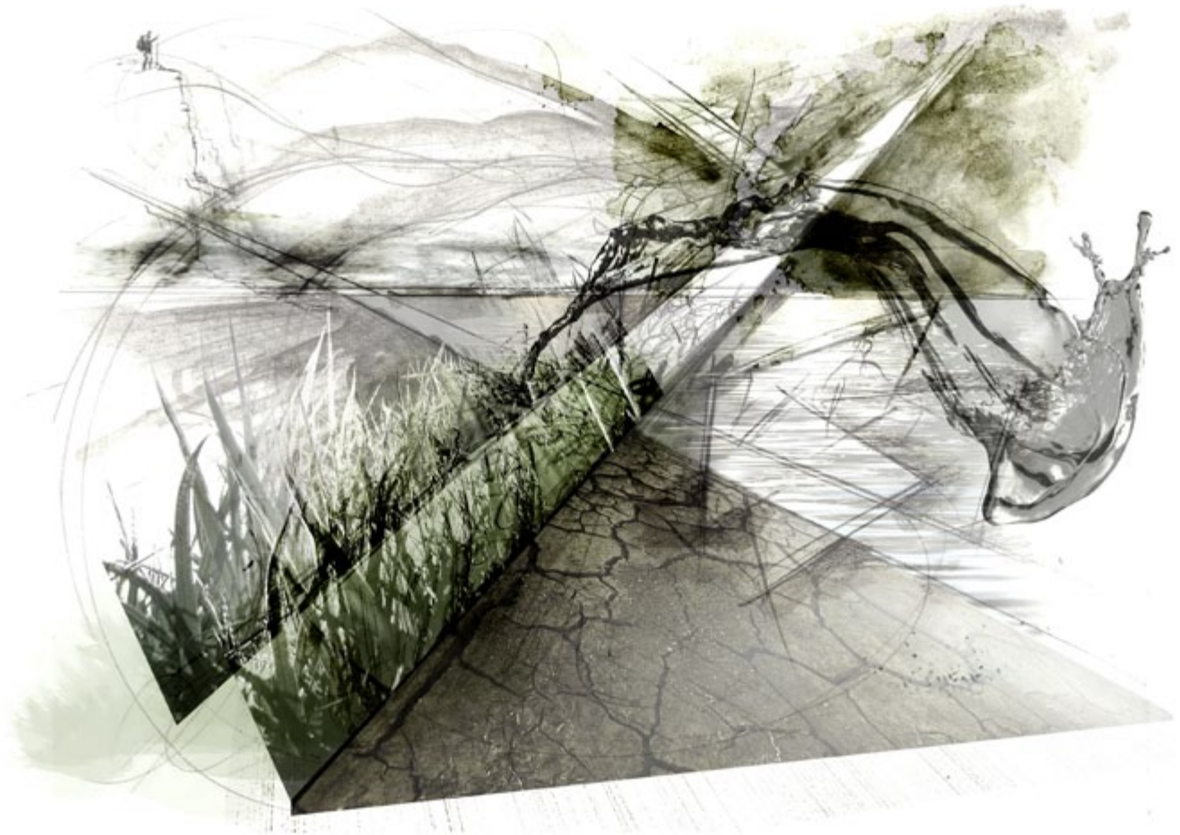


Figure 04: Abstract representation of a mutable landscape layered with memory (Adapted by author from Nightscales: 2012)

2.1 MUTABLE TERRITORIES

The critical dialogue between architecture and landscape offers an ameliorative power to revive and illuminate - passionately engaging with the most dismal of territories.

Corner, J (1999: 3)

The direct relationship of architecture and the built environment to the landscape can be clearly identified if the landscape is considered and transfigured in relation to the notion of place and to the definition of boundaries – whether visual, geographic, cultural, or political. The intrinsic understanding and appreciation of the importance of landscape plays a fundamental role in the construction of architectural thinking and thus should not be separated from the conception of spatial and temporal phenomena (Birksted 2000: 26).

In exploring the mutable exchange between architecture and landscape and weaving the two threads, the opportunity arises for the 'natural' and 'man-made' to be intertwined in critical and engaging dialogue. Dynamic environments are constructed again and again responding to continuously fluxing forces, different cycles and varying speeds. Partly becoming and partly vanishing – the architecture and landscape subtly change through everyday occupation, weathering, climate, and cultural reasons.

Architecture can act as a generative agent for our perception of the environment – influencing the relationship between porosity and the phenomena of nature, altering where light falls, when shadows play, if dust rises, and how materials colour. Modifying the environmental sensitivity exposes architecture's ability to respond to, and reflect, the fundamental irrepressibility of nature, producing an array of events by which architecture is propelled into life – creating illusionistic reverberations in the otherwise inert and resistant material of architecture. The individuality of experience and imagination can allow space to seem substantially altered by percipient environmental design.

By bridging between the substance of architecture and the experience of space - one discovers an indeterminate and intangible liquid of immaterial matter, through which architecture can become a modified body, a living environment.

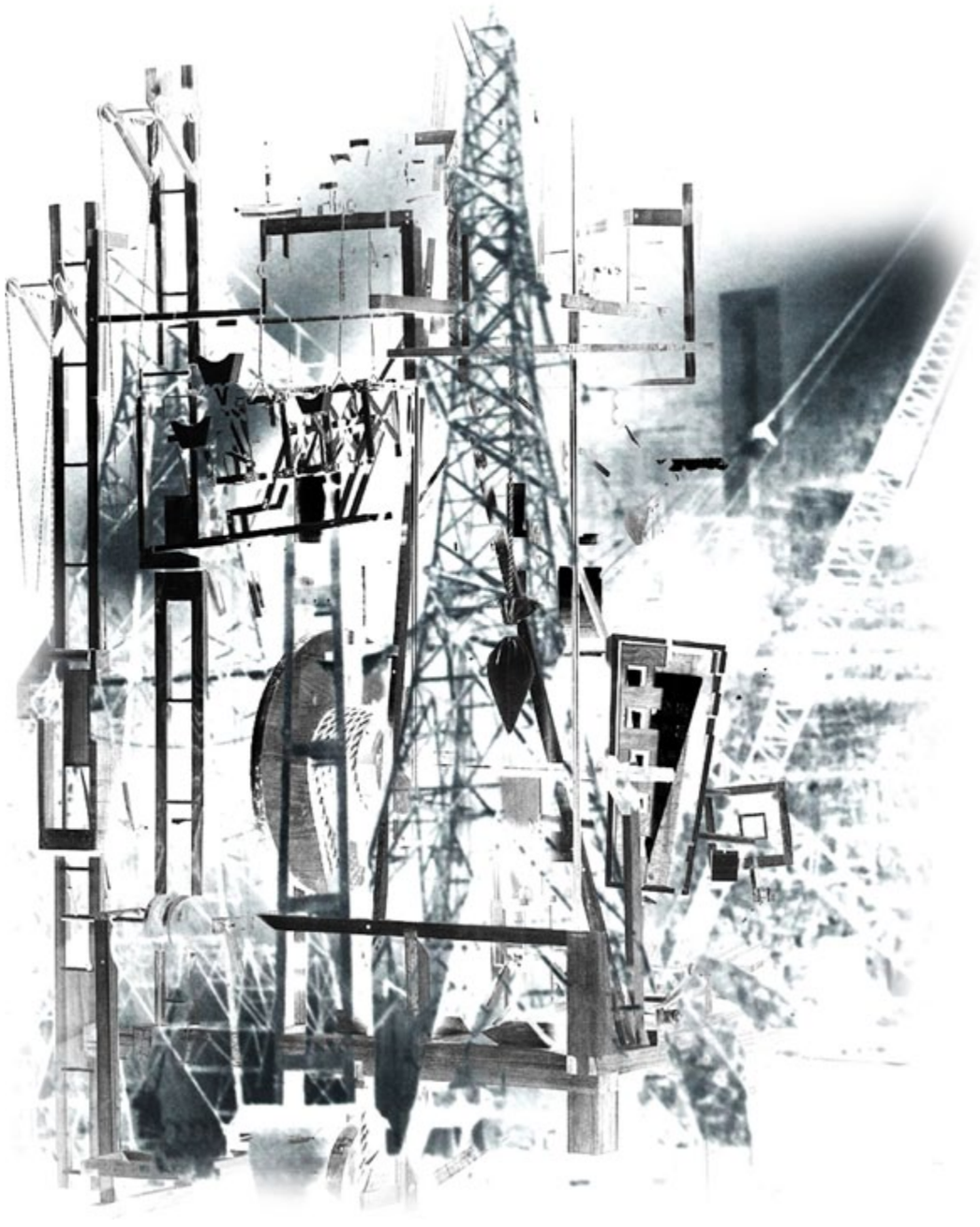


Figure 05: Abstract representation of a mnemonic machine in the landscape (Author: 2012)

2.2 MNEMONIC MACHINES

A landscape is a space deliberately created to speed up or slow down the process of nature… it represents man taking upon himself the role of time.

Jackson (1999: 1)

Concerned with the relation between life, time and architecture - the theoretical premise, in essence, places the notion of memory within a changing landscape that stimulates remembrance; exhibiting physical, functional, and sensorial alterations.

The scheme envisions a mnemonic landscape that embodies the engagement of collective memory whilst allowing one to interrupt the accelerating pace of today's society. Ultimately, it aims to alleviate distorted perceptions of time and memory that plague us as we dive into hyperactive futures.

It is a landscape that is mutable, changeable, and adaptable, situated in the life of the everyday, a site for transformative practice.

The proposed mnemonic landscape embodies the fragmented and reconstructive nature of the process of memory. As time blurs and memories shift, so does the landscape and its composition. As a mechanism for the generation of collective memories and the retreat from a fast society; the insertion of a mnemonic landscape into the urban tissue serves as a new means by which to engage those forces, however fleeting, that allow us to slow, pause, and perhaps, transcend into the unknown.

Figure 06: Landscapes inscribed with memory (Author: 2012)

2.3 LANDSCAPES OF MEMORY

Landscape is not the inscription of memory or encoding of memories, but rather the process of remembering.

(Kuchler 1993: 85)

The corporeal and immaterial aspects of the cultural landscape provide the setting for narration. According to Muller (2012: 8), the landscape offers the opportunity of setting “anchoring points” in place that “guide you through the landscape of the story, anchoring points to bring to mind the memory of the story.”

Holtorf (2009: 9) states that “we all experience memory” and are acquainted with its process - the emotions that remembering evokes and the impact of memories in our lives. Memory is therefore not merely a storage place for information to be retrieved later, but rather “a process” - a process whereby the past is continuously constructed, based on certain social and mental conditions.

As memories are interpretations of experiences - an individual’s sense of identity is integrally connected to the constructed narratives and memories which interweave the past, present and future (Muller 2012: 11).

The perception of landscape helps us to maintain our identity through the process of memory. It is therefore clear that landscapes are comprised of both intangible and tangible aspects: tangible in terms of the biophysical aspects that define place, and intangible in terms of the process of memory in place.

The concept and perception of landscape can therefore provide a platform for identifying a crucial link between the tangible and intangible. A link between the fabric of places and the meanings, memories, cultural traditions and social practices that form part of its associated intangible values.

In essence, landscape offers the opportunity to act as a medium, a nexus which crosses the boundary between intangible and tangible heritage - aiding in the way cultural heritage may be perceived in a new light - as a living and breathing entity of the past, present and future.

03

territory

Chapter three focuses on highlighting the historical significance of Zwartkoppies whilst contextualising it within the industrial realm of South African history. It introduces the discovery of the weathered terrain located on Sammy Marks' farm and the platform it offers for transformative practise within a dynamic and fluctuating landscape.

3.1 BACKGROUND

Zwartkoppies for Sammy Marks was more than simply an outlet for his gregarious instincts, it was a source of great delight and pleasure and became the physical embodiment of his social aspirations and a crucial means by which to realise them.

Throughout the 1890's and beyond Marks spent a small fortune in transforming Zwartkoppies into the Highveld equivalent of an English country estate. Marks' Zwartkoppies reflects a Victorian passion for improvement and for the rigid conformation of nature. During the 1890's, the house was successively refurbished to accommodate his expanding family. Alterations to the original structure were designed by Dutch architect De Zwaan and were executed by the Scottish building contractor, John Johnston Kirkness (Mendelsohn 1991: 37).

Marks reclaimed and 'greened' Zwartkoppies, creating a civilized landscape in what his secretary described as a wilderness. Thousands of trees, extensive orchids and vineyards were established over a number of years and Marks also included a maze, a croquet lawn, and a grand avenue of trees. Eighteen acres were also utilized for farming which regularly yielded two profitable crops per annum (Mendelsohn 1991: 38).

With Paul Kruger and other members of the Transvaal gentry, Marks shared in the emerging enthusiasm for conservation, which was to save a small part of South Africa's once abundant wildlife from extinction (Mendelsohn 1991: 41).

◀ Figure 07: Historic photo collage of buildings on Sammy Marks farm (Adapted by author from Sammy Marks' Collection: 2012)

Figure 08: Aerial photo of Zwartkoppies in 1939 illustrating the existing environment (Adapted by author: 2012)

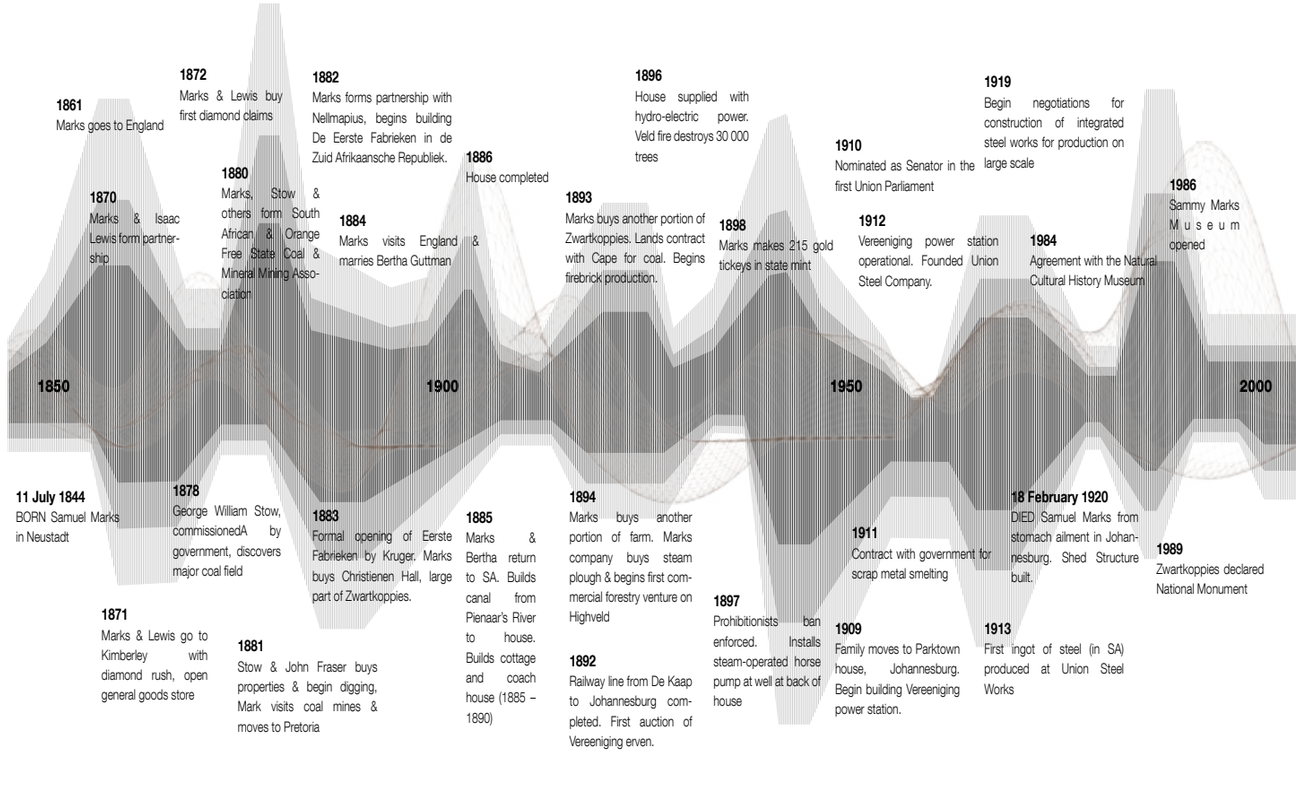


Figure 09: Dairy cattle on Sammy Marks' farm (S.M Collection, UP: 1897)

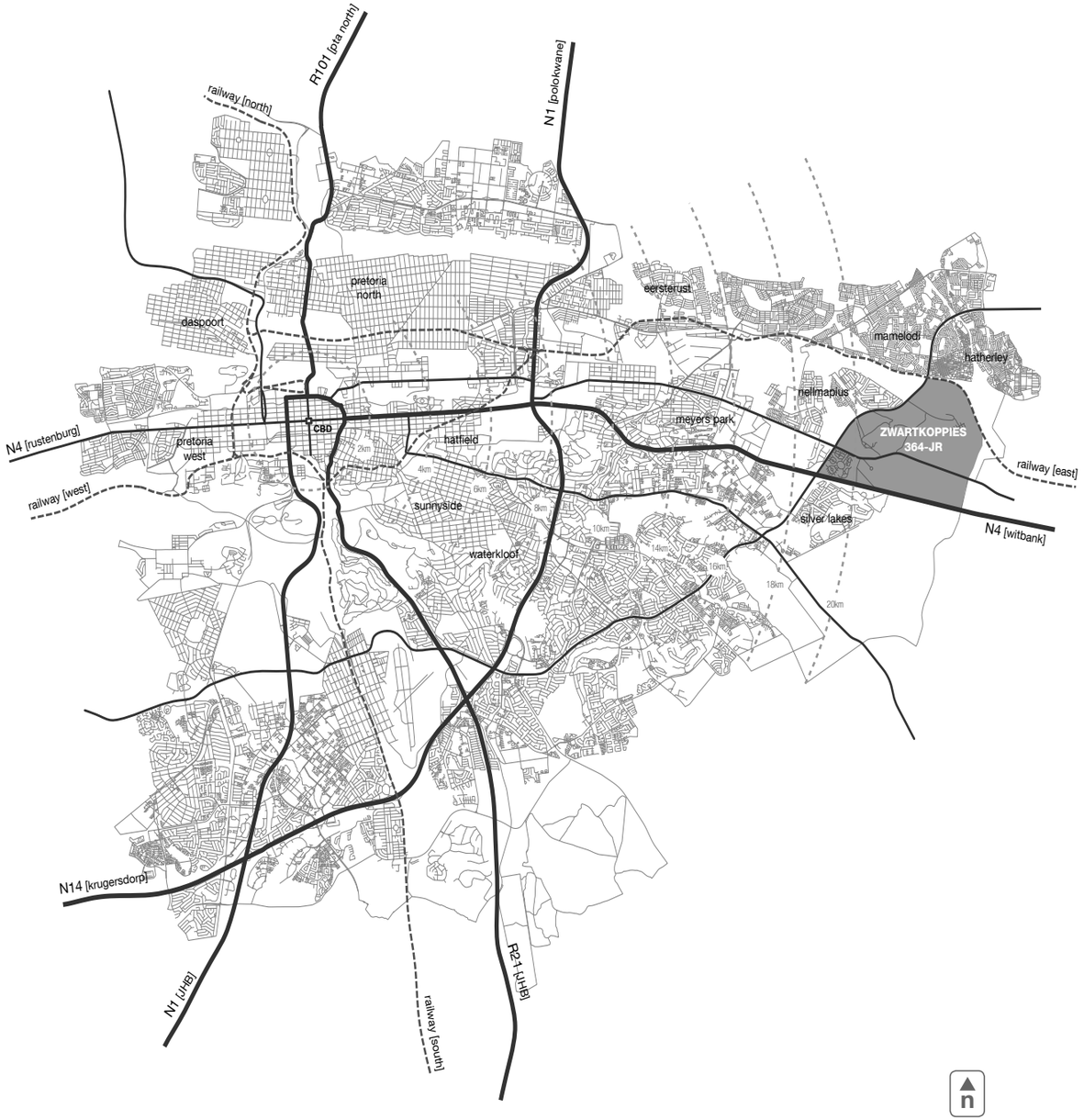


Figure 10: Locality map of Zwartkoppies 364-JR in relation to Pretoria (Author: 2012)

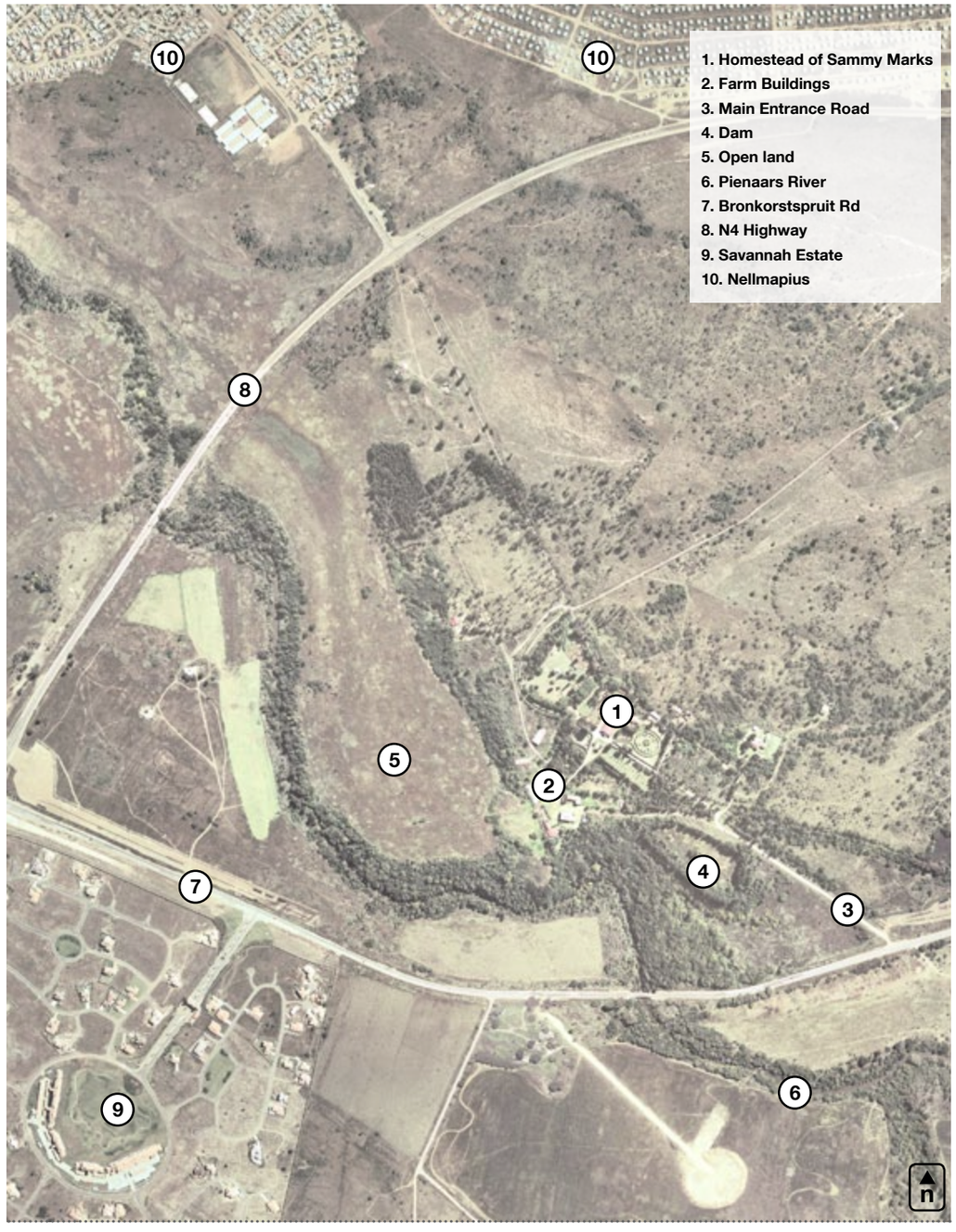


Figure 11: Sammy Marks Farm today within Zwartkoppies 364-JR (Author: 2012)

3.2 LOCATION

Sammy Marks was immediately drawn to Zwartkoppies due to its natural elements and existing infrastructure, which provided the ideal setting for an industrious and creative man like Marks.

Located on the banks of the Pienaars River, the original farmstead was located just above the floodplain. The dwelling Marks' later erected was located further north at a site set slightly higher than that of the original dwelling. He had the original dwelling demolished after the main house was completed and the old site became the focus of his farming activities and production centre for most of his farming activities and the place where two cottages, the dairy and stables were eventually erected. This site, located south of the main dwelling, became the core of the farmstead and farming activities (Mendelsohn 1991: 26).

RAILWAY LINE

Hatherley and Zwartkoppies are located along the railway line connecting Pretoria to the Maputo harbour. The same railway line formed the backbone of Kruger's ideal of a transport network linking the Transvaal to a harbour other than Durban or Cape Town – the railway line to Maputo being shorter and more economically viable.

PIENAARS RIVER

The Pienaaars River has been a consistent water source for many years and flows through the Zwartkoppies farm adding to the agricultural and economic value. At this point the river's floodplain is the widest, consisting of deep layers of clay and turf soils. Marks erected a weir and water furrow system in the river to support and sustain the flow of water through his water canal linking the river to the farmstead.

ROADS

The main road linking Pretoria to Maputo cuts through Zwartkoppies. Discovery of gold in Transvaal meant movement of transport wagons and goods escalated as the need for construction materials, produce and other household goods became more consistent.

◀ Figure 12: Aerial photograph of Zwartkoppies today (Adapted by author: 2012)

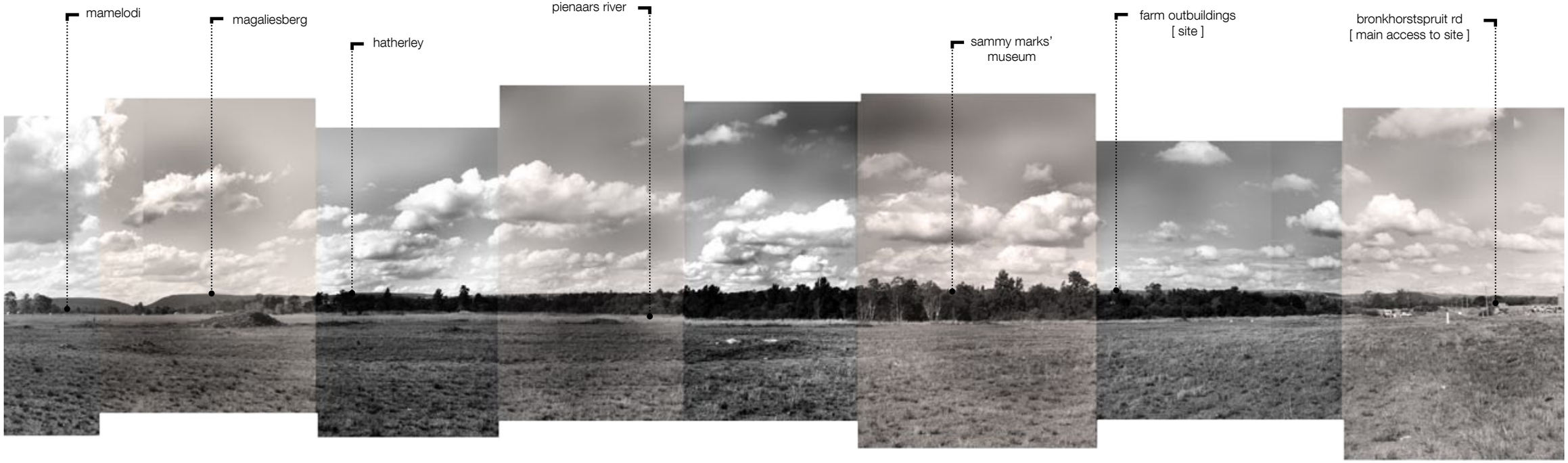


Figure 13: Panoramic photo collage of site in context (Author: 2012)

3.3 MEMORY

Today the farm and the Museum are surrounded by municipal land and form part of the greater Pretoria metropolitan fabric. Since the death of Sammy Marks, the landmark value dwindled and only gained new significance when the old house was renovated by the National Cultural History Museum between 1988 and 1995 and finally became a new landmark in the tourism itinerary when it was opened to the public as a Victorian house museum.

Lowenthal (1985: xxiii) declares that historical sites “remain essential bridges between then and now. They confirm or deny what we think of it, symbolise or memorialise communal links over time, and provide archaeological metaphors that illumine the process of history and memory.”

The rich heritage of the farm adds value to the history of the area between Donkerhoek and Pretoria. This was reinforced when the site became State property, a ‘heritage site’ and when the Museum was opened to the public in 1988. As Eerste Fabrieken on the neighbouring farm Hatherley has been demolished, the only physical remains associated with Sammy Marks are those on the farm, Zwartkoppies. The loss of the buildings and factory of Eerste Fabrieken has added heritage and value to the farmstead on Zwartkoppies.

◀ Figure 14: Ruins in the landscape layered with the memory of time & weathering (Author: 2012)

Figure 15: Ruins of the building fabric found on site (Author: 2012)

Figure 16: Mapping the natural landscape on site (Author: 2012)

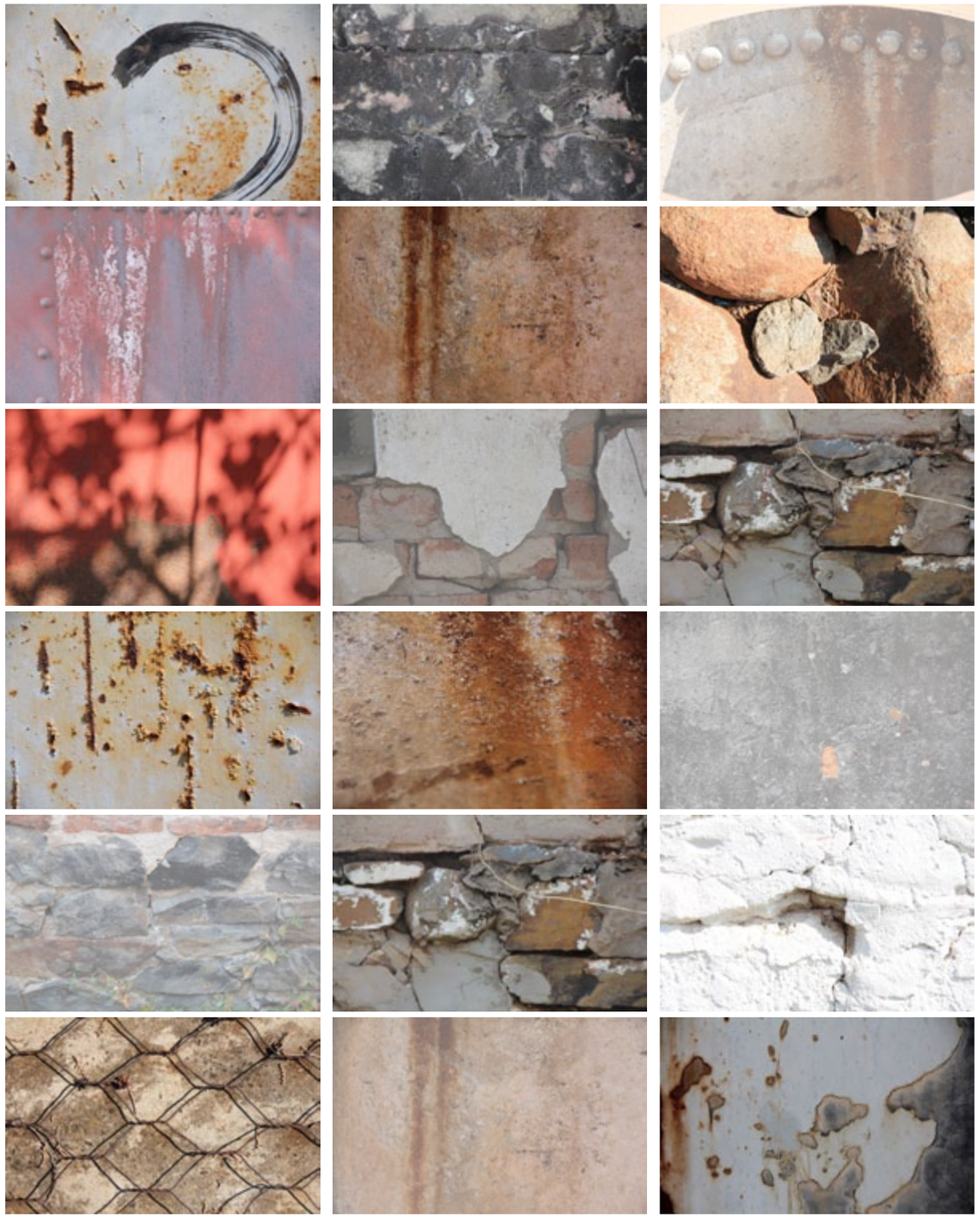


Figure 17: Existing material palette of the existing built fabric (Author: 2012)

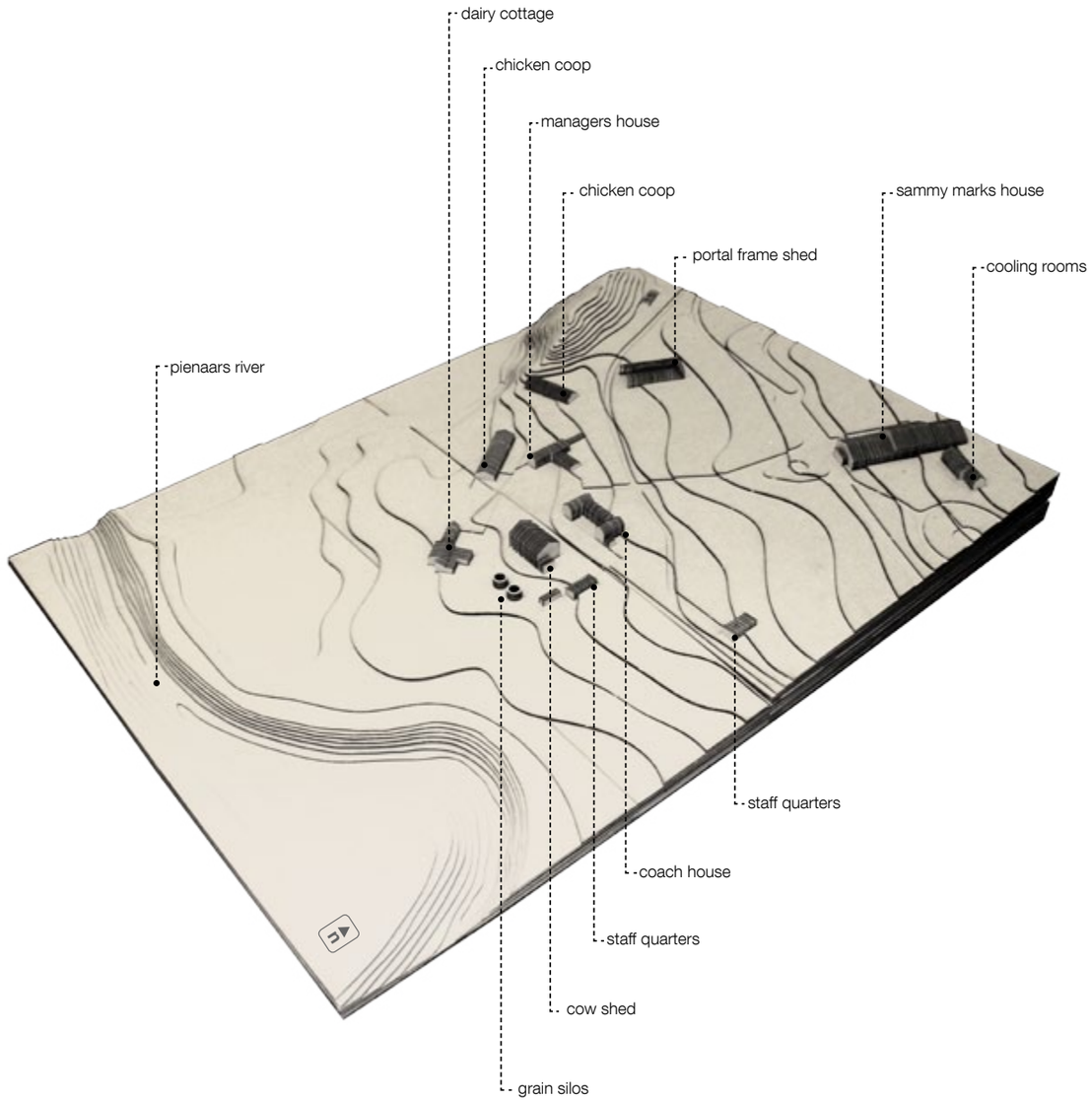


Figure 18: Site Model - Existing built fabric & their original functions (Author: 2012)

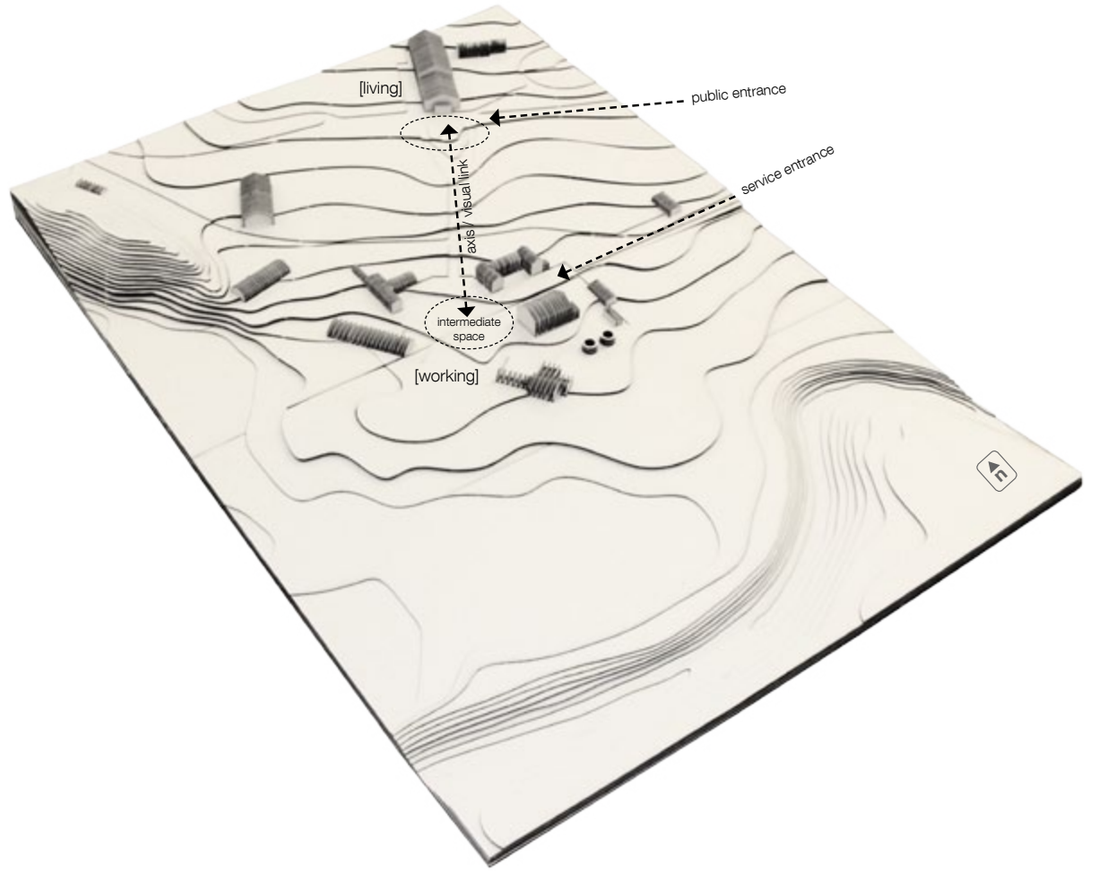
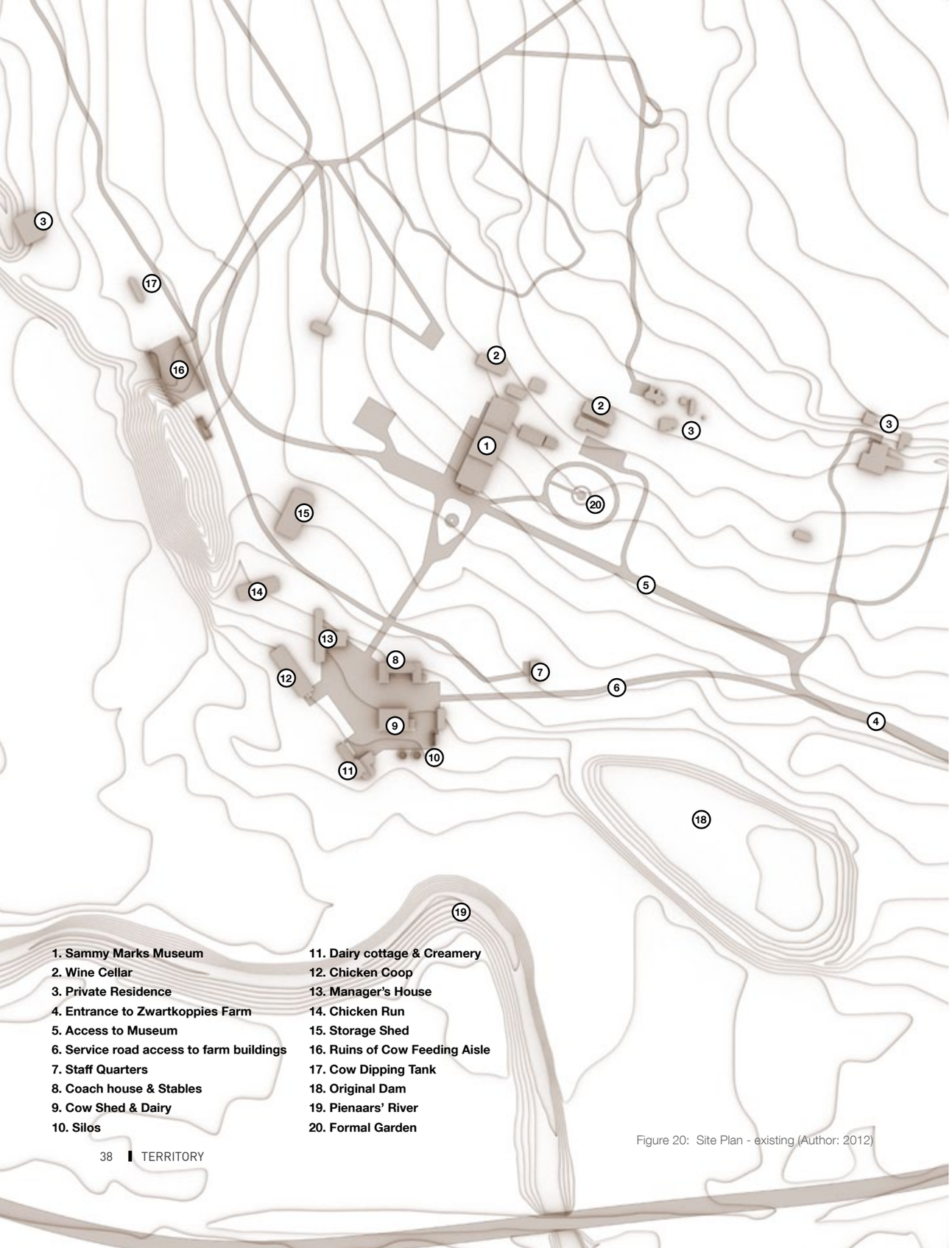


Figure 19: Site Model - Routes & connections (Author: 2012)



1. Sammy Marks Museum
2. Wine Cellar
3. Private Residence
4. Entrance to Zwartkoppies Farm
5. Access to Museum
6. Service road access to farm buildings
7. Staff Quarters
8. Coach house & Stables
9. Cow Shed & Dairy
10. Silos
11. Dairy cottage & Creamery
12. Chicken Coop
13. Manager's House
14. Chicken Run
15. Storage Shed
16. Ruins of Cow Feeding Aisle
17. Cow Dipping Tank
18. Original Dam
19. Pienaars' River
20. Formal Garden

Figure 20: Site Plan - existing (Author: 2012)

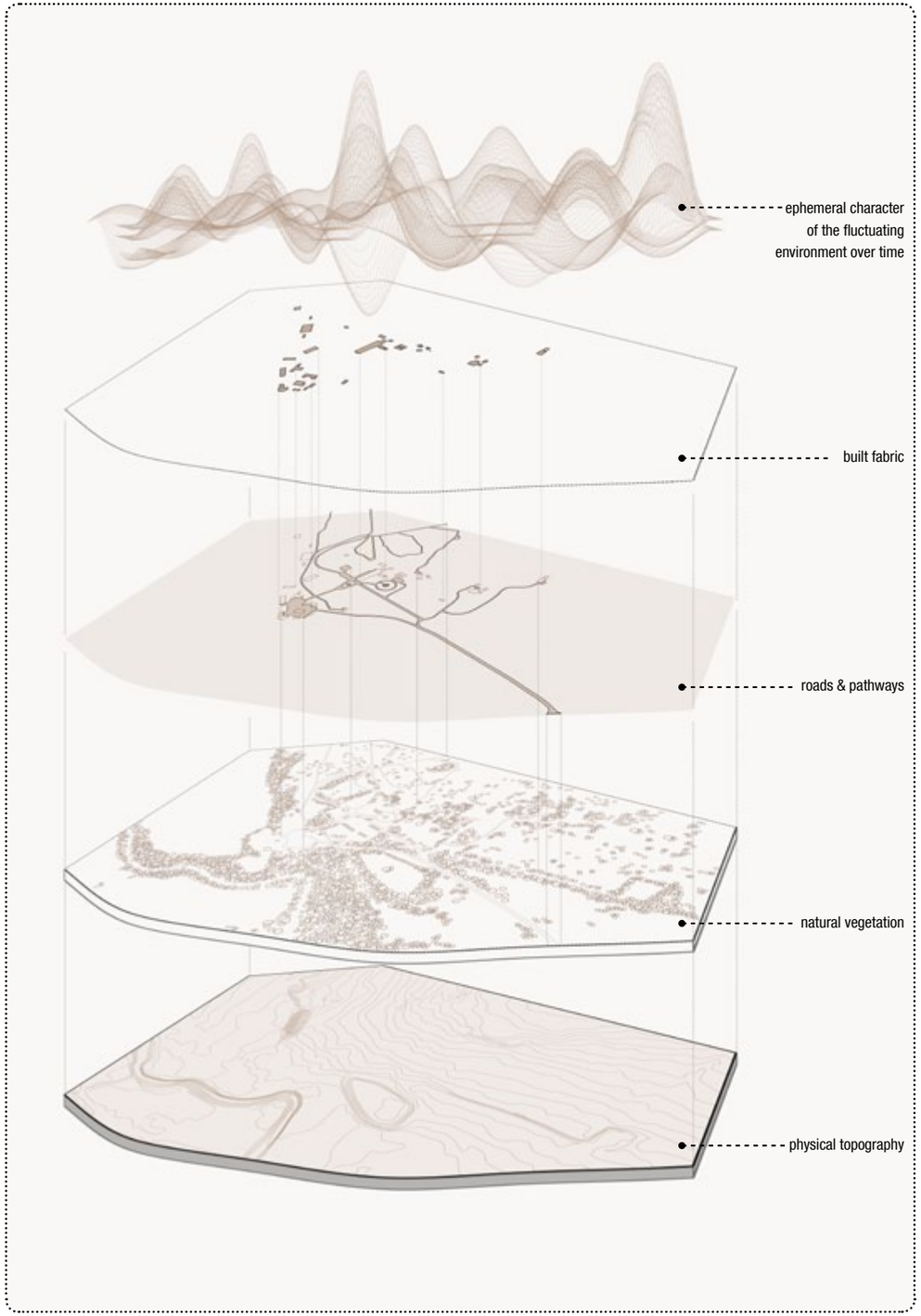


Figure 21: Layering of physical & metaphysical data of the land (Author: 2012)

Places of cultural significance enrich people's lives, often providing a deep and inspirational sense of connection to community and landscape, to the past and to lived experiences. They are historical records, that are important as tangible expressions of Australian identity and experience.

Places of cultural significance reflect the diversity of our communities, telling us about who we are and the past that has formed us and the Australian landscape. They are irreplaceable and precious.

These places of cultural significance must be conserved for present and future generations.

The Burra Charter advocates a cautious approach to change: do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained.

Burra Charter (1999: 1)

3.4 STATEMENT OF HERITAGE SIGNIFICANCE

Sammy Marks was a prominent business and political figure in old Transvaal Republic and played a key role in the unification of South Africa. As one of the few physical remains of his legacy, the defining significance of the site lies in his culture of fostering progressive thought into a tangible outcome.

Zwartkoppies' proximity to strategic trade routes, water sources and industrial nodes (Eerste Fabriekken) made it a significant site on which to establish one of the first examples on an industrialised farm in the Transvaal.

As a model farm, it was used by Marks' to impart knowledge to the surrounding farmers, on the most contemporary farming methods and best quality produce, in the hope that these farmers would supply his industrial ventures at Eerste Fabrikken.

The site has been polarised into living and working each playing a significant role in the establishment and development of Zwartkoppies. The placement of this symbiotic working and living spaces was strongly affected by the geography of the site and Marks' own Victorian sensibility of the relationship between human inhabitation, agriculture and natural landscape.

As the physical manifestation of Marks' industrial aspiration, the core farmstead buildings become an important documentation of Sammy Marks and his legacy.

The conceptual approach therefore moves away from the idea of the 'served' (superior) and 'serving' (inferior) and embraces the notion of working together as one community, forming a symbolic relationship. By creating this dialectic connection, the previous division between the two surrounding communities (Savannah Estate and Mamelodi) is foreshortened. The division is reduced by creating a contemporary model farm, through a progressive approach to agriculture, community participation, and education.

The architectural intent therefore clearly distinguishes the old from the new by breaking through, mediating between and concealing below - whilst creating a palimpsest of experiential platforms of engagement.

04

programme

Chapter four explores the dairy production process, in relation to both its historical narrative and present day practise. Furthermore, this chapter outlines the architectural response required for the future of dairy production in order to recreate and maintain its cultural experience, whilst also introducing the client for the proposal.

Figure 22: The dairy cow being milked by a young girl - 18th century (cattlegirl.wordpress.com: 2012)

Figure 23: Pioneer women milking a cow by hand - 19th century (old-photos.blogspot.com: 2012)

4.1 BACKGROUND

Back into the night of history, when the orphan child waked and cried from hunger, a cow outside was tied to a stake waiting to be milked.

(Pirtle 1926: 1)

The history of dairy farming seems to extend far beyond the written history of man, with no recorded date of when cow's milk was first used, churned into butter or when cheese was first made. What is evident is that the dairy cow and the product of her milk were evidently appreciated long before modern civilisation (Pirtle 1926: 1).

The oldest record of dairy cows to date was found in an excavation carried out near Babylon by the British Museum and the University Museum of Philadelphia. The unearthed building is reported to be more than 6000 years old. The following is an extract from the archaeological report:

Its facades were set back from the platform so as to leave a narrow strip on which stood a row of statues of bulls sculptured in the round. These stood some three feet high... Of the frieze of cattle lying down we have a dozen examples. The most interesting, a panel four feet long, has on one side a milking scene, cows and their calves and men milking the cows into tall jars.

(Pirtle 1926: 5)

The rise of dairy production moving beyond sustaining a single family and towards a primary source of income, developed around villages and cities, where residents were unable to graze cows due to increased development and lack of suitable land.

Farmers soon realised the monetary potential of purchasing additional dairy cows in order to increase their milk production, thereby allowing them to sell their excess to the public in the surrounding towns. Until the late 19th century, the daily task of milking cows was done by hand every morning, after which, the farmers would transport the milk barrels on a wagon to the market (Pirtle 1926: 8).

Figure 24: Dairy cows in cow barn (Author: 2012)

Figure 25: Dairy cows in holding area - waiting to be milked (Author: 2012)

Figure 26: Cows being mechanically milked (Author: 2012)

Figure 27: Dairy processing plant (Author: 2012)

4.2 DAIRY INDUSTRY TODAY

Today, the production of farming milk has developed into a highly scientific farming exercise on an industrial scale - placing huge demands on the skills of farmers. Of all farming enterprises, dairy farming places the highest demand on advanced technology (Gertenbach 2009: 2). Not only must workers have a thorough knowledge of the cow and its management, but they also have to use highly sophisticated technology in the milking process - both natural and mechanized processes need to be thoroughly understood and executed.

The dairy industry is a major provider of food, job opportunities and supports many other enterprises. It is a major client of agricultural mechanization and has a significant contribution to the tourist trade of South Africa (Gertenbach 2009: 5).

Nutritionists, however, continue to maintain that people in South Africa must increase their intake of dairy products in order to have a healthier diet. Production must therefore be increased more than two-fold before this need is met (Gertenbach 2009: 3).

No other food is so vital to the welfare and health of the human race as milk... no family of five should buy meat until they have bought at least three quarts of milk.

North, C.E. Public-health spokesperson (1921)

With a disconnection from the production line to the consumer and the rapid rise of dairy consumption, there has been a more rapid decline in the quality of dairy that is produced. Due to the lack of public awareness and engagement, the vital source of health and nutrition one expects from a glass of milk is now nowhere near what it used to be (Gertenbach 2009: 8).

By exposing the true health benefits of milk and creating a platform for public engagement and memory-making, the opportunity arises for the dairy cow to be reintroduced as the ‘foster mother of the world’, for which she was once known.

4.3 THE DAIRY COW

The dairy cow is a living creature that has been domesticated from a wild beast over thousands of years. Through the development of the Western world and the rapid increase of dairy production, the voice of the cow and her general well-being has been lost in time.

The understanding of the cow and dairy husbandry is crucial in the design process of a dairy facility. The following attributes to the dairy cow play an important role in the design process of the scheme.

They are social animals with a hierarchy within the herd and become stressed when separated from the rest of the cows (Kutz 2007: 5). It is therefore important that herds are kept in both visual and physical contact with each other and moved as a group, as they will readily follow the leader due to the hierarchy formed in the herd environment.

The average healthy cow may produce up to 65 litres per day during the lactation period, with the milk being produced reaching its peak approximately 60 days after calving (Kutz 2007: 8).

Cows are milked for 10 months a year, after which she is given a respite of two months to once again give birth and initiate the lactation cycle. On average, dairy cows may have up to eight lactation periods during a lifetime.

Raw milk is made up of a large quantity of water and therefore dairy cows may consume up to 65 litres of water a day. Although cows do spend most of their time grazing in the pastures, it is vital that oats, lucerne and dairy flour are included in their diet (Kutz 2007: 15).

◂ Figure 28: The dairy cow 'lost' in a past memory (Author: 2012)

	maize silage			hay		
	kg/day	kg/year	storage space (m^3)	kg/day	kg/year	storage space (m^3)
calf (125 - 350kg)	12	4380	6.15	0.5	180	1.2
full grown cow (350 - 550kg)	22	8030	11.15	-	-	-

Figure 29: Feeding requirements per cow (Adapted by author from Neufert: 2012)

weight section (kg)	stall area (m^2)	feeding area width/cow (m)	floor dimension widths (mm)	
			step	gap
125-150	1.20	0.40		
150-220	1.40	0.45		
220-300	1.50	0.50	1.20 up to 1.60	35
300-400	1.80	0.57		
400-500	2.00	0.63		
>500	2.20	0.70		

Figure 30: Sizing for cow sheds (Adapted by author from Neufert: 2012)

	feeding / lying stall (m^2)			box pen stall (m^2)		
	40 cows	60 cows	80 cows	50 cows	80 cows	120 cows
stall	250	380	500	400	640	960
milking area	10	20	30	50	80	120
silo	200	300	400	250	400	600
roughage	80	120	160	100	160	240
liquid manure	160	240	320	200	320	480
roadways	400	600	720	500	720	960
farmyard area	800	1050	1200	1250	1760	2400
area required (m^2)	1900	2710	3330	2750	4080	5760

Figure 31: Sizing for dairy cow pens without calves (Adapted by author from Neufert: 2012)

	feeding / lying stall (m^2)			box pen stall (m^2)		
	40 cows	60 cows	80 cows	50 cows	80 cows	120 cows
stall	320	470	630	440	700	1050
milking area	20	20	30	60	80	80
silo	250	380	500	310	500	750
roughage	100	150	200	130	200	300
liquid manure	200	300	400	260	400	600
roadways	500	750	900	620	900	1200
farmyard area	1000	1270	1500	1560	2200	3000
area required (m^2)	2390	3340	4160	3380	4980	6980

Figure 32: Box pens & stalls for dairy cows with calves (Adapted by author from Neufert: 2002)

4.4 GUIDELINES FOR THE DAIRY INDUSTRY

The following gives an overview of the general guidelines for the design of dairy farms and milk processing areas.

1. COW SHED

The cow shed is made up of a series of components which forms the housing and storage areas for the dairy cows and their food. Cows generally spend most of their time grazing in the pastures, however, during the colder months they are kept indoors. The housing area includes cow pens with feeding aisles, storage areas for feed and farm equipment, an infirmary, and a workshop for servicing and repairing equipment.

2. MILKING PARLOUR

The milking parlour is the 'heart' of a dairy farm. It is the facility where cows are brought in to be milked twice daily. The parlour is required to be positioned alongside a holding area, where cows are gathered before and after being milked. The interior space must allow for easy drainage for cleaning of cow dung and milk, whilst providing a nonslip surface for cows and workers.

3. MILK PROCESSING

The area for milk processing is located near to the milking parlour. This is the part of the process which involves removing bacteria from the raw milk and being packaged or alternatively being used in cheese making. The spatial requirements should be considered in relation to large storage tanks and high-tech machinery.

4. CHEESE MAKING

Cheese making involves the process of adding cultures and rennet to milk in large vats before being cut and cured. The cheese making process allows for public engagement and should be linked to a tasting and sales area.

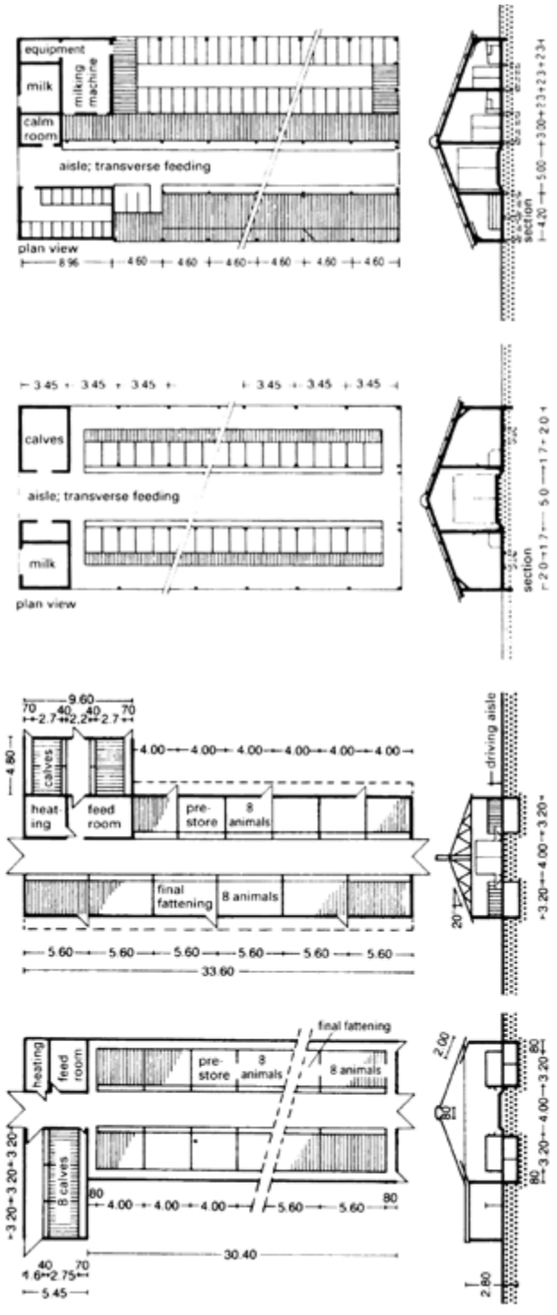
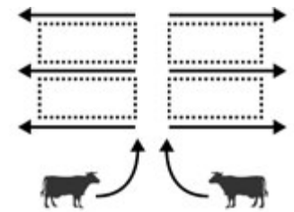
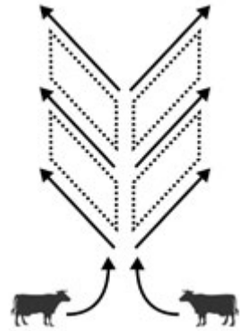


Figure 33: Examples of typical dairy housing units (Neufert: 2012)

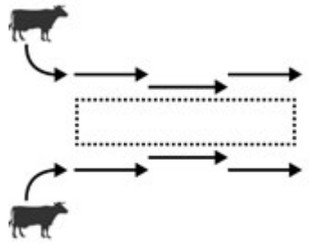
1. BALI-STYLE [50 COWS/HR]



3. HERRINGBONE [75 COWS/HR]



2. SWINGOVER [60 COWS/HR]



4. ROTARY [250 COWS/HR]

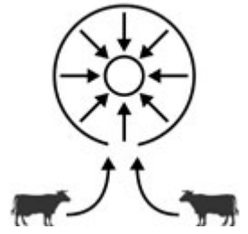
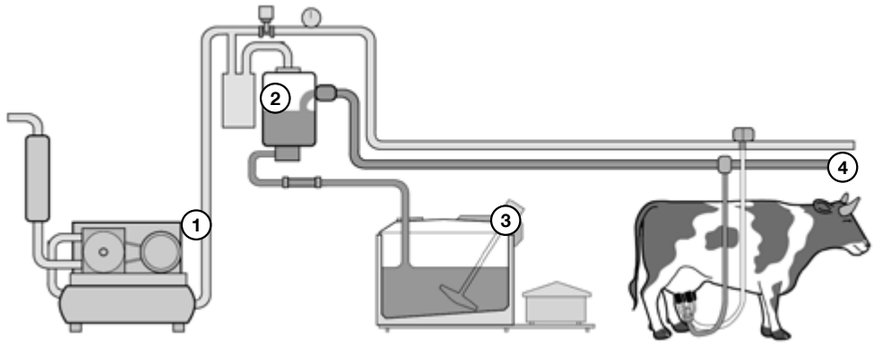
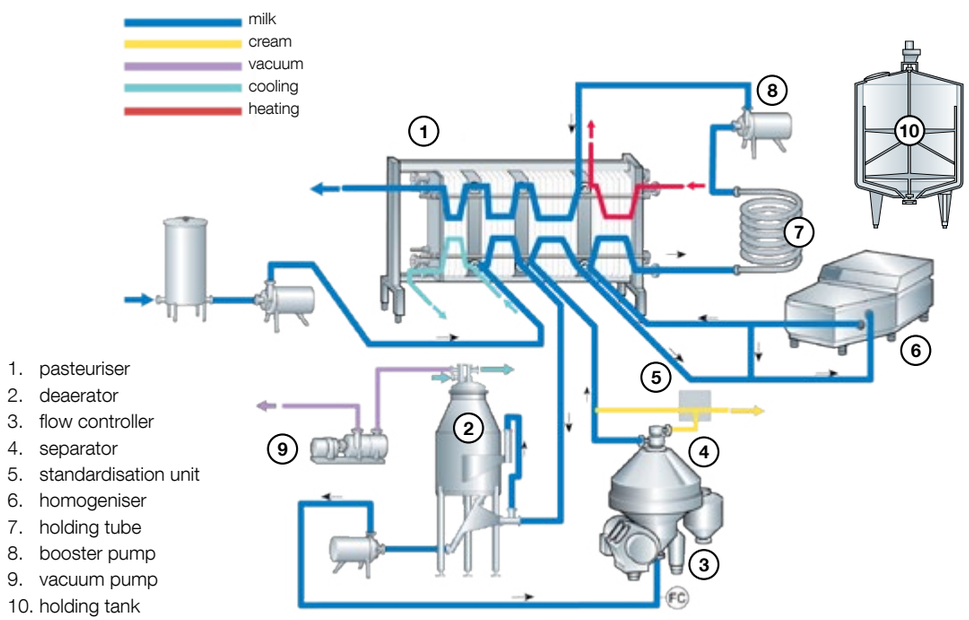


Figure 34: Milking parlour types (Author: 2012)



1. vacuum pump
2. vacuum pipeline
3. milk cooling tank
4. milk pipeline

Figure 35: Pipeline milking system (Author: 2012)



1. pasteuriser
2. deaerator
3. flow controller
4. separator
5. standardisation unit
6. homogeniser
7. holding tube
8. booster pump
9. vacuum pump
10. holding tank

Figure 36: Milk processing plant (Author: 2012)

4.5 PROCESS

The following gives an overview of the process of milk from the cow to the consumer.

MILKING:
Dairy cows are milked by machine twice a day on average, in the early morning and late afternoon. Cows are taken from the fields or the enclosed housing into a holding yard before being taken through to the milking parlour. Raw milk leaves the udder at a temperature of about 37°C and must be cooled down as soon as possible to eliminate the growth of bacteria and micro-organisms.

STORAGE:
Raw milk is pumped to a clarifier by means of the milk pump, where it is removed of microscopic impurities. Clarified milk is next sent to the cooler where it is cooled to about 2-5°C, then pumped to the storage tanks.

PROCESSING:
Processing of raw milk mainly involves heat treatment operation known as pasteurization and sterilization. These processes are used to kill off bacteria which can be found in raw milk.

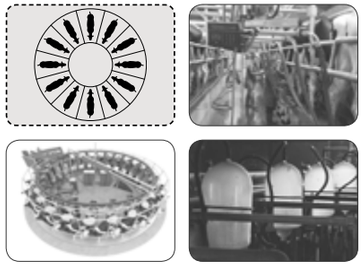
The milk is, then, preheated and pasteurized to a temperature of about 80°C by heat exchange. Further, by the effect of ultra-high temperature sterilizer, the fatty ingredients are homogenized in the homogenizer and recycled to the ultra-high temperature sterilizer where it is pasteurized instantly in about 2 seconds at a high temperature of 135°C.

Finally, cooling is achieved by means of chilled water to lower the temperature to 3°C, after which the milk is stored in the surge tank for filling into suitable containers for various uses.

After such a process, a specified quantity of the milk is sold as a pasteurized product while the remaining portion is further processed in the plant for the production of other milk products such as butter and cheese.

GRAZING PASTURES -

dairy cows to be allowed to graze freely during the summer months and kept indoors during the colder winter nights

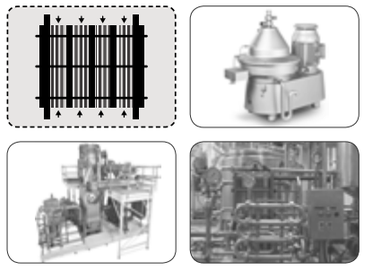


MILKING PARLOUR -

the first stage in the milking process - cows are brought in and mechanically milked twice daily - early morning & late afternoon

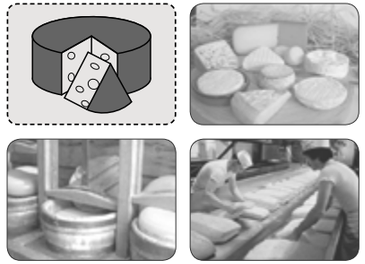
STORAGE TANKS -

warm milk from the cow's udder is immediately sent through to cooling tanks before entering the processing area



PROCESSING -

cooled raw milk is pasteurised and homogenized in the processing area before it is once again cooled down



CHEESE MAKING -

milk is piped through to the cheese making area where cultures are added and curing aids in the ripening of the cheese

PACKAGING -

processed milk is packaged and prepared to be distributed to the restaurant and shops located off site

Figure 37: Diagrammatic illustration of the process of milk (Author: 2012)

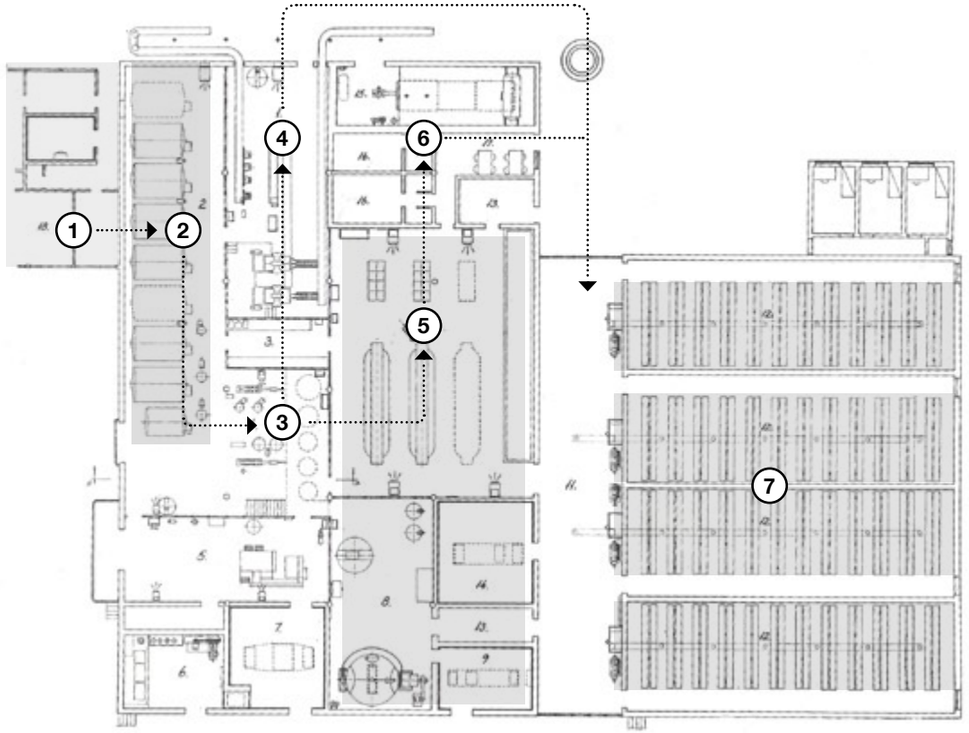


Figure 38: Example of a typical dairy processing plant (Petersen: 1963)

1. raw milk receiving
2. raw milk tanks
3. milk processing
4. milk packaging
5. cheese making
6. cheese packaging
7. milk & cheese storage

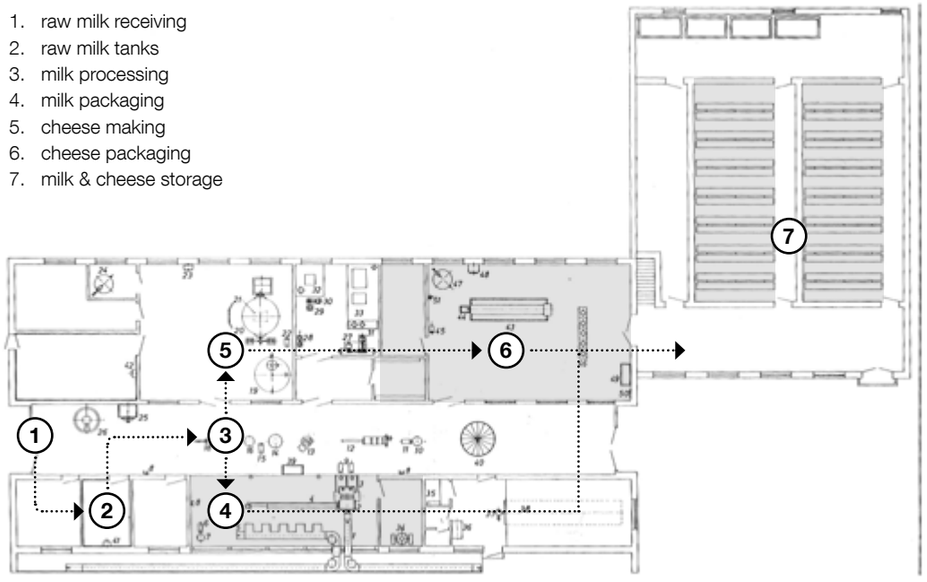
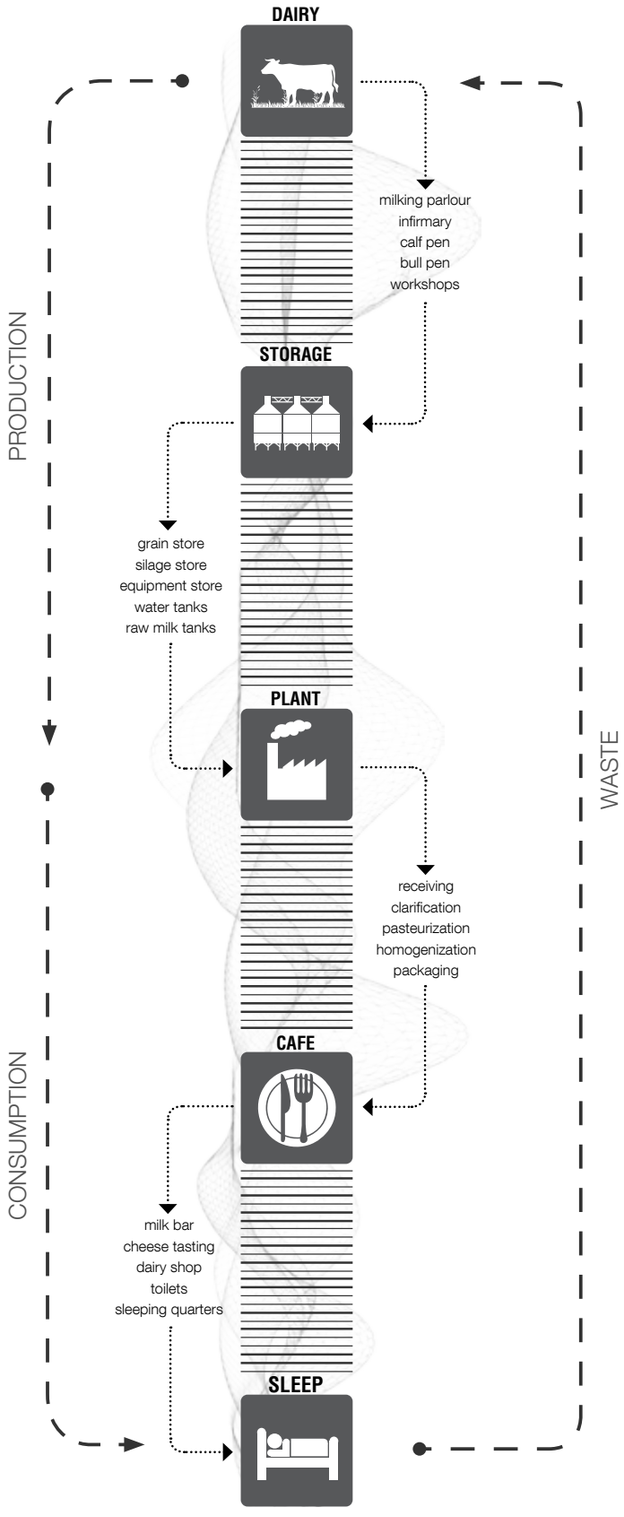


Figure 39: Danish cheese plant (Petersen: 1963)



4.6 RESPONSE

The intention of the dairy facility is to provide a platform for an industrial typology to engage in a critical dialogue with a public interface. The proposal links the idea of a closed loop system where production, consumption and waste are linked - to work together rather than as separate entities.

The historic setting of the site provides the opportunity for the living memory of Sammy Marks to be captivated on a day to day basis - whilst creating a sustainable livestock husbandry which unites the needs of animal, environment, consumer and entrepreneur.

Dairy husbandry is an intricate system where farmer, animal, soil, crop, capital, energy, and nutrients are interconnected in many ways. This is why system innovation is necessary: a turnaround in thinking and acting.

P. Koerkamp, Cow Power (2009)

The facility therefore adopts the notion of a model farm typology where there is an intrinsic link and engaging dialogue between the practise of dairy husbandry, research and education.

The dairy process becomes a fragment within the greater cultural landscape, where other farming methods may be adopted in facilitating a contemporary model of farming in South Africa.

Whilst engaging with the living heritage of the built fabric and natural landscape, the programme intends to add value and historic relevance to the disused site, allowing the farmstead to once again be activated as a platform for training and experimentation.

◂ Figure 40: Process diagram of the proposed dairy facility (Author: 2012)

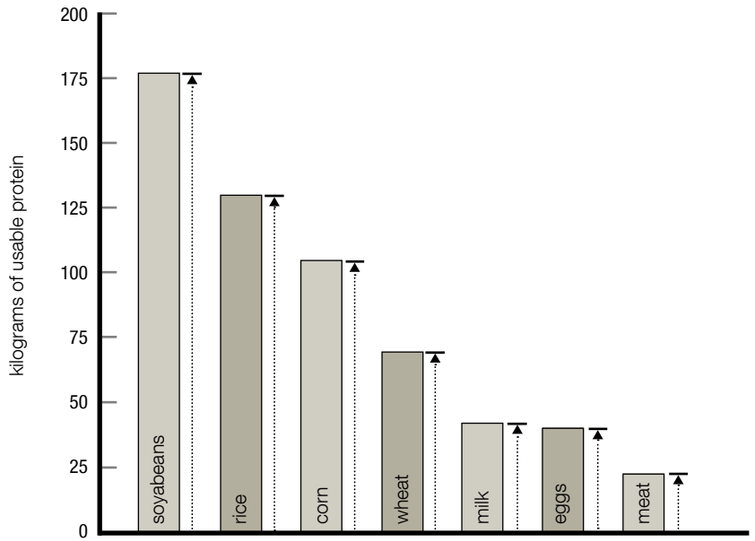


Figure 41: Agricultural land use efficiencies (Author: 2012 - Information from www.ciwf.org)

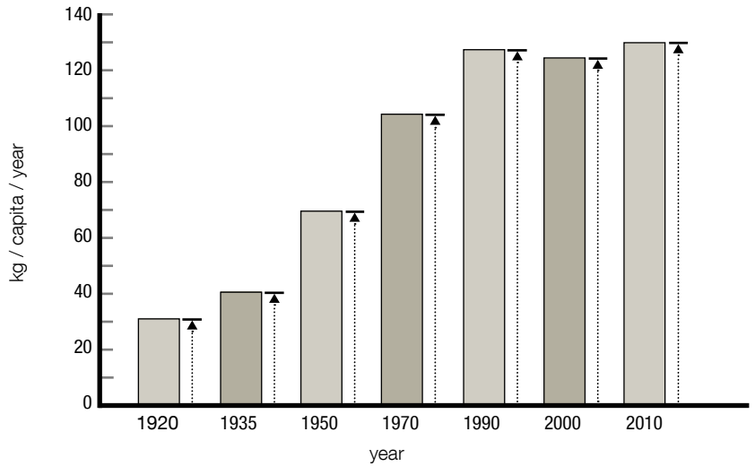


Figure 42: Average Dairy consumption graph (Author: 2012 - Information from Rollinger: 1963)

4.7 CLIENT

The following two parties are identified as a joint venture in establishing and maintaining the dairy facility:

1. Ditsong Museums - an amalgamation of eight national museums, and current owner of the Sammy Marks museum and the surrounding 73 hectares of farmland.

2. The Dairy Standard Agency (DSA) - a registered non-profit company with the primary objective being the promotion of milk and other dairy products.

Ditsong was established to transform and enhance museums and heritage sites as vehicles for nation building and social cohesion through active conservation, innovative research and relevant public programmes for the benefit of present and future generations.

The company seeks to design, implement and manage exhibitions and public programmes with a view to supporting the national educational curriculum, economic development and other socio-economic objectives of the Government.

The primary objective of Ditsong is to transform and enhance museums and heritage sites as vehicles for nation building and social cohesion through active conservation, innovative research and relevant public programmes for the benefit of present and future generations (ditsong.org.za: 2012).

The Dairy Standard Agency is aimed at increasing the market for milk and other dairy products, the improvement of international competitiveness of the South African dairy industry, and the empowerment of previously disadvantaged people (dairystandard.co.za: 2012)

05

precedent study

Chapter five explores precedents within South Africa and abroad. The studies are conducted within three categories; programme, form and heritage. The architectural analysis serves as a premise for guiding and enriching the proposed design on Sammy Marks farm.

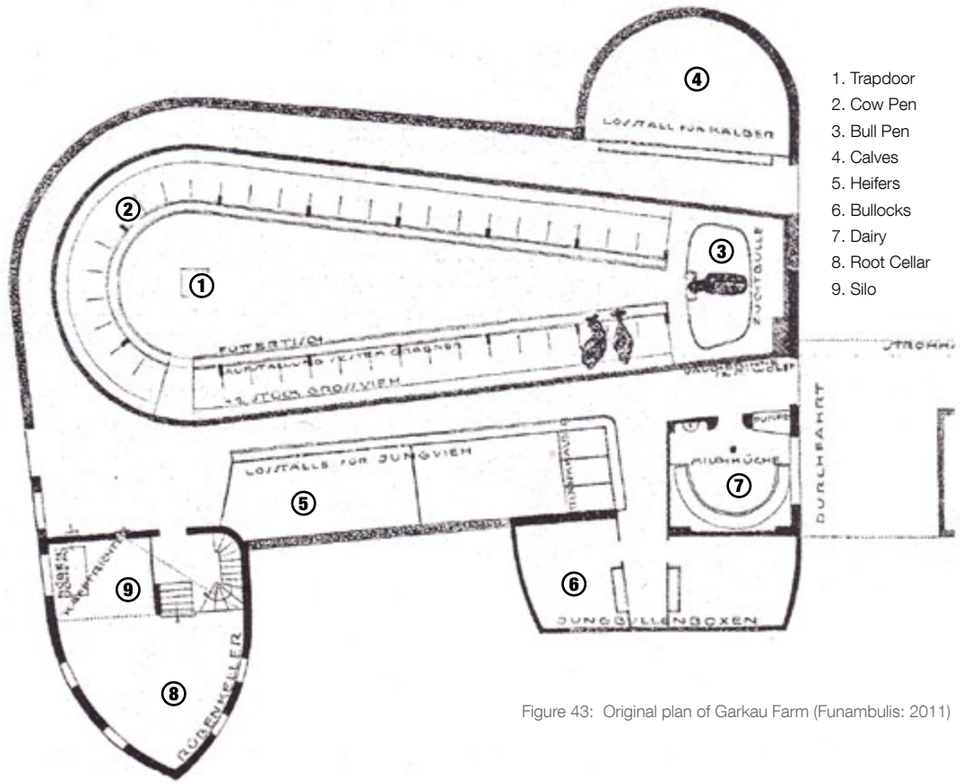


Figure 43: Original plan of Garkau Farm (Funambulis: 2011)

5.1 GUT GARKAU, GERMANY (1922)

ARCHITECT: Hugo Häring
APPLICATION: Programmatic

We must call on all things and let them unfold their own forms... we must search for shapes rather than impose them, discover forms rather than construct them.

(Hugo Häring 1925)

DESIGN:
Conceived through his vision of a new functional architecture, the Gut Garkau complex is perhaps the most demonstrative of Hugo Häring's works. The approach was to create an architecture that did not follow a preconceived style, but rather developed according to the needs of use, context, and construction, which would allow the building to gain its own appearance and identity (Jones 1999: 38).

The buildings illustrate Haring's belief that architecture should appear to arrive naturally and spontaneously from its surroundings. Avoiding the organic approach of Art Nouveau and its associated movements, Haring allowed the structure to evolve around its function and environment (Jones 1999: 41).

The functional approach to the design was therefore concerned with articulating the building according to the needs of the animals and the way they are cared for and fed by the farmer.

TECHNÉ:
Häring used concrete, brick, and wood to build the cowshed - which has a curved facade made up of bands of structural concrete expressed on lower stories, and the upper levels clad in painted wood. The floor plans were shaped by considerations such as animal welfare, with the concrete construction allowing for a tall, light-filled interior (Jones 1999: 48).

RESPONSE:
Today, Garkau farm has become an architectural monument, with its importance resting on the approach it demonstrated, both in terms of articulated organisation and expressed construction; whilst still being a reminder of passing innovations it introduced to farming practices. It is this approach of innovative thinking and general animal welfare which has been lost over time and seeks to be heard once again in future farming establishments.

◀ Figure 44: Photograph of Garkau Farm today (Funambulis: 2011)

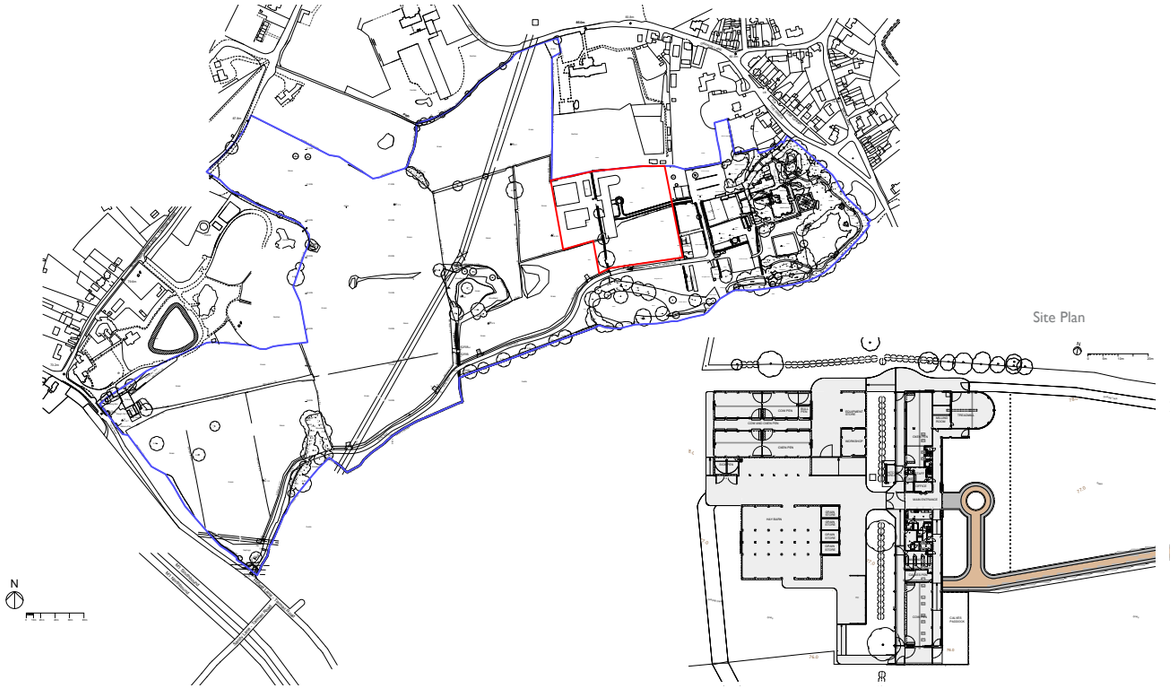


Figure 45: Plan of Goshalla Farm (Malcolm Pawley: 2012)

5.2 GOSHALLA FARM, UNITED KINGDOM (2010)

ARCHITECT: Malcolm Pawley
APPLICATION: Programmatic

The innovative design of this new complex fully complements Bhaktivedanta Manor's ethical and sustainable approach to farming. The choice and use of materials in the construction of the complex ensures that it is bright and airy – perfect conditions for both the Farm's visitors and animal husbandry.

(Jeremy Caulton 2011)

DESIGN:

Designed as a complex of farm buildings in the north of the United Kingdom, Goshalla Farm was established to support the continuation of ethical farming and dairy husbandry. The programme consists of a hay barn, two cow sheds, equipment stores, animal infirmary and a new visitor centre for pilgrims and visiting school groups. The visitor centre is integrated with the cow housing, milking parlour and dairy. (Malcolm Pawley: 2012).

The farm adopts the notion of a sustainable farm relying on animal power rather than mechanization. This provides the opportunity for making use of ox power instead of tractors therefore ensuring the bulls have an occupation and makes Goshalla Farm the only fully functioning dairy in the United Kingdom not using fossil fuels.

TECHNÉ:

Natural light and ventilation are at the forefront of the design approach in the cow shed and barn area. Portions of translucent sheeting is used for the roofs which allows for natural light to filter through and reduce energy consumption in the form of artificial lighting. A hardwood timber frame forms the primary structure with timber lattice infill acting as a sun filter which ensures a constant flow of natural ventilation.

RESPONSE:

The proposed dairy facility at Zwarkoppies takes into account the integration of a public interface with the processes involved with dairy farming. The scheme focuses on the notion of the cyclical nature of future farming methods, with each component playing an integral part of the whole.

◀ Figure 46: Photograph of Goshalla Farm (Malcolm Pawley: 2012)

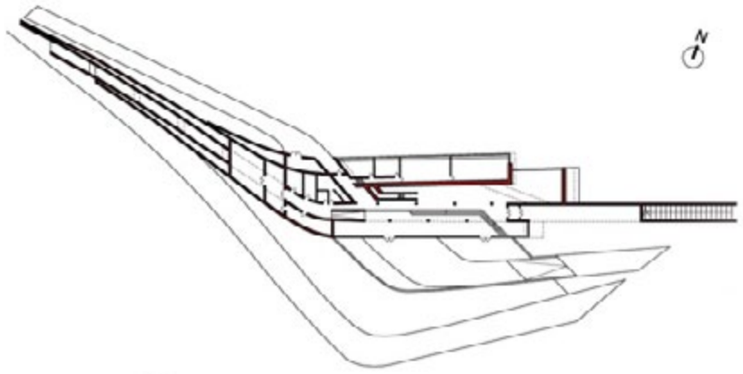


Figure 47: Plan of Landesgardenschau Pavilion (Zaha-Hadid: 2012)

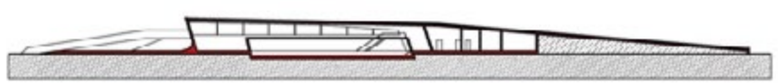


Figure 48: Section of Landesgardenschau Pavilion (Zaha-Hadid: 2012)

5.3 LANDESGARTENSCHAU PAVILION, GERMANY (1999)

ARCHITECT: Zaha Hadid
APPLICATION: Form

In contrast to conventional urban and architectural spaces, natural landscapes typically contain a multitude of subtly differentiated territorial definitions and smooth spatial transitions... we believe that these features liberate a more complex and nuanced way of ordering spaces.
(Zaha Hadid 1999)

DESIGN:
Designed as part of a national garden exhibition in Weil-am-Rhein, Germany - Landesgartenschau Pavilion rejects the concept of building as an 'isolated object' – bleeding out of and dissolving back into the surrounding landscape. Through a network of entangled paths and interwoven spaces, the structure rises out of the ground to contain an exhibition hall, café and environmental centre.

The conceptual approach to the design was to create a building that is carved out from continuous curves of movement paths, wall and roof. By adopting this liberating notion, the figure of the building is not contained but rather "bleeds out" and dissolves into the surrounding landscape. Emerging gradually from the tangle of paths, the pavilion allows the visitor to define and realise its beginning and its end, according to his or her perspective, purpose or mood.

The ground plane as stable reference is subverted through its multiplication. The public path sweeps over the building and the terrace carving into the ground makes any definition of ground ambiguous. The levels within and around the building are subtly staggered, so that they may potentially congregate into a single event, while allowing for temporary intimacy (zaha-hadid.com: 2012).

RESPONSE:
The scheme aims at allowing spatial transitions to be interwoven with one another, allowing for the new architecture to act as a mediating element between the built heritage and the landscape. The concept of allowing the building to "bleed out" into the landscape facilitates the integration of the man-made and the natural.

◀ Figure 49: Photograph of Landesgardenschau Pavilion (Flickriver: 2012)

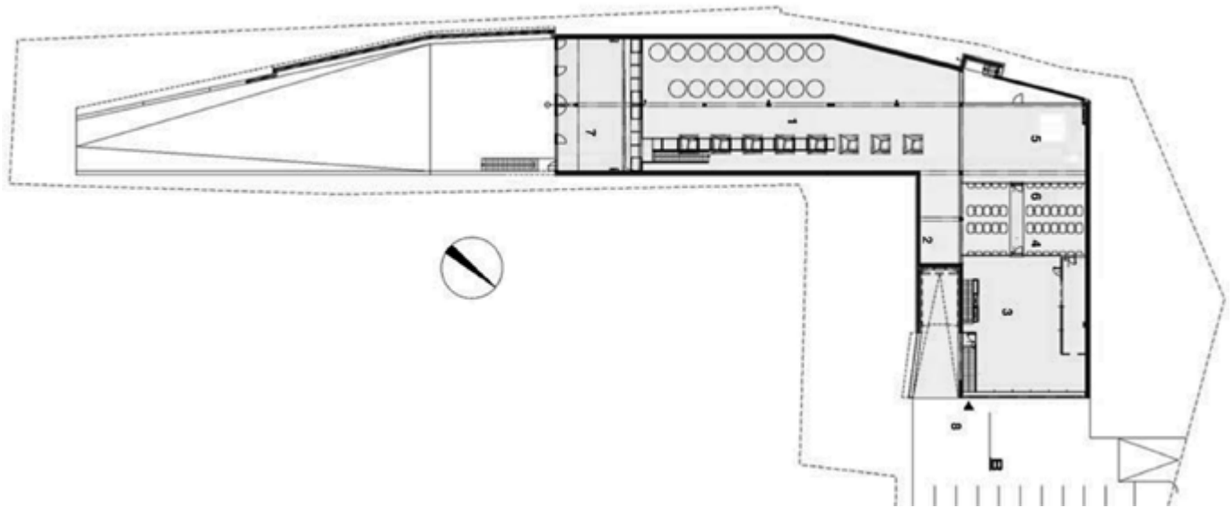


Figure 50: Plan of Leo Hillinger Winery (Leo-Hillinger: 2012)

5.4 LEO HILLINGER WINERY, AUSTRIA (2004)

ARCHITECT: Gerner Gerner Plus
APPLICATION: Form

DESIGN:

The architects of Leo Hillinger Winery set out to facilitate a symbiotic dialogue between landscape, architecture and viticulture. The unique location amidst the vineyards of Jois, allowed for an architecture with is integrated with the surrounding landscape (gernergernerplus.com: 2012).

The winery, completed in 2004, cuts deep into the sloped landscape which is covered with soil and replanted with grape vines. The conceptual approach was to honour the earth cellars of a typical wine cellar alley (kellergasse) of the past, which submerged itself below the surface of the ground and into the darker caves of the earth.

TECHNÉ:

The visible part of the building which emerges from the land appears to hover above the ground upon slim V-shaped pillars. The large window which opens up the connection to the vineyards and the Leithagebirge mountain range acts as a landmark beacon amongst the surrounding environment.

North facing roof lights located above the subterranean production hall allows for natural light to filter through to the spaces below. The interior spaces are made up of glass walls which allow visitors an insight into the various stages of the wine making process (gernergernerplus.com: 2012).

RESPONSE:

The winery establishes the notion of the building and landscape essentially becoming one. The integration of the public with the processes involved is carried through into the design process of the dairy facility.

◄ Figure 51: Photograph of Leo Hillinger Winery (Flickriver: 2012)

Figure 52: Locality plan of Maropeng Visitors' Centre (Maropeng: 2012)

5.5 MAROPENG VISITORS' CENTRE, SOUTH AFRICA (2005)

ARCHITECT: GAPP Architects
APPLICATION: Form & Heritage

Here landscape, view, spatial sequence and building have been orchestrated to convey both the sense of ancientness and sacredness associated with the architectures or earlier civilisations, and a world of hyper-modernity.

(Lindsay Bremner 2006)

DESIGN:
Shortly after its declaration as a World Heritage site in 1999 - GAPP was commissioned to develop a portion of the greater Cradle of Humankind site into a visitors' centre, focused on exhibiting the evolution of human beings and our ancestors.

The meaning and spirit of the Cradle of Humankind is derived from the Sterkfontein caves and is reflected in the development of the Maropeng Centre, which is focused around the Tumulus and Museum Cave.

The Tumulus building, which hosts the educational exhibition, rises from the earth and is representative of early hominid burial mounds. Serving as the gateway to the interactive museum, the Tumulus is also referred to as a buried fossil, taking visitors along a journey of discovery (Maropeng: 2012). Descending down into a subterranean cave, the visitor is transcended into a journey through time as they unravel the discoveries of the evolution of mankind.

TECHNÉ:
Embodying the link between past and future, the building takes on a transformation from the front to the back. On approach, the front of the building represents a tall, grass-covered, burial mound emerging from the surrounding landscape - transforming itself into a hi-tech, futuristic facade to the back of the building (Maropeng: 2012).

RESPONSE:
The journey of discovery forms part of the public route of the proposed dairy facility - with the visitor moving between various levels of open and enclosed spaces. The dialogue between the existing heritage and the contemporary addition is to establish a transformation as one moves through from the formal built fabric to the natural landscape.

◀ Figure 53: Photograph of Maropeng Visitors' Centre entrance (Maropeng: 2012)

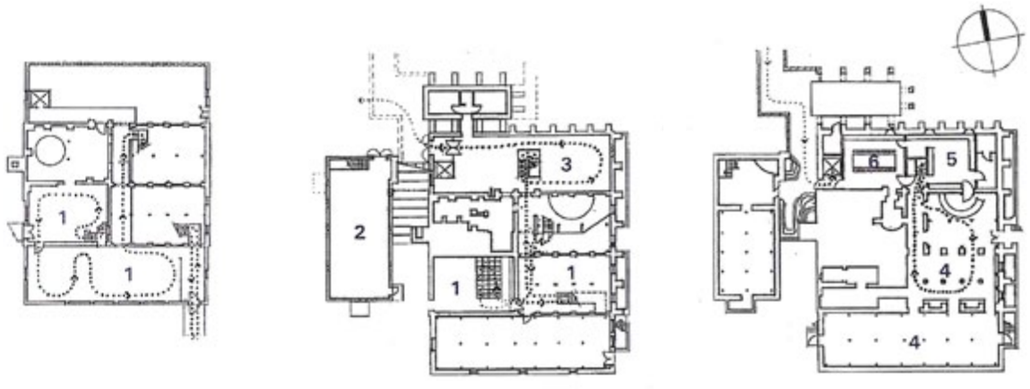


Figure 55: Plans of SA Breweries Visitors' Centre (Joubert: 2009)

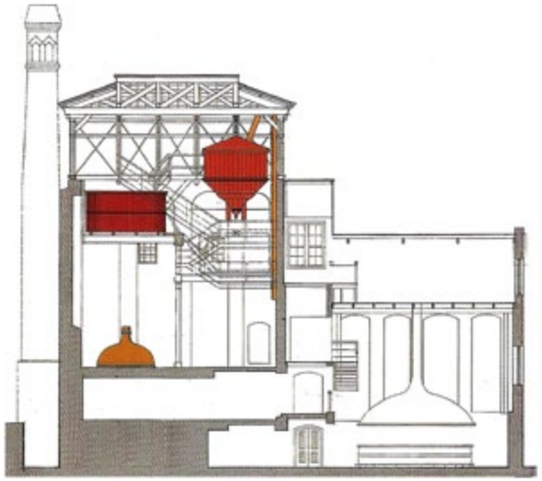


Figure 54: Section of SA Breweries Visitors' Centre (Joubert: 2009)

5.6 SA BREWERIES VISITORS' CENTRE, SOUTH AFRICA (1995)

ARCHITECT: Gabriel Fagan Architects
APPLICATION: Heritage

DESIGN:
Gawie Fagan was commissioned to convert a collection of existing buildings from the 19th century into a visitor's centre displaying the history of beer-making, as part of the centenary celebration of South African Breweries,

The new route established within the old buildings allow visitors to go through a sequence of spatial experiences. Starting in the Malt House, low, dark spaces, and a high-tech floor finish is exposed whilst contrasting to the original timber floors, with lighting used to illuminate the old structure (Joubert 2009: 288).

The upper level opens up to a steel staircase which descends to the garden below. A glass-covered walkway leads the visitor to a tunnel where archaeologists have exposed an old brick kiln. This dark, vaulted space opens below another glass roof providing a view of the brewery, with its reconstructed brick chimney and an industrially detailed glass lift.

The conceptual clarity of old versus new combined with the attention to detail is clearly evident throughout. The journey through the sequence of spaces brings a contemporary sensibility to the historic fabric and allows them to be experienced in a new manner (Joubert 2009: 288).

RESPONSE:
The clarity of old versus new forms a vital part of the architectural detailing of the proposed facility. The clear distinction of the existing fabric as opposed to the new addition is contrasted through material selection and spatial transitions.

◄ Figure 56: Photograph of SA Brewery Visitors' Centre (Artefacts: 2012)

06

design development

Chapter six focuses on the main design generators of the proposal whilst substantiating the design decisions made. The design is explored in relation to context, theory and programme.

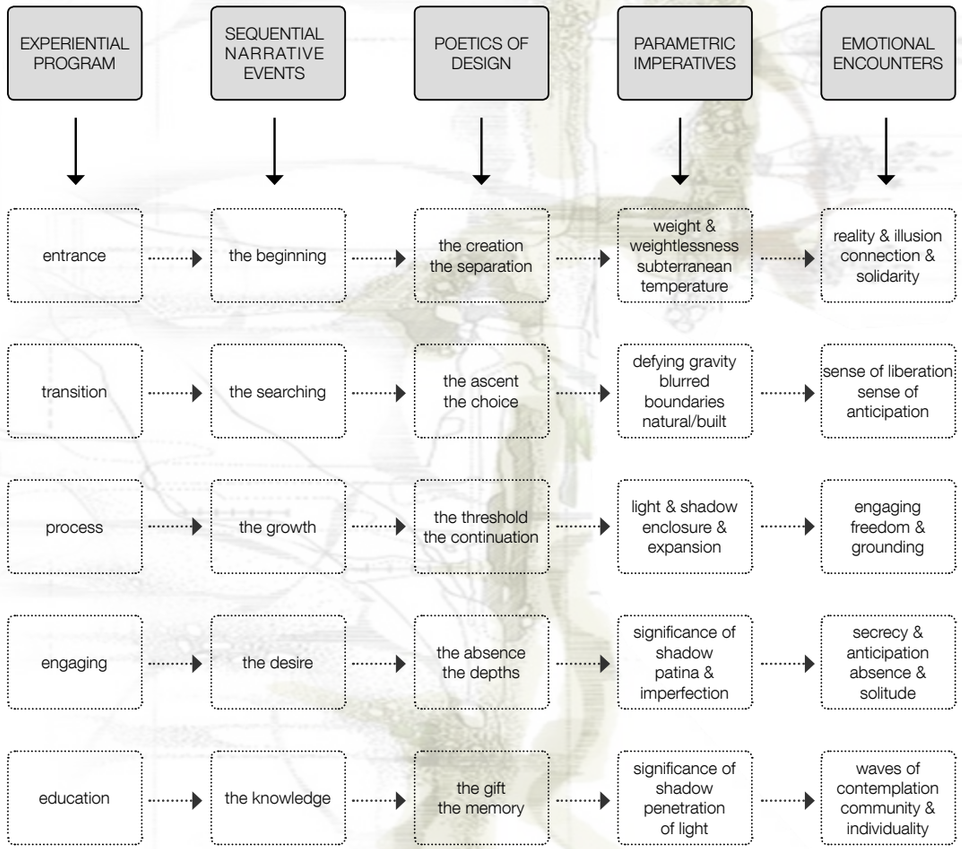


Figure 57: Metaphysical aspects of the design approach (Adapted by author: 2012)

6.1 APPROACH

The theoretical basis for the proposed scheme, which binds the conceptual framework into a singular ideal, sets out to reawaken and reinvigorate historical values. This notion is born from the built form's eroding values and remembrance in society. The presupposition is that these architectural ideals may be re-ignited through careful re-conceptualisation of issues concerning time, memory, and place.

The design takes shape within the rigorous framework of the laws of both nature and machine within the constructs of space and time. The fluidity of natural space and time stands in contrast to the rigidity of human space and time; the conceptual approach, therefore, aims to create a symbiotic and dialectic relationship between these segregated ideals. By understanding that man and nature progress and different speeds, whereby the conception of time in relation to human existence is rapidly accelerated in comparison to 'natural time', the opportunity thus arises for architecture to facilitate the mergence of these physical and metaphysical notions.

The scheme sets forth to become a fragment within the greater mnemonic landscape - in which one is greeted by the unfamiliar as a means of distraction and of deceleration. The architecture facilitates the idea of both building and landscape, past and present, merging together to form an existential experience. This is achieved by creating a medium that moves from above the ground surface to below, thus creating an environment endorsing repose. It is a dynamic landscape that stimulates remembrance, exhibiting physical, functional, and sensorial alterations.

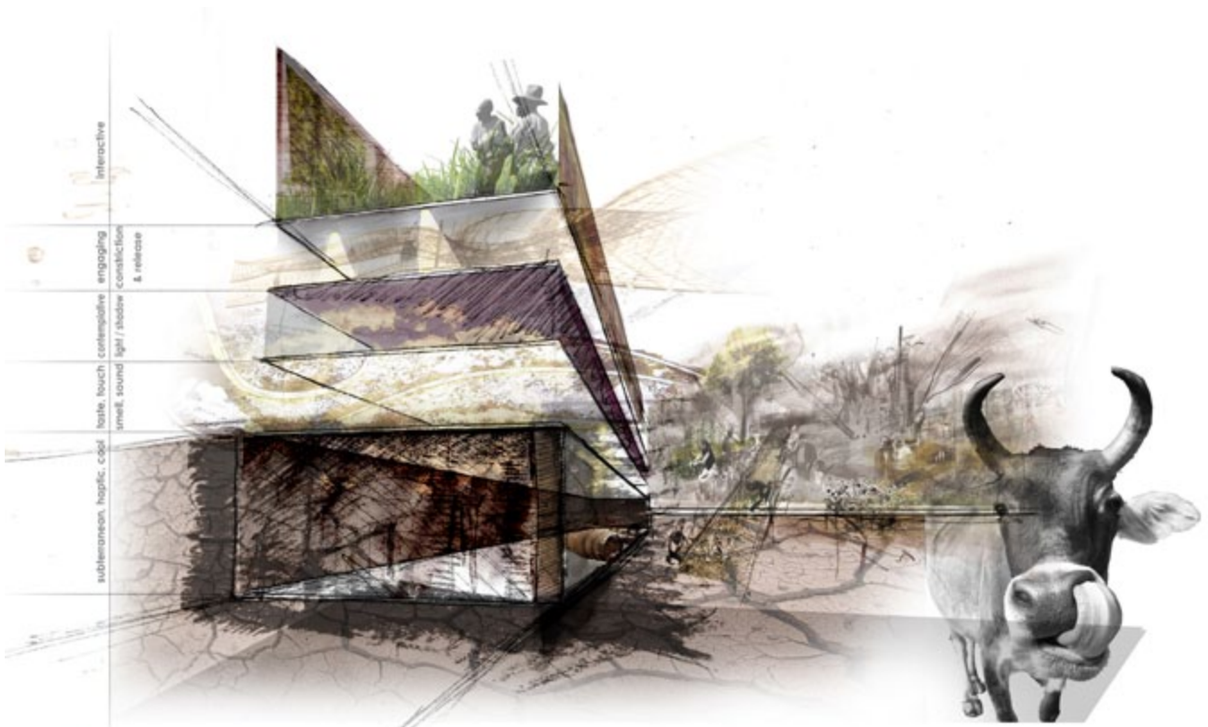


Figure 58: Layering of sensory experiences by both man & beast (Adapted by author from Nightscales: 2012)

The farmstead is transformed into a place for watching the movement of light and shadows, smelling the seasonal fluctuations, and witnessing the undulation of tectonic elements throughout the day. Constancy is void, and if our landscapes are to be true to our memories, they must exude adaptation over time.

Dispersed across space and time, the spatial conditions may drift, or disappear within the landscape in accordance with the interaction of man and beast. It is in this way that collective memories may not only be created and stored, but may also reflect interaction between various cultural groups. A complex relationship rich in meaning opens up in which space is seen as both the product of social interaction and the potential vessel, or producer, of social activities. The collective remembrance finds transformation as a physical process of our built environment.

Figure 59: Visualisation of the landscape as a mnemonic device (Adapted by author from Nightscales: 2012)

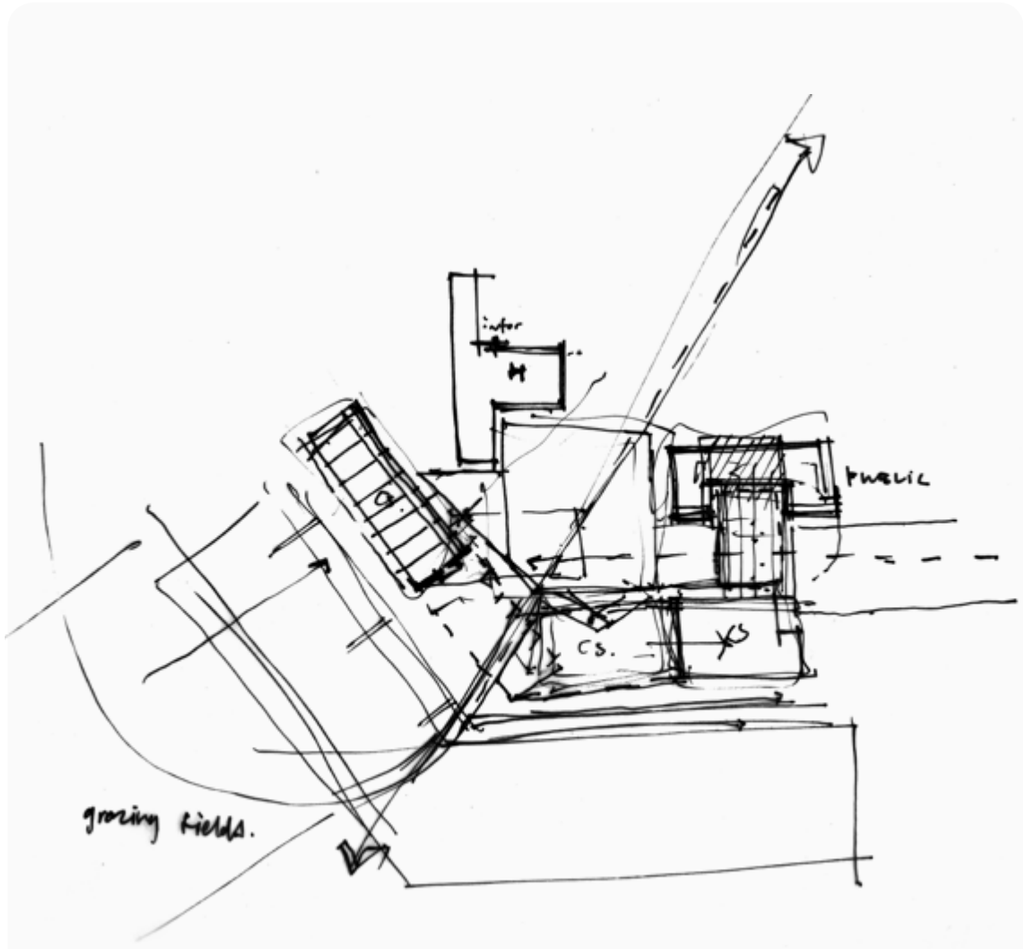


Figure 60: Initial parti diagram - plan (Author: 2012)

6.2 DESIGN PROCESS

The scheme sets out to facilitate an architecture of spatial exploration which mediates between the built heritage and the archaeological layering of the land. The idea of unfolding the earth forms the generator for exposing the potential experience that lies beneath the ground.

Through carving out new territories, epistemologies are anamorphically distorted to reveal an architecture of surrealism invigorated by advanced technology.

Moving between the built fabric and the natural landscape, the earth begins to open up, revealing a new condition that engages with the past, present and future. The myth of an inviolate nature slowly dissipates in favour of an architecture that in its very instability - encourages new kinds of spatial exploration and experience. By counterfeiting nature and by exploring its internal fissures, one begins to construct an architecture that is as real as nature itself.

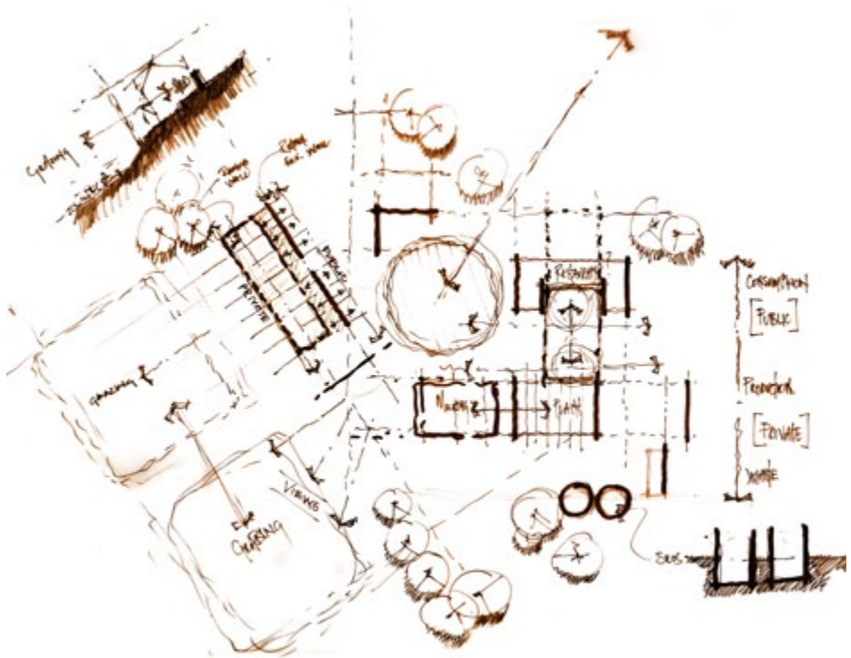


Figure 61: Conceptual design development - plan (Author: 2012)

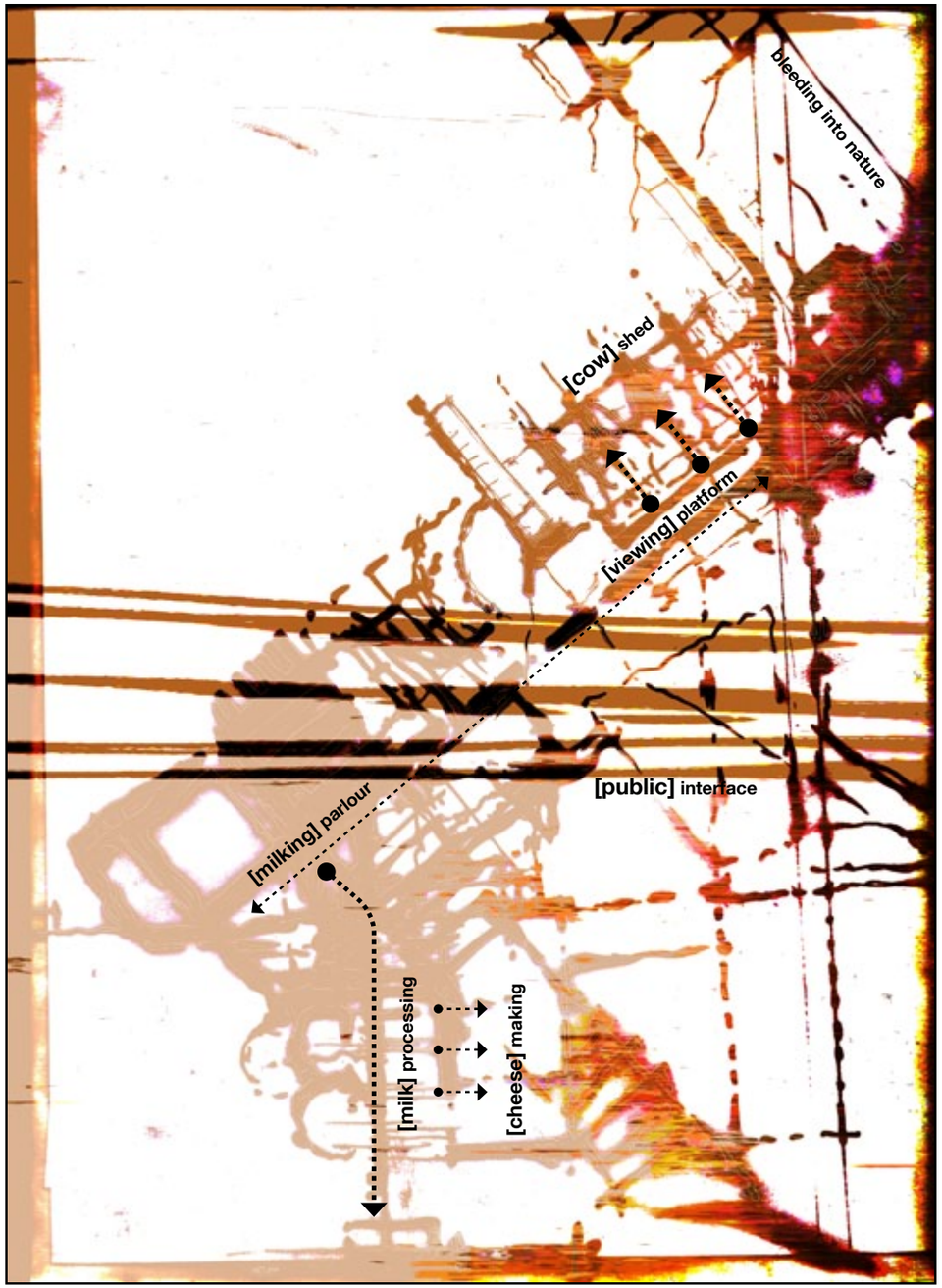


Figure 62: Abstract layout & process diagram - plan (Author: 2012)

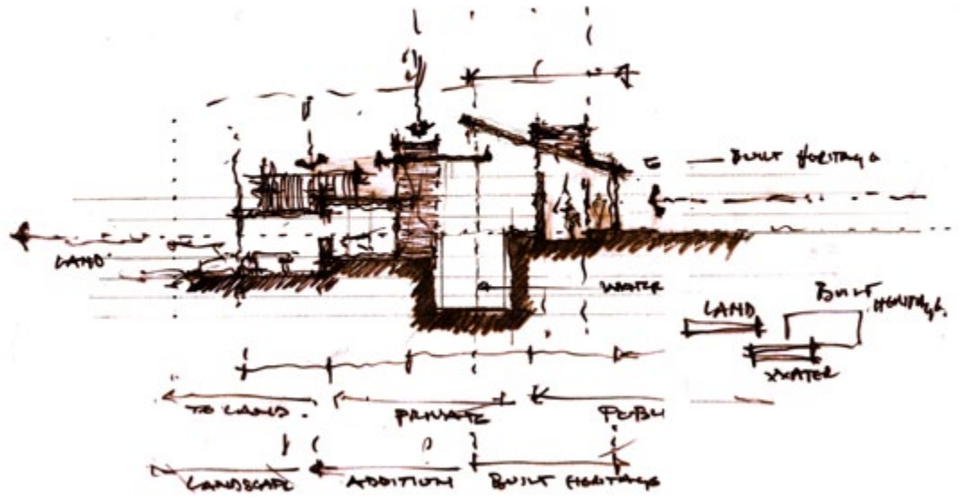


Figure 63: Initial sketch of the cow shed engaging with the historic built fabric - section (Author: 2012)

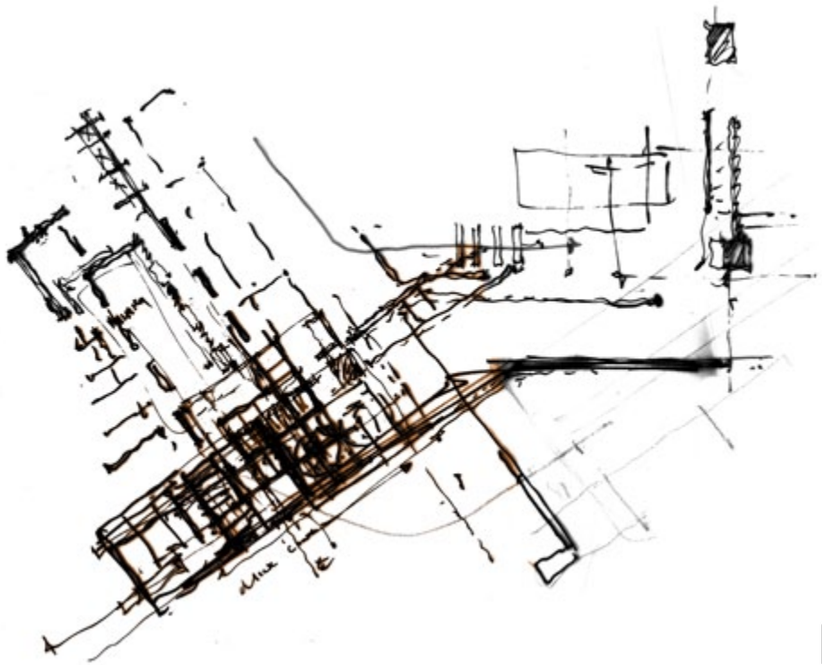


Figure 64: Concept sketch of the milking parlour & milk processing - plan (Author: 2012)

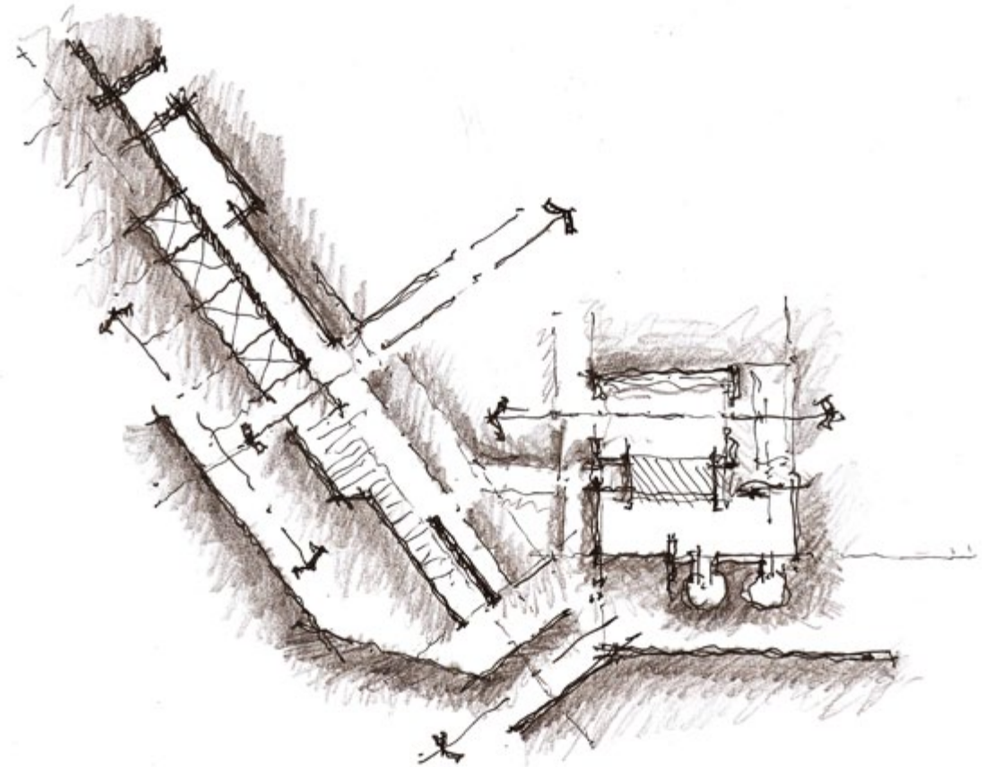


Figure 65: Concept sketch of the cow shed and milking parlour - plan (Author: 2012)

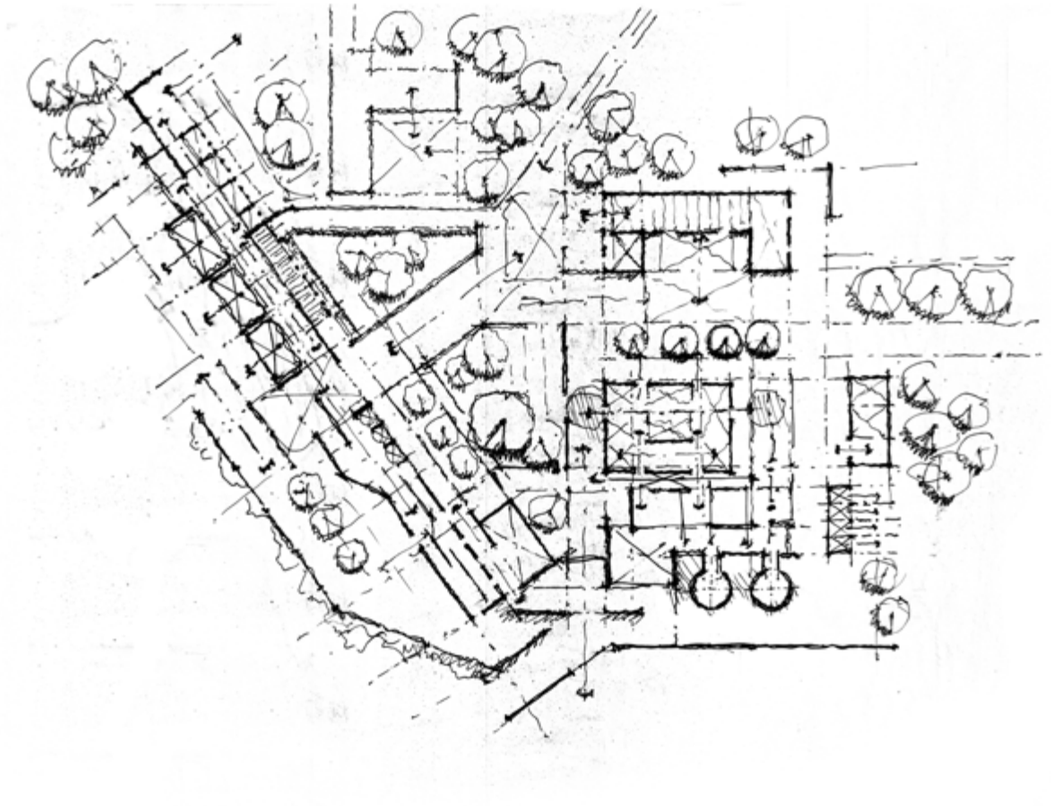


Figure 66: Design development illustrating spatial arrangements & connections (Author: 2012)

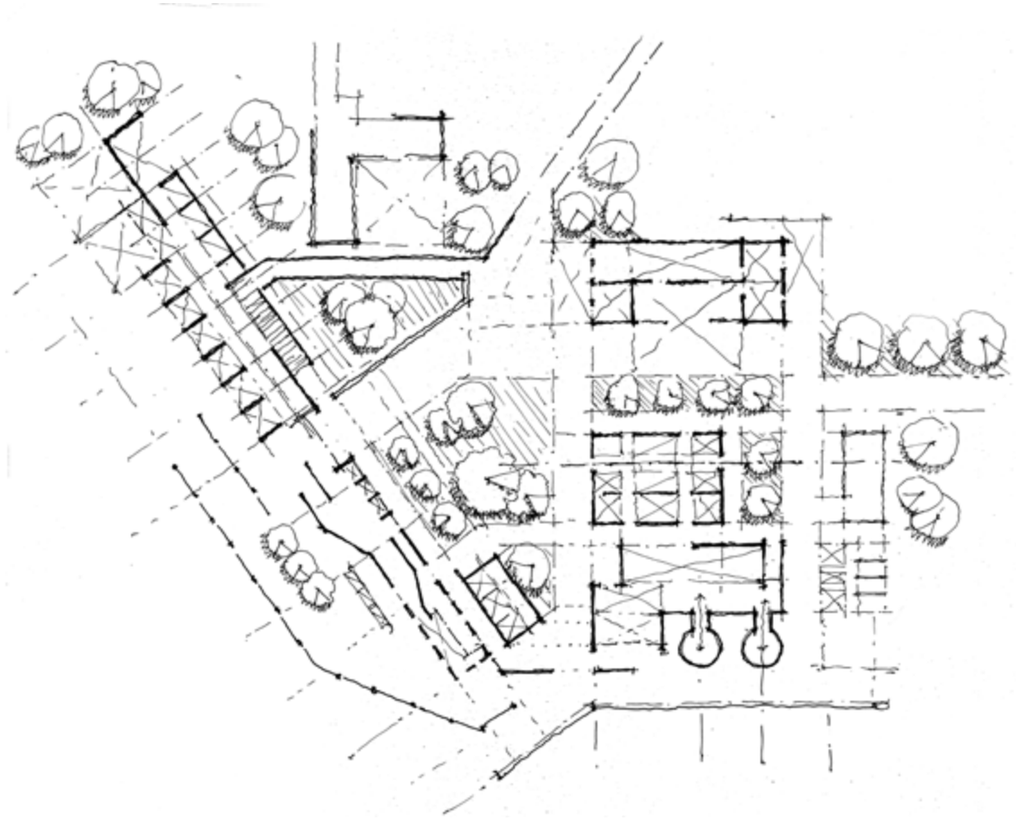


Figure 67: Design development illustrating built fabric in relation to the landscape (Author: 2012)

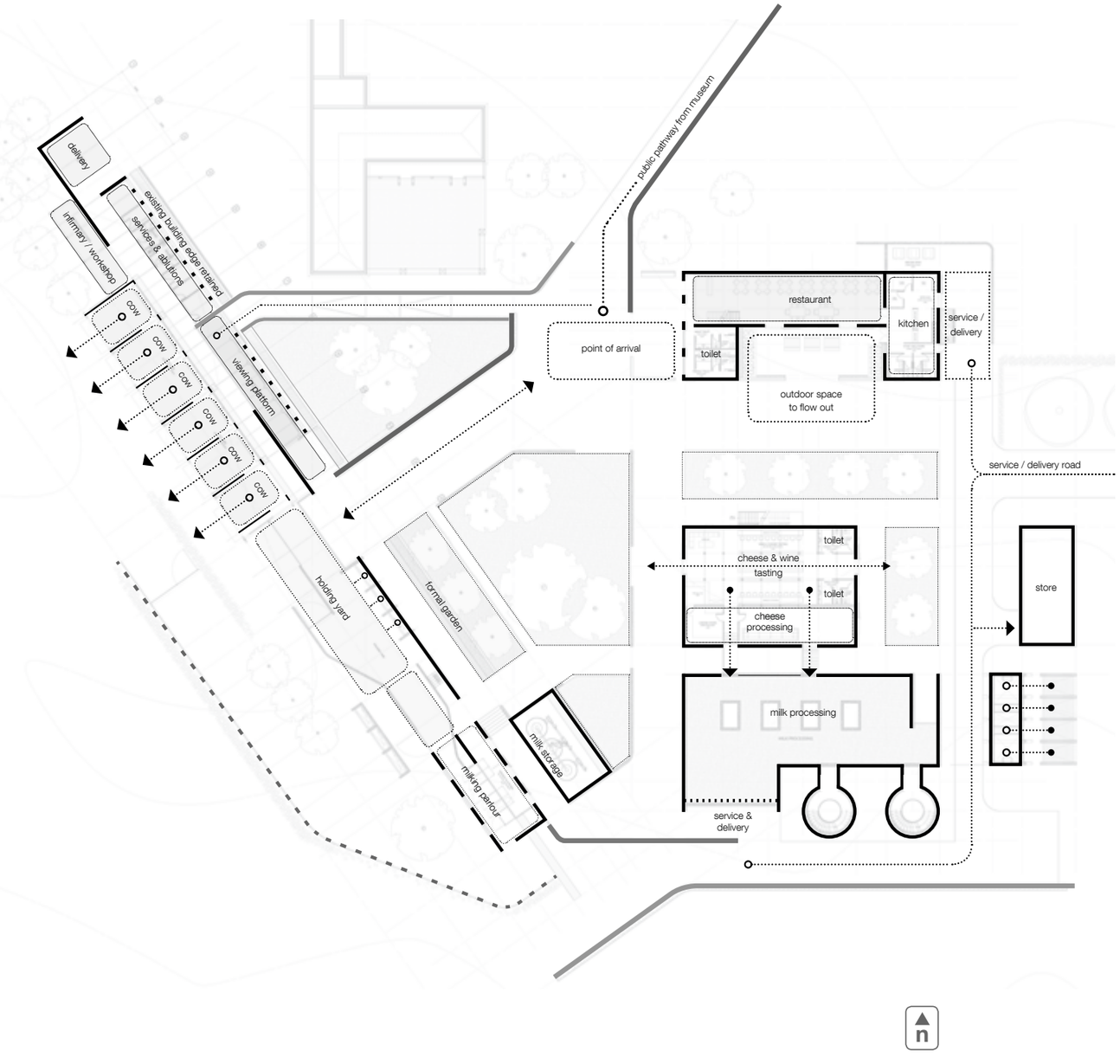


Figure 68: Layout of the proposed building functions and connections (Author: 2012)

6.3 PLANNING

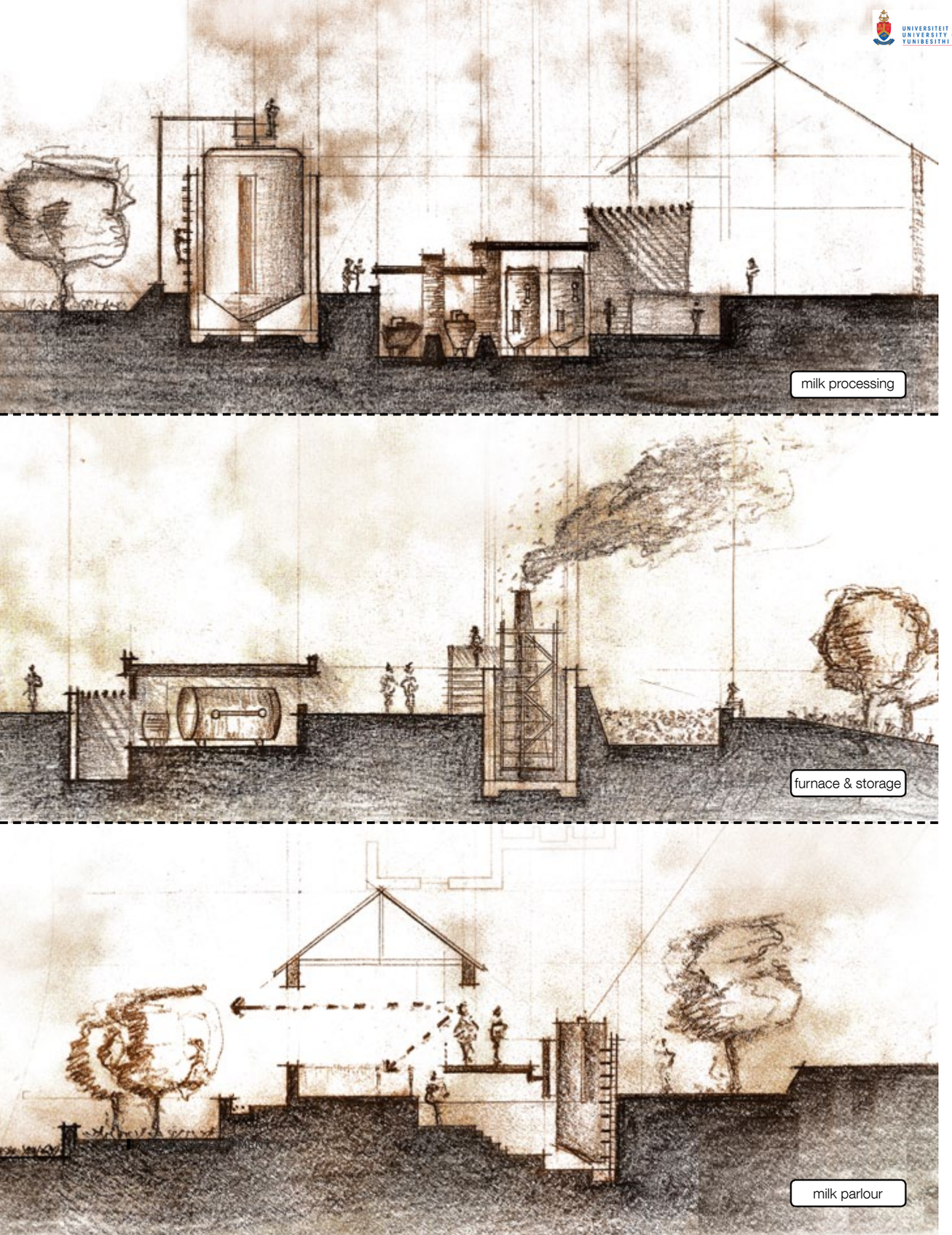
The layout of the scheme seeks to integrate the industrial typology of the dairy process with a public interface. The primary route from the museum of Sammy Marks brings the visitor down to original farmstead, which is re-established as a model farm for the dairy production process.

The cow pens, storage facilities, biogas digester, and infirmary are located in part of the existing 'chicken run', with the new architectural language, of a light tectonic skin, mediating between the existing fabric and the landscape.

The milking parlour, located in part of the original dairy of the farm, brings the visitor into the 'heart' of the dairy facility, allowing them to engage in the milking process and the existing built fabric.

Raw milk is then cooled in large storage tanks before being piped through to the milk processing area. Submerged below ground level, the processing area is carved out of the earth and emerges into the cheese processing area which is located in the existing 'cow shed'.

Throughout the process, the visitor, worker and dairy cow are engaged in an inventive dialogue, establishing a new understanding and appreciation for dairy production whilst exhibiting a mnemonic landscape as part of the built heritage of Sammy Marks' farm.



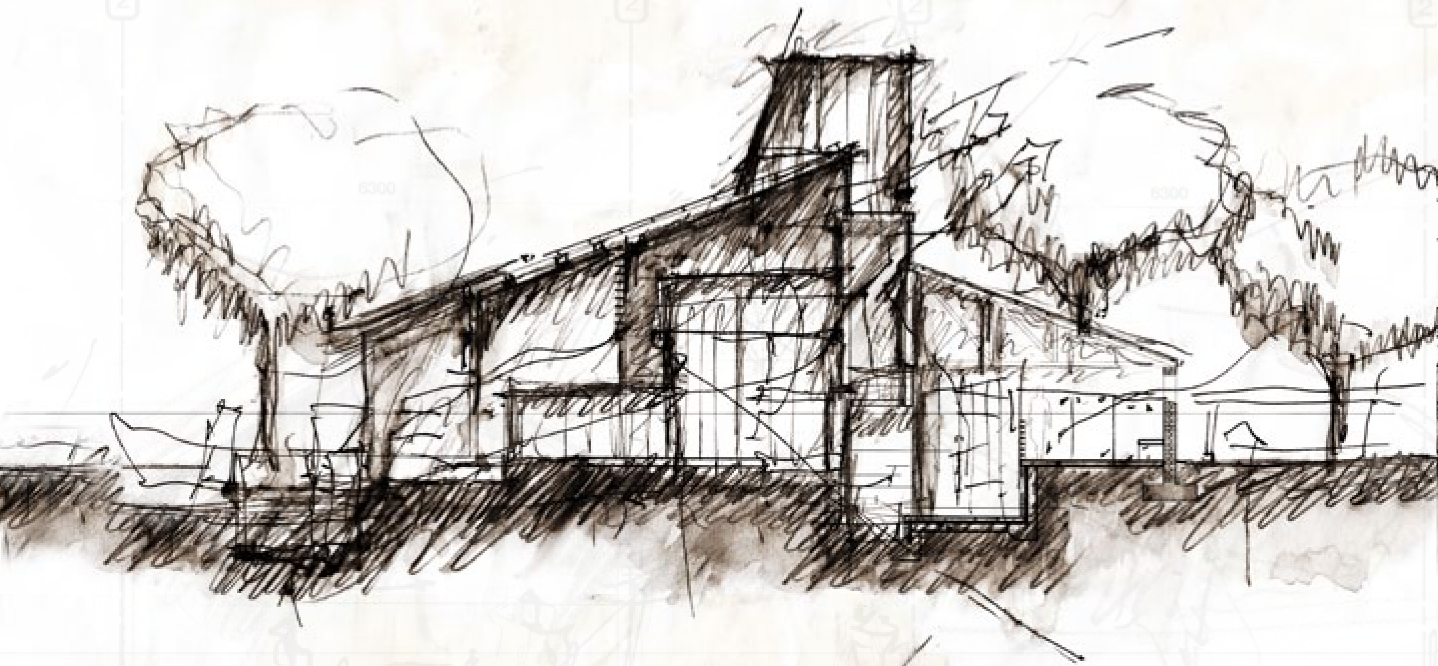
6.4 SECTIONAL DEVELOPMENT

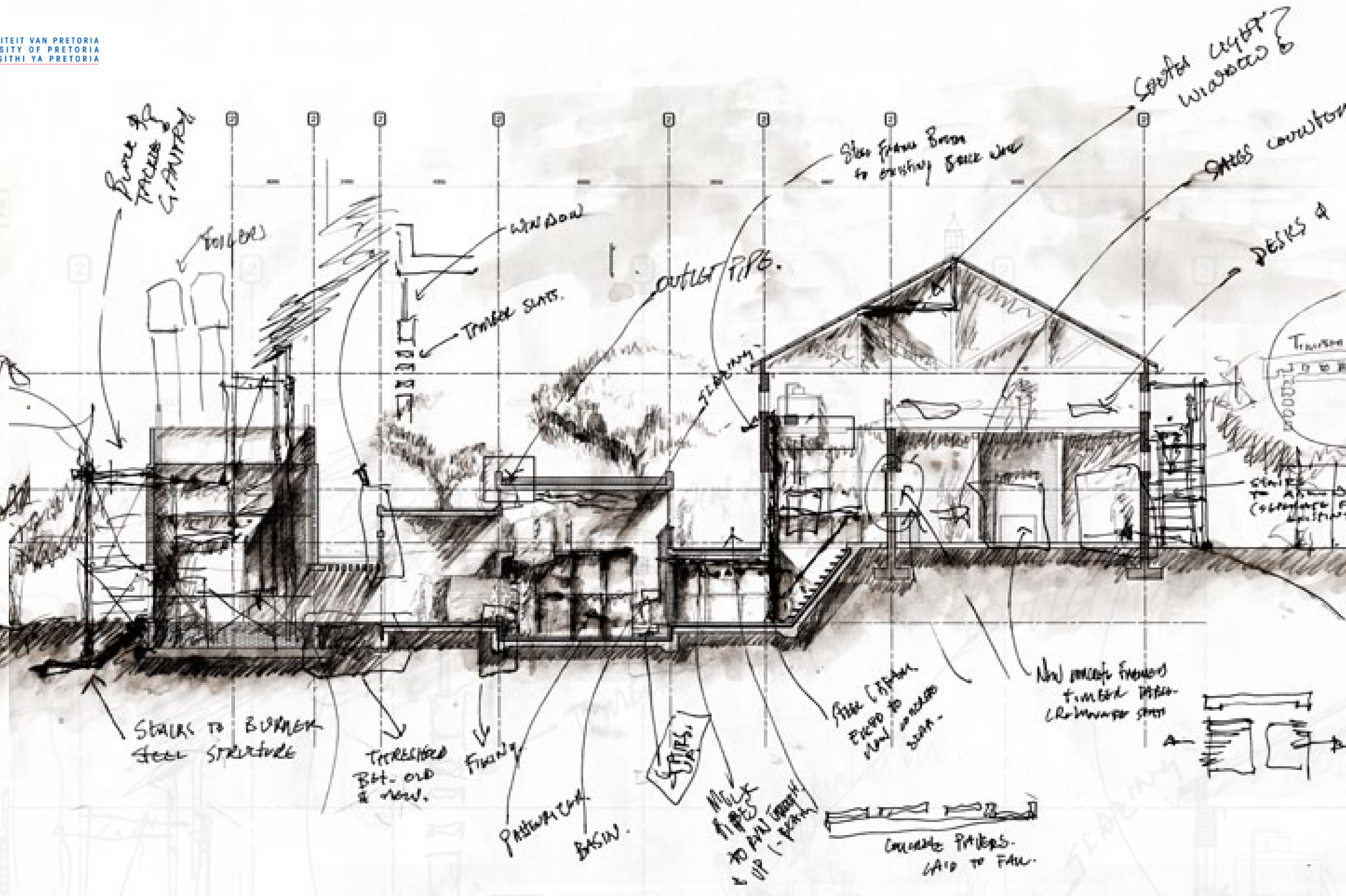
The sectional development of the scheme illustrates the notion of manipulating and exploiting the landscape and allowing the architectural design to be augmented through this sense of nature and environment. The fluctuating levels of experience, from above to below, facilitates the engagement of the built environment with the layering of the earth.

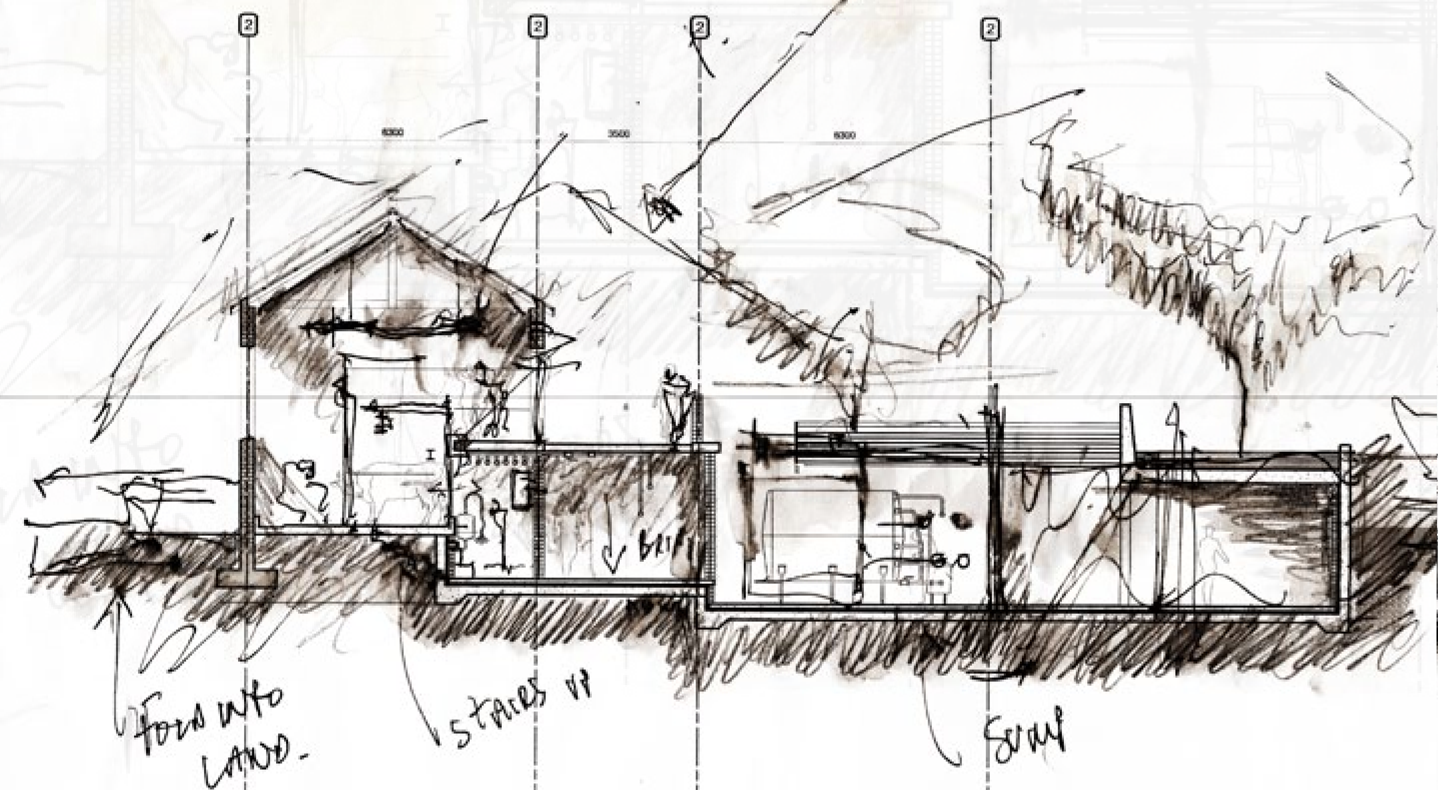
The critical and inventive dialogue between the natural and man-made provides a platform for the mutable exchange between architecture and the landscape - a medium which crosses the boundary between the known and unknown, the tangible and intangible.

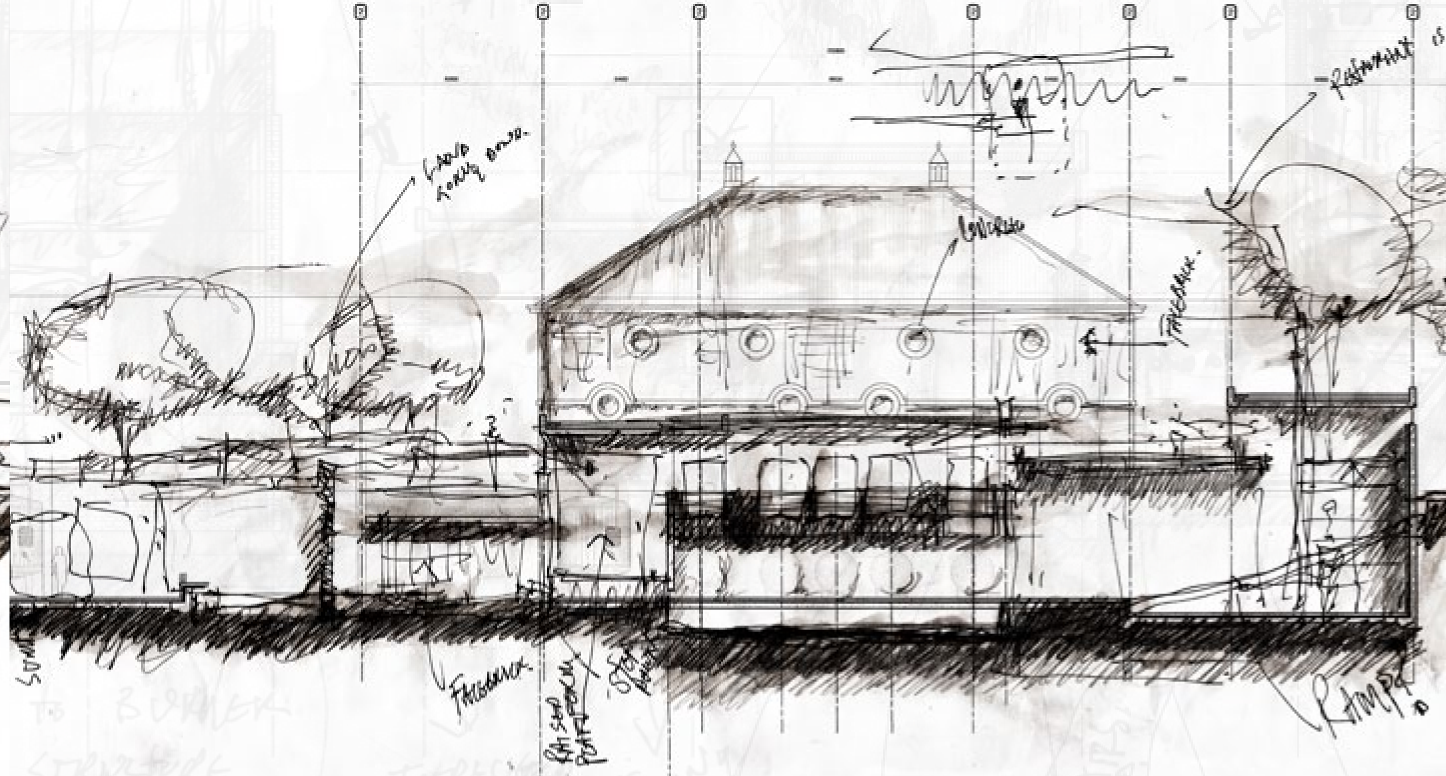
The sections set out to illustrate the conceptual approach of three different conditions. Firstly, the proposed scheme acts as a mediator between the built heritage and the natural landscape; secondly, it breaks through the built heritage to create a new sequence of events within the old; and thirdly, it carves out a new territory with the existing landscape, unearthing what lies below.

◄ Figure 69: Conceptual sections illustrating the engagement between the new & old (Author: 2012)









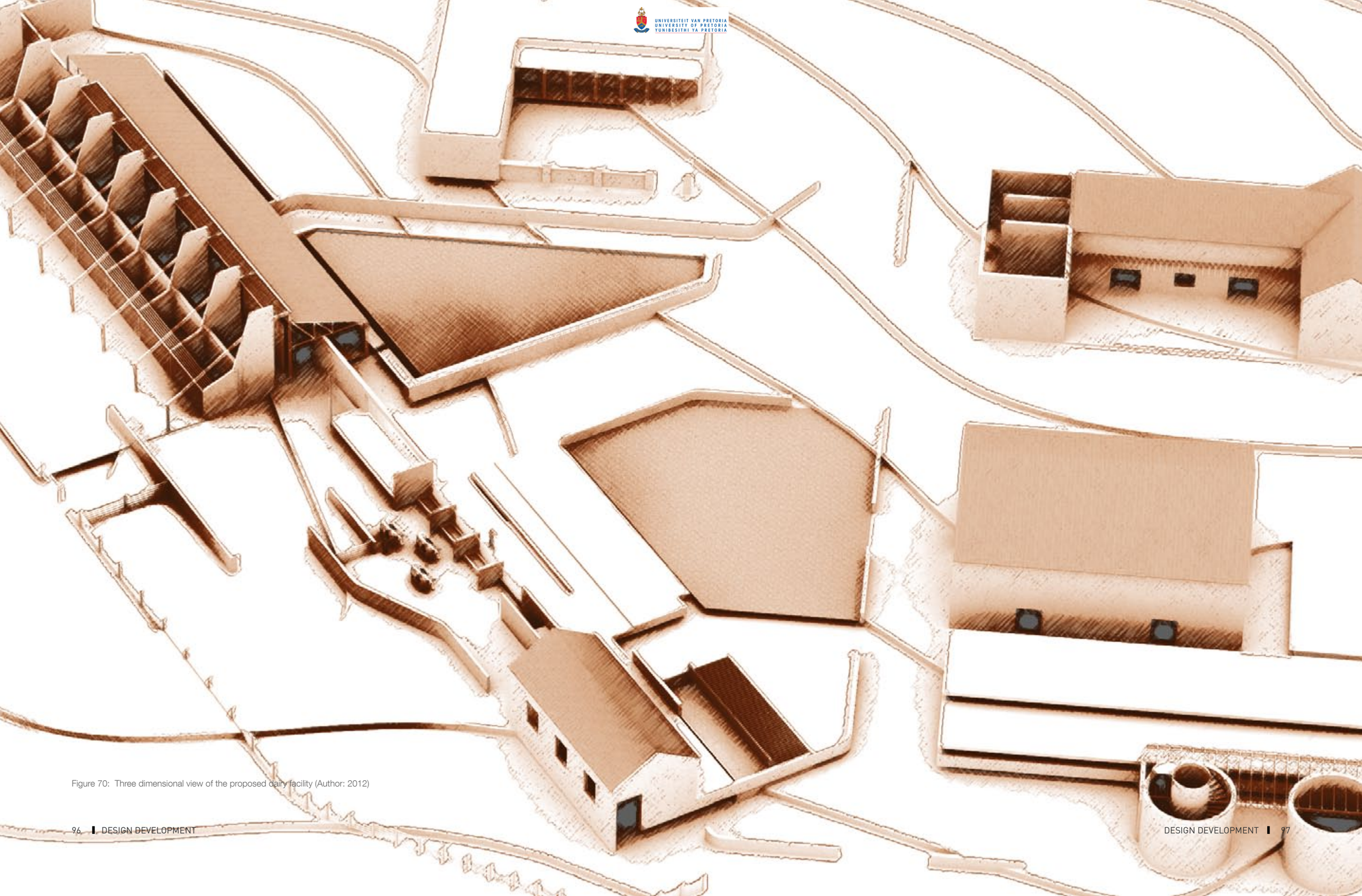


Figure 70: Three dimensional view of the proposed dairy facility (Author: 2012)

07

technical approach

Chapter seven introduces the technical approach to the scheme in regards to the techné, structural logic and material choice, as well as discussing the circulation of public visitors, private workers and the cows.

7.1 STRUCTURAL LOGIC

The structural investigation of the proposed scheme is explored on two levels which are integrated as a whole in the technical resolution.

The first approach is related to the two opposite compositions of materiality, the stereotomic - which relates to the solidity and grounded elements, and the tectonic - which defines dematerilisation or the lighter structural framework.

The second condition is grounded in the theoretical premise of mediating between the existing built fabric and the landscape, with the architectural intent being to facilitate a dialogue between the two by expressing what exists and bleeding into the surrounding landscape.

The character of the proposed building fabric sets out to create a cohesion between these two conditions. The conceptual approach therefore allows for certain edges of the existing fabric to be retained with the new addition being made up of a lighter tectonic element which dissolves into the landscape.

It also allows for the proposed scheme to take on the character of a submerged typology which is carved out of the ground and is defined by stereotomic mass.

The mutable exchange between the existing built fabric and the landscape allows for the natural and man-made to be intertwined through the mediating architectural elements of either tectonic (above) or stereotomic (below).

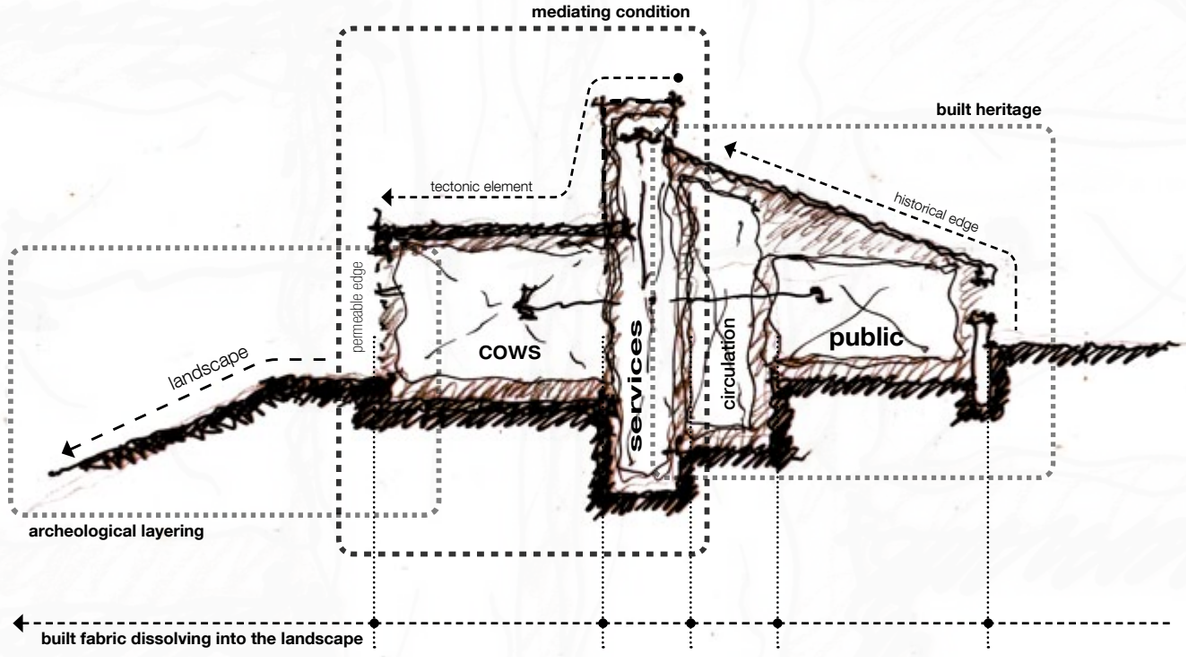


Figure 71: Sectional parti through cow shed (Author: 2012)

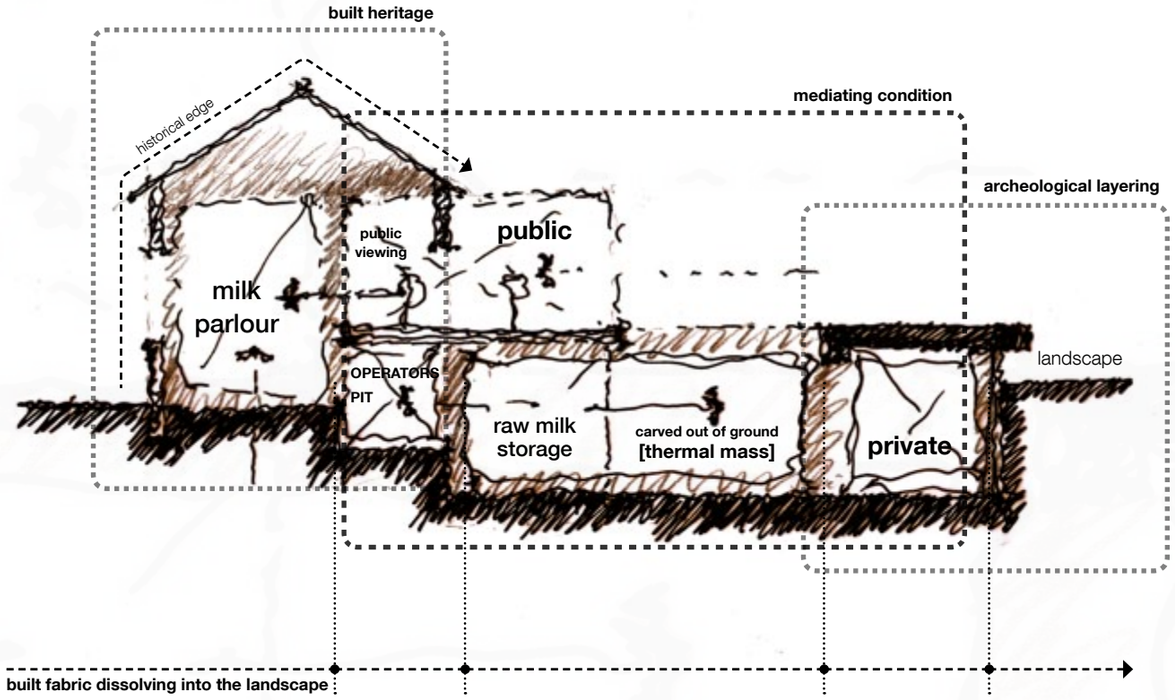


Figure 72: Sectional parti through milking parlour (Author: 2012)

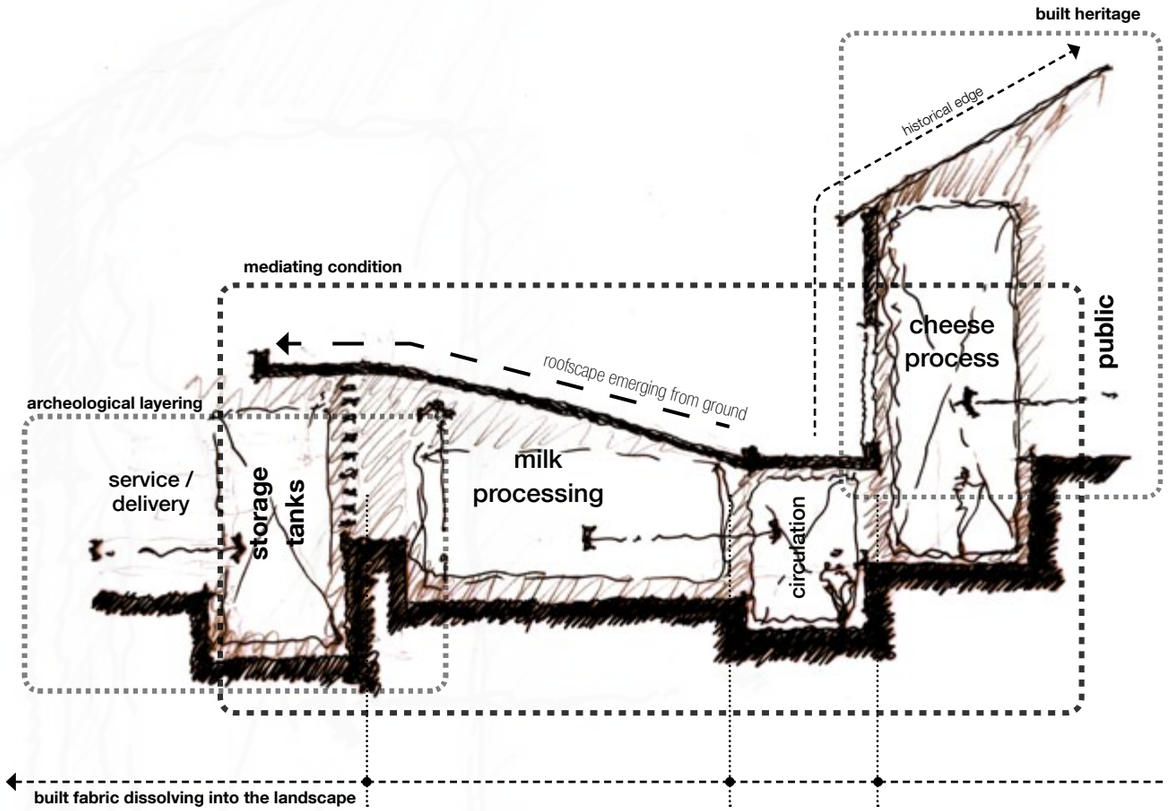


Figure 73: Sectional parti through milk processing (Author: 2012)

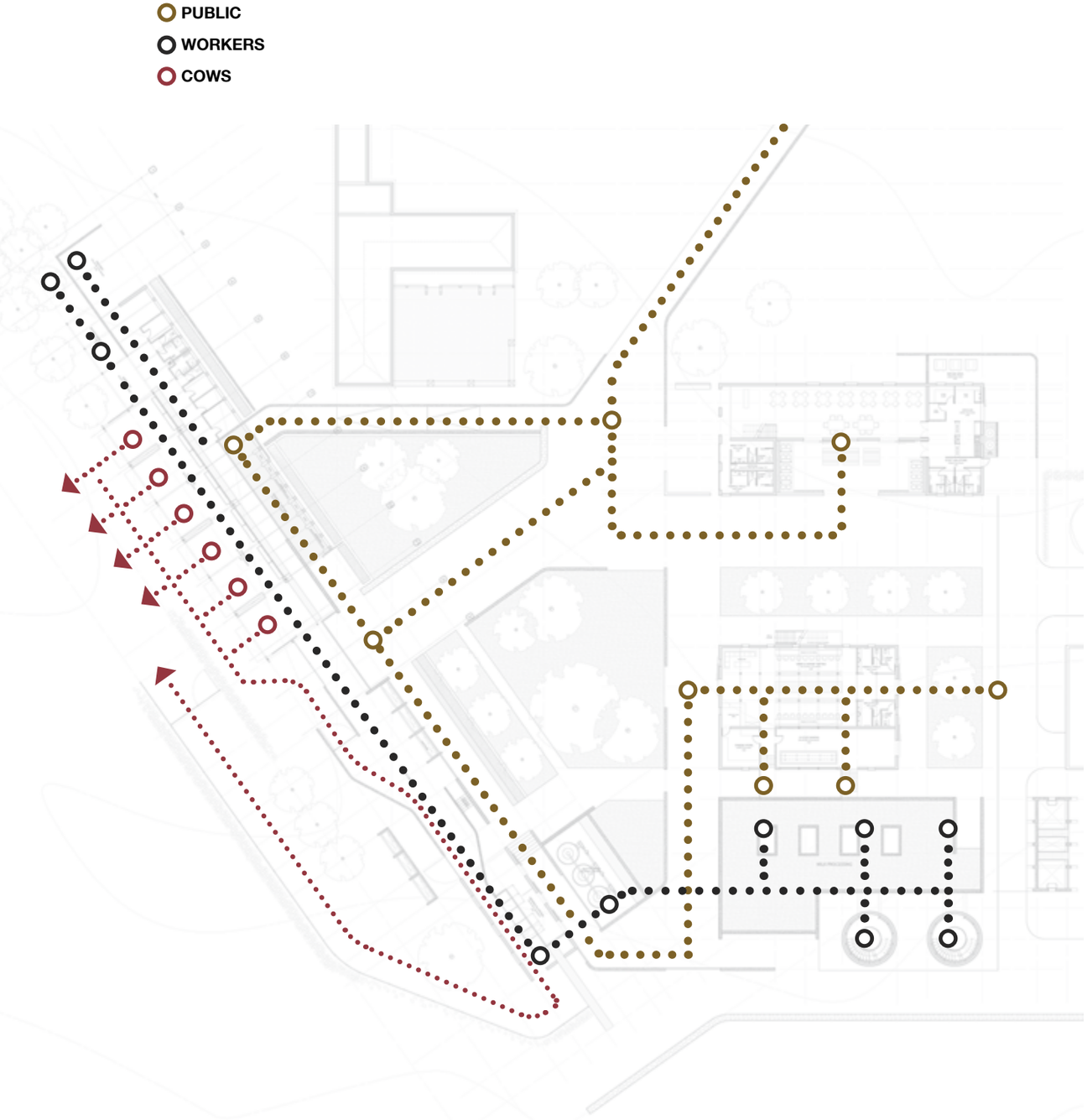


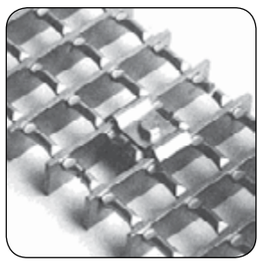
Figure 74: Circulation routes by the public, workers & cows (Author: 2012)

7.2 CIRCULATION

The circulation routes of the scheme forms a crucial part of the layout of the various processes involved in dairy production. The movement of cows, workers and the public are layered in such a way that they are separate entities at certain points and at other stages they overlap.

The scheme allows for the public viewer to be engaged with the process of the dairy industry at each stage, from the housing of the cows, through to the milking parlour and finally the processing of milk and cheese. The scheme facilitates the idea of transitioning between the existing buildings and the natural landscape, with the architectural intervention acting as the mediator between the two.

The design of the circulation routes used by the workers and the dairy cows facilitates the day to day activities on the farm whilst being physically separate from the public. This provides a platform for an industrial typology to engage in a critical dialogue with a public interface.

	Material	Discription	Application
stereotomic	 off-shutter reinforced concrete	Composite material which offers a new language to the existing materials found on site.	Robust surface finish used to define new edges which contrast to the existing face brick fabric of the historic fabric
	 wire-bound gabion walls	Rocks found on site are filled into wire mesh baskets in order to act as retaining devices and define adges along the route.	Gabion rock baskets are used as a contemporary alernative to the existing rock wallls found on site. Although stereotomic in nature, they retain a sense of permeability by allowing light to filter through.
tectonic	 lightweight timber	Pine timber is locally sourced and a renewable material. The new timber is used to relate back to the existing timber roof structures found on site.	Planed pine timber slats are used as tectonic elements which define space yet allows for a permeable threshold.
	 mentis grating	Pressure locking system of galvanised mild steel. It can be easily constructed and removed if necessary.	Mentis grating is used for it's lightweight and flexible properties. It is specified for the elevated walkways found in the processing areas.

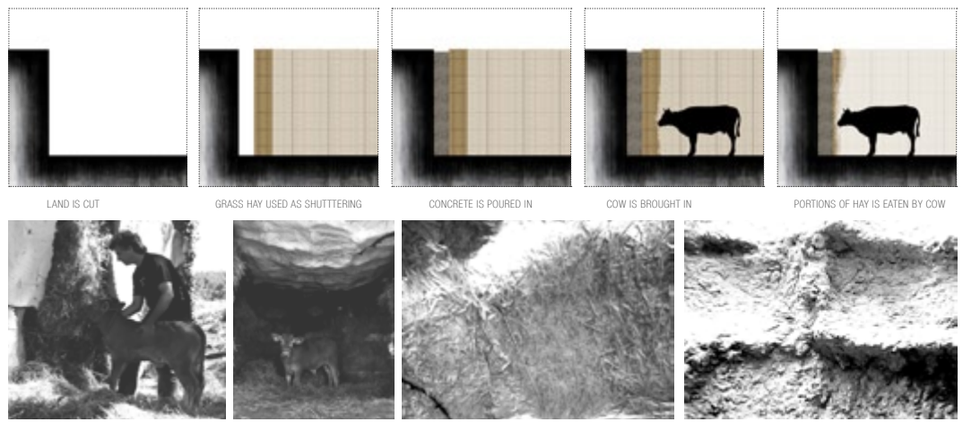
7.3 MATERIALS

The materials chosen for the proposed dairy facility are according to both the structural logic of the scheme and the functional properties required for the space.

The stereotomic elements of the proposal are comprised of off-shutter concrete and gabion rock walls. The concrete floors and walls offer a new language to the existing built fabric, moving between, through and below the buildings and the land. The gabion rock walls act as a contemporary interpretation of the existing rock walls found on site, defining space and edges along the route.

The tectonic elements are made up of planed timber and structural steel members. The timber generally acts as a lattice structure in filtering light into the buildings, whilst relating back to the timber roof trusses of the existing fabric. The steel members form part of the new structure, dissolving into the landscape from the stereotomic elements.

Cows are introduced in the process of construction by allowing them to eat portion of hay which have been used as shuttering for the concrete. This gives a uneven texture to the interior whilst allowing the architecture to relate back to the memory of the cow.



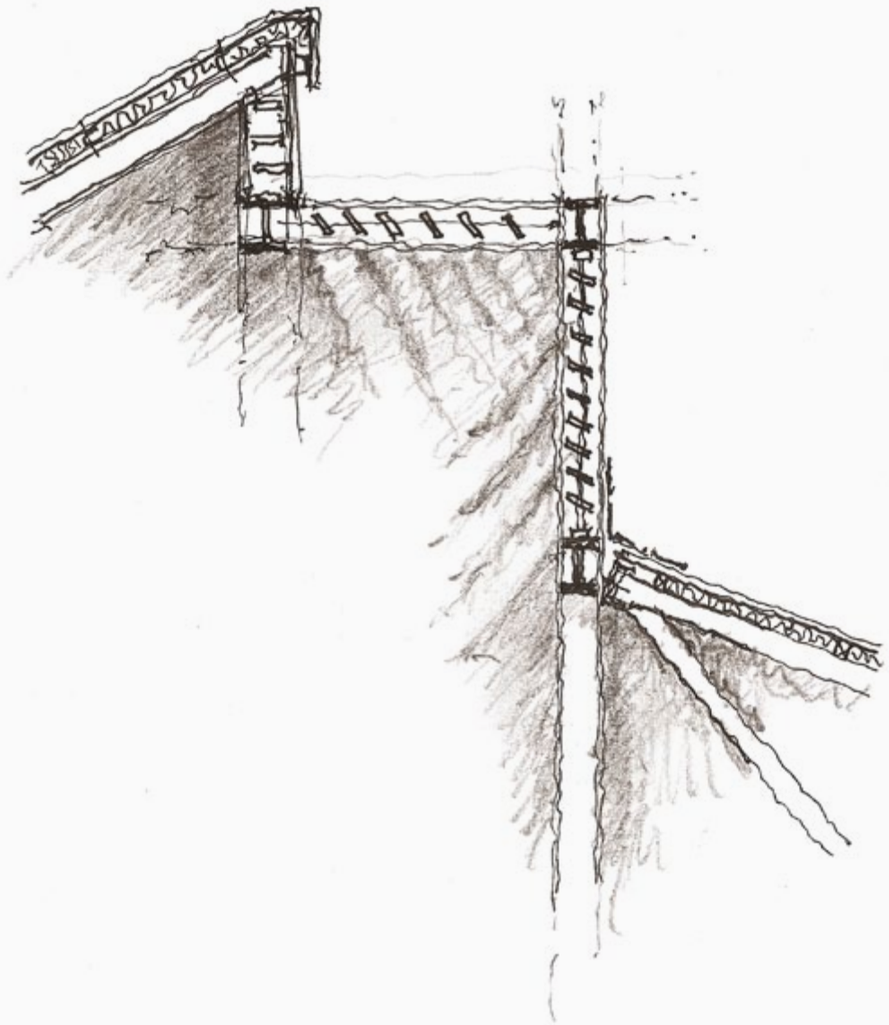


Figure 75: Detail of the mediating connection between the new & existing structure - plan (Author: 2012)

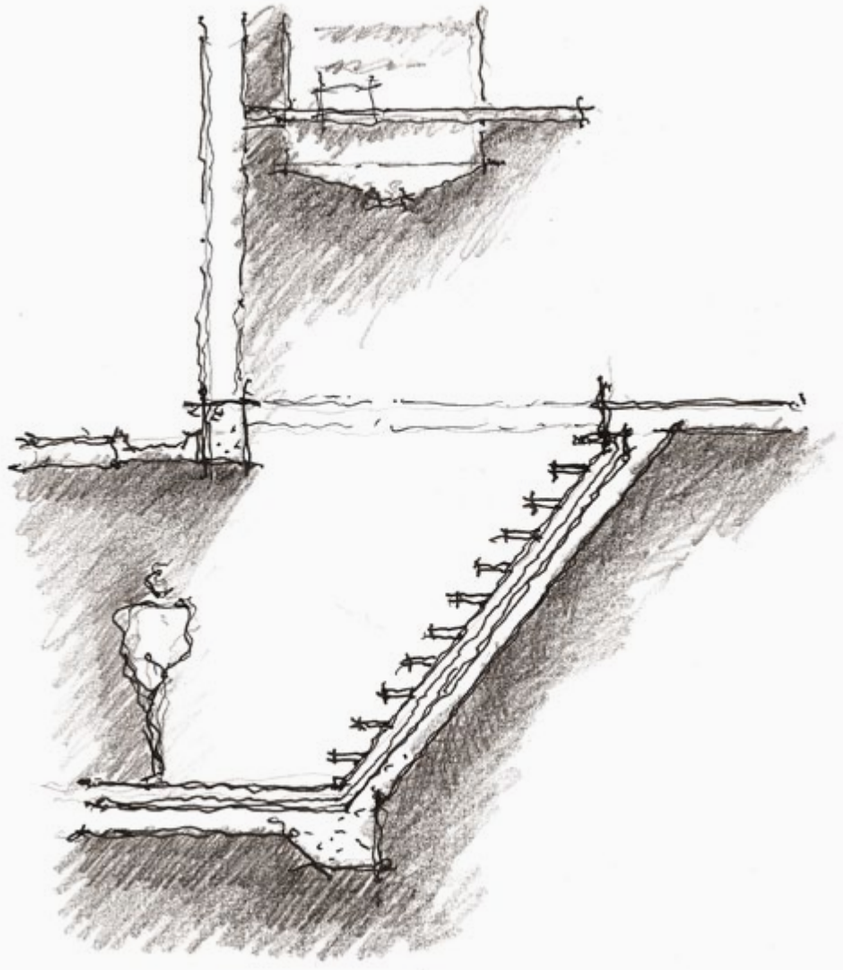


Figure 76: Detail of the processing area emerging from below into the existing (Author: 2012)

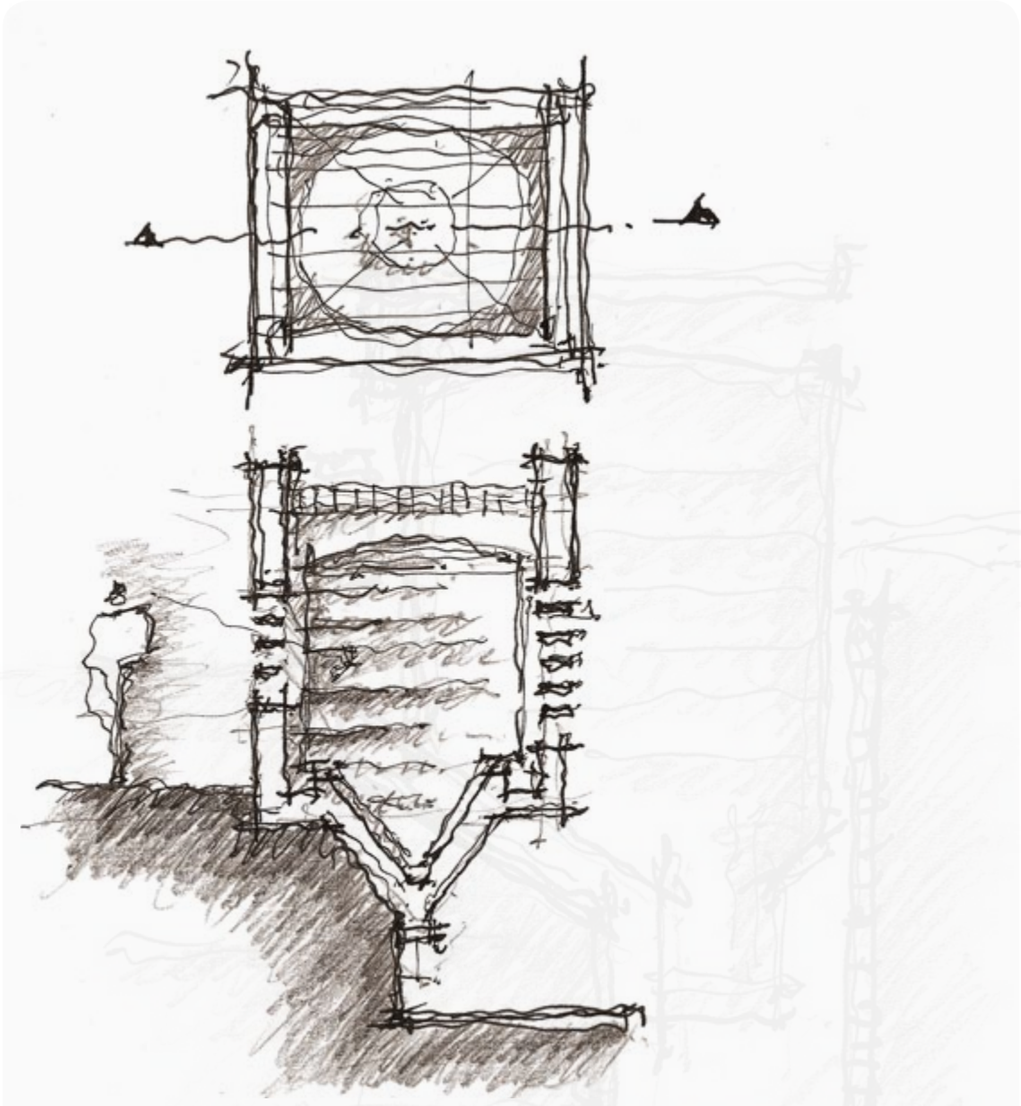


Figure 77: Sketch detail of the milk storage tanks housed within a concrete frame (Author: 2012)

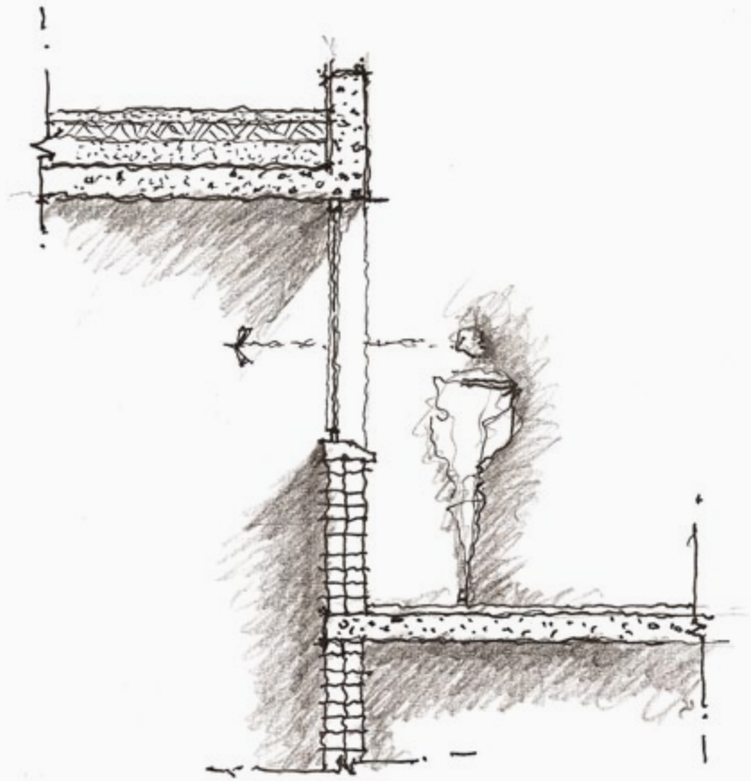


Figure 78: Detail of the viewing platform into the milk processing area below ground (Author: 2012)

08

drawings

Figure 79: Floor plan of the proposed dairy facility (Author: 2012)

Figure 80: Floor plan of the proposed cow shed & workshop (Author: 2012)

Figure 81: Floor plan of the proposed restaurant, cheese & wine tasting & milk processing (Author: 2012)

Figure 82: Section A-A (Author: 2012)

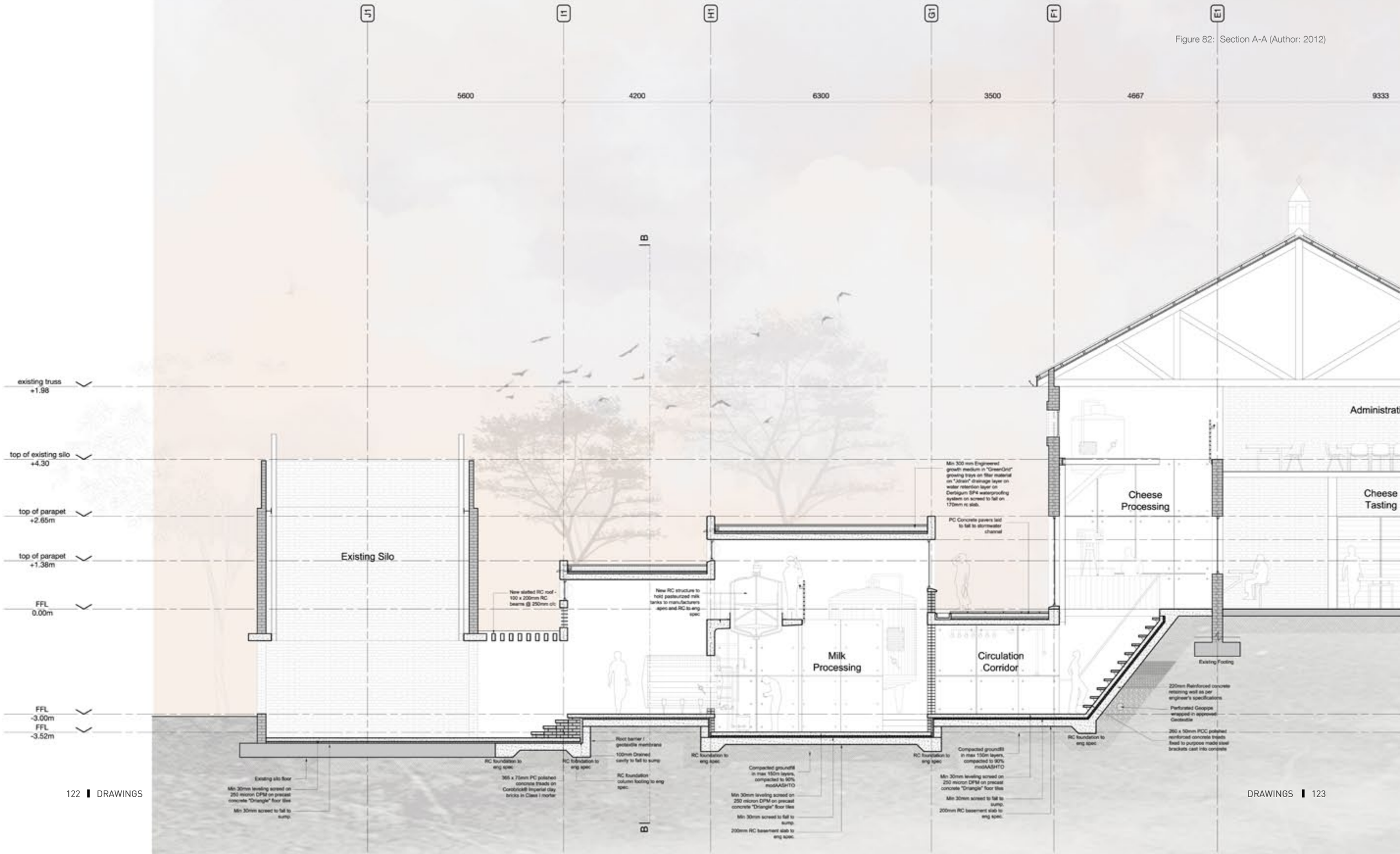


Figure 83: Section A-A (Author: 2012)

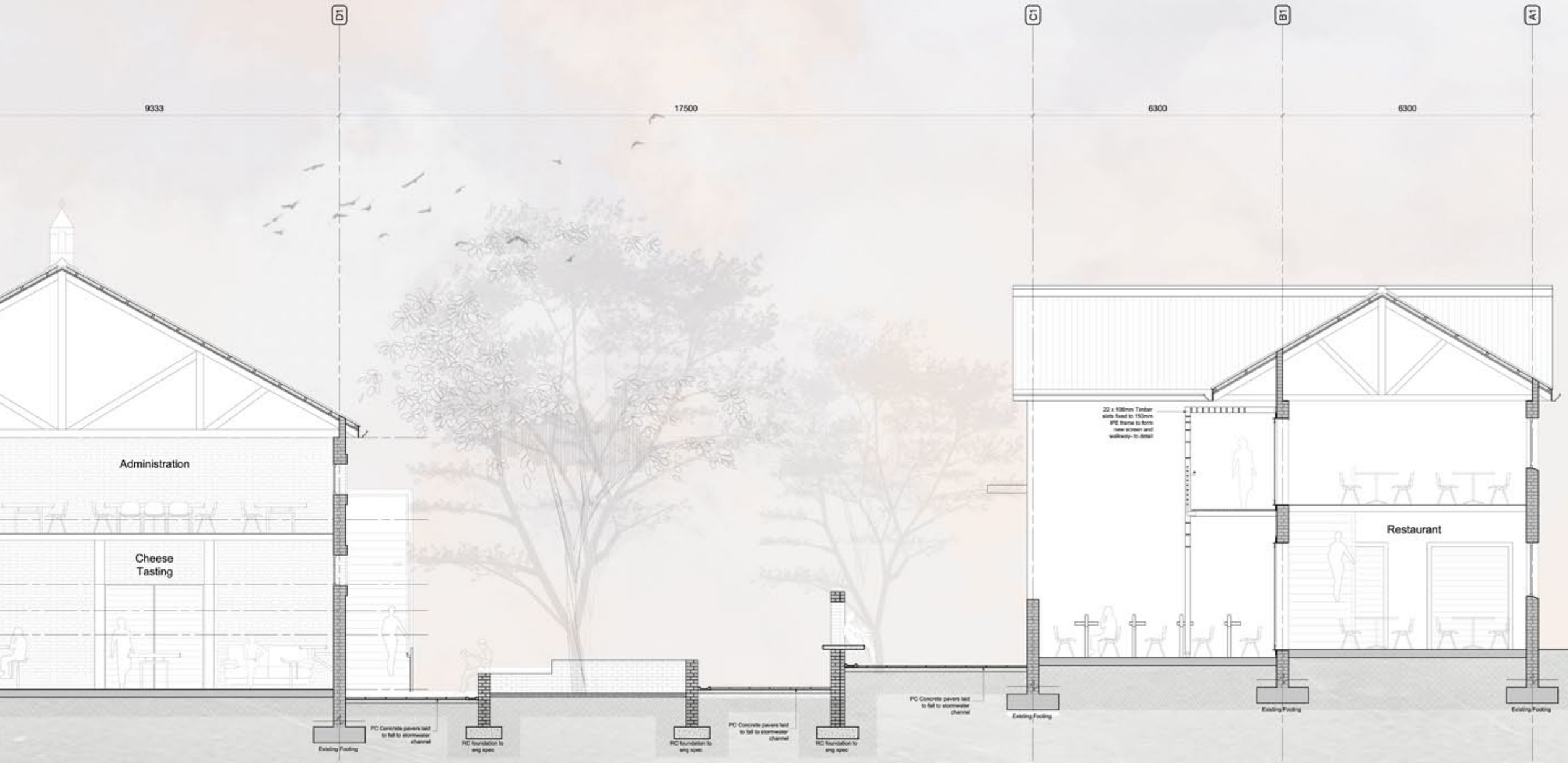


Figure 84: Section B-B (Author: 2012)

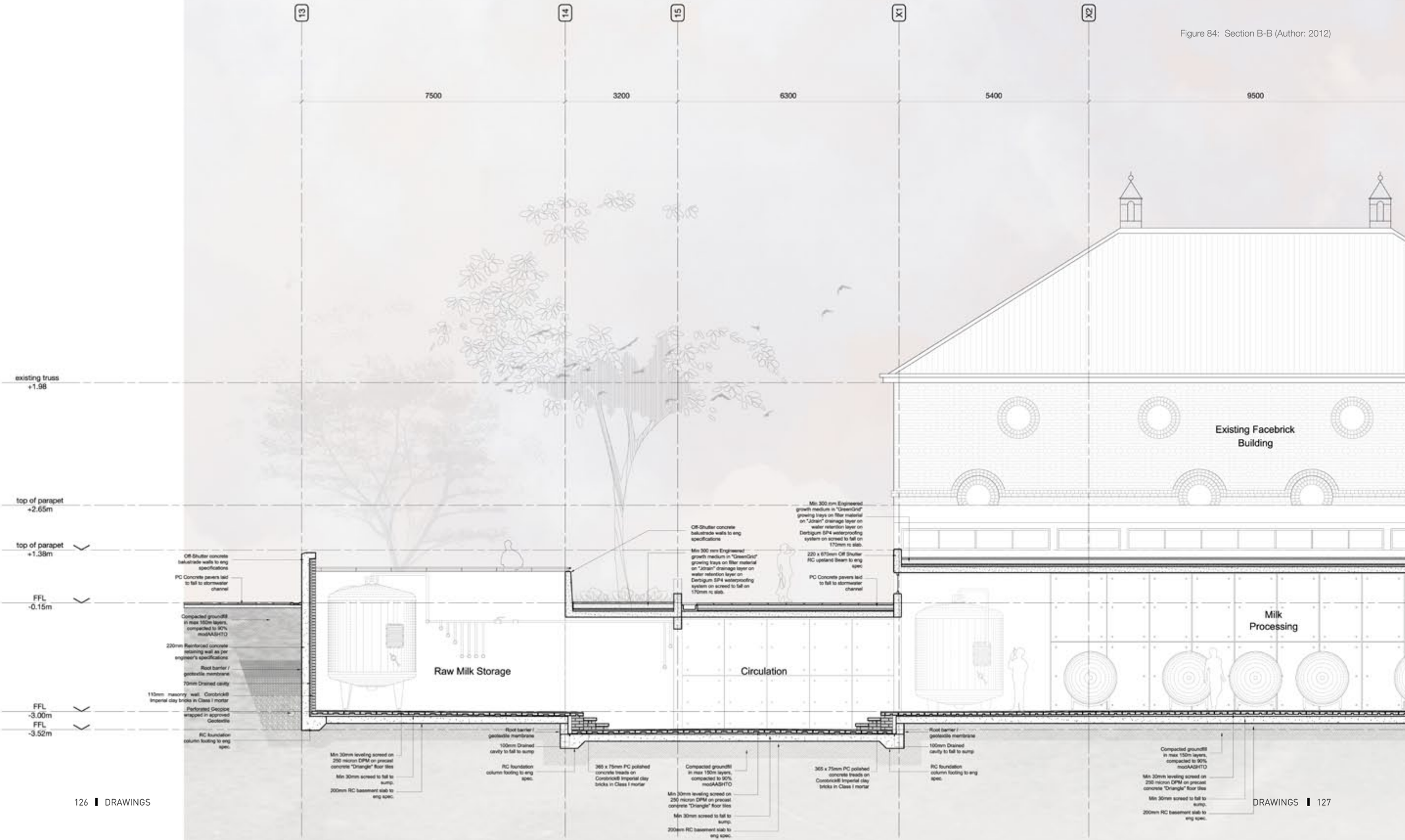


Figure 85: Section B-B (Author: 2012)

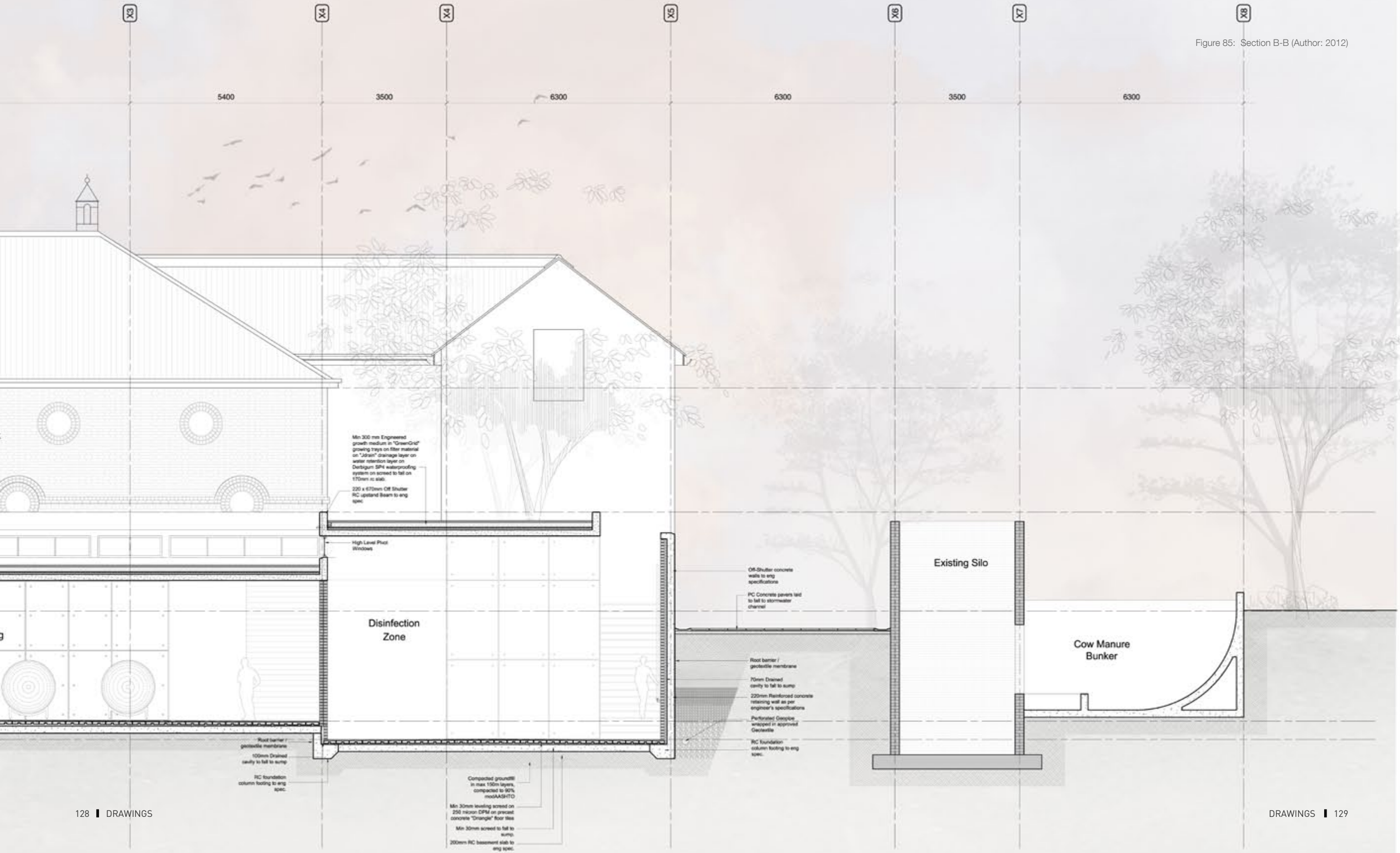
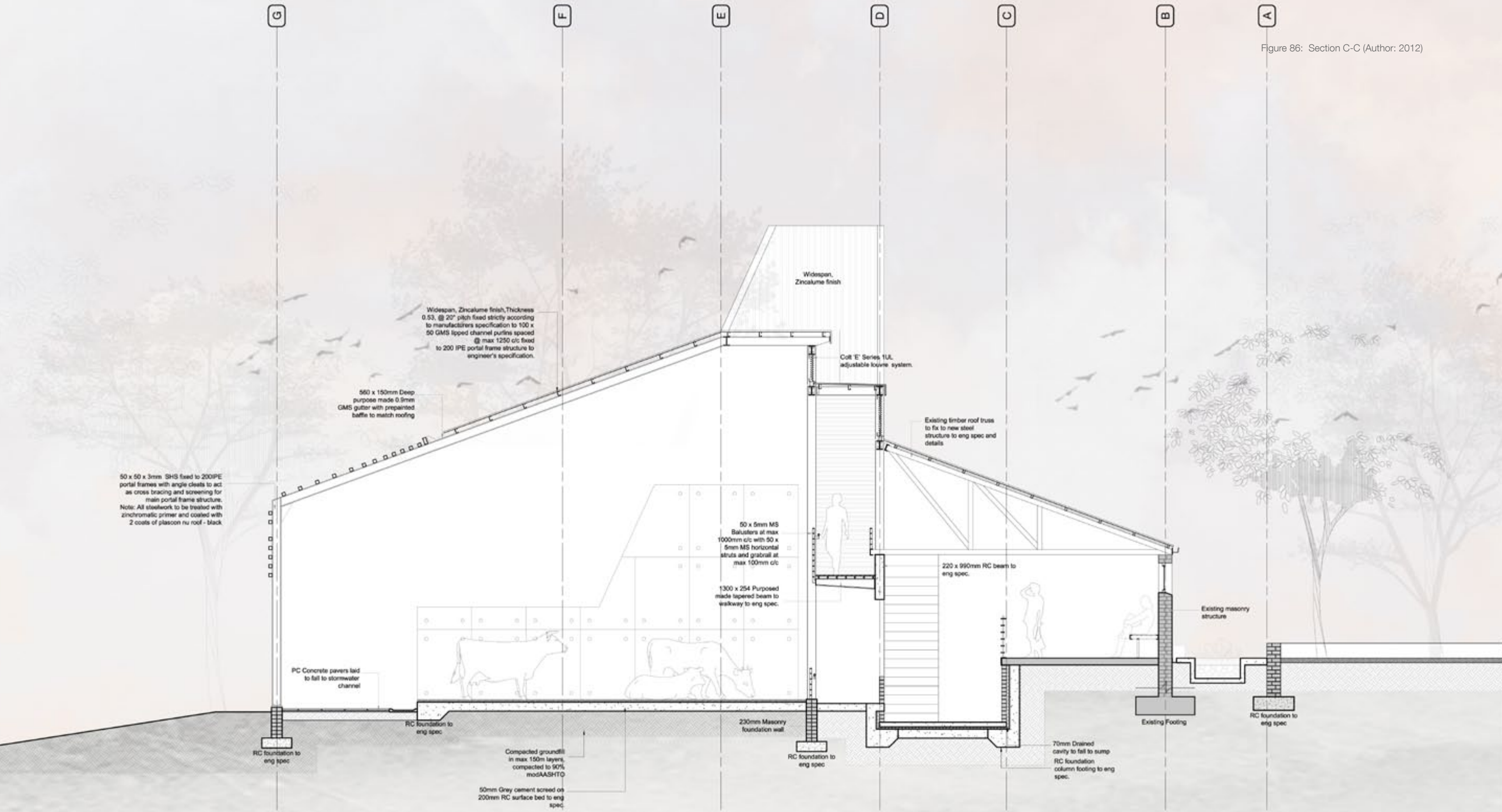
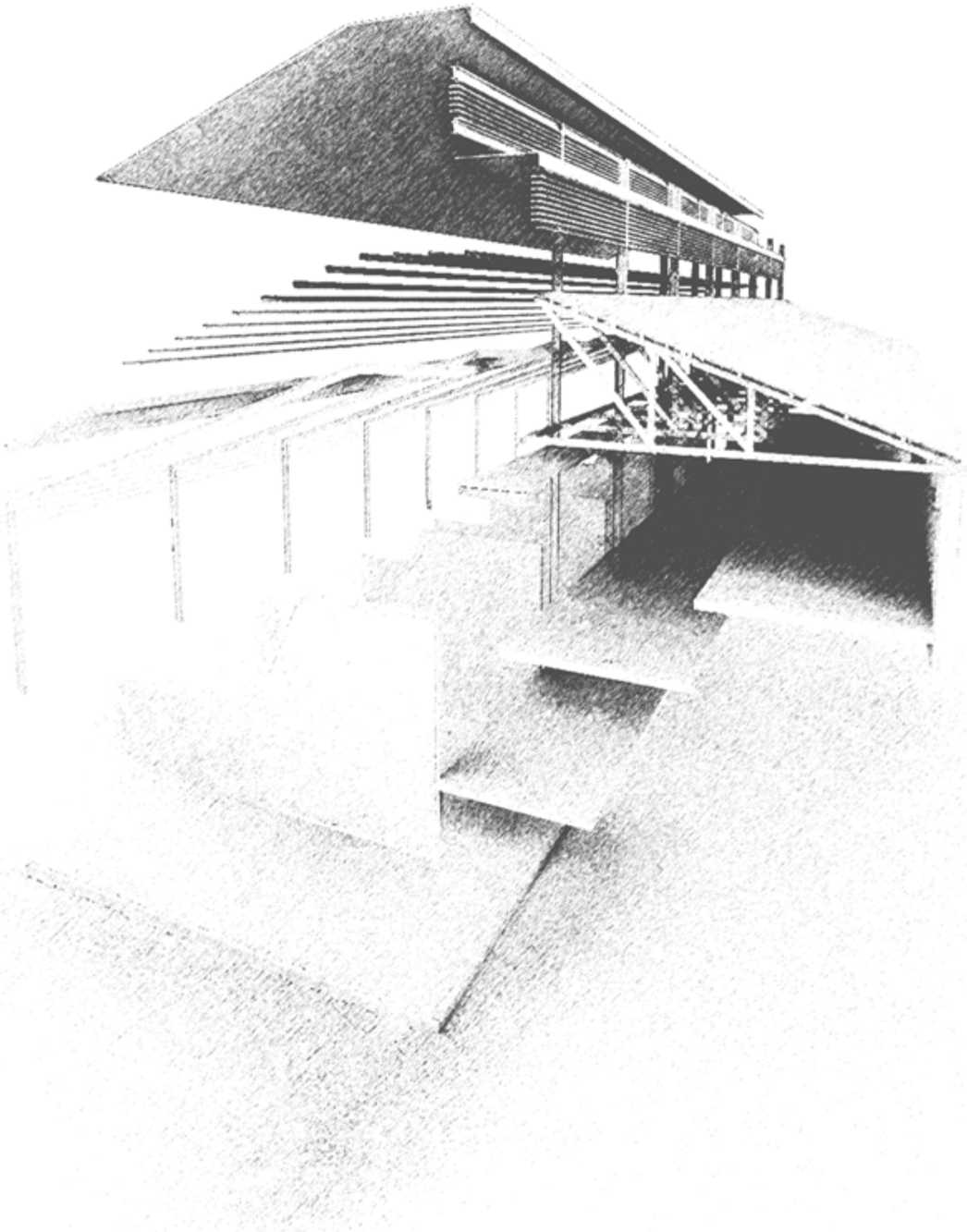


Figure 86: Section C-C (Author: 2012)





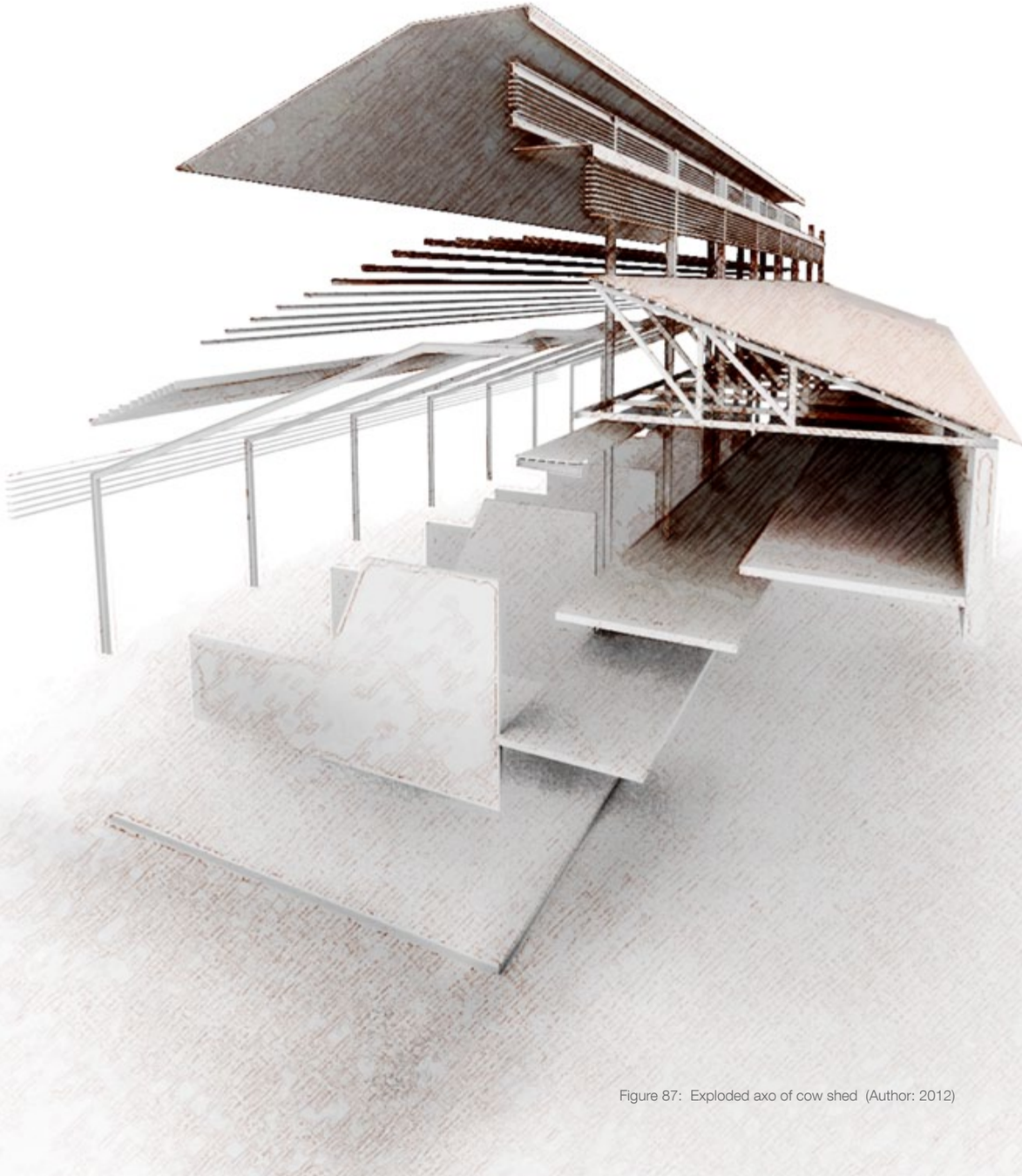


Figure 87: Exploded axo of cow shed (Author: 2012)

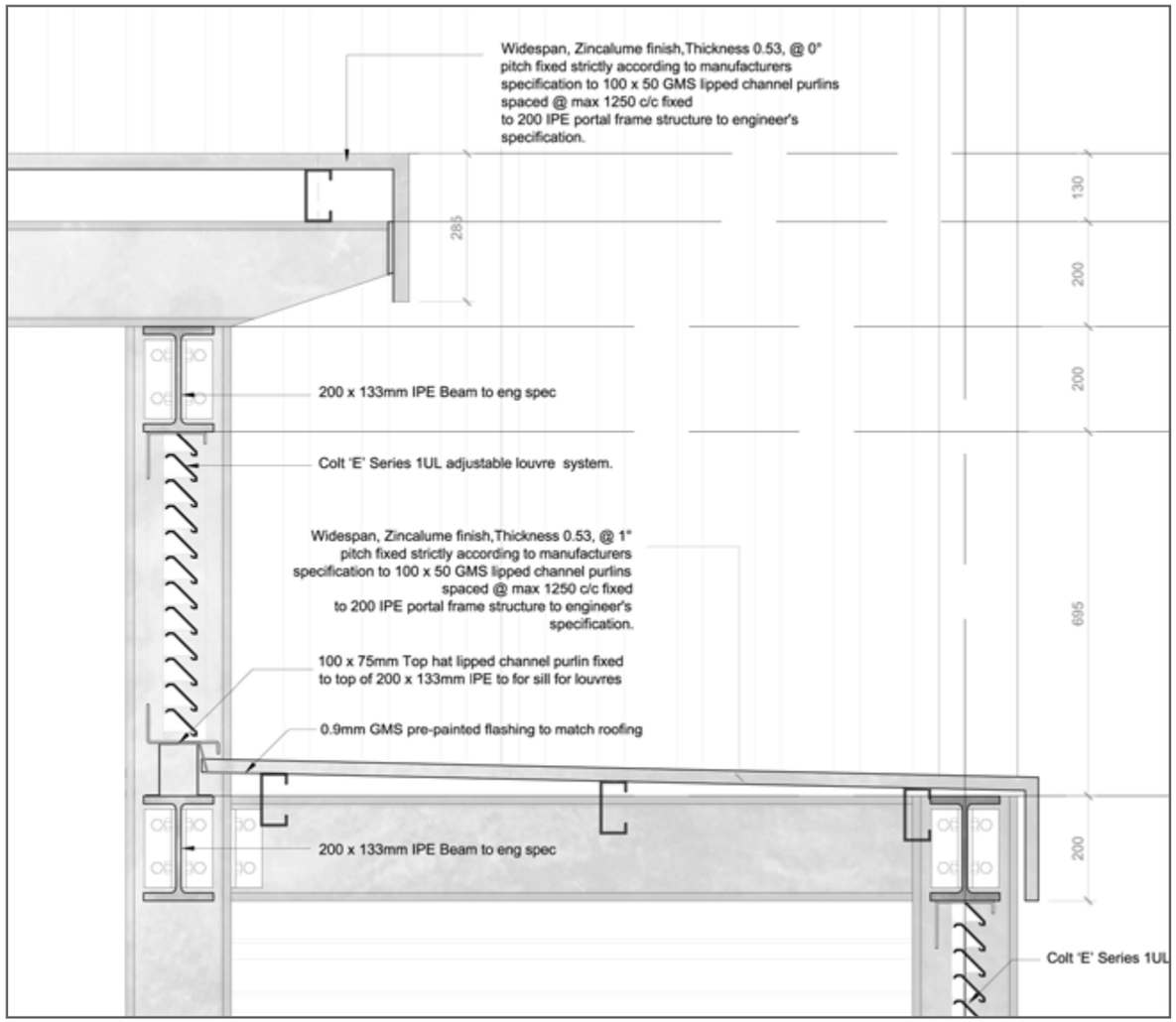


Figure 88: Roof connection detail (Author: 2012)

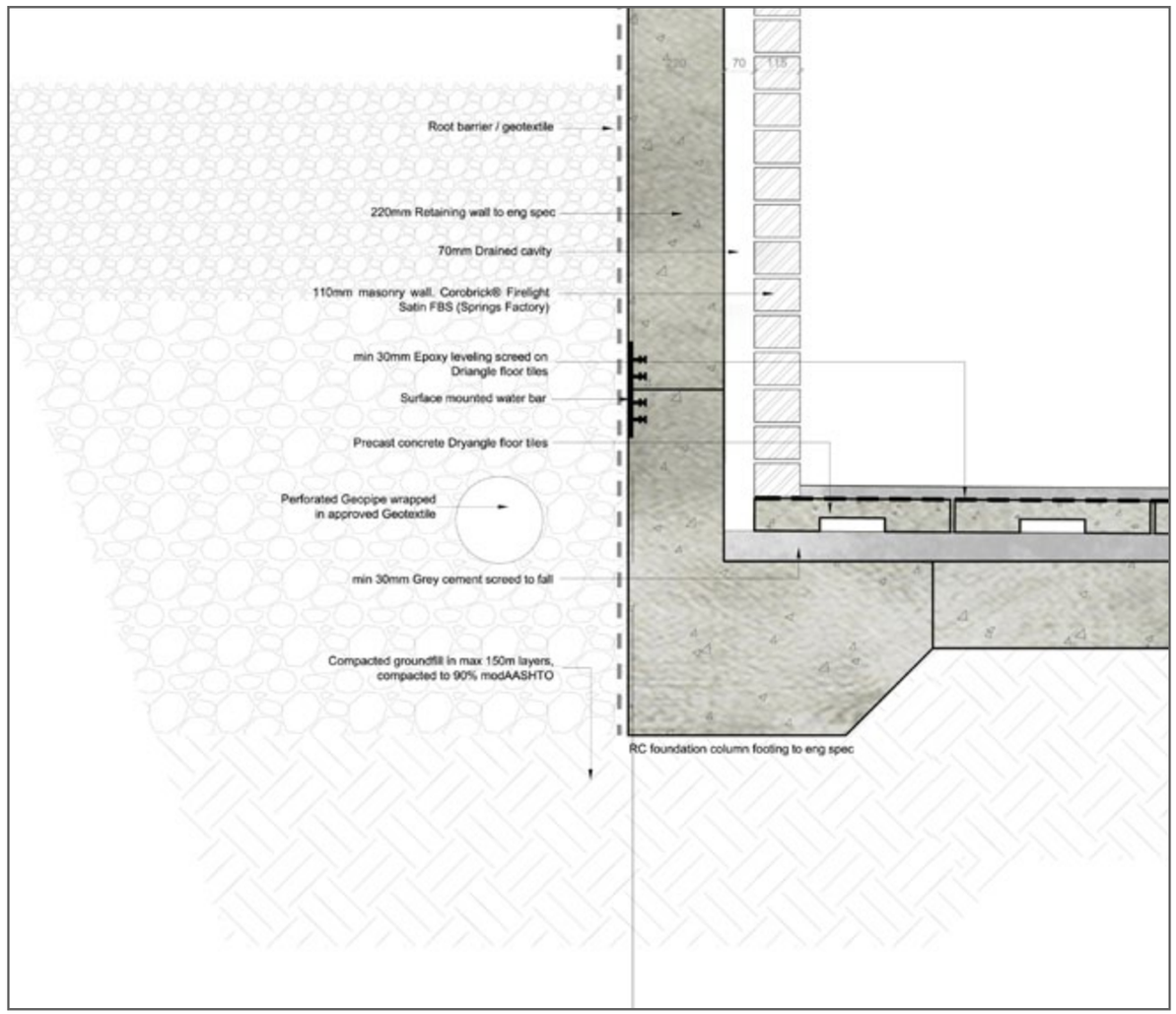


Figure 89: Basement floor detail (Author: 2012)

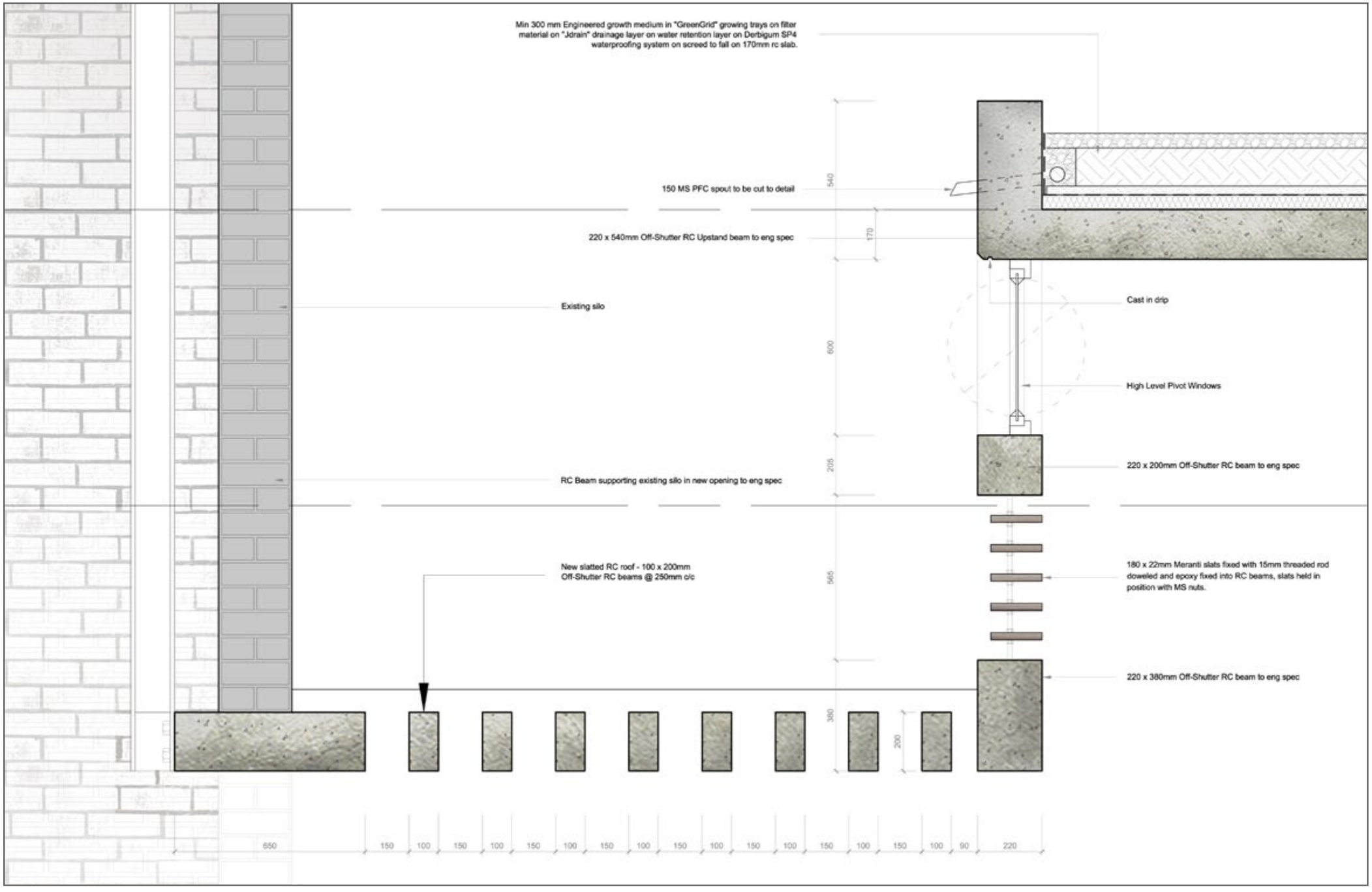


Figure 90: Mediating connection detail between existing & new (Author: 2012)

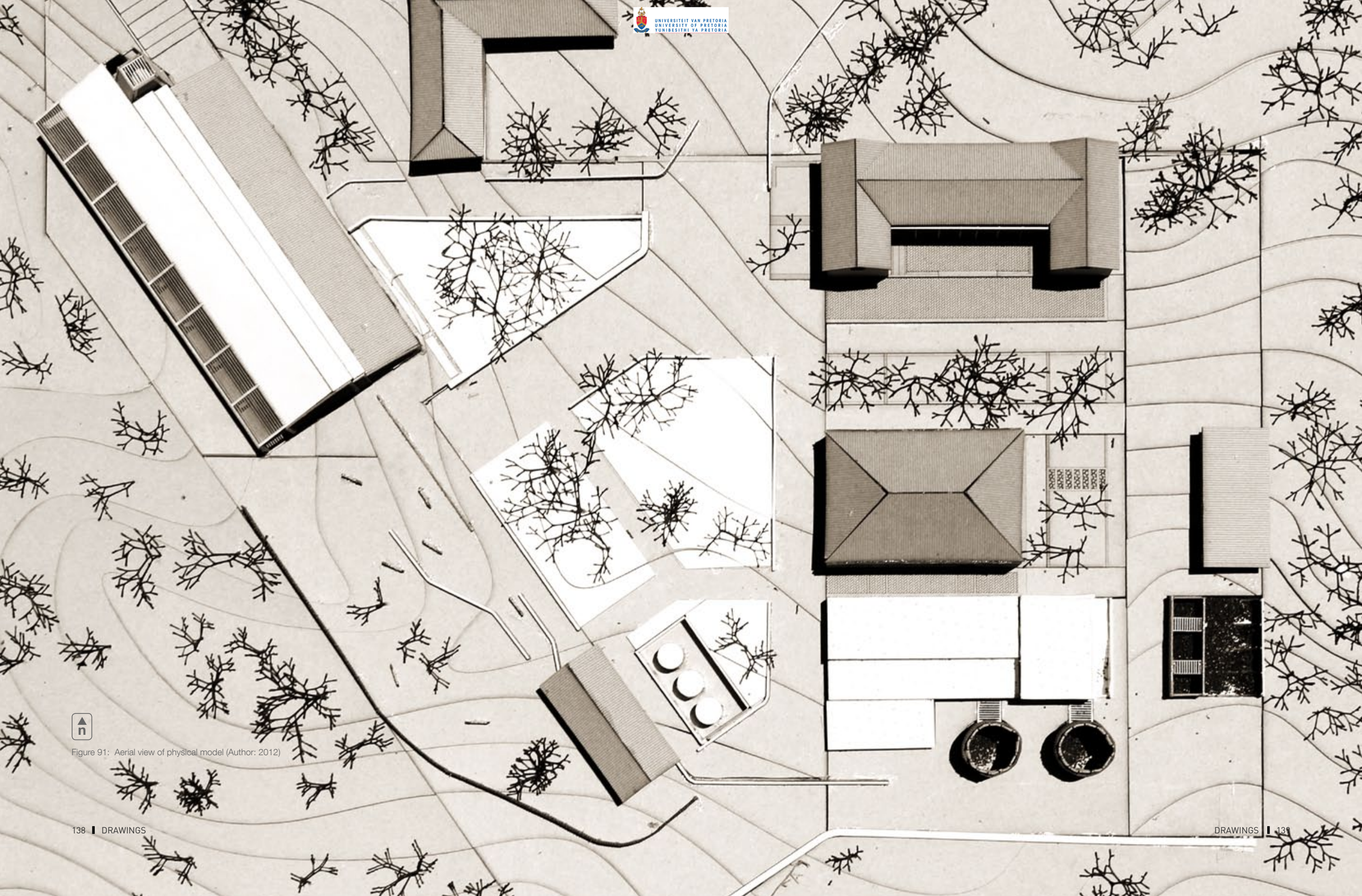


Figure 91: Aerial view of physical model (Author: 2012)

Figure 92: Physical model (Author: 2012)

Figure 93: Physical model of restaurant, cheese tasting & milk processing (Author: 2012)

Figure 94: Physical model of restaurant (Author: 2012)

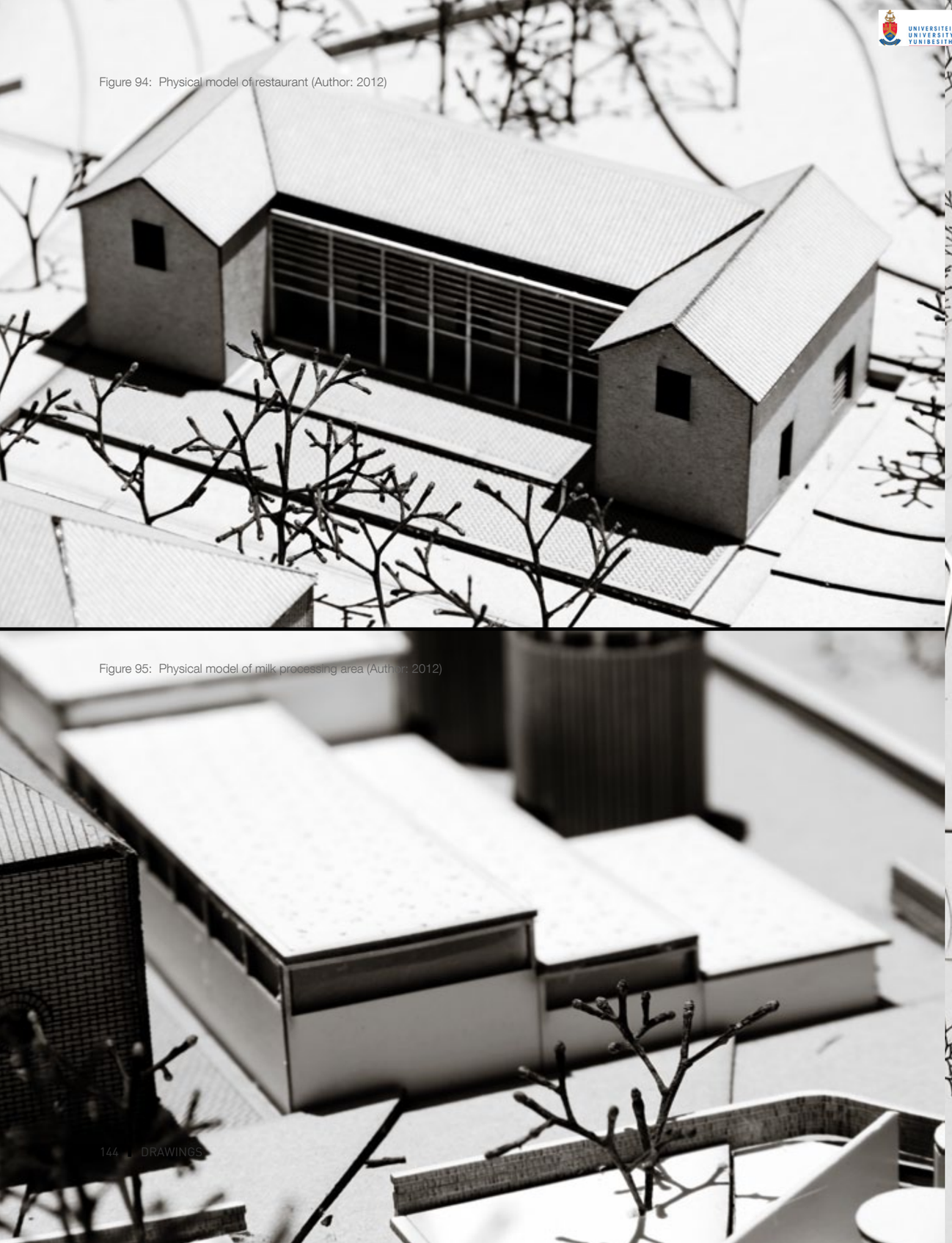


Figure 95: Physical model of milk processing area (Author: 2012)

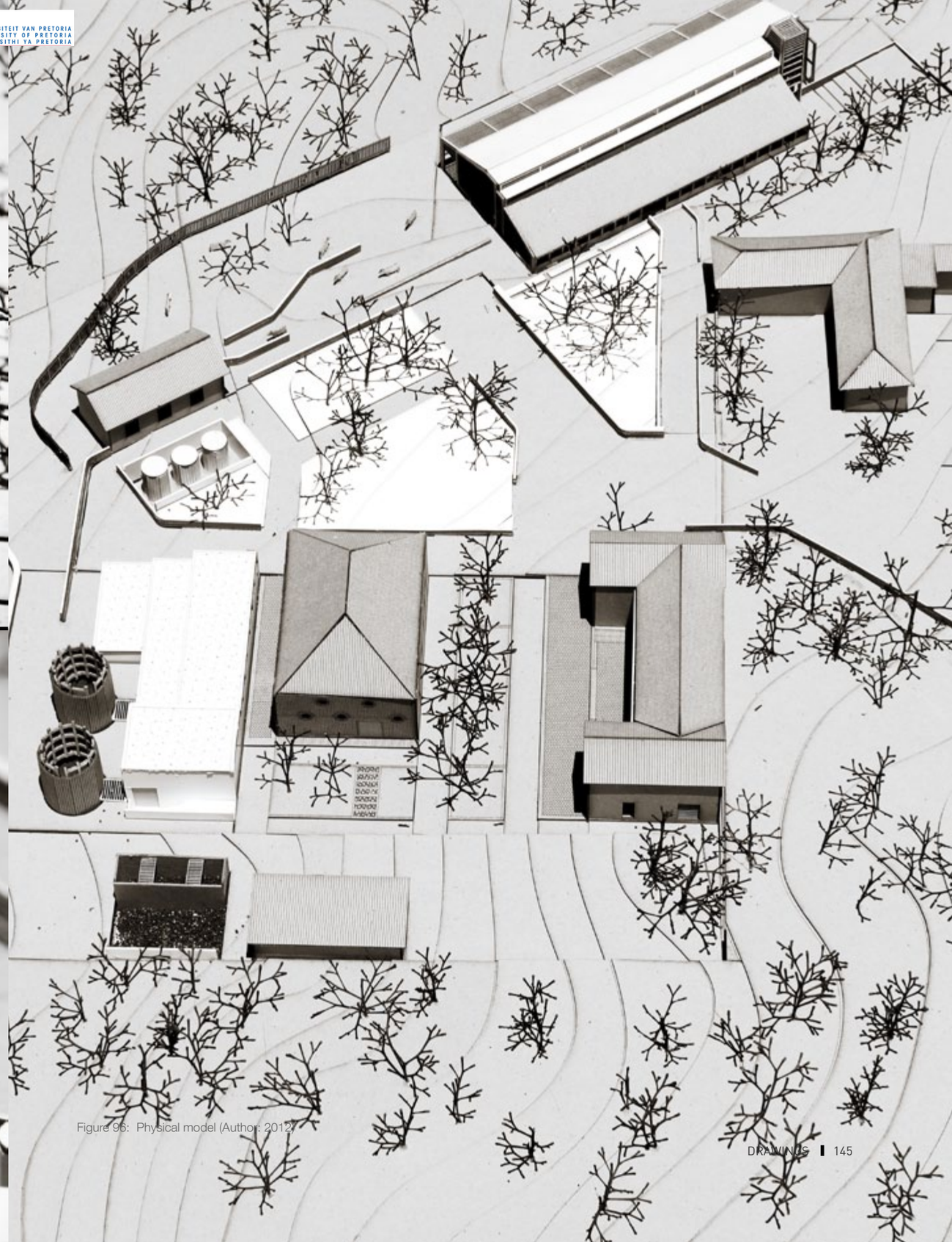


Figure 96: Physical model (Author: 2012)

Figure 97: Physical model (Author: 2012)

list of references

ALLEN, S. 2007. *Pamphlet Architecture 28: Augmented Landscapes.* New York: Princeton Architectural Press.

BAKKER, KA. 2011. *Heritage as transmission: Towards achieving a more dominant narrative of Inclusion.* Paper delivered at UMass Amherst Centre for heritage & Society. May 4-7, 2011, UMass Amherst.

BETSKY, A. 2006. *Landscrapers: Building with the land.* London: Thames & Hudson

COENEN, J. 2006. *The Art of Blending.* Delft: VSSD.

CORNER, J. (ed) 1999. *Recovering Landscape: Essays in Contemporary Landscape Architecture.* New York: Princeton Architectural Press.

EL-KHOURY, R. ROBBINS, E. (ed) 2004. *Shaping the City: Studies in History, Theory and Urban Design.* London: Routledge.

GAUSA, M. 2003. *The Metapolis Dictionary of Advanced Architecture.* Barcelona: Actar.

GERTENBACH, W. 2009. *Dairy Farming in South Africa - Where to now?* http://typo3.fao.org/Dairy. (June 2012)

HARRIES, K. 1982. *"Building and the Terror of Time." Perspecta No.19.* Cambridge: MIT Press.

HAUPTMANN, D. (ed) 2006. *The Body in Architecture.* Rotterdam: 010.

HAYS, MK. (ed) 2000. *Architecture Theory since 1968.* London: MIT Press.

HOLL, S. PALLASMAA, J. PEREZ-GOMEZ, A. 2006. *Questions of Perception: Phenomenology of Architecture.* San Francisco: William Stout.

HOLTORF, C. 2009. *Contemporary Archaeologies.* Oxford: Peter Lang.

ICOMOS, 1999. *The Burra Charter. The Australian ICOMOS Charter for places of cultural significance.* ICOMOS. Australia

JENCKS, C. (ed) 2006. *Theories and Manifestoes of Contemporary Architecture.* London: Academy Press.

JOUBERT, O (ed) 2009. *10 Years + 100 Buildings, Architecture in a Democratic South Africa.* Cape Town: Bell-Roberts.

KOERKAMP, P. 2009. *Cow Power.* http://krachtvankoeien.wur.nl (May 2012)

KUIPERS, M. 2010. *The Architectural Memory.* Delft: VSSD.

KUTZ, M. (ed) 2007. *Handbook of Farm, Dairy and Food Machinery.* New York: William Andrew

LEATHERBARROW, D. 2000. *Uncommon Ground. Architecture, technology, and topography.* London: MIT Press.

LECUYER, A. 2001. *Radical Tectonics.* London: Thames & Hudson.

MASSEY, D. 2005. *For Space.* London: Sage Publications.

MEIRING, H. 1980. *Pretoria 125.* Cape Town: Human & Rousseau.

MENDELSOHN, R. 1991. *Sammy Marks: The Uncrowned King of the Transvaal.* Ohio: Ohio University Press

MENDELSON, A. 2011. *In Bacteria Land: The Battle over Raw Milk. The Journal of Food & Culture. Vol. 11, No. 1 (Spring 2011).* California Press.

MORRIS, R. 1978. *"The Present Tense of Space." Art in America, Jan/Feb.* New York: Brant

MOSTAFAVI, M & LEATHERBARROW, D. 1993. *On Weathering: The Life of Buildings in Time.* London: MIT Press.

MULLER, L. 2012. *South African Landscape Architecture: A Reader.* Cape Town: Unisa Press.

PADAN, Y. 2000. *"Reconstructing Recollection: Making Space for Memory." Architectural Design Oct. 76-81.* London: Wiley & Sons.

PALLASMAA, J. 2000. *“Hapticity and Time: notes on fragile architecture.” Architectural Review 207, no. 1239.*

PALLASMAA, J. 2005. *The Eyes of the Skin – Architecture and the Senses.* London: Wiley & Sons.

PALLASMAA, J. 1998. *“The Space of Time.”* OZ Vol. 20.

PALLASMAA, J. 2009. *The Thinking Hand. Existential & Embodied Wisdom in Architecture.* Chichester: Wiley & Sons.

PIRTLE, T. 1926. *History of the Dairy Industry.* Chicago: Mojonnier Bros.

PORTER, T. 2004. *Archispeak.* London: Spon Press.

PRIME, R. 2009. *Cows & the Earth: A story of kinder dairy farming.* London: Fitzrovia Press.

RASMUSSEN, SE. 1959. *Experiencing Architecture.* New York: Wiley & Sons

ROWE, PG. 1987. *Design Thinking.* London: MIT Press.

SMITH, E. 2000. *Techno Architecture.* London: Thames & Hudson.

TILL, J. 2009. *Architecture Depends.* Cambridge: MIT Press

TILL, J. 1996. *“Architecture in Space, Time.” Architectural Design Nov./Dec. 9-13.* London: Wiley & Sons.

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