

# Rompslomp en Soutstories

## *Helter-Skelter and Salty Yarns*

Creating place for meaning in a forgotten bay

### **Soutstories:**

Its literal meaning is “Stories about salt”, but it can also indicate that these are stories with flavour, in other words unusual or interesting stories.

### **Rompslomp:**

Synonyms are: fuss, bother, ado and red tape. It is derived from the two words “romp”, which is an Afrikaans word that means “hull” (of a boat) and “slomp”, which is a Dutch word that means “cargo”.

*The financial assistance of the National Research Foundation (NRF) towards this research is hereby acknowledged. Opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.*

Beatrix Kellerman

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.



DISSERTATION NAME: Rompslomp en Soutstories (*Helter-Skelter and Salty Yarns*)  
– Creating place for meaning in a forgotten bay

STUDENT'S NAME: Beatrix Kellerman

SUPERVISOR NAMES: Professor Jo Noero (First Semester)  
Associate Professor Nic Coetzer  
Rob de Jager  
Francis Carter (Second Semester)

This dissertation is presented as part fulfilment of the degree of Master of Architecture (Professional) in the School of Architecture, Planning and Geomatics, University of Cape Town  
Date: 15 November 2013

“I hereby:

- a. grant the University free license to reproduce the above dissertation in whole or in part, for the purpose of research.
- b. Declare that:
  - (i) The above dissertation is my own unaided work, both in conception and execution, and that apart from the normal guidance of my supervisors, I have received no assistance.
  - (ii) Except as stated below, neither the substance or any part of the dissertation has been submitted for a degree in the University or any other university.
  - (iii) I am now presenting the dissertation for examination for the degree of Master of Architecture (Professional)”

Plagiarism Declaration:

1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the Harvard convention for citation and referencing. Each contribution to, and quotation in, this report from the work(s) of other people has been attributed, and has been cited and referenced.
3. This report is my own work.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Signature \_\_\_\_\_



## Abstract

This dissertation examines the creation of public place that is rich in experience. The design project is located at the Small Fishing Harbour of Saldanha Bay.

The research was based primarily on the following: Topics around place character and meaning were investigated and the use of poetry as a phenomenological method to illuminate the character of place was researched. The significance of recovered landscapes and peripheral sites was also investigated. The possibility of uncovering different spatial identities of site by investigating space at different scales was researched. New technologies that are suitable for application in the specific context such as fog catchers and Integrated Multi-trophic Aquaculture (IMTA) practices were also investigated.

Through theoretical research the conclusion was reached that it is important to create place in such a way that it is rich in experience and has unique character. Places that are rich in experience have the potential to carry meaning in the minds of their users. Place needs both character and meaning for people to be able to identify with it and have a sense of belonging.

Urban analysis showed that the Small Fishing Harbour is a peripheral site which is very important in terms of its physical location in the town of Saldanha Bay. It provides access to the water's edge to a segregated community. It was concluded that re (claiming) the Small Fishing Harbour as public place, through remediation of the site and an improved urban link to the town centre, is necessary for it to become a sustainable public place.

It was illustrated that understanding existing context in terms of history and different spatial identities is important. Site specifics inform how existing experiences can be celebrated and/or reinforced in the design project.



Figure 1: Retaining wall and old fish canning factories at Hoedjies Point at the Small Fishing Harbour of Saldanha Bay. (Author, 2013)

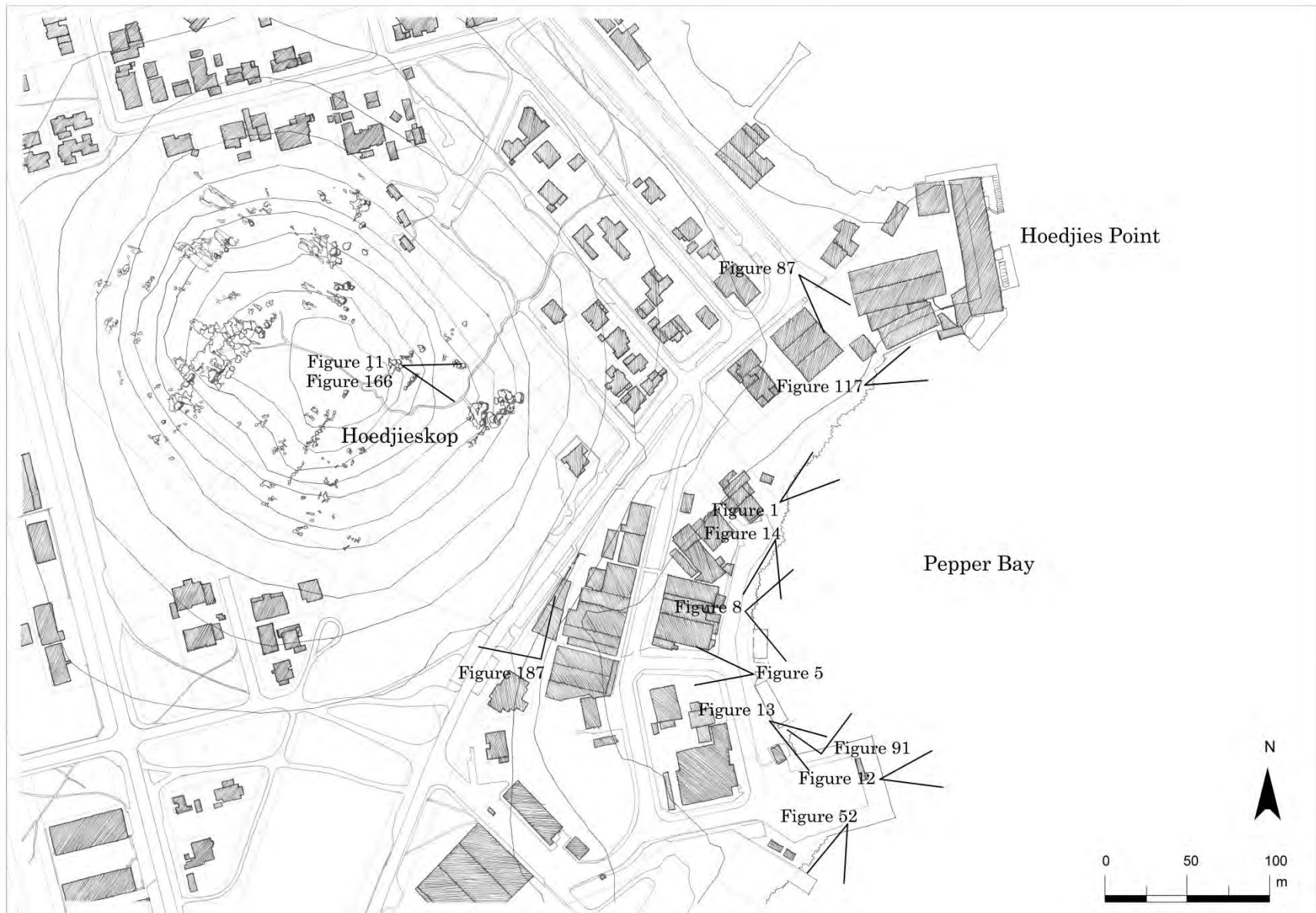


Figure 2: Locations of some of the photographs in the text below. (Author, 2013)

# Table of Contents

Abstract.....	5	Development of Rib Structure.....	79
Table of Contents.....	7	Construction at the Water's Edge.....	80
Table of Figures.....	8	Conclusion.....	81
Preface.....	12	Glossary.....	82
Prelude.....	13	References.....	83
Introduction.....	15	Bibliography.....	83
Proposed Context – The Small Fishing Harbour of Saldanha Bay.....	15	Webography.....	83
Problem Statement and Research Question.....	16	Image Sources.....	84
Dissertation Visions.....	16	Appendix.....	86
Theoretical Discourse – Human Experience.....	17	Dream of the West Coast.....	86
Place, Poetry and Phenomenology.....	17	First Conceptual Investigative Works.....	86
Meaning and Belonging.....	19	Task 1: Articulate the notions of containment and release as found in your artifact.....	87
Theoretical Discourse – Site.....	21	Task 2: Represent and record your artifact as palimpsest.....	88
Recovered Landscapes.....	21	<i>Forced Removals</i> .....	88
Spatial Identity & Questions of Scale.....	22	<i>Whaling</i> .....	88
Site - Urban Analysis.....	24	Task 3: Devise a system of tunneling and excavating appropriate to your artifact.....	89
Investigations of Scale.....	24	Task 4: Photograph your artifact in black and white.....	90
Recovered Landscape.....	28	Ecology of Saldanha Bay Region.....	91
Existing Activities.....	30	Oceans, Currents and Tides.....	91
History.....	32	<i>Ocean and Currents</i> .....	91
Forced Removals.....	32	<i>Tides</i> .....	91
Whaling.....	33	Climate.....	92
Technical Investigations.....	35	Water Quality in the Bay.....	97
Fog Catchers.....	36	SDF 2011: Proposed Waterfront Development.....	99
Marine Aquaculture.....	36	Performative Landscapes.....	101
Design Development.....	37	Fog Catchers.....	101
Sketch Design.....	37	Marine Aquaculture.....	103
The Existing.....	37	<i>Ecological point of view</i> .....	103
Three Experience Tests.....	42	<i>Economic point of view</i> .....	103
<i>Fog at the Old Quay</i> .....	42	<i>Aquaculture farming on the West Coast</i> .....	103
<i>Tidal Pools</i> .....	43	Construction at the Water's Edge.....	111
<i>Stand on Rocks</i> .....	44	Constructed Edges.....	111
Experiential Space.....	46	<i>Closed Solid Fill Type Construction</i> .....	112
Linking Hoedjieskop.....	47	<i>Open Pile- or Column Supported Construction</i> .....	114
Identification of the Maritime Heritage Node.....	49	Floating Structures.....	119
Urban Framework and Programme.....	54	<i>Floating Rafts for the Cultivation of Oysters</i> .....	120
Maritime Heritage Node.....	59	Media Articles.....	122
The Theatre in the Factory.....	61	Media Article 1.....	122
Integrated Multi-Trophic Aquaculture (IMTA).....	62	<i>Extracts from: Die Weskus groet drie legendes</i> .....	122
Telling Histories.....	63	Media Article 2.....	122
Small Retail Component.....	66	<i>Toerisme in Saldanha Gaan Eersdaags Bot</i> .....	122
Wit Welkom Sê.....	67	Media Article 3.....	123
Stepping Back.....	68	<i>Active Community Theatre and Art – in Saldanha Bay</i> .....	123
Old Quay Node.....	70	Media Article 4.....	123
<i>Telling Histories</i> .....	70	<i>"Sout Stories" Take People back to Their Cultural Roots</i> .....	123
<i>Markets and Harvest Festival</i> .....	73	Acknowledgements.....	124
Practical Considerations.....	74		
Technical Development - A Tectonic Experience.....	75		
Development of Experience Points.....	75		
<i>Stand on Rocks</i> .....	75		
<i>White Dream</i> .....	76		
<i>Working with the Existing</i> .....	77		

## Table of Figures

Figure 1: Retaining wall and old fish canning factories at Hoedjies Point at the Small Fishing Harbour of Saldanha Bay. (Author, 2013) .....	5	Figure 33: One owner of a private property on Main Road (with a restaurant and living units) allows access to the water's edge to the general public (not only patrons of the restaurant) through his parking area. (Author, 2013) .....	27
Figure 2: Locations of some of the photographs in the text below. (Author, 2013).....	6	Figure 34: Local residents use this access (refer to image above) to get to a fishing spot. (Author, 2013).....	27
Figure 3: Views into town on Camp Road (Author, 2013).....	12	Figure 35: 1:2000 model of the Small Fishing Harbour precinct with Hoedjieskop in the background (Author, 2013).....	27
Figure 4: View driving on Camp Road (Author, 2013) .....	12	Figure 36: Plan indicating restricted access to water's edge today. (Author, 2013) .....	28
Figure 5: Industrial buildings at the Small Fishing Harbour of Saldanha .....	12	Figure 37: Different sides of Main Road (Author, 2013).....	28
Figure 6: Granite boulders create an edge at the water (Author, 2013) .....	12	Figure 38: Tarmac dominates as ground plane material. (Author, 2013).....	28
Figure 7: Google Earth maps showing the location of Saldanha Bay Top: Location of Saldanha Bay on the West Coast; Middle: Location of the town of Saldanha Bay in relation to Langebaan and Langebaan Lagoon; Bottom: Location of Small Fishing Harbour in relation to Hoedjieskop. (Original Images Top to bottom: Google Earth, 2007a; Google Earth, 2007b; Google Earth, 2013b).....	13	Figure 39: From left to right: 1968, 1993 and 2011 aerial maps of Saldanha Bay showing changes in movement routes over time. (Author, 2013) .....	29
Figure 8: Photomontage of view of the bay of Saldanha from the Small Fishing Harbour. (Author, 2013).....	14	Figure 40: Movement of people from White City to central business district and Small Fishing Harbour (Author, 2013) .....	29
Figure 9: Google maps showing the location of the Small Fishing Harbour in Saldanha Bay. (Original Images: Left: Google Earth, 2013b; Right: Google Earth, 2013a) .....	15	Figure 41: Locations of existing activities .....	30
Figure 10: "A Fisherman's Friend" – fishing at the Small Fishing Harbour. (Author, 2013) .....	16	Figure 42: Existing activities .....	31
Figure 11: View of the Small Fishing Harbour from Hoedjieskop. The Yacht Basin and Saldanha Harbour is visible on the right. (Author, 2013) .....	16	Figure 43: Land Ownership (Author, 2013) .....	31
Figure 12: <i>Droom van die Weskus</i> by M.M. Walters (Poem: Botha & Walters, 1976; Image: Author, 2013).....	18	Figure 44: Land Use (Author, 2013) .....	31
Figure 13: Simple Pleasures: Warm concrete surfaces to take a nap on (Author, 2013) 19		Figure 45: One of the first houses of Kliprug. According to the view of Hoedjieskop on the left in the photograph it was taken in either White City or Diazville. (Botha & Walters, 1976, 12).....	32
Figure 14: Different times of day and different types of weather all create different conditions of light and therefore results in different characters of place. This was evident when perceptions of the character of the hard materials on site changed throughout the day. (Norberg-Schulz, 1980: 14); .....	20	Figure 46: Scars in the Landscape (Author, 2013; Original images (left to right): Chief Directorate Surveys & Mapping, 1968; Chief Directorate Surveys & Mapping, 1993; Saldanha Bay Municipality, 2011) .....	33
Figure 15: View of horizon from pool complex. (Rusli, 2010).....	21	Figure 47: Location of Donkergat and Salamander Bay (Author, 2013; Original Image: Google, 2007b).....	33
Figure 16: Looking back towards the street (Patt, Trevor. 2011) .....	21	Figure 48: Conceptual Investigative work: Whale skeleton model. (Author, 2013).....	34
Figure 17: Copper roofs (WikiArquitectura, 2010).....	21	Figure 49: Operations at Donkergat (Author, 2013; Original image sources all Athiros et al., 2008: 130-134) .....	34
Figure 18: The Leça de Palmeira swimming pool complex is located along a busy road. (Guerra, 2013) .....	22	Figure 50: Tidal Patterns for March 2013 (Author, 2013; Data source: SANHO, 2013) .	35
Figure 19: The buildings to the back of Siza's swimming pools are big in scale. (Guerra, 2013) .....	22	Figure 51: Climate of Saldanha Bay (Author, 2013).....	35
Figure 20: Google Earth Image of the location of the swimming pools. (Google Earth, 2013a) .....	22	Figure 52: Ruin of jetty on the southern side of the Small Fishing Harbour precinct with fog moving in. (The buildings of Southern Sea Fishing as well as the yacht basin are visible.) (Author, 2013) .....	36
Figure 21: The location of the site in proximity to the international Port of Leixões. (Google Earth, 2013b).....	22	Figure 53: Fog catchers (Quezada et al., 2013).....	36
Figure 22: Plan (Santos, F. 2012) .....	23	Figure 54: Mussel Rafts next to the Marcus Causeway in Saldanha Bay.....	36
Figure 23: Topographical survey, 1966 (Ganshirt, 2004: 26 cited in McAviney, 2013: 44) .....	23	Figure 55: Material variations of man-made edges at the fishing harbour of Saldanha Bay (Top: timber jetty on concrete piles, middle: stabilized edge of granite boulders, bottom: concrete wharf on concrete piles) (Author, 2013) .....	37
Figure 24: The adult pool (WikiArquitectura. 2010).....	23	Figure 56: Location of the sections of existing site ( <b>Figure 57 to Figure 59</b> ).....	37
Figure 25: Blurring of limits (WikiArquitectura. 2010) .....	23	Figure 57: Sections through existing site at the northern side of the precinct. (Top: Section EE, Bottom: Section DD) (Author, 2013).....	38
Figure 26: Private properties on Main Road (Author, 2013) .....	24	Figure 58: Sections through existing site at the old quay. (Top: Section AA through old quay, Middle: Section BB, Bottom: Section CC) (Author, 2013) .....	39
Figure 27: Private property on Main Road (Author, 2013) .....	24	Figure 59: Section FF through the existing site from Main Road to the water's edge. (Author, 2013).....	40
Figure 28: The Hoedjies Bay Hotel on Main Road is the first property to the south that blocks continuous waterfront access at Main Road (Author, 2013).....	24	Figure 60: Variations in the heights of structures across a plane (Author, 2013) .....	42
Figure 29: The small public beach on Main Road (historically designated as a separate apartheid beach) (Hoedjieskop is visible in the background) (Author, 2013).....	24	Figure 61: The appearance of level changes in fog (Author, 2013) .....	42
Figure 30: Map showing current limited access to water's edge from the Main Road networks (Author, 2013) .....	25	Figure 62: Light slits in a wall. The tectonics was also inspired by Carlo Scarpa's Brion Cemetery. (Author, 2013) .....	42
Figure 31: Zoning of Saldanha Bay (Author, 2013).....	26	Figure 63: Tidal pools and tidal steps (Author, 2013).....	43
Figure 32: Possible link of the Small Fishing Harbour Precinct to the future waterfront development proposed in the 2011 municipal SDF plans. (Author, 2013).....	27	Figure 64: Tidal pool model (Author, 2013) .....	43
		Figure 65: Tidal pool model (Author, 2013) .....	43
		Figure 66: Concept sketches (Author, 2013).....	43
		Figure 67: Location of the tidal pools (Author, 2013) .....	43

Figure 68: Uniquely shaped rocks on the northern side of the precinct. (Author, 2013) .	44	Figure 110: Eroded surface of concrete block boundary wall oyster production company (Author, 2013).....	59
Figure 69: Revealing of views from platform (Author, 2013).....	44	Figure 111: The Maritime Heritage Node was first tested at a larger scale. (Author, 2013).....	60
Figure 70: Dark lines are created on the old retaining wall and other surfaces where the tides move up and down. (Author, 2013).....	45	Figure 112: Conceptual section through theater. (Author, 2013).....	61
Figure 71: Configuration of facade (Stieber, 2011).....	45	Figure 113: Conceptual model: View of theatre from the side when inside the building. (Author, 2013).....	61
Figure 72: Views (WikiArquitectura, 2010).....	45	Figure 114: (Author, 2013).....	61
Figure 73: Shadow and light at changing cubicles (WikiArquitectura, 2010).....	45	Figure 115: Structure within structure. Highest end of theatre is deliberately stepped back from structural frame to reveal that it is a new structure within an existing one. (Author, 2013).....	61
Figure 74: Shadow and light (WikiArquitectura, 2010).....	45	Figure 116: Bernard Tschumi, Limoges Concert Hall (Bernard Tschumi Architects, 2013).....	61
Figure 75: Conceptual Model and Sketch (Author, 2013).....	46	Figure 117: Aquaculture operations have an important experiential value. It is intriguing to see the off-shore structures and how these organisms are grown. Left: Mussels on a rope (Guerrero & Gremades, 2012: 12) ; Middle: harvesting seaweed from an IMTA system the Bay of Fundy, Canada; (Guerrero & Gremades, 2012: 12) Right: Fish cages in as part of an IMTA system in Coruna, Galicia, Spain (Guerrero & Gremades, 2012: 38).....	62
Figure 76: New nodes and connections for Hoedjieskop (Author, 2013).....	47	Figure 118: 1:500 Model used to test urban design options. (Author, 2013).....	63
Figure 77: Link diagram (Author, 2013).....	47	Figure 119: The rib structure of the production area is explored again. (Author, 2013)..	63
Figure 78: Graves (Author, 2013).....	47	Figure 120: Links from the site to the off shore IMTA aquaculture component were tested here. (Author, 2013).....	64
Figure 79: <i>Rondawels</i> in background (Author, 2013).....	47	Figure 121: 1:200 test model. (Author, 2013).....	64
Figure 80: Museum with unused building in foreground. (Author, 2013).....	47	Figure 122: In his design exercise the site was designed in more detail. Note that this is not the final scheme. (Author, 2013).....	65
Figure 81: Sections AA (top) and BB (bottom) through the hill showing the design concept. (Not to scale) (Author, 2013).....	48	Figure 123: 3D study of the shops that are located behind the production area. (Author, 2013).....	66
Figure 82: Model of proposed nodes and connections on Hoedjieskop (Author, 2013) .	48	Figure 124: Elevation study of shops. A skylight allows light to enter the offices of the production area below. ....	66
Figure 83: The three factories that would house the new public component. (Author, 2013).....	49	Figure 125: Chimney of houses at Stofbergfontein in Langebaan (Botha & Walters, 1976: 52).....	67
Figure 84: Tectonics of the old factories (Author, 2013).....	49	Figure 126: A chimney of one of the first houses of Seeberg, Saldanha Bay ( Botha & Walters, 1976: 9).....	67
Figure 85: Old factories of the original Saldanha Bay Company (Author, 2013).....	49	Figure 127: Baking ovens on the outside of houses, location unknown (Botha & Walters, 1976: 12).....	67
Figure 86: Looking back towards Main Road (Author, 2013).....	49	Figure 128: A broken up façade for the restaurant (back) was tested in the beginning (Author, 2013).....	68
Figure 87: Entrance to the factory site from Main Road (Author, 2013).....	49	Figure 129: Restaurant Elevation: Test of a restaurant of which the chimney carries significance. (Author, 2013).....	68
Figure 88: Sketch Design: Proposed nodes and connections (Author, 2013).....	50	Figure 130: Test of pedestrian movement from theatre towards restaurant. The restaurant is stepped down on the one side so that it does not overpower the site. (Author, 2013).....	68
Figure 89: The 'Green Fingers' of Kalk Bay and St' James resonates with the idea of improving the linear access to the water's edge. (Photographs: Author, 2013, Drawing: City of Cape Town, 2007).....	51	Figure 131: (Author, 2013).....	68
Figure 90: Square modular broken up facades of the smaller factory buildings (Author, 2013).....	51	Figure 132: Existing edge conditions (Author, 2013).....	69
Figure 91: Existing built fabric (Author, 2013).....	51	Figure 133: Aerial photograph that shows the landfill areas (Original image: Saldanha Bay Municipality, 2011).....	69
Figure 92: Languages of built fabric (Author, 2013).....	51	Figure 134: A small strip of natural coastline at the Small Fishing Harbour (Author, 2013).....	69
Figure 93: Elevation with broken planes. The language of the existing smaller factory buildings inspired the development of the restaurant. (Author, 2013).....	52	Figure 135: Note that most of the vegetation on is on landfill and the area appears very dry in summer. (Author, 2013).....	69
Figure 94: Design development of restaurant inspired by the en lodge exercise (refer back) and the rib structure of whales. (Author, 2013).....	52	Figure 136: 'Stand on Rocks' experience point (Author, 2013).....	69
Figure 95: Ground and First Floor Plan of proposed restaurant. (Author, 2013).....	52	Figure 137: Rocks that will be included in the swimming pool. (Author, 2013).....	69
Figure 96: Site diagram of new "heritage node" (Author, 2013).....	52	Figure 138: Design Development: Started reinforcing urban links through experiences (and program). The idea of a park that links hill to site emerged. (Author, 2013).....	70
Figure 97: Movement, Experiences and Views at the proposed restaurant (Author, 2013).....	53	Figure 139: Left, Middle and Right: Conceptual model that shows new linear link from Hoedjieskop through new park to water's edge. (Author, 2013).....	70
Figure 98: Model of the proposed restaurant (1:200) (Author, 2013).....	53		
Figure 99: Urban Framework: a) Reconnecting b) Two Nodes: Maritime Heritage & Old Quay c) Parking Strategy (Author, 2013).....	54		
Figure 100: Urban Framework: Experiences and Attractions (Author, 2013).....	55		
Figure 101: First larger urban scale test: The first design exercise explored the concept of one waterfront with a simplified coastline (not to scale). Its concept was derived from a study of the contour lines of the precinct. (Author, 2013).....	56		
Figure 102: Contour model of site (Author, 2013).....	57		
Figure 103: Conceptual diagram of contour line at water's edge. (Author, 2013).....	57		
Figure 104: Old Quay node and Maritime Heritage node as developed for 2 <sup>nd</sup> test (Author, 2013).....	57		
Figure 105: Conceptual urban framework as developed for 2 <sup>nd</sup> test (Author, 2013).....	57		
Figure 106: Second larger urban scale test: In this scheme, different experiences along the water's edge were identified (not to scale). This was a development of the earlier ideas around experience points ( <i>Three Experience Tests</i> ). (Author, 2013).....	58		
Figure 107: Movement diagram for Maritime Heritage Node. (Author, 2013).....	59		
Figure 108: Dilapidated timber jetty (Author, 2013).....	59		
Figure 109: Battery Park, City Cove, New York, 1984-1987, Mary Miss (Paesaggiocritico), 2013).....	59		

Figure 140: Design Development: The park link was developed in more detail. (Author, 2013) .....	71	Figure 177: Photomontage of concept for creating the model by Author, 2013 (Original Images: Aerial view of Hoedjieskop (Google); 1795 map that shows the original coastline before the Marcus Island Causeway and Iron Ore Port was constructed (Burman & Levin, 1974: 88); Whale skeleton (Wikipedia, 2013c)) .....	89
Figure 141: Section FF showing a design for a water carriage that takes the water collected from the hill down to the park. (not to scale) (Author, 2013) .....	72	Figure 178: Start of the short film (Author, 2013) .....	89
Figure 142: Development of the above mentioned water carriage (not to scale) (Author, 2013) .....	72	Figure 179: The original artifact (left) and the selected Google image (right). (Left: Author, 2013; Right: Nudo, 2013).....	90
Figure 143: Plan of old quay. (not to scale) (Author, 2013) .....	73	Figure 180: An analysis of graphic similarities and differences between the two images. (Author, 2013).....	90
Figure 144: Weslander of 16 September 1988 front page (Terreblanche, 2012) .....	73	Figure 181: Oceanic and coastal context of southern Africa (Glavovic, 2000: 33) .....	91
Figure 145 (Middle and bottom): Covered structures in Paternoster create a place for informal fish and for other types of markets. (Paternoster Tourism, 2013).....	73	Figure 182: Oceans and currents (Glavovic, 2000: 41).....	91
Figure 146: Section GG through quay showing a fixed structure on the right (to provide permanent shelter for formal and informal markets). (not to scale) (Author, 2013) .....	73	Figure 183: Average Monthly Rainfall (Transnet Limited, 2007) .....	91
Figure 147: Water spouts that create a surface for play. (Verbakel, 2011) .....	74	Figure 184: Rainfall along the coast (Glavovic, 2000: 39).....	91
Figure 148: The structure for access to the underground was configured in such a way that it doubles as a skateboard ramp. (West 8, 2013) .....	74	Figure 185: The area is quite dry especially in summer. Here one can compare the vegetation on the koppie at the end of summer with spring. The photograph on the left was taken in February and the one to the right in October. (Author, 2013) .....	92
Figure 149: Lightweight steel and timber surface. (West 8, 2013).....	74	Figure 186: Average air temperature Saldanha (HolidayCheck, 2013) .....	93
Figure 150: A dynamic multi-layered surface has been created that can stage various events in the city. (West 8, 2013).....	74	Figure 187: Average water temperature Saldanha (HolidayCheck, 2013).....	93
Figure 151: Development of point of rock outcropping. (Author, 2013) .....	75	Figure 188: Analysis of Sun path at Summer Solstice at northern side of precinct (Author, 2013).....	94
Figure 152: Design development of pier of Maritime Heritage Node. This development is still in progress. (Author, 2013) .....	76	Figure 189: Analysis of Sun path at Spring Equinox at northern side of precinct (Author, 2013).....	95
Figure 153: Factory with theatre inside. This work still needs some development. (Author, 2013).....	77	Figure 190: Analysis of Sun path at Winter Solstice at northern side of precinct (Author, 2013).....	96
Figure 154: The steel frame is visible on the inside (Author, 2013).....	77	Figure 191: Water circulation patterns before and after the construction of the port and causeway (Anchor Environmental Consultants, 2011: 12).....	97
Figure 155: Windows that face Main Rd (Author, 2013) .....	77	Figure 192: A red tide off the West Coast in Lambert's Bay. (Dept. of .....	98
Figure 156: Steel column (Author, 2013) .....	77	Figure 193: Proposed Development of the Waterfront Area (Saldanha Bay Municipality, 2011: section 14.2 p220)).....	99
Figure 157: Steel frame of first factory on Main Rd's side (Author, 2013) .....	77	Figure 194: Proposed Saldanha Waterfront (Saldanha Bay Municipality, 2006) .....	100
Figure 158: The use of calcrete to create a street boundary wall in Saldanha Bay. (Author, 2013).....	78	Figure 195: Fog catchers (Quezada et al., 2013).....	101
Figure 159: The use of calcrete to create a street boundary wall at a residential house in Langebaan. (Author, 2013) .....	78	Figure 196: Gutter at bottom of net (Ideass, 2012) .....	101
Figure 160: A rather interesting example of the use of calcrete on Main Road in Saldanha Bay. (Author, 2013) .....	78	Figure 197: A graph illustrating growth rate of the marine aquaculture industry from 2000 to 2010 (Dept. of Agriculture, Forestry and Fisheries, 2012: 10) .....	103
Figure 161: Dry packed calcrete with concrete seat. (Fogarty, 2013).....	78	Figure 198: Mussel and oyster rafts at Saldanha Bay. The Iron Ore Port of Saldanha Bay is visible in the background. (Author, 2013) .....	104
Figure 162: Calcrete wall. (Fogarty, 2013).....	78	Figure 199: Mussel production for the years 2000-2010 (Dept. of Agriculture, Forestry and Fisheries, 2012:12).....	104
Figure 163: Gabion baskets filled with calcrete. (Fogarty, 2013) .....	78	Figure 200: The Mediterranean mussel (left) and the Black mussel (right) (Sources: left: Dept. of Environmental Affairs and Tourism, 2007: 4; right: Wikimedia Commons, 2010) .....	104
Figure 164: View of Pepper Bay from Hoedjieskop at night. When one looks back at Figure 12 one can see some parts of the Iron Ore Terminal in the distant horizon. At night its lights become a spectacular display that is visible from anywhere in the bay. (Author, 2013).....	78	Figure 201: Wooden mussel raft (Dept. of.....	105
Figure 165: 1:50 Section through production area (not to scale). (Author, 2013).....	79	Figure 202: A rope with mussels is hoisted with a crane (Dept. of Agriculture, Forestry and Fisheries, 2012: 4).....	105
Figure 166: 1:50 Section of concrete platforms on concrete piles. Their depth depends on the bed rock level. (not to scale) (Author, 2013) .....	80	Figure 203: Mussels being graded and sorted for the market (Dept. of Agriculture, Forestry and Fisheries, 2012: 14).....	105
Figure 167: At the Leça de Palmeira Pool complex a poetic use of concrete is displayed where it is poured directly onto the rocks and offsets the tectonic differences between man-made and the natural (Wang, 2011) .....	80	Figure 204: Mussels are sorted (Visser, 2012: 36) .....	105
Figure 168: Another interesting use of concrete and rock at the Jack Evans Boat Harbour in Australia by Aspect Studios. (Archdaily, 2011) .....	80	Figure 205: Sea lettuce (Ulva spp.) is commonly used as cultured feed on abalone farms (Dept. of Environmental Affairs and Tourism, 2007: 3) .....	106
Figure 169: Concrete coloration at the Jack Evans Boat Harbour (Archdaily, 2011).....	80	Figure 206: Gracilaria spp. (Red dried seaweed) (Viet D.E.L.T.A Industrial Co., Ltd.) .	106
Figure 170: Granite boulders at the edge of the Small Fishing Harbour .....	81	Figure 207: Gracilaria on the beach in the region of the Blue Water Bay resort in Saldanha (Du Plessis, B. 2012).....	106
Figure 171: A small boat that is used for catching crayfish stops at the quay of the Small Fishing Harbour. ....	82	Figure 208: Artificial seeding of Porphyra in Japan using rotating drums. (From Fish Farming International 3(3), 1986 cited in Pillay & Kutty, 2005: 566) .....	107
Figure 172: The starting point of the dissertation (the first artifact): Photomontage of view of bay from small fishing harbour and some activities at the precinct (Author, 2013).....	86	Figure 209: Porphyra / conchocelis life cycle. (From Melvin et al., 1986 cited in Pillay & Kutty, 2005: 566) .....	107
Figure 173: Different positions of the kinetic structure (Author, 2013) .....	87	Figure 210: The recycling of organic and inorganic waste in an Integrated Multi-Trophic Aquaculture System (Guerrero & Gremades, 2012: 8) .....	108
Figure 174: Working mechanisms of the mist machine (Author, 2013) .....	87		
Figure 175: Conceptual whale skeleton (Author, 2013) .....	88		
Figure 176: View of model from above (Author, 2013) .....	89		

Figure 211: Overall design of the facility used for IMTA experiment at the Aquacria Arousa fish farming plant in Cambados, Pontevedra (Guerrero, Gremades, 2012: 64)	109
Figure 212: A turbot farming plant, where a closed circuit, with filtering molluscs (clams and oysters), suspensivore invertebrates (anemone) and food macroalgae ( <i>Saccharina latissima</i> and <i>Ulva spp.</i> ) was tested. It is located in O Grove, Pontevedra (Guerrero & Gremades, 2012: 53)	109
Figure 213: The tanks of the turbot farming plant (left) (Guerrero & Gremades, 2012: 52)	109
Figure 214: A commercial-scale pilot project in the Bay of Fundy, Canada, where cultivated kelps and mussels utilize by-product wastes from the nearby salmon cages as major inputs. (Guerrero & Gremades, 2012: 32)	110
Figure 215: Salmon cages on the left, a mussel raft in the right foreground and a seaweed raft in the right background at the Bay of Fundy (Ridler, 2007 :52)	110
Figure 216: Salmon cages on the Bay of Fundy (Google, 2013)	110
Figure 217: Material and sectional variations that are possible at the water's edge. (Berizbeitia 2009: 245)	111
Figure 218: Structural Capacity and Infrastructure Gradient of different types of constructed edges. (Berizbeitia, 2009: 241)	111
Figure 219: Cantilevered Sheet Pile Wall (Saczynski and Kalhawy, 1982: 14 cited in Burgess & Hulhaway, 1983: 104)	112
Figure 220: Anchored Bulkhead Wall (steel sheet pile bulkhead) (Dept. of the Army USA, 1983: 8-14)	112
Figure 221: Michael Van Valkenburgh Associates, Allegheny Riverfront Park project (completed 2001) - The construction of the precast deck superstructure is shown here during different phases of construction. (Berizbeitia, 2009: 72)	112
Figure 222: Illustration of recommendation to construct a Barge Terminal, circa 1925. (3 Rivers 2nd Nature. Pittsburgh Urban Waterfront: 172-1926. Prepared by STUDIO for Creative Inquiry at Carnegie Mellon University. 2004. Cited in Biohabitats, 2013)	113
Figure 223: Port Botany Expansion in Sydney by Stoss Landscape (Macgowan, 2011: 42)	113
Figure 224: Timber deck (Macgowan, 2011: 46)	113
Figure 225: Construction details (Macgowan, 2011: 46)	113
Figure 226: Common marine pile types. (GZA GeoEnvironmental, Inc. cited in Gaythwaite, 2004: 242)	114
Figure 227: Pile head connection details (Gaythwaite, 2004: 244)	114
Figure 228: Typical wharf with low-level relieving platform on timber piles (Zmeu, 2012)	115
Figure 229: Timber pier in Saldanha Bay (Author, 2013)	115
Figure 230: Typical timber pier nomenclature. (Gaythwaite, 2004: 240)	115
Figure 231: Timber deck structure. (Dept. of the Army USA1983: 8-19)	115
Figure 232: Diagrammatic section of the park (Lasky, 2012: 112)	116
Figure 233: Williamsburg River Park in Brooklyn by W Architecture and Landscape. (Lasky, 2012: 112)	116
Figure 234: Examples of Cast-in-Place Concrete Piles (Peck, Hanson and Thornburn, 1974: 205 cited in Burgess & Hulhaway, 1983: 149)	117
Figure 235: Examples of Precast Concrete Piles (Peck, Hanson and Thornburn, 1974: 206 cited in Burgess & Hulhaway, 1983: 150)	117
Figure 236: Green Bay's New City Dock, Wisconsin, USA by Stoss Landscape (Arvidson, 2011: 142)	117
Figure 237: Green Bay's New City Dock, Wisconsin, USA by Stoss Landscape (Arvidson, 2011: 149)	118
Figure 238: Concrete deck systems (Gaythwaite, 2004: 244)	118
Figure 239: Typical concrete pier nomenclature. (Gaythwaite, 2004: 241)	118
Figure 240: A twin - pontoon at Saldanha Bay's small craft harbour that consists of a simple timber deck structure supported by two floats. (NSRI, 2013)	119
Figure 241: Floating-pier basic hull types. (Gaythwaite, 2004: 362)	119
Figure 242: Older type of timber mussel raft in Saldanha Bay (Dept. of Agriculture, Forestry and Fisheries, 2012: 3)	120
Figure 243: Modern mussel rafts in Saldanha Bay that are longer and have plastic tubes on the top structure (Visser, 2012: 34)	120
Figure 244: Ropes hanging from the raft that supports the mussels (Dept. of Agriculture, Forestry and Fisheries, 2012: 3)	120
Figure 245: Plastic tubes on a raft (Blue Ocean Mussels (Pty) Ltd., 2013)	120
Figure 246: 4x6m oyster rafts with different configurations of oyster trays. Left: four bay raft, middle: five bay and right: six bay rafts. A = 500mm, D = 6000mm, E = 4000mm, C and B varies (NSW Government, 2013: 4)	121
Figure 247: An older type of mussel raft with fibreglass floats (Centro Tecnológico Del Mar, 2004: 17)	121
Figure 248: A modern mussel raft with 6 iron floats (Centro Tecnológico Del Mar, 2004: 18)	121
Figure 249: A Typical oyster raft constructed using recycled 200 litre plastic drums. (NSW Government, 2013: 1)	121
Figure 250: A Typical oyster raft constructed using end-capped 300mm PVC plastic pipe. (NSW Government, 2013: 1)	121

## Preface

An interest in the town of Saldanha Bay was my entry point into this dissertation. This interest resulted from many personal memories of this unique coastal town that I have had the privilege to visit and experience from a very young age.

In spite of its coastal setting, Saldanha Bay is not a place of traditional picturesque beauty. One often needs to look deeper and further in order to appreciate what one sees, yet it is a special town for the people who live in it. Legend has it that once you have lived here you will never really be able to leave. Residents jokingly say that their number plate registration, CFG, represents the phrase “Come for Good”.

My interest in the town and its people was reignited after revisiting the town at the end of 2012 and spending quite a lot of time there.

Furthermore, I have always had an interest in how new technology opens up new possibilities so that people who have been living in remote locations or undeveloped countries can gain access to services and utilities that others may consider standard. My interest was explored in some of the technologies that were researched as part of the dissertation.



Figure 3: Views into town on Camp Road (Author, 2013)



Figure 4: View driving on Camp Road (Author, 2013)



Figure 5: Industrial buildings at the Small Fishing Harbour of Saldanha Bay in varying stages of neglect or ruin with Hoedjieskop in the background. (Author, 2013)



Figure 6: Granite boulders create an edge at the water (Author, 2013)

## Prelude

Saldanha Bay is located on the West Coast of South Africa. Together with Langebaan it is situated around one of the largest natural harbours in the world. Even though Saldanha is a West Coast town the central part of town faces a coastline on the east. (Refer to **Figure 7** on this page.)

### *Cape of Fires*

Between 1600 and 1800 years ago Saldanha Bay was occupied by the CochoQua (nomadic herders known as the Khoikoi). (Athiros et al., 2008: 16, 108) This was before trawlers started diminishing the natural resources and there was a great abundance of seafood in the bay. In the 17<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> centuries sailing ships from different nations started using the bay for shelter on route to Table Bay. (Athiros et al., 2008: 16) Already in 1684 Hoedjies Point was marked on the maps of these explorers. (Botha & Walters, 1976: 3) (Refer to **Figure 9** for its location.) There were often misunderstandings about rights to land and water between the local herders and the early explorers. (Athiros et al., 2008: 18)

The authors of [*Dream of the West Coast*] wrote about the first ships entering the bay as follows:

“Stadig om die Hoedjiespunt, waar rokies trek uit die skerms van Strandlopers, Kaap van Vure wat die winde keer en die deining laat verbyrol tot branders op die duine.” (Botha & Walters, 1976: 2)

‘Slowly around Hoedjies Point where the smoke plumes from the fire screens of the Strandlopers, Cape of Fires which gives protection from the winds and lets the swell roll past into waves on the dunes.’ (Botha & Walters, 1976:2 (in Afrikaans). Translated here by author from Afrikaans to English.)

The above text implies that the area of Hoedjies Point was already then seen as a place suitable for living, by the CochoQua. Also note the name given: “Cape of Fires”. This name could have been derived from the many fire screens of the CochoQua.

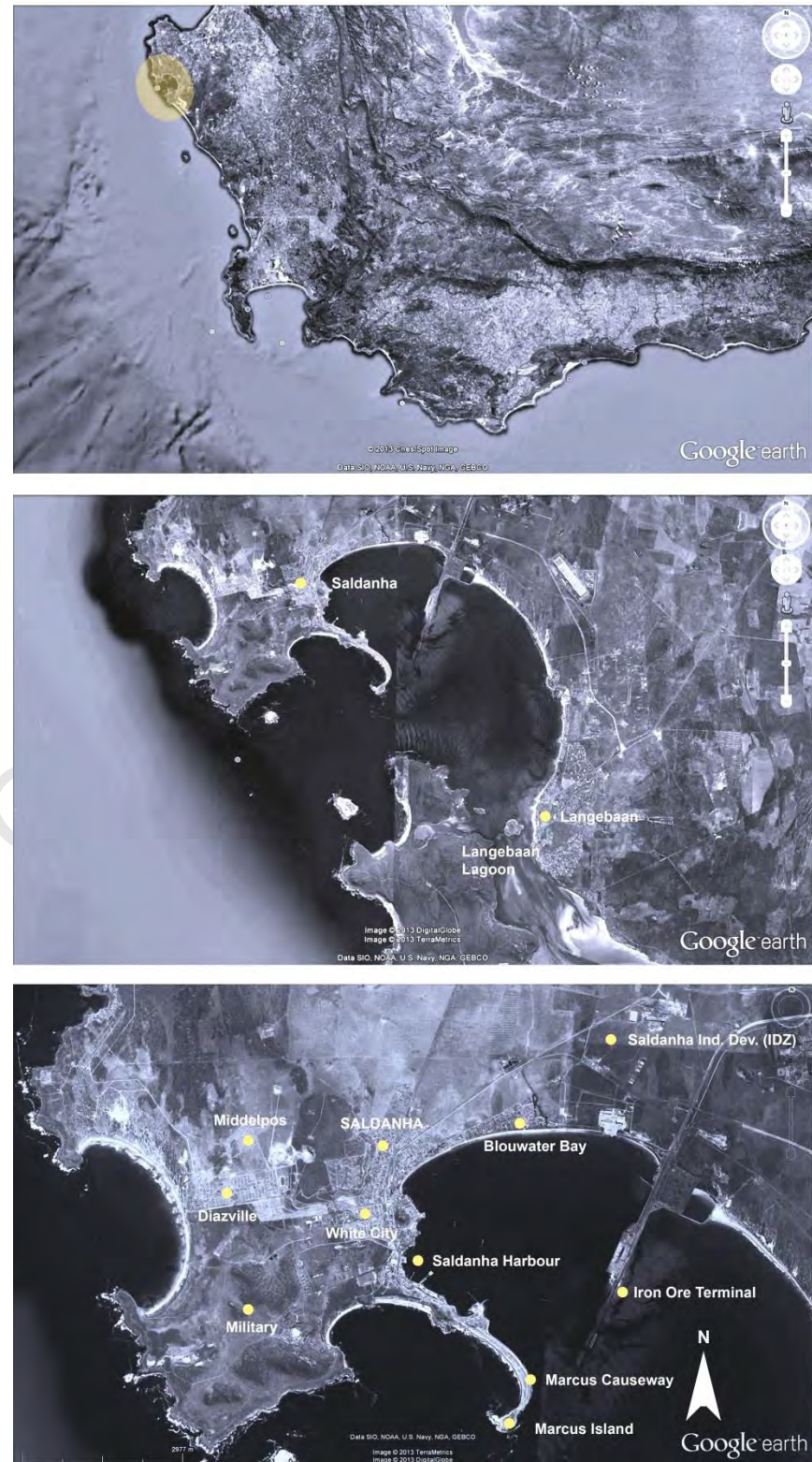


Figure 7: Google Earth maps showing the location of Saldanha Bay Top: Location of Saldanha Bay on the West Coast; Middle: Location of the town of Saldanha Bay in relation to Langebaan and Langebaan Lagoon; Bottom: Location of Small Fishing Harbour in relation to Hoedjieskop. (Original Images Top to bottom: Google Earth, 2007a; Google Earth, 2007b; Google Earth, 2013b)

“There is no land in the whole world so barren and unblest by the Lord God.”

- Commander Jan van Riebeeck’s note observation upon investigating the stretch of land where the town of Saldanha Bay is now situated, for potential use to the Company in 1660. (Athiros et al., 2008: 3; Botha & Walters, 1976: 5)

After settling at the Cape Jan van Riebeeck found Saldanha Bay’s harsh terrain and lack of fresh water to be unappealing. (Botha & Walters, 1976: 5) Saldanha Bay was only used as a fish trading post and to supply the Cape with fish from time to time. Only in 1669 after the French’s interest in Saldanha Bay became clear, the establishment of a permanent post became important. (Athiros et al., 2008: 49)

The development of the commercial fishing industry in Saldanha Bay commenced in 1903 when the first fish canning factory was established. (Anchor Environmental Consultants, 2011:2)

The original lack of fresh water is described as a benefit for the area because until 1970, when the development of the iron ore port commenced, the bay was mostly still undisturbed. (Athiros et al., 2008: 136; Botha & Walters, 1976: dust jacket) Saldanha Bay was later supplied with water from the Berg Water Project. Massive developments such as the Marcus causeway (Marcus Island was connected to the

main land to provide shelter for the new port) and large scale dredging operations followed. (Anchor Environmental Consultants, 2011) Refer to **Figure 191** in the *Appendix* for more information on how this affected the Bay.

One could say that the rate of growth in Saldanha Bay and Langebaan was about equal in the 1980s and 1990s. From personal memory I can remember a lot more tourist activity in Saldanha Bay during this period than there is today. Then from the end of the 1990s there was a noticeable downward trend in tourism in Saldanha Bay, while its neighbour, Langebaan, started experiencing a boom in tourism and residential development. Some say that people preferred Langebaan because of the unpleasant smell that was caused by the fishmeal and fish oil processing of Premier Fishing (trading as Southern Seas Fishing). These operations were suspended in 2008 for commercial reasons. Today they are intending to re-commission and upgrade this plant and are currently in a process for reapplication. (SRK consulting, 2013)



Figure 8: Photomontage of view of the bay of Saldanha from the Small Fishing Harbour. (Author, 2013)

## Introduction

### *Proposed Context – The Small Fishing Harbour of Saldanha Bay*

For the design project of my master's dissertation I am focusing my interests on the Small Fishing Harbour of Saldanha Bay. It is situated around Pepper Bay. (Refer to **Figure 9**) The precinct has a very industrial nature with parts of land that are undeveloped as well as some derelict and deserted buildings. (Refer to **Figure 5** and **Figure 6**) Most of the buildings that are still in use are related to the marine industry, but there are some recreational activities such as fishing, boat launching and a takeaway shop/restaurant. To the back of the harbour, in close proximity, lays a *koppie* that has a significant history. Apart from a walking route and two lookout points it is now mostly deserted. The precinct also neighbours the lower income communities of the town.

The site was chosen intuitively based on an admiration of the richness of experiences that being close to the water's edge brings. (Refer to **Figure 8**) Prior personal knowledge about the site's urban location and potential also played a role in the selection of the site. These facts led to a great awareness of the importance of preserving this precinct as a public place.

As one enters Saldanha Bay, one notices a distinct landscape of mostly flat terrain that at some points build up to low *koppies* or granite outcrops with scattered

rocks. Saldanha Bay has a semi-arid Mediterranean climate and as a result sparse vegetation makes the natural terrain appear dry and harsh. (**Figure 3** and **Figure 4**)

It is a working town where people go about their daily chores in an unpretentious way. By looking at the built form of the residential parts of town one realises that many of the community are poor. Even in the higher income areas residential buildings are mostly old and of a smaller scale. The town also has a unique industrial character due to the old fish processing factories. Some of these once prosperous industries have left with nothing in their place.

Today it seems like in a way this town has been forgotten by the outside world. Even though the neighbouring town of Langebaan is bursting out of its seams, the global phenomenon of explosive growth and urban coastal sprawl in desire of the coastal living style has not had its effect on this town yet. There is however an increased awareness that it will not remain this way. Recent proposals for an Industrial Development Zone close to the town of Saldanha Bay has already spurred interest from global institutions who are interested in buying up stretches of land at the water's edge.

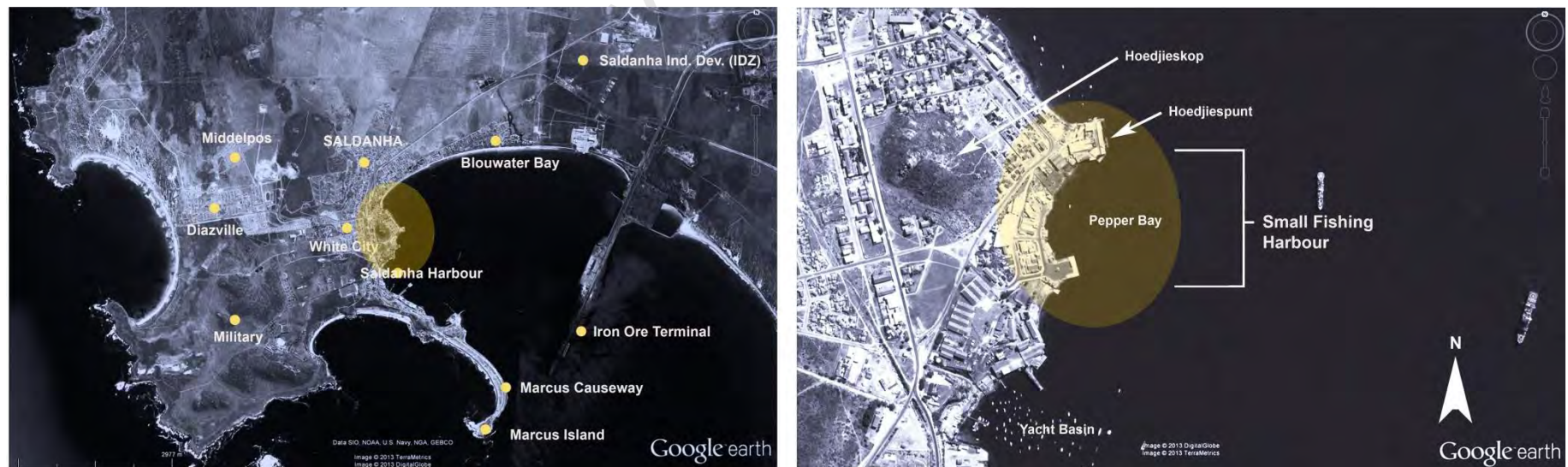


Figure 9: Google maps showing the location of the Small Fishing Harbour in Saldanha Bay. (Original Images: Left: Google Earth, 2013b; Right: Google Earth, 2013a)

## Problem Statement and Research Question

Two problems have emerged from the global phenomenon of explosive growth and urban coastal sprawl. One problem is when vast areas of coastal land are bought by developers for private developments and access to the water's edge becomes restricted. It will become evident through the dissertation work that the physical location of the Small Fishing Harbour precinct within the town is such that (re)claiming it as a place for public use, now and for the future, is extremely important.

The other great concern is a loss of character due to rapid developments. Remediation of post-industrial sites at the water's edge into public places is a project that is commonly undertaken abroad. The biggest challenge is to design these public spaces in such a way that the public values them so that they can contribute to the

community in a positive way and be sustainable as public spaces. A potential problem of these types of projects is when the existing context is not placed under sufficient consideration and a generic place with little delight for the human senses is created. The effect of this can be that it is not valued by its users.

The main question that this dissertation asks is how can public space be created that is rich in experience? When the design project addresses this question it is done by writing through site. The context of the design project is therefore important. Site can be used as a key informant so that existing character and experiences are celebrated and/or reinforced.

## Dissertation Visions

Through answering the research question the following aims were created for the project in its specific location.

Theoretical aims: Create valued public space that carries meaning.  
Practical aims: Reveal unique hi(stories) about the place;  
Improve physical connections to the precinct to contribute to a continual waterfront scheme;  
Reclaim and uplift (it is important that public spaces are uplifted in order to stimulate tourism which is an unutilised economy in the area);  
Establish roles for the precinct (by extending its programme to have multiple experiences and attractions);  
Support (by ensuring public access to the precinct in future and also creating a physical connection to Main Road which is the main hub of the retail and hospitality industry).



Figure 10: "A Fisherman's Friend" – fishing at the Small Fishing Harbour. (Author, 2013)



Figure 11: View of the Small Fishing Harbour from Hoedjieskop. The Yacht Basin and Saldanha Harbour is visible on the right. (Author, 2013)

## Theoretical Discourse – Human Experience

The first part of the theoretical investigation focuses on issues around place and meaning.

As mentioned before, the answer to the research question will be written through site. It is therefore important to understand the character of the precinct. In this regard the illumination of place character through phenomenological methods was investigated. This is discussed below in *Place, Poetry and Phenomenology*.

Subsequent theory looked at why it is important for places to be rich in experience, in other words accommodate human activity and delight the senses. Following Norberg-Schulz's arguments the statement is made that identification of man with place is necessary for man to have a sense of belonging and that this is only possible when place has distinct character and also has meaning associated with it. (Norberg-Schulz, 1980: 19-20) Following from this, the statement is made that the design of places that are rich in experience is necessary to allow places to have meaning associated with them. (Treib, 1995: 128) These topics are discussed in *Meaning and Belonging* (page 92).

Two main precedents were chosen to explore the theoretical topics that are discussed throughout the dissertation. Alvaro Siza's internationally recognized 1961 Leça de Palmeira Pool complex was chosen firstly, because it is also a project at a coastal setting and secondly, because some of the challenges of its site were similar to those of the Small Fishing Harbour. Siza's focus was on the sensorial rather than a formal design. Its design resolution is commended for the way that it uses site as an informant for built form and also uncovers and enhances site experiences to contribute to the overall richness of the project. West 8's Schouwburgplein was investigated as an interesting example of a project at a very unnatural landscape. The existing character of the Small Fishing Harbour is a lot more unnatural than the Leça de Palmeira Pool complex.

### *Place, Poetry and Phenomenology*

Place is defined by Norberg-Schulz as "a space that has a distinct character". (Norberg-Schulz, 1980: 57) Character is therefore that which makes space unique. Norberg-Schulz also states that *place* is a "totality made up of concrete things". (Norberg-Schulz, 1980: 6) These "concrete things" that our "everyday life-world" consists out of can be both tangible (e.g. trees) and intangible (e.g. feelings). (Norberg-Schulz, 1980: 6) The character of a place is also determined by *how* these things are. (Norberg-Schulz, 1980: 10) Therefore to understand the character of a place one must understand *what* and *how* these things are. What and how these things are can be called the *phenomena* of a place.

Heidegger first introduced the phenomenological method as a tool to identify the phenomena of a place. (Norberg-Schulz, 1980: 14) In more detail Norberg-Schulz says that the phenomenological understanding of place "comprise(s) a survey of

manifest characters as well as an investigation of their concrete determinants". (Norberg-Schulz, 1980: 14) It is important to note that the phenomenological understanding of a place can never be complete. This is caused by fact that the character of place has a temporal nature and also by the fact that the user may not be able to identify all the underlying dimensions of a place. (Norberg-Schulz, 2000: 72) (Refer to **Figure 14**)

According to Norberg-Schulz, scientific concepts fail to provide a real understanding of the life-world for the way that they abstract things. (Norberg-Schulz, 1980: 7) Instead he promotes art as a *phenomenological* method for the way that it gathers the real complexities and contradictions of life (Norberg-Schulz, 1980: 23) Poetry, a form of art, is useful in the same way for its ability to uncover the meanings inherent in our life-world. (Norberg-Schulz, 1980: 9)

In *Genius Loci: Towards a Phenomenology of Architecture*, Norberg-Schulz has illustrated how the poem "Winter Evening" by George Trackl is able to illuminate both the basic properties of place as well as some phenomena of our life-world. He explains how poetry is able to do this by being able to concretize (make visible) both the local and the general situations of our life-world. (Norberg-Schulz, 1980: 9) Local phenomena could, for example, be how it is to be living in a specific continent. Phenomena that have to do with general situations are informed by general knowledge, for example, knowing what it is like to be inside or outside a dwelling.

Poetry was also used as a phenomenological method to illuminate specific phenomena of Saldanha Bay so that character of place can be uncovered. A poem about Saldanha Bay that was written and published by the acclaimed Afrikaans poet M.M. Walters in 1976 was discovered in [*Dream of the West Coast*] early in the research process. Refer to **Figure 12** and *Dream of the West Coast* in the *Appendix* on **page 86** for an English translation. It is useful to know that the goal of the publication of the book was to capture the character ("the dream of ages") of Saldanha because of a concern that it would be lost to the then looming industrial Marcus Island Causeway and Iron Ore Terminal developments. (Botha & Walters, 1976: dust jacket)

This poem illuminates the character of Saldanha Bay in the following way. The sensory experience of the natural elements that are unique to this place, such as wind, movements of the water, sounds, rocks, seagulls and sea spray, are richly described to articulate emotions such as freedom, dreaming, peace, excitement and longing. It illuminates not only the physical properties of place (how the sky, islands, rocks, etc. are) but also illuminates how it is to be in Saldanha Bay. It does this, for example, by suggesting that a person can be emotionally transferred to a different place when he/she experiences the call of the seagulls (a local situation). Another example is where the experience of the movement of waves (a general situation) is described. This is however also a local phenomena. When one looks at the words that are used to describe these movements one realises that it is the small waves of the calm bay of Saldanha that is described.



O suidewind wat langs die weskus waai  
gee vlerke aan my drome  
laat my weer vir oulaas sweef  
soos n wit voel    dons  
wat in die blou lug hang  
dryf op jou strome    wit droom  
wat die aarde nie ken nie...

laat my weer met wit seile vaar  
geruisloos oor stil water  
stil    by groen eilande verby...  
op rotse staan wat uitsteek in die see  
kyk en luister na die suig en wieg  
lied van die branders  
wat daal en styg en breek...

laat my weer deurspoel word    oorstuif  
deur sproei    weggevoer deur die geroep  
van meeue wat by my verbygaan...  
hoor hoe die riete ruis bedags    en snags  
hoe die groot stilte oor die duine daal...  
suidewind wat langs die weskus waai  
gee vlerke aan my drome...

- Droom van die Weskus, M.M. Walters

Figure 12: *Droom van die Weskus* by M.M. Walters (Poem: Botha & Walters, 1976; Image: Author, 2013)

## Meaning and Belonging

The importance of places to have distinct character, and also to have meaning associated with them, becomes clear when one looks at Norberg-Schulz's discussion on what is necessary for man to be able to feel at home in a place. It can be said that man is only able to *dwell* - defined by Heidegger as being at peace in a protected place - when he is able to *orientate* himself ("know where he is") and *identify* himself with the environment that he is in ("know *how* he is in a certain place"). (Norberg-Schulz, 1980: 19) Identification is made possible when places have distinct character and also have meaning associated with them. (Norberg-Schulz, 1980: 20) Identification is needed for a person to have a sense of belonging. (Norberg-Schulz, 1980: 20)

The need for places to have character also illustrates the importance of the 'imaginary', or creative, part of the design process. Historically design projects that include the 'arts' have also focussed on the creation of spaces that accommodate human activity and delight the senses. (Corner, 2006: 32) The problem with methodologies that only employ rational design methods and do not account for the significance of design is that replicable answers are produced. (Mossop, 2006: 166) By making the imaginary part of design, places that are unique are created.

When looking at the architectural problem of how architecture can create places that have meaning, it is important to note that architecture and design cannot create specific meanings for place. The reason is that meaning of a place gets generated over time through users' experiences. An individual's experience of a place

is filtered by his/her own culture, morals, ethics etc. (Treib, 1995: 126; Norberg-Schulz, 1980: 21) Meaning is also dynamic since the user's experience can differ seasonally and timely. (Treib, 1995: 128) (Refer to **Figure 14**)

It is however possible to create places that have the potential and ability to mean in the future. According to Treib the potential to mean is made possible by creating places that are experientially powerful, that is have an effect on the senses. (Treib, 1995: 128) He says: "In the past, sensory pleasures have served to condition meaning; ... Sensory experience *moved* the viewer, causing him or her to reflect upon ... one's position in the universe..." (Treib, 1995: 133)

There are different types of pleasures and sensory experiences. Olin differentiates between simple pleasures and high pleasures as follows: He says that *simple pleasures* are the ones that appeal to human instincts and since they are not based in culture so much they are easier to predict. (Olin, 2008: 2) Examples would be: to have place sit and rest, to have shade when it is hot and to be protected from wind. (Olin, 2008: 2) (Refer to **Figure 13**) High pleasures are much harder to predict. Examples of *high pleasures* are: joy, delight, contemplation and satisfaction. (Olin, 2008: 2) Different types of sensory experiences also have different effects. A sensory experience that moves the user in such a way as to "reflect upon ... one's position in the universe" (Treib, 1995: 133) is not the same as the one that causes a simple pleasure.



Figure 13: Simple Pleasures: Warm concrete surfaces to take a nap on (Author, 2013)

These differences were understood in the early distinction that was made between the picturesque and the sublime or the beautiful and the sublime. The sublime was connected to an appreciation of the grandeur and violence of nature or terror in the realisation of man's insignificance in the face of nature. (Oxford University Press. 2006) On the other hand the picturesque is associated with pastoral gardens and its associated concepts of joy, pleasure and the idea that nature can be ordered and controlled by man. (abh9h@virginia.edu, 2009) The sublime was also characterized by obscurity, ruggedness, intensity, vastness, and power, while "the beautiful is light, smooth, and delicate". (Burke, 1756 cited in White, 2013; Oxford University Press. 2006)

In understanding of these concepts, I can say that it was more the sublime nature of the town of Saldanha Bay and the Small Fishing Harbour that ignited my interests than it was the idea of beauty and qualities of the traditional picturesque. The rough materials of the precinct create a total imagery that is very different from the conventional idea of the picturesque. (Refer to **Figure 1**, **Figure 5**, **Figure 6** and **Figure 14** again.) Views of the ocean create a perception of uncontainability and add to the sublime nature of the site.



Figure 14: Different times of day and different types of weather all create different conditions of light and therefore results in different characters of place. This was evident when perceptions of the character of the hard materials on site changed throughout the day. (Norberg-Schulz, 1980: 14); All Images: (Author, 2013)

## Theoretical Discourse – Site

As mentioned before, in this specific design project it is important that the existing natural forces and sensory experiences at the site are carefully considered so that the potential of being located at the water's edge is not dismissed, but rather celebrated.

The theoretical concerns that were in this section also form part of the discourse of Landscape Urbanism. The need for the understanding both the urban and natural led to an interest in these topics. Landscape Urbanism is most often recognised for the way that it allows one to deal with all types of complex processes that are related to the “dual binaries of landscape and urbanism”. (Corner, 2006: 28)

One of the first observations about the Small Fishing Harbour precinct was that the built form of part of the precinct are very neglected with open or derelict buildings. Understanding the potential of these types of sites is important. This is discussed in more detail in *Recovered Landscapes* below.

It is also important to know that all sites have multiple identities/characteristics. Sites need to be understood as complex landscapes that have relationships with each other through networks and processes that operate between them. (Czerniak, 2006: 107) Site is also political. (Burns, 1991: 152) These concerns are discussed in *Spatial Identity & Questions of Scale* (page 22).

## Recovered Landscapes

“Landscape is not given but made and remade; it is an inheritance that demands to be recovered, cultivated, and projected toward new ends.”

- James Corner in *Recovering Landscape: Essays in Contemporary Landscape Theory* (1999a: 12)

Wall says that one significant effect of urbanization is the “rise of new kinds of urban site” of which one type is the “peripheral site.” (Wall, 1999: 234) He describes these types of sites as “the ambiguous areas that are caught between enclaves... middle landscapes that are neither here nor there, and yet are so pervasive as to now characterize the dominant environment in which most people actually live”. (Wall, 1999: 234)

Peripheral sites can also be described as liminal: “occupying a position at, or on both sides of, a boundary or threshold”. (Oxford Dictionaries, 2013) In the past these types of liminal spaces have been recognised for their potential. (Corner, 1999a: 13) “Major transformations occur at crossroads and other liminal places, at least partly because liminality—being so unstable—can pave the way for access to esoteric knowledge or understanding of both sides.” (Wikipedia, 2013a)

Siza's Leça de Palmeira Pool complex is also a peripheral site. The site is located along a semi-industrial portion of a rocky coast. (Pollak, 2006: 137) It is in close proximity to the international harbour, namely the Port of Leixões. (Refer to **Figure 18**, **Figure 19**, **Figure 20** and **Figure 21**) From the site the long harbour wall of the port and storage tanks are visible on the horizon. (**Figure 15**) Another predominant feature of the site is that it is situated along a kilometre long, 5m high sea wall that stretches from the North of the site to the Port of Leixões. (McAvinney, 2013: 47) The seawall forms the boundary between cultivated land and the wild Atlantic Ocean. (McAvinney, 2013: 48) The rock outcropping that was chosen as a site for Siza's project was originally being used for Lobster farming and therefore the site is also a recovered site. (McAvinney, 2013: 44)



Figure 15: View of horizon from pool complex. (Rusli, 2010)



Figure 16: Looking back towards the street (Patt, Trevor. 2011)



Figure 17: Copper roofs (WikiArquitectura, 2010)

## Spatial Identity & Questions of Scale

The space of the site is made by humans and is therefore preoccupied by knowledge, power and time. (Burns, 1991: 164) In *Production of Space*, Henri Lefebvre, challenges the conception of space as being unproblematic. He points out two types of illusions that conceal problematic productions of space. The one is the illusion of transparency where it is thought that the world can be seen as it really is. This allows authorities of power that produce space to remain invisible. The other is the realistic illusion where it is thought that something that seems natural requires no explanation. These illusions can allow landscapes to mask undesirable histories. (Lefebvre, 1991: 28, cited in Pollak, 2006: 128) It can conceal social injustices and ecological harm. (Corner, 1999b:10)

The use of the common figure/ground representation can also enable agendas to remain hidden. The reason is that the ground is represented as a neutral and unproblematic background around buildings. (Pollak, 2006: 127) A challenge is to find working ways that can support and represent such a multitude of spatial identity, so that ground that has been relegated to the background in the past through figure/ground representations can be brought into focus. (Pollak, 2006: 128). Pollak suggests using the notion of “space of differences” of Lefebvre as the starting point for such a working method. She goes further and suggests that the notion of space at different scales can be used as a tool to represent spatial difference. In design a range

of scales are associated with architecture, landscape and city. She says that the “negotiation between the respective scales at which architecture, landscape architecture and urban design” operate can be used to engage with dimensions of difference “that characterize the space that is being produced”. (Pollak, 2006: 129). Then the ability to understand all the forces acting upon a site at different scales and the ability to realise the potential of a project to operate at different scales is dependent upon the designer’s investment in representing the elements and forces that exist or have existed at those scales. (Pollak, 2006: 130)

One can see that at the Leça de Palmeira Pool complex Siza used site as an informant to create a sensorial design solution. Existing forces were often uncovered or intensified in order to create rich sensory experiences. Outside at almost every angle the water levels of the pool and ocean appear to be the same. (Balters, 2011) (Refer to **Figure 25**) This intentional blurring of the ocean’s edge contributes to the idea that the swimmer is in an unlimited expanse of water (Balters, 2011), which enhances the sense of uncontainability of the ocean. The uncontainability of nature is also emphasised when at high tide the waves break at the jetty of the ocean pool to produce a huge spray. (Pollak, 2006: 137) The intensifying of existing forces emphasizes the idea of the sublime. (Pollak, 2006: 137)



Figure 18: The Leça de Palmeira swimming pool complex is located along a busy road. (Guerra, 2013)



Figure 19: The buildings to the back of Siza's swimming pools are big in scale. (Guerra, 2013)



Figure 20: Google Earth Image of the location of the swimming pools. (Google Earth, 2013a)



Figure 21: The location of the site in proximity to the international Port of Leixões. (Google Earth, 2013b)

Site was also used as an informant for the built form of the design. One major site informant was the existing topography of the site. Siza carefully mapped the rocks of the site to determine the optimal location of the pools so that it requires the least amount of blasting and the existing rocks only needed to be supplemented with concrete walls in order to form the pools. (McAviney, 2013: 44) (Refer to **Figure 23**)

The existing kilometre long sea wall was also used as a reference. (McAviney, 2013: 50) The dressing rooms, sanitary facilities, check room and plant room that were inserted into the existing seawall as if they are a modulation of it. (Refer to **Figure 22**) It was also done as to not disrupt the views of the ocean from the roadway. (McAviney, 2013: 45) (Refer to **Figure 16** and **Figure 17**)

One can also say that the project is successful in its engagement with site at different scales. As just described at a *local scale* and *regional scale* the built forms follow the existing shapes of the rocky coastal landscape. (Pollak, 2006: 137) At the *urban scale*, the semi-industrial context, the long seawall and the busy roadway at the back had to be dealt with. Rather than ignoring or attempting to screen the industrial elements that are visible on the horizon, the use of concrete registers the industrial scale of the storage tanks. (Pollak, 2006: 137) (**Figure 15**) By sinking the buildings along the existing sea wall behind the road a disconnection between the pools and the infrastructure of the city was created at an *urban scale*. (Balters, 2011) As was mentioned earlier at the *human scale* another focus of the design was to create human sensory experiences.

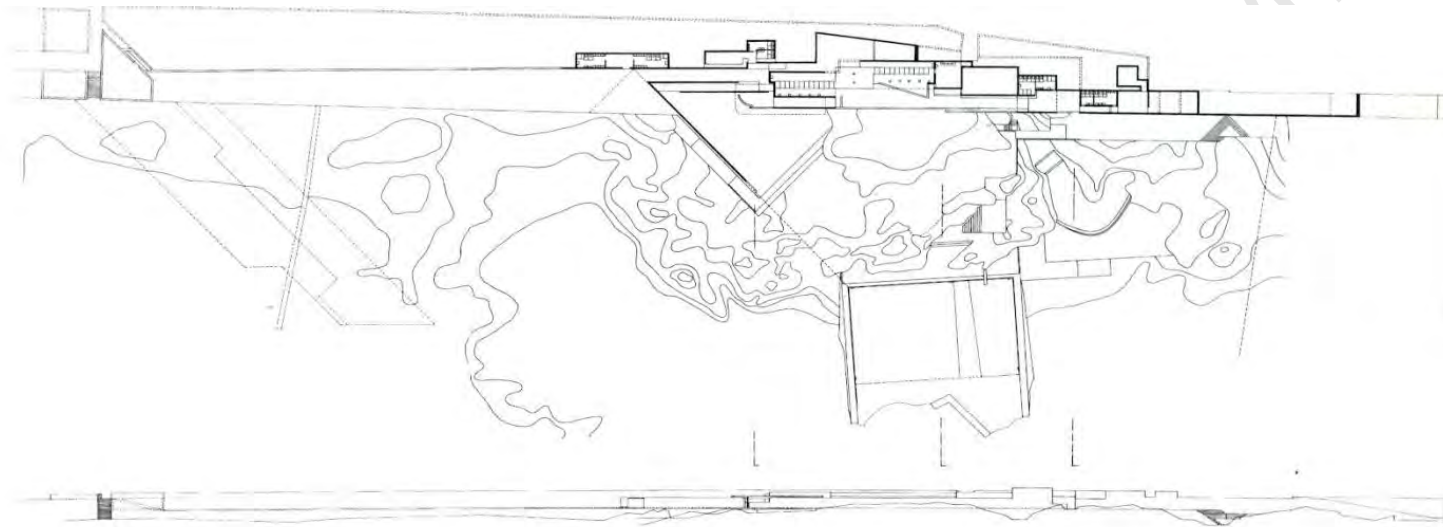


Figure 22: Plan (Santos, F. 2012)

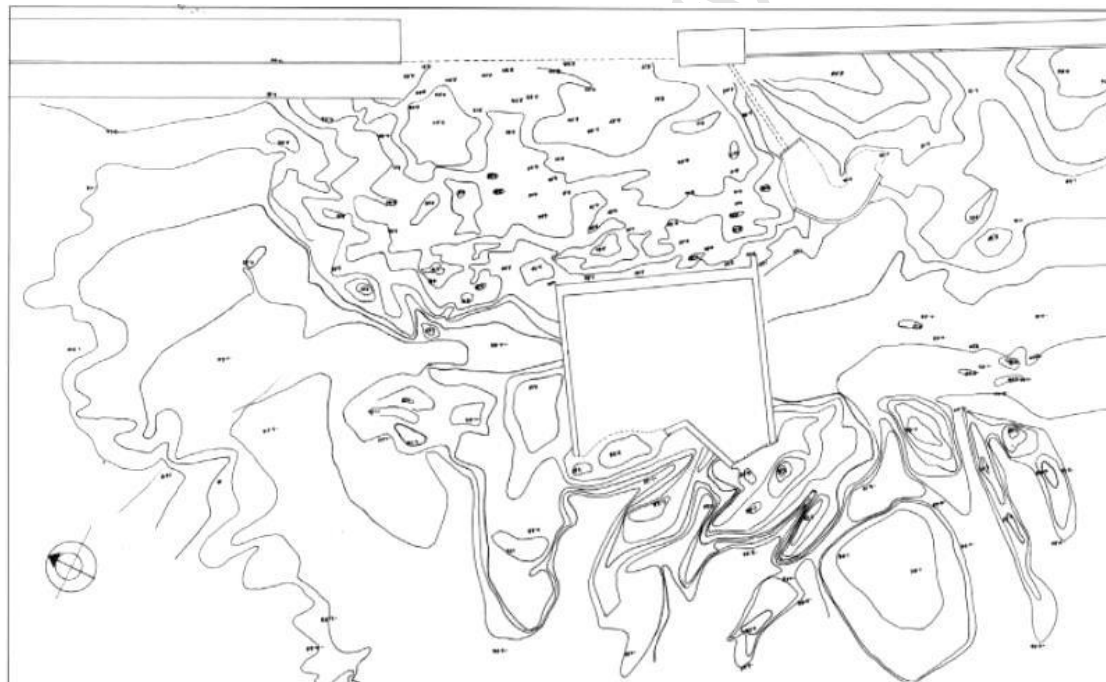


Figure 23: Topographical survey, 1966 (Ganshirt, 2004: 26 cited in McAviney, 2013: 44)



Figure 24: The adult pool (WikiArquitectura. 2010)



Figure 25: Blurring of limits (WikiArquitectura. 2010)

## Site - Urban Analysis

### *Investigations of Scale*

Access to the water's edge in Saldanha Bay has become restricted over the years. Driving southwest through Camp Road one gets a sense of entrapment with large pieces of land on one's left that restricts direct access to the beach. Firstly access to Blue Bay is difficult due to the urban layout of the residential part. From there the municipal camping ground, the cemetery and another long residential stretch result in having only a few access points to the water's edge from Main Road and Camp Road. (Refer to **Figure 30**).

By the time one reaches the Hoedjies Bay Hotel in Main Road, further access to the water's edge is blocked. (Refer to **Figure 28** and **Figure 30**) Access to the water's edge is also now fully "owned" by private properties. (Refer to **Figure 26**, **Figure 27**, **Figure 29**, **Figure 33** and **Figure 34**) Only when one reaches the Small

Fishing Harbour pedestrians again have free access to the water (vehicles pay R5 during office hours).

Main Road is the centre of the retail, tourism and hospitality industry in Saldanha Bay. (Refer to **Figure 31**) The 2011 municipal Spatial Development Framework for Saldanha Bay includes a proposal for a waterfront adjacent to Main Road. (Saldanha Bay Municipality, 2011: 31) (Also refer to *SDF 2011* in the *Appendix: page 99*) Unfortunately, this type of development is not possible until all the private owners of these land parcels see financial feasibility in doing so. If this proposed waterfront on Main Road gets developed in the future, the Small Fishing Harbour Precinct can be linked to it and a continuous public connection from the beach at Blue Water Bay all the way to the Small Fishing Harbour will be possible. (Refer to **Figure 32**).



Figure 26: Private properties on Main Road (Author, 2013)



Figure 27: Private property on Main Road (Author, 2013)



Figure 28: The Hoedjies Bay Hotel on Main Road is the first property to the south that blocks continuous waterfront access at Main Road (Author, 2013)

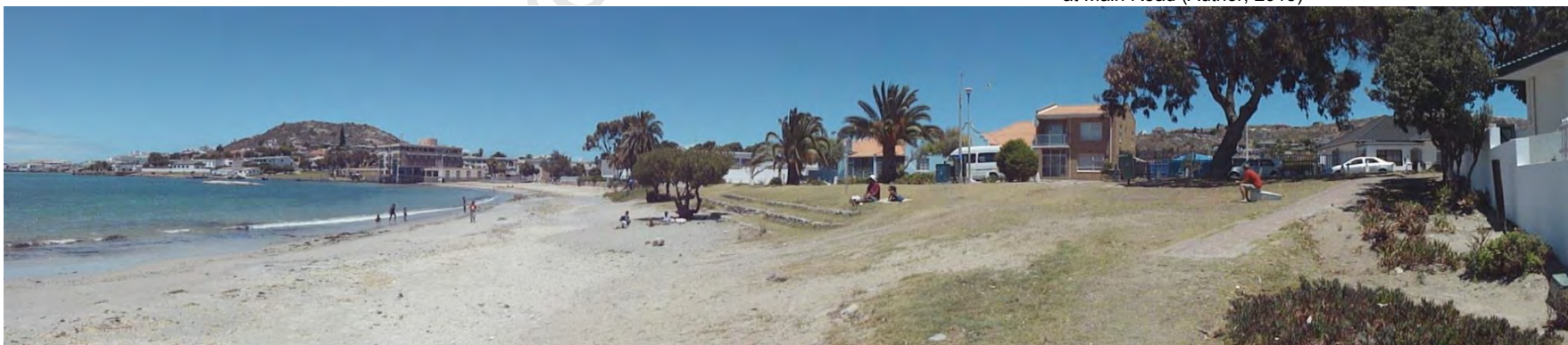


Figure 29: The small public beach on Main Road (historically designated as a separate apartheid beach) (Hoedjieskop is visible in the background) (Author, 2013)

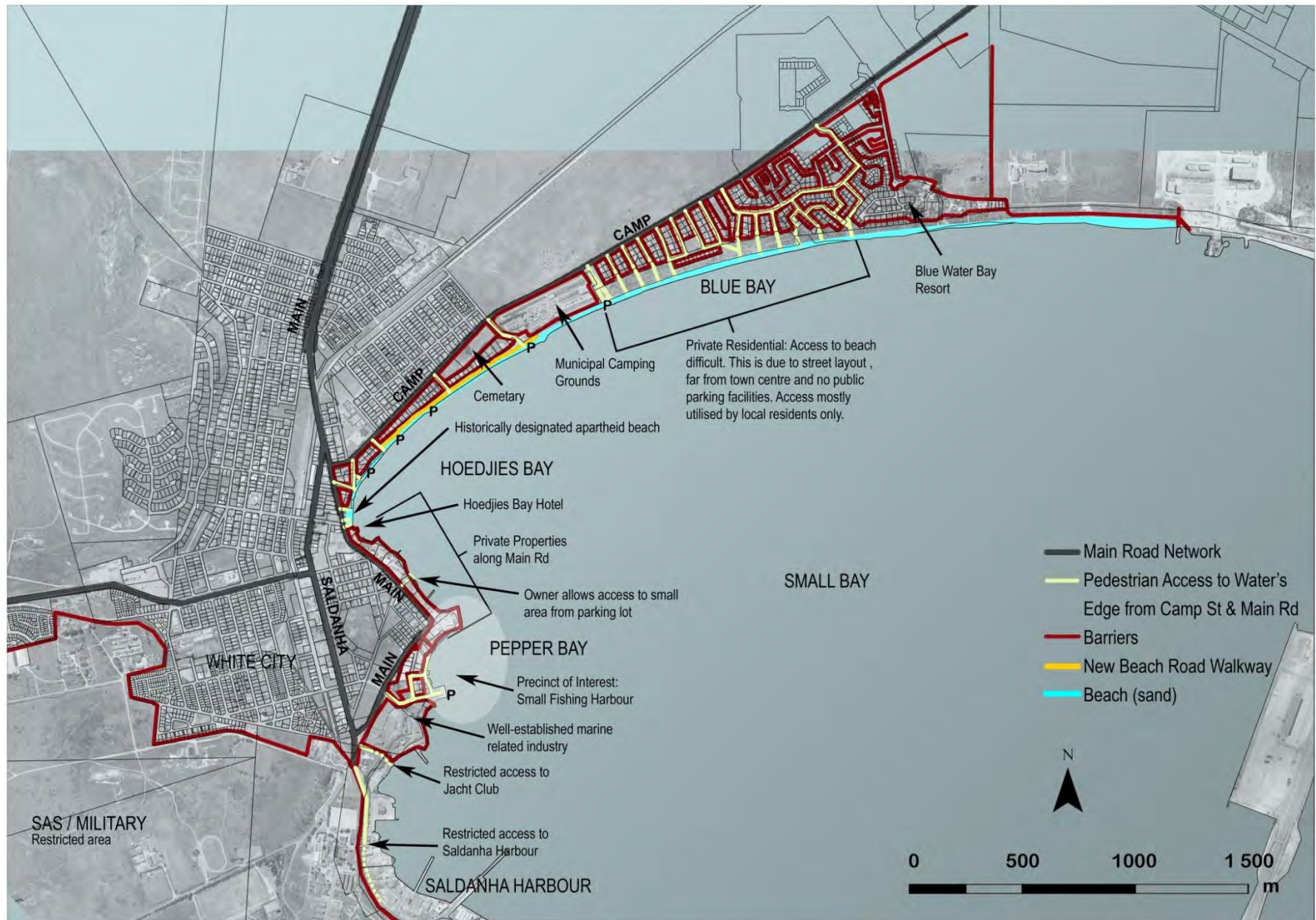


Figure 30: Map showing current limited access to water's edge from the Main Road networks (Author, 2013)

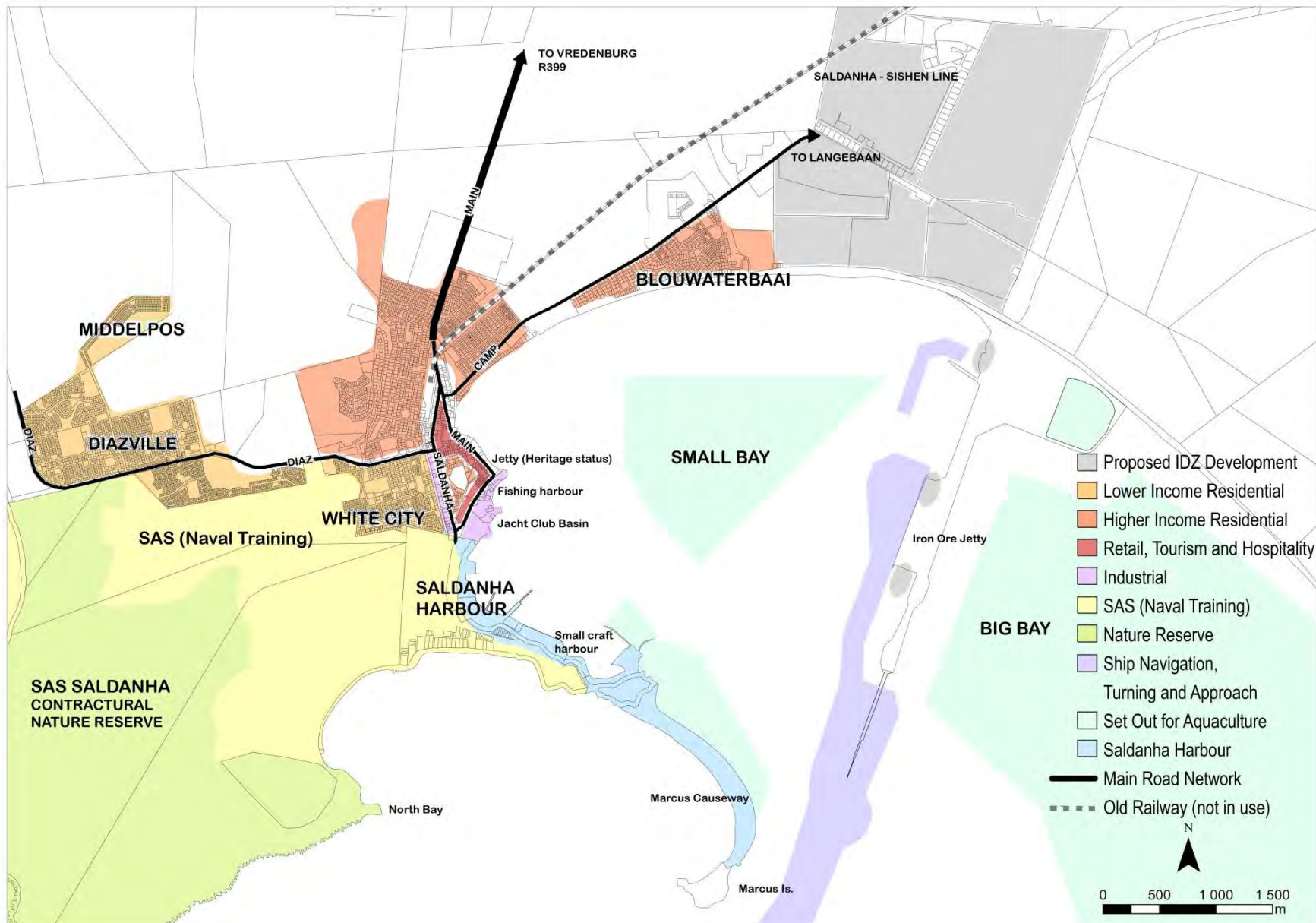


Figure 31: Zoning of Saldanha Bay (Author, 2013)

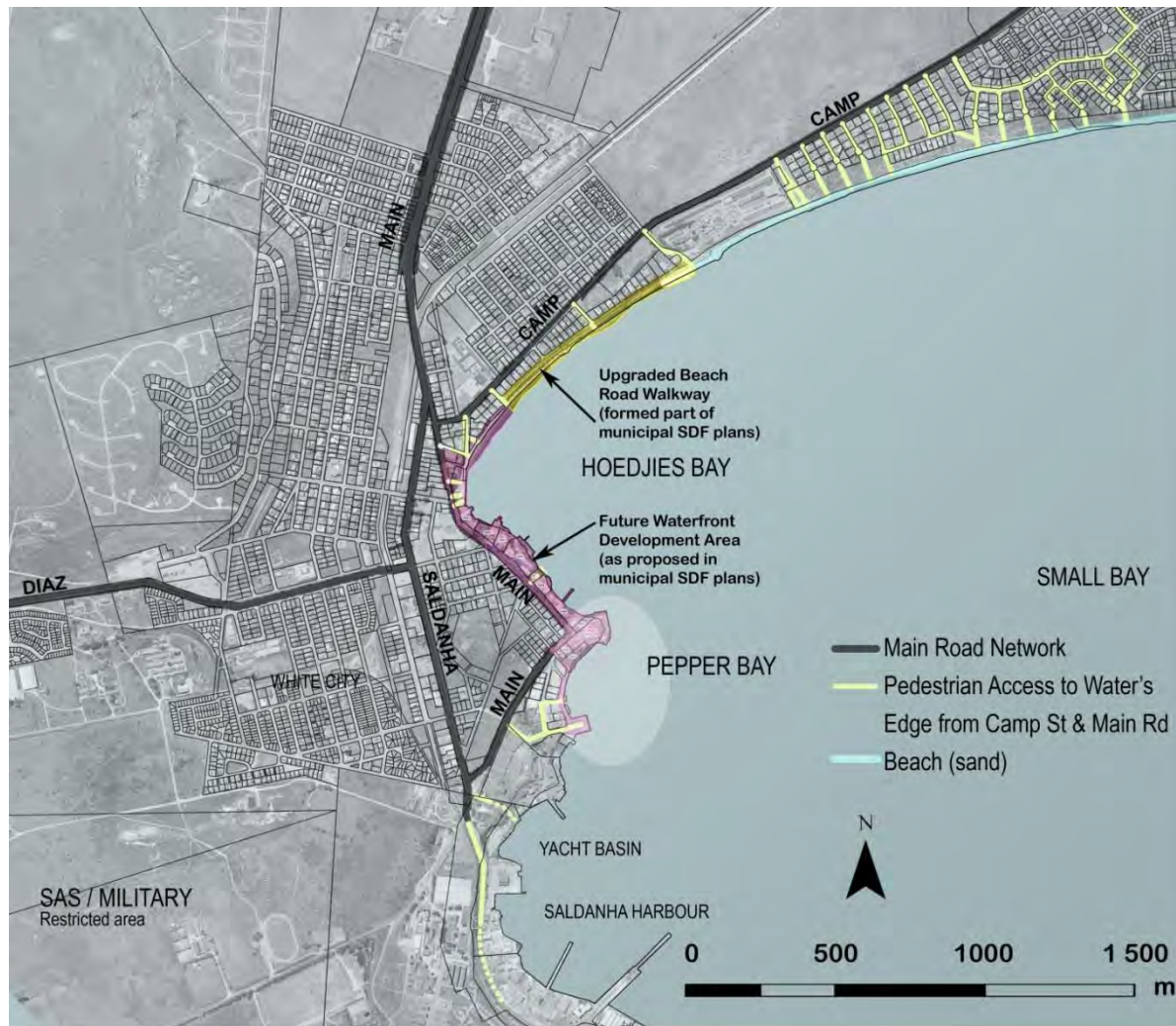


Figure 32: Possible link of the Small Fishing Harbour Precinct to the future waterfront development proposed in the 2011 municipal SDF plans. (Author, 2013)



Figure 33: One owner of a private property on Main Road (with a restaurant and living units) allows access to the water's edge to the general public (not only patrons of the restaurant) through his parking area. (Author, 2013)



Figure 34: Local residents use this access (refer to image above) to get to a fishing spot. (Author, 2013)

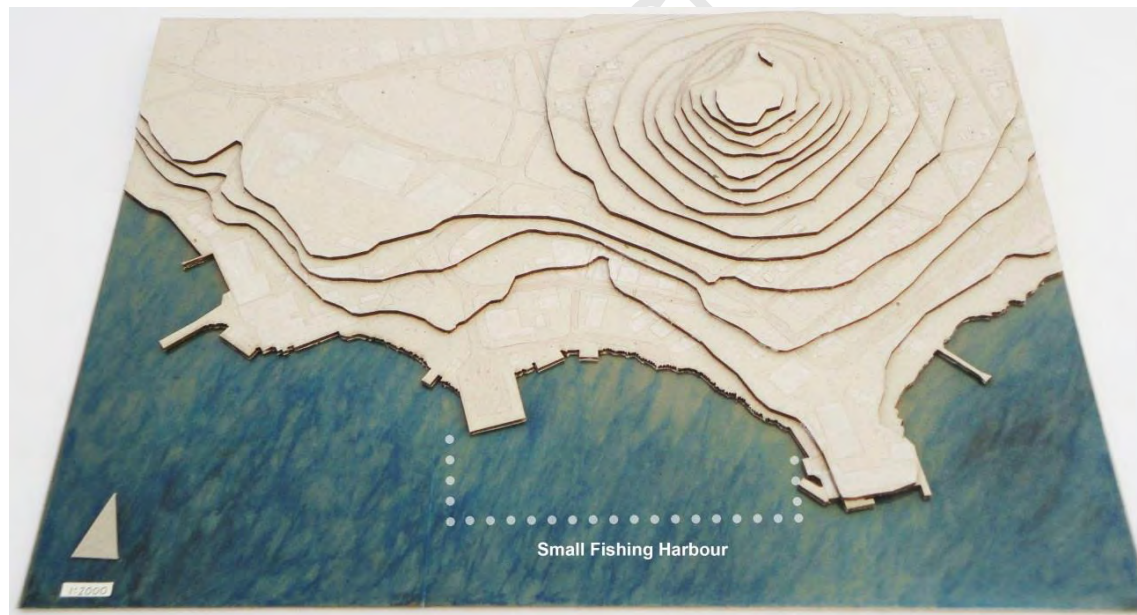


Figure 35: 1:2000 model of the Small Fishing Harbour precinct with Hoedjieskop in the background (Author, 2013)

## Recovered Landscape

The Small Fishing Harbour precinct has a peripheral nature.

Even though most of the buildings that are still in use are related to the marine industry, it is located some distance from the bigger Saldanha Harbour where other marine related industries are located. (Refer to **Figure 32**)

It has been assigned recreational purposes by the local municipality (such as restaurant, fishing and boat launching) but it is separated from the beaches, camping grounds and higher income areas that are at the moment more readily associated with tourism. (Refer **Figure 31**) It is physically separated from Main Road by industrial sites and roads that have been closed off through historical developments. Currently there is only one way of entry left. This entry is situated quite far from the existing retail and hospitality hub at the south end of Main Road. (Refer to **Figure 36**, **Figure 37** and **Figure 39**) The side of Main Road where this entry is located is mostly undeveloped and contains the remnants of a burnt down restaurant. (Refer to **Figure 38** and **Figure 185**) After the activity of Main Road to the south this area appears quite desolate.

There is a general harshness in the materials that were used to construct parts of the ground plane. (Refer to **Figure 38**)

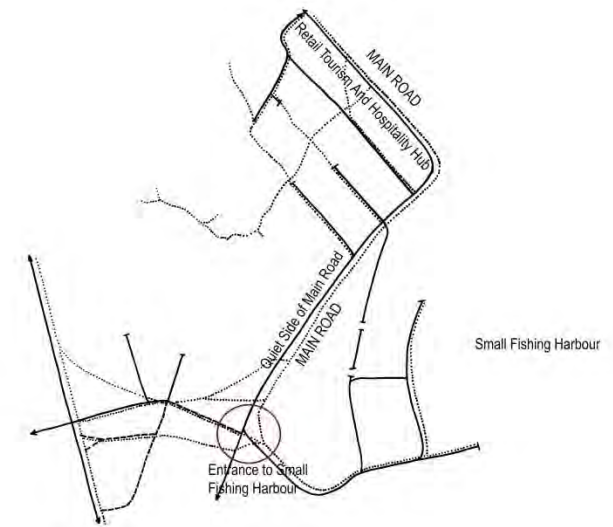


Figure 37: Different sides of Main Road (Author, 2013)



Figure 36: Plan indicating restricted access to water's edge today. (Author, 2013)



Figure 38: Tarmac dominates as ground plane material. (Author, 2013)



Figure 39: From left to right: 1968, 1993 and 2011 aerial maps of Saldanha Bay showing changes in movement routes over time. (Author, 2013)

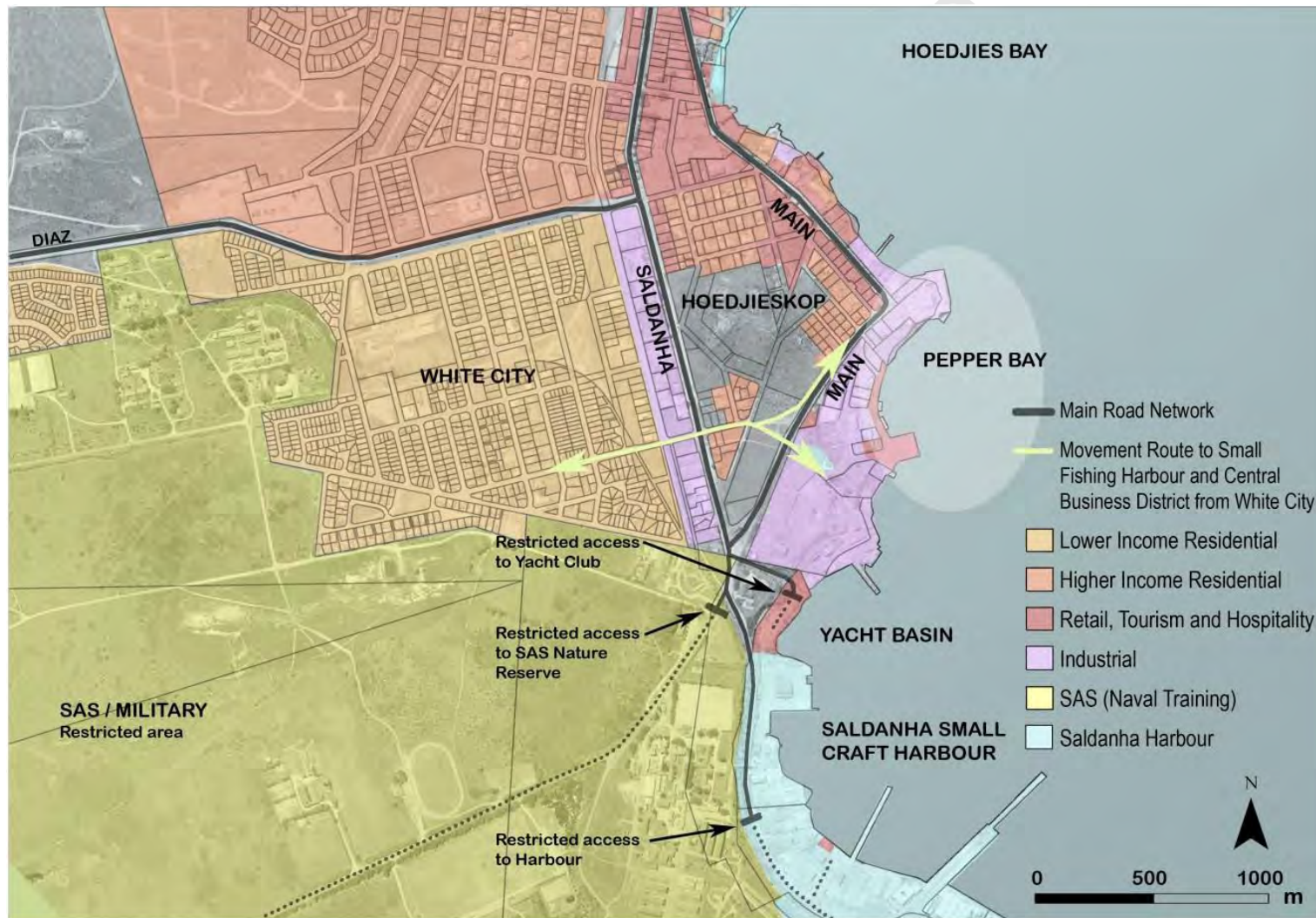


Figure 40: Movement of people from White City to central business district and Small Fishing Harbour (Author, 2013)

## Existing Activities

As mentioned before the precinct already has a public role. Recreational fishing, boat launching and buying simple seafood meals like fish and chips from the restaurant and takeaway shop are popular activities throughout the year. Activities like boat launching peaks during the end of year summer vacation. Another activity that is popular throughout the year is just simply to come and watch the scenery and activities such as seals coming ashore, local fishermen or commercial crayfish, mussel and oyster boats docking and offloading produce. (Refer to Figure 41 and Figure 42)



Figure 41: Locations of existing activities



Figure 42: Existing activities



Figure 43: Land Ownership (Author, 2013)

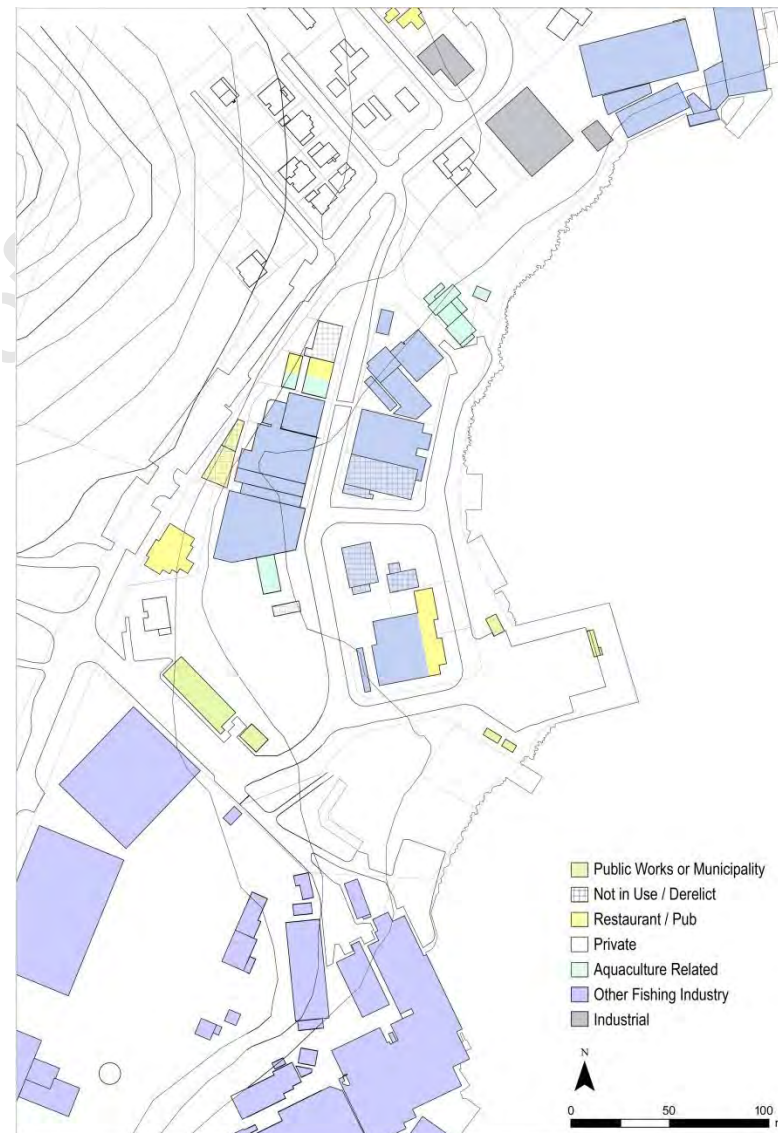


Figure 44: Land Use (Author, 2013)

## History

When investigating the history of Saldanha Bay I discovered two significant stories that often go untold. The first is about forced removals from Hoedjieskop that happened during the apartheid years. The second is about the whaling industry of 1909 to 1967 in Saldanha Bay. More details on these follow below.

### Forced Removals

At Saldanha Bay's only museum, the Cultural Village Museum, I learnt for the first time about the forced removals from Hoedjieskop during the apartheid years. Although there is no concrete evidence to prove this fact, it is very likely that the people were relocated either to Diazville or White City where the greater part of the poorer communities are located today. (Refer to **Figure 31** and to **page 92** in the *Appendix*) These are segregated communities that are separated from Main Road by an industrial area.

A piece of text in [*Dream of the West Coast*] makes a reference to this historic fact (see next) and a photograph that is included implies that they were relocated to either Diazville or White City. (Refer to the image below.)

“Kliprug se gewelhuysies is nou nuut gepleister en gekalk maar die vensters en die deure soek nog soos vanslewe Hoedjiesbaai toe...” (Botha & Walters, 1976, 12)

‘The gable houses of Kliprug are freshly plastered and lime washed but the windows and doors are still searching Hoedjies Bay like before.’ (Botha & Walters, 1976: 12 (in Afrikaans). Translated here by author from Afrikaans to English.)

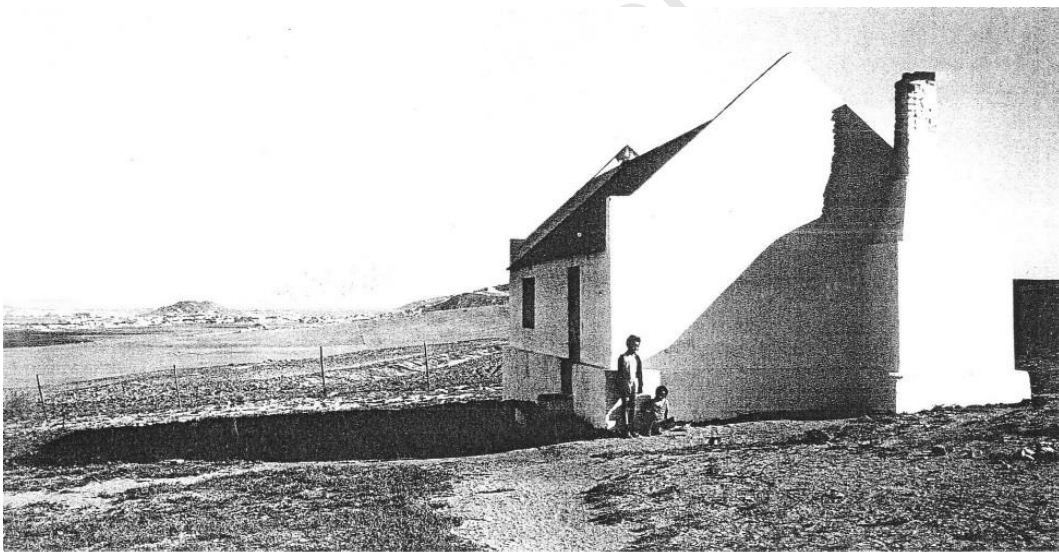


Figure 45: One of the first houses of Kliprug. According to the view of Hoedjieskop on the left in the photograph it was taken in either White City or Diazville. (Botha & Walters, 1976, 12)

Note that Pepper Bay was originally also referred to as Hoedjies Bay. Today the northern part of the bay off Saldanha Bay is generally referred to as Hoedjies Bay, while the bay at the Small Fishing Harbour is referred to as Pepper Bay. (Refer to Figure 32)

There are no official land claims for Hoedjieskop. There was however a late application which was advised to rather go through a process of negotiation with the Municipality of Saldanha Bay since the land in question belongs to the Municipality. (Smit, W., 2013)

The discovery of this story also proved how a natural landscape like that of Hoedjieskop can hide agendas or history from the uninformed viewer. (Pollak, 2006: 127) What is interesting is that the first legible aerial photograph available (1968) shows the scars on the landscape on Hoedjieskop. (**Figure 46**) This falls in line with the time period of forced removals in South Africa. At the 2011 aerial photograph one can see that the disturbed vegetation is still not fully recovered. From the aerial photograph one can also see white surfaces below Main Road where the factories of the Small Fishing Harbour are today. It seems that the ground there was also then recently levelled and prepared.

There is now an important pedestrian movement route from White City to Main Road and the Small Fishing Harbour on the South side of Hoedjieskop. (Refer to **Figure 40**) The importance of the Small Fishing Harbour as a public place that provides access to the water's edge to the people of White City becomes evident through this.

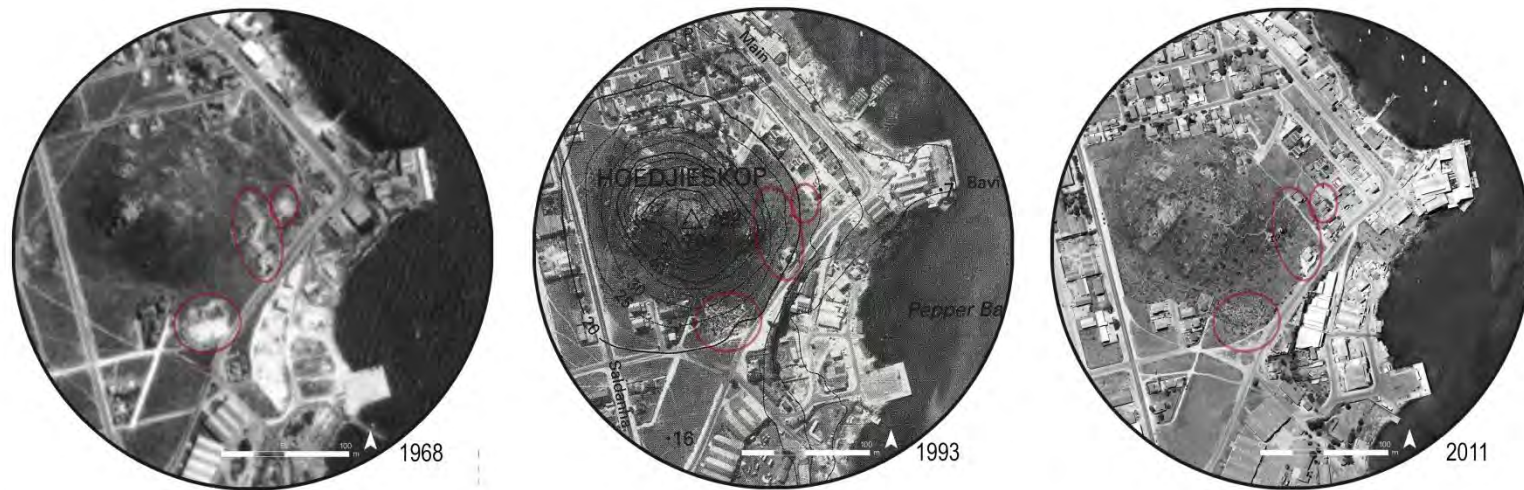


Figure 46: Scars in the Landscape (Author, 2013; Original images (left to right): Chief Directorate Surveys & Mapping, 1968; Chief Directorate Surveys & Mapping, 1993; Saldanha Bay Municipality, 2011)

## Whaling

Today the buildings at Donkergat and the adjacent Salamander Bay house the Special Forces Regiments of SANDF. (Refer to **Figure 47**) For six decades this site on an island across the bay of Saldanha was the site of whale slaughtering and processing. (Athiros et al., 2008:129, 132) (Refer to **Figure 49**)

The Southern Right Whale was the preferred target. (Athiros et al., 2008:132) It is interesting to know that Right whales derive their name from the fact that they were considered to be the right whale to hunt. They were preferred over other species, as

they have a high oil yield, are slow swimmers, and usually float when dead. (South African Museum visit, 23Feb2013) (Refer to **Figure 48**) For more information see *Task 2 of First Conceptual Investigative Works in the Appendix at page 92*.

Today access to Donkergat and Salamander Bay is completely restricted due to the SANDF operations and so the story about the Whaling industry in Saldanha Bay remains untold.



Figure 47: Location of Donkergat and Salamander Bay (Author, 2013; Original Image: Google, 2007b)

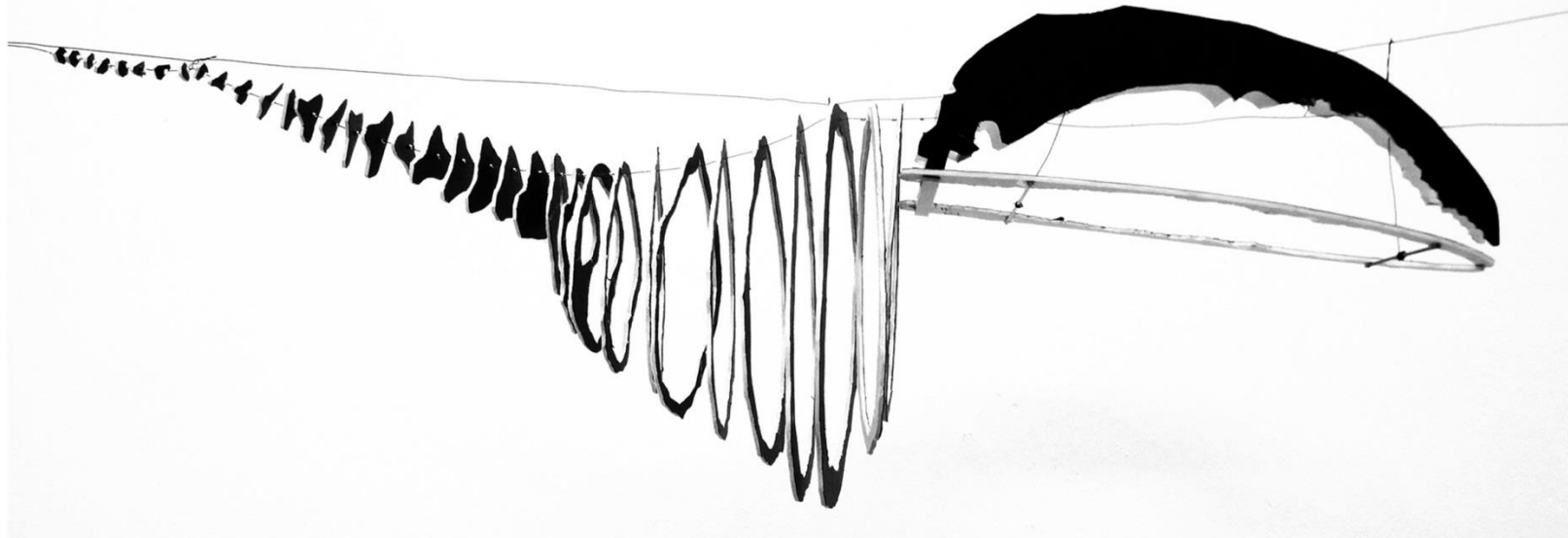


Figure 48: Conceptual Investigative work: Whale skeleton model. (Author, 2013)

For more information see *Task 2 of First Conceptual Investigative Works in the Appendix. (page 88)*



Figure 49: Operations at Donkergat (Author, 2013; Original image sources all Athiros et al., 2008: 130-134)

## Technical Investigations

As one of the first steps in learning about natural processes that impact the site Oceans, Currents and Tides were investigated. (Refer to *Oceans, Currents and Tides* in the *Appendix: page 91*. Also refer to **Figure 50** below.)

Through investigating climate zone, water temperature, air temperature, rainfall, fog and wind a unique context with a semi-arid Mediterranean climate and sparse vegetation was discovered. A graph summarised these findings. (Refer to *Climate* in the *Appendix: page 92*. Also refer to **Figure 51** below.)

Marine construction techniques were also investigated. Details on these techniques can be viewed in *Construction at the Water's Edge* in the *Appendix: page 111*.

Specific productive strategies were also considered for their feasibility and potential to contribute to the community in a positive way. They are fog catchers and marine aquaculture. These are discussed in a summarised manner below. More detail on both is available in the *Appendix: Fog Catchers: page 101* and *Marine Aquaculture: page 103*.

Understanding the natural processes also proved to be very useful during the subsequent investigations into marine aquaculture farming techniques and marine construction techniques.

These were considered to be the most important natural processes of the site that need to be understood in order to propose an appropriate design scheme.

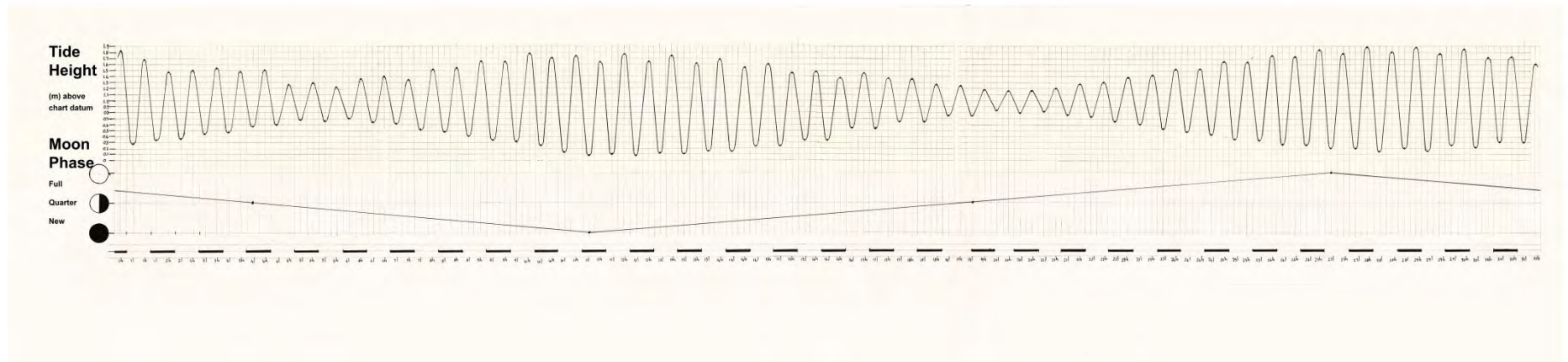


Figure 50: Tidal Patterns for March 2013 (Author, 2013; Data source: SANHO, 2013)

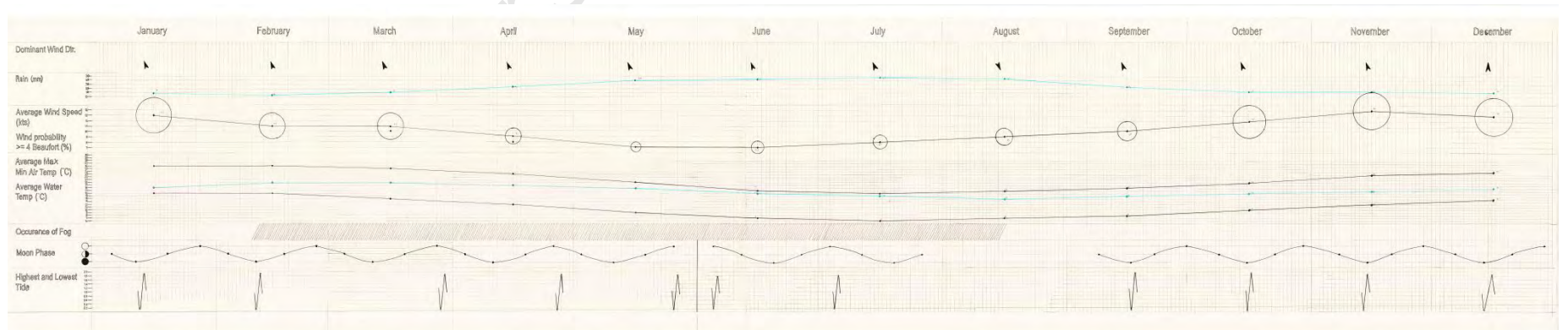


Figure 51: Climate of Saldanha Bay (Author, 2013)

## Fog Catchers

The Saldanha Bay area has cool temperature conditions with very little rainfall. This is largely caused by the large-scale stable climatic weather patterns of this region and the cold coastal waters of the West Coast that do not evaporate easily. On the other hand the occurrence of fog is common during the winter months. (Refer to *Climate* in the *Appendix: page 92* and **Figure 52**.) For these reasons fog catchers have great potential in this semi-arid region. (Refer to **Figure 53**)

Fog catching is a technology that allows the catching of microscopic drops of water that are contained in fog. (Ideass, 2012) The captured water is suited for agricultural irrigation and domestic use. (Quezada et al., 2013) For more detail on fog harvesting techniques refer to *Fog Catchers: page 101*, in the *Appendix*.

## Marine Aquaculture

Another thing that makes Saldanha Bay unique is its existing marine aquaculture sector. As mentioned before in earlier years Saldanha Bay had an abundance of natural fish resources. Today cultured fisheries production are increasing and becoming better alternatives over the fish trawling industry due to a massive decline in natural resources. (Dept. of Agriculture, Forestry and Fisheries, 2012: 2)

Being one of few natural sheltered embayments in South Africa, Saldanha Bay is very suited for aquaculture. (Anchor Environmental Consultants, 2011) Another factor that makes Saldanha Bay very ideal for aquaculture is the periodic upwelling of cold, nutrient rich waters that result in a very high biological productivity of marine organisms. (Glavovic, 2000: 34) The fertile waters make it an excellent natural breeding-ground for mussels and Saldanha Bay is the only place in South Africa where mussels are cultivated.

In the first half of the year the technologies around Mussel Framing, Oyster Farming and Seaweed Farming were investigated. Later in the year a new technology that is more sustainable was investigated and subsequently became part of the final design proposal: Integrated Multi-Trophic Aquaculture (IMTA). IMTA systems combine the fed aquaculture of fish with extractive inorganic aquaculture of seaweed and extractive organic aquaculture of shellfish. In such a system the by-product wastes from one resource become the inputs for another. (Ridler, 2007: 52) More detail on IMTA systems can be found in the *Appendix*. (See *Integrated Multi-Trophic Aquaculture: page 108*.) Due to its relevance in IMTA systems general mussel farming and seaweed farming methods are also discussed in more detail in the *Appendix*. (Refer to *Mussel Farming: page 92* and *Seaweed Farming: page 105*.)

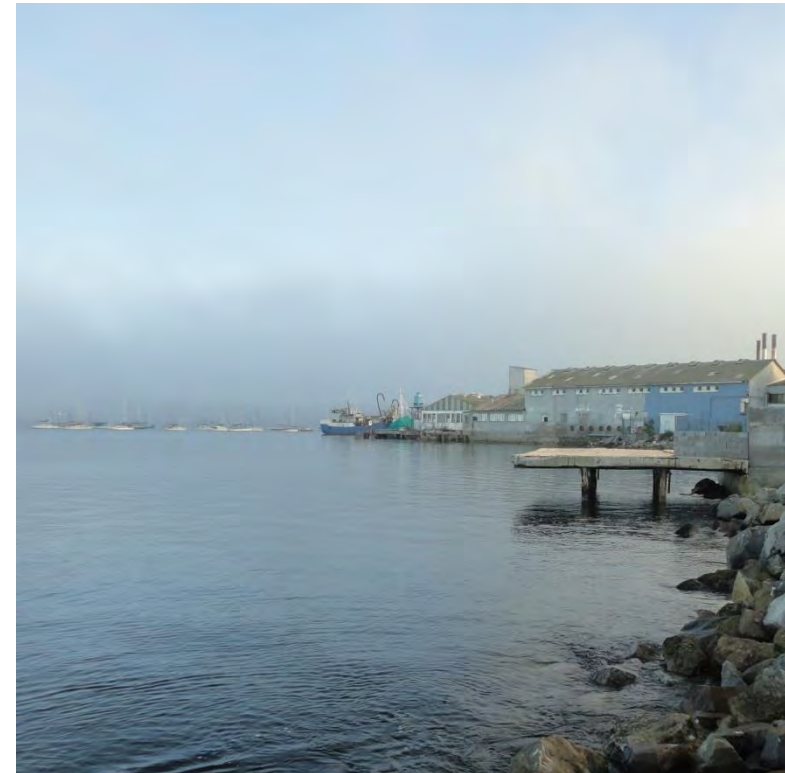


Figure 52: Ruin of jetty on the southern side of the Small Fishing Harbour precinct with fog moving in. (The buildings of Southern Sea Fishing as well as the yacht basin are visible.) (Author, 2013)



Figure 53: Fog catchers (Quezada et al., 2013)



Figure 54: Mussel Rafts next to the Marcus Causeway in Saldanha Bay (Visser, 2012: 36)

## Design Development

Throughout the design development process the unique existing characteristics and experiences of the precinct were considered. The focus on these aspects subsequently informed design decisions.

Before the urban framework and programme were fully developed a few design development exercises were done. The first step was to investigate the existing physical conditions of the Small Fishing Harbour. Next a few exercises in reinforcing experiences was done. Through this the unique qualities of the retaining wall and the rock outcroppings of the open piece of land adjacent to Hoedjies Point were identified.

Together with the old factories of Hoedjies Point this unique area was then defined as an important node, the Maritime Heritage node. It provides a link from Main Road to the Small Fishing Harbour. The need for other important urban links, such as direct link from Hoedjieskop to Main Road, was also identified. More details about these design considerations follow in *Sketch Design* below.

After this the urban framework and programme was developed. In the urban frame work two nodes are proposed: the Maritime Heritage node (identified earlier) and the Old Quay node. The concepts developed here were taken through to the final design.

In the design process both of these nodes were then developed further. The Maritime Heritage node was considered to be the most important in terms of the link that it provides between Main Road and the Small Fishing Harbour and was developed in the most detail.

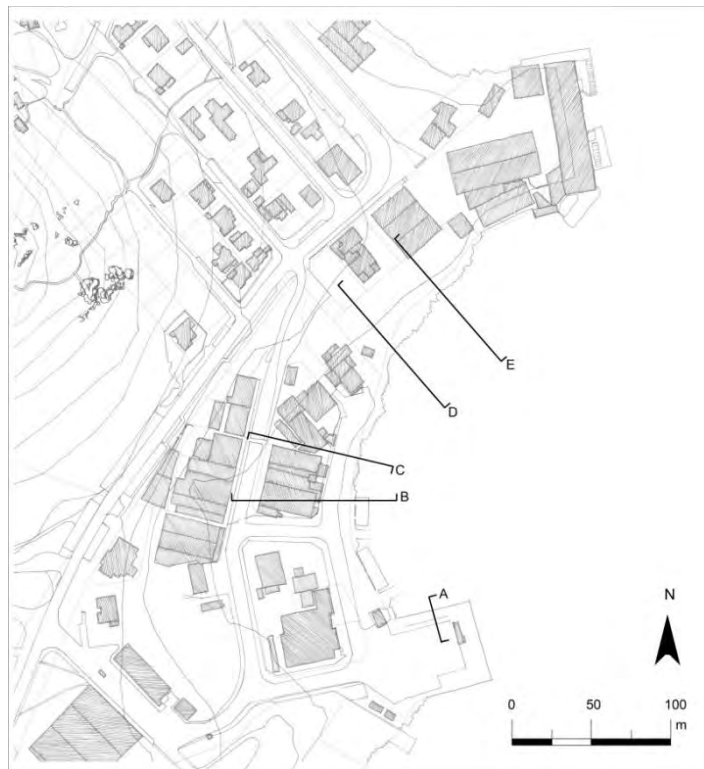


Figure 56: Location of the sections of existing site (Figure 57 to Figure 59)

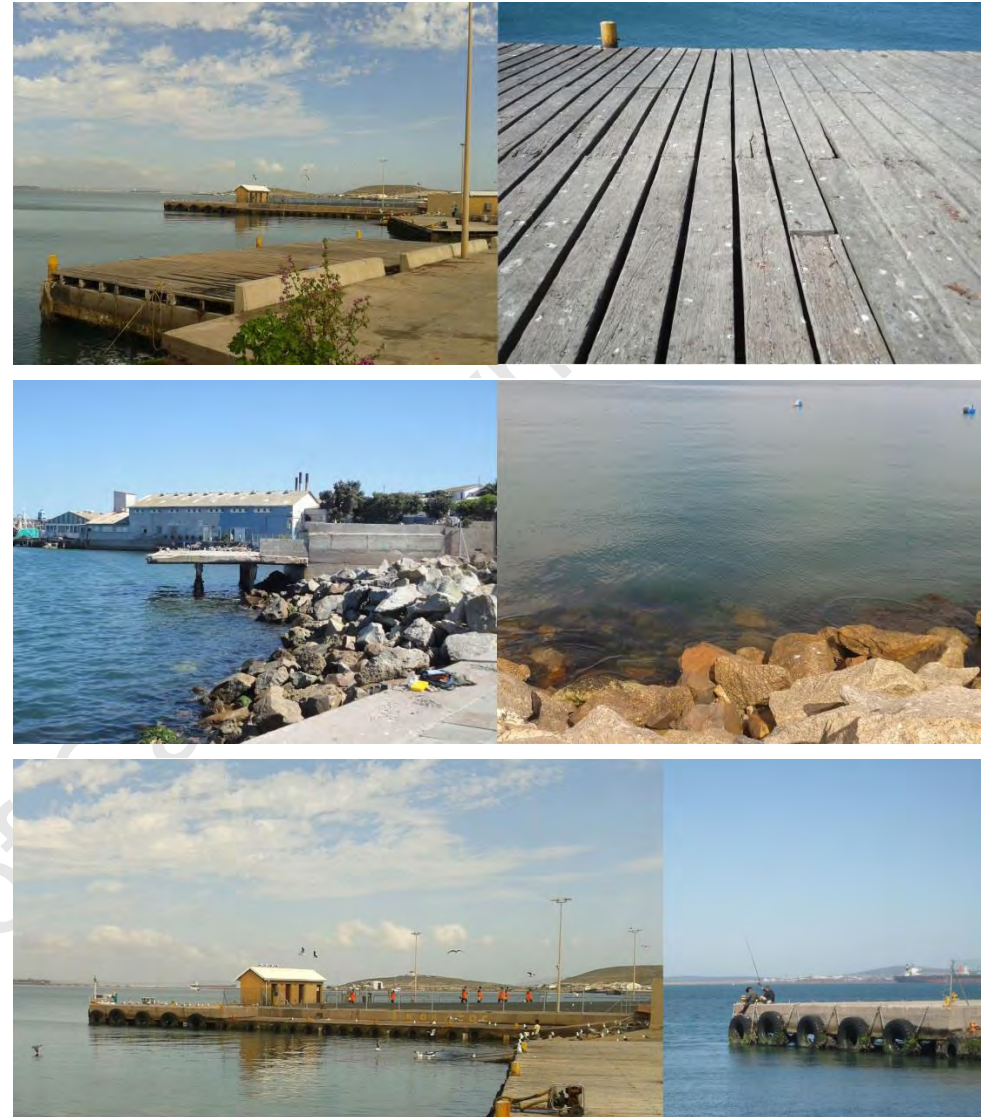
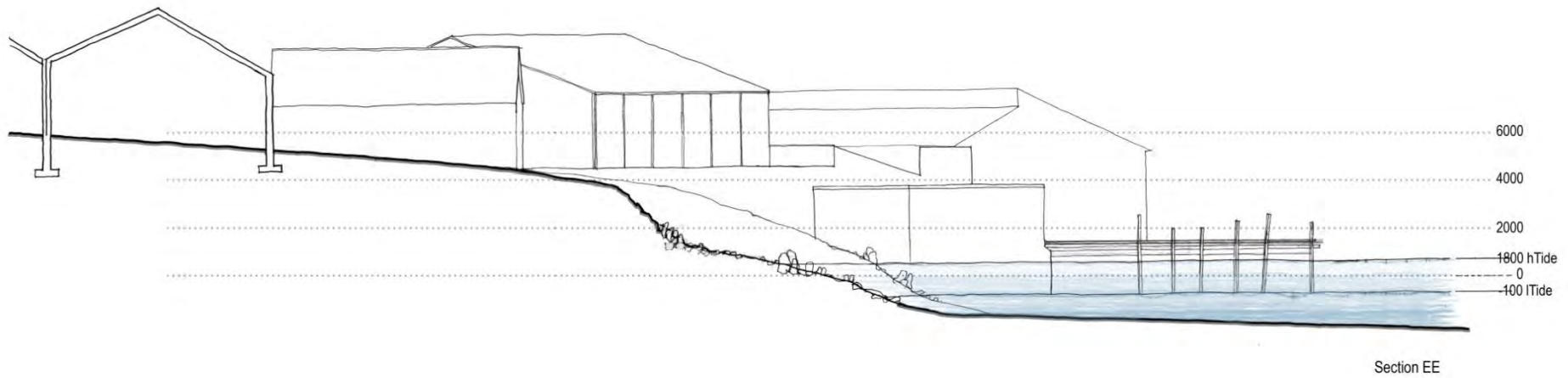


Figure 55: Material variations of man-made edges at the fishing harbour of Saldanha Bay (Top: timber jetty on concrete piles, middle: stabilized edge of granite boulders, bottom: concrete wharf on concrete piles) (Author, 2013)

### Sketch Design

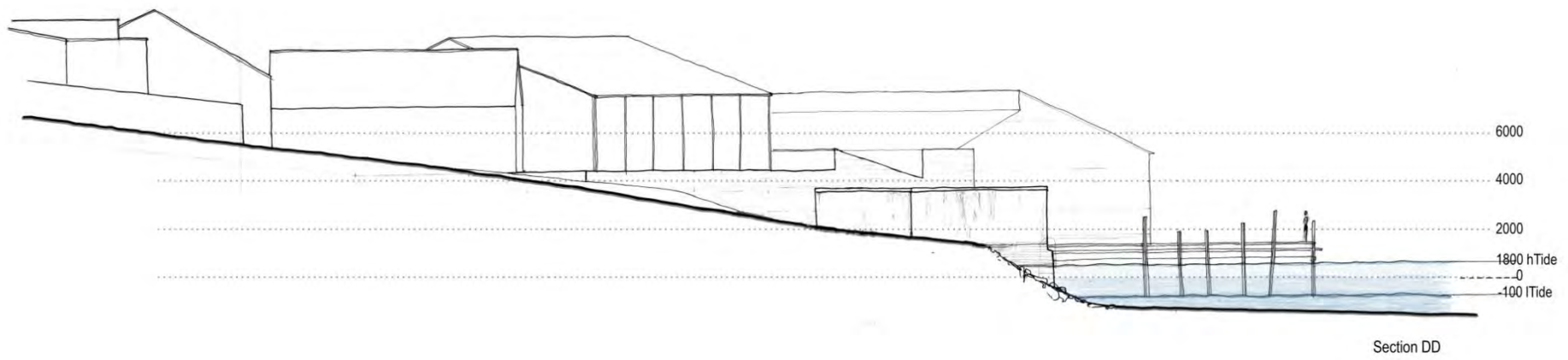
#### The Existing

Pepper Bay originated as a natural bay and therefore some areas have steep slopes towards the water. Together with construction methods at the water's edge these existing conditions were explored first. Refer to **Figure 55** for material variations of man-made edges at the study area. (Also refer to *Construction Methods at the Water's Edge* in the Appendix: **page 111**)



Section EE

Tide (mm chart datum)  
Level (mm above sea level)



Section DD

Figure 57: Sections through existing site at the northern side of the precinct. (Top: Section EE, Bottom: Section DD) (Author, 2013)

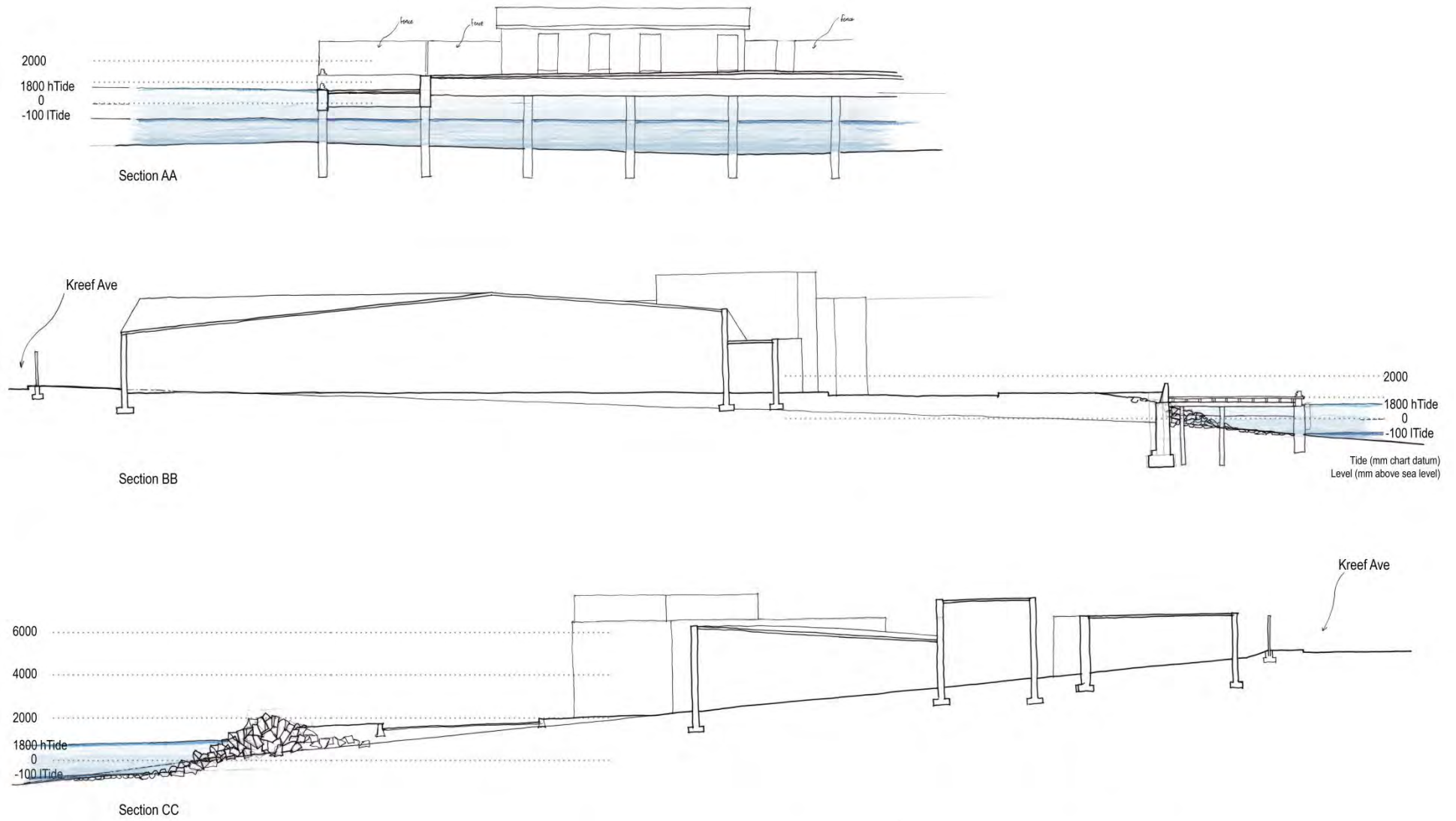


Figure 58: Sections through existing site at the old quay. (Top: Section AA through old quay, Middle: Section BB, Bottom: Section CC) (Author, 2013)

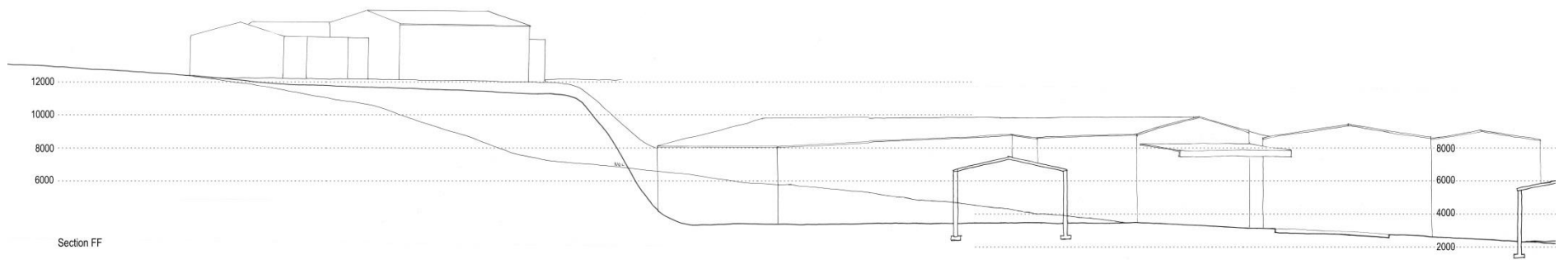
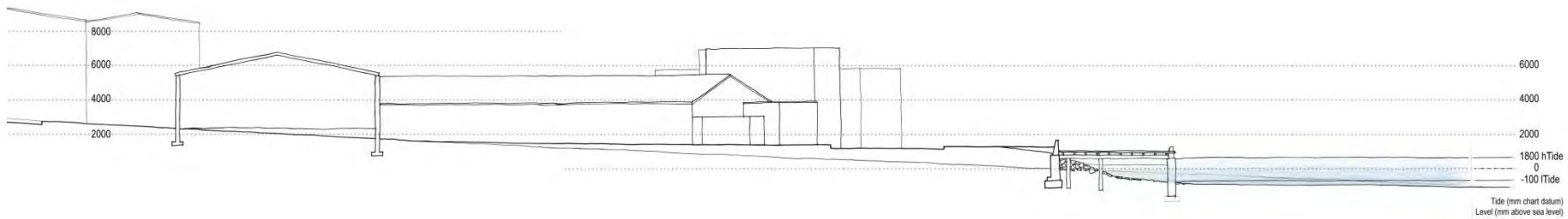


Figure 59: Section FF through the existing site from Main Road to the water's edge. (Author, 2013)

TOWN



## Three Experience Tests

As a design exercise three tests on reinforcing certain sensorial experiences of the Small Fishing Harbour were done.

### *Fog at the Old Quay*

The first intervention is at the old quay and had to do with the experience of fog. The existing service buildings on the quay obstruct the view of the ocean as well as movement. (Refer to **Figure 41**) They were moved with this scheme.

A pier is added as an extension of the quay. The intervention had to do with the experience standing in fog at the end of a pier. The event of when one becomes enclosed by fog and is not able to see the shore line any more was imagined. The level changes of the structures on the pier had to do with how structures of varying heights appear and disappear in fog. The difference between light and dark materials in fog was also considered.

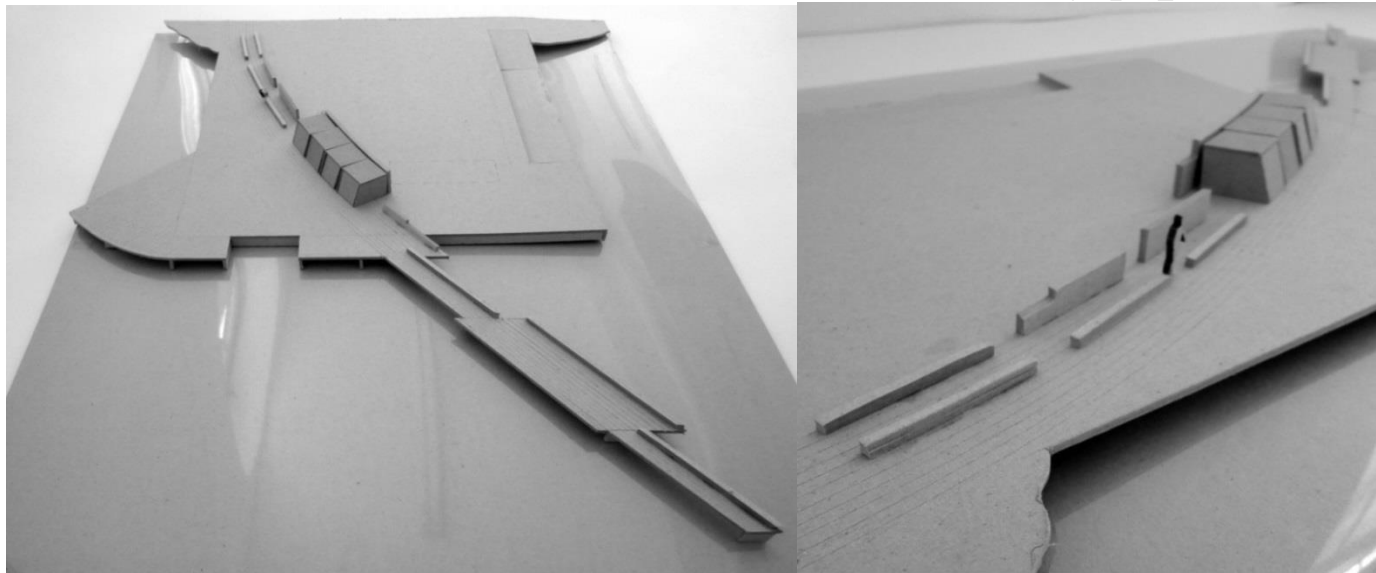


Figure 60: Variations in the heights of structures across a plane (Author, 2013)

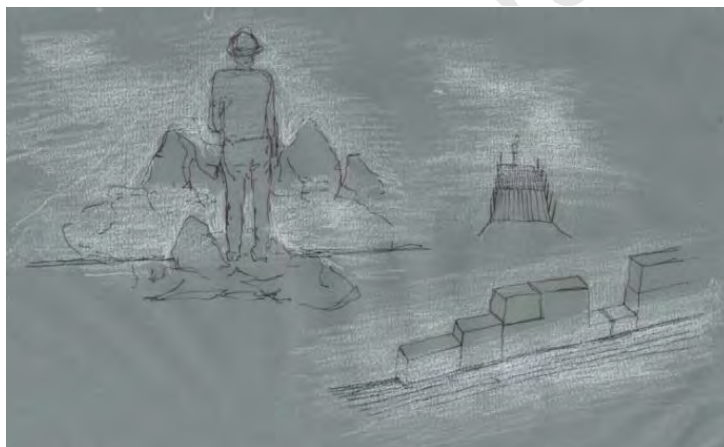


Figure 61: The appearance of level changes in fog (Author, 2013)

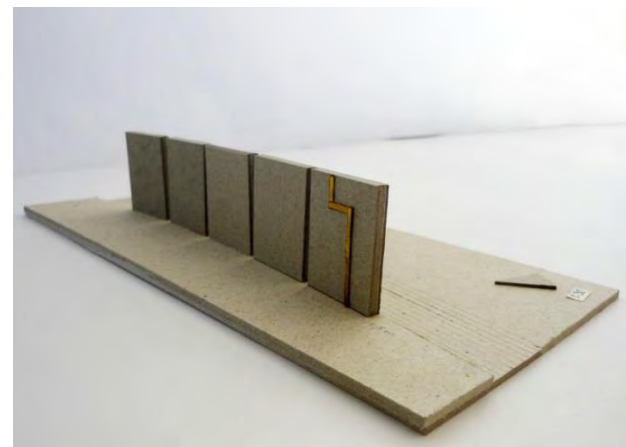


Figure 62: Light slits in a wall. The tectonics was also inspired by Carlo Scarpa's Brion Cemetery. (Author, 2013)

## Tidal Pools

The second exercise had to do with experiencing tides. Tidal pools and steps disappear and reappear with the changing tides. Through the urban analysis the location of this intervention (land that forms part of Southern Sea Fisheries) was later found to not be suitable.

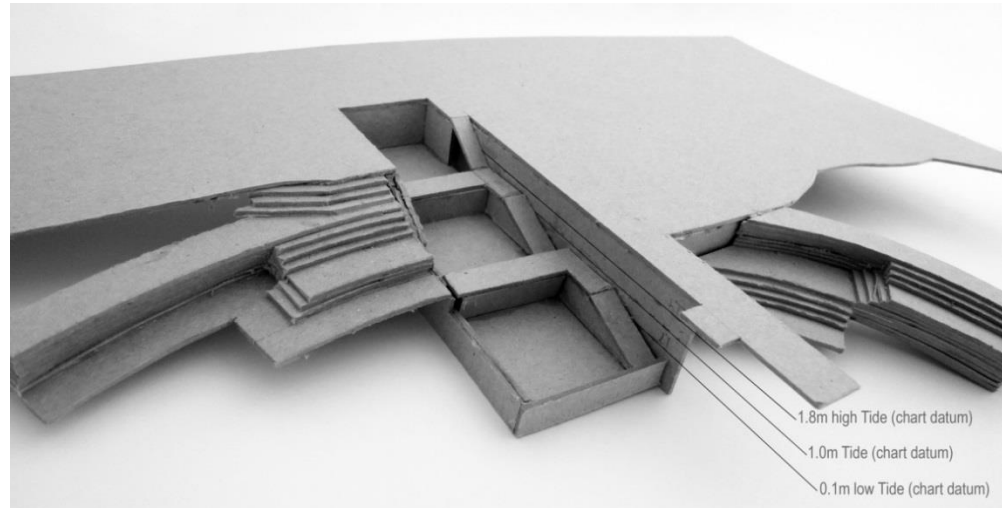


Figure 63: Tidal pools and tidal steps (Author, 2013)

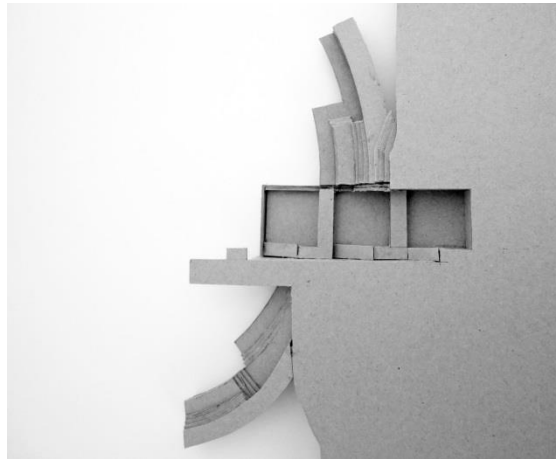


Figure 64: Tidal pool model (Author, 2013)

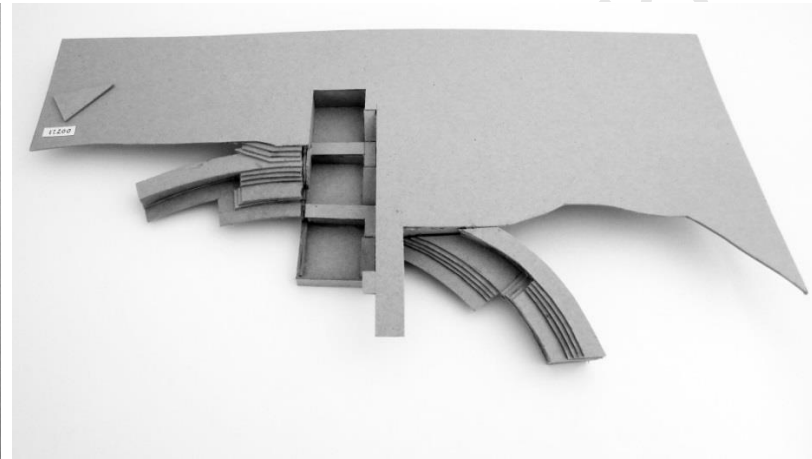


Figure 65: Tidal pool model (Author, 2013)

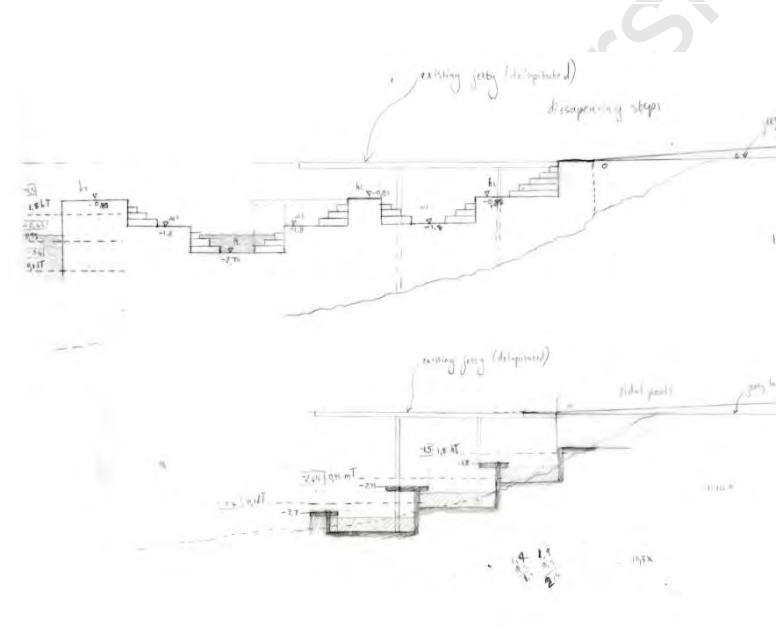


Figure 66: Concept sketches (Author, 2013)

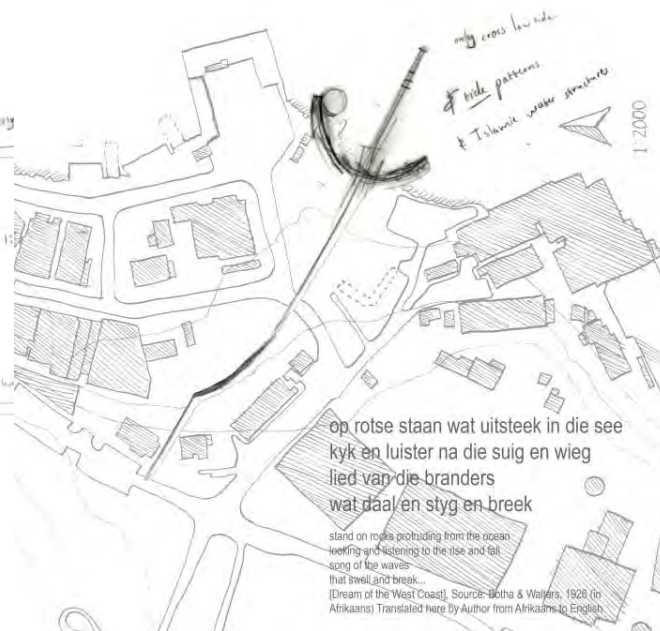


Figure 67: Location of the tidal pools (Author, 2013)

## Stand on Rocks

Through this test the unique qualities of a piece of land at the northern side of the Small Fishing Harbour, adjacent to Hoedjies Point, were identified. (Refer to back to **Figure 1**) It provides a unique picture: the white planes and visible structural frames of the old factories, the texture and tectonics of an old retaining wall and the shapes of two rock outcroppings that stand upright at the water's edge. (Refer to **Figure 68**, **Figure 69** and **Figure 70**)

The open piece of land below the factories belongs to the municipality. I wanted to create an experience of descending down towards the water and then being able to experience the tectonics of this place from up close. Before one reaches the platform where one can observe this place, there are steps at which the view is partially obstructed. The hiding and revealing of views during this descend was also inspired by Siza's way of hiding and revealing views at the Leça de Palmeira Pool complex. (Refer to **Figure 72** below.)



Figure 68: Uniquely shaped rocks on the northern side of the precinct. (Author, 2013)

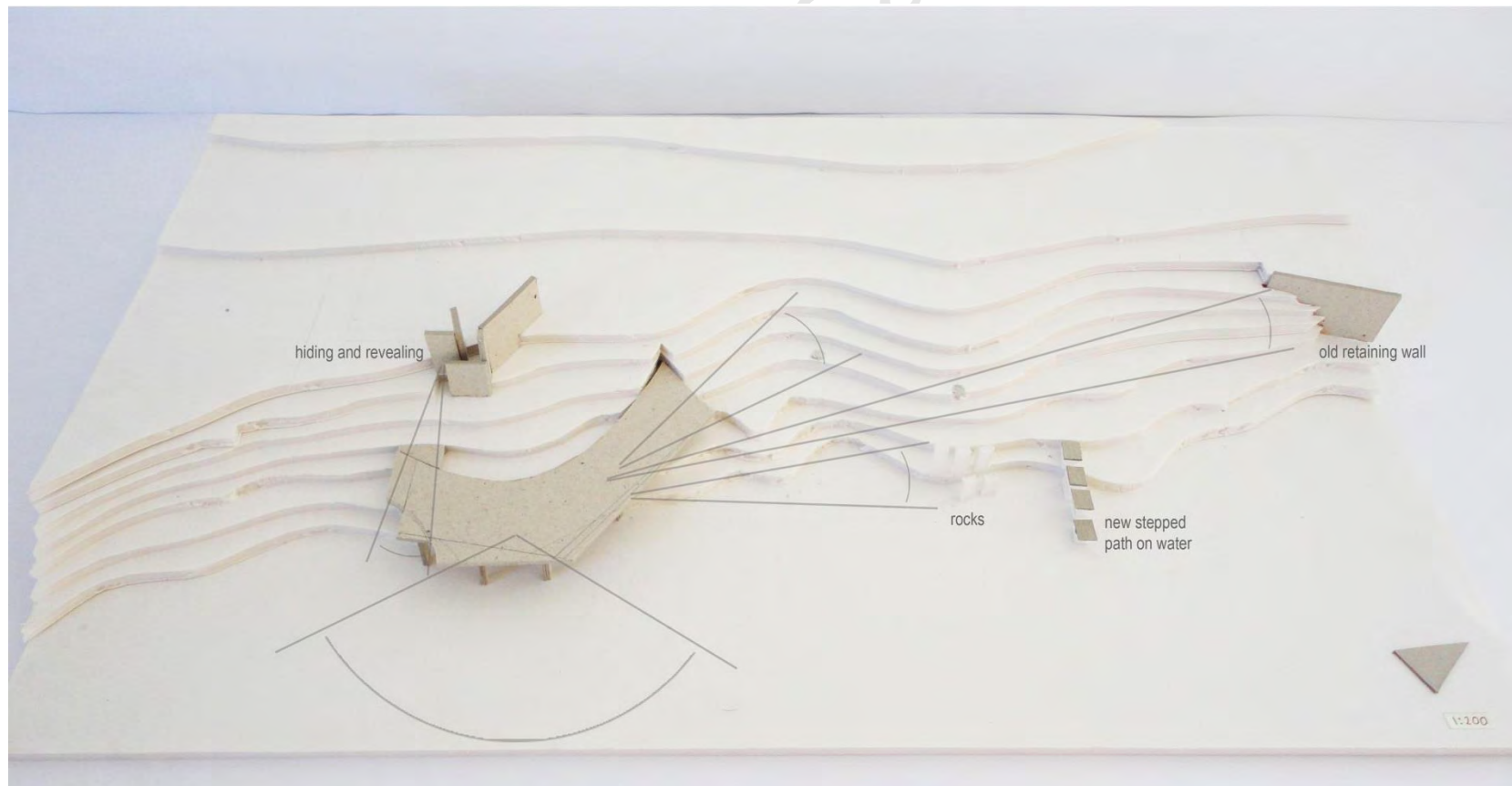


Figure 69: Revealing of views from platform (Author, 2013)



Figure 70: Dark lines are created on the old retaining wall and other surfaces where the tides move up and down. (Author, 2013)

Siza's focus on the human experience is clear when the following features of the Leça de Palmeira Pool complex are considered. The geometry of the built form creates a rich sequence of vistas as one proceeds on the walkways. (Siza, 2011; McAviney, 2013: 48) (Refer to **Figure 71** and **Figure 72**) There is also a play with one's sensory experiences in how light is manipulated. (McAviney, 2013: 51). (Balters, 2011) The concrete walls begin to obscure the views of the road behind and the ocean and the light disappears from view as one descends down the ramp towards the cave-like

entrance of the changing facilities. (McAviney, 2013: 51) The reduced light heightens the senses and forces the user to slow down. (McAviney, 2013: 51; Balters, 2011) The changing rooms are dark and partly illuminated by light piercing through narrow openings that make the rough texture of the concrete envelope visible. One can smell the treated Riga wood and the salty ocean air as it breezes through the timber structures of the changing cubicles. (McAviney, 2013: 51) (Refer to **Figure 73** and **Figure 74**)



Figure 71: Configuration of facade (Stieber, 2011)



Figure 72: Views (WikiArquitectura, 2010)



Figure 73: Shadow and light at changing cubicles (WikiArquitectura, 2010)

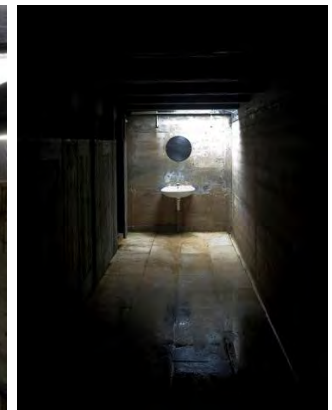


Figure 74: Shadow and light (WikiArquitectura, 2010)

## Experiential Space

Experiential space was explored during an en lodge.

*Task: Build a model of the spaces of your project as simultaneously idea and built object, as scaled and scale-less at 1:1 and at 1:1000.*

The concept included water flowing through an enclosed space and mussels that grow on ropes that hang from the structure.

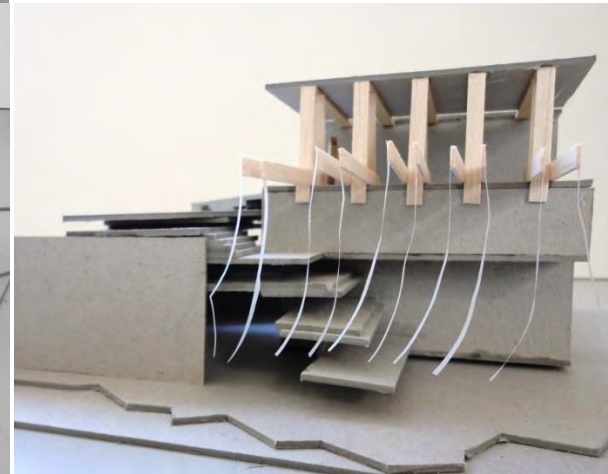
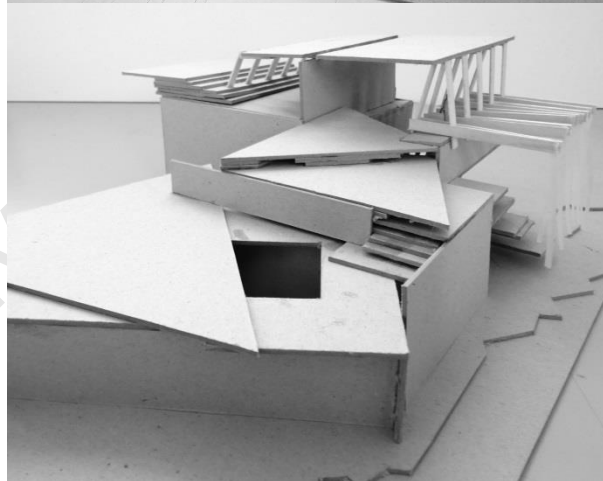
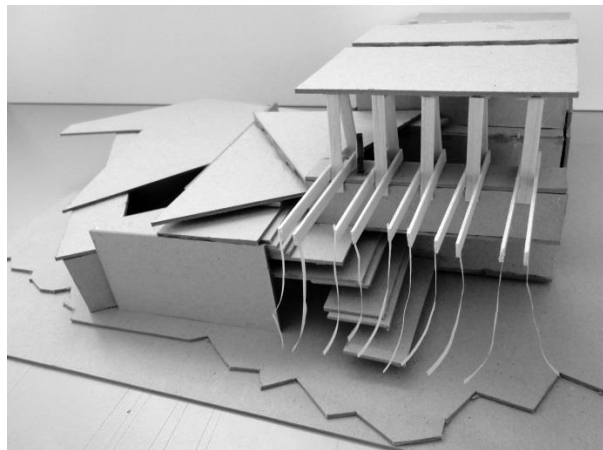
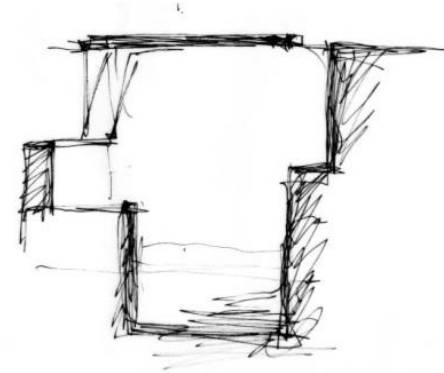
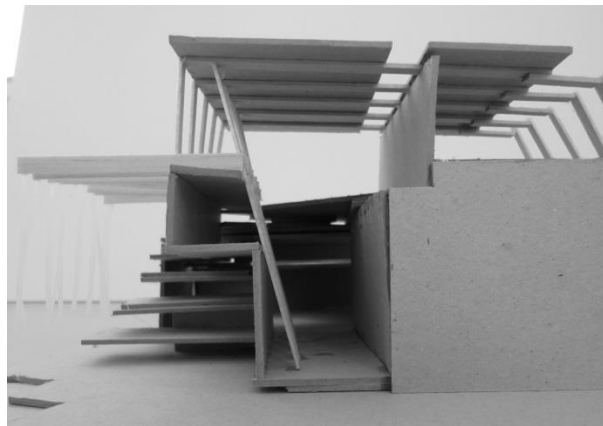


Figure 75: Conceptual Model and Sketch (Author, 2013)

## Linking Hoedjieskop

Hoedjieskop is considered to be important for its untold history. (Refer to *Forced Removals*, page 32).

With this exercise an extension of the existing footpath of the *koppie* to link it with the Small Fishing Harbour on the south east was proposed. Two new nodes as well as fog catchers are incorporated into this. The fog catchers are used to reinforce the pedestrian link. (Refer to **Figure 88** and **Figure 76**)

The starting point of the footpath is located on the north east on the *koppie* from within the residential area. It leads to two lookout points. There is not a direct link to it from Main Road. (Refer to image below.) Close to the starting point of the footpath are the 'Saldanha Cultural Village' museum and three small *rondawels*. The *rondawels* have heritage status and were donated to the municipality for a similar use. At the moment they are being rented out for private use to private persons. (Botha & Walters, 1976: 14) For the last couple of years there has been a struggle to keep the museum

open. Also refer to *Media Article 1* and *Media Article 2* (page 122 in the *Appendix*.) The museum is also too small to house extra functions like a coffee shop. In close proximity are old graves with heritage value that are unmaintained and almost not visible in the landscape. The existence of these buildings within the residential area is not always apparent from Main Road.

The idea was that the two newly proposed nodes would contain new exhibition spaces and/or coffee shops. They could be extensions of the exiting "cultural village". The one new node would act as a beacon for the graves. The other node would be on the new pedestrian path on the south east. See **Figure 81** and **Figure 82** for a description of the concept for this node.

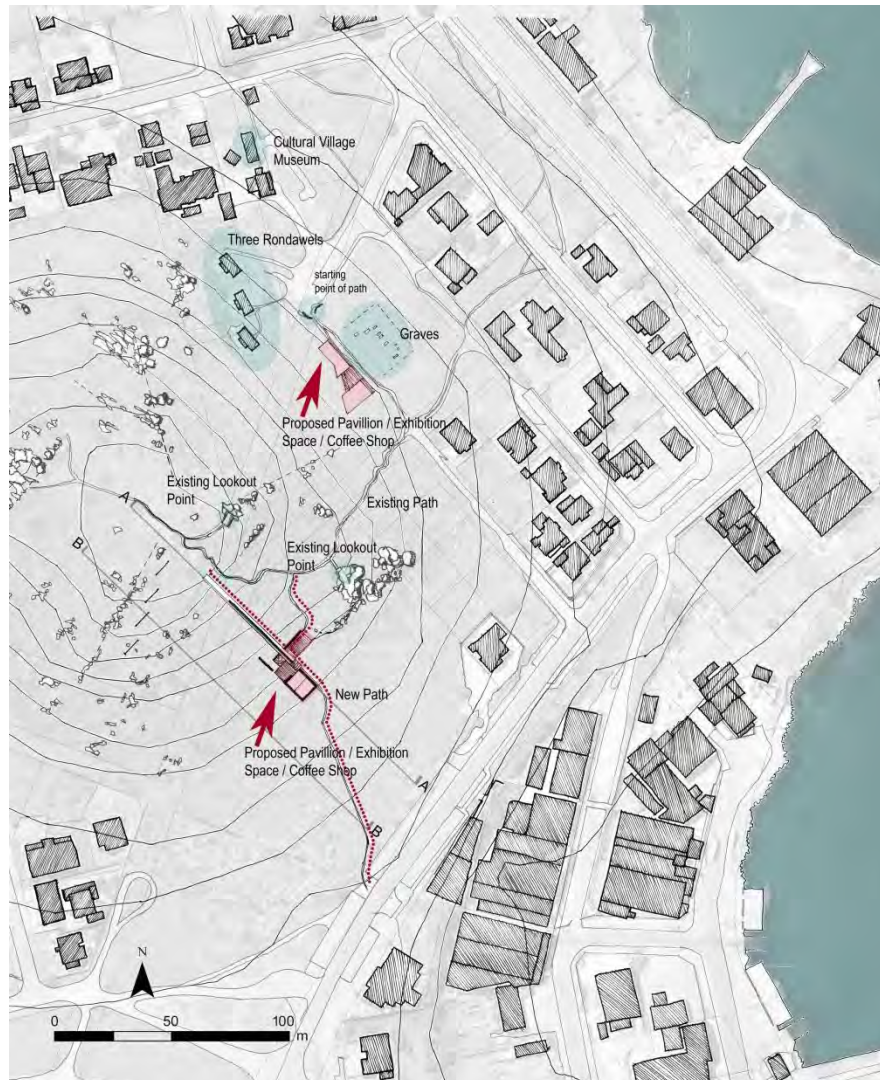


Figure 76: New nodes and connections for Hoedjieskop (Author, 2013)



Figure 77: Link diagram (Author, 2013)



Figure 78: Graves (Author, 2013)



Figure 79: *Rondawels* in background (Author, 2013)

Figure 80: Museum with unused building in foreground. (Author, 2013)

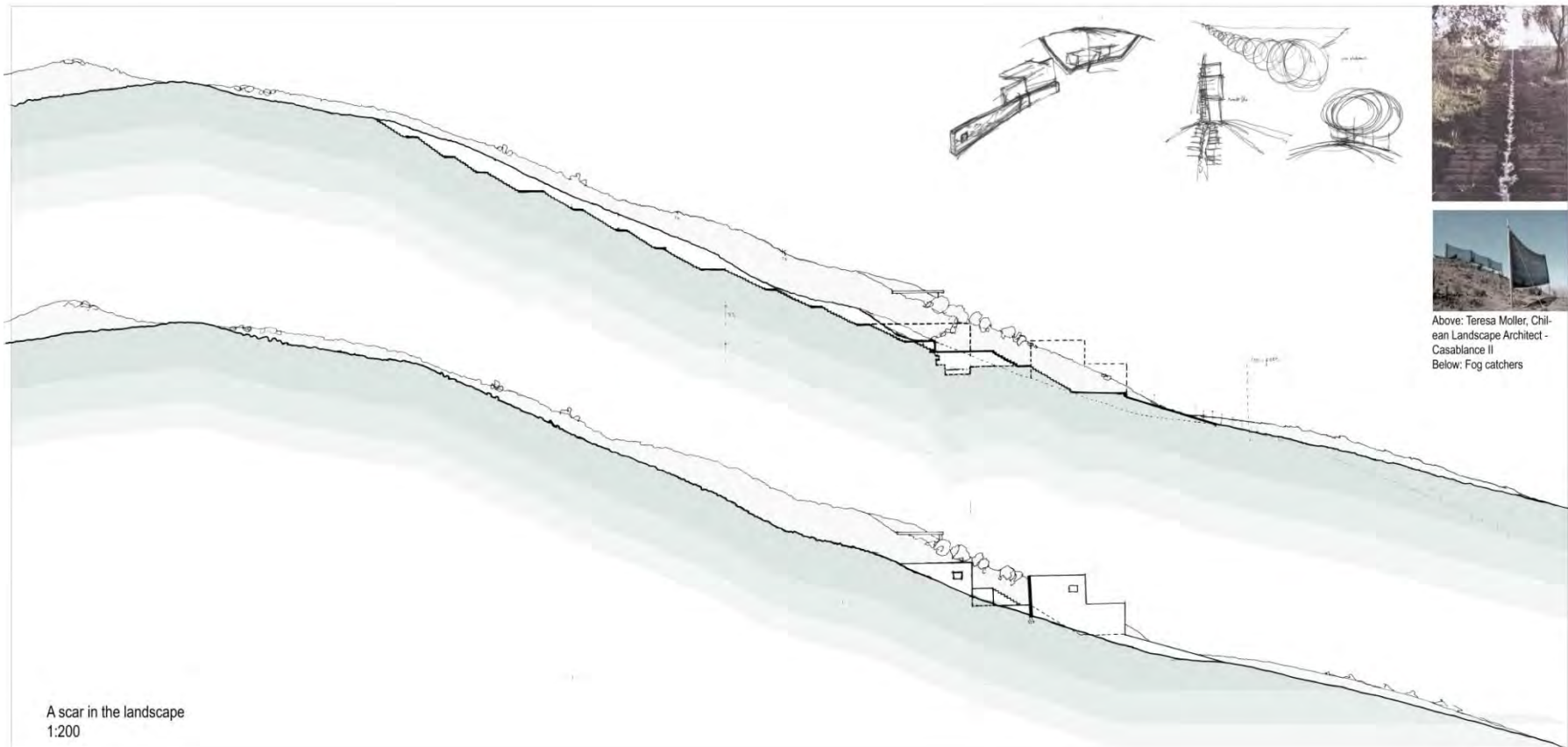


Figure 81: Sections AA (top) and BB (bottom) through the hill showing the design concept. (Not to scale) (Author, 2013)

The still visible scars in the aerial photographs (refer to **Figure 46**) inspired the concept for this design intervention. Research also indicated that the best location for fog catchers is on hills. (Refer to **page 101**)

The proposed concept was the following: Sunken steps go down the hill to create the idea of a scar in it. Fog catchers would collect water on the hill which would then be led down these steps in a visible manner. Water would only be collected on days of fog and so this would be a feature with a dynamic nature. At the point where the natural ground of the hill starts to flatten out would be a pavilion and enclosed commemorative space which could be an exhibition space and/or café.

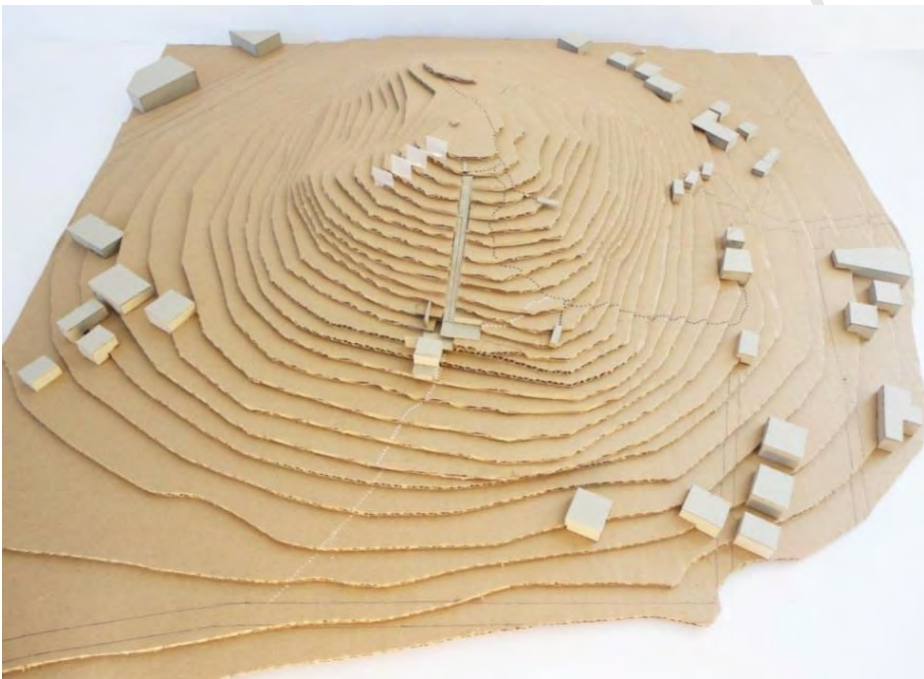


Figure 82: Model of proposed nodes and connections on Hoedjieskop (Author, 2013)

## Identification of the Maritime Heritage Node

With the next design exploration the urban framework was considered in more detail.

As mentioned before the piece of land adjacent to Hoedjies Point has some unique qualities. (Refer to **Figure 1** and **Figure 69**) This led to the conceptual idea of a heritage node that would provide a pedestrian link between the more developed side Main Road (refer to **Figure 37**) and the Small Fishing Harbour. This will improve pedestrian access to the water's edge. Other linear pedestrian links from Main Road to the water's edge were also proposed in this urban scheme. (**Figure 88** and **Figure 89**)

In 1905 the Saldanha Bay Canning Company opened the factories at Hoedjies Point. (Refer to **Figure 85**) Later they relocated and old factories from where they operated are now in various stages of neglect. Due to their age they can be considered as buildings with heritage value. Some of these buildings are rented out to various

smaller industries that are not related to the marine sector any more (such as panel beating, packaging and metal work) while others are left empty.

For this scheme three adjacent factories that face the new pedestrian link were envisioned to house a new public component like shops and a museum that commemorates the history around the fishing industry of Saldanha Bay (such as whaling and the early canning industries). Their programme was developed further in the final design scheme. Apart from that a new restaurant was also proposed. (See **Figure 90** to **Figure 98**) Note that the existing restaurant at the quay of the Small Fishing Harbour is more like a takeout café with only a few tables. (Refer to **Figure 41**) They would serve different needs.



Figure 83: The three factories that would house the new public component. (Author, 2013)

Figure 84: Tectonics of the old factories (Author, 2013)

Figure 85: Old factories of the original Saldanha Bay Company (Author, 2013)



Figure 86: Looking back towards Main Road (Author, 2013)

Figure 87: Entrance to the factory site from Main Road (Author, 2013)



Figure 88: Sketch Design: Proposed nodes and connections (Author, 2013)



## Kalk Bay and St. James

### Connection to Ocean: "Green Fingers"

STEEP PEDESTRIAN STEPS ARE A UNIQUE FEATURE OF THIS AREA AND ACT LIKE "GREEN FINGERS", CONNECTING MAIN ROAD WITH BOYES DRIVE - Guidelines Formwork in St. James & Kalk Bay Heritage Area, City of Cape Town Heritage advice pamphlet 12, March 2007

## Hout Bay

### Fishing Industry and Tourism Mix

Figure 89: The 'Green Fingers' of Kalk Bay and St' James resonates with the idea of improving the linear access to the water's edge. (Photographs: Author, 2013, Drawing: City of Cape Town, 2007)

The outdoor market of Hout Bay also was an inspiration for how commercial activities and tourism could mix and create extra opportunities for the existing marine industries. At Hout Bay the factories that sell fish and other sea foods are open during the weekend when the public comes to visit the outdoor Hout Bay market.



Figure 90: Square modular broken up facades of the smaller factory buildings (Author, 2013)



Figure 91: Existing built fabric (Author, 2013)

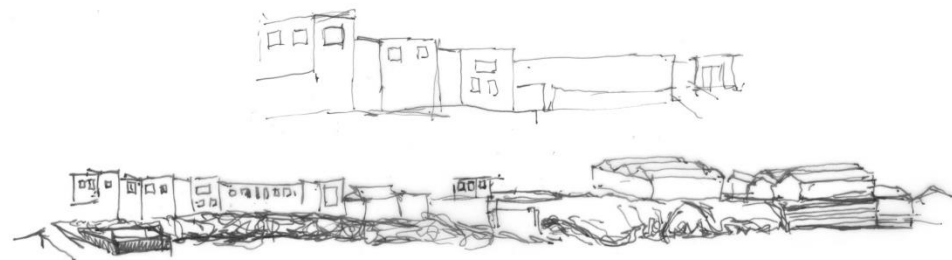


Figure 92: Languages of built fabric (Author, 2013)

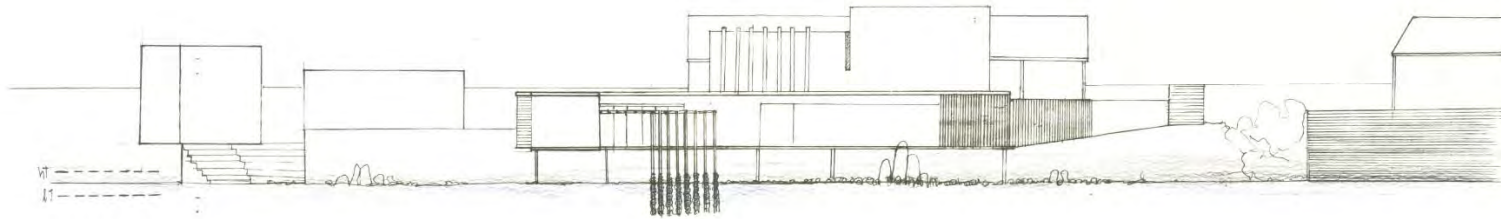


Figure 93: Elevation with broken planes. The language of the existing smaller factory buildings inspired the development of the restaurant. (Author, 2013)

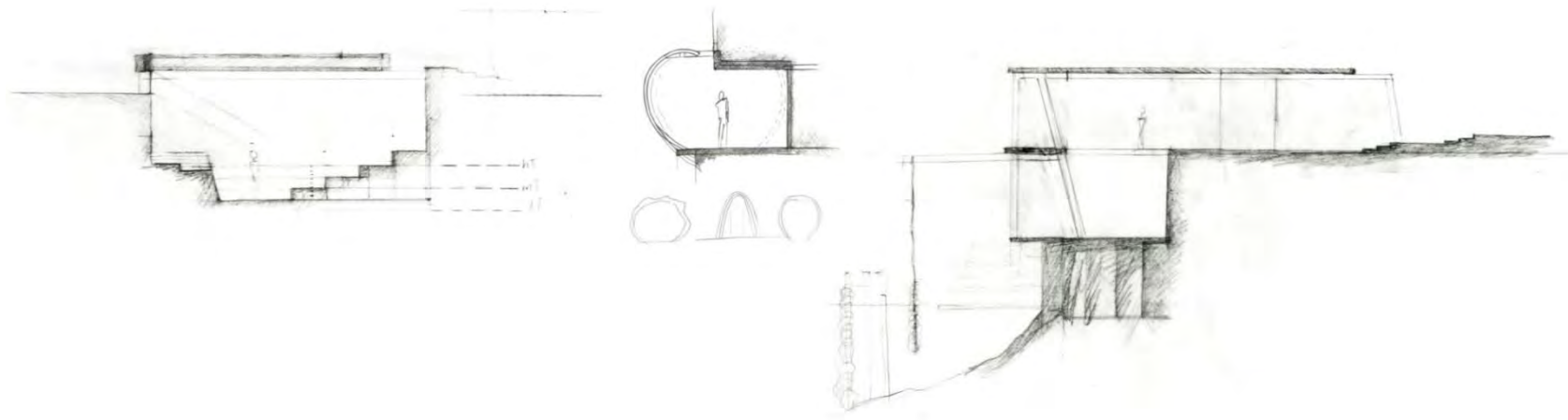


Figure 94: Design development of restaurant inspired by the en lodge exercise (refer back) and the rib structure of whales. (Author, 2013)

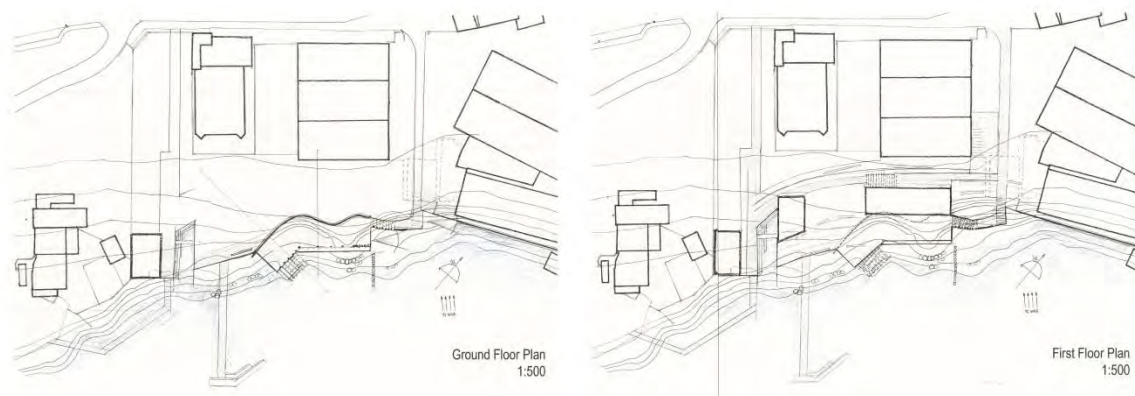


Figure 95: Ground and First Floor Plan of proposed restaurant. (Author, 2013)



Figure 96: Site diagram of new "heritage node" (Author, 2013)

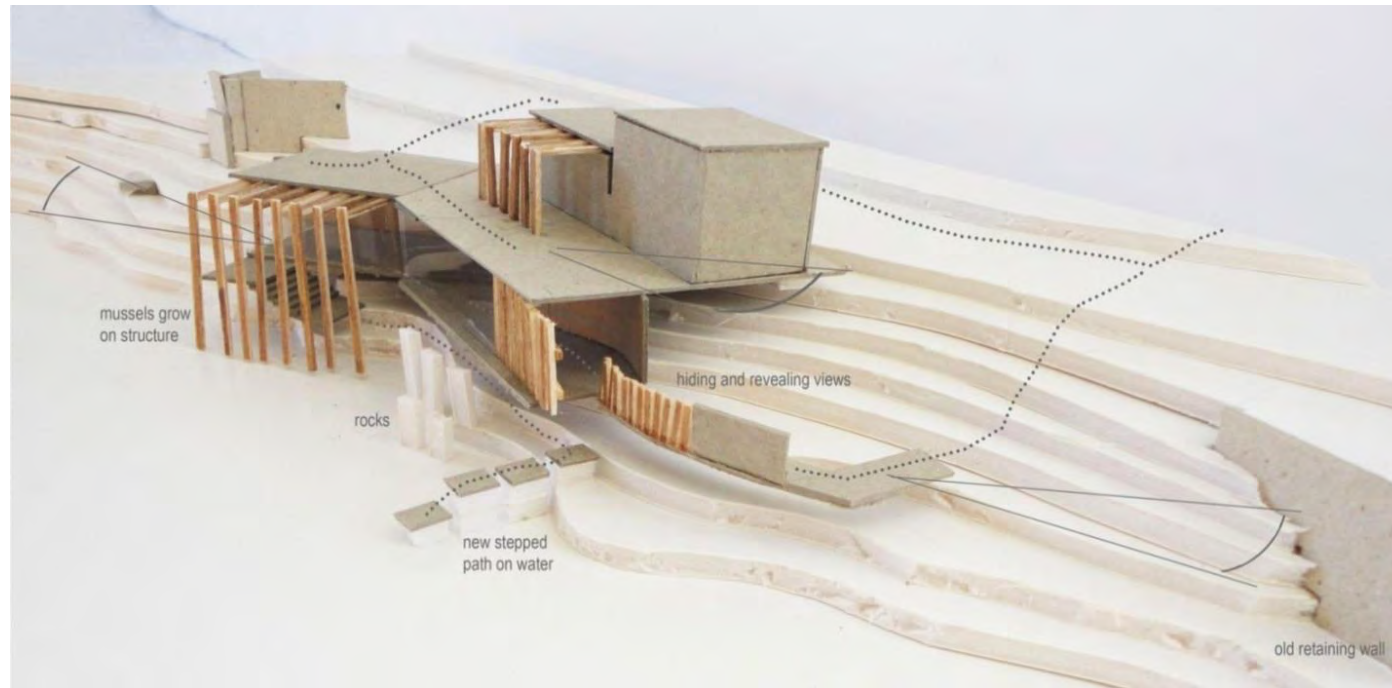


Figure 97: Movement, Experiences and Views at the proposed restaurant (Author, 2013)

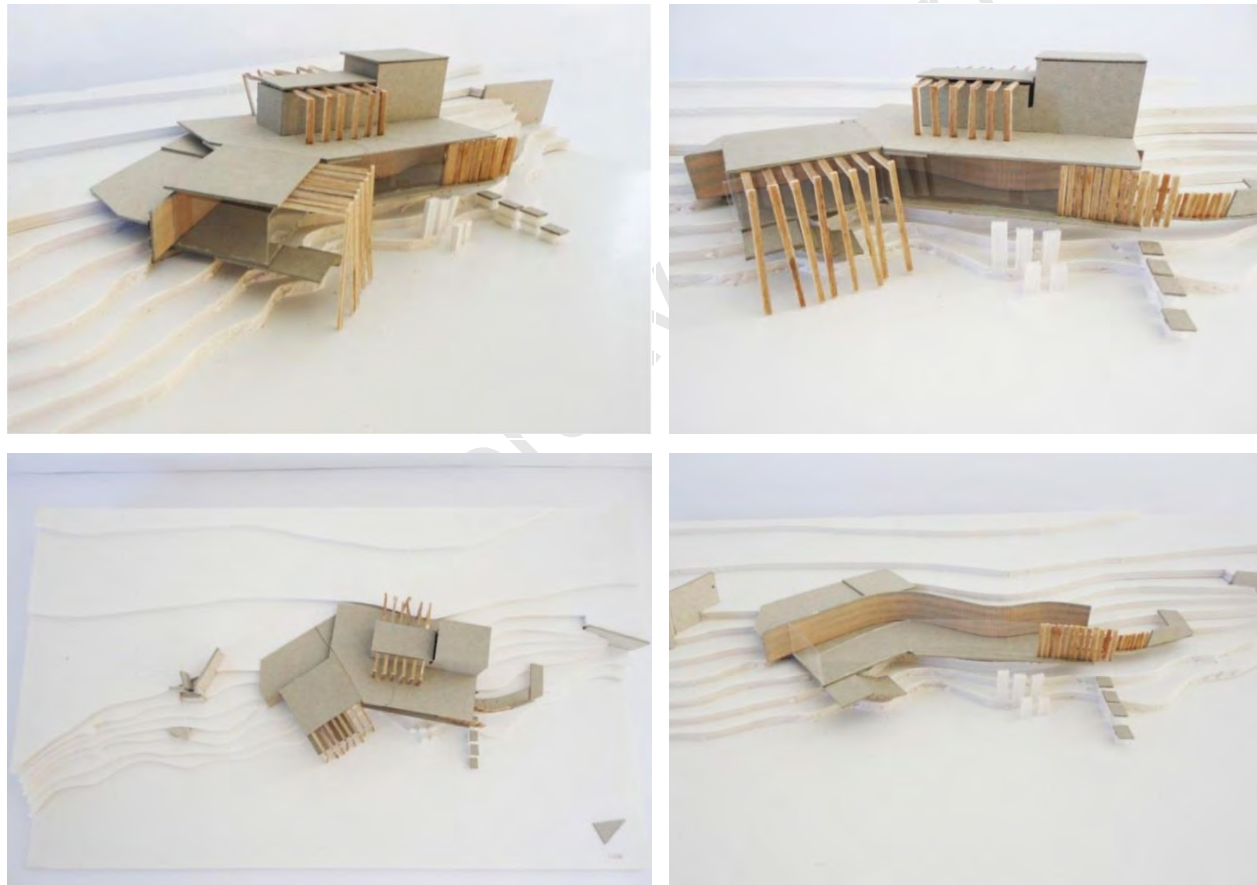


Figure 98: Model of the proposed restaurant (1:200) (Author, 2013)

## Urban Framework and Programme

### A Refocus on Experience

For the urban framework two nodes are proposed: the Maritime Heritage node and the Old Quay node. (Refer to image below.) As mentioned earlier the most important consideration of the Maritime Heritage Nodes is the pedestrian link that it creates between Main Rd and the Small Fishing Harbour.

The Old Quay node is focused around the existing quay and takeout café that faces it. It already has some existing public activities. (Refer to **Figure 41**) A new linear link is proposed that provides an alternative pedestrian route, through a new public park, to the water's edge. This pedestrian route also leads to Hoedjieskop.

At the moment Southern Seas Fisheries, a well established marine industry, occupies a large parcel of land on the south of the Small Fishing Harbour. It was decided that for the time being it makes sense to end the public scheme at that point. (Also refer to **Figure 41** and **Figure 52**)

In terms of programme the goal was not to create one focal attraction of each of the two proposed nodes, but rather to have multiple activities and attractions which could lead to multiple experiences. Ten attractions / activities were developed for each of the two nodes. (Refer to **Table 1** and **Figure 100**) This resonates with the theoretical concept that a richness of experience provides places with the ability to carry meaning in the public's minds. When one looks at waterfront design abroad one learns that the most successful waterfronts have multiple attractions. *Project for Public Spaces* describes the most successful waterfronts as those that have multiple attractions and activities at each key destination along a waterfront. Examples that are provided are the Baltimore Waterfront and Helsinki Esplanade. (Project for Public Spaces, 2013)

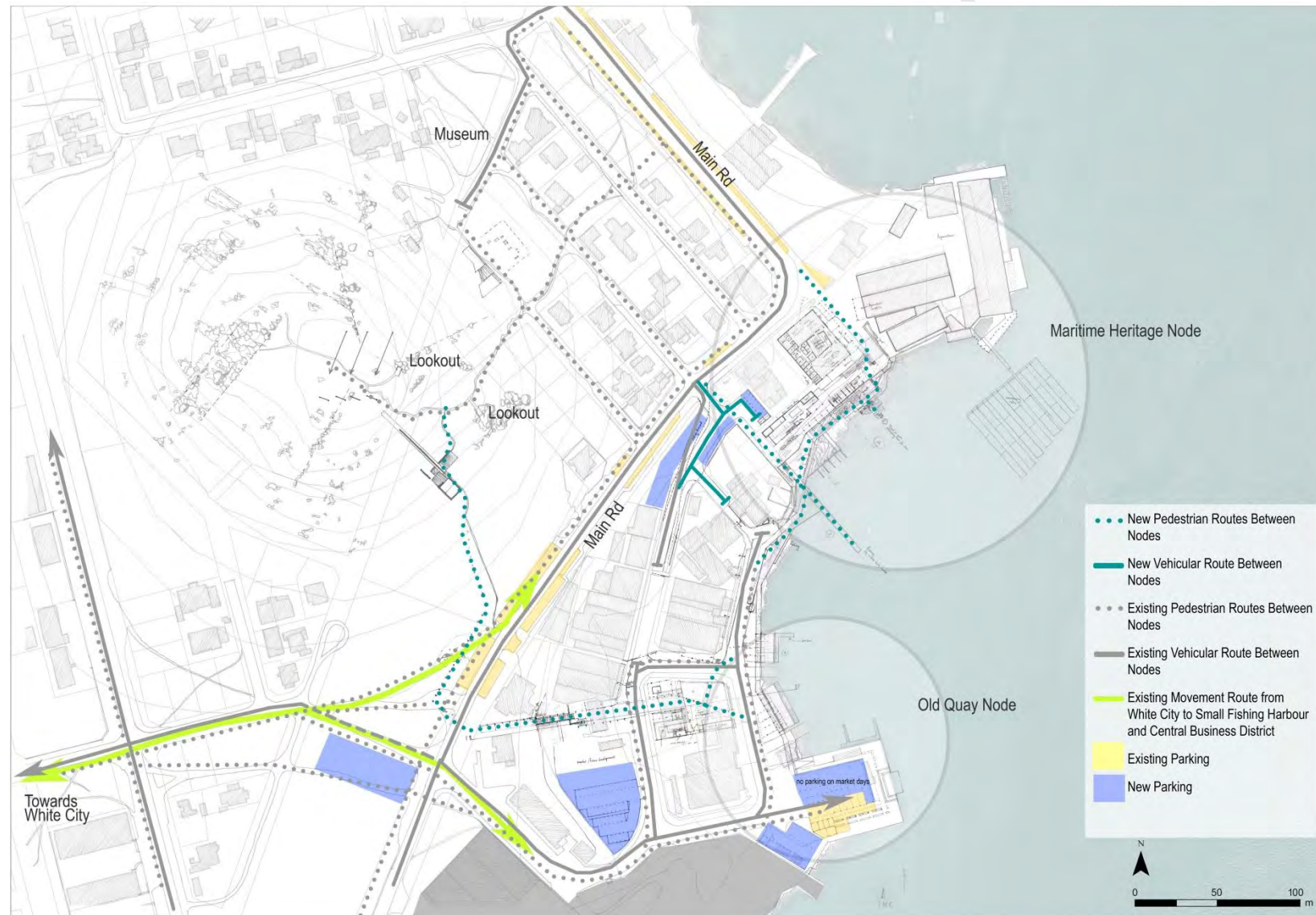


Figure 99: Urban Framework: a) Reconnecting b) Two Nodes: Maritime Heritage & Old Quay c) Parking Strategy (Author, 2013)

It was decided not to enforce a full 24h programme, but the following attractions and activities will happen in the later hours of the day and even at night: the new restaurant, theatre or movies, exhibitions and night markets in the enclosed exhibition hall. The proposed urban framework and programme are also architectural responses to the earlier history and urban analysis. In this regard the most important parts of the programme are the following: telling the histories

and teaching the public about sustainable marine aquaculture practices. These are discussed in more detail for each of the two nodes in the sections below: *Maritime Heritage Node* (page 59) and *Old Quay Node* (page 70).

The design exercises that led to the urban framework and programme are shown below. (Refer to **Figure 101** and **Figure 106**.)

Table 1: Proposed experiences and activities for each node

Maritime Heritage	Old Quay
1) fishing	1) performances (quay)
2) museum	2) play spaces (park)
3) restaurant	3) take away/restaurant
4) aquaculture (learn about)	4) buying fresh seafood from local entrepreneurs and small factories
5) swimming	5) seasonal craft markets and the harvest festival
6) rock exploring	6) fishing
7) pier walk experience	7) boat launching
8) small shops	8) tidal gauge machine
9) watching	9) watching: natural scenery, commercial activities and boats, seal landings, people
10) walking, cycling	10) walking, cycling

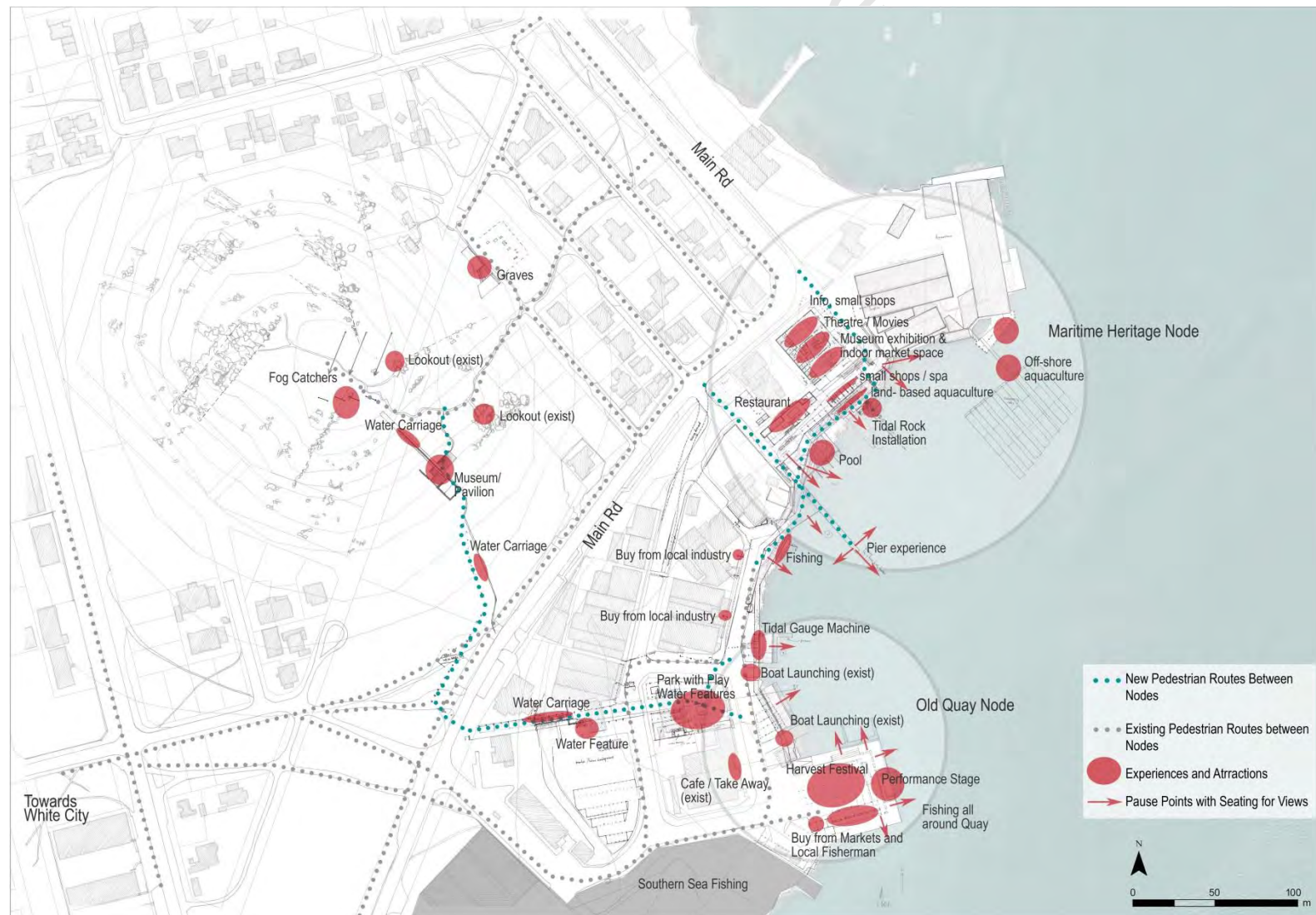


Figure 100: Urban Framework: Experiences and Attractions (Author, 2013)



Figure 101: First larger urban scale test: The first design exercise explored the concept of one waterfront with a simplified coastline (not to scale). Its concept was derived from a study of the contour lines of the precinct. (Author, 2013)

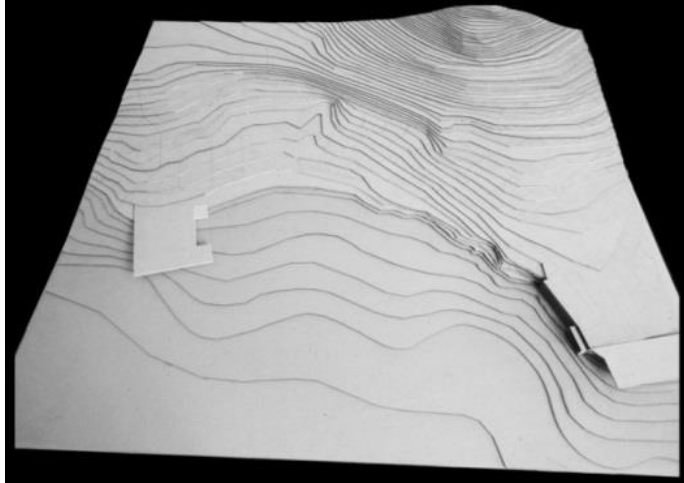


Figure 102: Contour model of site (Author, 2013)

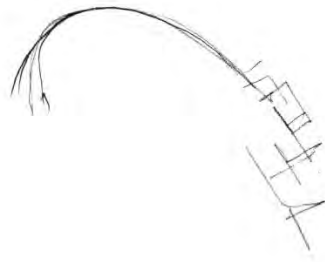


Figure 103: Conceptual diagram of contour line at water's edge. (Author, 2013)

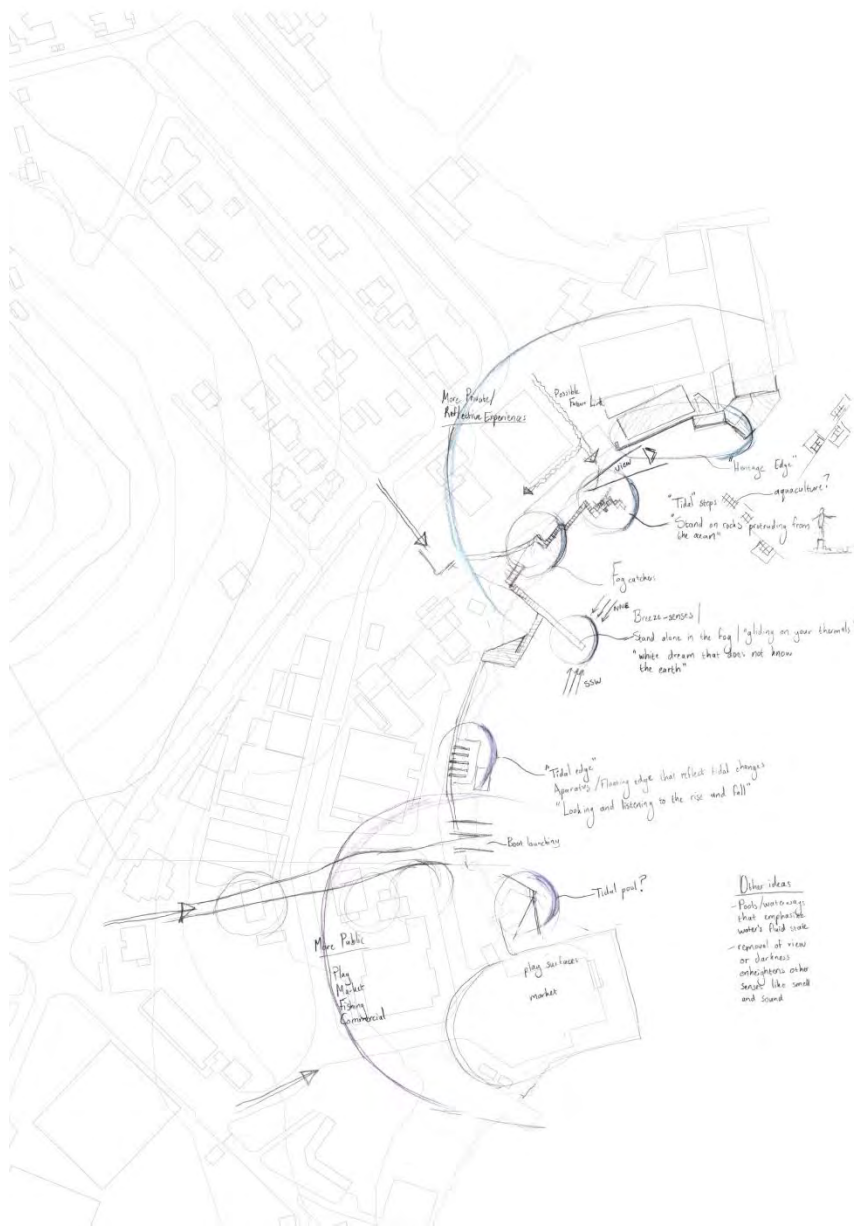


Figure 104: Old Quay node and Maritime Heritage node as developed for 2<sup>nd</sup> test (Author, 2013)

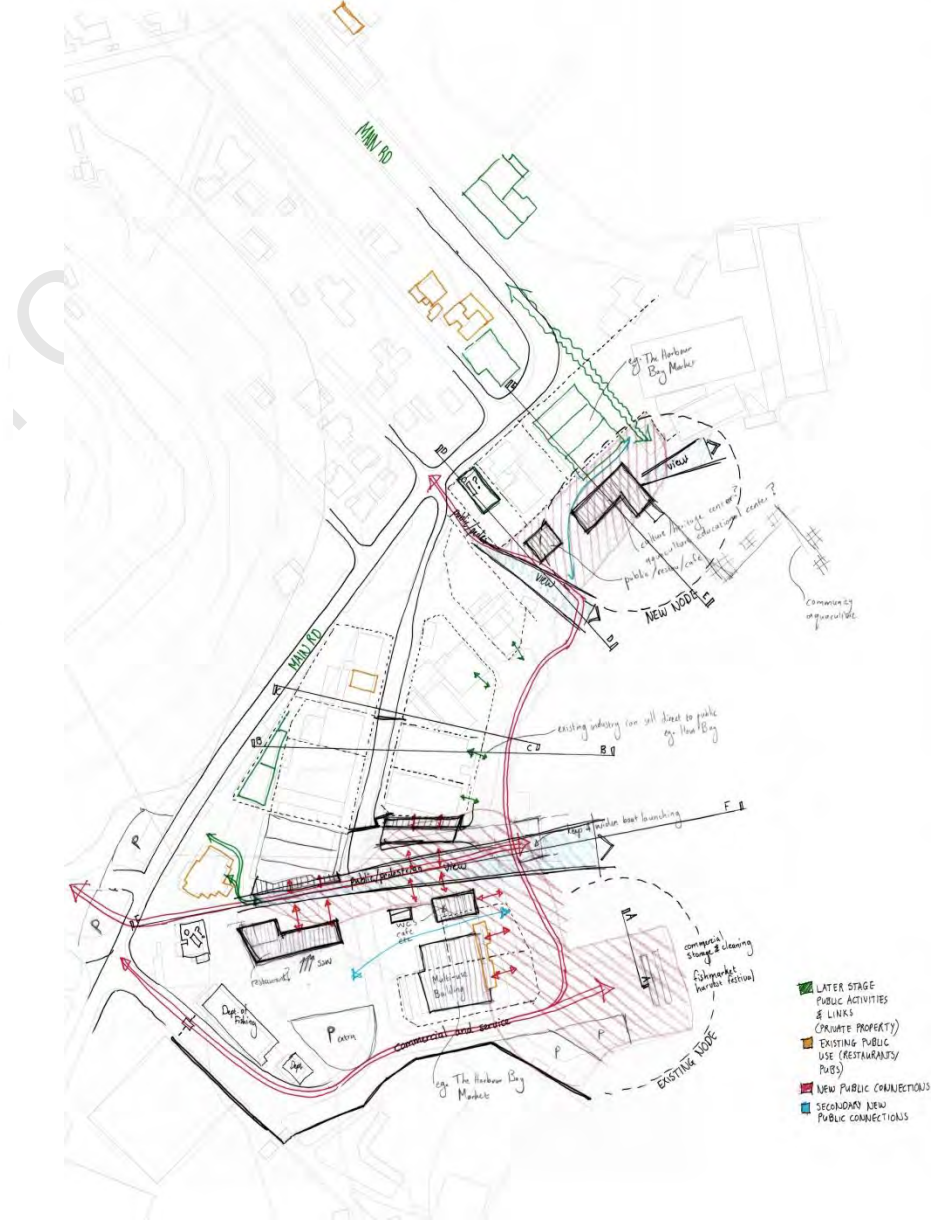


Figure 105: Conceptual urban framework as developed for 2<sup>nd</sup> test (Author, 2013)



Figure 106: Second larger urban scale test: In this scheme, different experiences along the water's edge were identified (not to scale). This was a development of the earlier ideas around experience points (*Three Experience Tests*). (Author, 2013)

## Maritime Heritage Node

The most important programmes that were added to this site are: a theatre, a restaurant, an off-shore IMTA system, shops and a public pool. They will be discussed in more detail below.

There are two pedestrian access points to the area. A person can move from one side of the precinct to the other at either the upper or the lower level of the site. The pool and IMTA production area are located at the lower level, while the theatre and restaurant are located at the upper site level. (Refer to image below.)

The most important decisions that were made during the design development process are discussed in this section.

The boundary walls of an oyster production company extend over their boundary line onto the rocky area adjacent to the water. (Refer to **Figure 107** and **Figure 110**) One solution would have been to demolish these walls and create a path on the land. It was decided to rather have the walkway step over the water and back to the land again. Most of the old walls (apart from one which blocks the way completely) are retained. A new pier also extends into the water at this point. The widened area coincides with one of the most popular fishing spots and provides more space for this activity.

The ruins of the first loading deck of Saldanha Bay are visible in **Figure 108**. For the design its original piles and columns will be retained and a new jetty will be constructed in such a way the historic structure is still visible. This concept is similar to Battery Park in New York (refer to **Figure 109** below).

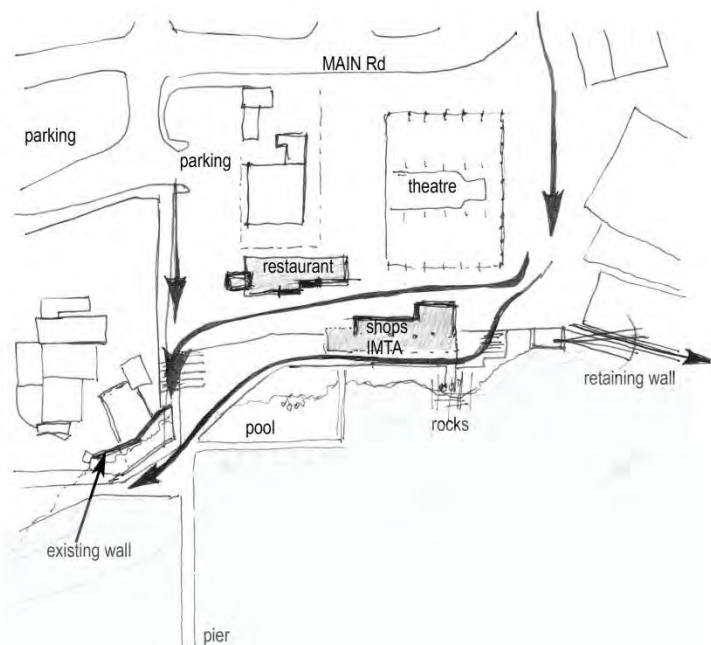


Figure 107: Movement diagram for Maritime Heritage Node. (Author, 2013)



Figure 110: Eroded surface of concrete block boundary wall oyster production company (Author, 2013)



Figure 108: Dilapidated timber jetty (Author, 2013)



Figure 109: Battery Park, City Cove, New York, 1984-1987, Mary Miss (Paesaggiocritico), 2013)



Figure 111: The Maritime Heritage Node was first tested at a larger scale. (Author, 2013)

## The Theatre in the Factory

As mentioned earlier three adjacent factories of the site will be used for public programmes.

The Cape West Coast Biosphere Small Grants association has the goal to mainstream sustainable development through micro grant projects. They identified a need in Greater Saldanha Bay Municipal Area for a solution to a number of social challenges “The grant provided for an Active Community Theatre (ACT), a creative space where youth

are trained on creative and fine arts, i.e. crafts and some drama storytelling, allowed youth to escape from destructive social ills such as alcohol and drug abuse.” (West Coast Green Projects, 2012) Also refer to *Media Article 3 and Media Article 4* in the *Appendix (page 123)*. It was therefore decided that a theatre will serve a need in the community. The theatre can be used as a cinema as well. See the design development of the theatre below.

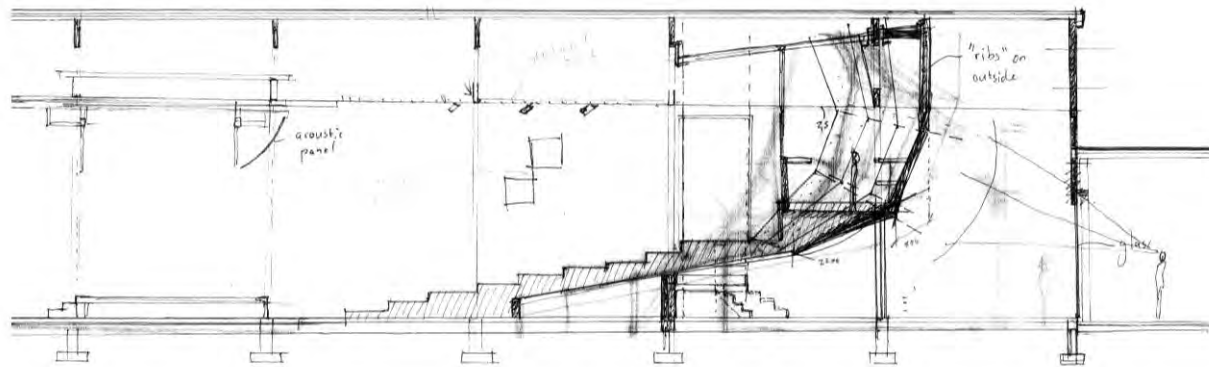


Figure 112: Conceptual section through theater. (Author, 2013)

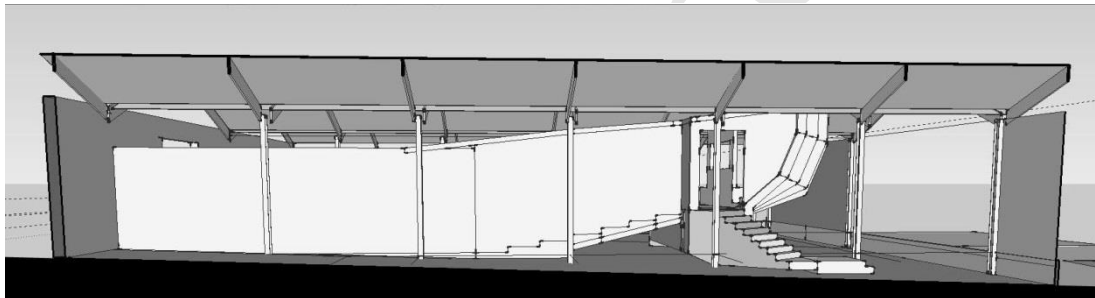


Figure 113: Conceptual model: View of theatre from the side when inside the building. (Author, 2013)



Figure 114: Inside of existing factories (Author, 2013)

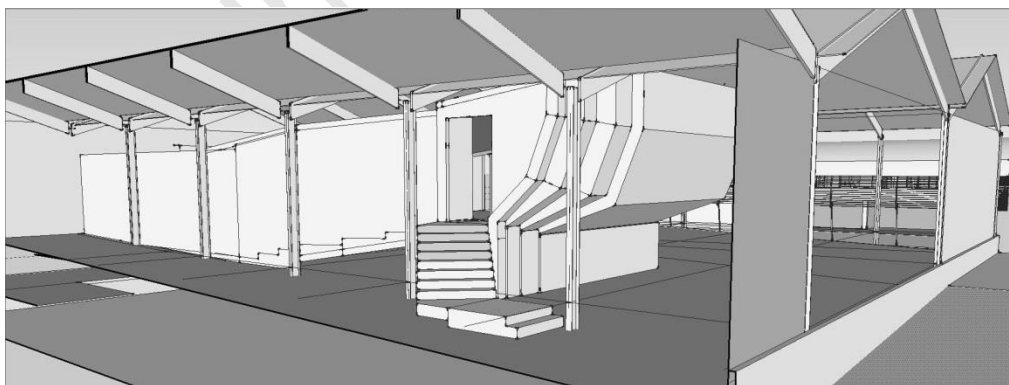


Figure 115: Structure within structure. The highest end of the theatre is deliberately stepped back from the existing structural frame to reveal that it is a new structure within an existing one. (Author, 2013)



Figure 116: Bernard Tschumi, Limoges Concert Hall (Bernard Tschumi Architects, 2013)

## Integrated Multi-Trophic Aquaculture (IMTA)

The following Integrated Multi-Trophic Aquaculture (IMTA) programmes are introduced at the Maritime Heritage node:

- Commercial off-shore farming of Mullet, *Laminaria pallida* (Kelp) and Mussels
- A land-based open or closed circuit plant for farming Mullet and *Ulva Capensis* and Mussels. This will serve as demonstration area for both the restaurant and maritime heritage exhibition space.
- Other commercial land-based IMTA systems will also be implemented in the large open factories on the site. Which species will be grown depends on the success of the pilot projects.

The aim of the aquaculture component will be to create public awareness of the importance of the unique setting of the Saldanha Bay and its aquaculture related industries, our natural fishing resources and how important the water quality of the bay is for its future. (Refer to *Water Quality in the Bay* in the Appendix: page 97.) Apart from being an experiential attraction, it should also be educational and teach people about respect for the environment by

showcasing how waste can be converted into an asset, inputs can be kept as low as possible and the water quality can be protected when an IMTA system is used.

I would like to integrate this closely with the public components so that people can visit these places, learn new facts and taste some of the produce at the restaurant afterwards. For this reason there is a production area with a land-based farm at the front of the site. The other factories of this site will have larger areas of land based IMTA cultivation. The production area at the front of the site is more for demonstration purposes and if it only grows some produce for the restaurant, it would satisfy the goals set. The off-shore rafts are also commercially scaled.

Note that the off-shore area where the IMTA project is suggested is not currently zoned for aquaculture. That would need special permissions from the Department of Agriculture, Forestry and Fisheries. The designated area has a depth that is similar to some of the other areas that are currently zoned for aquaculture. It is also placed in such a way that it does not interfere with boating activity. (Refer to **Figure 111.**)



Figure 117: Aquaculture operations have an important experiential value. It is intriguing to see the off-shore structures and how these organisms are grown. Left: Mussels on a rope (Guerrero & Gremades, 2012: 12) ; Middle: harvesting seaweed from an IMTA system the Bay of Fundy, Canada; (Guerrero & Gremades, 2012: 12) Right: Fish cages in as part of an IMTA system in Coruna, Galicia, Spain (Guerrero & Gremades, 2012: 38)

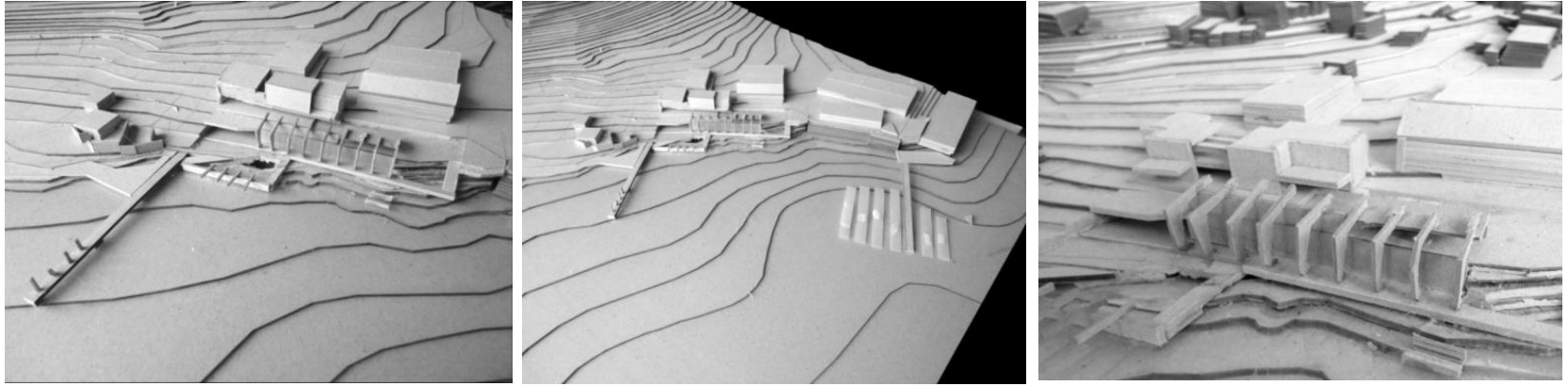


Figure 118: 1:500 Model used to test urban design options. (Author, 2013)

## Telling Histories

The Maritime museum will have exhibitions that tell about the history of fishing, whaling and the aquaculture industry. The physical form of a whale's skeleton was also used as an inspiration for the design of the land-based IMTA production area.

The goal is to have the off shore IMTA rafts accessible from the shore via a walkway. Options were tested in model form. None of these were found to be desirable. The intent was to rather retain the unique qualities of the existing old retaining wall on its own. In the final design scheme an overland connection was developed instead.

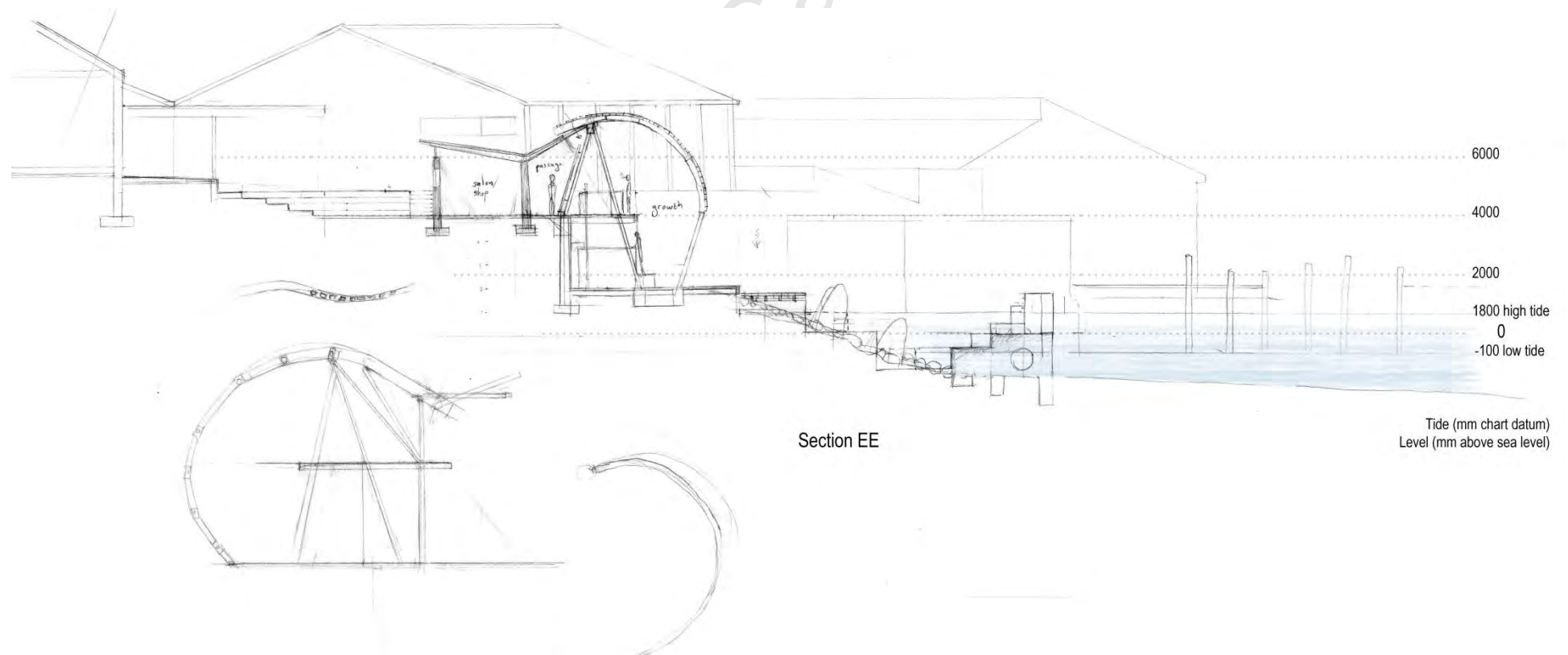


Figure 119: The rib structure of the production area is explored again. (Author, 2013)

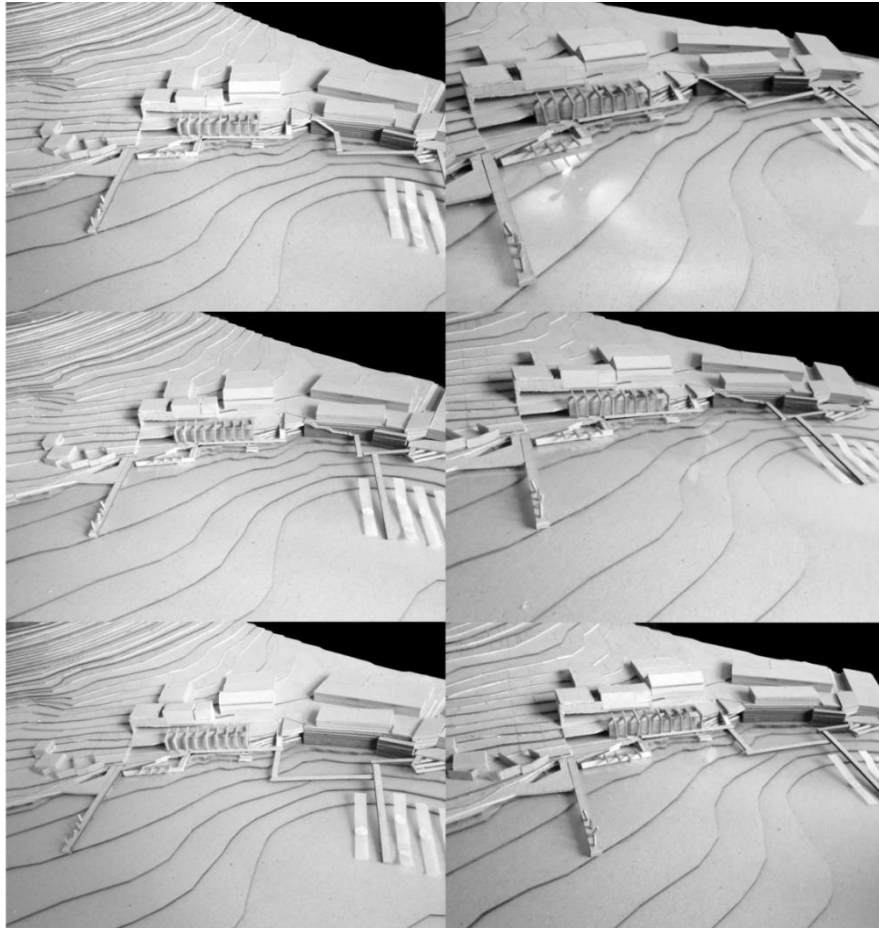


Figure 120: Links from the site to the off shore IMTA aquaculture component were tested here. (Author, 2013)

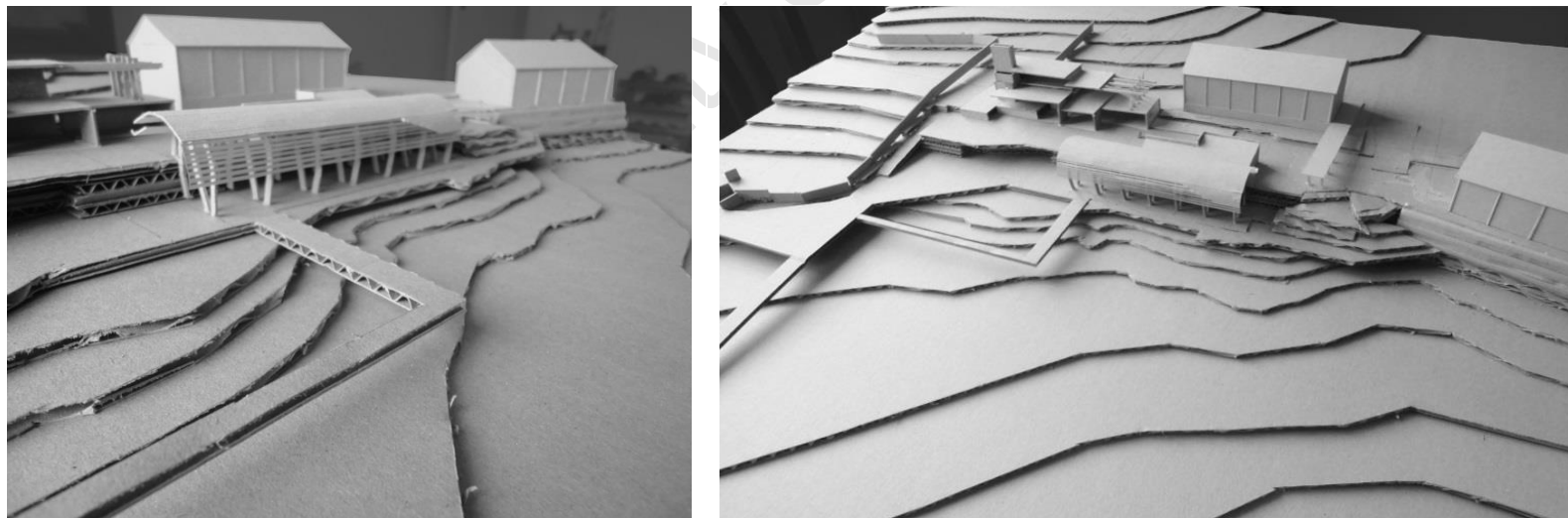


Figure 121: 1:200 test model. (Author, 2013)

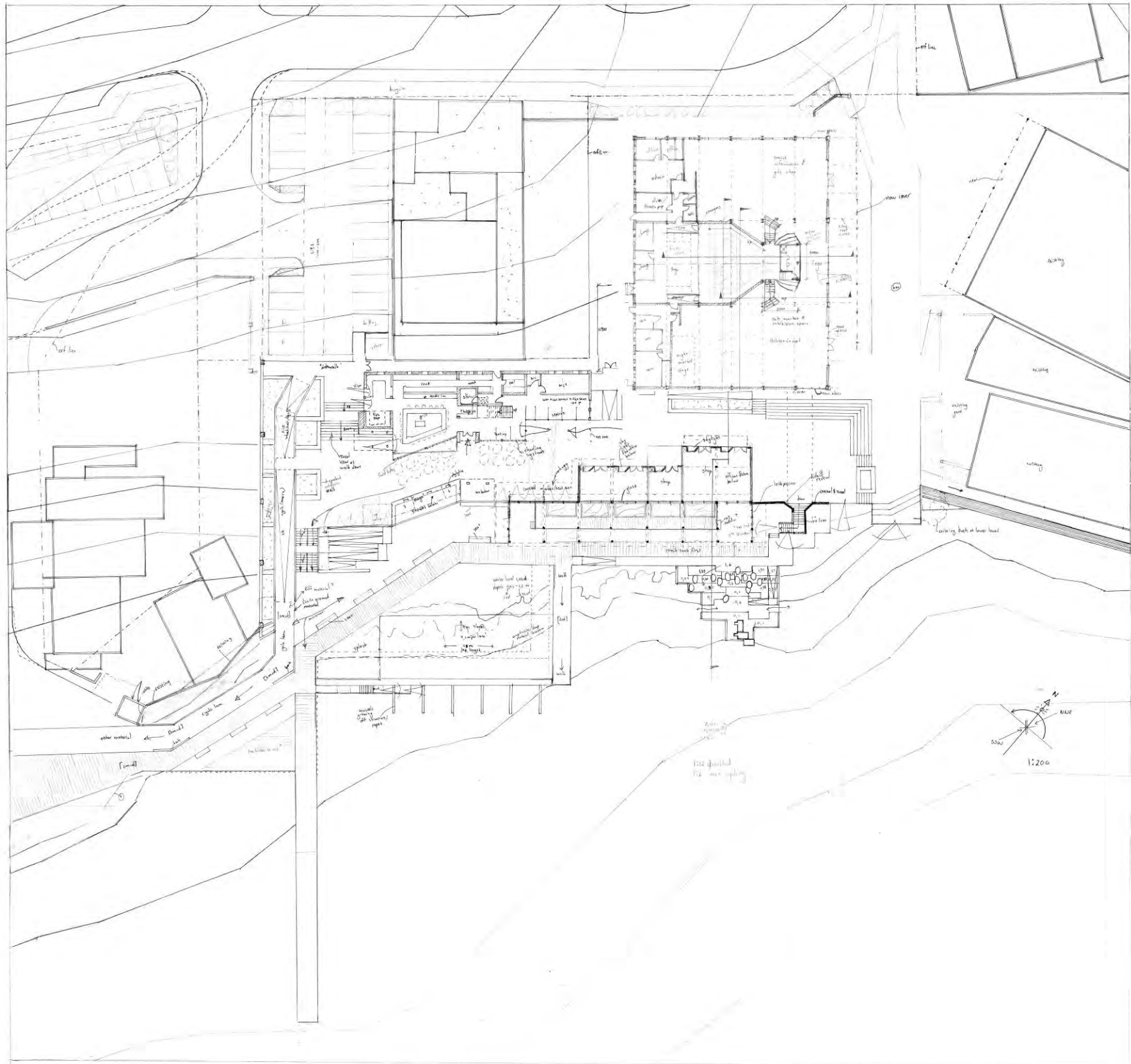


Figure 122: In his design exercise the site was designed in more detail. Note that this is not the final scheme. (Author, 2013)

## Small Retail Component

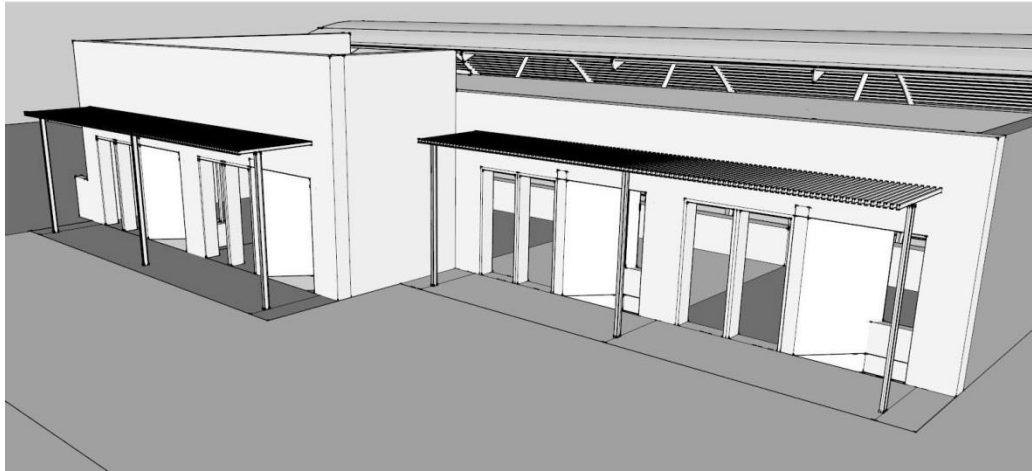


Figure 123: 3D study of the shops that are located behind the production area. (Author, 2013)

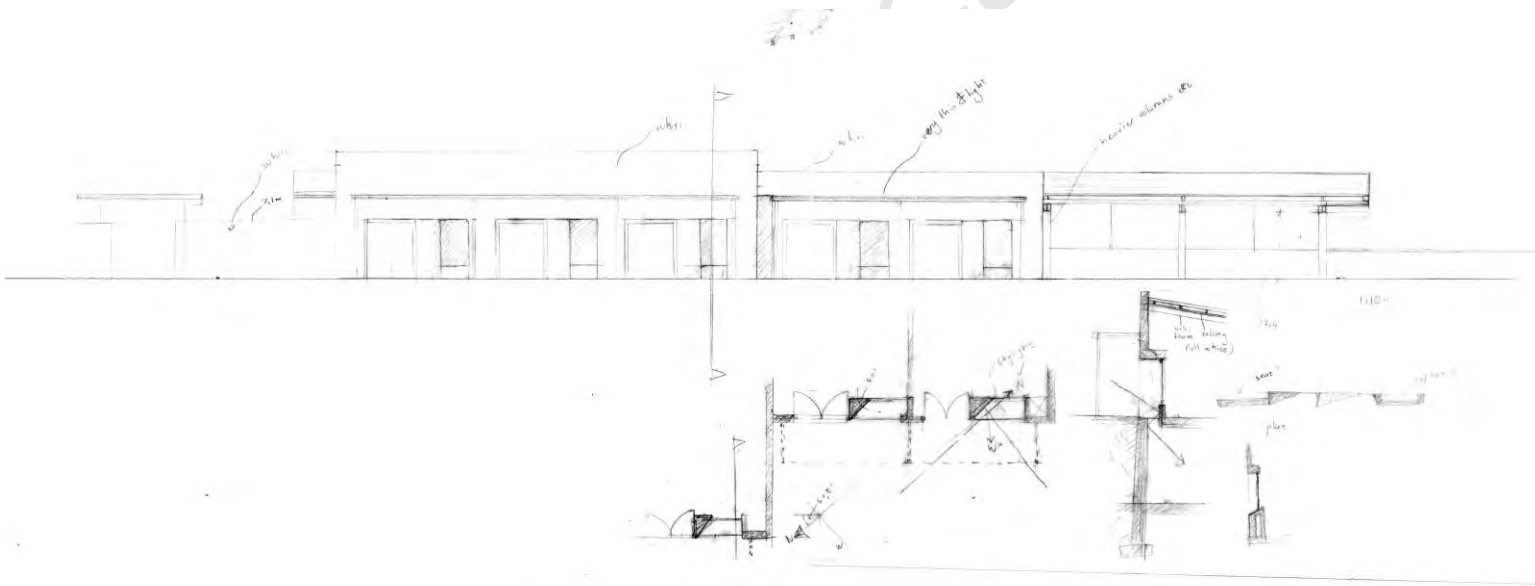


Figure 124: Elevation study of shops. A skylight allows light to enter the offices of the production area below.

## Wit Welkom Sê

-‘Say Welcome in White’

The chimney of the restaurant can have symbolic significance. Apart from its more recent historic significance (refer to poetry and images on this page) there was a discovery about the smoke that used to plume from the fire screens of the CochoQua. (Refer to the *Prelude*.)

“Die skoorsteen kan maar krom wees  
hy moet net warm wees en wyd  
met dagbreek rook blou resnosterbos-  
rook en vanmiddag laat se son  
as ons om Hoedjiespunt kom  
moet hy wit wees en se welkom.”  
(Botha & Walters, 1976, 20)

‘The chimney can be skew  
it just needs to be warm and wide  
at daybreak smoke blue rhenoster bush-  
smoke and in late afternoon sun  
when we come around Hoedjiespunt  
it should be white and say welcome.’  
(Botha & Walters, 1976:20 (in Afrikaans).  
Translated here by author  
from Afrikaans to English.)



Figure 125: Chimney of houses at Stofbergfontein in Langebaan (Botha & Walters, 1976: 52)

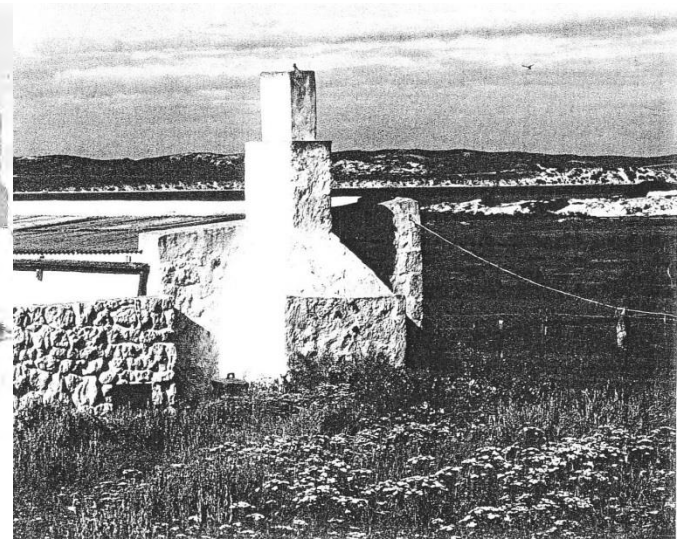


Figure 126: A chimney of one of the first houses of Seeberg, Saldanha Bay ( Botha & Walters, 1976: 9)



Figure 127: Baking ovens on the outside of houses, location unknown (Botha & Walters, 1976: 12)

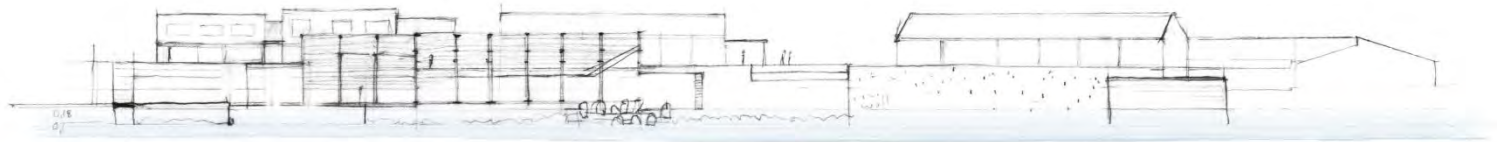


Figure 128: A broken up façade for the restaurant (back) was tested in the beginning (Author, 2013)

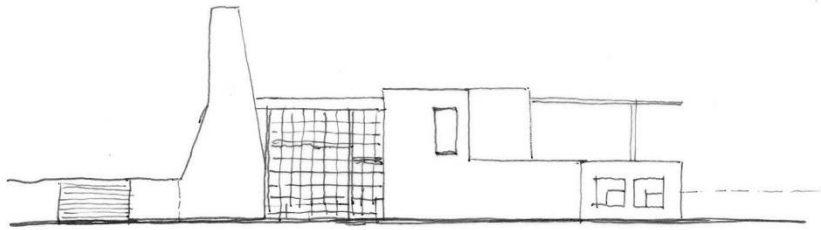


Figure 129: Restaurant Elevation: Test of a restaurant of which the chimney carries significance. (Author, 2013)

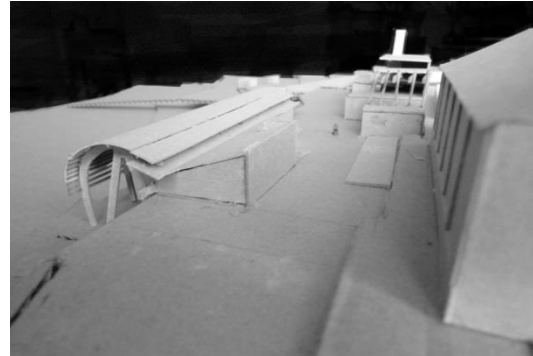


Figure 130: Test of pedestrian movement from theatre towards restaurant. The restaurant is stepped down on the one side so that it does not overpower the site. (Author, 2013)

## Stepping Back

Towards the end of the design process I realised that I started to miss the opportunity of the natural piece of coastline at the bottom of the site. Compare **Figure 134** with the constructed edges of **Figure 55**. The design scheme was then stepped back to

celebrate this unique experience. It will allow people to explore two natural rocky bays. (Refer to **Figure 132**)

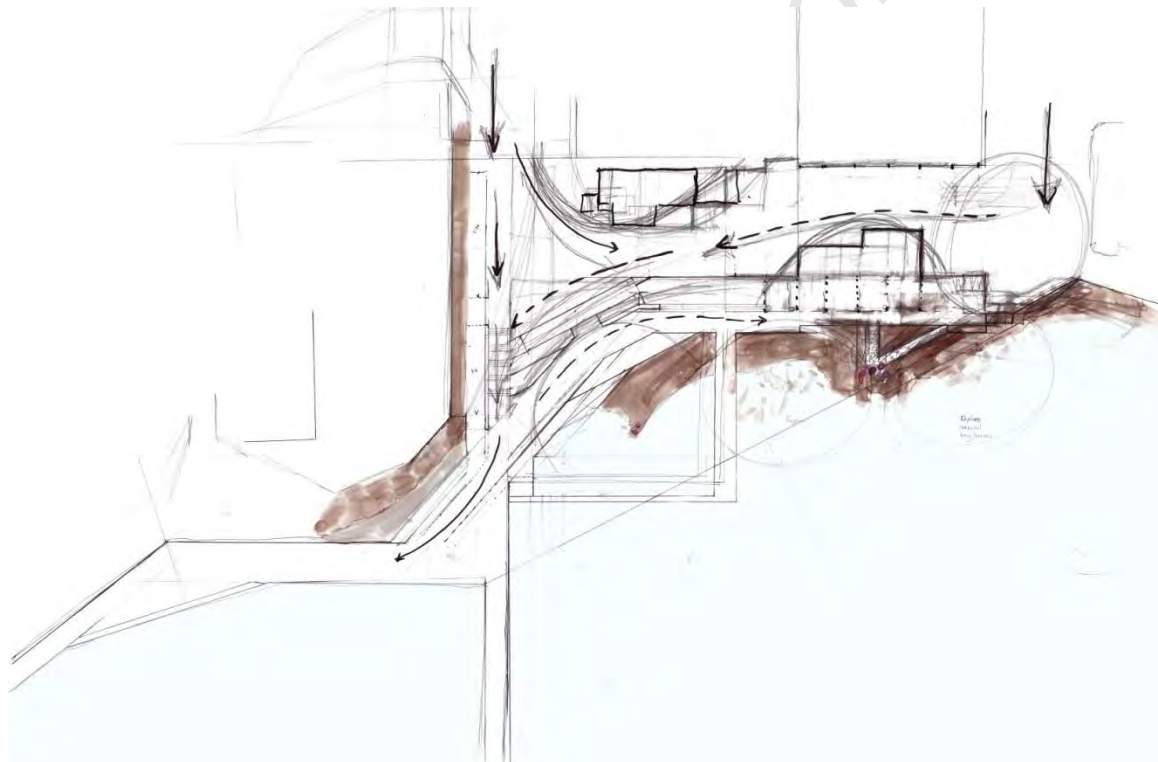


Figure 131: (Author, 2013)

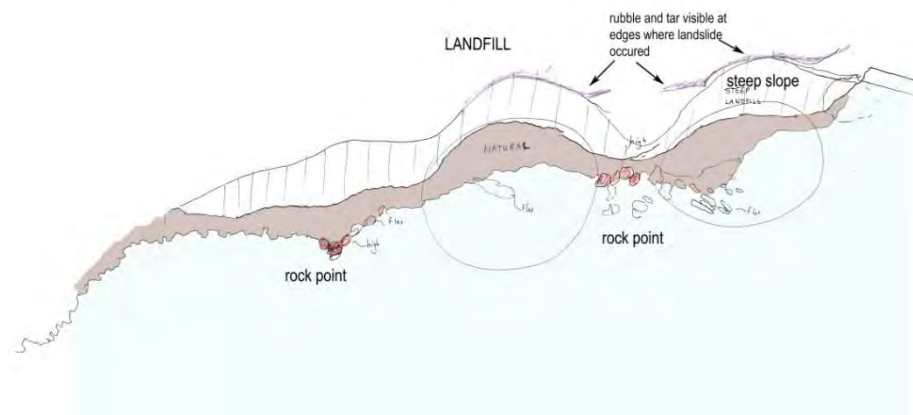


Figure 132: Existing edge conditions (Author, 2013)



Figure 133: Aerial photograph that shows the landfill areas (Original image: Saldanha Bay Municipality, 2011)



Figure 134: A small strip of natural coastline at the Small Fishing Harbour (Author, 2013)



Figure 135: Note that most of the vegetation is on landfill and that the area appears very dry in summer. (Author, 2013)



Figure 136: 'Stand on Rocks' experience point (Author, 2013)



Figure 137: Rocks that will be included in the swimming pool. (Author, 2013)

## Old Quay Node

### Telling Histories

As mentioned before a new linear link that provides an alternative pedestrian route from Main Rd, through a new park, to the water's edge was proposed here. This pedestrian route also links back to Hoedjieskop with its earlier proposal for fog collectors.

The story about the forced removals is thread through the landscape from Hoedjieskop with its proposed scheme (page 47) towards the park with the names of the people who were removed engraved in slabs (Figure 142).

The public park creates an active link between Main Rd and the water's edge. The water collected by the fog collectors will be stored and used for the soft landscaping of the park. One 70 m<sup>2</sup> fog catcher provided 3800 litres of water per day with a study in Limpopo. (Refer to Table 3). Visual water carriages create a visible link (Figure 142).

Figure 138 to Figure 142 shows the development of these concepts.

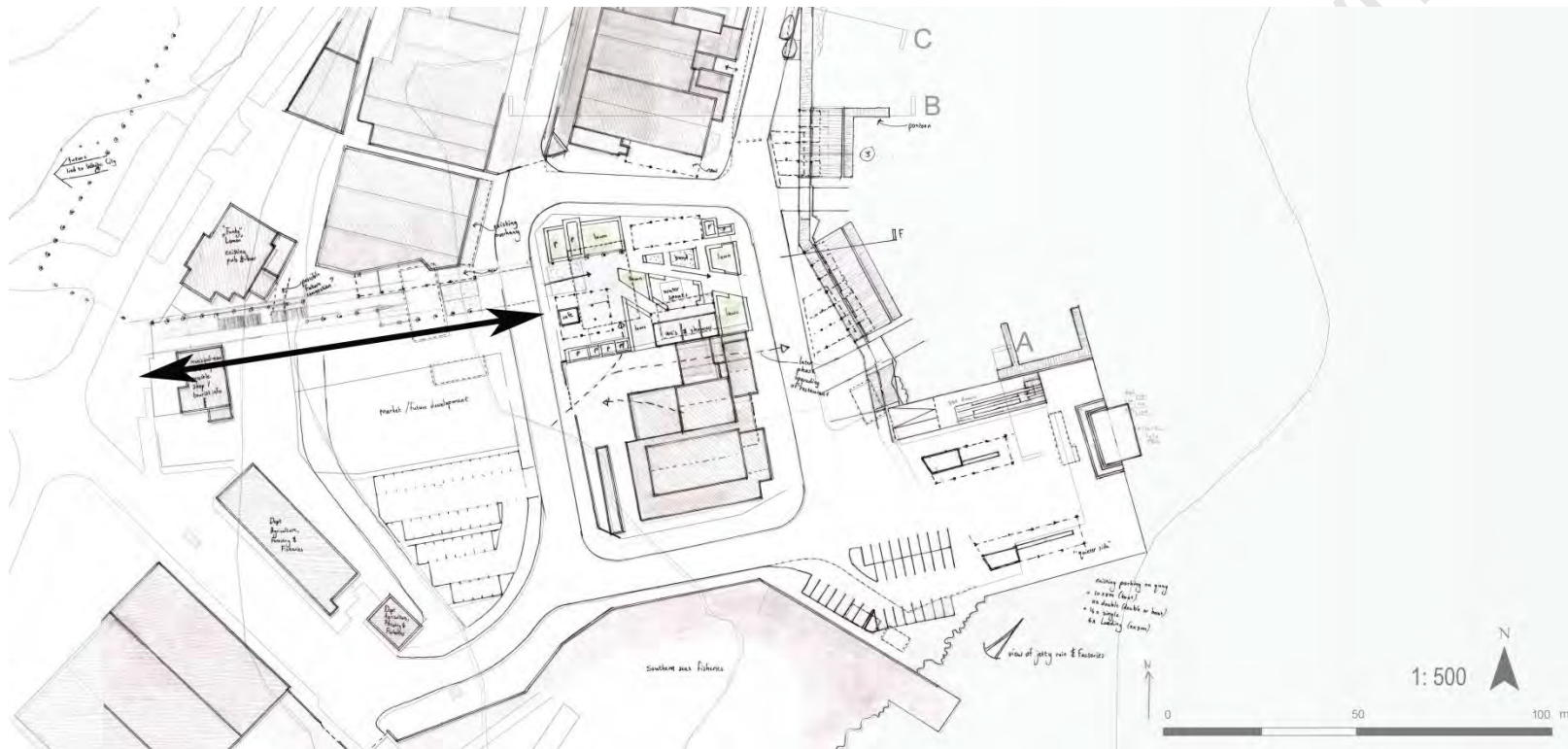


Figure 138: Design Development: Started reinforcing urban links through experiences (and program). The idea of a park that links hill to site emerged. (Author, 2013)

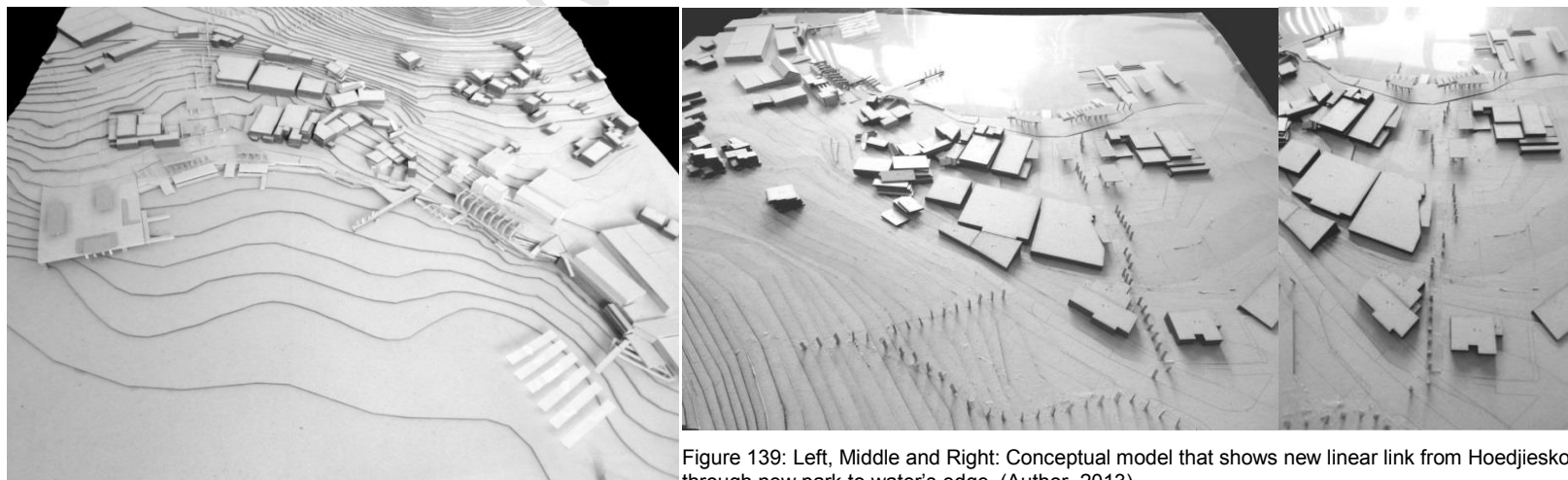


Figure 139: Left, Middle and Right: Conceptual model that shows new linear link from Hoedjieskop through new park to water's edge. (Author, 2013)



Figure 140: Design Development: The park link was developed in more detail. (Author, 2013)

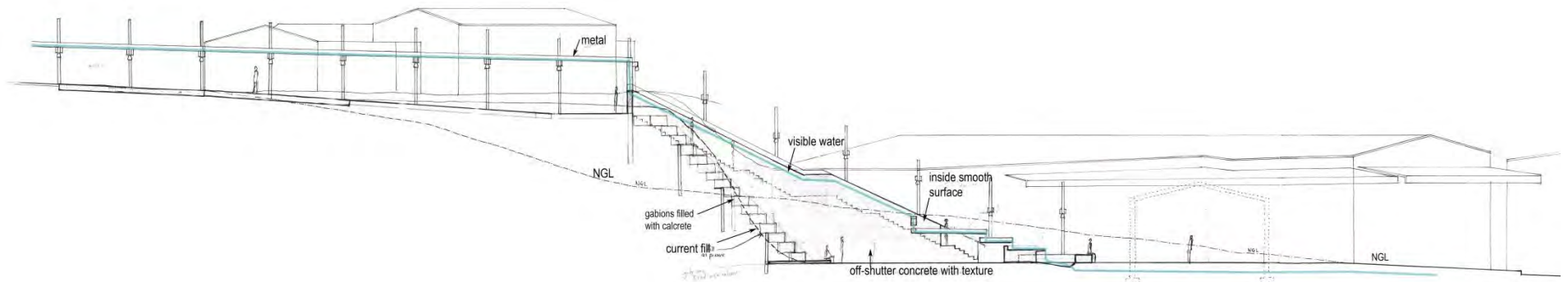
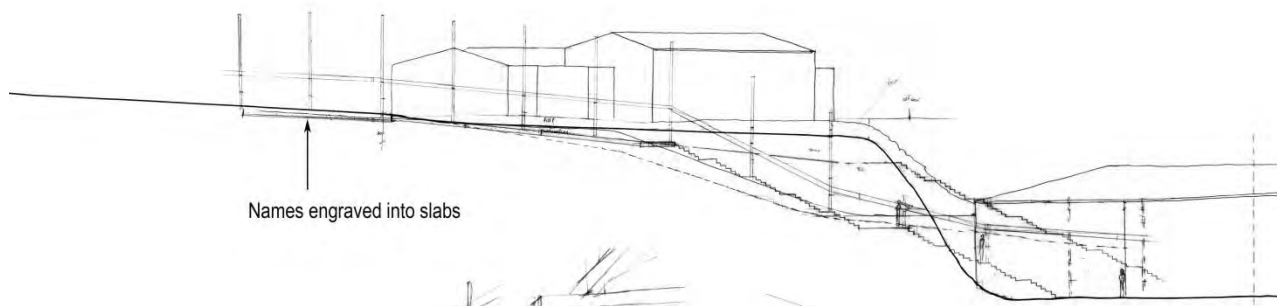
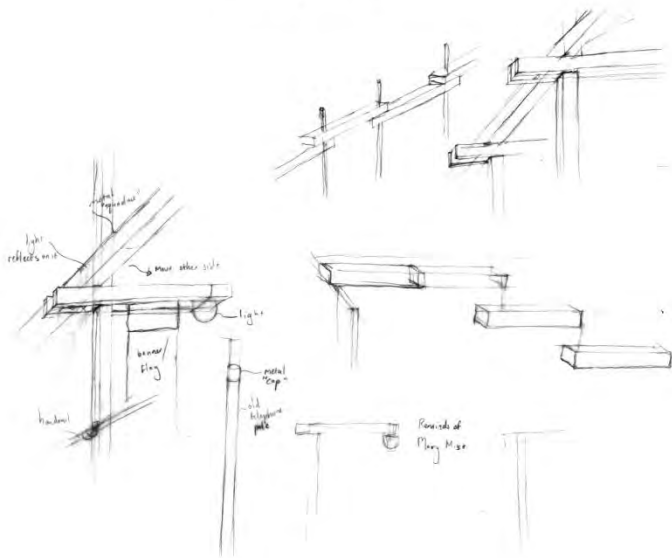


Figure 141: Section FF showing a design for a water carriage that takes the water collected from the hill down to the park. (not to scale) (Author, 2013)



Water feature, Krone Borealis Estate, Tulbach (Author, 2013)



Left: Test language of structure that carries water towards steps

Figure 142: Development of the above mentioned water carriage (not to scale) (Author, 2013)

## Markets and Harvest Festival

The old quay was developed with the aim to facilitate a wider range of public activities. The harvest festival was a very popular annual festival in Saldanha Bay. One of its highlights was the markets at the Small Fishing Harbour. According to a newspaper article in ended in 1995 due to rising costs. (Coetzee, 1998) There are also talks about reinstating the festival. The proposed design scheme for quay makes provision for these types of festivals.

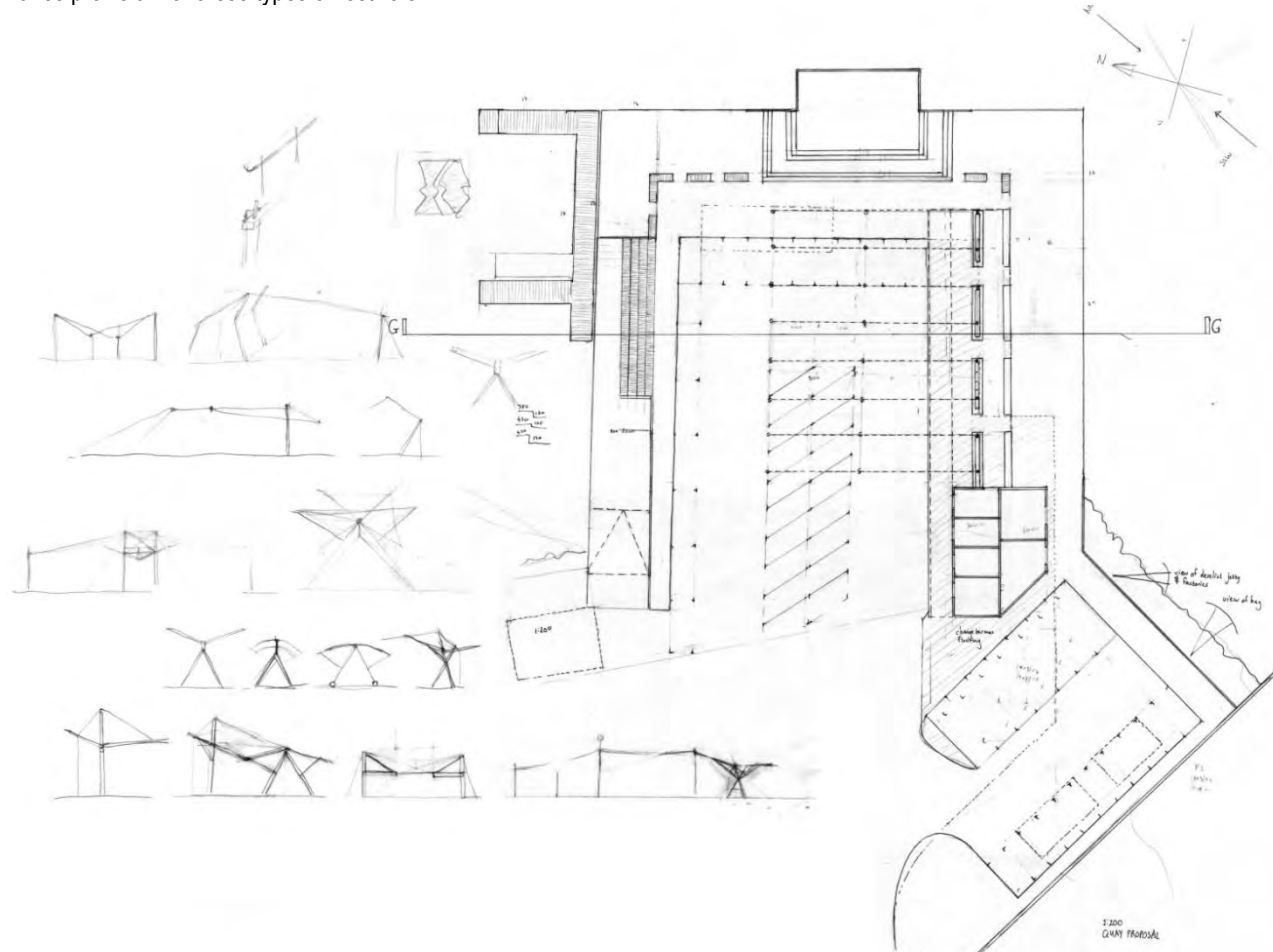


Figure 143: Plan of old quay. (not to scale) (Author, 2013)

Some of the existing service buildings on the quay (refer to **Figure 41**) obstructs the view and movement on the quay. They are very small structures and it was decided that it would make sense to relocate them. They now form part of a linear scheme on the right hand side of the quay. New fixed cover provides shelter and facilities for informal fish markets and other types of formal markets. A slightly elevated “stage” was also introduced. Between the parking bays are holes that allow temporary covers for larger events and performances to be erected.

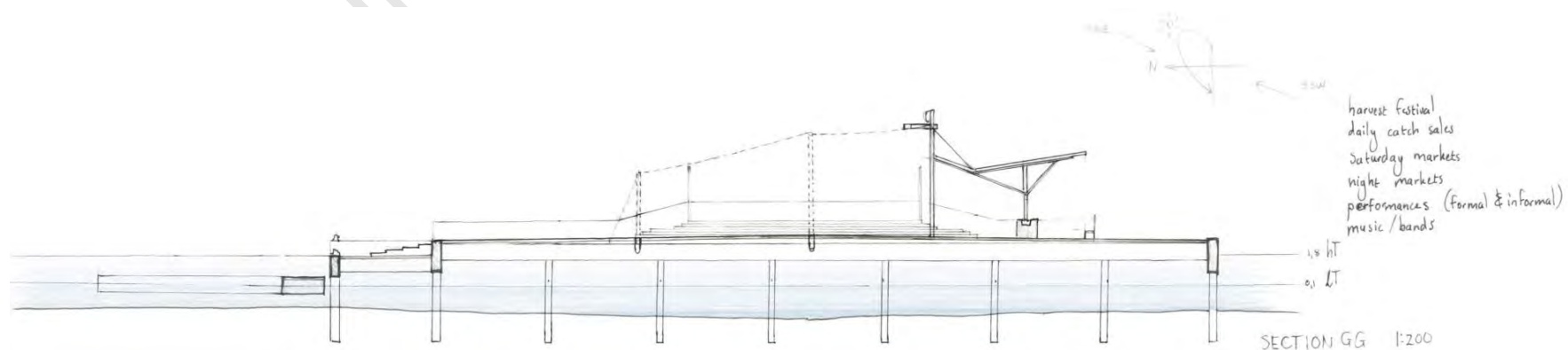


Figure 146: Section GG through quay showing a fixed structure on the right (to provide permanent shelter for formal and informal markets). (not to scale) (Author, 2013)



Figure 144: Weslander of 16 September 1988 front page (Terreblanche, 2012)



Figure 145 (Middle and bottom): Covered structures in Paternoster create a place for informal fish and for other types of markets. (Paternoster Tourism, 2013)

Schouwburgplein by West8 was used as a precedent study for the development of the quay. What is interesting about this project is its completely unnatural landscape and to see how a richness of experiences can be created that has not got anything to do with the vastness of the site, the picturesque or any natural plant materials. Schouwburgplein is a great square with a simple and spare surface, but it is experientially rich in the many sensory experiences that it provides: wet, dry, warm, cool, light and texture. Instead of heavy paving above a lightweight steel and wood surface with an interesting texture and a host of services and utilities below the surface was created. (Refer to **Figure 149**) It also has holes for posts so that the surface can be adapted as needed. Water spouts create surfaces of play. (**Figure 147**)



Figure 147: Water spouts that create a surface for play. (Verbakel, 2011)



Figure 148: The structure for access to the underground was configured in such a way that it doubles as a skateboard ramp. (West 8, 2013)

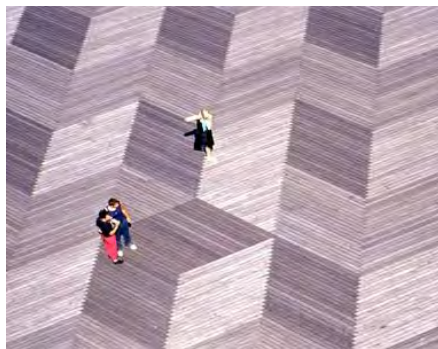


Figure 149: Lightweight steel and timber surface. (West 8, 2013)

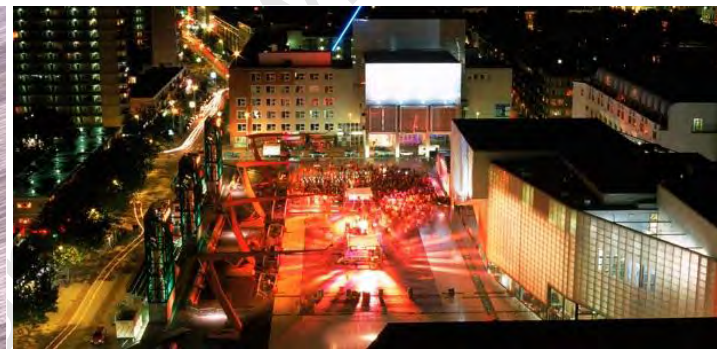


Figure 150: A dynamic multi-layered surface has been created that can stage various events in the city. (West 8, 2013)

## Practical Considerations

I am aware that with both of the productive landscape technologies that were suggested, namely the fog collectors and the aquaculture components, pilot projects will need to be implemented first to know whether they will be successful within the design project.

Even though all environmental factors indicate that fog catching will be feasible in Saldanha Bay it is not possible to predict that it will be the case. A next step would be to record occurrence and density of fog over time and compare this with a reliable dataset from other implementations of fog catchers. Even if one has this information, due to the changing nature of the occurrence of fog, it is still difficult to make any accurate predictions on feasibility. For this reason pilot projects are recommended. (Schemenauer & Cereceda, 1994 cited in Quezada et al., 2013)

A similar argument is applicable to both the land-based and off-shore IMTA projects. The small marine aquaculture industries located at the precinct pump water directly from the shore at the precinct to keep harvested livestock such as oysters alive in tanks until distribution. It is therefore reasonable to believe that the quality of the water will be suitable for the growth of organisms.

Marine biologist, Kevin Ruck, from Blue Sapphire Pearls (a company that farms shellfish in Saldanha Bay), recommended that the water of the area where it is planned to have the new aquaculture installations is thoroughly tested beforehand. He also suggested that pilot projects are implemented first. (Ruck, 2013) Unfortunately further research of such a great scope is not possible within the constraints set for this design dissertation and decisions were made based on the information available.



## White Dream

Another phenomena that is described in [*Dream of the West Coast*] is the effect of a white feather that lightly floats in a contrasting blue sky. The poem goes further to associate this with a dream, in specific a white dream. For a large part of the year bright blue skies (or parts of sky) are visible as the area does not have a lot of cloud forming skies. This has a very unique effect where white colours appear intensified in

contrast with their dry surrounds. (Refer to **Figure 12**, **Figure 83** and **Figure 90**) In one of the first design exercises the experience of standing on a pier in the fog was investigated. Together with the verse from the poem (below) this concept was used to develop the new pier at the Maritime Heritage node.

“laat my weer vir oulaas sweef  
soos 'n wit voel dons  
wat in die blou lug hang  
dryf op jou strome wit droom  
wat die aarde nie ken nie ...”

'let me soar again for the last time  
like a bird's feather  
that floats in the blue sky  
gliding on your thermals white dream  
that does not know the earth...'

[*Dream of the West Coast*] by M.M. Walters  
Source: Botha & Walters, 1926 (in Afrikaans)  
Translated here by Author from Afrikaans to English

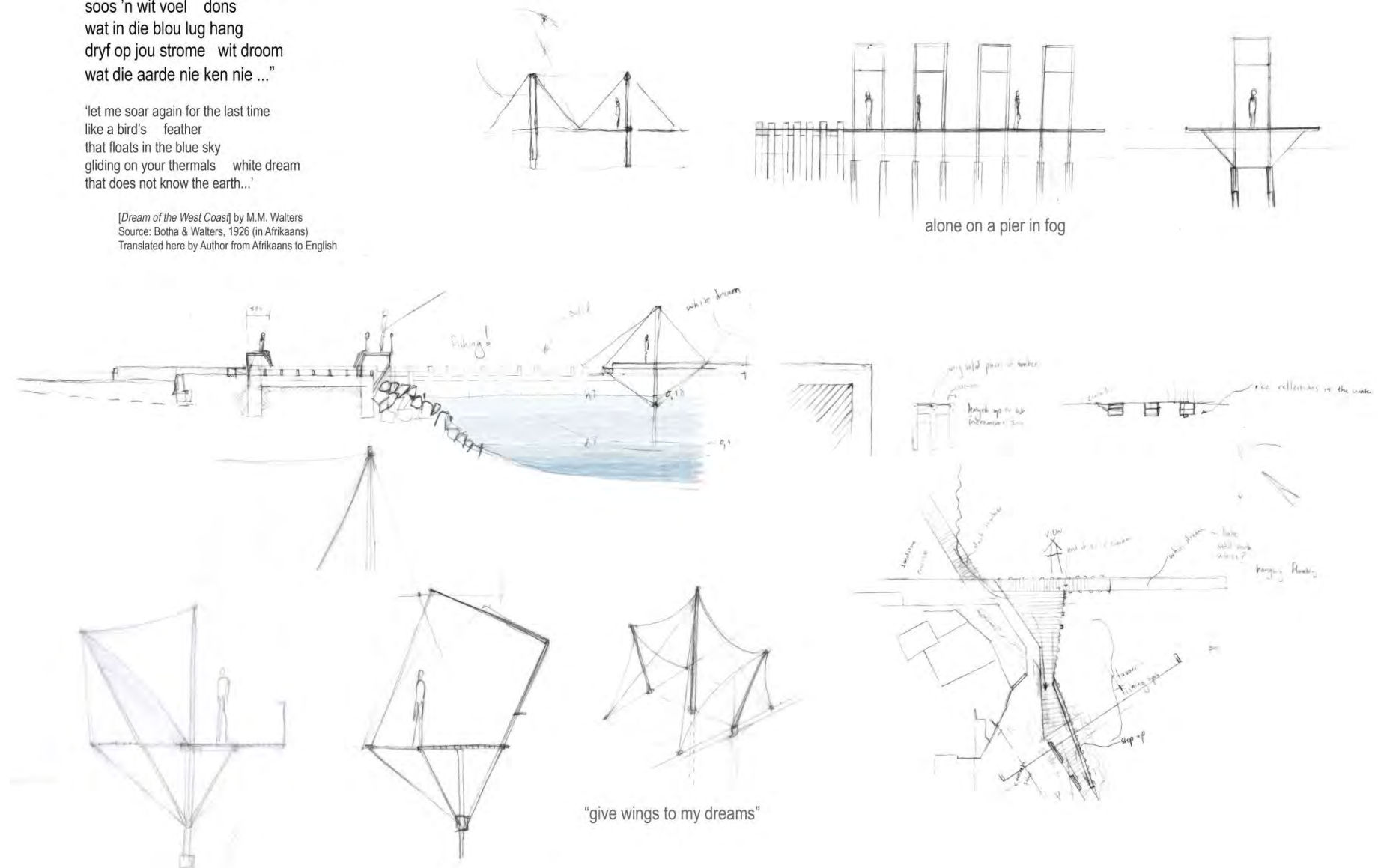


Figure 152: Design development of pier of Maritime Heritage Node. This development is still in progress. (Author, 2013)

## Working with the Existing

### The Theatre in the Factory

The structure of the factory that will house the theatre was investigated in more detail. The structure is a very simple steel frame structure.

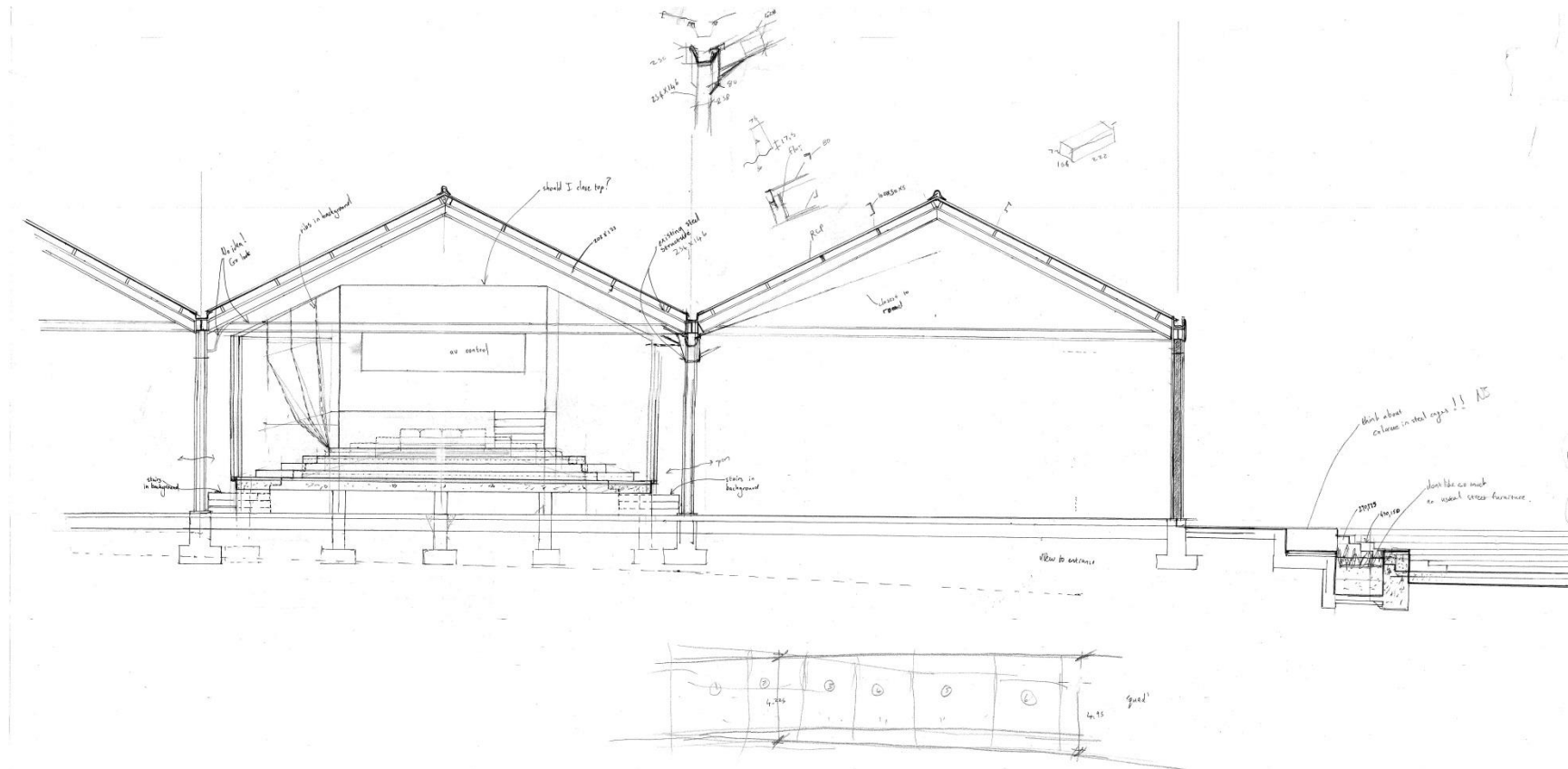


Figure 153: Factory with theatre inside. This work still needs some development. (Author, 2013)



Figure 154: The steel frame is visible on the inside (Author, 2013)



Figure 155: Windows that face Main Rd (Author, 2013)



Figure 156: Steel column (Author, 2013)



Figure 157: Steel frame of first factory on Main Rd's side (Author, 2013)

## Materials

The goal is to uplift the existing whilst recognising the industrial nature of the precinct. With this regard the selection of materials will be important. It needs to be robust, but friendly. The goal is that a sense of the everyday should remain in the language of the new development. For this reason local materials were considered.

The use of calcrete is commonly found in Saldanha Bay. (Figure 158 to Figure 160) There is also an informal calcrete quarry. It is a porous material not strong enough to build load bearing structures. The use of calcrete for landscaping at the Mitchells Plain Hospital (by Tarna Klitzner) was considered. (Figure 161 to Figure 163)



Figure 158: The use of calcrete to create a street boundary wall in Saldanha Bay. (Author, 2013)



Figure 159: The use of calcrete to create a street boundary wall at a residential house in Langebaan. (Author, 2013)



Figure 160: A rather interesting example of the use of calcrete on Main Road in Saldanha Bay. (Author, 2013)



Figure 161: Dry packed calcrete with concrete seat. (Fogarty, 2013)



Figure 162: Calcrete wall. (Fogarty, 2013)



Figure 163: Gabion baskets filled with calcrete. (Fogarty, 2013)

## Lighting

The lights from the Iron Ore Jetty are visible from the precinct at night is an attractive feature. Lighting will also be an important part of the precinct. The connecting paths to the precinct need to be well lit. Lights underneath seating

and at the water's edge will create experiential qualities as it reflects on water or shines through fog.



Figure 164: View of Pepper Bay from Hoedjieskop at night. When one looks back at Figure 12 one can see some parts of the Iron Ore Terminal in the distant horizon. At night its lights become a spectacular display that is visible from anywhere in the bay. (Author, 2013)

## Development of Rib Structure

As mentioned before the structure of the production area was inspired by the shape of the ribs of whale skeletons. Here its structure and loads are considered in more detail.

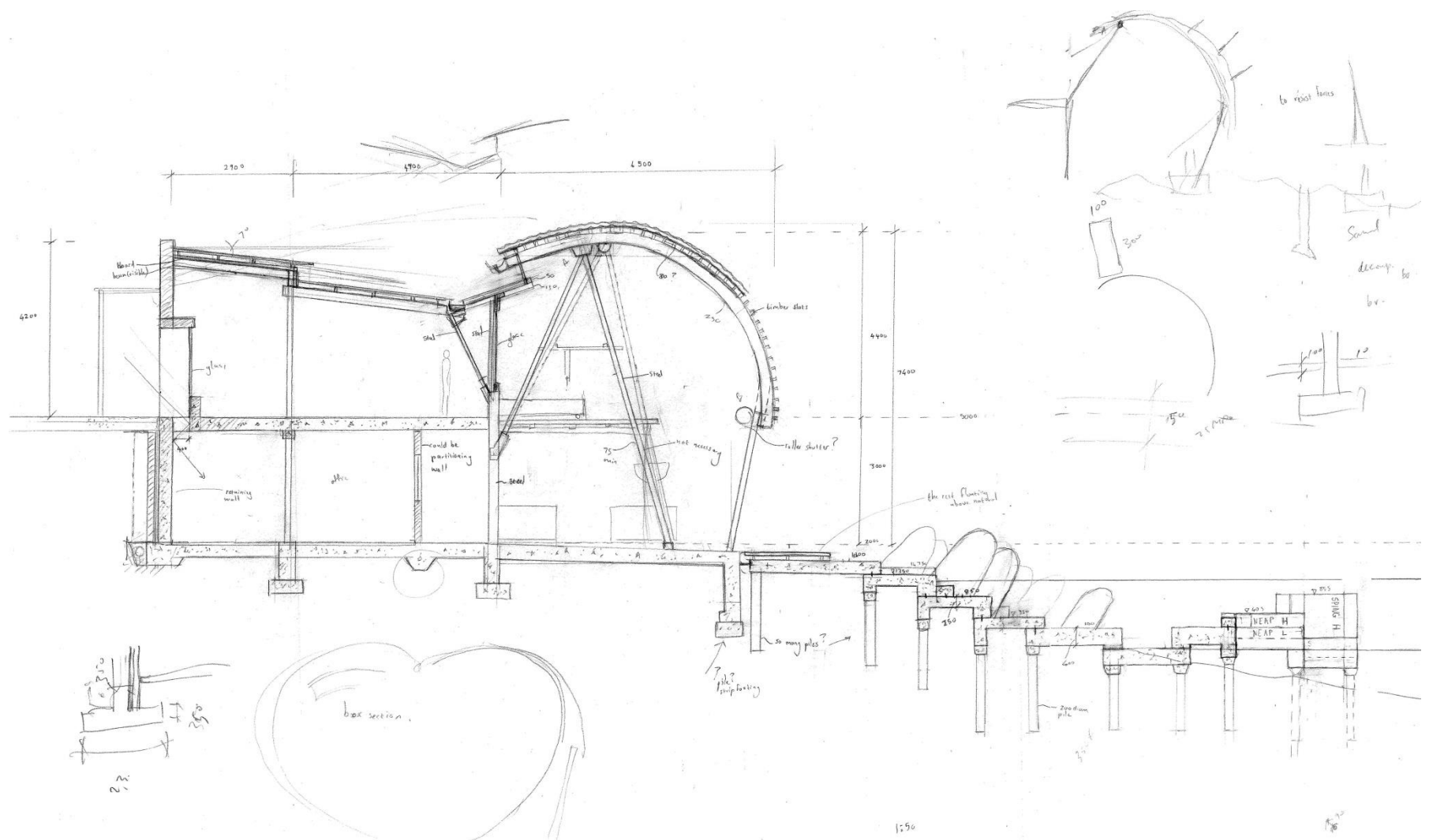


Figure 165: 1:50 Section through production area (not to scale). (Author, 2013)

## Construction at the Water's Edge

Here the construction method for the platforms at one experience point (Stand on Rocks) was investigated in more detail.

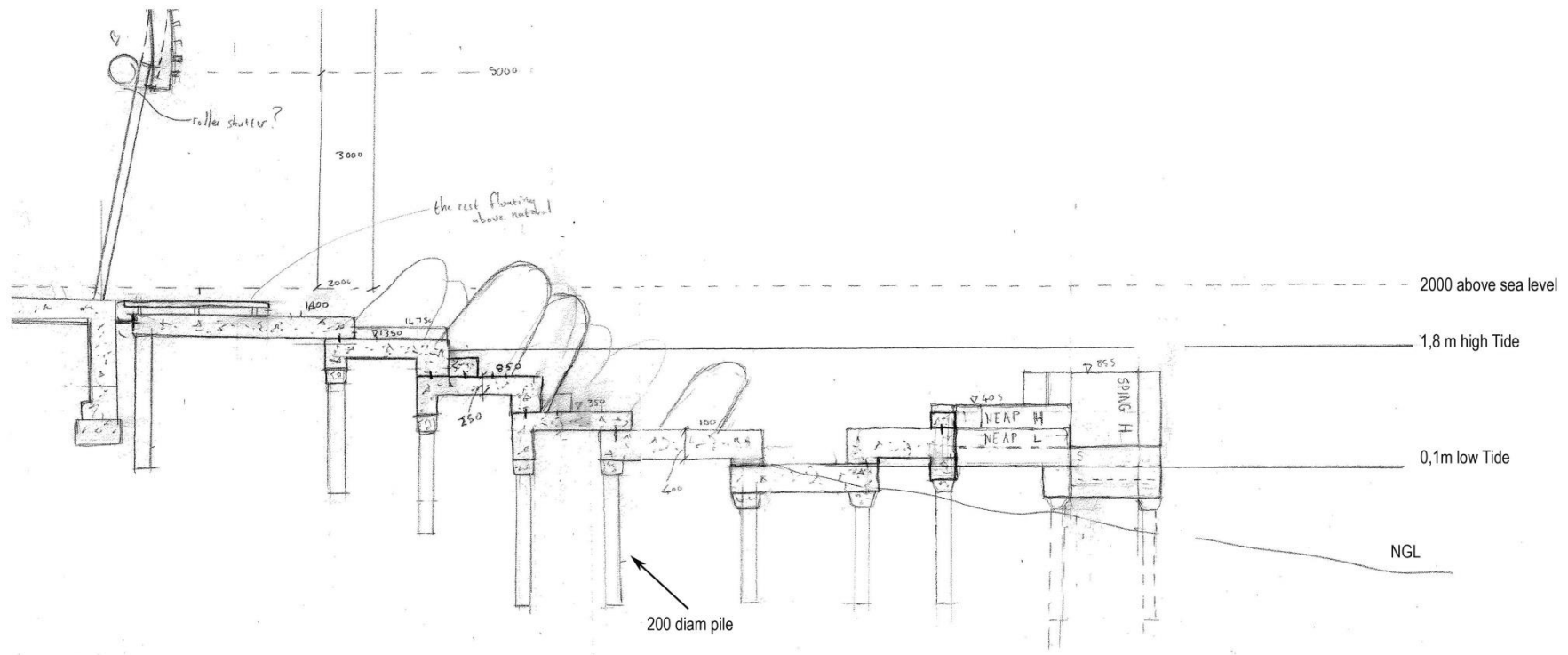


Figure 166: 1:50 Section of concrete platforms on concrete piles. Their depth depends on the bed rock level. (not to scale) (Author, 2013)

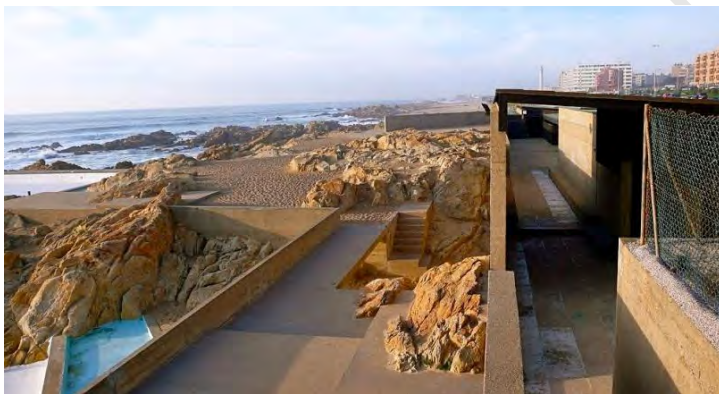


Figure 167: At the Leça de Palmeira Pool complex a poetic use of concrete is displayed where it is poured directly onto the rocks and offsets the tectonic differences between man-made and the natural (Wang, 2011)



Figure 168: Another interesting use of concrete and rock at the Jack Evans Boat Harbour in Australia by Aspect Studios. (Archdaily, 2011)



Figure 169: Concrete coloration at the Jack Evans Boat Harbour (Archdaily, 2011)

## Conclusion

The focus of this dissertation was around the research question of how place that is rich in experience can be created. This inquiry was illustrated through a design project that is located at the Small Fishing Harbour of Saldanha Bay.

Through theoretical research the conclusion was reached that it is important to create places that are rich in experience and have unique character for the following reasons: When place is rich in experience it has the potential to have meaning in the minds of its users. It necessary for place to have distinct character and have meaning associated with it in order for people to be able to identify with place and have a sense of belonging.

There was a focus on the existing character and experiences of the Small Fishing Harbour throughout the design development process. Poetry was also used as a phenomenological method to illuminate place character. It was shown that in order to design place that have unique character and a richness of experiences, the existing context needs to be understood. This is necessary so that the potential of existing experiences are not lost, but celebrated and/ or reinforced.

The Small Fishing Harbour was identified as a public place of great importance in terms of the following: its physical location, access to the water's edge that it provides to a historically segregated community and the potential that linking it to the tourism hub of Saldanha Bay, namely in Main Road, provides. These concepts call attention to the present-day importance of preserving the Small Fishing Harbour of Saldanha Bay for public use.

Through theoretical research it was also concluded that site has a range of identities at different scales, from urban to human scale. The analyses the precinct of the Small Fishing Harbour at a range of scales led to the identification of some key informants for the design project. Untold histories of Saldanha Bay, namely the forced removals at Hoedjieskop and the whaling industry of earlier times were discovered through research.

Knowledge about the history of whaling was used as a poetic informant for the design project. This illustrated how understanding context in terms of history, can be useful in a design process that aims to create a richness of experience. In the same way it was illustrated how understanding existing character and existing experiences of a place can be used as key informants for a design project that reinforces and/or celebrates the existing.

This type of research led to a final design scheme that includes a range of experiences for the human senses. The aim was to create a public place that still supports tourism related activities, but without being a generic waterfront design scheme. What meanings such a place would have will still be determined by its users and not by the designer. It can however be argued that public place that is rich in experience has the potential to mean and therefore also the potential to be valued.

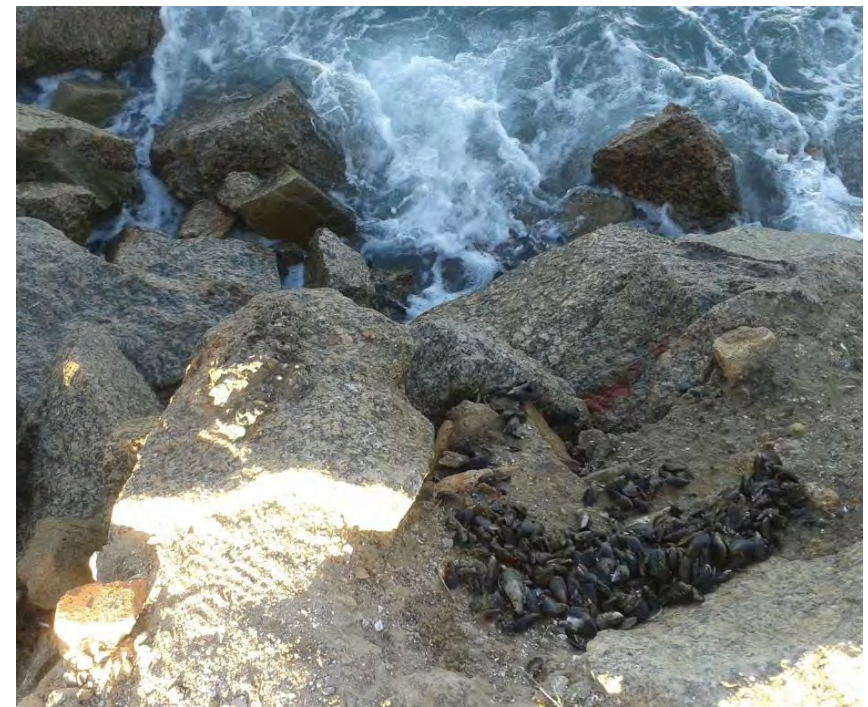


Figure 170: Granite boulders at the edge of the Small Fishing Harbour. (Author, 2013)

## Glossary

**Imaginary (adjective):** creative, different, new  
**Koppie:** A small isolated hill. (Wordreference.com, 2013)  
**Life-world:** This definition our world includes all the complexities and contradictions of our world as we life in it on a day to day basis.  
**Meaning:** The significance of something that is formed in the mind of the person who experiences it. Meaning is something that gets attached to an object, but the knowledge of that is carried by the subject.

**Phenomenology:** A study of *how* things are experienced in our life-world. How things are determined by the way that they are experienced. Things as they appear through experience can also be called the phenomena of a place. (Norberg-Schulz, 1980: 6)  
**Site:** A three dimensional space construct that includes not only tangible but also intangible things.



Figure 171: A small boat that is used for catching crayfish stops at the quay of the Small Fishing Harbour.

## References

### Bibliography

1. Athiros, G. Athiros, L. Athirol, N. Turner, M. 2008. A West Coast Odyssey: A Journey into the Colourful and Fascinating History of the Cape's West Coast Peninsula. Woodstock, South Africa: Historical Media cc.: 129-135.
2. Arvidson, A. R. 2011. So Inclined. *Landscape Architecture Magazine*. 101 (11): 140 – 153.
3. Botha, C.S. & Walters, M. M. 1976. [Dream of the West Coast]. Human & Rousseau. Cape Town. (In Afrikaans).
4. Burns, C. 1991. On Site: Architectural Preoccupations. In *Drawing Building Text*. Kahn, A. ed. New York: Princeton Architectural Press: 146-165.
5. Corner, J. 1999a. Recovering Landscape as a Critical Cultural Practice. In *Recovering Landscape: Essays in Contemporary Landscape Theory*. Corner, J. ed. New York: Princeton Architectural Press: 1-25.
6. Corner, J. 1999b. Eidetic Operations and New Landscapes. In *Recovering Landscape: Essays in Contemporary Landscape Theory*. Corner, J. ed. New York: Princeton Architectural Press: 152-169.
7. Corner, J. 2006. Reading the Landscape: Terra Fluxus. In *The Landscape Urbanism Reader*. Waldheim, C. ed. New York: Princeton Architectural Press: 24 – 33.
8. Czerniak, J. 2006. Looking Back at Landscape Urbanism: Speculations on Site. In *The Landscape Urbanism Reader*. Waldheim, C. ed. New York: Princeton Architectural Press: 105-123.
9. Glavovic, B. 2000. Our Coast, Our Future A New Approach to Coastal Management in South Africa. Rogge Bay, South Africa: Department of Environmental Affairs & Tourism.
10. Department of Environmental Affairs and Tourism. 2007. Marine Aquaculture in South Africa, Rogge Bay, South Africa: Chief Directorate: Integrated Coastal Management, Department of Environmental Affairs and Tourism.
11. Department of Agriculture, Forestry and Fisheries. 2012. South Africa's Aquaculture in Annual Report 2011. South Africa: Chief Directorate: Aquaculture and Economic Development Fisheries Branch, Department of Agriculture, Forestry and Fisheries.
12. Korringa, P. 1976. "Nori" Farming in Japan (Cultivation of Edible Seaweeds of the genus Porphyra). In *Farming Marine Organisms Low in the Food Chain*. Amsterdam, Oxford, New York: Elsevier Scientific Publishing Company: 17-48.
13. Mossop, E. 2006. Landscapes of Infrastructure. In *The Landscape Urbanism Reader*. Waldheim, C. ed. New York: Princeton Architectural Press: 163-175.
14. Norberg-Schulz, C. 1980. Place. In *Genius Loci Towards a Phenomenology of Architecture*. London: Academy Editions: 6-23.
15. Norberg-Schulz, C. 2000. Comprehension. In *Architecture: Presence, Language and Place*. Italy: Skira: 59-89.
16. Olin, L. 2008. *Olin: Placemaking*. New York: Monacelli Press.
17. Pillay, T.V.R. Kutty, M.N. 2005. Oysters and Mussels. In *Aquaculture Principles and Practices*. Oxford: Blackwell Publishing: 519-548.
18. Pillay, T.V.R., Kutty M.N. 2005. Seaweeds. In *Aquaculture: principles and practices*. Oxford: Blackwell Publishing Ltd: 562-575.
19. Pollak, L. 2006. Constructed Ground: Questions of Scale. In *The Landscape Urbanism Reader*. Waldheim, C. ed. New York: Princeton Architectural Press: 125-139.
20. Ruck, K. (Kevin@ruck.co.za). 12 July 2013. Aquaculture. E-mail to: Kellerman, B. (beatruxkellerman@gmail.com).
21. Smit, W. (Wilene.Smit@sbm.gov.za). 11 October 2013. Saldanha enquiry about land claims. E-mail to: Kellerman, B. (beatruxkellerman@gmail.com).
22. Saldanha Bay Municipality. 2011. *Municipal Spatial Development Framework, Final Document, Feb 2011*. Saldanha Bay Municipality.
23. Treib, M. 1995. Must Landscapes Mean?: Approaches to Significance in Recent Landscape Architecture. In *Settings and Stray Paths. Writings on Landscapes and Gardens*. 2005. New York: Routledge: 108-137.

24. Truter, C. 1998. 2<sup>nd</sup> ed. *West Coast: A Tourist Guide*. Rondebosch: University of Cape Town Press (Pty) Ltd.
25. Wall, Alex. 1999. Programming the Urban Surface. In *Recovering Landscape: Essays in Contemporary Landscape Theory*. Corner, James, Eds. New York: Princeton Architectural Press: 222-249.
26. Visser, S. 2012. Sustainable Seafood: Mussel Farming on the West Coast. *West Coast Escape* magazine. 08 (summer/autumn): 34- 38.

### Webography

27. abh9h@virginia.edu. 2009. *Re-viewing Nature; Machines and Industry; Greek Revival Architecture*. [Online]. Available: <http://xroads.virginia.edu/~ma96/forrest/ww/nature.html> [11 April 2013].
28. Anchor Environmental Consultants. 2011. *Saldanha Bay and Langebaan Lagoon: State of the Bay 2011*. [Online]. Available: [http://www.anchorenvironmental.co.za/Documents/Pdfs/Saldanha%20State%20of%20the%20Bay/SoB\\_SBLA4\\_for\\_Clients.pdf](http://www.anchorenvironmental.co.za/Documents/Pdfs/Saldanha%20State%20of%20the%20Bay/SoB_SBLA4_for_Clients.pdf) [02 April 2013].
29. Anderson, R. *Seaweeds*. [Online]. Available: <http://www.botany.uwc.ac.za/envfacts/seaweeds/index.htm> [01 May 2013].
30. Arup. *Allegheny Riverfront Park*. [Online]. Available: [http://www.arup.com/Projects/Allegheny\\_Riverfront\\_Park/Details.aspx](http://www.arup.com/Projects/Allegheny_Riverfront_Park/Details.aspx) [01 May 2013].
31. Balters, Sofia. 2011. *AD Classics: Leça Swimming Pools / Alvaro Siza*. [Online]. Available: <http://www.archdaily.com/150272/ad-classics-Leça-swimming-pools-alvaro-siza/> [29 April 2013].
32. Biohabitats. 2013. *2013 Strategic Plan Technical Appendix Allegheny Riverfront Green Boulevard*. [Online]. Available: <http://ura.org/pdfs/ARGB/Open-Space-and-Riverfront-Access-Appendix.pdf> [01 May 2013].
33. Bock, B. 2012. "Sout Stories" Take People back to Their Cultural Roots. Western Cape Government. 8 Oct 2012. [Online]. Available: <http://www.westerncape.gov.za/news/%E2%80%9Csout-stories%E2%80%9D-take-people-back-their-cultural-roots> [13 October 2013].
34. Bolton, J.J. De Clerck, O. John, D.M. Unknown Date. Seaweed diversity patterns I Sub-Saharan Arica. University of Cape Town. [Online]. Available: [www.vliz.be/imisdocs/publications/227296.pdf](http://www.vliz.be/imisdocs/publications/227296.pdf) [01 September 2013].
35. Burgess, W. Jr. Hulhaway, F. 1983. *Coastal Structures Handbook Series. Docks, Piers and Wharves: A Design Guide*. New York: New York Sea Grant Institute. [Online]. Available: [nsgl.gso.uri.edu/nysqi/nysqih83002/nysqih83002\\_full.pdf](http://nsgl.gso.uri.edu/nysqi/nysqih83002/nysqih83002_full.pdf) [25 April 2013].
36. Centro Tecnológico Del Mar. 2004. *Analysis and Diagnosis On Waste Byproduct Generating From Mussel Farming On Mussel Rafts*. [Online]. Available: <http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=wastemanagementofmussels-Diagnosis.pdf> [01 May 2013].
37. Coetzee, S. 1998. Saldanha-Oesfees herleef weer vanjaar nadat die fees in 1995 doodgeloop het. *Volksblad*. 11 Sep 1998. [Online]. Available: <http://152.111.11.6/argief/berigte/volksblad/1998/09/11/14/4.html> [5 September 2013].
38. Debby@sealogix.co.za. *Identifying Common Seaweed on the South African West Coast*. [Online]. Available: [http://sealogix.co.za/index\\_files/Page1377.htm](http://sealogix.co.za/index_files/Page1377.htm) [02 May 2013].
39. Du Plessis, B. 2012. *Seaweed Hampers Saldanha-Strand*. [Online]. Available: <http://www.weslander.co.za/articles/articleDetails.aspx?id=17182> [25 April 2013] (In Afrikaans).
40. Donovan, T.W. 2010. 9 Incredible uses for seaweed. [Online]. Available: [http://www.huffingtonpost.com/2010/04/14/9-incredible-uses-for-sea\\_n\\_526746.html#s77906&title=Food Additives](http://www.huffingtonpost.com/2010/04/14/9-incredible-uses-for-sea_n_526746.html#s77906&title=Food Additives) [02 April 2013].
41. Esmaili, A. Beirami, P. Ghasemi, S. 2010. Evaluation of the Marine Algae *Gracilaria* and its Activated Carbon for the Absorbion of Ni(II) from Wastewater. Islamic Azad University, Theran, Iran. [Online]. Available: <http://www.hindawi.com/journals/chem/2011/137484/abs/> [2 August 2013].

42. Esmaeili, A. Ghasemi, S. Rustaiyan, A. 2008. Evaluation of the Activated Carbon Prepared of Algae *Gracilaria* for the Biosorption of Cu(II) from Aqueous Solutions. Islamic Azad University, Theran, Iran. [Online]. Available: [http://www.idosi.org/aejaes/jaes3\(6\)/2.pdf](http://www.idosi.org/aejaes/jaes3(6)/2.pdf) [2 August 2013].
43. FOA. 1990. The Artificial Cultivation of *Gracilaria*. In *Training Manual on Gracilaria culture and seaweed processing in China*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. [Online]. Available: <http://www.fao.org/docrep/field/003/AB730E/AB730E02.htm> [01 May 2013].
44. FOA. 2003a. Other Uses of Seaweed. In *A guide to the seaweed industry*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. [Online]. Available: <http://www.fao.org/docrep/006/y4765e/y4765e0c.htm> [01 May 2013].
45. FOA. 2003b. Seaweeds Used as a Source of Alginate. In *A guide to the seaweed industry*. Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations. [Online]. Available: <http://www.fao.org/docrep/006/y4765e/y4765e07.htm> [01 May 2013].
46. Gaythwaite, J. W. 2004. 2<sup>nd</sup> ed. Design of Fixed Structures. In *Design of Marine Facilities for the Berthing, Mooring, and Repair of Vessels*. Virginia: American Society of Civil Engineers (ASCE). [Online]. Available: [http://www.knovel.com/web/portal/browse/display?EXT\\_KNOVEL\\_DISPLAY\\_bookid=5209&VerticalID=0](http://www.knovel.com/web/portal/browse/display?EXT_KNOVEL_DISPLAY_bookid=5209&VerticalID=0) [25 April 2013].
47. Guerrero, S. Gremades, J. ed. 2012. Integrated Multi-Trophic Aquaculture. [Online]. Available: [hal.archives-ouvertes.fr/docs/00/74/33/95/PDF/AMTI\\_Galicia\\_EN.pdf](http://hal.archives-ouvertes.fr/docs/00/74/33/95/PDF/AMTI_Galicia_EN.pdf) [25 September 2013].
48. Ideass. 2012. *Fog Catchers of Chile for the Collection of Water*. [Online]. Available: <http://www.ideassonline.org/public/pdf/AtrapanieblasChileENG.pdf> [02 April 2013].
49. Kumba Iron Ore. 2007. *Saldanha Port Operations Conditions For Loading Iron Ore at the Port of Saldanha*. [Online]. Available: [http://www.saldanhaportoperations.com/pdf/notice\\_to\\_vessels\\_110107.pdf](http://www.saldanhaportoperations.com/pdf/notice_to_vessels_110107.pdf) [02 April 2013].
50. Marine World Database. 2009. *Saldanha Bay*. [Online]. Available: <http://www.anchorageworld.com/content/saldanha-bay-saldanhabai> [02 April 2013].
51. McAviney, A. Case Study 2 – Ocean Swimming Pools – Leça de Palmeira, Matosinhos 1996. In *Learning from Siza*. MArch Dissertation. Cardiff University, [Online]. Available: <http://issuu.com/tmcdesigndiary/docs/dissertation> [29 April 2013]: 43-53
52. NSW Government. *NSW Oyster Industry Best Practice Guidelines Oyster Raft Construction*. NSW Government Department of Primary Industries. [Online]. Available: [http://www.dpi.nsw.gov.au/\\_data/assets/pdf\\_file/0003/421275/INT11-83575-Best-Practice-Guidelines-Oyster-Raft-Construction.pdf](http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0003/421275/INT11-83575-Best-Practice-Guidelines-Oyster-Raft-Construction.pdf) [01 May 2013]. *Oxford Dictionaries*. 2013. [Online]. Available: <http://oxforddictionaries.com/definition/english/liminal> [29 April 2013].
53. Oxford University Press. 2006. *Oxford Dictionary of Architecture & Landscaping A Dictionary of Architecture and Landscape Architecture*. [Online]. Available: <http://www.answers.com/topic/sublime-1> [11 April 2013].
54. Panagiotis, T. Danielidis, D. Dring, M. J. Katsaros, C. 2009. *Removal of phosphate by the green seaweed *Ulva lactuca* in a small-scale sewage treatment plant (Ios Island, Aegean Sea, Greece)*. [Online]. Available: <http://www.researchgate.net/publication/225453518> *Removal of phosphate by the green seaweed *Ulva lactuca* in a small-scale sewage treatment plant (Ios Island Aegean Sea Greece* [01 May 2013].
55. Project for Public Spaces. *9 Steps to Creating a Great Waterfront*. [Online]. Available: <http://www.pps.org/reference/stepstocreatingagreatwaterfront/> [11 June 2013].
56. Quezada, A. Hagggar, J. Torres, J. Clements, R. *Fog harvesting*. [Online]. Available: <http://climatetechwiki.org/content/fog-harvesting> [02 April 2013].
57. Ridler, N. 2007. Integrated Multitrophic Aquaculture. *Global Aquaculture Advocate*. 07 (March/April): 52- 55. [Online]. Available: [www2.unb.ca/chopinlab/articles/files/2007.04.GAA.Ridler.etal.pdf](http://www2.unb.ca/chopinlab/articles/files/2007.04.GAA.Ridler.etal.pdf). [15 July 2013]
58. Robertson-Andersson, D. 2009. Integrated Seaweed/Abalone Multitrophic Recirculating Aquaculture (IMTA) in South Africa: Balancing the Balance Sheets, Environment and Commerce. [Online]. Available: <http://www.slideshare.net/drobertsonandersson/integrated-seaweedabalone-multitrophic-recirculating-aquaculture-imta-in-south-africa-balancing-the-balance-sheets-enviroment-and-commerce-presentation>. [12 October 2013]
59. Siza, A., 2011. *Thoughts on His Style*. [Online]. Available: <http://alvarosizavieira.com/thoughts-on-his-style> [21 April 2013].
60. SRK consulting. 2013. *Southern Seas Fishmeal Plant, Saldanha*. [Online]. Available: <http://www.srk.co.za/en/page/za-southern-seas-fishmeal-plant-saldanha> [13 October 2013].
61. Terreblanche, R. 2012. Toerisme in Saldanha Gaan Eersdaags Bot. *Weslander*. Fri 06 Sep 2012. [Online]. Available: [http://issuu.com/weslander/docs/weslander\\_13-09-12](http://issuu.com/weslander/docs/weslander_13-09-12) [13 October 2013].
62. Weslander. 2013. Die Weskus groet drie legendes. *Weslander*. Mon 08 Jul 2013. [Online]. Available: <http://weslander.mobi/news/read/2786/die-weskus-groet-drie-legendes> [13 October 2013].
63. West Coast Green Projects. 2012. *Active Community Theatre and Art – in Saldanha Bay*. 29 Jun 2012. [Online]. Available: <http://www.capebiosphere.co.za/index.php/about-the-biosphere51/completed-projects/159-small-grants-fund> [13 October 2013].
64. Transnet Limited. 2007. Description of the Affected Environment. In *Final Environmental Scoping Report for the proposed Phase 2 Expansion of the Transnet Iron Ore Handling Facility, Saldanha Bay, Western Cape*. [Online]. Available: [http://www.transnet.net/BusinessWithUs/EnvPubDoc/Saldanha/Final\\_Scopinq/Chapter%204%20-%20Description%20of%20the%20Affected%20Environment.pdf](http://www.transnet.net/BusinessWithUs/EnvPubDoc/Saldanha/Final_Scopinq/Chapter%204%20-%20Description%20of%20the%20Affected%20Environment.pdf) [02 April 2013].
65. Wikipedia. 2013a. *Liminality*. [Online]. Available: <http://en.wikipedia.org/wiki/Liminality> [29 April 2013].
66. Wikipedia. 2013b. *List of seaweeds in South Africa*. [Online]. Available: [http://en.wikipedia.org/wiki/List\\_of\\_seaweeds\\_of\\_South\\_Africa](http://en.wikipedia.org/wiki/List_of_seaweeds_of_South_Africa) [02 April 2013].
67. White, Luke. *Sublime Resources: A brief history of the notion of the sublime*. [Online]. Available: [http://lukewhite.me.uk/sub\\_history.htm](http://lukewhite.me.uk/sub_history.htm) [22 April 2013].
68. Wordreference.com. 2013. *Koppie*. [Online]. Available: <http://www.wordreference.com/definition/koppie> [03 July 2013].
69. Zmeu, B. 2012. Evaluation of Timber Foundation Piling in Marine Applications. In *Structural Forensics investigation structures and their components*. [Online]. Available: <http://www.structuremag.org/article.aspx?articleID=1425> [25 April 2013].

## Image Sources

70. Archdaily. 2011. Jack Evans Boat Harbour / ASPECT Studios. . [Online]. Available: <http://www.archdaily.com/170913/> [10 October 2013]
71. Burman, J. & Levin, B. 1974. *The Saldanha Bay Story*. Pretoria: Human & Rousseau Publishers (Pty.) Ltd.
72. Berizbeitia, A. 2009. Michael Van Valkenburgh Associates Reconstructing Urban Landscapes. New Haven & London: Yale University Press.
73. Bernard Tschumi Architects. *Limoges Concert Hall*. <http://www.tschumi.com/projects/10/> [04 Oct 2013].
74. Blue Ocean Mussels (Pty) Ltd. *Best practice. Sustainable farming*. [Online]. Available: <http://www.blueoceanmussels.com/practice/> [04 April 2013].
75. Chief Directorate Surveys & Mapping. 1968. Aerial Survey. Job 1033 Strip 020. 1:50000. Mowbray.
76. Chief Directorate Surveys & Mapping. 1993. Ertshawe. 3317 BB5. 1:10000. Mowbray.
77. Google Earth 7.0. 6/26/2007a. 41°11'15.95" N 8°42'13.86" W eye alt 1.56 km. ©2013 DigitalGlobe ©2013 Google. [Online]. Available: <http://www.google.com/earth/index.html> [10 April 2013].
78. Google Earth 7.0. 6/26/2007b. 41°11'23.57" N 8°42'00.72" W eye alt 5.83 km. ©2013 DigitalGlobe ©2013 Google. [Online]. Available: <http://www.google.com/earth/index.html> [10 April 2013].

79. Google Earth 2013b. [Online]. Available: <http://www.google.com/earth/index.html> [10 April 2013].
80. Google Earth 2013a. 7.0. 33°03'29.21" S 21°45'53.96" W eye alt 393.94 km. ©2013 Cnes/Spot Image. [Online]. Available: <http://www.google.com/earth/index.html> [10 April 2013].
81. Google Earth 7.0. 3/14/2011 33°04'43.12" S 18°01'56.98" W eye alt 49.24 km. ©2013 DigitalGlobe. [Online]. Available: <http://www.google.com/earth/index.html> [29 April 2013d].
82. Google Earth 7.0. 4/10/2011 33°01'08.02" S 17°56'49.32" W eye alt 1.7 km. ©2013 DigitalGlobe ©2013 TerraMetrics. [Online]. Available: <http://www.google.com/earth/index.html> [29 April 2013e].
83. Guerra, F. Leça Swimming Pool, Matosinhos Porto, Portugal, Architect Alvaro Siza, 1966 (VIW-AS-PLP-0004). [Online]. Available: <http://www.agefotostock.com/en/Stock-Images/Rights-Managed/VIW-AS-PLP-0004> [29 April 2013].
84. HolidayCheck. *Weather for Saldanha*. [Online]. Available: [http://www.holidaycheck.com/climate-wetter\\_Saldanha-ebene\\_oid-id\\_12330.html](http://www.holidaycheck.com/climate-wetter_Saldanha-ebene_oid-id_12330.html) [02 April 2013].
85. Lasky, J. 2012. The Sales Agent has gone AWOL. *Landscape Architecture Magazine*. 102 (6): 112 – 119.
86. Macgowan, T. 2011. Port Botany Expansion. *Landscape Architecture Australia*. 131: 42 – 46.
87. Miller, W. 2011. alvaro siza - swimming pool, Leça da palmiera, portugal, 1973. [Online]. Available: <http://www.cosmicinspirocloud.com/image/10287514131> [29 April 2013].
88. Nudo, T. 2013. *Pictify*. [Online]. Available: <http://pictify.com/492924/laszlo-moholy-nagy1895-1946> [02 March 2013].
89. NSRI. 2013. *Yacht sinks despite gallant effort to save her*. [Online]. Available: <http://www.nsri.org.za/2013/04/yacht-sinks-despite-gallant-effort-to-save-her/> [04 April 2013].
90. Paternoster Tourism. 2013. Paternoster Tourism [Online]. Available: [https://www.facebook.com/paternostertourism/photos\\_stream](https://www.facebook.com/paternostertourism/photos_stream) [04 May 2013].
91. Patt, T. 2011. Piscinas de Marés. [Online]. Available: <http://www.flickr.com/photos/trevorpatt/sets/72157626620813537/> [29 April 2013].
92. Paesaggiocritico. 2013. *South Cove at Battery Park – NYC, USA*. [Online]. Available: <http://oldgardens.net/2013/02/19/south-cove-at-battery-park-nyc-usa/> [04 July 2013].
93. Rusli, D. 2010. Precedent Studies: Alvaro Siza. [Online]. Available: <http://demarusliarch1102.blogspot.com/2010/11/precedent-studies-alvaro-siza.html> [29 April 2013].
94. Saldanha Bay Municipality. 2006. [CD]. Path: //Economic Development/ Development Opportunities/Waterfront proposal/. In *Saldanha Bay Municipality*. Saldanha Bay Municipality [10 November 2006].
95. Saldanha Bay Municipality. 2011. Aerial SBM. 2011. Saldanha Bay.
96. SANHO. 2013. March 2013 Tide Table. [Online]. Available: [http://www.sanho.co.za/tides/tide\\_index.htm](http://www.sanho.co.za/tides/tide_index.htm) [05 March 2013].
97. Santos, F. 2012. Leça da Palmeira & Barcelona Swimming Pools |Álvaro Siza Vieira|. [Online]. Available: <http://farquitecturar.blogspot.com/2012/05/alvaro-siza-vieira-swimming-pools-leca.html>
98. Stieber, N. 2011. Leça Swimming Pools. [Online]. Available: [http://www.flickr.com/photos/architectural\\_peregrinations/sets/72157626957327217/](http://www.flickr.com/photos/architectural_peregrinations/sets/72157626957327217/) [29 April 2013].
99. Verbakel, E. 2011. Stop, Pause Play: the Public Experience. [Online]. Available: <http://www.bezalel-architecture.com/2011/07/stop-pause-play-the-public-experience/> [29 April 2013].
100. Viet D.E.L.T.A Industrial Co., Ltd. *Gracilaria SPP (Dried Red Seaweed)*. [Online]. Available: <http://www.ecvv.com/product/1000037537.html> [02 April 2013].
101. Wang, S. 2011. Exp 2 - The Space Between. [Online]. Available: [http://arch1101-2011sw.blogspot.com/2011/03/exp-2-space-between\\_29.html](http://arch1101-2011sw.blogspot.com/2011/03/exp-2-space-between_29.html) [29 April 2013].
102. West 8. Schouwburgplein 1991-1996, Rotterdam, The Netherlands. [Online]. Available: <http://www.west8.nl/projects/schouwburgplein/> [29 April 2013].
103. WikiArquitectura. 2010. Piscina des Marés. [Online]. Available: [http://en.wikiarquitectura.com/index.php/Piscina\\_des\\_Mar%C3%A9s](http://en.wikiarquitectura.com/index.php/Piscina_des_Mar%C3%A9s) [03 May 2013].
104. Wikipedia. 2013c. *Evolution*. [Online]. Available: <http://en.wikipedia.org/wiki/Evolution> [08 March 2013].
105. Wikimedia Commons. 2010. Little black mussels (*Xenostrobus pulex*) at Muriwai. [Online]. Available: [http://commons.wikimedia.org/wiki/File:Little\\_black\\_mussels\\_\(Xenostrobus\\_pulex\)\\_at\\_Muriwai.jpg#globalusage](http://commons.wikimedia.org/wiki/File:Little_black_mussels_(Xenostrobus_pulex)_at_Muriwai.jpg#globalusage) [03 July 2013].
106. Fogarty, B. 2013. *Mitchells Plain Hospital sets the Standard for Sustainable Landscaping*. [Online] Available: <http://www.capecontours.co.za/2013/07/12/mitchells-plain-hospital/> [03 September 2013].

## Appendix

### *Dream of the West Coast*

O southerly wind that blows along the west coast  
give wings to my dreams  
let me soar again for the last time  
like a bird's feather  
that floats in the blue sky  
gliding on your thermals white dream  
that does not know the earth...

let me sail again with white sails  
soundlessly over still waters  
quietly past green islands...  
stand on rocks protruding from the ocean  
looking at and listening to the sucking and rocking  
song of the waves  
that rise and swell and break...

let me be drenched again soaked  
by spray carried away by the call  
of seagulls that pass me by...  
hear how the reeds stir day and night  
how the great silence settles over the dunes...  
southerly wind that blows along the west coast  
give wings to my dreams...

- [*Dream of the West Coast*] by M.M. Walters  
(Botha & Walters, 1976 (in Afrikaans) Translated here by author from Afrikaans to English)

### *First Conceptual Investigative Works*

Four conceptual investigative tasks were done at the start of the project. With each of these a transformation of any of the previous artefacts was created.



Figure 172: The starting point of the dissertation (the first artifact): Photomontage of view of bay from small fishing harbour and some activities at the precinct (Author, 2013)

## Task 1: Articulate the notions of containment and release as found in your artifact.

A kinetic structure, “a mist machine”, which is powered by an oscillating wave column, was envisioned. The generated power would be used to move a hinge on the kinetic structure up and down which in turn causes movement of the kinetic arm. When the kinetic arm moves down a spray of mist would be released on land. The concept was inspired by Theo Jansen’s kinetic structures, green energy methods and the signs found at the site of water that is being pumped from the shore for use by some of the marine industries. It was later discovered that wave action on the site is in fact very low due to the sheltered position of Saldanha and that such an energy generating method would not be successful.

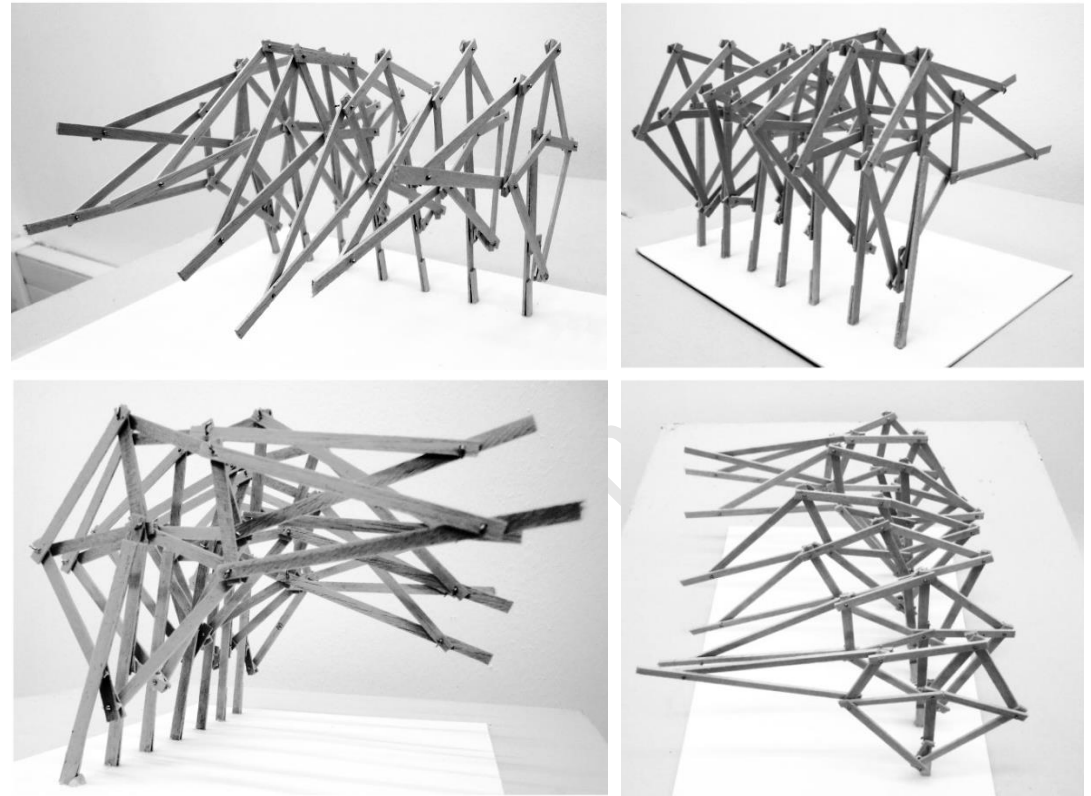


Figure 173: Different positions of the kinetic structure (Author, 2013)

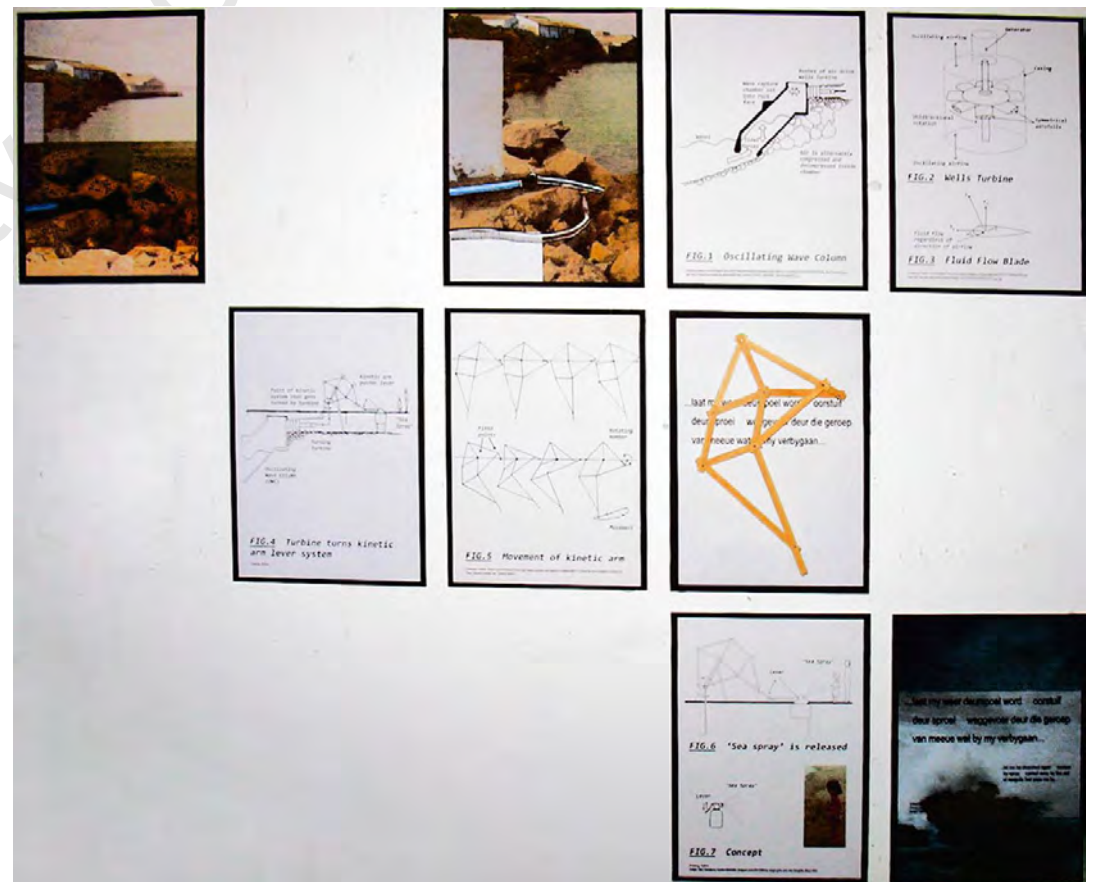


Figure 174: Working mechanisms of the mist machine (Author, 2013)

## Task 2: Represent and record your artifact as palimpsest



Figure 175: Conceptual whale skeleton (Author, 2013)

Early in the year I learnt about two interesting histories of Saldanha Bay that in all my previous visits to Saldanha Bay I never discovered. The first was that there were forced removals during the apartheid years from Hoedjieskop. The second is that whaling is an industry that took place in Saldanha Bay for 6 decades before natural resources were so diminished that operations ceased in 1967. These stories formed the basis of a conceptual model of a whale skeleton. (Refer to **Figure 177**) The body of the whale skeleton was created from the physical form of the contour lines of Hoedjieskop. The shape of its head was created from the physical shape of the coastline of Saldanha Bay before it was altered and divided by the construction of the Marcus Island causeway and the Iron Ore Port.

### **Forced Removals**

Today most of the land on and around the *koppie* is open. In earlier years I never understood why when there is another bigger hill in the town with many houses on its slope. This story about the forced removals from Hoedjieskop was only discovered after visiting the “Saldanha Cultural Village” in January before my studies commenced.

Unfortunately the last time I visited the museum was just before the commencement of my studies and soon thereafter the curator passed away. After this I was not able to get exact records of when, how many, from where at Hoedjieskop and to where people were removed.

### **Whaling**

South Africa was involved in the commercial whaling industry for almost 200 years. (Athiros et al., 2008:131) Whaling operations started in large scale at St Helena Bay in 1791. Later Table Bay, Kalk Bay, Gordon’s Bay, Algoa Bay, Fish Hoek, Mossel Bay, Simon’s Town and Plettenberg Bay were also involved. (Athiros et al., 2008:132) An estimated 10135 whales were hunted and killed on the coast of Southern Africa. (Athiros et al., 2008: 133)

The Southern Right Whale was the preferred target. It is interesting to know that Right whales derive their name from the fact that they were considered to be the right whale to hunt. They were preferred over other species, as they have a high oil yield, are slow swimmers, and usually float when dead. They were hunted for their oil and tough, flexible whalebone from which things like hair brushes and even medical prostheses were made. Whale filets and whale biltong was also produced. West Coast meatballs (a mixture of whale meat and pork) were a popular dish. (Athiros et al., 2008:132)

Today the buildings at Donkergat and the adjacent Salamander Bay house the Special Forces Regiments of SANDF. For 6 decades (1909 - 1967) this was the site of whale slaughtering and processing. (Athiros et al., 2008: 129, 132) Access to Donkergat and Salamander Bay it is completely restricted due to the SANDF operations and so the story about the Whaling industry in Saldanha Bay remains untold.

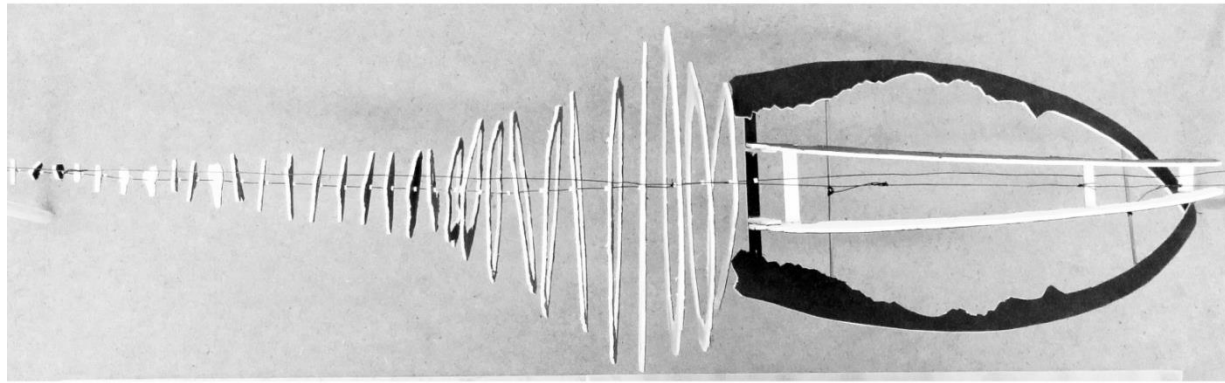


Figure 176: View of model from above (Author, 2013)



Figure 177: Photomontage of concept for creating the model by Author, 2013 (Original Images: Aerial view of Hoedjieskop (Google); 1795 map that shows the original coastline before the Marcus Island Causeway and Iron Ore Port was constructed (Burman & Levin, 1974: 88); Whale skeleton (Wikipedia, 2013c))

### Task 3: Devise a system of tunneling and excavating appropriate to your artifact.

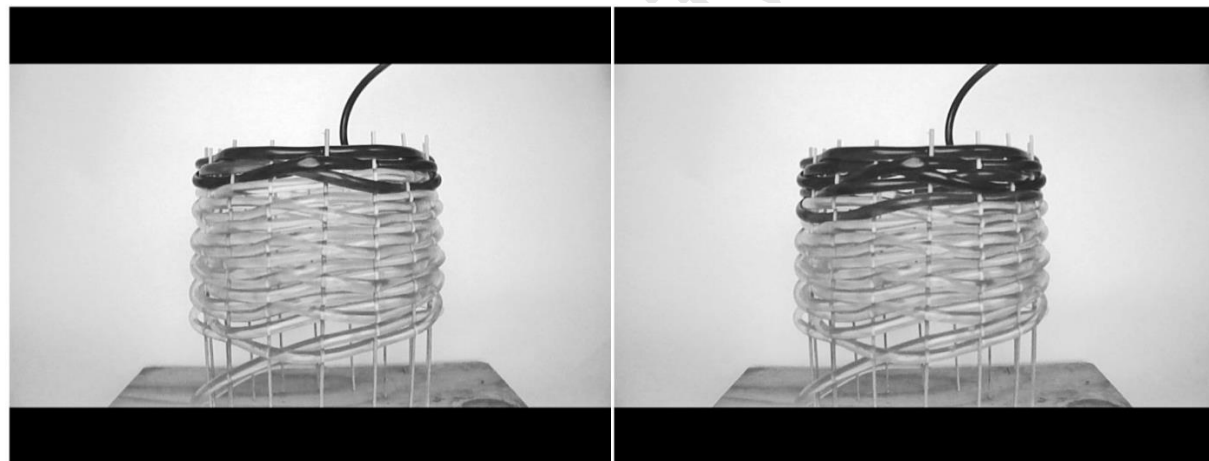


Figure 178: Start of the short film (Author, 2013)

A deliberate decision was made to focus on water instead of the easier association between the words “excavation” and “earth”. I devised an artefact that in quite a literal sense tunnels and excavates water. It works with the Bernoulli principle where water

always flows downhill. A sculpture that is in essence a weave of one long plastic tube was created. A short film of different colours of water flowing through the sculpture was made.

#### Task 4: Photograph your artifact in black and white...

... Use Google's reverse image search function to find similar images on the internet. Choose the one you find the most beautiful. By way of analytical drawings, show similarities and differences between the two images.

The selected image was chosen for its experiential qualities: the idea of being high up in the air and seeing and feeling things differently. I was also drawn to the fact that it also has to do with an event at the sea.

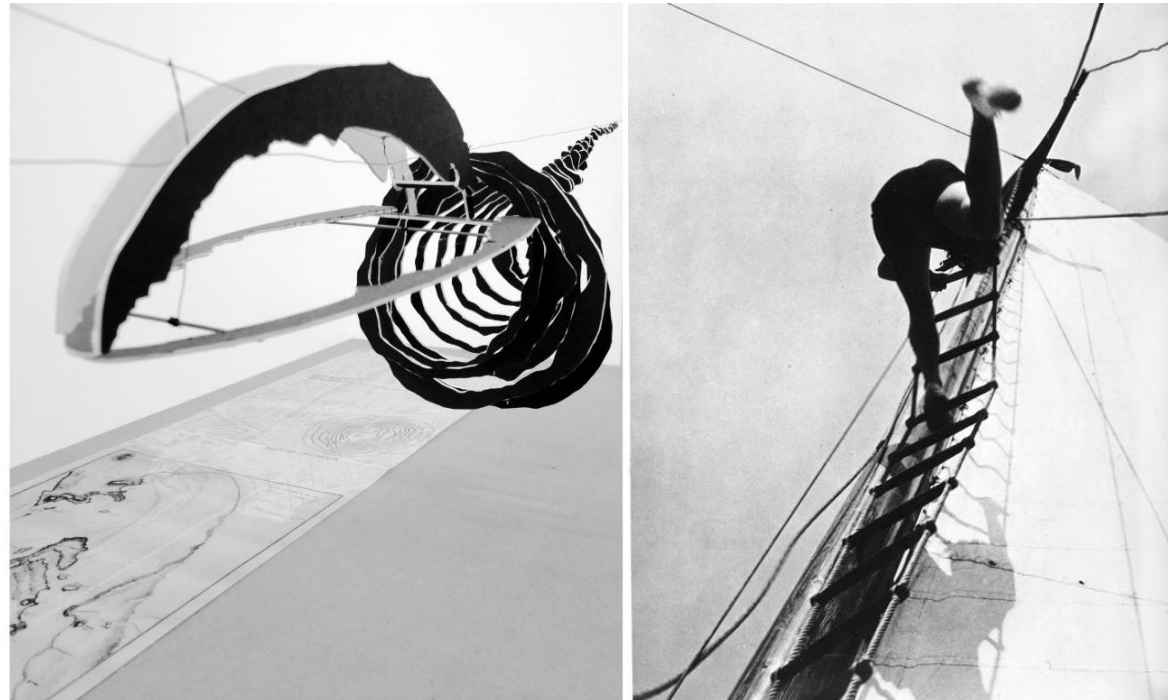


Figure 179: The original artifact (left) and the selected Google image (right). (Left: Author, 2013; Right: Nudo, 2013)



Figure 180: An analysis of graphic similarities and differences between the two images. (Author, 2013)

## Ecology of Saldanha Bay Region

### Oceans, Currents and Tides

#### Ocean and Currents

The climate of the West Coast is strongly influenced by the cool waters of the Benguela Current. (Refer to **Figure 181** and **Figure 182**) The cold coastal waters off the West Coast do not evaporate easily and as a result the air moving from the cold sea to hot land doesn't release as much moisture. Paired with the large-scale stable climatic weather patterns of this region, it causes the West Coast to receive very little rainfall. (Glavovic, 2000: 39) As a consequence cool temperature conditions prevail landwards along the West Coast, with sandy nutrient-poor soils and sparse vegetation. (Glavovic, 2000: 39)

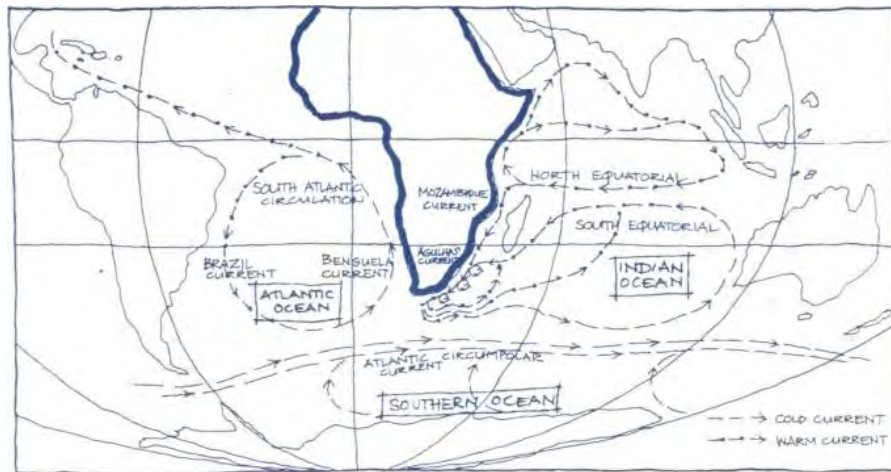


Figure 181: Oceanic and coastal context of southern Africa (Glavovic, 2000: 33)

#### Tides

The tidal rises at Saldanha Bay can be as much as 2m. (Marine World Database, 2009) The average tidal range is 1.50 m between MLWS and MHWS. (Kumba Iron Ore, 2007) The tidal currents are set fairly in and out of the entrance to Saldanha Bay, at a velocity of 0.2 to 0.5 knot. (Marine World Database, 2009)

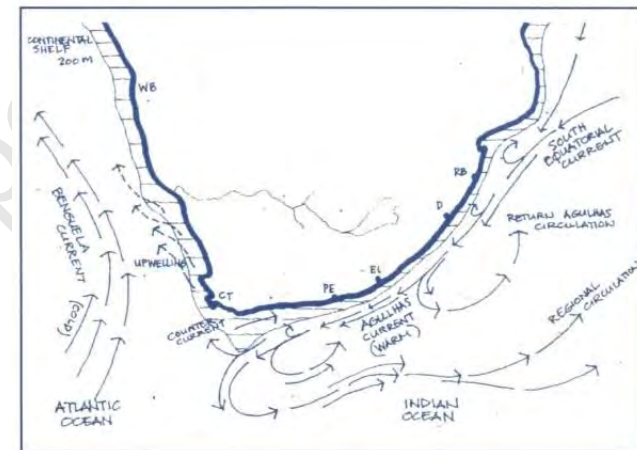


Figure 182: Oceans and currents (Glavovic, 2000: 41)

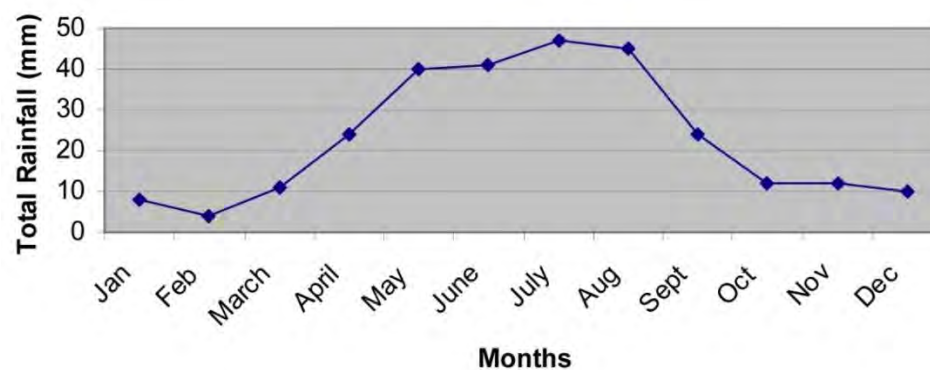


Figure 183: Average Monthly Rainfall (Transnet Limited, 2007)

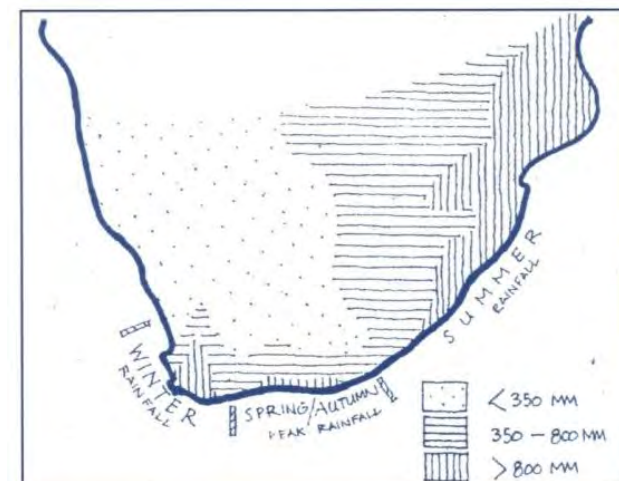


Figure 184: Rainfall along the coast (Glavovic, 2000: 39)

## Climate

- Climate Zone:** The Saldanha Bay area is characterised by a semi-arid Mediterranean climate. (Transnet Limited, 2007) (Refer to **Figure 186**)
- Water Temperature:** The sea water temperature average is 15°C. (Kumba Iron Ore, 2007) (Refer to **Figure 187**)
- Air Temperature:** Seasonal temperature variations are slight, with maximum temperatures ranging from 20 – 30°C and minimum temperatures ranging from 5 – 15°C throughout the year. (Transnet Limited, 2007) (Refer to **Table 2**)
- Rainfall:** Saldanha Bay is a winter rainfall area. Most of the precipitation occurs from May to September. (Refer to **Figure 183**) (Transnet Limited, 2007) The annual rainfall average is between 260 – 280 mm per year. (Transnet Limited, 2007)

- Fog:** Fog mostly occurs in the period February/March to July/August. (Kumba Iron Ore, 2007 and Marine World Database, 2009) Although it may remain dense outside the bay, in the harbour area it usually lifts by approximately 10:00 am. (Kumba Iron Ore, 2007)
- Wind:** The prevailing winds are SSW in the summer and NNE in the winter. (Marine World Database, 2009) In winter the wind may turn to the quadrant NW/SW, accompanied by rain. (Kumba Iron Ore, 2007) Summer winds can exceed 30 km/hr. for more than 20% of the time but winter winds are not as strong, although Berg wind conditions can exceed 30 km/hr in winter. (Transnet Limited, 2007)



Figure 185: The area is quite dry especially in summer. Here one can compare the vegetation on the koppie at the end of summer with spring. The photograph on the left was taken in February and the one to the right in October. (Author, 2013)

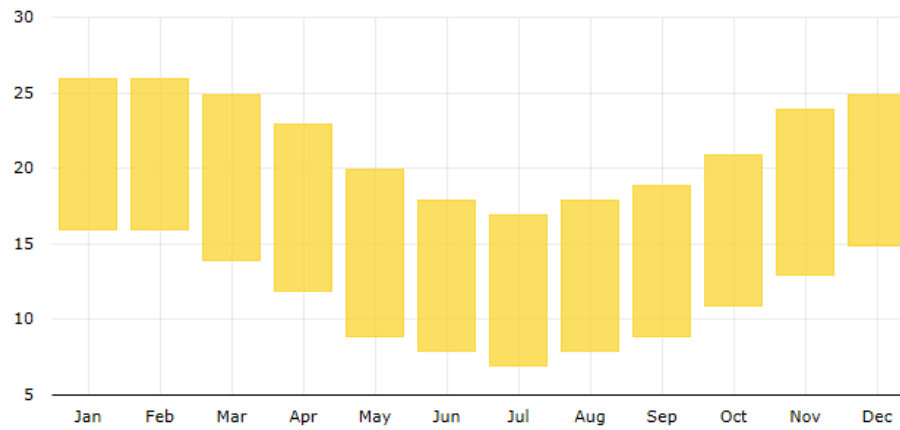


Figure 186: Average air temperature Saldanha (HolidayCheck, 2013)

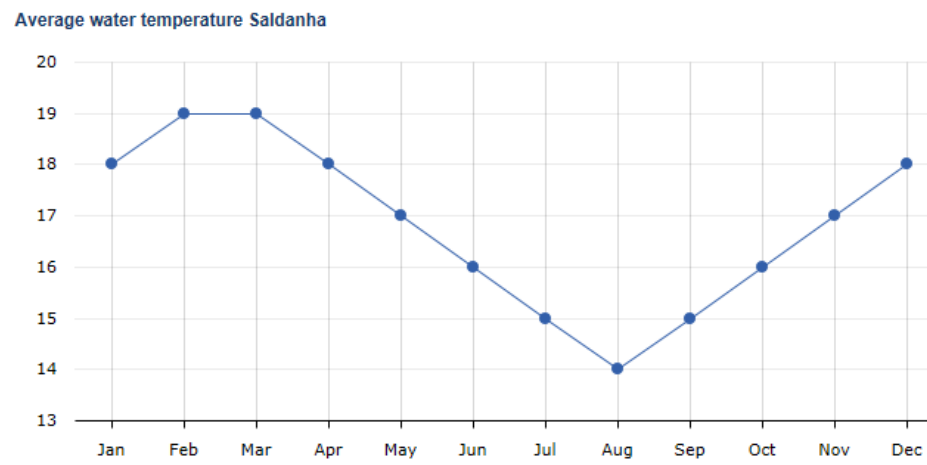


Figure 187: Average water temperature Saldanha (HolidayCheck, 2013)

Table 2: Weather characteristics for the study area (Transnet Limited, 2007)

Summer Air Temp (°C)		Winter Air Temp (°C)		Total Rainfall (mm)	
Av day	Max day	Av night	Min day	Driest 6 Months	Wettest 6 Months
26.0	35.0	10.0	4.0	69	274

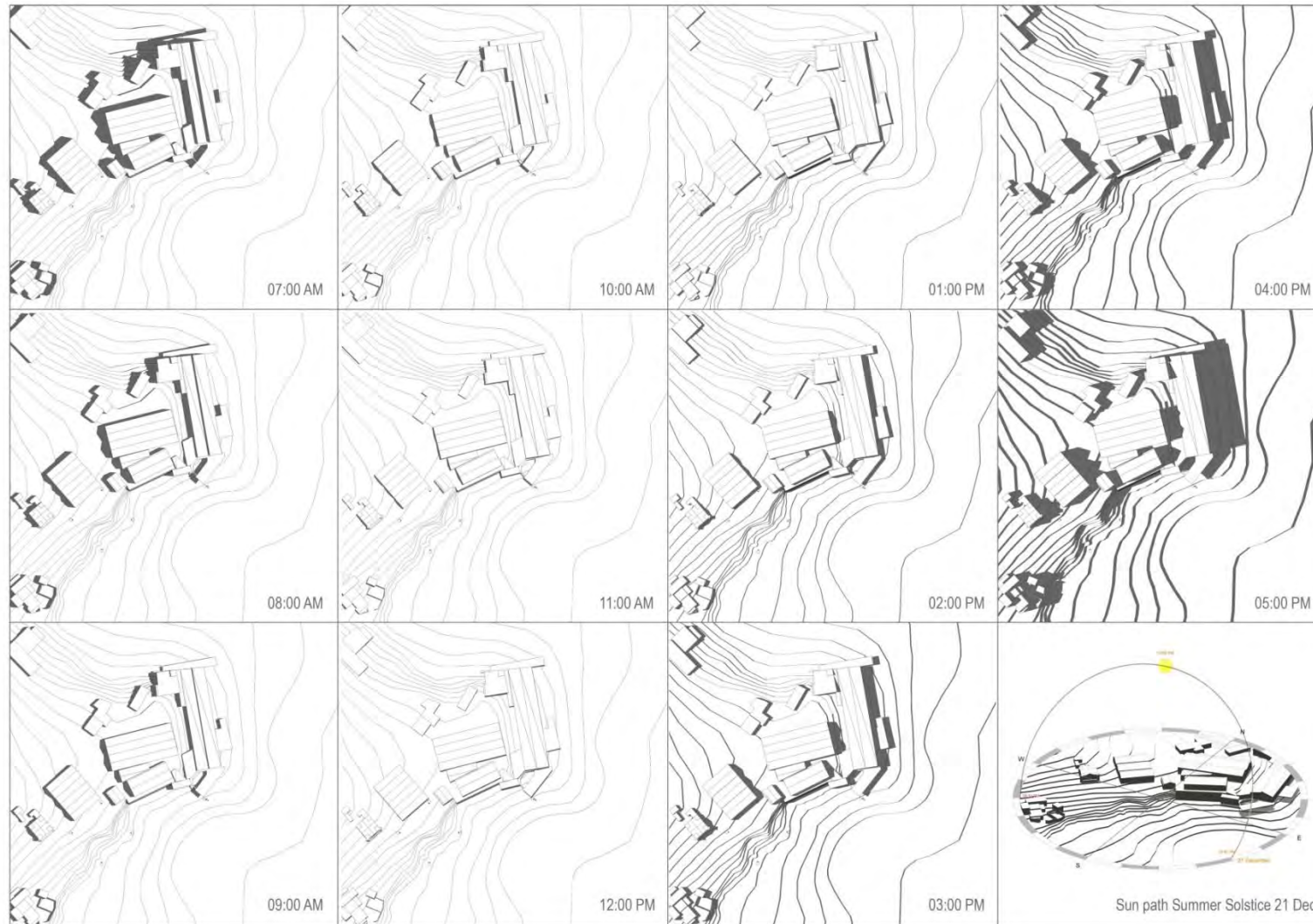


Figure 188: Analysis of Sun path at Summer Solstice at northern side of precinct (Author, 2013)

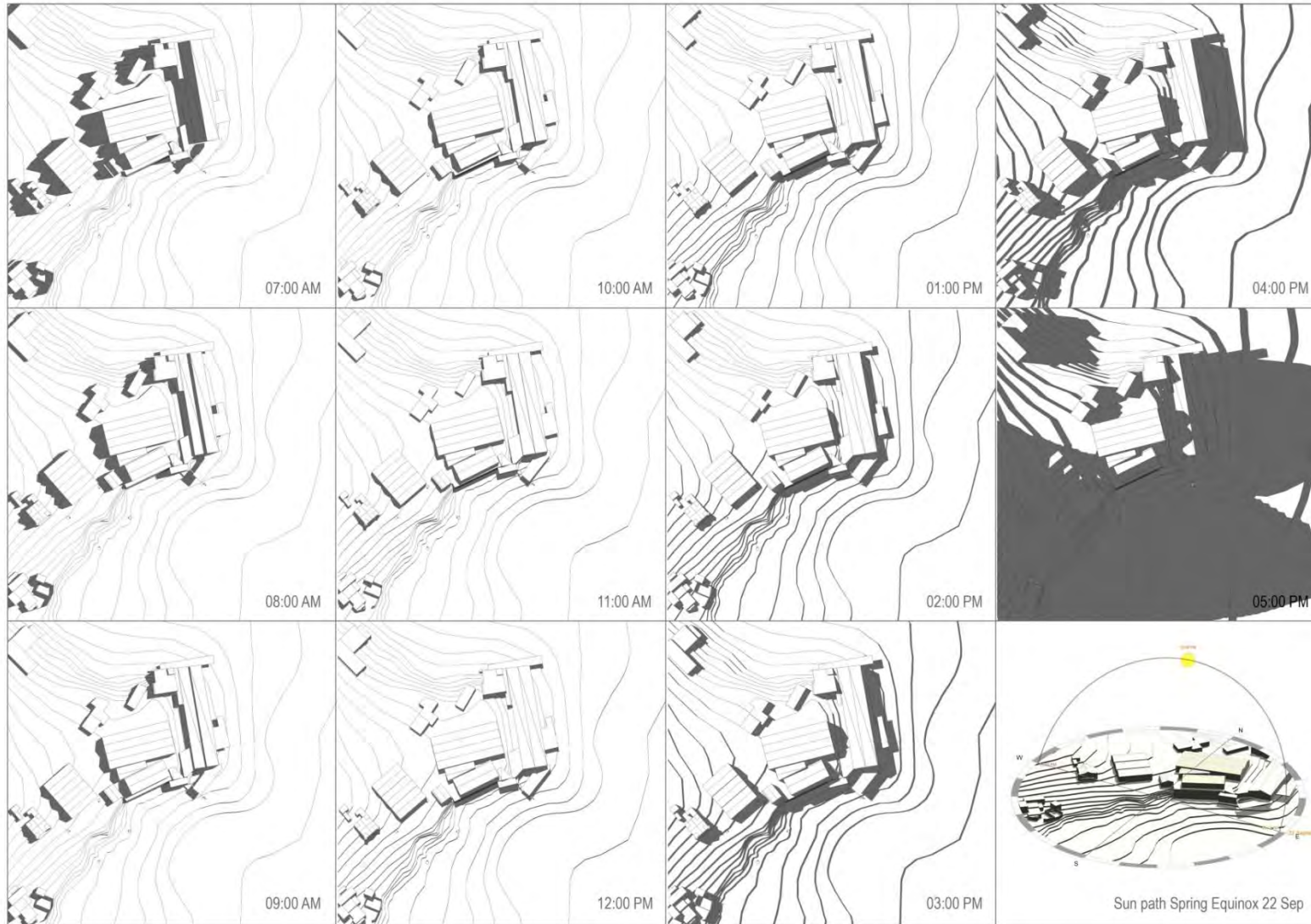


Figure 189: Analysis of Sun path at Spring Equinox at northern side of precinct (Author, 2013)

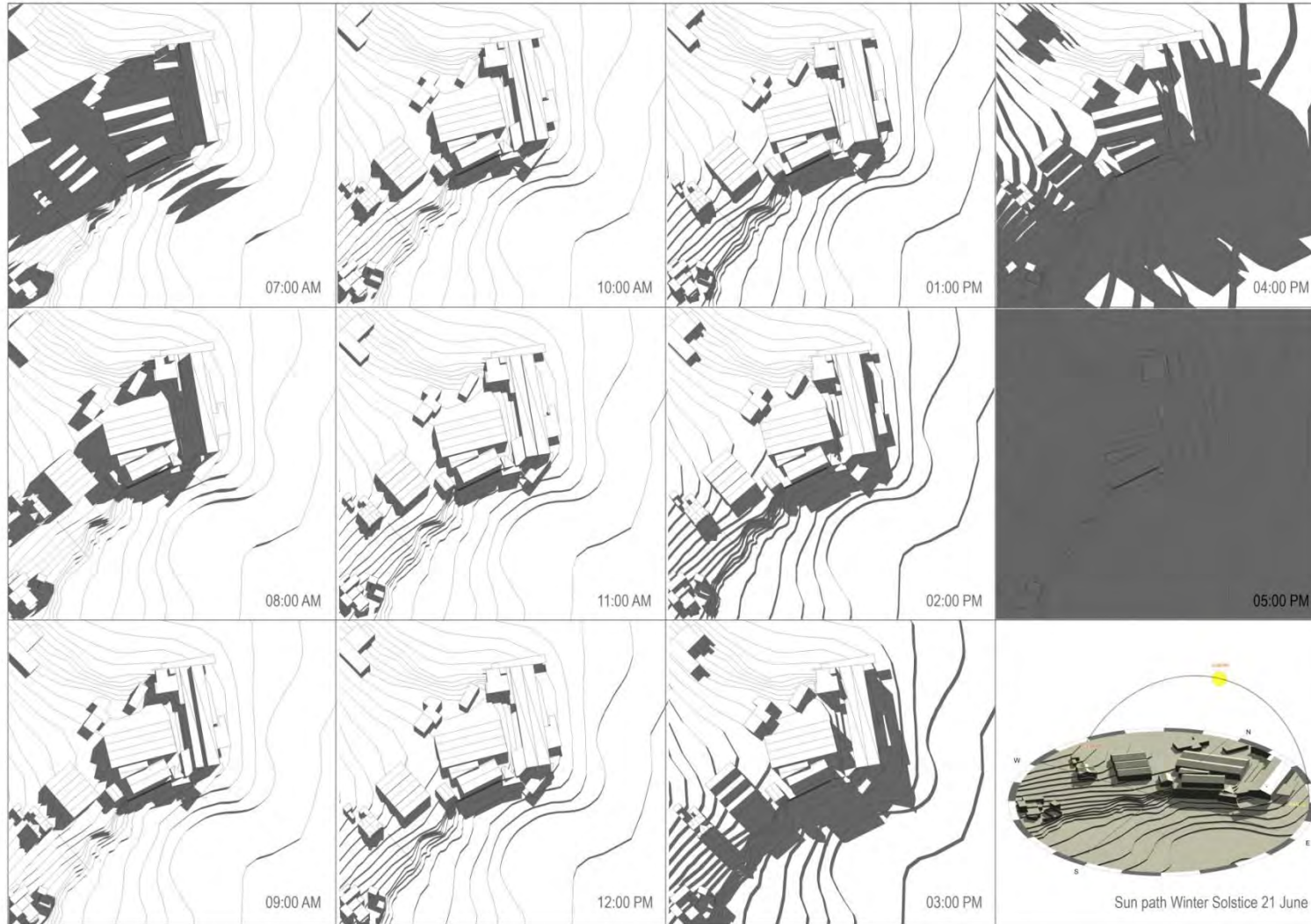


Figure 190: Analysis of Sun path at Winter Solstice at northern side of precinct (Author, 2013)

## Water Quality in the Bay

Filter-feeders, such as mussels and oysters, and seaweeds which are farmed for commercial purposes take up the minerals from organic matter like sewage and the trace metals from other types of waste water. For this reason it is important to know what the water quality in the bay of Saldanha is.

### Trace Metals

The development of the Marcus causeway / break water and the expansions of the port have decreased current strength and circulation in the bay. As a result the residence time of water in Small Bay has increased. This reduces the potential for dilution and flushing of effluent and contaminants discharged into this part of the bay. Contaminants persist in the water column for longer periods and deplete oxygen resources. As a result the amount of trace metals that accumulate in filter-feeding organisms and bacterial concentrations was found to be also higher in mussels that grow in natural conditions near shore waters. (Anchor Environmental Consultants, 2011: 12) (Refer to **Figure 191**) Mussels

that are grown on mussel rafts had normal levels of trace metals. This may have to do with the fact that on the cultivated mussels are in the water for a shorter period than those that were tested near the shore before they are harvested. (Anchor Environmental Consultants, 2011: 16) Mussels that are grown for commercial purposes are spaced apart for optimal growth so that they reach market size as soon as possible.

The increase in the volumes of ballast water discharged into the bay can also lead to higher concentrations of contaminants such as trace metals and hydrocarbons. (Anchor Environmental Consultants, 2011: 9)

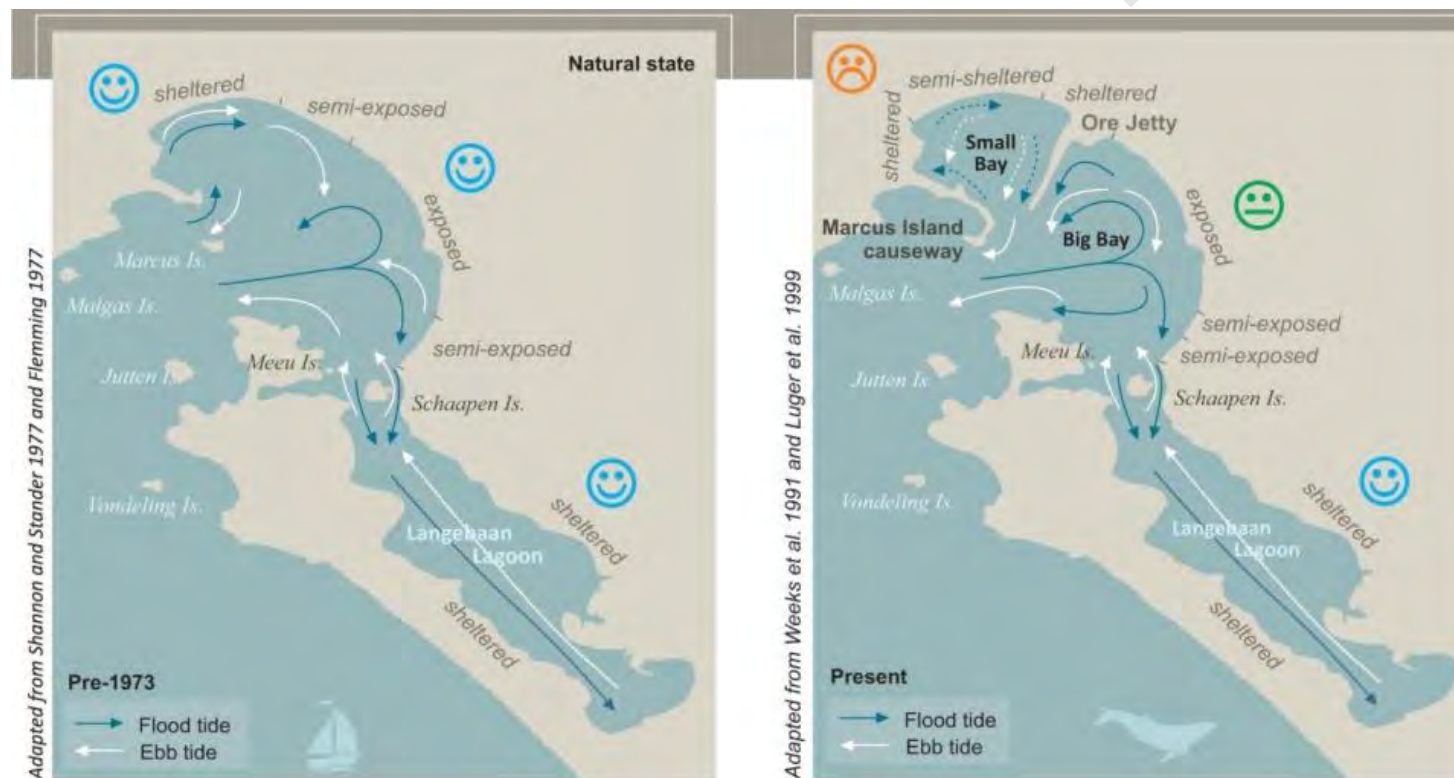


Figure 191: Water circulation patterns before and after the construction of the port and causeway (Anchor Environmental Consultants, 2011: 12)

## Organic Waste

Historically the development of the port and fishing industry attracted more industries to the area. A rapid urban development phase also occurred in Langebaan. The larger population generates greater volumes of sewage. Much of the sewage finds its way into the bay in a partially treated form from the waste water treatment works in Saldanha and Langebaan, or as untreated sewage from malfunctioning sewage pump stations and overflow from septic or conservancy tanks. (Anchor Environmental Consultants, 2011: 7)

Sewage contains high concentrations of nutrients such as nitrates and phosphates that affect the balance of natural systems. The same nutrients are also found in fertilizers and waste from fish factories. (Anchor Environmental Consultants, 2011: 7)

Eutrophication is the enrichment of waters with nutrients such as minerals and nitrogen- and phosphorus-containing materials that can lead to the unwanted and excessive growth of aquatic or marine plants such as phytoplankton and algae. (FOA, 2003a) Together with the decomposition of the organic material it can deplete oxygen in the bay. (Anchor Environmental Consultants, 2011: 7) Eutrophication can occur naturally, but it can be accelerated by allowing water, rich in dissolved fertilizers or sewage effluent to

seep into coastal waters. (FOA, 2003a) Blooms of algae (HAB) can be caused by this. (FOA, 2003a)

Red tide is most common on the West Coast during the late summer and autumn. It is also often associated with upwelling. The nutrient-rich waters that rise to the surface due to upwelling fuel the rapid growth of phytoplankton. (Visser, 2012: 37) (Refer to **Figure 192**)

Red tide refers to the discolouration of seawater caused by dense concentrations of phytoplankton. The term red-tide is commonly used to describe blooms of phytoplankton but the blooms may also include shades of orange, yellow, brown or green. For this reason scientists prefer the term Harmful Algal Bloom (HAB). (Visser, 2012: 37)

Red tide holds danger for both all types of shellfish species (especially for the bivalves, mussels and oysters) that are farmed in their natural environments. (Visser, 2012: 37) When toxic phytoplankton is filtered from the water by shellfish, they accumulate algal toxins to levels that are potentially lethal. (Visser, 2012: 37) Red tide can severely damage commercial production of shellfish and cause considerable economic loss to the industry. (Pillay & Kutty, 2005: 519)

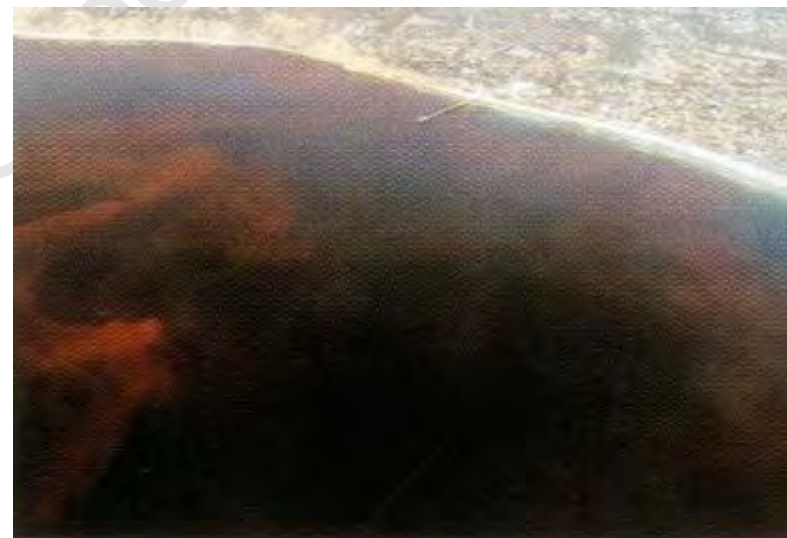


Figure 192: A red tide off the West Coast in Lambert's Bay. (Dept. of Environmental Affairs and Tourism, 2007: 5)

SDF 2011: Proposed Waterfront Development



Figure 193: Proposed Development of the Waterfront Area (Saldanha Bay Municipality, 2011: section 14.2 p220))

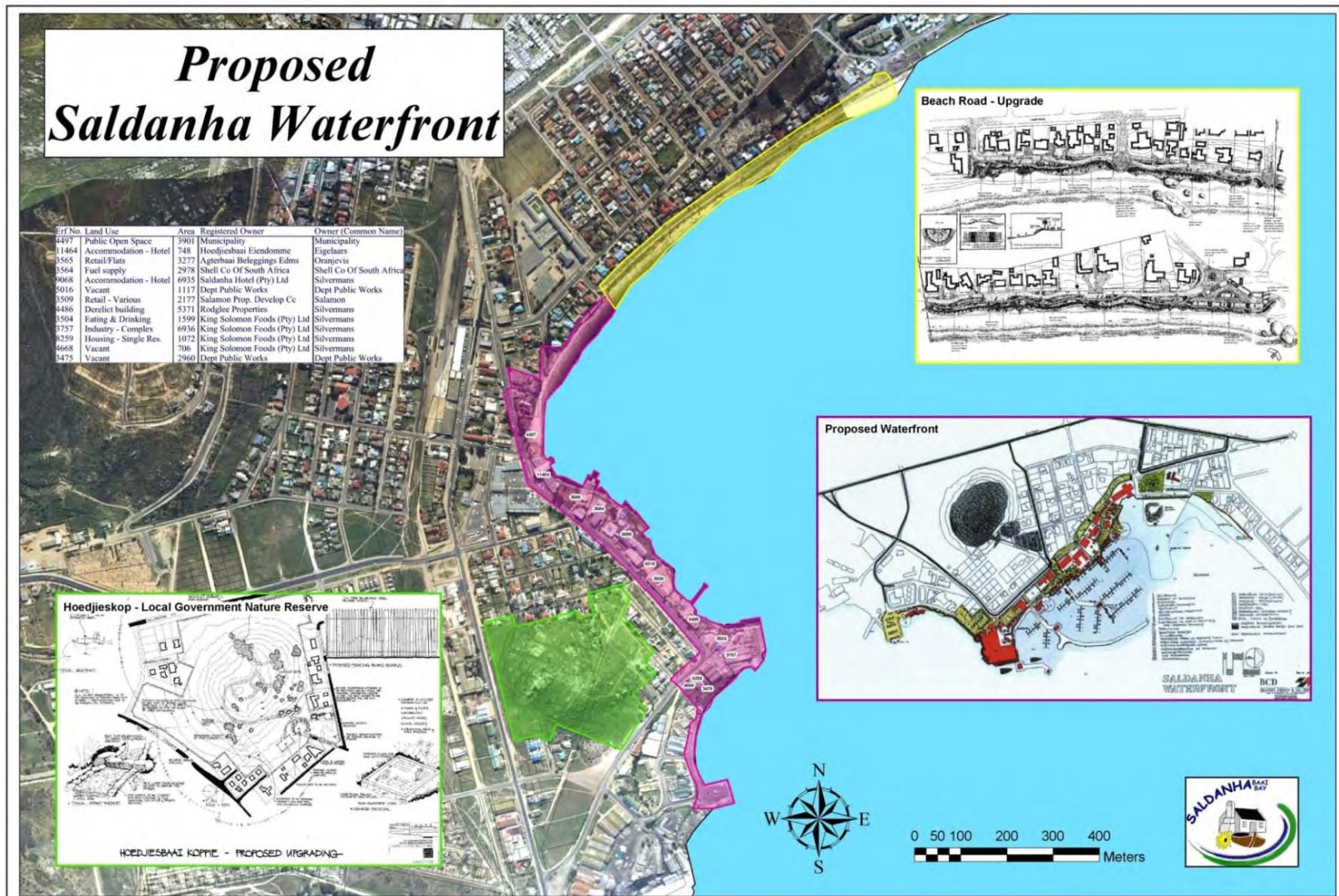


Figure 194: Proposed Saldanha Waterfront (Saldanha Bay Municipality, 2006)

## Performative Landscapes

This section will discuss recent developments in water catchment techniques and aquaculture. The areas of interest have been selected for their suitability for application at a coastal setting such as Saldanha Bay.

### Fog Catchers

As mentioned before Saldanha Bay receives little rainfall. On the other hand the occurrence of fog is common on this coastal setting. It was therefore relevant to investigate fog harvesting techniques.

Fog catching is a technology that allows the catching of microscopic drops of water that are contained in fog. (Ideass, 2012) The captured water is suited for agricultural irrigation and domestic use. (Quezada et al., 2013) One of the advantages of this technology is that the environmental impact of installing and maintaining the technology is minimal. After installation the system does not require any energy for operation. (Quezada et al., 2013) One of the drawbacks of this technology is that fog harvesting does not give a reliable water source, since the occurrence of fogs is not a daily event. (Quezada et al., 2013)

#### The technology

Fog harvesting technology consists of a single or double layer of mesh net supported by two posts rising from the ground. (Figure 195) The collectors are positioned perpendicular to prevailing winds to collect water when the fog sweeps through. The number of mesh panels and sizes vary. According to FogQuest the optimal arrangement is single mesh units that are at least 5 m apart. (FogQuest cited in Quezada et al., 2013) The ones used for a fog harvesting research project in Limpopo measured 70 m<sup>2</sup> and several mesh panels were arranged together in order to expand the water catchment area and provide greater stability to the structure in wind. (UNISA,



Figure 195: Fog catchers (Quezada et al., 2013)

2008 cited in Quezada et al., 2013) On the other hand in Yemen 26 small collectors of 1 m<sup>2</sup> were used. (Schemenauer et al. cited in Quezada et al., 2013)

The mesh is usually nylon, polyethylene or polypropylene netting (also known as 'shade cloth'). They are usually available in various densities. (Quezada et al., 2013) Different densities are capable of capturing different quantities of water. (UNEP, 1997b cited in Quezada et al., 2013)

The collector system functions with gravity. The water droplets run downwards on the mesh and then drip into a gutter / chute at the bottom of the net. (Refer to **Figure 196**) From there it is channelled via pipes to a storage tank or cistern. (Quezada et al., 2013)

The size of a storage system should be such that it is capable of storing at least 50 per cent of the expected maximum daily volume of water consumed. (UNEP, 1997b cited in Quezada et al., 2013)

Typical water production rates from a fog collector range from 200 to 1,000 litres per day. This varies daily and seasonally. (FogQuest cited in Quezada et al., 2013). Water collection rates from fog collectors at different places are shown in **Table 3**. (Quezada et al., 2013) Research has shown that collection efficiency improves with larger fog droplets, higher wind speeds, and narrower collection fibres. (Quezada et al., 2013) Fog collectors also work best in locations that have frequent fog periods, such as coastal areas. (Quezada et al., 2013) Refer to the next page for a range of other requirements that have been identified by UNEP for the implementation of this technology to be successful. (UNEP, 1997b cited in Quezada et al., 2013) It is interesting to note that height is also a requirement. The *koppie* close to the site of interest could therefore be considered for this type of project.

It is very difficult to calculate even an approximate quantity of water that can be obtained at a particular location. (Schemenauer & Cereceda, 1994 cited in Quezada et al., 2013) A range of meteorological and geographic information, such as wind directions, frequency of fog occurrence and fog water content is necessary for choosing a site. Therefore pilot projects are recommended to assess the magnitude and reliability of the fog water source and prevent investment risks. (Quezada et al., 2013)



Figure 196: Gutter at bottom of net (Ideass, 2012)

Table 3: Water collection rates from fog collectors (UNISA, 2008; Schemenauer et al, 2004; Washtechology; and FogQuest cited in Quezada et al., 2013)

Project	Total collecting surface (m <sup>2</sup> )	Water collected (litres/day)
University of South Africa (Limpopo)	70	3,800
Yemen	40	4,500
Cape Verde	200	4,000
Dominican Republic	40	4,000
Eritrea	1,600	12,000

### Key information requirements for assessing fog harvesting suitability

Global wind patterns: persistent winds from one direction are ideal for fog collection. The high-pressure area in the eastern part of the South Pacific Ocean produces onshore, south-west winds in northern Chile for most of the year and southerly winds along the coast of Peru.

Topography: it is necessary to have sufficient topographic relief to intercept the fogs/clouds. Examples on a continental scale, include the coastal mountains of Chile, Peru, and Ecuador, and, on a local scale, include isolated hills or coastal dunes.

Relief in the surrounding areas: it is important that there are no major obstacles to the wind within a few kilometres upwind of the site. In arid coastal regions, the presence of an inland depression or basin that heats up during the day can be advantageous, as the localised low pressure area thus created can enhance the sea breeze and increase the wind speed at which marine cloud decks flow over the collection devices.

Altitude: the thickness of the stratocumulus clouds and the height of their bases will vary with location. A desirable working altitude is at two-thirds of the cloud thickness above the base. This portion of the cloud will normally have the highest liquid water content. In Chile and Peru, the working altitudes range from 400 m to 1,000 m above sea level.

Orientation of the topographic features: it is important that the longitudinal axis of the mountain range, hills, or dune system be approximately perpendicular to the direction of the wind bringing the clouds from the ocean. The clouds will flow over the ridge lines and through passes, with the fog often dissipating on the downwind side.

Distance from the coastline: there are many high-elevation continental locations with frequent fog cover resulting from either the transport of upwind clouds or the formation of orographic clouds. In these cases, the distance to the coastline is irrelevant. However, areas of high relief near the coastline are generally preferred sites for fog harvesting.

Space for collectors: ridge lines and the upwind edges of flat-topped mountains are good fog harvesting sites. When long fog water collectors are used, they should be placed at intervals of about 4.0 m to allow the wind to blow around the collectors.

Crestline and upwind locations: slightly lower-altitude upwind locations are acceptable, as are constant-altitude locations on a flat terrain. But locations behind a ridge or hill, especially where the wind is blowing downslope, should be avoided.

(Source: UNEP, 1997b cited in Quezada et al., 2013)

## Marine Aquaculture

Marine aquaculture can be defined as the farming of marine organisms in a controlled or selected marine environment for all or part of their lifecycle. (Dept. of Environmental Affairs and Tourism, 2007: 1)

### Ecological point of view

Being one of few natural sheltered embayments in South Africa, Saldanha Bay is very suited for aquaculture. (Anchor Environmental Consultants, 2011) Another factor that makes Saldanha Bay very ideal for aquaculture is the periodic upwelling of cold, nutrient rich waters that result in high biological productivity of marine organisms. (Glavovic, 2000: 34) Upwelling is a process driven by the prevailing winds on the West Coast, which causes nutrient-rich waters to be drawn up to the surface from deeper layers of the ocean. (Visser, 2012: 35; Glavovic, 2000: 34)

### Economic point of view

Trends show an increasing opportunity for growth of the aquaculture industry in South Africa. In South Africa captured stock is declining while cultured fisheries production is increasing. (Dept. of Agriculture, Forestry and Fisheries, 2012: 2) Global aquaculture production has grown an average rate of 9,2% per annum over the past 30 years. Increased demand for sea products is expected to push

up the price of high-value food fish by 15% by 2020. (Dept. of Environmental Affairs and Tourism, 2007: 1) In South Africa the value of the marine aquaculture sector was estimated at R378-million in 2011, increasing by 11.2% from 2009. (Dept. of Agriculture, Forestry and Fisheries, 2012: 1)

### Aquaculture farming on the West Coast

In South Africa the culture of oysters and mussels is mainly carried out in open waters while the culture of abalone is mostly done on land. Abalone farming is an intensive process that requires large areas of land and it was decided that it will not form part of the design solution for the type of site that I am dealing with.

Both mussel and oyster cultivation is currently practiced in Saldanha Bay. The areas designated for aquaculture are shown in **Figure 31** in the main body of the paper. These growing areas are not accessible from the land, but are accessible via boat.

There is a small processing facility for oysters in the area that is of interest for the design project, while all processing of mussels happen in Velddrif. Oyster farming also formed part of the initial research, but in an effort to restrict the scope of this research paper, I decided to only discuss the cultivation of mussels and seaweed here before expanding on Integrated Multi-Trophic Aquaculture (IMTA).

Table 4: South Africa's marine aquaculture production 2000-2010 (Dept. of Agriculture, Forestry and Fisheries, 2012: 10)

Subsector	YEAR AND PRODUCTION (TONS)											Total production (tons) 2000 – 2010
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Abalone	181.03	372.88	429.42	462.02	509.2	670.8	833.36	783.25	1037.11	913.58	1015.44	7208.09
Finfish	1.04	0.3	2.38	14	1.81	1.68	0	0	2.71	22.75	0	46.67
Mussels	500	600	429.11	623	640	472	542	466	736.74	682.4	700.14	6391.39
Oysters	247.01	187.53	272.1	255.24	147.66	174.91	279.87	157.86	226.62	223.53	276.57	2448.9
Prawns	126.84	120.19	157.7	124.88	0	0	0	0	11.44	17.92	0	558.97
Seaweed	0	0	0	0	0	0	664	0	1833.49	1900.18	2015.01	-*
<b>Totals**</b>	<b>1 055.92</b>	<b>1 280.9</b>	<b>1 290.71</b>	<b>1 479.14</b>	<b>1 298.67</b>	<b>1 319.39</b>	<b>1 655.23</b>	<b>1 407.11</b>	<b>2 014.62</b>	<b>1 860.18</b>	<b>1 992.15</b>	<b>16 654.02</b>

\*Seaweed culture data not confirmed for previous years

\*\*Totals exclude cultured seaweed

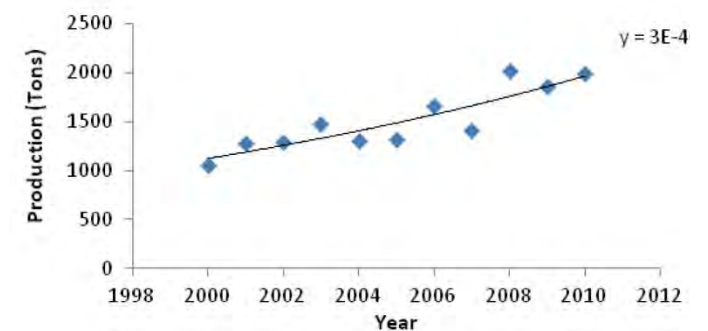


Figure 197: A graph illustrating growth rate of the marine aquaculture industry from 2000 to 2010 (Dept. of Agriculture, Forestry and Fisheries, 2012: 10)

## Mussel Farming



Figure 198: Mussel and oyster rafts at Saldanha Bay. The Iron Ore Port of Saldanha Bay is visible in the background. (Author, 2013)

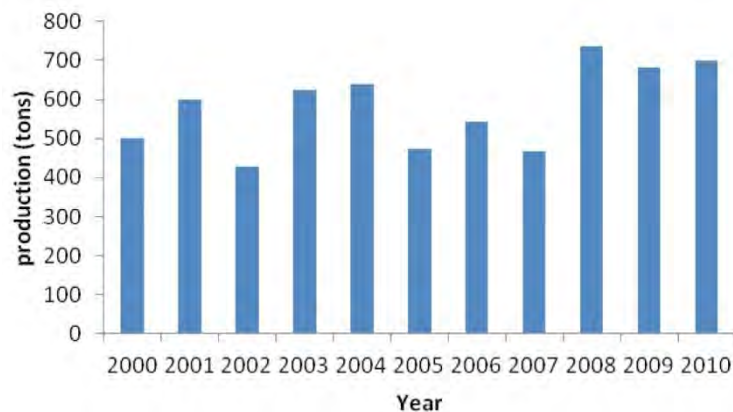


Figure 199: Mussel production for the years 2000-2010 (Dept. of Agriculture, Forestry and Fisheries, 2012:12)



Figure 200: The Mediterranean mussel (left) and the Black mussel (right) (Sources: left: Dept. of Environmental Affairs and Tourism, 2007: 4; right: Wikimedia Commons, 2010)

### Feasibility

In South Africa in 2010, the mussel industry produced 700 tons of mussels and the subsector sales was valued at R9,1 million. (Department of Agriculture, Forestry and Fisheries, 2012: 13 & v)

Mussel farming in South Africa is situated only in Saldanha Bay. (Department of Agriculture, Forestry and Fisheries, 2012: 13) Saldanha Bay is well suited for the culture of mussels, particularly *Mytilus galloprovincialis* and *Choromytilus meridionalis*. Water temperature and salinity in Saldanha Bay were found to be near optimal for mussel culture. (Heasman, 1996) As mentioned before the upwelling system of the Benguela Current and the resulting fertile waters of the Bay make it an excellent natural breeding-ground for mussels.

The foreign Mediterranean mussel (*Mytilus galloprovincialis*) is the species that is mostly cultivated for commercial purposes. The indigenous Black mussel (*Choromytilus meridionalis*) is also cultivated, but the Mediterranean mussel has the highest growth rates. (Visser, 2012: 34)

Three important aspects have to be dealt with in Saldanha Bay: Adverse weather conditions with high winds and swells make it imperative that the structures need to be very strong. The west coast is regularly affected by red tide and farmers need to manage their stock and marker requirements to be able to succeed. The excellent growth rates in Saldanha Bay, means that all organisms grow very well and that farming is very labour intensive to get rid of fouling. (Visser, 2012: 36)

### Farming Cycle and Cultivation Method

The farming cycle starts in November/December which is the natural spawning season for mussels. The high temperatures and strong winds of November/December are ideal for the spawning season to start.

Trillions of mussel eggs and sperm are released and fertilization takes place in the water. Mussel larvae float around for about three weeks before finding suitable surfaces to settle on. After settling it starts to grow its shell and develops a byssus thread that is a filament-like substance that hardens in the water and is used by them to attach to objects. From the larval stage it takes just over a year for the mussel to reach the preferred market size of 8cm. (Visser, 2012: 36)

In South Africa mussels are mainly cultivated on ropes that are suspended from rafts. (Visser, 2012: 36) (Also refer to the section on Floating Structures below for more information on the construction of these rafts.)

On the West Coast mussel farming does not rely on hatcheries, but rather on natural settlement. During the spawning season empty ropes ("collector" ropes) are hung from rafts where mussels attach themselves by natural settlement. Small mussels are left on the ropes for about six months. The "collector" ropes are then taken out of the water and the mussels are removed. (Visser, 2012: 36)

The mussels are then thinned out and seeded back onto a production rope with sufficient space for feeding and growth. (Visser, 2012: 36) One method of doing this is placing the mussels in mesh bags that are tied to the grow-out ropes. "The bags disintegrate over time and the mussels grow in clusters on the ropes." (Department of Agriculture, Forestry and Fisheries, 2012, 3)

Production ropes are left in the water for about 7 months. The ropes are then taken out of the water for processing. Larger mussels of the right size are sent to the markets and the smaller mussels are seeded back onto ropes. (Visser, 2012, 36)

Mussels are sold as fresh or canned products. (Department of Agriculture, Forestry and Fisheries, 2012, 3)



Figure 201: Wooden mussel raft (Dept. of Environmental Affairs and Tourism, 2007: 4)



Figure 202: A rope with mussels is hoisted with a crane (Dept. of Agriculture, Forestry and Fisheries, 2012: 4)



Figure 203: Mussels being graded and sorted for the market (Dept. of Agriculture, Forestry and Fisheries, 2012: 14)



Figure 204: Mussels are sorted (Visser, 2012: 36)

## Seaweed Farming

The goal with this section is to understand seaweed cultivation methods. Another goal is to explore what could create intent to farm seaweed in South Africa. Currently in South Africa seaweed is only cultivated on abalone farms as a feed and to improve the quality of their effluent water. (Dept. of Environmental Affairs and Tourism, 2007: 2)

### *Seaweed Farming in South Africa*

In 2006, South Africa produced 664 tonnes of seaweed worth R1-million. (Dept. of Environmental Affairs and Tourism, 2007: 3) The local seaweed industry is worth about R15 million annually. It has the potential to expand, by greater use of existing natural resources and farming of some of these marine plants. (Anderson, 2013)

The most common cultivated species for abalone feeding in South Africa are Sea lettuce (*Ulva spp.*) and Red Seaweed (*Gracilaria spp.*). (Refer to **Figure 205** and **Figure 206**) They are cultivated in paddle ponds or raceways. Wastewater is channeled into the tanks that contain the seaweeds and they feed on the slightly elevated dissolved nutrients in the waste water and reducing the levels of the nutrients that get released back into the environment. Water treated this way can also

be reused on the farm. (Dept. of Environmental Affairs and Tourism, 2007: 3)

*Gracilaria* also gets collected from beaches of Saldanha Bay and then baled and exported to the Far East for the production of agar. (Truter, 1998: 19) To pick up the seaweed a permit is required. The seaweed only gets collected from time to time according to financial feasibility. When it does not get collected and the seaweed decomposes it causes a strong unpleasant odour. (Du Plessis, 2012) (Refer to Table 5) *Gracilaria* can also be grown through raft cultivation methods and this method has been successful abroad (FOA, 1990). Maribus Industries attempted this cultivation method in St Helena Bay but for unknown reasons did not continue with it. (Du Plessis, 2012)

In South Africa Kelp gets collected from beaches or harvested from boats. Kelp is used for the production of alginate. (Refer to Table 5) This type of seaweed is found abundantly on the South African West Coast in the form of kelp forests. Kelp grows at a tremendous rate of up to 60 cm a day. (Debby@sealogix.co.za, 2013) In South Africa experimental cultivation of *Ecklonia maxima* (kelp) on rafts has been successful. (FOA, 2003b)

### Uses of Seaweed



Figure 205: Sea lettuce (*Ulva* spp.) is commonly used as cultured feed on abalone farms (Dept. of Environmental Affairs and Tourism, 2007: 3)



Figure 206: *Gracilaria* spp. (Red dried seaweed) (Viet D.E.L.T.A Industrial Co., Ltd.)



Figure 207: *Gracilaria* on the beach in the region of the Blue Water Bay resort in Saldanha (Du Plessis, B. 2012)

In this section some uses of seaweed will be discussed. (Also refer to **Table 5**) Certain types of seaweed are foods for human consumption. Again take note that seaweed is not produced for human consumption in South Africa. (Dept. of Environmental Affairs and Tourism, 2007: 2) It can also be an important ingredient of foods and drinks. Examples are: thickener and stabilizer of sauces, keeps ice cream smooth and creamy, an ingredient in beers that provides a more stable and lasting foam, and an ingredient in wines to help clarify the colour. (Donovan, 2010) It is also used in cosmetics, as fertilizers and soil conditioners and also in/as animal and fish feed. (FOA, 2003a) Another interesting potential use of seaweed is for wastewater treatment.

There are two main areas where seaweeds have the potential for use in wastewater treatment. The first is the treatment of sewage and some agricultural wastes where seaweeds use the nitrogen and phosphorus content of effluents from sewage for their growth. (FOA, 2003a) *Ulva Lactuca* (local green South African seaweed also known as Sea lettuce) has been shown to be successful in taking up phosphate. (Panagiotis et al., 2009) Of the red and brown seaweeds that are of interest because of their commercial value, tropical or subtropical forms have been successfully used, “while cold-temperate species are usually too sensitive to changing seasons and may fail to grow (and remove nutrients) in the winter months”. (FOA, 2003a) The types of red and brown seaweeds that are found on the South African West Coast are cold-temperate. (Bolton et al., 2013) The second area of potential is the ability of some types of dried seaweed to take up heavy metals from industrial wastewater. (FOA, 2003a)

Tests have been done on the absorption of Nickel and Copper by *Gracilaria*. (Esmaili et al., 2010 and Esmaili et al., 2008) It is not clear from these articles how the use of *Gracilaria* fair when compared to other methods of removing these metals.

In the East there are vast farms where seaweeds are grown for food for human consumption. There Nori (the red seaweed *Porphyra*) is worth one and a half billion US dollars annually, which is more than three times the entire South African fishing industry. Nori and others brown seaweeds such as Wakame and Kombu are sold for high prices. (Anderson, 2013) Nori is also the seaweed that is dried and used in sushi and continues to be the most important edible seaweed. (Pillay & Kutty, 2005: 562)

Wakame and Kombu does not grow on the West Coast, (Wikipedia, 2013b) but *Porphyra capensis* (a type of Nori) grows on the West Coast of South Africa. All Nori is edible. *Porphyra capensis* has been collected from rocks and eaten. Comments are that it is slightly tougher than the species found in the northern hemisphere. (Debby@sealogix.co.za, 2013) According to marine biologist, Kevin Ruck, from Blue Sapphire Pearls CC who farms with shellfish in Saldanha Bay, when seaweed such as *Ulva Capensis* is cultivated in a controlled environment it receives a better supply of nutrients and is therefore softer. He advises that it would be an extrapolation to say that it would definitely be true for *Porphyra Capensis* too but there is a very good chance that it would be the case. (Ruck, 2013) If so there should therefore be very little difference between *Porphyra Capensis* and the species cultivated in the Northern Hemisphere (where the four most cultivated *Porphyra* species are: *P. tenera*, *P. angusta*, *P. kuniedai* and *P. yezoensis*).

Table 5: Seaweeds of that are common on the West Coast of South Africa and their uses. (Author, 2013)

Name	Product and Use	Type	Cultivation
<i>Porphyra capensis</i>	Nori (food for human consumption)	Red seaweed	Cultivated abroad
<i>Gracilaria gracilis</i>	Abalone feed and production of agar (a gel for growth of microorganisms and an ingredient of foods like jelly)	Red seaweed	Cultivated and collected from beaches
Kelp	Kelpak (organic plant feed) and production of alginate (pharmaceutical uses)	Red seaweed	Collected by boat and collected from beaches
<i>Ulva Lactuca</i> / Sea lettuce	Abalone feed	Green seaweed	Cultivated on abalone farms
<i>Codium duthieae</i>	none	Green seaweed	N/A
<i>Codium fragile</i>	none	Green seaweed	N/A
<i>Leathesia marina</i>	none	Brown seaweed	N/A
<i>Ralfsia verrucosa</i>	none	Brown seaweed	N/A

### Nori Farming Cycle and Cultivation Method

The cultivation method of Nori includes the following processes. Spores are collected in a natural or cultivated environment. In some cases the plant grows where the spores are collected, while in other cases the spores are collected and then transferred to suitable sites for the growth phase. (Pillay & Kutty, 2005: 563)

Today the most common materials that are used for spore collection in natural environments are as follows. 15x15cm nets with a large mesh from palm fibre or synthetic twine are laid flat at a suitable level below the sea surface. They are supported by a series of bamboo poles or wooden stakes that are driven into the seabed at intervals of 2.5 – 3m. (Pillay & Kutty, 2005: 564) The other method uses 'blinds' (also referred to as 'hibi') that are made of split bamboo that are tied together with ropes at intervals of 10-15cm to. The blinds can be 18, 36 or 45m long and 1.2, 1.8 or 2.4m wide (Pillay & Kutty, 2005: 564) Floating systems can also be used at deeper waters. (Pillay & Kutty, 2005: 564) The best catches of seed is said to happen on the 1<sup>st</sup> or 15<sup>th</sup> of the lunar month or after a storm. (Pillay & Kutty, 2005: 565) The natural settling of spores happens in the warmest months; with the ideal water temperature being 22 – 23 °C. On the West Coast the average water temperatures are cooler. Refer to **Figure 187**.

Through the understanding of the microscopic conchocelis phase in reproductive cycle of *Porphyra* the production of spores can also be done in an unnatural environment. Conchocelis (produces the spores) can be grown in shell materials that are strung on nylon cords and suspended in large sea-water tanks. (Pillay & Kutty, 2005: 566) (Refer to **Figure 209**) These shells remain in



Figure 208: Artificial seeding of *Porphyra* in Japan using rotating drums. (From Fish Farming International 3(3), 1986 cited in Pillay & Kutty, 2005: 566)

tanks for about 5 months and by manipulating light intensity and temperature, the time of maturation of the spores can be varied to meet farming requirements. (Pillay & Kutty, 2005: 567)

Spores are collected from hibi by immersing them in culture tanks for a few minutes. Spores are collected from nets by rolling the nets on rotation drums that are fitted above the tanks. The drums are slowly rotated to immerse the nets in the tanks. The settling of the spores onto new nets (the growing substrate) can be facilitated with air bubbles that drive the spores from the bottom of the tanks to a new net that is stretched horizontally below the surface. (Pillay & Kutty, 2005: 567) (Refer to **Figure 208**) Vinyl bags containing the conchocelis-bearing shells can also be hung underneath nest or blinds that are stretched between poles in the sea. The spores will settle on the new nets when they are released.

About a month after the settling of the spore onto a substrate, small buds appear and the substrates with their seedlings can be transplanted to growing out areas. In 50-60 days the thalli will grow and multiply in ideal temperatures of 5 – 10 °C, (Pillay & Kutty, 2005: 565) but many of the edible seaweeds will grow in low temperatures of between 10 and 20 °C. (Pillay & Kutty, 2005: 562) (Refer to **Figure 187**) Lengths of 15-20cm are considered suitable for harvesting. (Pillay & Kutty, 2005: 567)

The drying of the thalli needs to be done within two to three hours after harvesting to ensure good gloss, taste and flavor of the product. (Pillay & Kutty, 2005: 569)

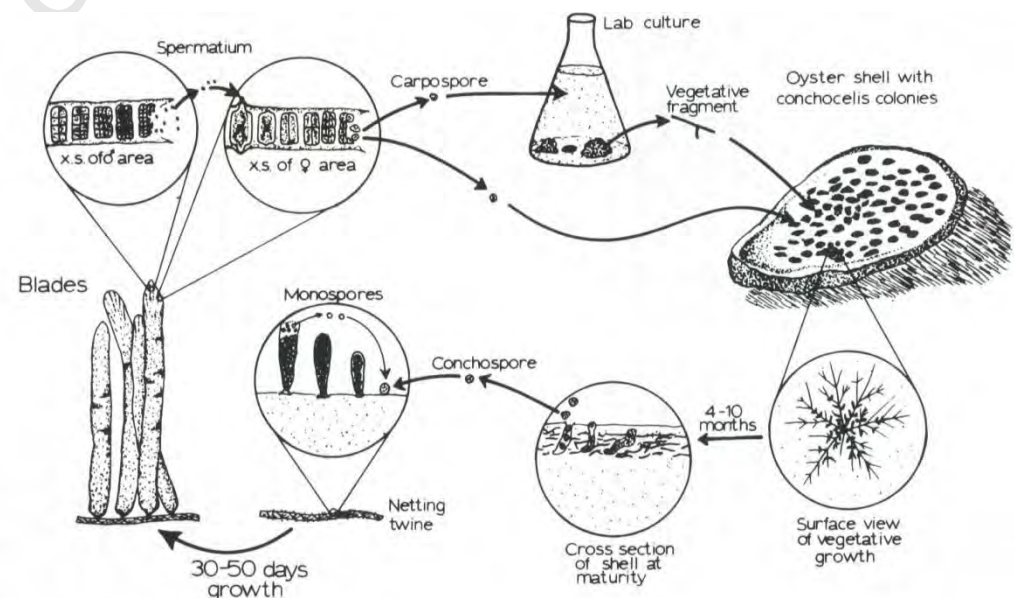


Figure 209: *Porphyra* / conchocelis life cycle. (From Melvin et al., 1986 cited in Pillay & Kutty, 2005: 566)

## Integrated Multi-Trophic Aquaculture (IMTA)

"IMTA Integrated multitrophic aquaculture (IMTA) systems combine fed aquaculture of fish with extractive inorganic aquaculture of seaweed and extractive organic aquaculture of shellfish. The approach is based on an age-old, common-sense recycling and farming practice: The by-product wastes from one resource become inputs for another." (Ridler, 2007: 52) These integrated systems where various species are farmed together make it possible to set up a balanced fish farm production systems that lead to an improvement in production and the quality of waters. These benefits have been found to be true both in the marine environment itself in off-shore systems and in open or closed circuit land-based systems of production. (Guerrero & Gremades, 2012: 10) IMTA systems are environmentally more sustainable and also economically feasible.

Aquatic effluents resulting from uneaten feed or as a waste product from animals like fish, accumulates in water. The effluent-rich water contains nutrients that are essential for the growth of molluscs and seaweeds. These then effectively clean the water as they grow on it. In land-based systems the clean water can be recirculated in the system and any water that is pumped back into the ocean is safer. ((Refer to *Water Quality in the Bay* in the *Appendix: page 97*, to see the dangers that pumping effluent rich water back into the ocean holds.) Limited coastal areas are open for ocean cultivation and these types of recirculating systems can be implemented on land with less harm to the environment. One existing example of IMTA in South Africa is integrated seaweed/abalone multi-trophic recirculating aquaculture systems that are

the used as a common method to grow abalone on land. Apart from being an ecologically more sustainable approach by growing their own feed and keeping water clean, great savings on feed are possible. (Robertson-Andersson, 2009: 12)

Studies conducted in Saldanha Bay and elsewhere have also shown that off shore mussel culture can lead to organic enrichment and anoxia in sediments under the mussel rafts which can have an impact on the benthic organisms of the water. (Anchor Environmental Consultants, 2011: 9) MTA systems create a more sustainable environment where these organic and inorganic wastes are consumed by the molluscs and seaweeds. The growth rates of molluscs and seaweeds have been proven to be better in such as system. (Guerrero & Gremades, 2012: 25) (Refer to **Figure 210**)

A common example of an off-shore IMTA system is where finfish are grown in fish cages and in between these cages mussels and seaweed are grown from lines or rafts. An example of such a system is the commercially scaled pilot project in the Bay of Fundy, Canada. There salmon cages, mussels and seaweed form an off-shore IMTA system. (Refer to **Figure 214**, **Figure 215** and **Figure 216**) Land-Based pilot projects are implemented in tanks. (**Figure 213**) Refer to **Figure 211** for an example of a closed-circuit land-based system. Refer to **Figure 212** for an example of an open-circuit land-based system.

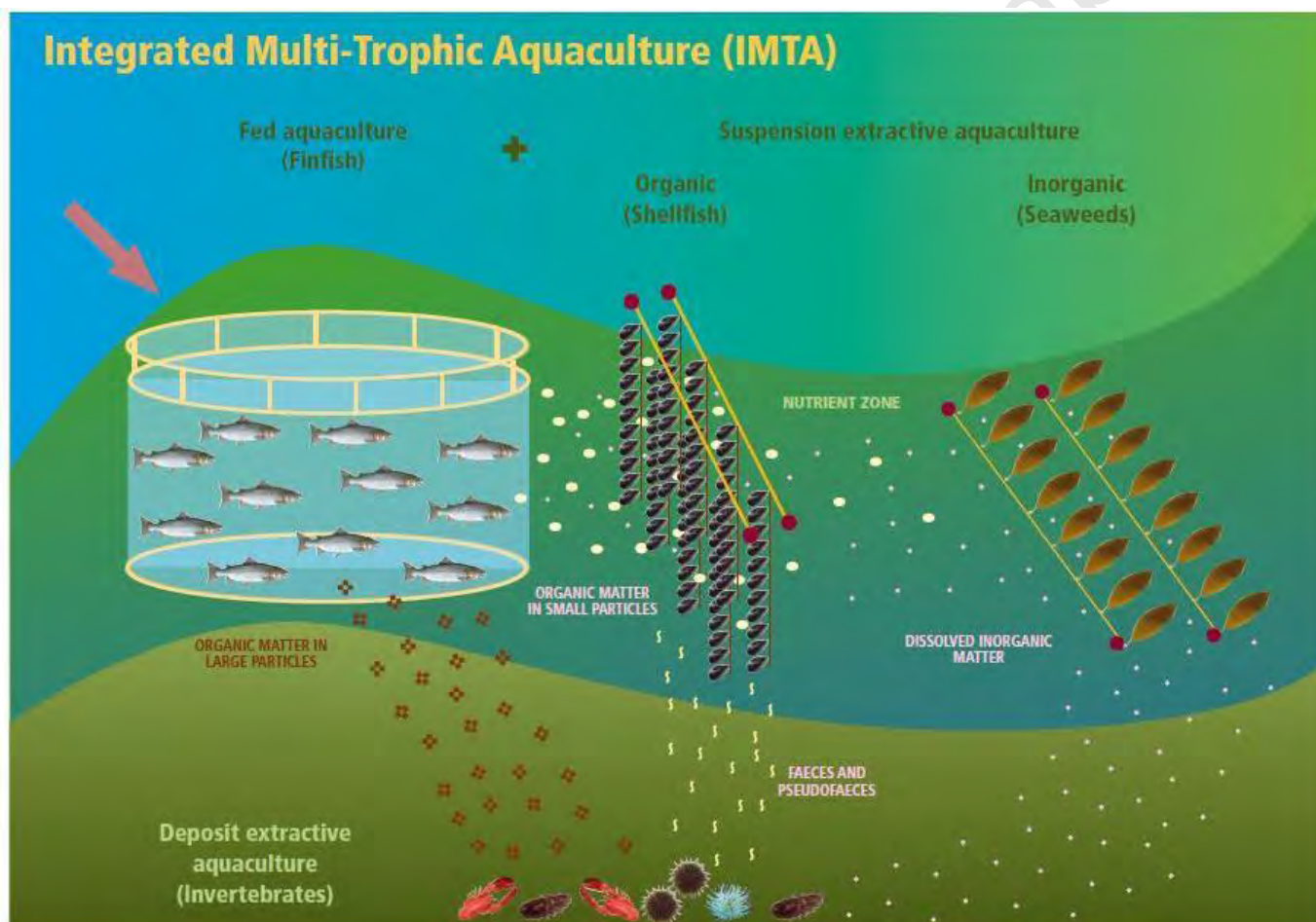


Figure 210: The recycling of organic and inorganic waste in an Integrated Multi-Trophic Aquaculture System (Guerrero & Gremades, 2012: 8)

In examples abroad *Ulva*, *Laminaria* (kelp) and *Gracilaria* have been grown in IMTA systems with success. (Guerrero & Gremades, 2012: 21) *Ulva* is very suitable due to its high growth rate and ability to grow in high concentrations of ammonium. Between *Ulva* and *Gracilaria*, *Gracilaria* has a better market value. (Also refer back to the *Uses of Seaweed* section above.) However, the commercial value of *Gracilaria* is declining at the moment. The Laminars (kelp) are described as very suitable for their commercial value. “The *Porphyra* species (the nori seaweed in sushi) are appropriate as they have the characteristics of *Ulva* and a high commercial value in the food market. The handicap with the *Porphyra* species is that, in an integrated aquaculture system, it is not possible at present to control their life cycle in order to keep up a purely plant culture throughout the year.” (Guerrero & Gremades, 2012: 21)

The most profitable option would be to grow *Porphyra* in an IMTA system. As mentioned before the indigenous *Porphyra Capensis* is indigenous to the West Coast. The most difficult part of growing *Porphyra Capensis* is obtaining the spores for the new growth cycle. In the northern hemisphere the most common method of farming

spores as needed is by controlling the *conchocelis* phase in a well-controlled unnatural environment. (Pillay & Kutty, 2005: 567) (Refer back to the section on **Seaweed Farming**) I am aware that because *Porphyra* has not been grown in South Africa yet and it would take considerable research before a successful *conchocelis* phase can be created here. Also, as mentioned before, it is also not possible to grow a pure *Porphyra* plant culture throughout the year. An alternative is perhaps that *Porphyra* could then be grown during certain periods of the year. Due to these uncertainties and the research that is still required, it was then decided that for the first phase *Laminaria pallida* (Kelp) would be grown as part of the IMTA system.

I have not been able to find a local example of an IMTA system where indigenous fish is also grown. After input from marine biologist, Kevin Ruck, it was decided that it IMTA system that could have a potential for success is a combination of the indigenous fish, *Porphyra Capensis*, also known as Mullet, together with *Laminaria pallida* and mussels. (Ruck, 2013)

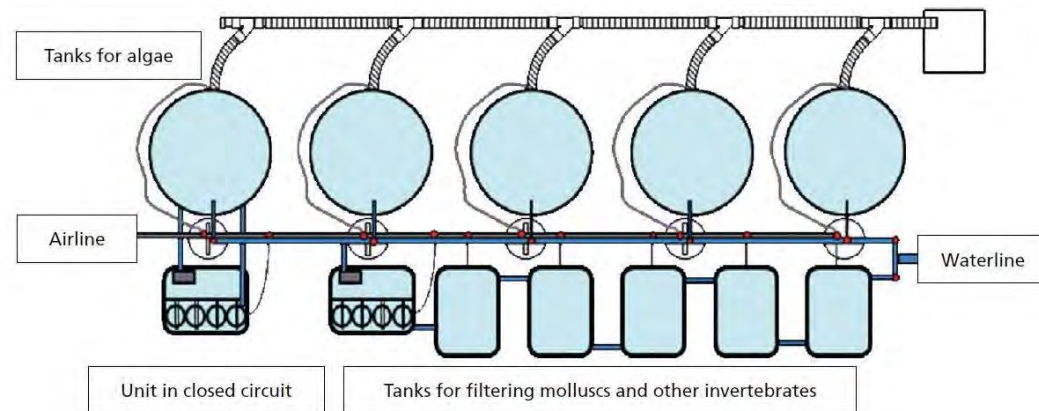


Figure 211: Overall design of the facility used for IMTA experiment at the Aquacria Arousa fish farming plant in Cambados, Pontevedra (Guerrero & Gremades, 2012: 64)

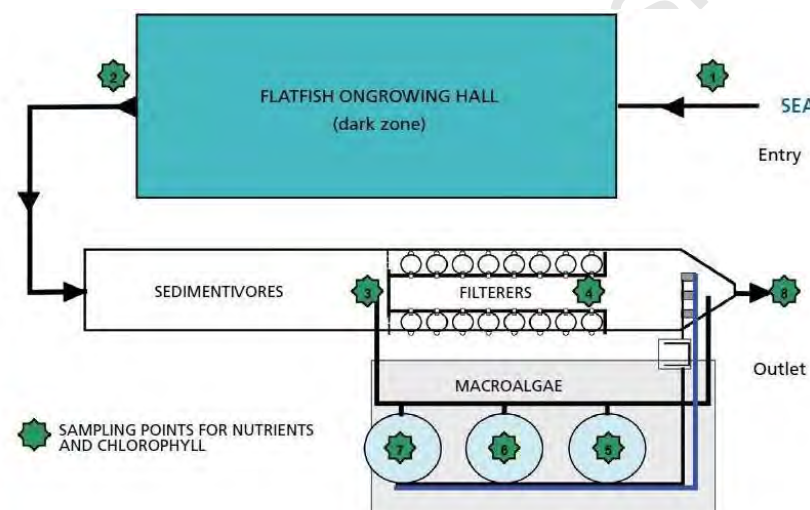


Figure 212: A turbot farming plant, where a closed circuit, with filtering molluscs (clams and oysters), suspensivore invertebrates (anemone) and food macroalgae (*Saccharina latissima* and *Ulva spp.*) was tested. It is located in O Grove, Pontevedra (Guerrero & Gremades, 2012: 53)



Figure 213: The tanks of the turbot farming plant (left) (Guerrero & Gremades, 2012: 52)



Figure 214: A commercial-scale pilot project in the Bay of Fundy, Canada, where cultivated kelps and mussels utilize by-product wastes from the nearby salmon cages as major inputs. (Guerrero & Gremades, 2012: 32)



Figure 215: Salmon cages on the left, a mussel raft in the right foreground and a seaweed raft in the right background at the Bay of Fundy (Ridler, 2007 :52)

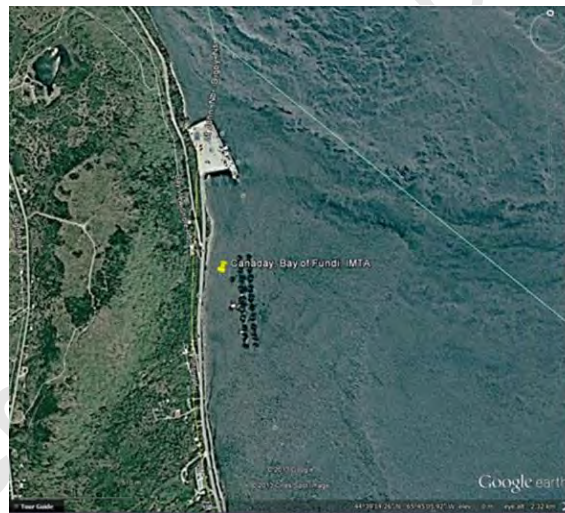


Figure 216: Salmon cages on the Bay of Fundy (Google, 2013)

## Construction at the Water's Edge

Different types of edges exist at the water's edge. (Refer to **Figure 217**). Building at a coastal setting makes it imperative that one needs to understand marine construction techniques.

In this section two types of edges will be discussed: constructed edges and floating edges. Note that not all possible configurations of marine construction will be discussed. Construction techniques that were found to be relevant in terms of understanding existing structures or interesting precedent studies will be discussed. Existing types of constructed edges found at the Small Fishing Harbour of Saldanha Bay are shown in.

This section also describes the floating raft structures that form a part of aquaculture farming.

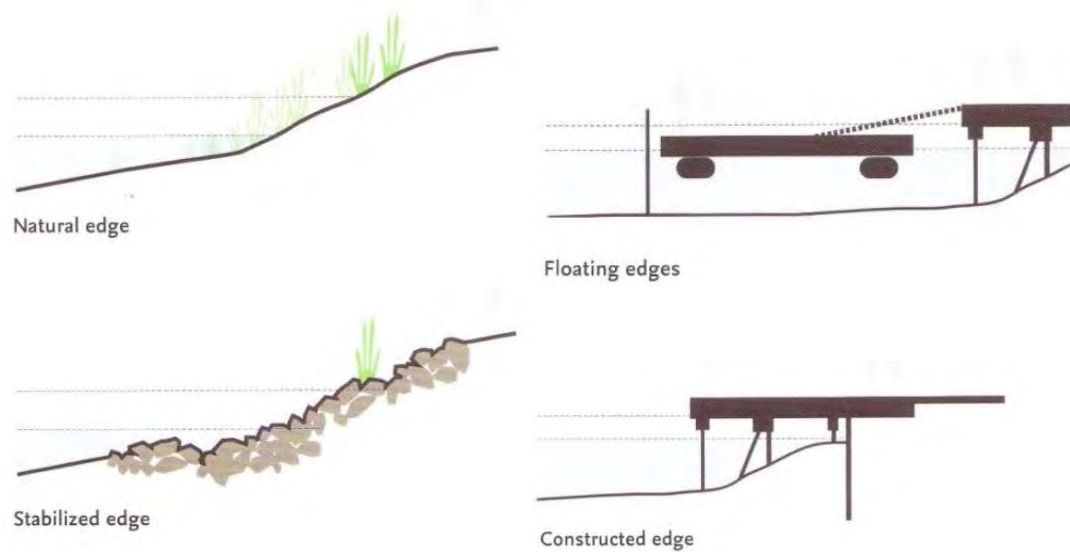


Figure 217: Material and sectional variations that are possible at the water's edge. (Berizbeitia 2009: 245)

## Constructed Edges

A *dock* is the most general term for an area at which a vessel can be moored. A dock can also be called a wharf or a pier. A *pier* (sometimes called a *jetty*) is a free-standing structure that is connected to the shore at one end. A *wharf* (sometimes called a *quay*) is a soil-retaining structure that is usually built nearly parallel to and contiguous with the shoreline. (Gaythwaite, 2004: 232)

further away from the land the structure is, the less its load carrying capacity is and the more expensive it is. (Refer to **Figure 218**)

Two types of construction are used to construct docks: *open* pile- or column-supported construction and *closed* solid-fill-type construction. (Gaythwaite, 2004: 232) These types of construction will be discussed in more detail next.

It is important to note that the

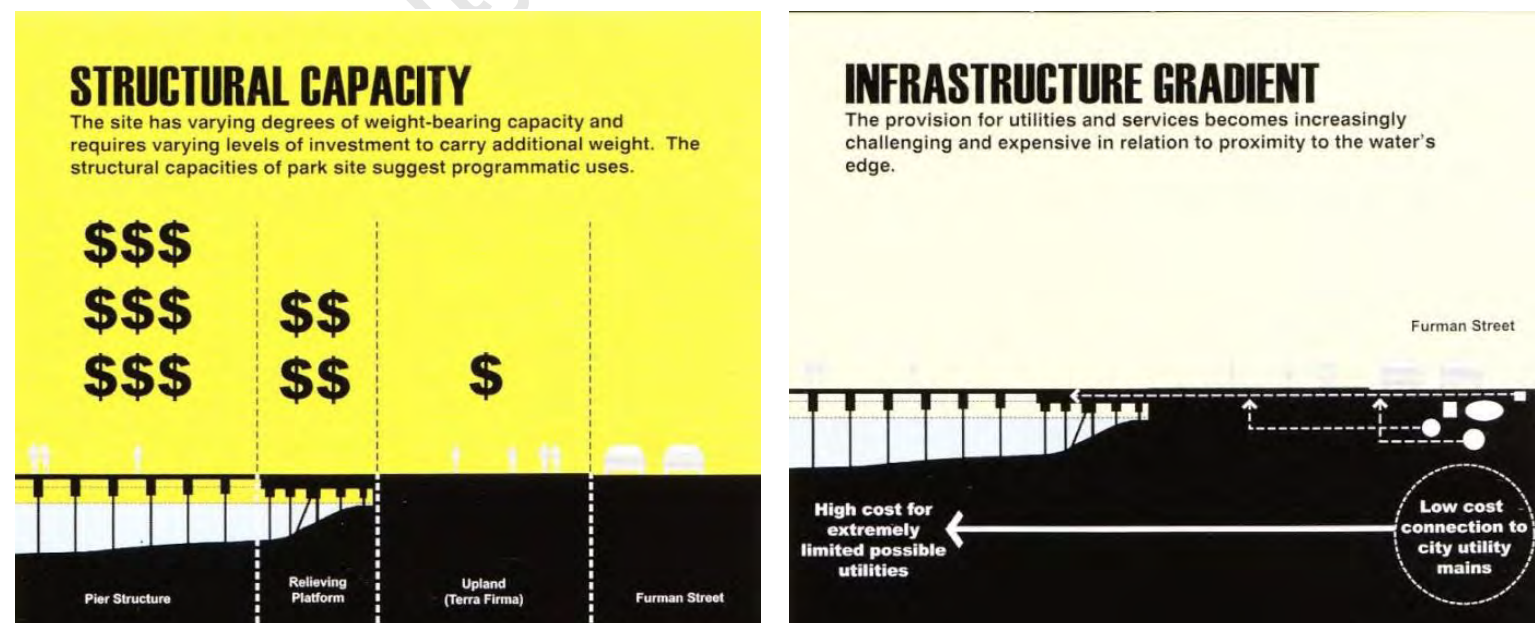


Figure 218: Structural Capacity and Infrastructure Gradient of different types of constructed edges. (Berizbeitia, 2009: 241)

## Closed Solid Fill Type Construction

Closed solid fill type construction is the construction method where a natural or artificial fill, surrounded by a vertical wall (also called a continuous bulkhead) supports a deck. (Burgess & Hulhaway, 1983: 101) The vertical walls can be cantilevered sheet pile walls or they can be anchored sheet pile walls (anchored bulkheads). (Refer to **Figure 219** and **Figure 220**) These types of structures usually require less maintenance than open types. (Dept. of the Army USA, 1983: 8-1)

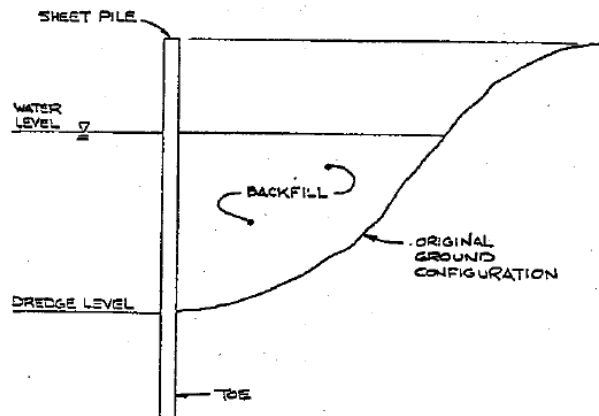


Figure 219: Cantilevered Sheet Pile Wall (Saczynski and Kalhawy, 1982: 14 cited in Burgess & Hulhaway, 1983: 104)

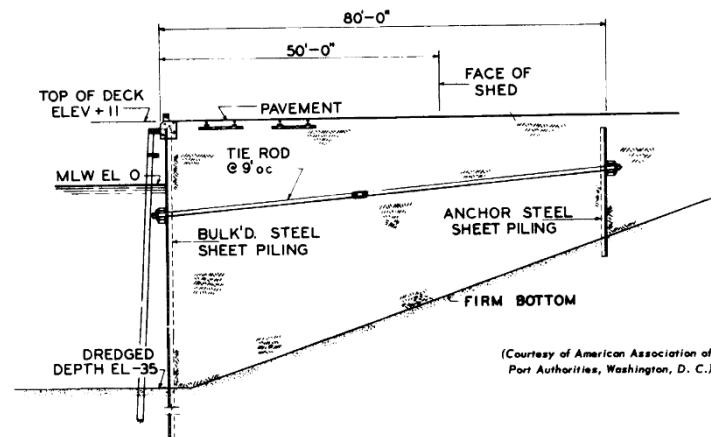


Figure 220: Anchored Bulkhead Wall (steel sheet pile bulkhead) (Dept. of the Army USA, 1983: 8-14)

An example of such a structure is the original bulkhead walls of the Allegheny Riverfront Park (visible in the background in **Figure 221**). (Biohabitats, 2013) Details of the structure of the original bulkhead wall can be seen in **Figure 222**.

It is also interesting to take look at the new structures here. The walls of the new cast-in-place concrete ramps is also a type of anchored bulkhead that were anchored with 60ft-long rock anchors to resist overturning instability. (Arup, 2013) What is interesting about the new deck is that instead of a conventional platform that is directly supported by piles (this type of construction is discussed next); a cantilevered deck superstructure of precast concrete panel sections that are cantilevered off inverted T- concrete beams was created. (Arup, 2013)

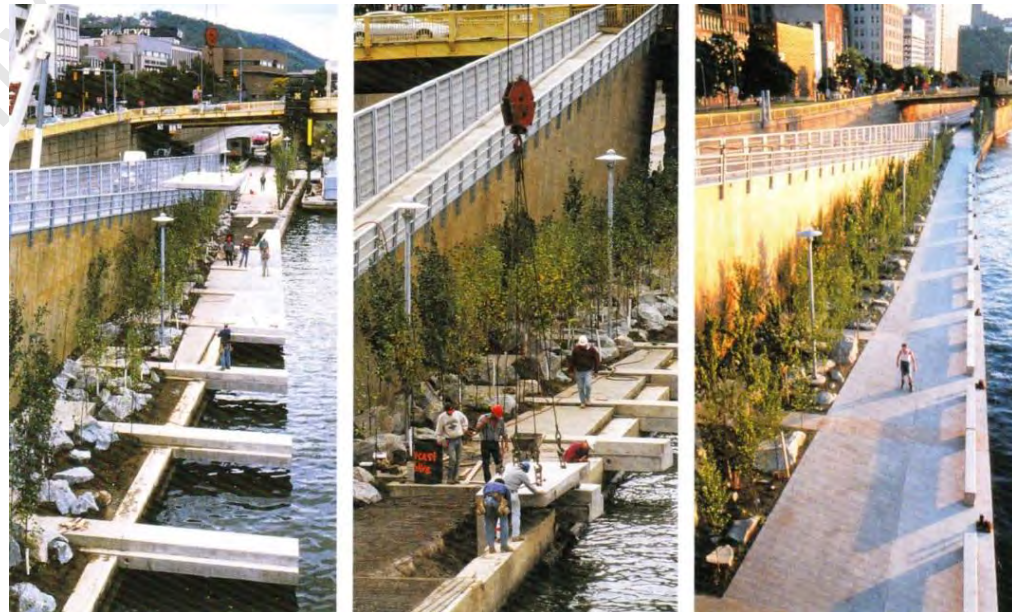


Figure 221: Michael Van Valkenburgh Associates, Allegheny Riverfront Park project (completed 2001) - The construction of the precast deck superstructure is shown here during different phases of construction. (Berizbeitia, 2009: 72)

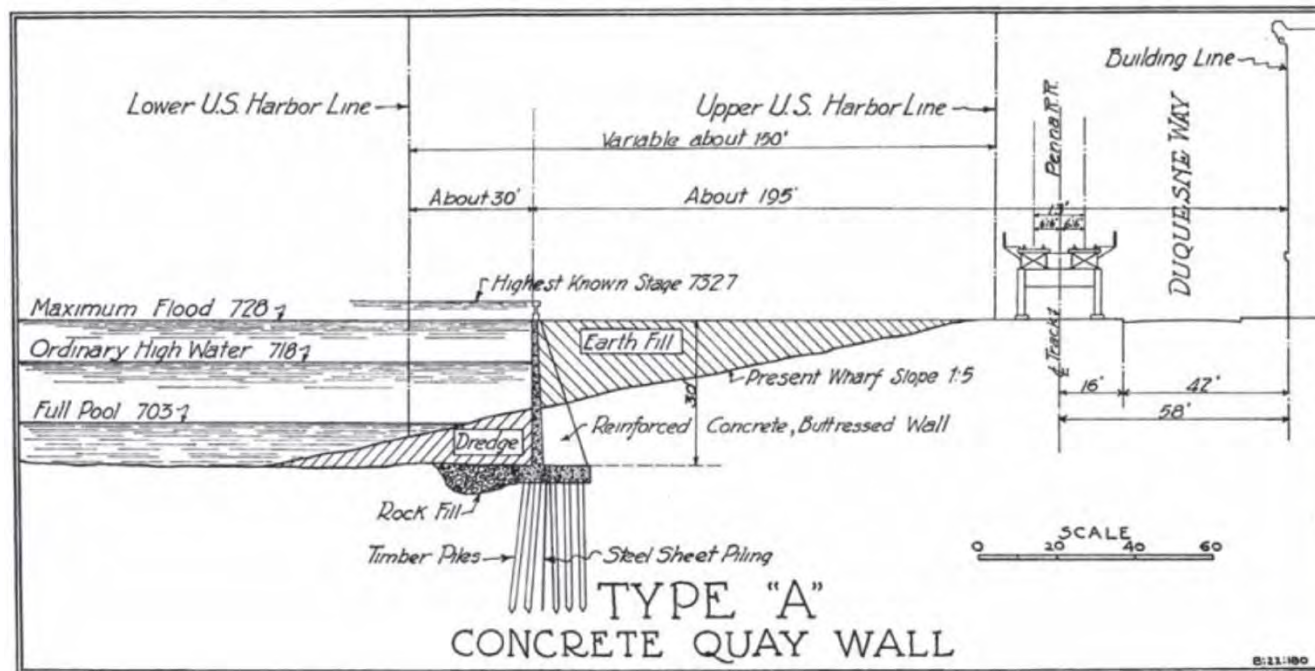


Figure 222: Illustration of recommendation to construct a Barge Terminal, circa 1925. (3 Rivers 2nd Nature. Pittsburgh Urban Waterfront: 172-1926. Prepared by STUDIO for Creative Inquiry at Carnegie Mellon University, 2004. Cited in Biohabitats, 2013)

At the Port Botany Expansion in Sydney by Stoss Landscape, the structure at the water's edge is just a timber deck supported by a concrete foundation structure on a stabilized edge. The total effect is an interesting contrast of materials.

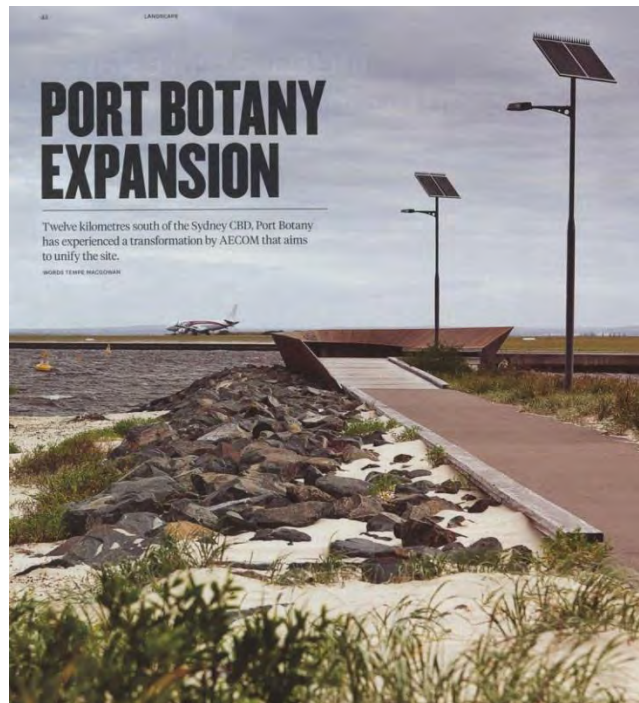


Figure 223: Port Botany Expansion in Sydney by Stoss Landscape (Macgowan, 2011: 42)



Figure 224: Timber deck (Macgowan, 2011: 46)

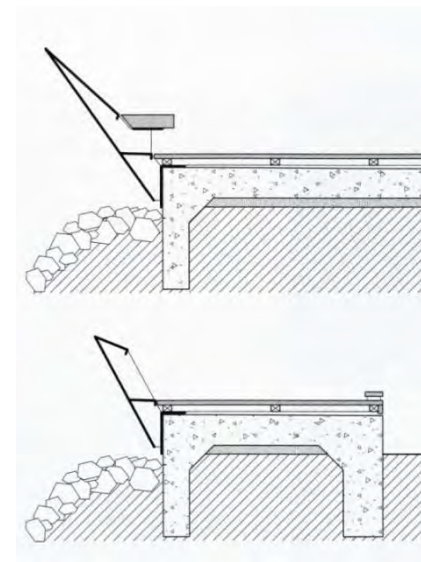


Figure 225: Construction details (Macgowan, 2011: 46)

## Open Pile- or Column Supported Construction

Pile or column supported docks are referred to as open docks because they have water flowing underneath them. (Dept. of the Army USA, 1983: 8-1) Open-type construction falls into two classifications a)

superstructures in which the deck system is supported directly on piles and b) structures with a relieving platform in which fill is superimposed, topped off by the finishing deck. (Dept. of the Army USA, 1983: 8-1)




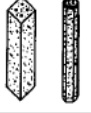

PILE TYPE	TYPICAL DIMENSIONS AND LENGTHS	USUAL RANGE OF CAPACITIES AND COLUMN LENGTHS	REMARKS
 Timber	6"-8" Tip diameter 12"-20" Butt diameter  Douglas fir to 80' Southern yellow pine to 65' lengths  Special order up to 125'	Typically limited to between 15 and 20 tons for all column lengths	Either Southern yellow pine or Douglas fir with ready available lengths of up to 60 feet. Piles are usually pressure treated with creosote or CCA. Greenheart piles are usually untreated.
 Steel H-Pile	Section depth 8" to 14"  Unspliced- 60'-80' lengths  Splices- unlimited length	40 to 120 ton capacity with effective lengths of up to 60'.	Low displacement, able to penetrate through some obstructions, and easily spliced. The pile is vulnerable to corrosion and may be damaged or deflected when encountering obstructions. Favored for end bearing on rock.
 Concrete Filled Steel Pipe	8" to 48" $\phi$ 5/16" to 3/4 wall thickness.  Unspliced- 60'-80' lengths  Splices- unlimited lengths	40 to 200 tons with effective lengths up to 100'	Displacement type piles may be driven either open or close ended, easily spliced, and provides good bending resistance
 Precast Concrete	12" to 24" round, octagonal or square  60' to 120' lengths unspliced	20 to 120 tons with effective lengths up to 80'	High displacement pile may be provided with good corrosion resistance, tolerable of hard driving stresses and vulnerable to large handling stresses.
 Concrete Cylinder	30" to 54" diameter  150'-200' + lengths	120 to 240 tons with effective lengths up to 250'	Prestressing allows for large handling stresses and capable of tolerating high bending stress induced by lateral loading and long unsupported lengths.

Figure 226: Common marine pile types. (GZA GeoEnvironmental, Inc. cited in Gaythwaite, 2004: 242)

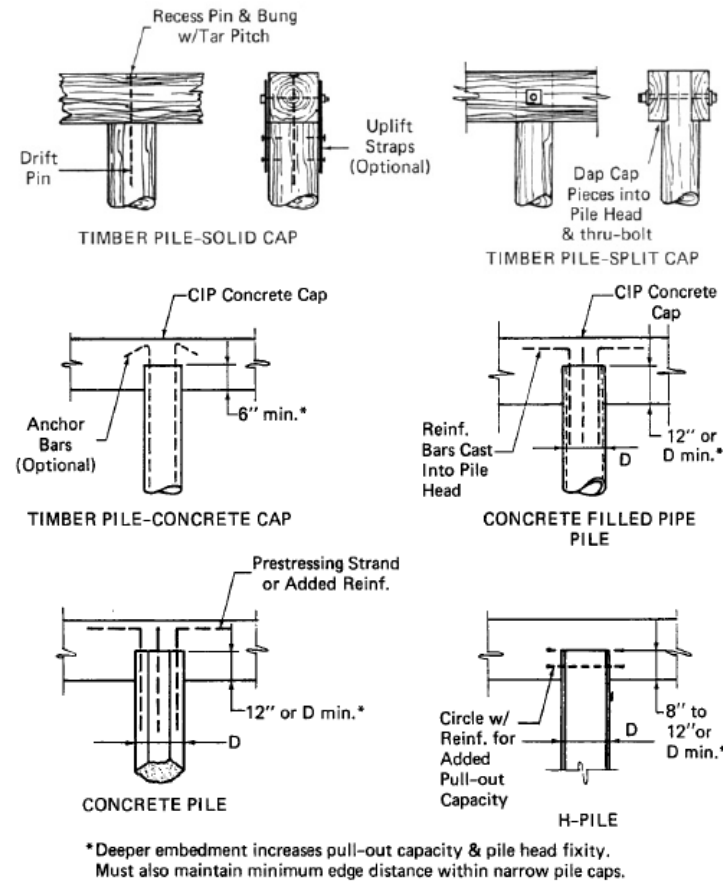


Figure 227: Pile head connection details (Gaythwaite, 2004: 244)

## Structural Geometry

The structural geometry of the structures that do not include a relieving platform is relatively simple. It mainly consists of pile foundations and a decking structure. Piles are arranged in rows or "bents" that are spaced 3 to 4m apart. (Burgess & Hulhaway, 1983: 137) (Refer to **Figure 226**) The piles that support decking structures are bearing and batter piles. Piles are trimmed to the proper elevation and pile caps finish each pile bent. (Burgess & Hulhaway, 1983: 155) (Refer to **Figure 227**) Stringers (or beams) are installed on top of the pile caps and the deck finish

follows on top of the stringers. (Burgess & Hulhaway, 1983: 155) These structures will be explained in more detail through examples.

Structurally relieving platforms are similar to the vertical walls of closed solid fill structures. The basic configuration is a platform resting on a line of sheet piling that retains the soil behind the bulkhead. Rip-rap under the platform adds stability to the sheet piles. (Burgess, Hulhaway 1983: 112) This type of structure is suitable for greater depths and softer underlying material than are sheet pile walls. (Burgess, Hulhaway 1983: 112) (Refer to **Figure 228**)

## Example: Timber Pier Construction

In one of the bays of Saldanha is a timber pier structure that is more than 60 years old. (Refer to **Figure 229**) Some of the supporting timber piles have collapsed and the pier is in urgent need of repair. Timber piles are subject to physical and material degradation due to a host of factors such as normal wear-and-tear, fungal rot and marine borer attack. (Zmeu, 2012)

Timber piles require bracing to resist lateral loads and stiffen the structure to reduce side sway. (Burgess & Hulhaway 1983: 157) The general construction of timber pier structures are illustrated in **Figure 230** and **Figure 231**) Timber piles can also be used in combination with concrete decks.



Figure 229: Timber pier in Saldanha Bay (Author, 2013)

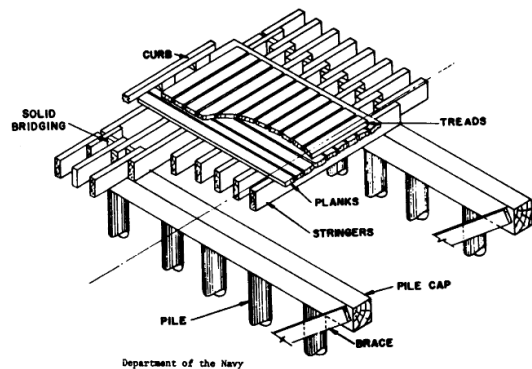


Figure 231: Timber deck structure. (Dept. of the Army USA1983: 8-19)

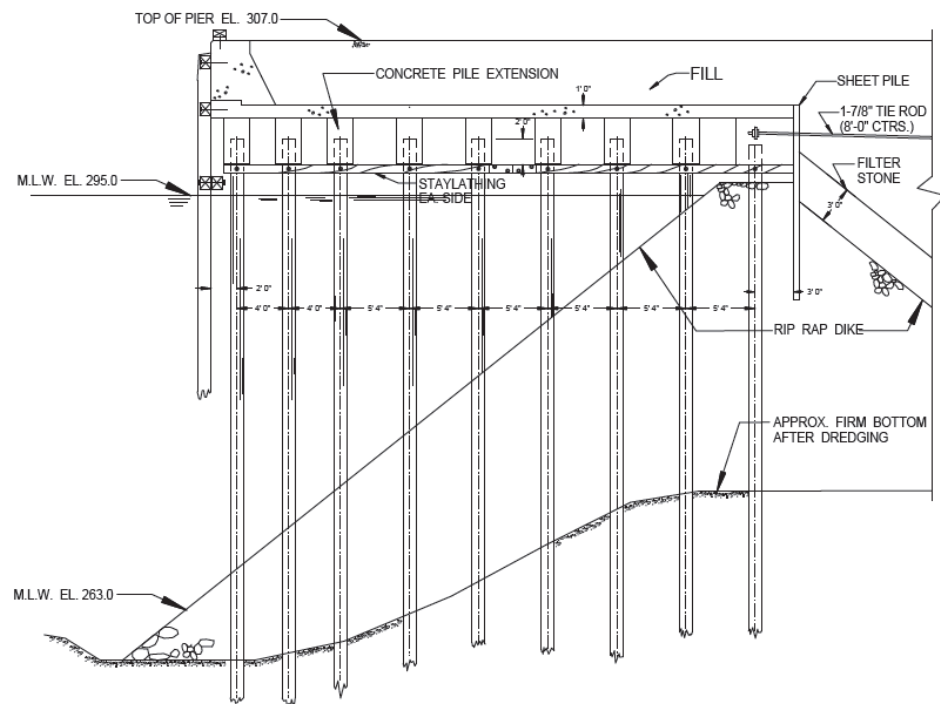


Figure 228: Typical wharf with low-level relieving platform on timber piles (Zmeu, 2012)

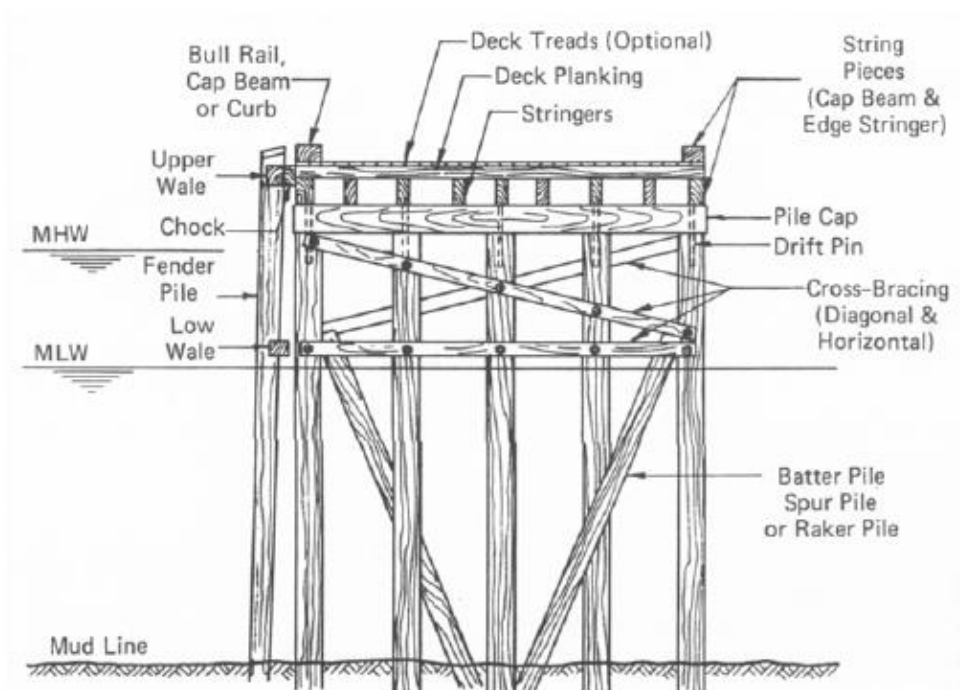


Figure 230: Typical timber pier nomenclature. (Gaythwaite, 2004: 240)

## Examples: Concrete Wharf and Pier Construction

Nowadays concrete dock structures are more common because they require less maintenance than timber structures. A contemporary example of concrete open pile- or column supported structure is the Williamsburg River Park in Brooklyn by W Architecture and Landscape. (Refer to **Figure 233**) In **Figure 232** one can see a concrete relieving

platform with rip rap under the deck. A concrete deck is supported by concrete columns/piles. The concrete piles of these types of structures can be cast in place or precast. (Refer to **Figure 234** and **Figure 235**) Typical concrete deck systems are shown in **Figure 238**.



Figure 232: Diagrammatic section of the park (Lasky, 2012: 112)



Figure 233: Williamsburg River Park in Brooklyn by W Architecture and Landscape. (Lasky, 2012: 112)

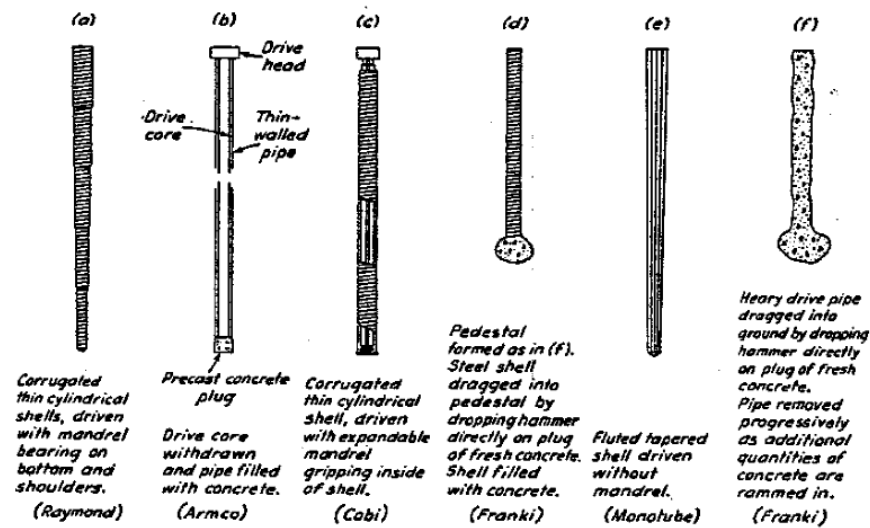


Figure 234: Examples of Cast-in-Place Concrete Piles (Peck, Hanson and Thornburn, 1974: 205 cited in Burgess & Hulhaway, 1983: 149)

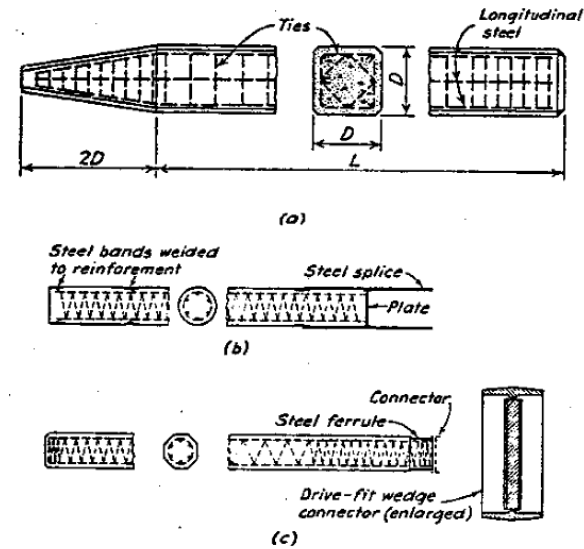


Figure 235: Examples of Precast Concrete Piles (Peck, Hanson and Thornburn, 1974: 206 cited in Burgess & Hulhaway, 1983: 150)

A contemporary example of a concrete piles structure that is used in combination with a timber deck is [Green Bay's New City Dock in Wisconsin, USA, by Stoss Landscape](#). (Refer to Figure 236) An existing sheet pile wall meant that a relieving platform was not used in this construction. The structure is shown in Figure 237.

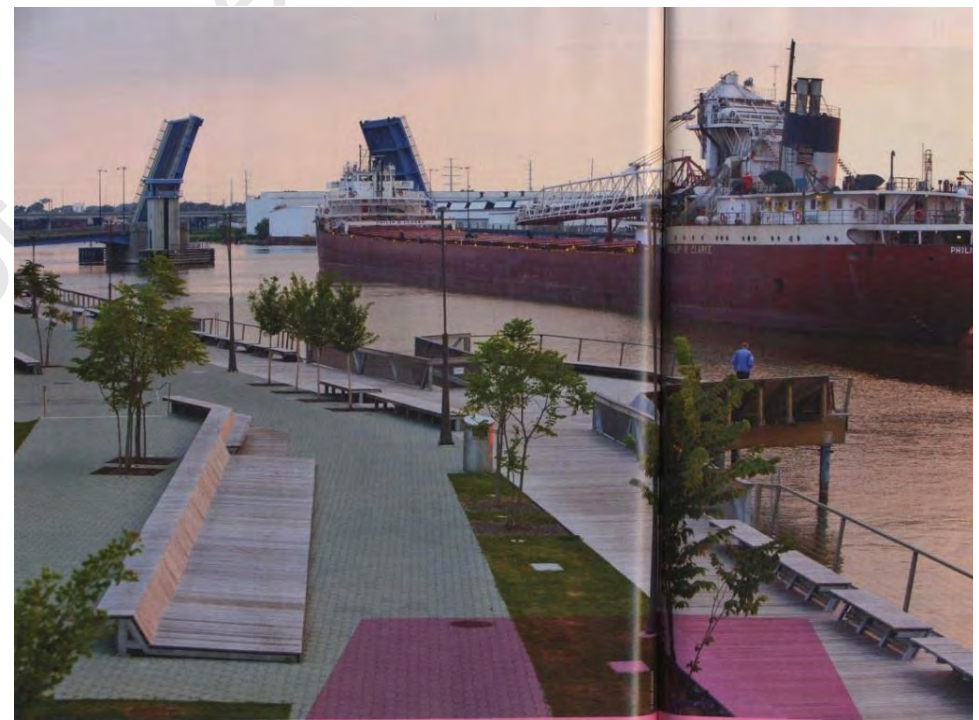


Figure 236: Green Bay's New City Dock, Wisconsin, USA by Stoss Landscape (Arvidson, 2011: 142)

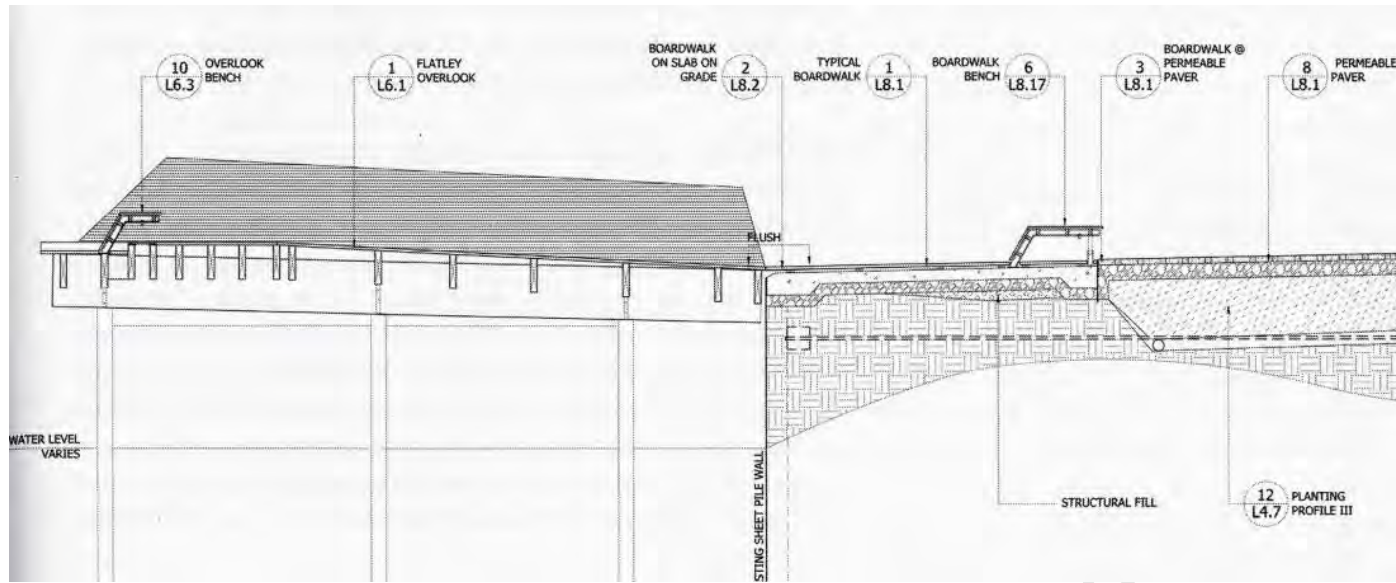


Figure 237: Green Bay's New City Dock, Wisconsin, USA by Stoss Landscape (Aavidson, 2011: 149)

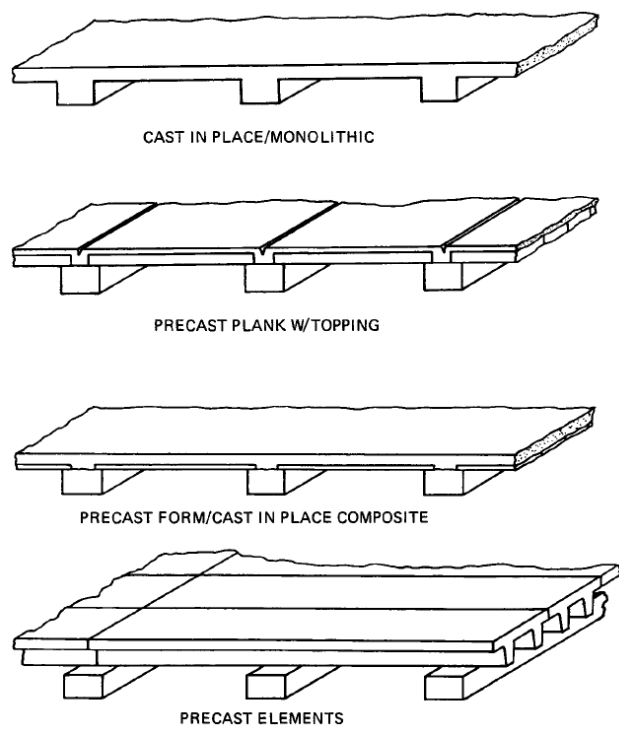


Figure 238: Concrete deck systems (Gaythwaite, 2004: 244)

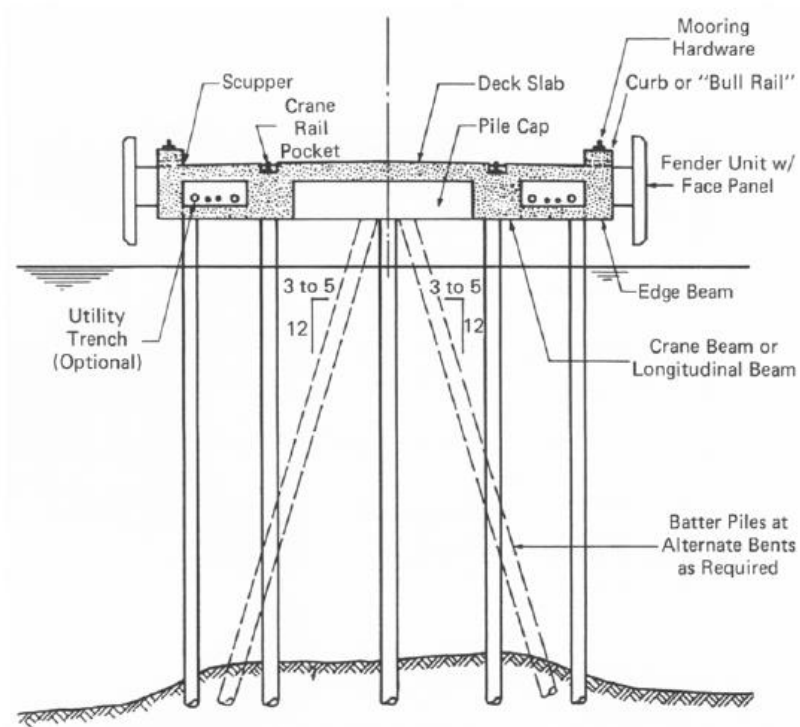


Figure 239: Typical concrete pier nomenclature. (Gaythwaite, 2004: 241)

## Floating Structures

In this section we are going to consider two categories of floating structures.

The one category is the types of floating structures that can be found at marinas and small-craft facilities, such as floating docks, floating ramps or bridges (or gangways) and smaller landing floats (also called pontoons - used to access small-craft vessels from decks). Floating docks are used for the berthing and mooring of small-craft vessels and are often used where the tide range is high. (Gaythwaite, 2004: 406) Floating ramps or bridges can provide access to shore from other structures. Those with smaller, lighter spans which are limited to human use only are also called gangways. (Gaythwaite, 2004:



Figure 240: A twin - pontoon at Saldanha Bay's small craft harbour that consists of a simple timber deck structure supported by two floats. (NSRI, 2013)

268) Landing floats (pontoons) are used to access small-craft vessels from a level which is lower than that of the main dock. (Refer to **Figure 240** and **Figure 241**) The site that is of interest for the design project does not include the mooring of vessels. It is useful to take note of these types of structure and what their functions are but for the above reason their structure will not be investigated further.

The other category that will be investigated in more detail is the floating rafts that are used for the culture of oysters. Mussels and sometimes even seaweeds are cultivated on similar structures.

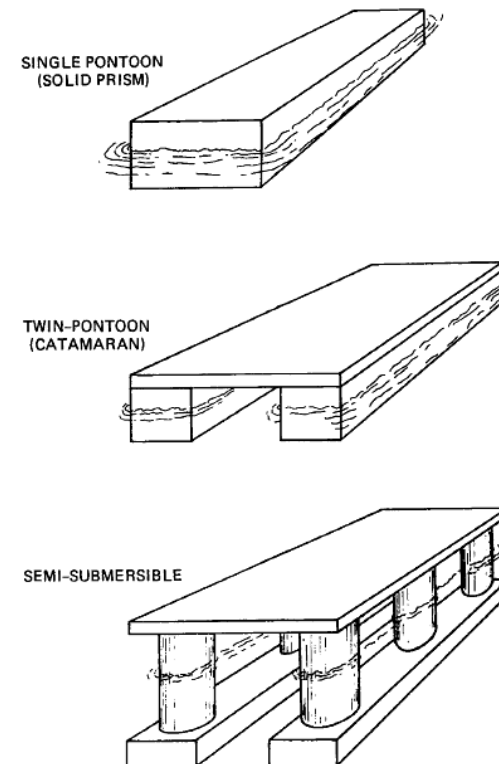


Figure 241: Floating-pier basic hull types. (Gaythwaite, 2004: 362)

## Floating Rafts for the Cultivation of Oysters

The structures of rafts that are used for mussel and oyster cultivation are similar. They are typically made up of a flotation system which supports a framework of timber. The ropes that hold the mussels or oyster trays are tied to the framework. (Dept. of Agriculture, Forestry and Fisheries, 2012: 4) Rafts need to be designed to carry stock and withstand structural stresses caused by environmental conditions such as winds, currents and boat generated waves. (NSW Government, 2013: 2) They also need to be moored. The moorings need to be adequate to secure the raft in position in normal and adverse environmental conditions such as storms. (NSW Government, 2013: 7)

### Framework Structure

There is not a standard size for oyster rafts. The depth of water and the tidal current regime will determine the design. (NSW Government, 2013: 4) The depth of the water limits how many oyster cages can be suspended below each other or the length of the oyster nets. A good flow of water allows mussel ropes and oyster trays to be spaced closer to each other. These factors determine the load that a raft will carry and therefore also the size. (NSW Government, 2013: 4)

An example of the size of an oyster raft is the Spanish oyster raft that is 4x6m. (NSW Government, 2013: 4) (Refer to **Figure 246**) What is interesting to note is that some of the newer mussel rafts of Saldanha Bay are not only constructed of timber. (Refer to **Figure 242** and **Figure 243**) This method has not been utilised at the oyster rafts in Saldanha Bay yet. The older mussel rafts have the mussel growing ropes hang from timber beams. (Refer to **Figure 244**) A newer method is to have the ropes hang from plastic tubes. This is said to be more effective because the plastic tubes better absorb the energy from the wind and waves. (Refer to **Figure 245**)

### Flotation

Common flotation devices that are used today are: Iron cylinders coated with water resilient paint that can be filled with expanded polyurethane to ensure their floatability (Centro Tecnológico Del Mar, 2004: 15); recycled 200 litre plastic drums (NSW Government, 2013: 1); and end-capped large diameter PVC, or polyethylene pipe. (NSW Government, 2013: 1) (Refer to **Figure 247**, **Figure 248**, **Figure 249** and **Figure 250**)



Figure 242: Older type of timber mussel raft in Saldanha Bay (Dept. of Agriculture, Forestry and Fisheries, 2012: 3)



Figure 243: Modern mussel rafts in Saldanha Bay that are longer and have plastic tubes on the top structure (Visser, 2012: 34)



Figure 244: Ropes hanging from the raft that supports the mussels (Dept. of Agriculture, Forestry and Fisheries, 2012: 3)



Figure 245: Plastic tubes on a raft (Blue Ocean Mussels (Pty) Ltd., 2013)

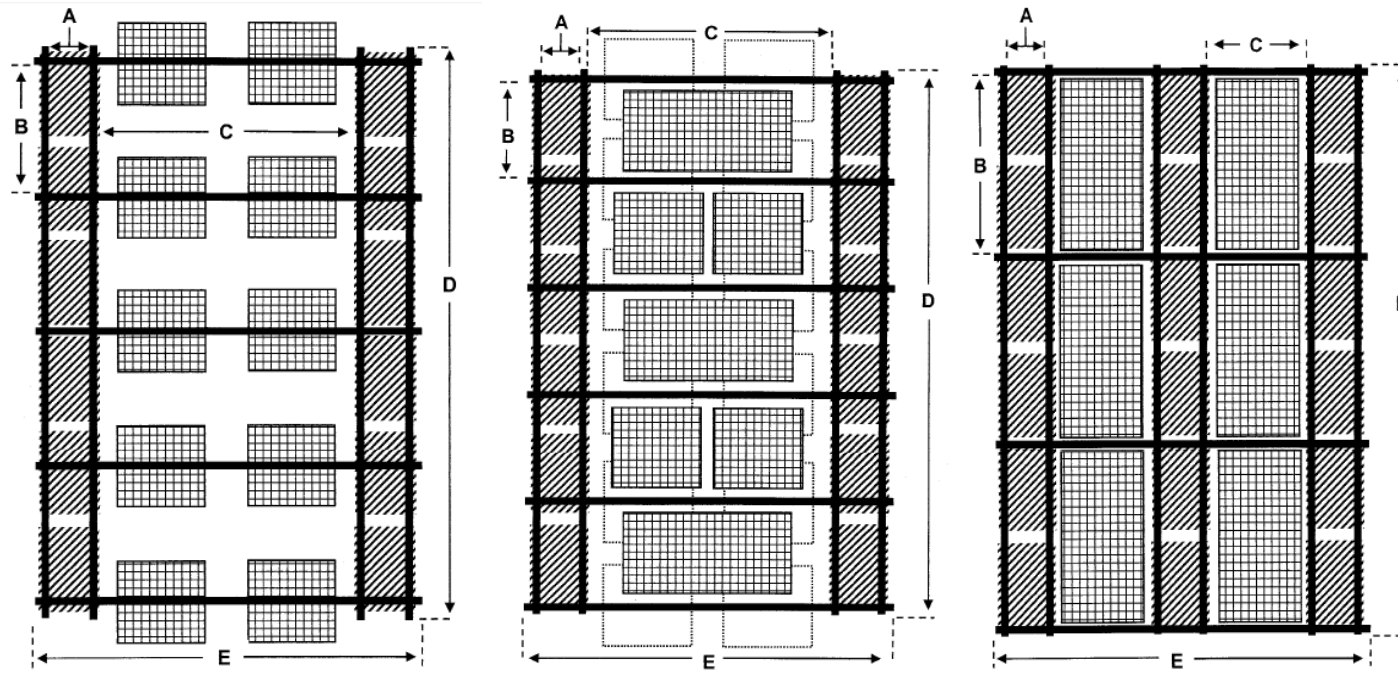


Figure 246: 4x6m oyster rafts with different configurations of oyster trays. Left: four bay raft, middle: five bay and right: six bay rafts. A = 500mm, D = 6000mm, E = 4000mm, C and B varies (NSW Government, 2013: 4)



Figure 247: An older type of mussel raft with fibreglass floats (Centro Tecnologico Del Mar, 2004: 17)



Figure 248: A modern mussel raft with 6 iron floats (Centro Tecnologico Del Mar, 2004: 18)



Figure 249: A Typical oyster raft constructed using recycled 200 litre plastic drums. (NSW Government, 2013: 1)



Figure 250: A Typical oyster raft constructed using end-capped 300mm PVC plastic pipe. (NSW Government, 2013: 1)

## Media Article 1

### **Extracts from: Die Weskus groet drie legendes**

Weslander, Monday 08 July 2013

Source: Weslander, 2013

...Gerald Stoffberg (61), bekende persoonlikheid van Saldanha, is op Donderdag 27 Junie oorlede ná sy prostaatkanker, wat vir agt jaar in remissie was, onlangs weer teruggekeer het. Gerald het diep spore op die Weskus en veral in sy geboortedorp Saldanha getrap....

...Gerald was veral bekend vir sy liefde vir Saldanha se geskiedenis. Hy het tien jaar gelede gehelp om die ou vissershuisies teen die Hoedjiesbaai-kop in 'n museum te omskep. Oor die jare het dié museum gesukkel om hulle deure oop te hou weens 'n tekort aan befondsing en Gerald was die voorvegter om te verhoed dat die museum sluit. Volgens Henriette sal die Hoedjiesbaai-kultuurdorpprojek-komitee voortgaan met Stoffberg te stryd om die museum oop te hou en Saldanha se erfenis te bewaar....

## Media Article 2

### **Toerisme in Saldanha Gaan Eersdaags Bot**

Weslander, Friday 06 September 2012

Source: Terreblanche, 2012



Die geskiedkundige vissershuisies op Hoedjieskop in Saldanha moet vir die nageslag bewaar word. Die gedagte is om dit as deel van 'n kultuursentrum vir toerisme te ontwikkel. Foto: Madelie Tolken 2012-05-25 10:00

SALDANHA is op een na die oudste dorpie aan die Weskus. Net Hopefield is ouer.

Die dorp het 'n ryk, historiese geskiedenis wat sy oorsprong het uit sy natuurlike hawe en 'n visbedryf wat reeds oor eeue strek.

Die goeie nuus is dat toerisme in Saldanha, wat die afgelope tyd afgeskeep is, eersdaags saam met die blomme van die veld gaan begin blom. Dave Osborn, bestuurder van Saldanhabaai-toerisme (SBTO), bevestig dat 'n gebrek aan fondse een van die groot redes is dat toerisme hier tekort skiet.

'n Ander rede is 'n klaarblyklike gebrek aan inwoners wat bereid is om koppe bymekaar te sit en saam te werk om die geskiedenis van die vissergemeenskap te verkondig.

“Langebaan, Hopefield, Paternoster en St Helenabaai het sterk en aktiewe plaaslike toerisme-verenigings (PTV). Toerisme in Saldanha kan gedy juis omdat die dorp 'n lewendige hawe, 'n vlootbasis en 'n interessante militêre geskiedenis het,” het Osborn gesê.

Die SBTO se toerismestrategie vir Saldanha is onder meer 'n Saldanha-kultuursentrum om Hoedjieskop en sy vissershuisies, wat nie net 'n museum sal bevat nie, maar ook akkommodasie en 'n koffiewinkel.

Herinneringe oor die Oesfees van 'n aantal jaar gelede, is ook in die strategie opgeneem en die SBTO gaan alles in sy vermoë doen om die fees te laat herleef.

“Angela Baron is aan die stuur van Saldanha-toerisme en hoewel die ou gebou, Oorlogsvlei, geskiedkundige waarde het, is dit nie geskik as 'n toerismekantoor nie.

Die kantoor gaan dus binnekort na die munisipale kantore in die dorp verskuif,” het Osborn gesê. Enigiemand wat vrywillig skouer aan die wiel wil sit om toerisme in Saldanha te bevorder, kan Baron kontak by 022 714 2088.

### Media Article 3

#### **Active Community Theatre and Art – in Saldanha Bay**

Source: West Coast Green Projects, 2012



In the Greater Saldanha Bay Municipal Area conservation has become a solution to a number of social challenges. The grant provided for an Active Community Theatre (ACT), a creative space where youth are trained on creative and fine arts, i.e. crafts and some drama storytelling, allowed youth to escape from destructive social ills such as alcohol and drug abuse. The Saldanha art group hosts drama nights across different venues in the district, performing plays that educate and raise awareness about complex environmental themes such as global warming, climate change, air and water pollution etc. ACT, a local organization and our partner in this project bought audio equipment and employed two people in preparation for their plays. The initial play, “Bye, Bye Slippersbaai” was performed by ten artists at Steenberg’s Cove’s St Mary Anglican Church, an event that attracted over 200 residents of Saldhana and attracted the attention of local government.

*‘Financial resources from TMF made our dream possible... we hope to start craft classes and change behaviors in our area’ – Elton Lesch, project leader from ACT*

### Media Article 4

#### **“Sout Stories” Take People back to Their Cultural Roots**

Source: Bock, 2012



Benjamin Bock Of Arts And Culture Also Shared A Few Of His Stories On Stage

The “Sout Stories” programme took Afrikaans story lovers back to their cultural roots at the Paternoster Fish Market on Friday, 5 October 2012. The programme, which was hosted by the Department of Cultural Affairs and Sport and Saldanha Municipality, formed part of the Annual Provincial Arts Week that took place on the West Coast this year.

The programme took place in traditional fashion with outdoor storytelling next to the beach. The cultural warmth of the event was enhanced by gellieblik fires and potjiekos.

About 50 people attended the event, which featured a stage musical, poetry, storytelling and dance performances. John Cloete, Serena van Alphen, Vernon Vraagom and Elton Lesch, were highlights of the evening’s entertainment.

REAL, a rap group from Hopefield, and jazz group African Skies from Vredenburg performed on stage. They also participated in the development workshops that took place for local people in the days leading up to the main performance. Anwell Bergh, lead guitarist of African Skies, said that the event created the ideal atmosphere to bring across a message through a story. “These performances made us proud to be Africans,” he said.

The department succeeded in achieving its aim to bring people closer to cultural heritage by co-hosting this event. Mr Benjamin Bock of the Directorate: Arts and Culture expressed his gratitude for people being able to share Afrikaans stories around the fire and the important opportunity it represents for people to preserve their cultural history.

## Acknowledgements

Most importantly thank you to God Almighty for this exiting venture and strength throughout the year. A very special thank you to a wonderfully inspiring person, my husband Frans Kellerman. Without your continuous support this would not have been possible in so many ways. Thank you to my friends and family for their interest and support throughout the year. I would also like to thank the professional team, Nic Coetzer, Rob de Jager, Francis Carter and Jo Noero for their help and advice throughout the year.

University of Cape Town