Site Knowledge: in Dynamic Contexts

A project submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

Richard Black
M.Arch, B.Arch

School of Architecture and Design
Portfolio of Design and Social Context
RMIT University
February 2009
For Michelle and Oscar
Site Knowledge: in Dynamic Contexts

A project submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

Richard Black
M.Arch, B.Arch

School of Architecture and Design
Portfolio of Design and Social Context
RMIT University
February 2009
DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

Sign here:

Name:

Date:
Introduction: PhD statement and overview

CHAPTERS

1. SITE 12

2. MAPPING THE RIVER MURRAY 34
   2.1 Inventing a site: The River Murray 34
   2.2 Transitory 82
   2.3 Mobile Landscapes 102

3. LIVING WITH THE RIVER MURRAY 116
   3.1 Amphibious Architectures 116
   3.2 Tidal Garden 134

4. CONCLUSION: DESIGNING THE SITE 242
Site knowledge diagram. The diagram illustrates the impact of site knowledge upon my design process. Off-site and on-site operations play a formative role in the construction of site knowledge.
Statement
The PhD commenced with the question: what are the consequences for a range of architectures of living with the River Murray – rather than living against the River Murray?

The PhD is concerned with the construction of site knowledge and how this is transformed into knowing where and how to intervene in a river system close to ecological collapse. It involves three overlapping topics:

- **Site knowledge and its impact upon the design process**
- **Development of tools and techniques appropriate for working on a particular type of site condition: the threshold between land and water**
- **Transitory: the impact of dynamic processes and events on inhabitation**

The River Murray provides a context for the project work of the PhD. Site knowledge emerges from a process of investigating a location. It is generated by on-site and off-site operations. This involves the architect in a dynamic set of relationships – between encounters on the ground in the here and now, with more remote encounters with the site from the studio and archive. This mode of site study amplifies the impact of scale shift and it exposes the variable and provisional status of a location, while also providing a way of operating in environments that can be considered dynamic.

The PhD is premised upon the need for a work to relate to its surrounding environment. The hinged meaning between the terms a site and to site have relevance to the design process. A site, as a noun, suggests a specific place, such as a plot of land, whereas the verb, to site, suggests that a work will be placed in relation to other things. Site knowledge is thus generated through the act of describing a place, through the act of making drawings and other descriptions of that place. It generates ways of conceptualising a site and leads to action: knowing how and where to intervene in a location.

Projects that form part of this PhD belong to a genre of architectural design work that can be considered speculative. An exemplary project of this type would be Temple Island by Michael Webb. Speculative design projects are unbuilt works that exist as drawings, models and sketches. They are not made for a client, nor are they generated from an architectural competition brief, and they are not developed for a pre-existing site or brief for a building. As an academic, I have taught design
studio since 1991. In parallel to these activities I have endeavoured to continue to practice, making speculative designs. During this time my practice has explored a particular type of landscape condition, developing a set of tools and techniques appropriate for working in sparsely populated terrain. This is a territory, I believe, that has been overlooked by conventional architectural practice. The project work of the PhD continues this trajectory of work.

Dynamic Contexts
Dynamic contexts occur at the convergence of land and water. As water recedes and advances along a shoreline it creates a landscape of change. The River Murray is Australia’s second longest river and has been likened to a long inland shoreline. When settler Australians first encountered the Murray, they found an unpredictable river governed by cycles of flood and drought. Big floods would spill out across the land for up to 20 kilometres from the main channel, whilst drought periods saw the water recede exposing the river bed. During the early part of the twentieth century, dams, weirs and barrages were constructed along the length of the river transforming it from a wild river into an irrigation canal. Now, too much water is extracted from the river and its natural flow regime has been inverted, bringing the Murray close to ecological collapse. Ecologists realise that the cycles of flood and drought, that regulation had minimised, are part of a river’s ecological life. Current thinking argues for a return to a variable flow pattern, and it is this point of view that is embraced by the project work of the PhD. But while the ecological benefit of a variable river has been well documented, there has been little discussion of its impact upon the river towns or the land-uses that presently occupy the floodplain. Living with the River Murray is a proposition to embrace a future where land-use and ways of inhabiting a floodplain do not compete with its ecological processes. The project work of the PhD sets out to examine the floodplain and its river, as a means to develop a range of amphibious architectures that are mapped closely to its terrain, derived from, and working with, the process of the river’s rehabilitation.

Structure of the PhD
The PhD is structured into four parts. These are: Site, Mapping the River Murray, Living with the River Murray, and then finally Conclusion: Designing the Site. The first section situates the research and how it addresses perceived gaps in the field. The following sections introduce the project work that has been undertaken in conjunction with the written component of the PhD. The various chapters introduce each project through the development of the key research themes. Finally, in the conclusion I reveal a way of generating site knowledge that can have a significant impact upon the design process.

1. SITE
In this review I locate the research within the field of site study and its influence upon the design process. I expand upon terminology and situate the research in relation to overlapping disciplinary areas between architecture, landscape architecture and art practice. Through the hinged relationship of a site and to site I proceed to build an argument for a site specific design practice. In the process I identify a series of gaps that the research sets out to address. At the heart of my argument is the proposition that site can exert a formative influence upon the design process.
But, this requires a more creative exploration of a site’s full potential in the formative stages of a project; only then can it motivate where and how to intervene in a location.

2. MAPPING THE RIVER MURRAY
This marks the commencement of the project work of the PhD and is structured into three chapters. Mapping the Murray charts the techniques used to start to understand a river system.

2.1 Inventing a site: the River Murray. This project is the beginning of transforming a river into a site. The chapter elaborates upon the process used. It examines three different ways in which the river was approached: from the archive, from the ground, and from above. These are strategic techniques used to examine a location implicating scale change and time as integral for engaging place. Material from the archival work generated a new drawing of the River Murray that explored three relationships: the flood river, the existing river channel and the survey grid of each town. Another sequence of encounters with the river, this time from the ground, generated an intimate understanding of the spaces depicted in the line drawing. I travelled thousands of kilometres, driving to and along the river, walking it, canoeing along part of it, crossing it and living temporarily by it. Over this period I progressively worked my way along its length, from its upper reaches at the Hume Reservoir to its estuary in South Australia. Photographic documentation assembled these journeys as a sequence to be read in relation to the drawn line. And in the process, the River Murray began to be defined through the presence and absence of water; a flood river (floodplain), a drought river, and the river of the present. While this phase of the study revealed the immensity of the Murray it also started to construct an overview of the river towns and their precarious sitting on its floodplain.

2.2 Transitory. Water Theatre was a commissioned work for the visual arts program of the Melbourne Festival. It required the making of an installation for a laneway on the city campus of RMIT University. While it was physically distant from the river, it became a project where I could develop a way of working with water on an intimate scale. For me it provided an opportunity to shift scale to work at one-to-one on a project that would be constructed. From the distance of Melbourne, the river provided a conceptual context for the work: firstly, to make a work that was transitory informed by the dynamic flood events being discovered along the river; and secondly, to explore the potential of water as material. The installation grew out of a close understanding of the physical context as a site already filled with a presence of activity. The installation explored what a transitory occupation of the lane might be. Water was pulsed into its spaces to resonate with the memories of flood events along the Murray. As a transitory event, the interaction between the planned and the unexpected was seen as a significant outcome. Additionally, this project introduced the political implications of water use, which took me into further reading that would contribute to the next chapter.

2.3 Mobile Landscapes. This chapter articulates a proposition for living on the floodplain and consolidates a broad range of subject material. It summarises my understanding of the river threading
a path through the archival material and journeys, and then relates these to other disciplinary areas of knowledge on the river, particularly its ecology, management and politics. The key issue to emerge was that the flood was seen as a normal event for the river. Its floodplain was understood as a mobile landscape defined by the absence and presence of water. This created a set of specific conditions that could be directed back onto each town to challenge their future. How might the towns start to live with the river? This text was a significant turning point for the project work of the PhD where the various topics began to converge and the study of site informed possible projects. But what was not yet clear was how these descriptions of the River Murray could impact upon the verb understanding of site: that is to know how and where to intervene in a location.

3. LIVING WITH THE RIVER MURRAY

3.1 Amphibious Architectures. The text Mobile Landscapes summarised key issues from which I framed five teaching programs for the design subject stream at RMIT University. Moving the research into a teaching environment offered a way of exploring several locations along the river in further detail. Interventions were revelatory, marking the territory of the floodplain with building and landscape elements. More importantly, the design studio offered me an opportunity to spend time in communities along the river to gain an intimate understanding of the issues raised in the previous section – but this time from the perspective of being on the ground. Towns identified as sites for a studio program were selected for their relationship to the floodplain and inundation. Site visits proved to be invaluable, and the significance of off-site and on-site operations became apparent. This shift into a teaching environment, also suggested a way into an architectural scale of engaging the Murray, which thus far had been hindered by the immensity of scale encountered in the mapping phase of the study. While the studio phase of the study solved the scalar problems and established rules for selecting particular sites, they did not sufficiently engage with the range of site material now accumulated between the scale of the town and the scale of the river.

3.2 Tidal Garden. Tidal Garden is a speculative design project for a location on the floodplain within the river estuary. In Tidal Garden, the process used to engage the whole river was re-visited, but here applied at a different scale – an island in the river’s estuary. This instigated another series of off-site and on-site operations that constructed (what I had begun to refer to as) site knowledge. The process of constructing site knowledge became instrumental in the development of the project. I demonstrated how a study of site can start to have a significant impact upon various aspects of the design process: from site selection to the development of programs and land-use; to knowing how and where to intervene; and how formal, spatial and material characteristics are derived from this understanding. Tidal Garden is a place constantly evolving; its spaces being constantly altered by the transitory action of the estuary landscape.

4. CONCLUSION – DESIGNING THE SITE

The PhD demonstrates the need to commit time to understand the particularities of a river before knowing how to act. The consequence, then,
for living with the Murray River is to derive new approaches that do not separate the study of site from the act of designing. It is a way of operating that is neither bottom-up or top-down, but takes aspects of both of these approaches to create a dynamic set of relationships that allow a more imaginative way of living with a river. The construction of site knowledge and its application into the design process is seen as the significant contribution to the study of site. In the conclusion I elaborate upon the significance of on-site and off-site operations and how they shift the focus of the site from a static entity into a provisional state where site is constantly constructed through its relationships with the natural and inhabited landscape. This approach implicates a wider range of scalar investigations with a specificity of time as a way of investigating a location. This allows me to design the site.

NOTES
In architecture the demands of relating a building to a physical location are necessary and inevitable. Architectural literature has been more than forthcoming about how to ‘relate to’ or to ‘fit in to’ urban situations. But these are not readily transferable to locations that are characterised by the absence of built fabric. How might a work relate to its setting in the open landscape? Is a landscape free of the usual constraints, a place where anything is possible? Could this suggest that landscape is imagined without the site encumbrances associated within urban settlements? Terms such as a ‘green field site’ and a ‘cleared site’ would certainly suggest the answer to be yes. But such thinking usually results in arbitrary interventions on the land’s surface with minimal regard for the existing situation.

A site specific approach, on the other hand, would focus on the careful examination of the landscape and its relationship to the site. Alternate reference points other than buildings are implicated. In this sense, it is a critique of architecture’s inability to move beyond formal concerns of the built fabric. By engaging with the concept of landscape this essay tries to find a space for an architectural work within this territory.

This chapter examines site and its role in the design process. Firstly, I look at site and how it is conceived in relationship to a wider context. I then review key precedents in architecture, art practice and landscape architecture that have been helpful in finding ways of operating in the sparsely populated terrain of the Australian continent. I then suggest ways in which the ground has been conceived imaginatively and how my design process has adjusted to these conditions. My argument is structured around the hinged relationship between a site as a noun, and to site as a verb. It is this hinged relationship between these words that would appear to have relevance to the design process.

My argument is structured around three topics that address perceived gaps in architectural thinking about site: firstly, that more creative and imaginative descriptions of site are needed; secondly, that there are inadequate architecture examples that show how site description motivates action; and thirdly, that design decisions can be motivated by site descriptions, and thus forge a relationship between what the site is and how it might evolve in the future.
Plan Landbridge, Richard Black, Yarra River 1998
1.1 A SITE

According to the English Oxford Dictionary, a site, as a noun word refers to ‘an area of ground on which something is located’.\(^2\) In architecture, a site is commonly understood to be a parcel of land having dimensioned boundaries that define its location and size. To imagine a site connected into its surroundings is to move it into more dynamic territory. Sites interact, spatially and conceptually, with other places. This can occur at a number of levels. An unobstructed visual field can bring near, middle distance and the distant horizon into relationship. An ecological point of view can also contribute to connecting near and far. A friend\(^3\) has often discussed how land-use practices on his property can potentially impact on the water quality of Adelaide – a city over 700 kilometres from his farm. While this environmental ethos is commendable, it reveals that landscape systems such as water catchments form networks that do not adhere to property boundaries. It is this reciprocity and interconnectedness between the micro and macro scales of landscape which challenges an interpretation of site as a bounded piece of property. Too often, architectural works\(^4\) remain conceptually constrained by the legal property boundary – instead of interacting with the landscape.

Site as a topic of study and research emerged from a sequence of speculative design projects. The more distant work was undertaken in Germany\(^5\), having an urban focus. This was followed by a return to Australia and a sequence of projects in remote parts of Western Australia. Tools and techniques used to examine the densely populated European cities were inadequate when applied to the sparsely populated ground encountered in Australia. Subsequent work\(^6\) has developed ways of making site investigations in sparsely populated terrain. This has led to a re-assessment of site and its role in the design process. Increasingly, I made projects for places defined by the meeting of land and water. Lake Eyre\(^7\) and the Yarra River\(^8\) were notable examples. Both places were seen as companion locations, Lake Eyre as a place relatively untouched by human endeavour, whereas the Yarra’s path to the sea had been constantly altered with the expansion and industrialisation of the city. These projects have pushed the role of the architectural project beyond its usual scale, where the built response may well be equal, if not secondary, to other concerns. In this work, the site for each project became a space marked by shifting boundaries, and the project’s interaction with landscape systems became a major point of exploration. Engaging with landscape processes has also challenged the normative scalar relationships between a building and its setting. One of the challenges posed by this has been to reconcile the small scale of the built intervention with the perceived immensity of the landscape. Drawn investigations of increasingly larger territories are a necessary part of this process. The following text outlines a range of tools and techniques that have been developed to break a place down, so that it can be opened up for scrutiny.

Landscape has been the common denominator, forcing me to consider other disciplinary points of view. I have benefited from others who operate within this context, in particular, artists\(^9\) who have made architectural enclosures tuned to the
phenomena of place, while others who have made more ephemeral interventions have challenged the need of enclosure. Reading has developed another layer to my understanding of landscapes’ complexity. Unlike an architectural context, landscape often has infrastructural networks that can encompass regional and continental spheres of influence. John Dixon Hunt has used the notion of a second nature to articulate a way of conceiving of the relationship between nature and human inhabitation. Second nature is a ‘landscape of bridges, roads, harbors (sic), fields – in short, all of the elements which men and women introduce into the physical world to make it habitable’.¹⁰ A second nature could exist in degrees of intensity. A good example would be the Netherlands, where the land has successively been remade and cultivated over centuries. Many commentators have often referred to this as an artificial nature. Wilderness, on the other hand, would be a place untouched by human endeavour – a first nature according to Hunt. Whether such a place still exists on the earth today is questionable. There would seem to be different intensities at which land has been processed and made habitable for human purposes. Because landscape can include buildings, the ground surface, roads, and infrastructural networks it necessitates a greater range of scalar shifts to adequately grasp its complexity. Where an architectural investigation may include the consideration of the built context beyond the scope of the site, a landscape context may well include investigations of territory beyond the horizon, combined with an encounter with the particular – combining near and far.

Landscapes are dynamic places evolving over long and short durations of time. Consider, for instance, the frequency of Lake Eyre filling and emptying with water, as it has on four occasions during the previous century. While its filling and emptying can last a year, it might be another 20 to 30 years until this cycle occurs again. By the time rivers discharge into the lake, they have traversed an immense distance through the deserts of Central Australia. Typically, landscape systems span large distance and time intervals far beyond any comparable architectural equivalent. It is impossible to imagine landscape as static. Even stone can appear to be mobile. Robert Macfarlane has suggested that ‘to understand even a little about geology gives you special spectacles with which to see a landscape. They allow you to see back in time to worlds were rocks liquefy and seas petrify, where granite slops about like porridge, basalt bubbles like stew, and layers of limestone are folded as easily as blankets. Through the spectacles of geology, terra firma becomes terra mobilis, and we are forced to reconsider our beliefs of what is solid and what is not’.¹¹ If observation and a little knowledge can reveal the landscape to be provisional, always on the move, even slowly evolving into something else, then it may also be possible to consider the act of inhabitation as provisional. Lived time of human existence takes place at a different pace to the immensity of landscape processes. Again, Macfarlane has written eloquently of his encounter with the remote mountain regions of the world: ‘Contemplating the immensities of deep time, you face, in a way that is both exquisite and horrifying the total collapse of your present, compacted to nothingness by the pressures of pasts and futures too extensive to envisage’.¹² Comparison
of lived time with the time of the landscape provides a way of conceiving of the act of inhabitation beyond a problem of form. To consider the life of the building as an active evolving set of possibilities may prompt parallel analogies with landscape processes. Looking at places over time reveals patterns of change. Rather than thinking of things in stasis I propose conceiving of things in dynamic relationship. To follow on from Macfarlane’s observation, I suggest conceiving of and inhabiting the landscape as a relational framework: where intervals of change are considered, slow to fast, of different pace and frequency. A relational understanding between landscape processes and the events and actions associated with the act of living might be a more productive way of designing. Too often, in built up areas, a work is assessed to ‘fit-in’ by examining its formal adjacencies to its neighbouring buildings. This can quickly degenerate into purely visual similarities between what already exists and what is added. A relational understanding, on the other hand, would privilege events over form. Formal considerations could then be allowed to recede when considering landscape and building from this perspective. I propose a way of thinking through architectures relationship to the wider landscape, where a built intervention enables action to unfold over time: between the landscape and the building fabric.

**Drawing the site**
Site enters the design process through the act of drawing. Robin Evans has stated that, ‘architects labour, never with the object of their thought, always working at it through some intervening medium, almost always the drawing...’13 Unlike the artist who works directly with paint on a canvas, the architect works on the drawing: rarely on the building. If the drawing is a substitute for working on the building, then it is also one way in which a site is mediated. However, David Leatherbarrow has noted that: ‘because of our dependence on site plans and other similar spatial abstractions as adequate symbols of the full reality of place, we have largely missed the creative aspect of site definition and the architect’s responsibility to “invent” the site of any design project’.14 I concur with Leatherbarrow on this point, particularly as the complexities of conceiving site and landscape are often overlooked by conventional site documentation. Drawing the site (as opposed to receiving a drawn site survey and a data file) enacts a process of selecting and arranging information – it is a way of describing a place. This may involve revealing what is seen and unseen, as well as testing its real and imagined boundaries within the wider context. This process is exploratory and imaginative rather than just a mirror of reality. Certain features, qualities and allegiances will be identified through this process and these may influence how and where to intervene in a location. Only then can the site have potential to inform the design process. My practice has developed a set of techniques to investigate site as a formative stage of a project, where site and its relationship to the wider landscape are examined in detail. I have endeavoured to delay the act of intervention, placing emphasis upon the investigation of a location, opening it up to scrutiny. The following summarises three ways of approaching site and landscape.
From above: plan drawings, maps and aerial photographs provide selective modes of representing the world from above. Maps rely upon cartographic conventions to represent the land’s surface. Some artists have used (or misused) these conventions to convey ideas about a site or landscape. The plan view, on the other hand, has persisted as the preferred architectural drawing to represent sites and buildings and entire city regions. From the 1970s, figure ground drawings were revived by Colin Rowe and Fred Koetter in *Collage City*. Mario Gandelsonas continued to cultivate a plancentric mode of representation as a means of investigating the American city. These were startling for their selective use of drawn conventions, resulting in highly reductive views of the city and its spaces. Both practices privileged a singular mode of projection, with limited scale change. Architectural drawing has proven to be particularly good at articulating compositional arrangements but has not been adequately exploited to reveal the land’s surface. Consider, for instance, the figure-ground plans as championed by Rowe and Koetter. They are indifferent to open space, rendering it as a void as do many other forms of architectural plan projection. The plan view may even recede in importance as other forms of imaging support, add to, and complement the aerial view. Artists’ use of cartographic conventions could also have relevance here. To overcome the sense of detachment from place, multiple plan views crossing a broad scalar range, from detail to overview, would be helpful. This technique has been explored by Peter Eisenman, where plans of various scale were superimposed to register a greater range of information of a location. Drawings made in time, rather than out-of-time, could also reveal the hidden, transitory processes that are often absent from site drawings.

From the archive: the archive has provided rich source material to reconstruct aspects of the natural and inhabited landscape. The term archive refers to material that has provided evidence of a site’s past, and might include manuscripts, newspapers, photographs, maps and survey drawings. Photographs and maps in particular have provided insights into the changing character of landscapes over time. These may be of lapsed events that have taken place, personal memories, or of landscape processes. Data from the archive has provided source material to make drawings of change over time. By drawing the Yarra River channel over a 134-year period, I was able to expose a landscape of excavation and reclamation that provided a conceptual framework to imagine the estuary landscape. At its best, material from the archive can help give a sense of time’s passage. It can challenge other encounters with the landscape, making the aerial, and on the ground, experience seem provisional.

On the ground: a location experienced on the ground in real time differs from the same place depicted on a map. These tensions have been played out particularly well through art practice. When an art work is executed in a location remote from a gallery, an artist has to rely upon documentation to capture a residue of the work for display back in the gallery. This process has mirrored my own experience of combining two modes of operation – working in the field as distinct from working in the studio. Architects perpetuate site documentation
produced in the studio – remote from the site. The plan drawing and site survey are good examples. With further reliance upon data files and the computer, the severing of contact with the reality of the site is becoming common. However, to be outside, in the field, to produce drawings and other forms of recordings is to engage with the immediacy of the here and now. Tools and techniques borrowed from art practices have helped overcome the inadequacies of architectural modes of documentation. Rather than work from simplified abstractions of a place, visits to a location can reveal its lived experience; the difference between morning, afternoon and midday may be of significance. Being in-situ foregrounds diurnal time and the sensed encounter with the landscape. Remarkably, these are the types of encounter that have been noticeably absent from architectural literature. But, for some artists these concerns have been particularly present. John Wolseley, for example, an artist based in Melbourne makes drawings in the landscape, sometimes leaving works buried for up to a year, allowing the ground to make its imprint on the work.

While there are numerous examples of documenting site from above, in architecture there are few examples that adequately account for approaching site from the archive or from the ground. The potential is for new combinations to emerge, the adjacencies of plan, an on-site encounter, and the archive can construct inventive and detailed descriptions of place. Site selection necessitates the investigation of a location to articulate boundaries. To locate boundaries from unbounded terrain is to establish a site. In this process the mandatory tasks of the site visit, drawing of the site and other research associated with these activities are considered to be the formative stages of a project’s inception.

Site and the design process
If drawing is ‘the instrument through which architecture is most often brought into virtual and actual existence’, then by looking at drawings by other architects I would expect to discover how they have engaged with a site and how this has led to action. The Austrian architect Raimund Abraham has claimed that ‘…the intervention and transformation of a site is the true beginning of architecture’. Abraham would not be alone in believing that architecture commences at this moment of intervention. But architects have done particularly well in concealing the impact of site on the design process. If architecture commences at the moment of intervention, how are we to know where and how to intervene? Consider for a moment, a sketch by Thom Mayne from the Los Angeles based practice Morphosis. It is a conceptual sketch for the Chiba Golf Club; a project that remains unbuilt, but nonetheless had several publications dedicated to its design process. If the beginning of architecture, as Abraham has claimed, is the moment of intervention, then preliminary sketches like Mayne’s should provide evidence of the motivations that initiate a work. While there is a prolific amount of information conveyed about the intricate formal complexity of the building, there is less evidence to suggest how they approached site and the landscape. Did Mayne and his colleagues visit the site and, if so, what kinds of documentation might have been undertaken? How might they have impacted upon the preliminary
sketch studies? Taking the published accounts of the design process into consideration, there is little evidence to answer these questions. The concept sketches are devoid of the surrounding context. It is only in the developed drawn and modelled studies that the surrounding terrain becomes present. This, I believe, echoes Abraham’s notion of architectural beginnings – that are with the building rather than the site. Conceiving of the site as full, on the other hand, would suggest a range of investigative studies with the site and broader landscape as its focus. Such studies would precede the act of intervention.

In the mid 1980s, Günther Domenig became famous for his own house at the edge of the Ossiacher See, in southern Austria. The Stone House25, as it became known, was based on a series of studies of the local mountainous terrain. Domenig had spent some time making drawings of this landscape, through a series of imaginative and interpretative studies that explored found geometry of the local terrain. These preliminary drawn studies are evidence of the architect struggling with a way of seeing site as a microcosm within the mountainous terrain. Nevertheless, they seem to have influenced the formal development of the house: its faceted surfaces reflecting the abstracted geological forms found in his earlier studies. Domenig’s design process is of interest for its privileging of a drawn investigation of the local landscape from direct observation, a process that preceded design work. This project reveals how site studies can have generative impact upon the design process.

Shifting context and scale provides further evidence of thinking through an encounter with a site as a formative part of the design process. Mary-Ann Ray and Robert Mangurian were commissioned to undertake the urban renewal of Santa Monica Boulevard. Like Domenig’s study they made a point of initiating on-site documentation and analysis. Interestingly, this mode of documentation was motivated by their desire to explore the diversity of the streetscape. Mangurian and Ray state that the: ‘bias of most planning and many architects is trying to make a place have an identity (at times we are for this). Our parting of ways comes from making the identity emerge through the application of devices that gives the area a kind of uniformity –stitching together, “blending in”, and so on. While not being totally against this way of thinking, we attempted to see commonalities as backgrounds, instead of providing frames for the great variety and diversity that exists along Santa Monica Boulevard. We also felt that the strong identity for this section of Santa Monica Boulevard could come from the hidden (and not so hidden) exceptions, oddities, and anomalies that exist’.26 These observations provided the stimulus for on-site documentation, such as photographic studies and interviews, that catalogue the range of ‘exceptions, oddities, and anomalies’. Cataloguing places using photographic documentation reflected techniques used by the artist Edward Ruscha in the 1960s, where he undertook factual documentation of apartment buildings, carparks and the Sunset Strip.27 For Mangurian and Ray, this mode of documentation seemed to have been pivotal for generating a set of rules that could be used to determine how and where to intervene. Interventions were to further strengthen
these found situations. Sometimes this would involve changing paint colour, modification to shop fronts, or the addition of landscape infrastructure. Analysis of the local context produced site knowledge that generated the rules of operating along the streetscape. Mangurian and Ray show how site thinking becomes strategic. Close observation drives a set of principles for intervening: from the most minimal cosmetic adjustments, to more permanent costly transformations of civic infrastructure.

According to Andrea Kahn, ‘Conventional site analysis – which privileges the clear over the chaotic, the elemental over the relational, the static over the mobile – are inadequate to the task of recognising (or representing) the incalculable angles of a site’s lived complexity’. Architects have been too reliant upon site documentation that limits the site to the property boundary, rather than seeing the act of analysis as a more creative process extending beyond the physical limits of the site. An understanding of site is also reliant upon a range of different documentation techniques that can engage the complexity referred to by Kahn. Reliance upon one mode of documentation such as aerial photography and plan drawing generalises rather than particularises. So far I have elaborated upon two practices that expanded the range of documentation. Domenig took to the mountains, while Mangurian and Ray traversed the Boulevard conducting interviews and taking photographs. These methods challenge the engagement with a place from the distance of the studio. Instead, they prompt the architect to become enmeshed within the surroundings, walking and traversing its spaces, documenting its nuances and specific character. It is through the remaking of site imagery that I believe the creative opportunities of a site investigation can translate and affect the design process. Rather than receive the site as a given, it is the role of the architect to imagine the multiple ways in which the site is grounded into the local context, at different scales and for different times of the day, month and year. I see the role of the architect as that of discovering and revealing a relational understanding between a site and the landscape of which it forms a part. For this to take place, the notion of site has to be conceived as a dynamic place, and not a static entity.

I prefer the term of ‘mapping’ to ‘site analysis’ to describe this joining of site and design. Mapping remains a potent metaphor to describe a process where connections are discovered and things brought into relationship. Mapping constructs a way of seeing and, as James Corner writes, is ‘a fantastic cultural project, creating and building the world as much as measuring and describing it’. ‘Building the world’ suggests a process of assembly. Data retrieved from the air, ground and archive can provide the raw material to commence this process. Mapping is where the notions of a site and to site are formulated and tested through drawn information – a process that leads to knowing how and where to intervene in a location. Mapping is more than just making representations of place – it should also be speculative and generative, suggesting how to intervene. Mapping is thus a strategic part of the process hinging between operations that would normally be termed ‘(site) analysis and design’. Authorship is a necessary component, selecting and arranging this material into a new set
of relationships. Rather than just replicating what is already known, mapping unearths hidden aspects of a place, allows its working parts to be seen and understood; it can bring a collision of scales and time frames into relationship. Mapping can thus become a strategic part of the design process. It not only reviews and re-assesses the found conditions of a place but constructs new realities. It brings together analytical and propositional thinking.

In landscape architecture several works have provided a critical insight into the role of representational techniques to disclose landscape processes. In *Taking Measures Across the American Landscape*30, James Corner examined agricultural and industrial landscapes of North America. His drawings reveal how working parts of the landscape fit together, in the same way that an analytical drawing can dismantle a building to understand the relation of the part to the whole. He has combined fragments of topographic maps, aerial photography and line drawing. The Pivot Irrigator series are an excellent example where multiple forms of representation have been layered together exploiting different scales of information. Corner’s drawings are constructed and assembled, recalling Leatherbarrow’s demand for drawings to ‘invent the site’. They are creative and imaginative depictions of reality, as opposed to site surveys and data that undergo limited transformation, and thus account for why Corner’s drawings are understood as a critique of representational techniques in landscape architecture. However, they do remain in the realm of description as opposed to other types of drawings that hinge between description and proposition; they are not drawings that lead to action.

In architecture, mapping has been associated with organisational techniques capable of addressing urban and landscape scale problems. Here the problem has been one of structuring processes and uncertainty rather than building design. The unbuilt competition entry to the Parc de la Vilette competition by the Office for Metropolitan Architecture (OMA) is often identified with this approach.31 OMA offered a compelling strategy to organise the exhaustive schedule of requirements called for by the competition brief. It included buildings, infrastructure and various types of landscaping all of which had to be implemented over a given period of time. The scale and complexity of the project also called for a plan that could accommodate unforeseen changes along the way. The resulting organisational system has been frequently referenced by landscape architects. Rather than a fixed plan form, a strategy of layers was proposed, all of which could co-exist simultaneously to provide a kind of thickened ground surface. James Corner saw the potential in these techniques to accommodate open ended indeterminate processes – something that landscape architecture had been grappling with. Alex Wall, a one-time OMA collaborator, has reflected on the paradigm shift of the la Vilette proposal. The ‘problem, then was less of design in terms of style and identity, representation, or formal composition, and much more one of strategic organisation.’32

These mapping practices do not adequately address the transition between site analysis and design activity. In the la Vilette proposal, the existing site conditions were reduced to a single line marking the perimeter site boundary. Again, this recurring
problem has already been discussed33 – where the very absence of existing site features reveals the agenda of the practice to be elsewhere. Conversely, Corner’s mapping technique is almost the symmetrical opposite to that of OMA; it is all description, but without any indication of how this leads to action. An alternative mapping process would span this division, from description to action, and would lead directly into design activity. The mapping process I envisage is similar to a design process, but engages with organisational strategies outlined above and with site and the landscape in a way that Corner exemplifies. The process embraces multiple points of view rather than a singular overview associated with master planning. However, unlike Corner’s work it extends beyond representational techniques into a range of strategies to inhabit the landscape. Mapping can bridge what a site has been in the past, what it is in the present and what it might become in the future; and as such is propositional. I have already discussed how an architectural design process can exclude site and landscape. Alternatively, the mapping I propose is about making connections, bringing different scales and times into relationship. It offers an alternative to master planning, where oversimplified geometries are often arbitrarily projected onto site with little regard for existing topographic and environmental conditions. Instead, its inclusiveness encourages working with the particular, the topography and the ground. This is the potential of mapping as a tool to start to inform the design process, bringing this into relationship with Kahn’s notion of a site’s ‘lived complexity’.

1) Pivot Irrigator I, James Corner.
2) The strips divide the site into a series of parallel bands, Parc de la Villette, OMA.
3) Point Grids and Confetti: small-scale elements such as pavilions and kiosks, Parc de la Villette, OMA.
1.2 TO SITE

‘The minimal intervention to trigger regeneration, the least possible to start the process … the essence of urbanism’.

To site, as a verb, is ‘to fix or build in a particular place’. Thus, to site is to know where and how to intervene in a location. I have already outlined an approach to the noun understanding of a site as an act of description. Having derived a detailed understanding of a place, it is the architect’s role to use this understanding to drive, and to motivate, a work’s participation in its setting. Thus, the noun and verb understanding of site have a reciprocal action motivating design decisions.

The point of view of the author – here the architect or landscape architect – is, of course, another critical influence on site and siting, and must be considered. To elaborate, I will return to an earlier example. Robert Mangurian and Mary-Ann Ray, when commissioned to examine the streetscape of Santa Monica Boulevard, saw it as a place defined more by its ‘exceptions, oddities, and anomalies’, rather than things that would give the area a uniform identity. Their point of view was to create identity by reinforcing differences, and thus the designed interventions were conceived to further intensify these qualities of the Boulevard. A point of view is derived from close observations of a place, and through the accumulation of knowledge gained from having worked persistently in a region. Alison and Peter Smithson were also careful observers of the environments in which they operated and have left a trail of thoughts and observations that were fed back into their work, and then reworked further. The following text outlines a similar set of observations derived from several years of practice, teaching and travelling. I use the titles of *Grounding, Living and Making* to structure a way of relating a work into its physical context. These observations have helped guide the types of investigative studies described in the first part of this essay. They describe the transitory action of time on places and things seen through teaching, research and practice of architecture.

*Grounding*: operating in sparsely populated territory has forced me to consider the ground as an active part of a work. Rather than a passive participant, building and ground impact on one another in a reciprocal relationship. The ground can be shaped and sculpted or, alternatively, it can be left intact. Elsewhere, I have suggested the land is dynamic. Active processes embedded across its surface can make the ground seem like a constantly shifting earthwork. These possibilities require a careful examination of the found conditions, to determine what might be happening, before deciding how and where to act. This is different to the notion of clearing the site ready for the arrival of a piece of architecture. Instead, the addition of a work onto the ground is perceived as another layer onto that which already exists, and like a process of accumulation the various histories of the site remain intact. The following ideas suggest ways in which the particular aspects of topography can create a reciprocal relationship between the work and the earth on which it sits.
The act of placement can reveal the topographic and material characteristics of a site. Richard Serra’s work, Sea Level, in the Netherlands, is exemplary of this approach. Consisting of two concrete walls, each measuring 200 metres long, they straddle the opposite banks of a waterway. While separated, the twin walls are aligned in plan and in section. The top surface of each wall is horizontal and flush with the ground. As each wall extends towards one another, the land falls away, so the depth and presence of each increases in sequence with the fall of the ground. Serra’s project can be seen to be a register of the subtle shift in the site’s topography – as though it were a built sectional slice of the landscape. Its title, too, refers to the history of the area – a polder landscape, where land has recently replaced the sea. So the sectional reading of the landscape is also a poignant reference to the larger battles between water and land that underpin the Dutch landscape. Serra’s work is indicative of many other works that also utilise very simple formal devices, such as the line, to trigger a complex set of relationships with the site. This has been an enduring principle that has underpinned much of my work.

Shifting scale and context, another type of line superimposed onto the land’s surface, led to a movement sequence that brought distant objects into relationship. Castle Howard has been described as a ‘great scenic creation’. It is approached from the Great Avenue, a six kilometre stretch of road that straddles the undulating terrain of the Howardian Hills. Apparently, when Vanbrugh received the commission, he decided to reorient the Avenue from an east west direction along a flat ridge line, to a north south direction. This had a significant impact upon the approach to the estate. By changing its orientation, it bisected the undulation terrain. The incisive linearity of the Avenue is more evident in plan view, as once it is projected onto the rolling topography it follows the folds of the land’s surface. As an armature, the Avenue anchors a set of incidents along its path, directs movement, and choreographs a set of visual relationships with distant buildings and the surrounding landscape. Movement along the Great Avenue brings all of this into play. These relationships rely upon a precise understanding of the lie of the land. Each building, pavilion, statue, and monument seems to have been set down to exacting levels, using the topography to heighten the presence of each intervention. The Mausoleum in particular is at least one kilometre from the Avenue and has been scaled to be viewed from such a distance; so, too, have the many other built objects that are scattered across the estate. Castle Howard has been of significance, bringing me into contact with a set of architectural conditions I had only imagined through drawn information – the careful and precise setting down of buildings onto the land’s surface, so that they could be experienced from near and far. This requires a precise relationship between plan and section with an anticipation of how things are viewed from distance.

While the Avenue and Sea Level have been useful in elaborating upon the opportunities presented by the found topography, they have also forced me to consider the opportunities of simple geometry. This also recalls the work of many land artists who have utilised the line as a device to identify human intervention in the landscape.
Another way of using the ground is to shape and prepare it in order to receive a building. This has a long architectural tradition, and it is exemplified in a residence designed by the Frankfurt based practice of Gabriela Seifert and Götz Stöckmann. The setting for the house is a hillside overlooking a village in the valley below. At street level, the highest point of the site, the ground has been excavated, and the house inserted into this space. This aligns the roof of the house with the level of the road above. Excavated material is then relocated to make two landforms on the garden side of the dwelling. Carving the site won numerous benefits. It retained the view of the valley from the road, created a private courtyard between the road and the house and lastly, and most importantly, signalled an allegiance to the landscape rather than the surrounding houses. Seifert and Stöckmann have used the ground creatively, carving into it and then sculpting a series of forms from the earth to weave a sequence of implied connections between foreground, middle ground and the distant landscape that recalls, in a reduced scale, the spatial experience of Castle Howard.

Living: in 1955, Charles and Ray Eames made a short film titled House: After Five Years of Living. As the title suggests, this film reflected a period of inhabiting their house over five years. Apparently, the film had been made from thousands of still images taken by Charles. Many of the scenes recorded were of the everyday acts of inhabitation. Other transitory moments, such as the formation of fallen leaves on external paving, reinforced an underlying theme of stasis and movement throughout the film. Architectural surfaces, too, were portrayed as registers of time’s passage as the glazed skin of each pavilion was shown transformed by morning, afternoon and evening light. The film illustrates the life of a building likened to a performance. This approach is the opposite to that of an architect like Le Corbusier, who would often ‘rearrange and compose the ordinary domestic objects of his interiors for photographic purposes, giving the appearance of a scene frozen in time’. Instead, the Eameses were intent on conveying the duration of architectural enclosure as an ongoing performance. This mode of documentation was continued in the work of Alison and Peter Smithson. In their publication Upper Lawn: Solar Pavilion Folly, they too recorded the design, construction and inhabitation of a small pavilion. Like the film, this book traced the interaction of a pavilion with seasonal change, and the lives of the inhabitants over 20 years.

The Schindler-Chace house is another example of rethinking use and how it is accommodated. Designed by Rudolf Schindler in 1922, it has a series of spaces that are structured to delay the transition from interior to exterior. Whereas the Eames’ house possessed a clear demarcation between inside and outside, Schindler crafted a far more ambiguous gradation of spaces giving this house a degree of porosity to the exterior world. A loose fit sequence of spaces anticipated a range of winter and summer
1) The allegiance of this house is to the surrounding landscape, Flammer House, Gabriela Seifert and Götz Stöckmann.
2) Sculpted landforms on the garden side of the Flammer House.

living conditions. Most porous were the roof-top sleeping baskets. These were sacrificial spaces: useless during winter but suited to hot summer evenings. Draped in mesh netting they allowed the cool air to pass freely through – more like a tent than a building. During cooler months the occupants would retreat into the interior of the house leaving the baskets dormant. To accept that certain parts of a building could remain dormant – or inactive – during the course of the year, suggests one way of considering use in relation to seasonal time. The garden courts also seemed to have been conceived in relation to the seasons. Furnished with open fireplaces, and protected by the pinwheeling arms of the house, they extend the range of options for living. This loose fit relationship between form and use offered the occupants a choice of space, each providing different degrees of protection from the weather. Their house would have been in a constant state of flux, closed down and dormant, or opened up, full of anticipation, offering the Schindlers a range of territories for living between interior and exterior.

In each of the preceding projects, events and processes unfolding within the ongoing life of the building have been emphasised; movement and change being a constant theme. Glazed surfaces of the Eames' pavilion provided a datum to record the diurnal movement of light from the sun. In the Schindler residence, movement of the inhabitant became the focus, as spaces were either occupied or vacated during the seasons of the year. Of significance here has been the aim to factor the ongoing life of a building into its design. This would appear to be at odds with the belief of many architects who imagine buildings to have an idealised moment of completion – often marked by the client taking possession of the work. Instead, these projects have been imagined as living systems. They alter shape, have adjustable parts, and can accommodate a range of dynamic processes and events over time.

Anticipation of a human body walking, climbing and descending can provide another opportunity for architectural enclosure to frame movement. This differs in duration from the other types of movement already mentioned. Elsewhere, various architectural responses to the slower rhythms and cycles of the seasons have been discussed. But the ambulatory motion of a body through an enclosed space is the most immediate and spontaneous of events, elapsing in seconds and minutes. Imagine a body in motion, moving between, through and across space. The eye experiences compression, stretching and foreshortening of architectural surfaces and the consequential shift in detail between the foreground, the middle ground and background. Juhani Pallasmaa has described this encounter with building as an ‘inherent suggestion of action’. He went further, discussing the ‘verb essence of architectural experience as the act of entering the room, not of the formal design of the porch or the door’. How could this motivate design? How might a building be formed to anticipate its future use or misuse? Certainly, houses by the Eames, Schindler and the Smithsons seemed to have been conceived with this in mind. Through the stages of the design process, the architect could be attendant to these and other types of movement that may unfold in the life of the building. Imaging and anticipating such movement during the design process would be critical. One
imagines that the enclosing envelope could stage the simultaneous coincidence of a sound, a glimpsed view, and a shaft of light brought in relation to the passage of a body moving through space.

The edge of a building could become a dynamic zone accommodating and adjusting to the variable opportunities of inhabitation. This could be where landscape and site forces, referenced previously, could weave in and out of the enclosure. Consideration of building in relation to the passage of time can reveal potential processes and intervals of change. Rather than being static and frozen, buildings can be made available to the rhythms of afternoon and morning, night and day, winter and summer. The challenge is to find strategies which can embrace, resist or amplify these variables: to orchestrate collisions, overlaps and misalignments between hourly intervals of light entering a room, the seasonal vacancy and occupancy of space, and the unfolding of bodily movement in real time. A building could be considered to be analogous to a schedule of events and processes. Could the task of the architect become that of anticipating, ordering and staging those events? Such a scenario would require the architect to consider different rhythms, cycles and movements which might be incorporated into the enclosure, placing emphasis upon the threshold separating interior and exterior as a dynamic place of exchange and porosity.

Making: David Leatherbarrow has suggested that ‘materials are invented in construction, location and inhabitation’.47 I think Leatherbarrow is claiming, rightly, that material selection is not just about constructional logic, but also informed by architectural ideas. Formal and spatial characteristics of raw material can provide a means to relate a work to its wider context. An understanding of the phenomenal characteristics of raw material can also help reinforce the relationship of the work to its broader context.

A building can only ever be modest in comparison to the immensity of the landscape. This poses a challenge for any architectural project: how can a small work start to take on the expanse of the landscape? Inevitably, this invites consideration of the physical presence of an object, building or artwork. By physicality, I am thinking of its material qualities and how these are articulated to sustain a spatial relationship to its setting. A building that can be viewed from a kilometre away presents a different proposition to one that is only ever seen close up. In an open landscape the possibilities of seeing a work from varying distances is inevitable. Suppressing surface detail can make a building appear larger than it really is. An alternative approach might involve the dispersal of fragments across a wider terrain to engage the larger context. *The Lightning Field*, by Walter De Maria, is an artwork dispersed across the desert floor. It is comprised of 400 stainless steel poles arrayed across the landscape, marking out a one kilometre by one mile field. This is a work that is simultaneously big and small – made from poles that have a diameter of 35 five millimetres and are five metres long. It covers an area larger than any building, but uses the most minimum of material to do so. The milled stainless steel poles oscillate between visibility and invisibility depending upon the weather conditions and seem to have been a strategic choice of material to heighten the physical...
presence of this artwork in the expanse of the desert.

In Rotterdam, the architectural practice of Drost + van Veen designed several pavilions using thatch as a roofing material. Use of this material seemed appropriate given there were several old thatched roof villas nearby. The material itself has connotations of a vernacular building tradition. These were associations the architects were happy to promote. However, they were worked into other reference to create a more complex allegiance between a vernacular and contemporary architectural identity. Contributing to this were the fully glazed perimeters of each pavilion that were closer in spirit to the Farnsworth house than to any farm building. This ambiguity was further reinforced by the articulation of each roof as a folded planar surface – in preference to traditional roof detailing. But the thatch sustained a strong material presence – to suggest on the one hand an allegiance to the old villas, while on the other, being unlike any other building nearby. So, selection of material, articulated through detail design, can bring new and old into relationship, thus weaving a work into its context.

Materials can also be used to heighten a site’s historical continuity. Rather than reflect the material character of adjacent buildings, a work might be set apart from its surroundings. This can be useful where there is already evidence of historical layering. Alison and Peter Smithson used this strategy in their pavilion at Upper Lawn, where there was already an accumulation of built remains present on site. By clearly demarcating the difference between remnant buildings and their own pavilion, the Smithsons were able to bring their architecture into dialogue with the site’s history. Repetitive framing expressed on the surface of the pavilion helped to visually set the new work apart from its surroundings. Other material finishes, such as glazing and aluminium contributed to this sense of difference. Consequently, the pavilion appears to be distinct from its setting – as though it had been brought to site in one piece and lowered into place. The Upper Lawn pavilion reaffirms the Smithsons’ concept of the *minimal intervention*. The notion of minimal intervention is used here, in the sense of lightness-of-touch, brought about through the strategic act of placement. Placing, without the destruction of the remnant bits of wall and terracing, enabled the old and new to be seen in dialogue. This could be likened to a process of accretion allowing a site’s historical continuity to remain intact.

Material selection encourages a move away from the abstraction of the architectural drawing, forcing an engagement with the site and context at varying scales. Conversations with the local and particular, rather than the general, are encouraged triggering further observation and analysis of surrounding site conditions. This is where the character and identity of a project can be generated and given life.
Conclusion

Through this review I have attempted to thread a range of ways in which site is embedded into the design process through an understanding of its definition as both a noun and a verb. A site is seen as a dynamic place possessing shifting spatial and conceptual relations with its surrounding context.

The research is positioned to straddle a perceived gap that exists between site analysis and design; as I have tried to outline in the text, the lack of evidence in architectural literature to account for the transition between how a site is approached, conceived, and then drawn, and then how these operations have relevance to the design process. Project work undertaken for the PhD will straddle this space, making a more coherent transition between how a site is approached, invented, and then how these operations motivate knowing how and where to intervene in a location. This has particular significance as the particular outcomes of this process can impact on the design process. I have proposed a mapping process as a way of bringing together activities associated with site analysis and design. The following points summarise the arguments of the review:

- A site is not a given, but needs to be constructed and invented.
- A site is bound into a wider physical context – not just about how buildings look, but how they perform and interact with their surroundings.
- The ground has a more active context, rich in potential, topography, landform, imprint of human traces, layers of occupation.
- Design decisions begin with the site.
- The concept of transitory is an enduring theme running through the text that suggests the provisional dimension of things acting on one another over time, from the site and the landscape, to the building and how it allows living patterns to unfold.
NOTES

3. Maurie Dynon is the project coordinator and president of the Guildford Landcare, Victoria, Australia. Maurie has spoken on this topic to architecture students, as part of on-site fieldwork, and as part of Architectural Design studios I have directed with Michelle Black at RMIT University.
4. This is not only confined to architects. For instance, even in large scale landscape urbanism projects, such as the entries to the Downsview Park competition, the site is rarely conceived – if even at a conceptual level – beyond the confines of the legal property boundary. See, for instance, J Czerniak, Case: Downsview Park Toronto, Prestel Verlag, Munich, 2001.
5. Projects designed for Frankfurt and Berlin, were undertaken while a post-graduate student in the architecture class of Professor Peter Cook, at the Städelschule, Frankfurt, Germany, 1989–91. Published as ‘Frankfurt-Berlin: 3 Projects’ in Transition, Discourse on Architecture, no 39, pp. 6–18.
6. R Black and S Neille, Groundcode: speculation on architecture object and landscape, MDB Publications, Fremantle, 1995. The publication was launched as part of an exhibition and an installation of architectural projects undertaken with Stephen Neille that explored the sparsely populated terrain of Western Australia, at the Door: exhibition space, Fremantle, 1995. This work received numerous CHASA refereed design citations, and prizes from the RAIA for unbuilt architecture. A condensed version of this work was published in G Hansen (ed), Imaginary Australia, B no 52/53, Architectural Magazine, Arhus: Arkitekturidsskrift B.
8. Landbridge: a design project completed as part of my Master of Architecture Degree. It was sited on reclaimed land at the estuary of the Yarra River. My architectural and teaching practice has continued to explore the architectural potential of sites between land and water.
12. Macfarlane, p. 43.
17. Here I am thinking of works such as Water Way Walk, 152 miles southwards, Wales and England 1989, by the artist Richard Long. In this work, text is used to convey a range of water courses encountered on one of his walks. And through its composition on the page, its hierarchy and colour, it is reminiscent of notation found on topographic maps. In Anne Seymour, Richard Long walking in circles, Thames and Hudson, London, 1991, p. 103.
18. In particular the project by Peter Eisenman: Moving arrows, Eros and other errors, in the The roots of architectural invention, site, enclosure, material.
21. See E Robbins, Why architects draw, The MIT Press, Cambridge, 1994, p. 29. This publication gives an excellent account of the role of drawing in architectural practice, through the stages of sketch design, design development and contract documentation, discussed through several case study reviews of several architectural practices. However, it fails to discuss the role of drawing and site, particularly as pre-design drawing. Such publications continue to see design as: commencing with the built object, rather than with the surroundings in which the building is to be situated.
24. Thom Mayne has suggested that: ‘The Blades House anticipates our current work, all of which is predicated on working very literally with the ground itself as opposed to objects on the ground’, in T Mayne, T Robins and A Vidler, Morphosis volume 3: buildings and projects, Rizzoli International Publications Inc., New York, 1999, Appendix IX II.13. The absence of any published pre-design drawings helps to cultivate a sense of the sites absence from the design process. Such drawings could provide insights into how the architects imagined the ground prior to the moment of intervention. Such drawings might inform the reader of pre-existing and past conditions and how they may have influenced design decisions.

25. The design approach promoted by Domenig in publications of the Stone House project was influential in my early architectural education, particularly the range of exploratory drawings of the landscape that preceded the design. In particular, see the boxed set of drawings: G Domenig, Steinhaus-Stonehouse, Folio XI, Architectural Association, London, 1986. See also, P Cook, ‘Beyond the normal limits of twentieth-century architecture’ in DE Cosgrove (ed), Architectural Association, London, 1999, p. 237. When an architect’s design processes is opened up for scrutiny through publication, there are seldom references to what might be called pre-design drawings. These are the types of drawings that might start to engage with the pre-existing site conditions. I have already cited the unbuilt Chiba Golf club by Morphosis as exemplary of this attitude. This attitude can also be reflected through the subsequent documentation of built works where the surrounding context can often be excluded or even erased through digital manipulation of the photograph. Some architects and photographers advocate this position. As an educator promoting the role of site in the design process, I have struggled to find adequate reference material to account for the ways in which site representations impact upon the design process.

26. See M Ray and R Mangurian, ‘City proposals: 29 drawings for East West Hollywood’, in C Spellman (ed), Re-envisioning landscape/architecture, Actar, Barcelona, 2003, p. 107. This project is one of a few examples that elaborate upon a way of approaching a site, and how this leads to particular design outcomes. It brings the role of site into relationship with the design process in a way that few others have done. Consequently, I have used this project constantly in teaching programs as a reference to students.

27. M Ray and R Mangurian, ‘City proposals: 29 drawings for East West Hollywood’, in C Spellman (ed), Re-envisioning landscape/architecture, Actar, Barcelona, 2003, p. 107. When an architect’s design processes is opened up for scrutiny through publication, there are seldom references to what might be called pre-design drawings. These are the types of drawings that might start to engage with the pre-existing site conditions. I have already cited the unbuilt Chiba Golf club by Morphosis as exemplary of this attitude. This attitude can also be reflected through the subsequent documentation of built works where the surrounding context can often be excluded or even erased through digital manipulation of the photograph. Some architects and photographers advocate this position. As an educator promoting the role of site in the design process, I have struggled to find adequate reference material to account for the ways in which site representations impact upon the design process. 34. A Smithson and P Smithson, The charged void: urbanism, The Monacelli Press, New York, 2004, p. 323. 35. Oxford English Dictionary on line www.askoxford.com/dictionary.

28. B Engdman said of the enclosed void: ‘I feel that this kind of thoughts offer us tools – not a method but rather a deeper understanding – for our architectural process. Other kinds of thoughts, e.g. theories, rarely do so. As many buildings produced are “out-of-context-objects”, this way of thinking is urgent’. See, A Smithson and P Smithson, Italian Thoughts, Sweden, 1993, p. 5.


33. When an architect’s design processes is opened up for scrutiny through publication, there are seldom references to what might be called pre-design drawings. These are the types of drawings that might start to engage with the pre-existing site conditions. I have already cited the unbuilt Chiba Golf club by Morphosis as exemplary of this attitude. This attitude can also be reflected through the subsequent documentation of built works where the surrounding context can often be excluded or even erased through digital manipulation of the photograph. Some architects and photographers advocate this position. As an educator promoting the role of site in the design process, I have struggled to find adequate reference material to account for the ways in which site representations impact upon the design process.
which was later always being elaborated upon, became part of the layout in a single stroke’, in Steenberg, p. 259.

42. Similar experiences to those at Castle Howard (the weaving together of near, middle and background), but in the more modest Flammer House, these ideas are realised in a scaled down and compressed manner. An extended review of the house and these themes was published in Richard Black, ‘Territorium: Wohnhaus Flammer’, in M Cuadra, Die Bauten, Das Leben, Die Stadt, Am Ende Der Neunziger Jahre, Junius Verlag GmbH, Hamburrg, 1999, pp. 188–190. Also, in Richard Black ‘Material Presence’, Monument, no 28, pp. 46–59.


45. This thinking has been helped by visits to: the Wohnhaus Flammer, Biedenkopf, Germany, designed by the architects Gabriela Seifert and Götz Stöckmann; and in the gardens and buildings of Castle Howard designed by Sir John Vanbrugh and Nicholas Hawksmoor. This encounter with a work through an ambulatory experience heightened a set of relationships between architecture and landscape that I had, until this time, only explored through the medium of drawing – particularly in the Groundcode and Landridge projects. To visit Wohnhaus Flammer and Castle Howard was to experience these conditions in the here and now of real time experience.


47. D Leatherbarrow, The roots of architectural invention: site, enclosure, material, Press Syndicate of the University of Cambridge, New York, 1993, p. 210. Elsewhere, Leatherbarrow has also reflected upon expressing and heightening the different identities of things, rather than uniformity, as a siting strategy: ‘Landscape and building can only be joined only if they are distinct, interlocked only if separate, for only when they are different can they perform their roles similarly, and only then can the energies of the first, the landscape, animate the second, the building, by filling it to capacity’; see D Leatherbarrow, Uncommon ground: architecture, technology and topography, The MIT Press, Cambridge, 2000, p. 183.

48. In conversation with Evelien van Veen (partner of Simone Drost), during a visit to the Park.

49. In the publication Upper Lawn: Solar Pavilion Folly, it reveals an architectural awareness of inhabiting the landscape over time. Documentation reveals the site connected into the wider landscape of the Fonthill Domain, and how the more localized ruins and built surfaces impact upon the design of the siting of the pavilion. This is an exemplary project that has underpinned much of my thinking. The publication not only outlines the site’s past, but how the new pavilion adjusts to, and is impacted by, the surrounding site conditions and weather over 20 years of residency.
2.1 INVENTING A SITE: THE RIVER MURRAY

The project work of the PhD commences with the noun understanding of site. If the River Murray as a physical location is to anchor the project work of the PhD, then how could it become a site? Its sheer size challenges the conventions of a traditional site analysis. It was of a scale beyond anything I had encountered previously and architects do not usually engage with rivers. How could an architect approach a river? What tools would I use? Richard Long¹, an artist, has walked along river beds as part of his ongoing landscape works. Robert Smithson² once proposed making a film of the Panama Canal – an earthwork comparable to the scale of the Murray. Another artist, Maria Nordman³, has used a barge to document various cities along the Rhine in Europe. Paul Sinclair, a writer and historian, has perhaps summarised this predicament more poetically when he likened it to acquiring ‘The conceptual tools needed to begin thinking oneself into the Murray’.⁴ Sinclair, a writer and historian, has travelled the river collecting oral testimonies from people who have lived with the Murray.

The Murray-Darling Basin covers the south-eastern corner of the Australian continent. Its size alone poses challenges to what might be considered site study. Much of the basin is in semi-arid terrain and has an extremely low gradient in comparison to other water catchments around the world. The Darling is the major northern river, flowing down through central Queensland, into New South Wales for a distance of just over 2500 kilometres. The Darling enters the Murray at the small rural town of Wentworth. In comparison, the Murray is slightly shorter in length but has a much wider profile and flows through the southern region of the basin. Its headwaters originate from near Mount Kosciusko descending in a westerly direction through progressively flat and arid terrain to its confluence with the Darling. From here it continues further west, passing into South Australia, entering a progressively confined section where its channel has been incised deep into limestone rock. Here, limestone cliffs define its path to the big lakes of Alexandrina and Albert before entering the ocean at Encounter Bay.

The chapter outlines my methodology of approaching the Murray. Tools, outlined in the previous chapter, formed the basis of this investigation. I began the process with the archive, collecting images of the river that had been drawn by others. These investigations were paired with journeys to, and along, the Murray to experience it in real time. New images emerged of the Murray and its floodplain, beginning the process of its transformation from a river into a site.
Collecting different types of drawn information on the river was a way of starting to catalogue ways of representing its distinctive plan-form. Map collections in the state libraries of Victoria and South Australia provided the source of many forms of cartographic and survey information. Other archives in state authorities were also used to source drawn material. Fred Williams has painted the Murray on several occasions, and his way of representing the landscape from an aerial view makes a useful comparison to the orthodox survey drawing.

Detailed surveys of the entire river were only undertaken once it became apparent that damming the Murray might guarantee water supply during dry months. Before then, hand drawn maps of the river had been produced for navigational purposes. These flattened out the meanders of the river to fit onto a narrow continuous scroll. The river in these charts resembled a straight continuous channel that anchored occasional features such as sand bars and buildings that would assist navigation. Detailed surveys undertaken along the South Australian section of the river were amongst the first drawings to fully convey the full range of wetlands across the width of the floodplain. These are particularly compelling images of the river’s scale and order when seen against the adjacent survey town grid. Another drawing revealed the sense of geological time captured in the ancestral channels of the middle section of the river. Other techniques of delineating reduced the river to a single line that concealed the richness of its floodplain and geomorphology.

The river’s plan-form is one of its most distinctive features. This is a consequence of the geology and topography of the land, which has impacted upon the frequency and the geometry of its meandering profile. Along the middle reaches of the river, anabranches are common. This is where the main channel becomes braided into two or more channels that connect to the main channel further downstream. This has created long islands along the middle sections of the Murray. The floodplain also has a distinctive series of wetlands that can create a complex interaction of land and water.

This range of drawn material emphasised a range of drawing styles, as much as intent of the map or survey. It was also revealing how this process of encountering a river through the archive also made present the various ways in which governments and authorities have divided and compartmentalised the river into arbitrary zones that work against its natural behaviour. For instance, county maps drawn in Victoria would show detailed land subdivisions on the Victorian side of the river, while the area on the New South Wales side of the river was left blank. Other commissioned studies and surveys would suddenly stop once they hit state or local authority boundaries, as though the world had ceased at the border. These reminded me of the first maps of the Australian coastline where sections would be left blank. So these early forays into the river started to reveal a patchwork of uncoordinated attempts to start to track and measure the bends and meanders of the river.
1) Panel 4, Murray River, Number 4, 1972-73, Fred Williams.
2) Riverbed (D) 1981, Fred Williams.
Flood and Drought
A significant discovery started to define the scope of the research. A flood atlas found in the map collection of the State Library of Victoria revealed a different type of river. It documented the impact of flooding and its frequency through aerial photography. What I found remarkable was the extent to which a flood could transform the surrounding landscape. In the flatter sections of the river, floodwaters would spill out over 20 kilometres from the main river channel inundating roads, infrastructure and towns. The flood seemed to be like other large scale transitory processes that had been present in other landscapes I had worked on prior to the PhD. Instinctively I knew this would narrow the focus of looking at the river.

While the atlas revealed the magnitude of the flood as a footprint, it did not provide sufficient other evidence of what it was really like on the ground during the time of a big flood. Neither did it give adequate sense of how the landscape was transformed by the flood. Further, the atlas had been commissioned by New South Wales and Victoria. Nothing comparable had been commissioned for the South Australian section of the river. The next series of archival searches would address these gaps. Pictorial collections provided aerial photography and occasionally images from being on the ground of the flood. I then tracked back through newspapers from May 1956 through until September 1956 to gain another sense of the duration of the flood and the distance and its impact in the river towns. Newspaper accounts gave a sense of the flood moving progressively along the river, its impact upon the life of river communities. In the map collection of the South Australian Library I found a mosaic of black and white aerial photography that complemented the area that had not been covered by the flood atlas.

It was during the search through pictorial collections that I also discovered the impact of drought upon the Murray. In many instances its channel has been exposed during long spells of low rainfall. In order to control the supply of water year round, weirs and dams began to be constructed along the Murray from the 1920s. Locks were also built into the many weirs so that the river could remain navigable. Larger dams provided greater storage capacity to supply the growing irrigation communities. With this came further construction of channels to convey water out of the river onto the farms. Levees were also constructed along the floodplain to protect townships and agricultural land from inundation.

By now the archive had revealed a range of different material on the river. Maps, drawings, photographic records and reports told a particular story of the river. While I had been accumulating this material I had also started to embark on journeys to the river, guided by the archive.

On the Ground
The archive had revealed many things: a river of flood and drought, the infrastructure of irrigation, and the floodplain and its towns. Over several years I embarked upon many expeditions along the river, documenting and cataloguing these conditions from the ground. These were often sporadic trips, undertaken over a weekend or over a week. Sometimes the destination would be a specific
point on the river or its floodplain, along sections of the river. Roads rarely follow the river; they tend to converge upon the river at towns and then separate. Several journeys took me by canoe and boat so as to obtain a different vantage point, observing the land from water, and took me to places that would have been inaccessible from land.

Each journey increased my awareness of the landscape as I started to develop the skills necessary to identify parts of the floodplain. The floodplain is like a phantom, almost imperceptible to the untrained eye. This is where the archival material was of benefit – it gave me a footprint of its extent that became useful while travelling to and from the river. Roads elevated above the ground for no apparent reason, kilometres from the river channel, were found to be crossing sections of the floodplain. These became a constant reminder of water’s absence. Black box trees were also another way of identifying the extent of the floodplain. Progressively, the archival information made sense of the landscapes that I visited. Some visits were paired to archival material. A visit to Mannum was undertaken to document its street from the same vantage points of two photographs taken in 1956 – when the street was submerged under two metres of water. Progressively I covered the length of the river, from the Hume Reservoir to its estuary. On my travels, I used the camera as the means of documentation, a process of cataloguing the river and its floodplain.

At Renmark in South Australia another variation to this method of cataloguing took place. A 24 kilometre walk was paired to the archival material of the 1956 flood. The walk traversed the space between the shoreline of the 1956 flood and the existing river channel, passing through rugged remote terrain and ending in the urban edge of Renmark. Detailed drawings of the ground and photographic documentation recorded the subtle shift in topography and other found conditions along a sectional slice of the floodplain: a space that would have been submerged under water in 1956.
River Survey undertaken for determining the position of locks and weirs, Renmark South Australia, 1910. These drawings map the intricate network of wetlands along the floodplain.
1) Survey of Echuca town site, between the Murray and Campaspe River, 1856.
2) Flood at Echuca and Moama, 1974.
3) Prediction of 1 in 100 year flood on Moama.
4) County map, New South Wales side of the River Murray. The river marks a political boundary between two states, revealed by the absence of settlement patterns in the state of Victoria.
5) Moama flood study.
1) Prediction of 1 in 100 year flood on Echuca.
2) Survey, Hume Reservoir.
3) Oblique aerial view of the 1974 flood at Echuca and Moama.
4) County map, Victorian side of the River Murray.
5) Flood Echuca, 1974
6) Shinbone Alley between Moama and Echuca.
Page 45-46 River Survey undertaken for determining the position of locks and weirs, Blanchetown, South Australia, 1910. These drawings map the intricate network of wetlands along the floodplain and the relative scale of river towns.
1) Flood Renmark, 1956
2) Low Water Renmark, 1914
3) Construction of irrigation infrastructure
4) Hume dam under construction
5) Flood near Mildura, 1956
6) Flood Renmark, 1956
1) Aerial photography from the Floodplain Atlas showing the impact of a 1 in 100 year flood at Mildura, Victoria.
2) 1876 Survey from Albury to Red Cliffs along the Victorian and New South Wales section of the River Murray.
3) Drawing showing the proposed levee construction to Renmark, South Australia, 1924.
4) 1927 survey of the river channel, near Wentworth.
1) Flood near Mildura, RMP/M188.
2) Flooded street of Mannum, South Australia, 1956. Image SLSA: B20274.
3) During major flooding along the River Murray, high water levels remained for up to four months. Image SLSA: B23201.
5) Flood fighting in Mannum, South Australia, during the 1956 flood. Image SLSA: B20273.

Opposite. Photographic mosaic of the South Australian section of the River Murray during the peak of the 1956 flood.
Shoreline to Shoreline. July 2001. Distance approximately 24 Kilometres. A walk commenced at the 1956 flood shoreline in a southerly direction, passing from open landscape through the urbanised part of the floodplain, and terminating at the edge of the present river channel. Two types of documentation were made during the walk. Firstly, line drawings recorded found shadows cast onto the ground surface. Secondly, at the location of each line drawing, a series of photographs were taken to record north, south, east and west directions, complimented with a photograph of the ground. The following pages document twenty two locations along the walk.
The following pages chart three ways of imagining the River Murray. Pages have been arranged into three bands. The photographic sequence charts my encounter with the River. These have been edited from a wider selection, but focus upon a range of various ways of cataloguing the landscapes I have passed through. Below this sits a series of quotes that track the unfolding of the 1956 flood event and a sense of its duration over almost half a year. A series of drawn maps chart the relationship of three things: firstly the existing river channel, secondly, the shoreline of the 1956 flood, and finally the river towns. The adjacency of photograph, text and line drawing suggests a reading of the transitory dimension of the river: the lived time of each journey, an elapsed event, and the time of the river.
Months after the flood peak had passed, the water was still at very high flood level, even though it had fallen 4ft. By now it was summer, and we often went swimming over our land. I used to love rowing the boat out amongst the tops of the box trees, and found all sorts of things floating…

Mortimer P, *Flood: riverlanders face the flood of fifty-six*, p 67
In 1920 builders were at work erecting Eudunda Farmers Co-operative Store in Berri, where it stands today. Dan Creep, then just a lad, went into the town one Saturday morning with his Dad, who started talking to an old aborigine, George Disher’s father. Mr. Creep remarked what a fine shop it is going to be, and the old aborigine said “It will be alright until we get a big flood, and then it will be flooded”…

Mortimer P, *Flood: riverlanders face the flood of fifty-six*, p 82
Flood waters nearly reach the levee bags packed under the balcony of the Mannum Hotel, in the flooded main street of the town in South Australia…

Renmark, Today. – The Murray River here has remained unchanged in the past 24 hours at 30ft. 7in.
Renmark, Today. - Evacuation of patients at Renmark Hospital, began today, after a desperate overnight struggle to keep out floodwaters …

Army Engineers are constructing a Bailey bridge to replace a concrete one which collapsed under the flood water.
All sport in Mildura is off today. Hundreds of volunteers are massing their forces in the fight to save the Red Cliffs power station from the floods… At Euston, NSW, just over the Murray from Robinvale, the hotel is surrounded by floodwater. The neck of land is protected by a levee 5ft. high, but water is seeping through in places…
I saw water lapping against levees within yards of houses, while at Shailers Hotel, in the southern part of the town, the levees that hold off water on three sides were seeping badly.
Trapped by the combined waters of the Murray and Darling rivers, Wentworth is relying on one flood-flanked road. About a third of the 1500 people have already left. Others are staying put until ordered to go... The one road still open – it leads to Mildura – is a thin ribbon... It passes through the flood waters protected by weakening levee banks.
The Murray and Darling Rivers are now flooding for their total length—more than 3200 miles. The Murray is in flood from the Hume Weir to the sea—1385 miles. In places it is more than 20 miles wide. The Darling flood extends for more than 1800 miles and stretches as wide as 70 miles… For most of their length the rivers produce a creeping flood with the water rising only an inch or two every day. But for every inch the water rises it spreads over thousands of acres of country.
Mildura City Council today warned residents of Buronga they were in grave danger from the Murray River floodwaters…"Get out while you can," the council warned families in the settlement. "There aren't enough boats to rescue you"…Buronga is almost surrounded by levee banks. Some of them are holding back lakes that are 10ft. deep.
Boats ply up and down Warren Street Echuca today. It’s Echuca’s biggest flood since 1916… Only 300 yards of dry land separates the mighty Murray and the raging Campaspe in the centre of Echuca today. Levee banks are just keeping the Campaspe out of the main shopping area, but townspeople can do little to hold it back if the Murray flows over on the other side of the town. Hour by hour the Murray is growing wider and deeper above Echuca, as the water pours in from the flooded Goulburn River.
Echuca Crisis Looms. The biggest flood since 1939 is swirling around Echuca today, inches below a level that could bring disaster. The Campaspe River, on one side of the town, is a raging torrent. The Murray, on another side, is 32ft. 2ins. High – equal to the highest July level in 90 years of recorded history. And reports indicate that more water will pour down in the next few days from the flooded Goulburn and the Murray upstream. Nearly 50 houses and huts have already been evacuated in Echuca.
The River Murray around Loxton (SA) looks like this today – and the big flood is still to come. This picture taken from an aircraft, shows the immense spill of the flood waters 20 miles south of Renmark. The main body of flood water from swollen NSW rivers has not yet reached this stretch of the Murray.

The normal course of the Murray can be traced by the trees in the centre of the picture.
Residents now preparing for "biggest flood since 1931". Engineer-in-Chief said flood likely last(sic) several months.
...progress of Darling flood being watched with interest in the view of possible effect on Murray.
This rainfall resulted in record volumes of inflow to Hume Reservoir in April, May, and July… overflow commenced on 5th May, 1956.

Harrison G.L. Report on The River Murray Flood Problem. p.2
In normal years, the rainfall in the Murray and Murrumbidgee catchments occurs in winter and spring, whilst the Darling is largely fed by Monsoonal rains in the summer, thus it is unusual for the Darling to be in high flood at the same time as the Murray…

Harrison G.L. Report on The River Murray Flood Problem p.2
Conclusion

I had started to transform the river into a site through the remaking of three interrelated images of the river. These developed from the accumulation of archival material and the experience of being on the ground.

- Murray River Drawing: consolidating the archival material into a new drawing of the river, an overview of layers, the river channel, the footprint of the 1956 flood, and the position of river towns.
- Photographic documentation: four years of travelling along the Murray, from the Hume Reservoir, to the Ocean, 2000 kilometres, photo documentation.
- Renmark Flood Walk: a section through the floodplain in drawings and photographs.

Encountering the river from the ground and from the archive had started to forge a series of overlaps. Being on the ground was to be reminded of encounters of the river through the archive and vice-versa. There seemed to be three rivers emerging. The first was the wild river that recalled John Dixon Hunt’s notion of a first nature, which many Aboriginal communities had adapted to over centuries; this was characterised by an unpredictable river, governed by cycles of flood and drought. The second river was defined by settler communities that tried to harness its water and control its flow: a transformation from first into second nature. And finally, the flood river of 1956 was a reminder of the wild river.

The Murray could also be imagined as a massive inland shoreline as depicted in the River Murray drawing. Its shoreline was the space between the channel and the limit of the big flood. But unlike a coastal location that would be washed regularly by the tides, this would be inundated infrequently. So rather than conceiving the river as a meandering line on the land’s surface, it became a threshold of considerable width – sometimes up to 20 kilometres.

The flood was a significant discovery that also related back to pre-existing work I had undertaken. It had a transitory dimension that had proven to be a way of defining a site in previous work – one that was dynamic and unpredictable. Through archival material I had also discovered the flood is an event that unfolded over months along the river. The impact of the flood seemed to have significance at a range of different levels. Firstly, it revealed how futile the various regulatory structures were to control the force of water. Secondly, the scale and duration of the flood impacted upon the river towns and landscape infrastructure. It was the interaction between the flood and the river towns that started to focus the research. Many towns seemed to have been sted precariously in the middle of its floodplain. Living on the floodplain seemed to require a field of overlapping issues that called upon architectural, landscape and environmental knowledge. Here were the seeds for the subsequent direction of the PhD.

The scale of the river had also started to become all consuming. I felt lost in the immensity of the Murray. While the archival work and journeys had framed a more definite way of approaching the river, I still felt that the there were too many unknowns. Perhaps this uncertainty was the result of being in unfamiliar territory and concerned river ecology. What were the current arguments taking place? How might these help frame the project? These led into a period of
reading and reflection that will be outlined in another chapter.

NOTES


6. For the South Australian section of the river, A Vaughan, The River Murray general plan (cartographic material) : showing levels etc. for determining position of locks and weirs, Engineer-In-Chief, Adelaide, 1910. For the New South Wales and Victorian part of the River the following maps were sourced from the drawing archive of Murray-Goulburn Water, Tatura, Victoria. 1876 Survey downstream from Albury to Red Cliffs, 49 sheets of drawing; 1927 River Murray Waters Scheme, Wentworth to Echuca Locks and Weirs Survey Plans and Sections, 122 sheets of drawing.

7. Roll charts were used in paddle steamers for navigation. They consist of a map of up to 17 metres in length passing between two timber rollers (like a scroll). This would allow the map to be constantly unfurled to keep pace with the vessel as it traversed the river. These maps were hand drawn, ink on calico, and depicted the width of the channel with any obstructions to navigation noted. Several are held in the State Library of South Australia.


10. Aerial Photography: South Australia, Department of Lands, River Murray flood line 1956 (cartographic material): aerial photo mosaic series, Department of Lands, Adelaide, 1956. The photomosaics were produced from aerial photography taken on 14 September 1956, during a flood of the River Murray. The 21-sheet series covers the stretch of River Murray between the border of the Victoria and South Australian states, and the mouth, including Hindmarsh Island and the Coorong Channel.

11. Construction of the barrages, weirs and dams helped hold water in the river during dry months. They were effectively small water storages of varying size, often located in proximity to irrigation communities. Building these structures transformed the river into a series of steps. Upstream the height of the water increased creating a permanent flood. Downstream the water level could be three metres lower. But with the much larger constructions of the Yarrawonga Weir, and Hume Dam these aspects were amplified, creating even larger lakes upstream (such as Lake Mulwala at Yarrawonga and the Hume Reservoir close to Albury-Wodonga). In 1966 at Chowilla, close to the South Australian and Victorian state border, another large dam was proposed for construction that would have created the largest lake on the river, stretching over 100 kilometres upstream to Wentworth; refer to The River Murray Commission, Chowilla Dam , a regulation storage on the River Murray, The Government Printer, Adelaide, 1965.
Diagram of the operational sequence of the Water Theatre installation
2.2 TRANSITORY

“In looking at architecture we often focus on the façade and the internal spaces. But what of the left-over bits? The unused, yet necessary undercrofts, yawnings (sic) and gaps produced by the internal use and shape of buildings. These are the disenfranchised pieces of architecture; the forlorn effects of the frontal, glamorous intent. The Unused evolves a number of architect and artist projects that inhabit these inhospitable spaces to create narratives and nuances which reflect upon economics, the collection and archive, the grand tour and social spaces.”
An invitation to participate in the *Unused* Exhibition provided an opportunity to reflect on the material I had unearthed thus far. Shifting scale and context also provided a healthy distance from which to evaluate the mapping of the river. The Murray had become all consuming, grappling with its scale and masses of archival material, difficult and at times overwhelming. But it was the accumulation of imagery depicting the presence and absence of water along the floodplain that provided a starting point for this project. Beyond the requirements of the festival program, I saw the Unused exhibit as an opportunity to think about possible future project work that may emerge later in the PhD. In this sense I saw it as a step beyond the mapping phase of the work, to actually test out a scenario on site. More importantly, it provided me with an opportunity to work with water. I assumed that this would be a necessary development of the project work, after the completion of the mapping. It also provided an opportunity to work in a more direct manner, with the material itself, rather than through drawing. Water presented several opportunities. Firstly, it had a fluidity and transitory dimension that sat comfortably with the research material already outlined. Secondly, rather than design an object, I considered the response to be more of an event that had some relationship to the duration of the festival. Water seemed like an appropriate material overlapping with the dynamic cycles of flood and drought being explored along the Murray. Thirdly, I was excited to be offered the opportunity to construct a work outside, rather than inside, where the unpredictability of the weather might contribute to the work.

During the initial commissioning phase of the installation, participants were requested to select a site from those identified by the curatorial committee. Most were tucked into the narrow laneways on the University’s city campus. My criteria required a space that already had a transitory dimension. Sunlight can transform Melbourne’s laneways from deep shadow, for a brief moment at midday. I selected a space that had a north to south orientation, a place that received direct sunlight for a brief moment of the day. At 1.00 pm the angle of sunlight created a dramatic play of shadow across the walls of each building: a one-hour performance between the play of light and shadow revealing every imperfection of the wall’s surface. There were very few drawings produced; the project evolved through a process of direct observation, spending time in the space, from early morning through to evening to see how the space changed over the course of the day. This led to exploring the performance of water pours and testing prototypes on site.

Over the following months there were several presentations made to the curators of the visual arts program for concept approval, and approval to proceed to construction. A construction budget of $4000.00 was allocated to each participant. Prior to construction taking place further approvals were required from RMIT Property Services, and occupational health and safety.

The following text summarises the intentions of the project; it was written for inclusion in the Melbourne Festival program.
**Water Theatre**

The project is inspired by the theatre of water spilling across urban and rural surfaces. In particular, I am reminded of instances when water has a transitory presence through the process of wetting and drying. A short film made by Ray and Charles Eames in the early 1950s may help elaborate. Titled *Blacktop*, its subject was the flow of water across an asphalt surface. Using only close-up details, the film was able to convey the dynamic effects of water flow and its interplay with the ground. As the bitumen became momentarily submerged below the thin film of water, the yard became transformed into a surface of reflection and transparency.

On a much larger scale, aerial photography charting the floodwaters of the Murray River has also revealed a landscape transformed by water. Having escaped the confines of the riverbank, floodwater from the Murray spills outward across its vast floodplain to find its own level; constrained only by the contoured ground. Once inundated, the familiar features of the landscape disappear, such as the meandering profile of the Murray’s channel. But the floodwaters also revealed an unfamiliar landscape, in particular, an archipelago of islands.

Paul Sinclair, writing about the Murray, has cited people who witnessed the effects of flooding on the Murray and how the floodwater transformed the landscape. One person recalled that ‘it was strange indeed how submergence of the landmarks affected the sense of orientation’. These anecdotes are introduced to locate a series of issues that relate to time-based processes and events that form the background to the project for the Unused Exhibition.

In Melbourne, the intention is to follow the thematic of water to create an event that will continue to unfold for the duration of the festival.

The site is a narrow lane that has connections into the city’s water infrastructure. A stormwater channel spans the entire length of the laneway, while a network of pipes provides water supply to the surrounding buildings.

The strategy is to infiltrate the water infrastructure to make a water theatre. A discharge outlet to the stormwater drain – the lowest point on the ground surface – forms the centre of gravity for a series of interventions into the water supply system. These are: Flood – a plug, fabricated from river red gum (a timber known for its dependency upon seasonal floodwaters) is to be inserted into the existing stormwater drain to retard the discharge of water, inundating the ground surface. This forms the most permanent water presence for the duration of the exhibition. Cascade – a line of water sprays to release water at periodic intervals onto the treads of the concrete fire stair. Tower – a grid of water sprays trace the profile of the steel stair structure to release a mist of water into the volume of the lane, at less frequent intervals than the cascade. Line – dripping of water from an overhead cable tray onto the inundated ground below.

Collectively, these additions have parentage to the service infrastructure of the lane. Colouring of the water supply system reflects the graphic clarity of a service diagram, while the existing service infrastructure lends structural support to the new additions. As a system, these interventions set in
motion a process of wetting and drying. It will be the
cyclical appearance and disappearance of water
stains on the surface of the lane that constitutes the
drama of this theatre.

Programming the operating schedule of each water
device anticipates interaction with other occupations
of the lane while also taking the duration of the
festival into consideration. As an architect, I try to
engage with the lived dimension of the city and
its spaces. This position ultimately challenges
the permanence of architecture. I am working
towards an architecture that is open to change and
modification in use. Water has this quality: it is fluid
and dynamic. These qualities are also reflected
in the performance of light and the people who
pass through the lane. The ultimate theatre will be
the anticipated interaction of water and the other
transitory occupations of the lane.

Reflection
Water Theatre provoked a consideration of water
politics. Throughout the festival the installation
was tampered with on several occasions, and
components were removed and vandalised. I never
met the individual who constantly tampered with the
work, but once it was repaired, I would return the
following day to find another part had been removed.
This process of destruction and repair continued
for the entire length of the festival, and was a form
of interaction that was not anticipated nor desired.
The ethics of using water was certainly considered
during the conception of the work and discussed
with the curatorial committee and various approval
stages. I had decided that whatever material was
used, it would consume and impact on resources
and consume embodied energy. However, it would
be unlikely that a work like Water Theatre would
win approval from RMIT or the Melbourne Festival
under current conditions – unless a recycling system
was implemented. Low rainfall has placed severe
strain on water, and the public perception has
shifted considerably over the six years since the
completion of the work. With further lead-in time I
could have captured water in tanks for use during
the festival. This would have perhaps furthered the
theatrical dimension of the work and extended the
parasitic nature of tapping into building services, by
extending into the rainwater collection system. But
I suspect that to expel water onto urban surfaces,
even if collected from the roofs of buildings, would
have still created outrage. This in some way mirrors
the argument of irrigators, some of whom see the
return of water into the Murray, for environmental
reasons, to be a waste of a resource. The impact
of these events has remained over the subsequent
work, building an awareness of the various political
and ethical issues surrounding water use. It also led
to further reading on ecology and the politics of river
management that emerge in the following chapter.

Water Theatre shifted focus away from the built
fabric of the laneway to the events taking place in
the space. Unlike a physical object, the installation
had no fixed vantage point from which it should be
viewed. It had an amorphous quality which was a
consequence of working with the spatial complexity
of the lane and the way in which different parts of
the work would be activated over the course of the
day, particularly at 1.00 pm when the mist filled the
volume of the lane for five minutes, coinciding with
other fleeting passages through the space. The
simultaneous encounter between an unsuspecting person, the mist, the impact of the wind swirling the mist, and then the sunlight entering the space was a way of thinking about siting – as a process of staging encounters between the transitory elements of a place and a work. These temporal and dynamic aspects were evident while trying to document the work, but it was impossible to capture in a single image. Sequences of images provided one method of capturing its performance over the day.

A consequence of staging events in space opened up another problem. It required the structuring of the timing and duration of various water events. In terms of the installation, some of these were more successful than others, the most successful being when a spray was triggered to operate to coincide with a naturally occurring event – such as the tower of mist at 1.00 pm. Other sequences seemed to be more arbitrary in their relationship to the events of the lane. The cascade sprays, for instance, were activated every three hours and were not timed to coincide with other events in the lane. During the construction of the installation, experiments with the duration of the drying time of water had determined the intervals of operating the sprays. Once the ground had dried out these sprays would be reactivated, a sequence that would continue every three hours. So to make a work that evolved over its lifetime also required a way of conceiving at what rate changes occur and in what sequence.

Woking at the one-to-one scale gave fresh insights into possibilities to engage with water, particularly its phenomenal and material characteristics. How could water be used more creatively in building design?

This promoted a cataloguing of other works that exploit the use of water that would provide a context for the teaching programs outlined in amphibious architectures.

NOTES
Above, Studies of water poured onto a dry surface. Preliminary drawings of the site, tracking the path of afternoon light inhabiting the laneway.

Opposite. Existing site conditions under afternoon sunlight.
Above. The Cascade, details.

Opposite. The Cascade
Above. 15.00hrs, 26 October 2002.  
Photographic documentation at 10 second intervals.  

Opposite. Cascade detail
Above. The installation takes on the appearance of the service network.

Opposite. Detail
Above. The Flood

Opposite. Detail of the river red gum timber plug inserted into the stormwater drainage outlet
Above. The Tower

Opposite. Water supply system attached to tower structure
Above. The Tower at 1pm

Opposite: Detail
2.3 MOBILE LANDSCAPES

This chapter was a pre-existing text. It was written midway through the PhD as a way of summarising and clarifying issues arising from the mapping work and various reading. I have chosen to use the text in its original form, as it reflects the moment in which the writing was undertaken, and it did provide a way of concluding this section of the PhD that proved useful for the project work in the following chapters. As a consequence of its location within this document, the reader may observe occasional overlap with reference material cited in earlier chapters.

The Murray River

The Murray–Darling Basin occupies the southeastern corner of the Australian continent and is equivalent in area to 24 Netherlands. It is an ancient drainage basin that has evolved over geological time. Ian Rutherford has described the geological form of the basin as a shallow bowl. He states that the ‘bowl itself is made up of rock over 350 million years old, but the material within the bowl has been deposited over the past 65 million years, and has reached a depth of 600 metres’ and, further, that the bowl ‘is almost full and the surface of this deposited material is nearly flat, producing very low gradients for rivers that flow across the basin’.1 Rutherford’s analogy offers a way of comprehending the size and geological history of the basin. The rim of this bowl is defined by the Great Dividing Range stretching along the eastern seaboard into the State of Victoria. These highlands have directed rivers westward, away from the Pacific Ocean, through 2500 kilometres of semi-arid terrain to eventually enter a more distant ocean at Encounter Bay in South Australia. Incised into the deposited material filling the bowl is the Murray River and its major tributaries, the Darling and Murrumbidgee Rivers. In comparison to rivers of comparable size the Murray flows across extremely flat terrain2 and discharges a low volume of water. These factors, it is claimed, are responsible for the river’s distinctive plan-form. Anabranches are also a common feature of the middle stretch of the river where the main channel becomes braided into smaller rivers that follow the main channel, eventually re-entering the river further downstream.

Rivers are dynamic systems constantly on the move.3 Geomorphologists have discovered that the plan and sectional profile of the channel has continued to alter over geological time. Billabongs found along the floodplain are indicative of this change as they are remnants of prior river channels. Today, many rivers in the basin have been superimposed onto more ancient river channels: a process that has taken thousands of years. The Edwards River, for instance, follows the ancient channel of the Murray, while the present location of the River Murray at Echuca follows the ancestral channel of the Goulburn River. A drawing tracking the drift of the Murray’s channel across the surface of the ‘bowl’ might resemble the type of movement captured in Marcel Duchamp’s painting *Nude Descending a Stair* where lines and rays of colour track the movement of a body through space.

The first settler communities would have witnessed a different pace of movement than that which occurred over the span of geological time. At the time of settlement, the Murray was still in its natural state. It
was then a wild river with a more variable flow. Early accounts of those living along the river reveal water levels in constant fluctuation, between cycles of flood and drought. In Australia this process of wetting and drying is now understood to be an essential part of wetland ecology. Lake Eyre in South Australia is one extreme example where water is seldom present but when its dry bed does fill with water the surrounding arid landscape becomes transformed. A similar process occurred along the Murray. During flood the river would swell outward, discharging a vast body of water across its floodplain. In extreme floods the surrounding landscape would remain inundated for up to six months at a time. In several instances the river channel was known to have swollen in width from 80 metres to 40 kilometres in width. Even in minor floods these processes would be played out, though on a smaller scale, but in greater frequency. On the other hand, during prolonged dry periods water levels in the river would subside, and in extreme instances the river ceased flowing. It is claimed that during these periods when the fresh water dried out leaving the channel exposed, 'sea water would infiltrate upstream for up to 250 kilometres'.

Swamps, marshes, flood runners, intermittent lakes, and billabongs are wetlands that form part of the floodplain and can be seemingly remote from the main river channel. Scientists believe that fundamental chemical and biological exchanges take place between rivers and their detached wetlands during flood. This was probably why some have described the Murray as being more like a very long shoreline, with the wetting and drying of the land's edge analogous to the ebb and flow of tides along the coastline. If the Murray floodplain can be likened to a shoreline, then the frequency of its wetting and drying is far more unpredictable than a shoreline governed by tidal cycles.

Native flora and fauna have adapted over thousands of years to these cycles of wetting and drying. River red gum and black box trees, once more abundant along the floodplain, have adapted to these processes. They can withstand prolonged dry periods while, on the other hand, relying upon periodic wetting afforded by rising river levels. The red gum is found on the lower levels of the floodplain and its optimal growing conditions are for six months of drought and six months of flood. On the other hand the black box tree can withstand much longer dry spells requiring wetting every two to five years. These species also provide effective visual registers of the floodplain, indicating the extent of prior floods. Black box trees are more tolerant to drought and can therefore be found on higher ground, demarcating the edge of the floodplain. At Banrock Station in South Australia, black box trees can be found on a hillside kilometres from the main river channel. Moving up to higher ground, these trees give way to mallee vegetation marking the fringe of the floodplain.

Living against the River

The river supported an Aboriginal population for thousands of years until the arrival of European settlers. Europeans had a devastating impact on the Aboriginal population, attributed both to conflict and the spread of disease. Over thousands of years Aboriginal people had developed a pattern of existence that was in tune with the cycles of

1) Nude Descending the Stair, Marcel Duchamp.
2) Standing astride the River Murray near Nyah, Victoria, during the drought in 1923.
the river. Settlers, however, struggled to come to terms with the strangeness of the river. The Murray was unlike any European river; its flow fluctuated seasonally, and in dry seasons it almost ceased flowing. That a river could stop running must have seemed strange to those who had grown up amongst the wet landscapes of Europe. This was not the only difficulty the settler communities had with the strangeness of the Murray, but it was certainly one of the most significant as it impacted on the ability to survive in what was essentially a semi-arid terrain. If the tentative river communities were to survive, then supply of water needed to be guaranteed. Paul Sinclair, as discussed previously, has written eloquently on the unfolding relationship between the river and its people. Recounting stories and memories of those who lived with the river, he reveals a rich environmental history where the lives of people are interwoven with the river.

It was not until the signing of the River Murray Waters Agreement in 1915 that the long-planned regulation of the river took place marking the most dramatic change to be imposed upon the river in recent history. With the construction of dams, weirs and levee banks, control of water was wrested from nature and given over to water managers and engineers. During wet months, when water levels were high, water would be retained in large storages for release during the dryer summer months, thus inverting the natural flow patterns that had existed prior to regulation. Largest of these storages was the Hume Dam on the upper reaches of the river, followed by the Yarrawonga Weir and then a succession of smaller weirs that were positioned at strategic points downstream. This infrastructure marked the transformation of the Murray into an artificial canal for the purpose of conveying water to farmland. More and more water continued to be extracted from the river leaving less water for the river. Clearing of large tracts of native vegetation made way for agricultural production. River towns grew, fed by a rail and road network connecting into distant markets and urban centres. Levee banks constructed along the floodplain were designed to further confine the river, providing more land for development. Now hemmed in between levees and its flow greatly reduced, the river became severed from its floodplain, reducing wetting and drying processes. The destructive impact of this upon the ecology of the river and its hinterland has become evident in the past 30 years.

In North America there had been even more audacious attempts to manipulate whole river catchments. The environmental historian Donald Worster has described in detail how irrigation communities, along with federal government backing, redirected whole river systems across mountain ranges to supply farming interests in arid regions. A recent visit to the Netherlands also revealed the omnipresence of another kind of water infrastructure. Agricultural plots seemed to be ringed by networks of drainage channels; canals of varying width traced parallel lines of transport infrastructure, passing through towns, cities and agricultural zones. Water seemed to be everywhere, unlike the arid fringes of the Murray’s floodplain. But in sections this landscape appeared to be even more remarkable. Many water channels appeared to sit above the surface of the existing ground. Elsewhere, canals seemed to have been incised into the ground.
(rather than riding the surface) and in such places the water seemed to sit perilously close to the level of the surrounding land. Dirk Sijmons, a landscape architect practising in the Netherlands, has written about this phenomena, calling it the ‘Water Machine’. His use of a machine metaphor seems to be an appropriate term for this infrastructure and could equally be used in reference to the regulated Murray. A glance at the flow diagram, often used to explain how water is presently conveyed through the river, supports such a reading. It represents the grip of regulatory control that presently directs when and where water flows, highlighting the transformation of the river into a canal.

As much as the regulatory structures were able to harness the flow of water, they were still unable to fully control the river in really major flood events. In 1956 the Murray experienced one of its major floods in living memory and the extent to which development had encroached onto its floodplain quickly became evident. Road and rail infrastructure was severely damaged and entire river towns became encircled by water, severing them from the rest of the country. The 1956 flood was the result of heavy rains across the entire Murray-Darling Basin that had followed good rains from the preceding year. It is seldom that heavy rains in the Darling catchment coincide with those in the headwaters of the Murray, but in 1956 high river levels did coincide. It took several months for the rivers to reach peak levels. By April of 1956, in the upper Murray, levels had started to rise and by May the water in the Hume Reservoir began to overflow. From early July through to August newspaper headlines told of the looming threat to river towns downstream. In early July it was reported that ‘Hour by hour, the Murray is growing wider and deeper above Echuca, as water pours in from the flooded Goulburn River’. Later, in August, the threat loomed further downstream as the headline read: ‘Wentworth in danger, levees weak’. With a lapse of almost one month between these reports it is evident that floodwaters took time to reach peak levels and that the huge distances between river towns also slowed the impact of flooding. For many communities this delay did provide an opportunity to prepare defences, and this was recorded in one story where ‘Two hundred men have to fill and lay 300,000 sand bags within the next 10 days if the settlement of Curlwaa is to be saved from the Murray River flood’. Peak waters from the Darling did not enter the Murray until October, by which time the river levels in the upper reaches of the Murray had started to subside. Inflow from the Darling, however, extended the impact of high water levels on towns like Wentworth and those further downstream in South Australia. In Renmark, the peak water levels occurred 2 September, while further downstream at Mannum the peak water level was not until 9 September.

There was a sublime aspect to the 1956 flood. Perhaps this had something to do with the scale of the event and the interaction of water with the flatness of the terrain alluded to earlier. For several months a new landscape appeared above the rising water line as familiar features became submerged. A landscape of islands appeared, stretched out along the river – a Murray archipelago! Striking a new datum across the land’s surface this broad sheet of water altered familiar features of the floodplain. It must have been disorientating for those on the
ground. The familiar meandering line of the channel became submerged below the flood level while scattered roof profiles protruding from the water leant an abstract compositional pattern to this new datum line. When water spills out across any surface it has the wonderful ability to reveal forms that had previously remained hidden. Movement of floodwater into the various folds and shallow valleys of the ground seemed to enliven the floodplain topography. A new shoreline emerged, with softer, less frequent meanders than those of the submerged river channel.

Living with the River

‘Billie and Les Mitchell grew up during the 1930s in Echuca’s regularly flooded Shinbone Alley, an area inhabited by itinerant workers, timber cutters and other tradespeople. During the 1930s, as floodwaters rose each year, Billie’s father hung their furniture on hooks attached to the ceiling. A dining table and chairs made of water-loving red gum were left where they stood. The doors and windows were left open so water could flow freely through the house, and the family would move into a rented home in town. When the floodwaters receded, their house would be freshly painted and they’d move back in.’

Living with the Murray River might be a way of rethinking how we inhabit floodplains and deal with the threat of inundation. Many river towns are sited on low ground and the threat of rising water levels has always loomed large. In the past, the construction of levee banks had created a defensive wall against the threat of inundation, along with the various weirs and storages that have helped to harness the passage of water. Levees have not
only encircled some towns but have also been constructed to constrain movement of the river out onto its floodplain. Maybe it is time to once again allow the river to move freely! Water was permitted to flow freely through the buildings along Shinbone Alley. Might there be a way of inhabiting the floodplain that could embrace the uncertainty of the river? Making spaces to receive water, rather than fortifications to repel water, could mark the beginning of such thinking. In a small gallery in Venice the Italian architect Carlo Scarpa created such a place. A series of exhibition spaces inserted into the ground level of an existing building were crafted to receive occasional tidal water from the nearby canal. Like the Mitchell residence, these were sacrificial spaces given over to water in moments of high tide. But once water had receded, the more robust material finishes of these water receiving rooms (as opposed to the refined material surfaces of the dry rooms) gave presence to water’s absence. By working carefully with the fluctuations of tidal water Scarpa was able to weave his work into the ongoing hydrological processes that have underpinned Venetian history.

There were other aspects of living in Shinbone Alley worth reiterating. Movement from low to higher ground suggests a certain lightness of inhabitation, evoking ways in which Aboriginal people might have inhabited the floodplain. How could such lightness impact upon a contemporary mode of living along the floodplain? Amphibious architectures might be a way of living with the river. Inspired by the example of the Mitchell house, different categories of movement and mobility might be explored, contributing to a transitory inhabitation of the floodplain. This may involve the tradition of portability, of floating
structures that could be nomadic in their inhabitation of the river landscape, thus challenging architecture’s permanence. Another event, this time from the upper reaches of the river, also reflects this relationship between water and dwelling. But here an entire town was relocated to avoid the impact of a permanent flood. Early in the 1950s Tallangatta was relocated to higher ground making way for the planned expansion of the Hume Reservoir. Its increased storage capacity would send water further into the surrounding valleys, thus submerging the township. After much debate the government decided to relocate the town to a new site on ground above the flood contour. Over several weeks, buildings from the old town were hoisted onto flatbed trucks and transported eight kilometres to the new town site. Here was a theatre of movement that resonated with the relocation of the Mitchell family to the safety of Echuca.

Shifting scale, to focus upon details and material surfaces, can provide further potential for buildings and spaces to resonate with the surrounding landscape. Sculptors who work directly with materials have often excelled at this smaller scale, making their works participate within a wider context. In architecture, these ambitions have been discussed by the architectural theorist David Leatherbarrow who has stated that materials are ‘invented in construction, location and inhabitation’. Materials, according to Leatherbarrow, become charged by the context in which they are placed. The ‘dining table and chairs made of water-loving red gum’ left to the mercy of water flowing through the house lends weight to this discussion. Water would have been detrimental to the other furniture, but not that made from river red gum. While the timber is notoriously difficult to work, it has developed a resistance to periodic wetting and drying and is therefore suited to marine environments. Once wet, red gum swells and it was this property that made it a favoured material in boat construction. Swollen red gum planks would lock together creating a watertight hull to ply the waters of the Murray. Perhaps at this level of detail the action of water and the performance of material could be encouraged to resonate with the larger scale processes of the floodplain.

These previous examples suggest ways of working at the edge of land and water that is of a familiar architectural scale. If we are to really live with rivers, we must also consider the infrastructural implications of this idea. Zooming out of the Mitchell residence, observing the whole river catchment, encourages us to consider the house in relation to the river system. This approach can allow ideas to move back and forth from large to small scale. Such thinking encourages the making of artefacts that are interconnected with complex systems and processes. Large scale thinking with a local impact was echoed by Worster when he speculated on the inevitable removal of the dams to rehabilitate the ailing river systems of the American West. Elsewhere, in the Netherlands present land use policy has started to look at ways of making ‘Room for the River’. According to Sijmons, the presence of water in the Netherlands will have an increasing role to play in the future direction of urban design and land-use practices, particularly as ‘there is more water coming into our country, it is hard for it to flow away (because of rising sea levels), and the result is
higher water levels along the rivers, the increasing risk of floods and therefore the necessity of drastic measures to supplement the recent rising of the dykes.27 In the Netherlands, land that had previously been reclaimed from water is now once again being inundated. Water management is moving toward an awareness of river ecology. Donald Worster has used the term ‘Thinking like a river’28 to describe a sustainable way of working that places emphasis on ecological thinking over technical thinking. On the Rhine in Germany such policies that mirror Worster’s ecological thinking are being implemented. Along the Murray, poor water quality, high levels of salinity and reduction in environmental flows and the impact these have had on the health of the Murray-Darling Basin have been well documented.29 Recent discussion has centred on giving back more water to the river, especially along the Murray, where four icon sites have been identified for additional environmental flows.30 However, even this proposal has been attacked by a group allied to agriculture and fisheries’ interests indicating the charged political context surrounding water in the Murray-Darling Basin.31 The work undertaken for the PhD constructs an argument around higher environmental flows entering the Murray, supported by the proposal of the four icon sites. Present arguments suggest that water could be redirected into the Murray by buying back water and making irrigation infrastructure more efficient.32

This intense study of river ecology has formed the initial research phase of my PhD. Learning the particularities of the river system, its character and idiosyncrasies, has been like learning German to study Gottfried Semper. This study has provided data from which to undertake a series of drawings charting the river system. Remote observations from my studio in Melbourne, together with direct experience gathered from expeditions along the river, have provided a framework for seeing the river as a dynamic site in various states of change. A proposition to emerge from this work speculates on the making of a River-Garden, extending along the length of the river for 2500 kilometres, from the mountains to the ocean. Taking on Worster’s challenge to think ecologically, the River-Garden is to intensify the experience of being on the floodplain. That means more water to support ecological flows. At the level of infrastructure the River-Garden would generate a series of continental scale interventions: a massive tree planting regime, seeding, removal of infrastructure such as levee banks and roads and perhaps the decommissioning of weirs and irrigation infrastructure33, and the implementation of more efficient irrigation practices. River-Garden would rehabilitate environmental flows intensifying the rise and fall of water to activate processes of wetting and drying that have been part of the Murray’s ecology. The natural benefits of such a proposition have been well documented, but what about the benefit for the towns that are stretched out along the floodplain – how might the towns meet this garden?
Conclusion
This study of the Murray River consolidates more distant work that has examined ways of inhabiting the shifting edge between land and water. Underlying this research has been a growing awareness of environmental histories, and the part they can play in forming strategies for acting in large scale landscape systems. Lake Eyre marked the initial phase of this cycle, followed by the Yarra River Landbridge. These projects have privileged buildings and spaces as open structures susceptible to change (as opposed to fixed objects), enabling overlaps and adjacencies with larger evolving landscape processes. This has placed emphasis on the life of a project by considering living as a verb. Living with the river requires the architect to be receptive to the presence of water at a range of scales. Amphibious architectures can be derived from, designed with, the regeneration of a river system. The desire is to develop an amphibious architecture that:

- welcomes water – Scarpa welcomed the high tide into his building and similarly architectures of the Murray must welcome water. Working closely with the terrain, its levels and specific profile as a water carrying vessel might be the starting point of such an investigation. Bart Brands recently discussed a similar approach when he spoke of the ‘Dutch Mountains’ where any modification of the ground is limited to a sectional range of 300 millimetres.

- exploits the material properties of water. An installation commissioned for the Melbourne festival explored the ephemeral aspects of water in an urban environment. Using sprays, drips and mists, water was released onto an urban surface for two weeks. The lane was subjected to processes of inundation, soaking, staining, wetting and drying. Water is more fluid and ephemeral than conventional building materials, and it was this property that was exploited in the installation. Urban space became transformed momentarily, as this dynamic water event moved between the states of disappearance and re-appearance.

- operates across the scales of room – settlement – river system – and inevitably, working across such broad scales provides a way to unite, cross and test adjacencies of other disciplinary knowledge. An understanding of how the river works is an overarching concern of this scalar approach, and more particularly testing of this knowledge on the key question of: how and where to intervene?

- takes delight in living as a verb. How might a building/space perform over time? Can the act of design involve the structuring of relationships across time? An awareness of the transitory dimension of living with a river, this may forge relationships across geological time, flood time, growth time and human time.

1) Lawrence Weiner, On top of above the water. The use of text dispersed across several silver birch trees evokes the passage from water to land of the polder landscape of Zeewolde.


6. Years of drought were: 1839, 1840, 1885, 1886, 1888, 1889, 1902, 1903, 1904, 1912, 1913, 1919; dry decades 1920s, 1940s, and 1960s.

7. D Mussared, p. 11.

8. Scientists claim that under natural conditions rivers supply water, nutrients and sediments to floodplains; while floodplains supply carbon (the main building block of life), living organisms, and water treatments to rivers', in D Mussared, p. 34.

9. 'Their rising and falling floods wash over the fresh water equivalents of estuaries, seagrass beds, mangroves and all the other cleansing and life-supporting components of the seaside littoral zone', in D Mussared, p. 6. In geological time the Murray was part of an inland sea and has been a succession of receding shorelines. The Mallee zone of the river marks a succession of ancient shorelines. For instance, about twenty million years ago, an inland sea named the Murravian Gulf occupied the estuary of the river, reaching up to Swan Hill. At this time Swan Hill would have been a coastal town. See D Eastburn, *The River Murray: history at a glance*, p. 3.

10. 'At the peak of the 1956 flood, contour lines of box trees of great age were clearly discernable at various spots along the Murray well clear of the 1870 and 1956 flood', in P Mortimer, *Flood: riverlanders face the flood of fifty-six*, P Mortimer, Berri, 1985, p. 199. It is suggested that a major flood in the year 1780 took place and that water levels exceeded those of 1956 and 1870 by up to 1.4 metres.


13. There had been a series of infrastructural scale modifications to the river earlier than this. In 1881 wetlands were reclaimed for agriculture on the lower reaches of the river near Wellington. And, from 1887, irrigation settlements at Renmark and Mildura commenced. While these marked early transformation of the river, the degree of impact upon the river was less significant in comparison to the regulation of the Murray. See D Eastburn, pp. 18-20.

14. Prior to regulation high water levels would usually occur in spring and low water levels would generally be in the late summer months. At present, high water levels occur in late summer and autumn, low water levels in winter/spring.

15. For instance, *The Murray River is in deep, deep trouble. I'm not just talking about salinity or water quality; I'm talking about a once-rich and productive ecosystem that has taken a real hammering during the past 30 or 40 years in particular* – D Henry in *The Australian*, Monday 26 February, 2001, p. 13; and 'the floodplain is now a saline timebomb, just waiting for a good flood to release thousands of tonnes of salt into the river and provide South Australia with its most disastrous salt plume.' See *The Australian*, Monday 19 February, 2001, p. 8.


22. P Sinclair, p. 213.

23. Querini Stampalia Foundation, Venice 1961–63; see R Murphy, *Querini Stampalia Foundation: Carlo Scarpa*, Phaidon, London, 1993. More recent examples include an exhibition by the Royal Institute of Dutch Architects titled 'H2OLLAND: architecture not just talking about salinity or water quality; I'm talking about a once-rich and productive ecosystem that has taken a real hammering during the past 30 or 40 years in particular – D Henry in *The Australian*, Monday 26 February, 2001, p. 13; and 'the floodplain is now a saline timebomb, just waiting for a good flood to release thousands of tonnes of salt into the river and provide South Australia with its most disastrous salt plume.' See *The Australian*, Monday 19 February, 2001, p. 8.


22. P Sinclair, p. 213.
with wet feet’, showing how the combination of architecture and water can stimulate creative processes and new insights. See www.h2olland.nl/overbna.html

24. A Gallaccio, R Long, R Signer, M Nordman, H de Vries – Working at the scale of sculpture, as opposed to an architectural scale, these artists are able to forge a range of relationships between a work and its surrounding site. This has relied on an acute sense of material properties and ways of interacting with the more transitory site processes.


26. ‘Room for the River’ is a legislative policy in the Netherlands. Its aim is to reduce the urbanisation of the Rhine floodplain, thus helping to rehabilitate the natural flow regime of the Rhine. Similar proposals for the German sector of the Rhine are discussed entailing the removal of dykes and other flood control infrastructure that are seen to have negative impacts on the flow regime. See H Havinga, AJM Smits, ‘River management along the Rhine: a retrospective view’. Also helpful is PH Nienhuis, JC Chojnacki, O Harms, W Majewski, W Parzonka, and T Pruss, ‘Elbe, Odra and Vistula: reference rivers for the restoration of biodiversity and habitat quality’. Both are in AJM Smits, PH Nienhuis and RSEW Leuven, New approaches to river management, Backhuys Publishers, Leiden, 2000.

27. D Sijmons, p. 33.


29. See, for instance, D Mussared and D Connell.

30. The four sites identified are: Barmah-Millewa Forest; Gunbower and Koondrook-Pericoota Forests; Chowilla Floodplain; and the Murray Mouth, Coorong and Lower Lakes. See ‘River plan targets key Murray sites’, in The Age, Wednesday, 12 November, 2003, p. 1.

31. ‘A Government-dominated parliamentary committee has urged the federal government to halt the historic plan to divert billions of litres of extra water into Murray-Darling system, saying the river might not be as sick as the environmentalists claim’, in ‘Warning muddies water for the Murray’, in The Age Tuesday 6 April, 2004, p. 3.

32. Banrock Station, a vineyard on the banks of the Murray in South Australia, is a good example of implementing new water resource management, employing a full time environment manager and combining wine production and eco-tourism. The environment manager states that ‘water-use targets must now be set and tough penalties imposed for those who fail to reach them’. See The Australian, Wednesday 21 February 2001, p. 3. At Banrock Station water is conserved by using computer technology and drip feed irrigation techniques. ‘A soil moisture probe records the amount of moisture in the soil every minute, so the irrigation manager knows exactly when to irrigate’, in Banrock Station Walking Trail Guide, Banrock Station, Kingston-on-Murray, 2002, p. 17.

33. Dr Stuart Blanch, scientist and environmental lobbyist is an advocate of the ‘removal of several giant engineering structures established on the Murray in 1930s’ such as the ‘weirs at Torrumbarry and Euston’. He has proposed an alternative ‘off river water storages for further downstream’ in The Australianian, Monday 12 February 2001, p. 8.

34. Other projects exploring sites that straddle land water have been: the Lake Eyre Design Studio where a project titled Decay (a proposal for an observatory that deteriorated over time) was representative of design outcomes from the student group, in R Black and M Hook, Topography, RMIT University Press, Melbourne, 2004, pp. 82–85; Landbridge – an urban design project, is discussed in detail in ‘Framing the transitory’, in L van Shaik, Interstial Modernism, RMIT Publishing, Melbourne, 2001; R Black, ‘Water theatre’, in Kerb Journal of Landscape Architecture, Issue 12, 2003, pp. 18–19.
3.1 AMPHIBIOUS ARCHITECTURES

In the previous chapter I outlined a hypothesis of how to live with the river that accepts current ecological arguments for a return to an unpredictable river. This scenario anticipates future raising and lowering of water levels by artificial means. While the ecological benefits of this have been extensively argued, there has been little discussion as to the benefits for the river towns. This phase of the PhD tests this scenario at various points along the river by conducting five design studios that explored the notion of amphibious architectures. I selected locations that would provide a range of site conditions, from topographic, to variable river and wetland forms, and places susceptibility to inundation. Locations for each studio were determined from the research material that had already accumulated. As a suite of projects they became a way of cataloguing a range of specific site conditions particular to the floodplain. Using the research material to drive the teaching programs had an additional objective. It gave me the opportunity to structure visits to several river towns where I could organise meetings with local community members. While mapping studies had started to prepare an overview of the river, I felt they lacked specificity; the work seemed detached and caught within the immensity of the Murray. The tactic of changing scale\(^1\) has always served me well in the past to overcome design problems, so it was called upon again. By taking the work into the river communities, I saw an opportunity for a much more targeted ‘on the ground experience’ to project back onto the more remote work done to date: a ‘bottom-up,’ rather than a ‘top-down’ approach. However, the river knowledge already accumulated was invaluable as a basis to select and frame possible sites and projects for each of the teaching programs. I wondered what impact the experience of the river towns would have upon the mapping that had already been completed.

The final sequence of design studios, at Wentworth and then at the Murray estuary, were also used to target curatorial themes of Mobility and the Flood as particular design problems. They each respectively formed the Australian contribution to the 1\(^{\text{st}}\) and 2\(^{\text{nd}}\) Rotterdam Architecture Biennales. A publication titled *Mobile Landscapes*, co-authored with my teaching partner, captured the outcomes of the work exhibited in Rotterdam.

**Five stops along the River Murray**

River towns were often situated on low lying ground close to the river, and the presence and absence of water has loomed large in their past, weaving social and environmental histories together. Five towns were selected for more detailed study that offered a range of topographic conditions: from the mountainous upper reaches of the river to the flatness of the terrain downstream. Locations were selected for their persistent histories of inundation. The first location, Tallangatta, was a town that was relocated to avoid being permanently inundated by the enlargement of the Hume Reservoir. This was followed by Echuca, a place that had been inundated on several occasions; while its twin town, Moama (which is sited on lower land on the New South Wales side of the river), was destroyed by floods in 1870.\(^2\) Further downstream at the confluence of the Darling and Murray, Wentworth is susceptible to inundation from two directions and
can become completely surrounded by floodwater. Likewise, Renmark in South Australia can also be surrounded by floodwater, becoming an island in really big floods. Entering the estuary, the big lakes of Alexandrina and Albert help dissipate high water, reducing the impact of big floods on the surrounding towns. Each of the design studios are summarised below.

Tallangatta: during the early 1950s plans were approved to increase the storage capacity of the Hume Reservoir. This would have a significant consequence for the small township of Tallangatta. The higher water levels from the reservoir’s increased storage capacity would permanently inundate Tallangatta, so it was decided to relocate the town to a new site at Bolga, on higher ground several kilometres away. Many of the timber framed buildings from old Tallangatta were relocated to the new town site. For many years the site of Old Tallangatta has remained submerged below the waters of the Hume. But recently, due to low water levels the old town site has become exposed. In 2004 Tallangatta celebrated the 50th anniversary of its relocation from its original site. The studio proposed a new museum to commemorate the relocation of Tallangatta, sited at the old town site.

Echuca: the Murray Marathon is an annual canoe event involving 5000 people over five days. Unlike many sports meetings this is a mobile event. Commencing at Yarrawonga the marathon takes five days to progress 450 kilometres downstream to the finish at Swan Hill. The entourage of people who follow the marathon dramatically increase the population of river towns for a brief moment of the year. The studio required the design of a family of small buildings to accommodate services necessary for the Murray Marathon event: infrastructure for the race event. As the canoe event only lasts for five days, other uses and opportunities for the buildings had to be devised for the remaining 360 days of the year. The challenge was to explore the architectural potential of transformation, of shifting uses over time seen in relationship to the inevitable arrival of floodwater.

Wentworth: sitting at the confluence of the Darling and Murray rivers makes Wentworth even more susceptible to inundation: a fact that must have escaped those who had first proposed it as a suitable place for a town. Encircled by a levee bank it was severed from the rest of the country by floodwaters in 1956. Wentworth has enjoyed better economic times, and like many river towns it was once a bustling port exporting bales of wool to distant markets. Now it is the municipal centre of a vast agricultural region that straddles the south-western corner of New South Wales. Students were invited to identify sites on the river side of the levee bank, thus having to confront possibility of inundation in the future. New land uses had to be considered, offering a more sustainable future for Wentworth.

Renmark: is a latent island. During high floods it is severed from the surrounding land by water. Located in South Australia, and like Wentworth, it is encircled by a continuous levee bank that simultaneously marks the town’s perimeter and also severs it from the wetlands beyond. At an urban level, the levee has been considered as a necessary piece of infrastructure, but without civic presence. Levee
banks are also one of the only reminders of the omnipresent floodplain. At Renmark, the levee is presently in need of maintenance and reconstruction. This became a catalyst to consider a new type of the levee as a piece of landscape infrastructure, one that went beyond the role as purely utilitarian infrastructure, taking on a duty of the civic. The levee was explored for its potential to: interact with the town and the wetlands beyond; to be utilised for pedestrian access; and to invite additional use that could benefit the community. Finally, a more complex threshold between the town and its floodplain was anticipated.

Goolwa: is a small rural town that straddles the Murray estuary and the beaches of Encounter Bay. Being only 70 kilometres from the city of Adelaide (population 1 million) it is located at the edge of a pristine wetland wilderness making it an attractive destination for tourists and day trippers from Adelaide. During summer the population of Goolwa can double. Predictions are for continued population growth over the next 10 years and beyond. Continued growth is expected with many residents expected to do the daily commute from Goolwa to Adelaide. However, urban expansion along the shoreline will be detrimental to the fragile ecology of the estuary system. Projects speculated on the architectural opportunities of this paradox.
1) Tallangatta 1910
2) The town site of Tallangatta submerged 1977
3) Town site exposed in 2003. The remains of the railway embankment can be seen
4) Remains of Tallangatta 2003
5) Archive, boxed set of images of Tallangatta
6) Aerial view of Tallangatta and a full Hume Reservoir 1971
7) The town site of Tallangatta with buildings removed 1962

Opposite. Buildings being removed from Tallangatta to the new town site on higher ground, 1954.
TALLANGATTA
Above: At Echuca the Murray cuts a deep channel into the terrain. Here water levels can fluctuate by up to eight meters in 1:100 year floods.

Opposite: This detailed flood study was discovered in Echuca during the site visit. It provided a detailed analysis between landform and the various high water levels recorded since European settlement of the region.
1) Diagram of the levee bank surrounding the town of Wentworth. A portion of the levee system is mobile, and is stored within the town. It can be installed in several hours should a flood be imminent.

2) Diagram of the mobile levee construction system. Photographs documenting the permanent infrastructure required to house the levee once it is constructed. The holes for the columns are filled with foam, that can be easily removed should the level need to be installed.

Opposite. Floods encircled Wentworth in 1956
Above: Diagram of Renmark, its topography and relationship to the River. The oldest core of the town is located on the highest ground shown hatched. As the town expanded it was built on lower lying land. A levee bank encircles the town. A new housing subdivision constructed outside of the levee is built on fill to a new level of 20 metres AHD. The construction of the weir at Renmark has raised the river water to an artificial level of 16 meters. Water is extracted from the river for use by the town and for irrigation.

Above: Photographic documentation of the levee bank that surrounds Renmark.

Opposite: The Black Box tree in this carpark at Renmark is estimated to be 300 years old. Black Box trees rely upon infrequent flooding. Surrounded by bitumen, the tree is a poignant reminder of how floodplains have become detached from the river by forces of urbanisation.
As the Murray River approaches the ocean at Encounter Bay it widens to form a series of shallow lakes. Like many other parts of the river system the mouth too is in poor health. This has been attributed to the regulation of the river and the gradual diversion of water away from the river to irrigators. This has reduced the amount of fresh water flowing into the estuary and the construction of barrages has severed the tidal influence of the ocean. The federal government recently nominated the Murray Mouth and Coorong wetlands as one of several icon sites along the Murray targeting it for a series of restorative measures aimed at rehabilitating hydrological flows. Presently, the sheltered inlets of this landscape provide ideal conditions for recreation and sporting activities, making this a favoured holiday destination for people from the nearby city of Adelaide. Pressure to further develop the shoreline for tourism and the sea change phenomena is looming. Water from the estuary also sustains a large irrigation community while other more remote parts of the estuarine system have been reserved for the Ngarrindjeri people, and as a sanctuary for wildlife.

The project is premised upon the removal of infrastructure that presently constrains river flow, returning the estuary to unpredictable water levels and thus placing pressure on contemporary land-uses that rely on certainty of water supply. This project speculates upon a future where land-use practices work with, rather than against, the hydrological processes of the estuary. A series of strategies investigate ways of revealing and intensifying the process of restoring the ecology of the estuary while also making propositions for the future inhabitation of its shoreline.

The focus for our research has been the small rural town of Goolwa which straddles the Murray estuary and the beaches of Encounter Bay. Goolwa occupies a frontier situation. Being only 70 kilometres from the city of Adelaide (population 1 million) it is located at the edge of a pristine wetland wilderness making it an attractive destination for tourists and day trippers from Adelaide. During summer the population of Goolwa can double in size. Predictions are for the population to increase from 5 thousand to 15 thousand over the next ten years. Continued growth is expected with many residents expected to do the daily commute from Goolwa to Adelaide. However urban expansion along the shoreline would be detrimental to the fragile ecology of the estuary system.

Projects speculate on the architectural opportunities presented by this paradox: of predicted population growth, while on the other hand trying to minimise further urbanisation of the wetlands. We have devised strategies of containment concentrating the most significant growth close to existing infrastructure thus minimising the sprawl of suburbia onto adjacent wetlands and dune systems. A weaving of town and estuary into a more complex interrelationship is the outcome of this research.

Richard Black
Architect / Senior Lecturer
RMIT University

Drawing exhibited at the 2nd Rotterdam Architecture Biennale 2005
Reflection

On-site and off-site
A common pedagogical structure was devised for each of the design studios and progressively refined. During the first three weeks students would map the town remotely (off-site). These tasks included: redrawing the town using maps and pictorial information along with carrying out various assigned research topics and short esquisse that introduced students to conceptual issues of change and transformation. The fourth week would shift pace, with a week long excursion to the town. On-site studies encouraged a personal response to the issues that had been covered in Melbourne. Getting students from the studio and into the towns opened up a range of reciprocal relationships between what had been drawn remotely from the studio in Melbourne, and what was experienced on the ground. On-site activities involved drawing in the field to develop an intimate and personal response to the place. In addition, there were meetings arranged with local community groups, and targeted presentations. Collectively the range of these activities generated a two-way exchange between the remote and near investigation of place. Off-site discoveries helped focus where on-site work would be undertaken. Once in the field, discoveries would often help focus the work that had been undertaken remotely. This was partly because of the reciprocity between reality of the site as experienced meeting the archival material collected and assembled of the same place: it was like a meeting of worlds.

Levels
The lack of detailed levels for each town became a constant problem. An appreciation of the ground and its topography was an essential part of knowing how the floodplain worked. Without accurate levels movement of water could not be anticipated. Reconstructing accurate drawings of the terrain for each of the sites was a slow and often arduous activity. The archive as a particular component of site research provided a way around these obstacles. River communities were found to hold drawn and photographic material. These would often be in the form of personal collections that had been donated to libraries or councils. Sometimes individuals offered material to the group during our town visits. These proved to be of great use for the teaching programs, and also contributed to the ongoing archive of material I had been collecting. Detailed land surveys would often be discovered during the week spent in each township. Such drawings contributed to an understanding of how a town was sited on the floodplain. While the original surveys of the river had been made to grid and control its water, the need to now map the ground precisely had the opposite intention. Instead of controlling water, the intention was to allow it to run unimpeded. To design for such conditions, accurate levels of the ground were critical to predict the movement of water.

Buildings and Landscape infrastructure
Having to structure teaching programs prompted me to consider the range of projects that might involve an architect. Initially, the first two studios focused on the design of small built structures that had to devise ways of accommodating the presence and absence of water. Scenarios for each came from the particular
circumstance of the location. At Tallangatta, it seemed fitting to think of the implication of locating a building back on the old town site, particularly to mark the 50th anniversary of the old town’s demise. As each studio evolved, I found that the on-site and off-site work started to generate the project. The museum for Old Tallangatta was perhaps the most speculative of the projects, whereas subsequent projects progressively evolved from detailed knowledge of the local community and issues arising from these encounters. Overlaps with key areas of research would also be examined. Structures required for the Murray Marathon evolved from an inventory of existing facilities used to stage the event. Most studios involved considerable pre-planning that triggered further journeys to the river, such as when I followed the canoe race over several days. These expeditions would then be followed up with a meeting with the project coordinator of the race.

Progressively, studios started to move beyond just building to engage landscape and infrastructural scale interventions. The need for infrastructure to become more than just engineering was seen as an opportunity to imagine its civic and urban contribution to the town. The levee bank was a constant focus for design investigations. Presently these tend to be rather crude earthen mounds, which encircle townships severing them from the floodplain. They can be quite severe visual obstacles in some cases, over two metres in height. Many are in a poor state of repair having had little or no maintenance since the 1950s and would be of little use should a flood of similar magnitude threaten. The Wentworth Shire had recently completed the construction of a new levee system. A notable feature was a section that was permanently removed and stored off-site, allowing the heart of the town to spill out onto the banks of the Darling River. Within several weeks of a large flood coming down the river, the levee could be retrieved from storage and assembled ready to protect the town. This sense of adaptable mobile infrastructure provided inspiration for the living with the river.

On-site: another layer to mapping the Murray

If the Mobile Landscapes text had provided the initial framework to structure the studios, then the experience of staying in each town produced another layer of understanding to living with the river. Staying in each of the towns provided a completely different insight into where the work could lead. It opened up a range of possible projects that could be encountered, from the small scale delicate built insertion, to new land-use, to infrastructure scale interventions. Each town visit unearthed new discoveries, providing particular new layers to the mapping. By selecting locations that traversed the length of the river, it also started to give me an insight between upstream and downstream. Similarities and differences seemed to keep emerging between upstream and downstream, and on-site and off-site encounters.

It was during the first design studio that the impact of the off-site and on-site work became significant. Both ways of operating seemed to create a dynamic engagement with a location. Staying at Tallangatta provided a range of different encounters with the site, from fieldwork, to meetings and presentations. On the journey to Tallangatta, a tour through the
Hume Dam wall, provided a reminder of the scale of competing forces playing out along the river. The space between the dam wall and the old town site became palpable: one thing acting on another. In successive studios, the scope of meetings expanded, to include environmental organisations, planning authorities and other groups that had strategic control over the Murray. By the final studio land-use management plans and strategic planning documents were part of the engagement of the on-site experience. Taking on the pragmatics of planning and management legislation was an attempt to ground the research in the reality of issues being faced on the ground. This was also a way of understanding how various opportunities could be able to be played out between competing user groups. It was as much about finding the gaps in the documents, as much as finding clues as to what types of projects might start to overlap with strategic planning and management guidelines. What the design studios had not yet provided was a convincing way of moving beyond the site work into a design proposal. The most difficult aspect encountered by students had often been developing ways of translating the density of site information into material to generate architectural action. The next phase of the research would address this issue.

NOTES

1. Working on a piece of architecture at a range of different scales is a skill often learnt in practice, but not often discussed in architectural literature. It comes from the tradition of design operating from more broad based decisions that might impact upon a building and its relationship in its wider context, and at the other extreme, of detail design, where it might entail the design of junctions between material surfaces. Designing across scales can also be a way of operating in the landscape. In previous work, I have selected the scales of 1:20000, 1:2000 and 1:200 as a way of making strategic connections between a built intervention and the wider landscape.

2. ‘Moama first became aware of the hazards of its location on low-lying land adjoining the Murray in 1867, when the country experienced its first flood for many years... Three years later the river rose again to a height never before experienced... Old Moama was completely wiped out. All the buildings – including the schoolhouse, post office and police barracks – were completely submerged.’ H Coulson, Echuca-Moama, Murray River neighbours, Mc Cabe prints, Wangaratta, 1979. p. 44.
This image prompted the initial site investigations for Tidal Garden. It shows the Murray mouth blocked with sediment in 1981 – another mobile landscape.
3.2 TIDAL GARDEN

*Mobile Landscapes* provided a datum of knowledge that propelled me back out along the river to the river towns where I gained an intimate understanding of particular places. These encounters with the river, between my studio and those derived from being on the ground, became referred to as off-site and on-site conditions. Off-site encounters stood for a remote experience of a place mediated through the studio and the archive. On the other hand, on-site encounters relied upon going out into the field. Off-site encounters of the river gave purpose and direction to fieldwork conducted along its floodplain. Discoveries made on the ground would then reaffirm or supplement discoveries made in the studio. These modes of operation created a dynamic exchange – a relationship of reciprocity between on-site and off-site experiences – that generated a deep understanding of the site across scales and time.

Tidal Garden is a speculative design proposal for a property on the River Murray estuary. Selection of an estuary as the location for the final project was seen as a logical conclusion to a journey along the river. Having commenced this sequence at its upper reaches at Tallangatta, it seemed fitting to complete the sequence at the river’s mouth. An estuary environment also provided further comparison with the floodplain towns and landscapes I had already encountered. Furthermore, the estuary location also coincided with the curatorial themes of the 2nd Rotterdam Architecture Biennale, to which this project would form part of the Australian exhibit.

As a design project, it could be used as a kind of ‘laboratory’ for examining the relationship between a site and to site and their potential to influence the design process. However, Tidal Garden did not emerge from any pre-existing brief or site. It emerged from the knowledge of the river that had already been accumulated, and this would have a significant impact upon its development. The following essay elaborates upon this process of realising Tidal Garden. It outlines how site knowledge leads towards knowing where and how to intervene in a location. As a starting point, I returned to the methodology that has been discussed previously (approaching site from the archive, from the air, and from the ground), but applied to the estuary landscape to generate further on-site and off-site operations. This is followed by a discussion of the key strategic components of Tidal Garden. Finally, I conclude with a review of the design outcomes and how they address the drivers of my research.

**Estuary**

Hindmarsh Island, or Kumarangk, is the largest and most accessible of an archipelago of islands located in the Murray’s estuary. The estuary is the traditional home of the Ngarrindjeri people. Their story of dispossession and loss of cultural connection to their lands was dramatised through their struggle to halt construction of the Hindmarsh Bridge. Failure to halt its construction has led to the urbanisation of the western edge of Hindmarsh Island. A large residential sub division and a new marina followed the construction of the bridge. Because of the abundance of water and beaches, the region will continue to face pressure from urban growth. Predictions suggest a tripling of the population...
over the next 15 years. This will place considerable stress upon present levels of infrastructure and the fragile estuary ecology. Growth is being driven by the region’s close proximity to Adelaide – a city of over one million people that is within a 50-minute drive, and research suggests that a large proportion of a future population would commute to Adelaide for work.

Urban development is planned to continue along the island’s western edge. To the east and south, the island is sparsely populated, its flat topography being susceptible to inundation. Most of the native vegetation was cleared in the nineteenth century to make way for livestock. Several shack settlements populate the more remote shorelines of the island. These successive layers of cultivation would suggest the island fits with John Dixon Hunt’s classification of a ‘second nature’.

From the border with Victoria, the South Australian section of the River Murray flows 620 kilometres before it enters the ocean. Over this distance the river descends only 20 metres giving some indication of the channel’s low gradient. Downstream from Wellington the river discharges into two large lakes, Alexandrina and Albert. From there, it enters an archipelago of low islands and tidal flats. After winding its way around these obstacles the river eventually enters the ocean through a small gap in the coastal dune system. At this point another wetland system called the Coorong follows the coastline in a southerly direction for over 140 kilometres. The estuary has been designated a wetland of international significance under the Ramsar agreement for its high ecological value, and was chosen as one of six icon sites as part of the Living Murray initiative.

Prior to river regulation, the estuary had a complex and variable flow pattern. From the 1930s several barrages were constructed transforming the lakes into a storage basin for irrigation. Damming the river halted the exchange between fresh and salt water that had been part of the natural ecology of the estuary for millions of years. It also raised the water level of the lakes to provide certainty for the irrigators but, like upstream, it inverted the natural flow.

Since 2003 the river could no longer discharge into the ocean: its mouth had become blocked by sediment build-up. This has been attributed to the lack of water moving down the river into its estuary. According to statistics, up to 80 per cent of water is extracted from the river for irrigation leaving little for environmental flows. This has been compounded by record years of low rainfall combined with its unusually low gradient. Ecological thinking argues that river systems are complex interconnected systems, its base unit being the watershed. The present state of the mouth of the river is an excellent example of this theory, where actions upstream are now visibly impacting the river’s ability to meet the ocean.

This short commentary on the estuary reflects concerns that can be identified elsewhere along the river. Again these can be summarised as living against the river, where its natural flow pattern has been inverted by regulation. Tidal Garden charts a different path, exploring the uncertainty that could result from more unpredictable water levels and how
this can be used to structure ways of inhabiting its floodplain.

Constructing a Project
The following section outlines the process of establishing a project at the Murray Mouth, inventing a site, constructing a program, and the relevance of precedent.

Locating a site
A press release from the Commonwealth Government provided the first stage of defining a site and the beginnings of an architectural programme. It stated that the: ‘Federal Environment Minister Robert Hill and South Australia’s Environment and Heritage Minister Iain Evans announced the $3 million purchase of Wyndgate today saying the acquisition would protect critical wetlands and feeding grounds for migratory birds …’ and further ‘... The purchase of Wyndgate provides an opportunity to develop a meaningful visitor destination to the mouth of Australia’s great river and gateway to the Coorong’. Wyndgate is located on the more remote eastern edge of Hindmarsh Island. Its location had strategic relevance, potentially providing a buffer zone between the urban pressures from the west and the more fragile and remote wetlands of the Coorong to the south. Wyndgate would become part of the Ramsar wetlands reserve bringing it under the management of the Department for the Environment and Heritage. A shack settlement borders the southern boundary of Wyndgate, fronting onto the Mundoo and Goolwa Channels. Commanding spectacular estuary frontage, these ‘make do’ dwellings are from a period free of ecological consideration, on a 100-year land lease. Wyndgate offered a way into the project.

Inventing a site
I have argued that it is inadequate to just find a site. A site needs to be invented, brought into the imagination, and only then can it be conceived as part of the wider landscape.

Beginnings: instinctively, I returned to an image which had appeared regularly in publications. It was an aerial photograph of the mouth in 1981 (refer to page 134), when the river had also been blocked by sediment. Perhaps its frequent appearance in publication was due to the extraordinary fluvial forms of the sediment – it was certainly the reason it had lingered in my mind as it had also resonated with other imagery of the mobile landscape. I now had two key areas of focus; the plot of land at Wyndgate, and the aerial image of the Murray Mouth. These instigated the next sequence of studies: firstly, zooming out, to look at the island and estuary; and secondly, zooming in, to observe the shoreline. I embarked upon a process of re-constructing flood events and the impact of tidal action along the shoreline. I approached this task from the air, the archive, and the ground. These were focussed as either off-site or on-site operations. This process is outlined on the following pages.
On-site: Hindmarsh Island + estuary, photographic documentation of the island edge.

Off-site: Hindmarsh Island + estuary, de-layering the maps of the island.

Dark gray tone: fresh water.
Light gray tone: salt water.
On-site: Hindmarsh Island + estuary, photographic documentation of the island, roads and topography.

Off-site: Hindmarsh Island + estuary, de-layering the maps of the island.
Off-site: shoreline. A series of drawings made from aerial photographs recording the shifting edge between land and water, Murray mouth.
Off-site: shoreline. A series of drawings made from aerial photographs recording the shifting edge between land and water, Murray mouth.
On-site: shoreline. Saturday 26th March 2005. 3 minute drawings made while observing the incoming tide. The subtle variations of the grounds topography became animated by the advancing water.
1. Off-site and On-site: Island + Estuary (refer to pages 138-141). The shoreline of Hindmarsh Island was mapped from the air, from the archive, and from the ground. Aerial photography and survey drawings were sourced from the map collection of the State Library of South Australia covering a period of 130 years. They provided the raw data for a series of new plan drawings charting the shifting boundary between land and water. These were paired with another process, photographic documentation of the edge in the present.

2. Off-site: Shoreline (refer to pages 146-149). The most dynamic shoreline was found to be at the confluence of the Mundoo and Goolwa Channels and was selected for further investigation. Another sequence of plan drawings was undertaken using aerial photography from 1949 until the present. Again, this involved constructing a close reading of the shoreline over time. A dynamic landscape emerged, where islands and edges were constantly remade over time. But these drawings could only ever be an approximation of the reality of the forces acting on the shoreline. Another level of detail and complexity would be revealed by walking its edge.

3. On-site: Shoreline (refer to pages 150-153). Another sequence of drawn studies undertaken on-site revealed a different pace of change. These were fast drawings, undertaken in minutes; over three hours a pencil line captured the incoming tide across the subtle topography of the ground. The ground became animated by the planar surface of advancing water. This was a miniature landscape appearing before me in seconds and minutes. Subtle ridges and crests appeared, while hollows receded below the advancing plane of water. These details resonated with memories of the interaction of water and land that had been present in the aerial flood photography of 1956. Even across different scales, place and time, there seemed to be a recurring interaction of water with the ground plane.

4. A Transitory Line. Drawings of the shoreline and islands created an interesting scalar relationship: between the entire river and its estuary. One level of detail could nest within an ever increasing larger territory – such as an island nesting inside an estuary, and an estuary nesting inside a river system and so on. All of the drawn work had focussed upon the linearity of the shoreline, but it took multiple lines to articulate its thickness and transitory dimension. Extraneous information has been edited from the drawings. At the estuary, drawings undertaken on-site and off-site share these concerns. The big drawing of the River Murray has taken several years to complete. Lines¹¹ are a way of mediating the on-site and off-site encounters with a site. They are a device to track an underlying complexity of an edge. Having travelled this line over the past 8 years and to have been confronted by its meanders, twists and turns is to know something of its complexity. It is the discrepancy between these alternative ways of constructing and experiencing the landscape that fascinates. The drawing can never be a true depiction of reality. The phantom line depicting the edge of the flood river is another reference to this underlying complexity discovered through mapping. I am fascinated by the ‘to and fro’ or the zooming in and out, of being on the ground and in the studio. It is the reciprocity between the astringency of the line in comparison to the river’s various lived realities.
that animate this process. These are the magical moments of mapping, revealing the significance of being in the landscape and making the drawing. The linearity of the drawn work is a pivotal device to start to reveal a way of seeing the landscape.

Walking

‘The physical involvement of walking creates a receptiveness to the landscape. I walk on the land to be woven into nature. Vertical trees and horizontal hills. The character of a walk cannot be predicted. A walk is practical not theoretical’.12

On the floodplain of the River Erft in northern Germany is a museum that has been integrated with its surrounding landscape. Museum Insel Hombroich13 is surrounded by a dense cover of vegetation, of beech trees, cypresses, plane trees and yews. Unlike other museums, it has been built in stages over a 15-year period – it is a growing museum. Its art collection is housed in buildings that have been dispersed across the floodplain. The strategy of dispersal encourages visitors to wander from building to building, thereby weaving together landscape and building through the act of walking. A network of paths provides the necessary infrastructure for wandering. Moving inside and outside brings art and the landscape into collaboration. In this ensemble, the network of paths become significant, not just for circulation purposes, but to encourage a more fundamental understanding of the museum in its setting. The network of paths is without hierarchy, leaving the order and sequence of a museum visit open. Each pavilion has been carefully set into its surroundings, whether on higher ground and visible, or concealed on the lower land.

In some instances, new plantings have further intensified the relationship between landscape and architecture; especially where the wall of trees that encircle the labyrinth pavilion have heightened the passage from inside to outside.

Design studios that had been staged along the river had taught me that buildings alone were too small to sufficiently take on the scale of the floodplain. They needed an infrastructural scale. Levee buildings, for instance, bridged the scale of building and infrastructure. Town survey grids also operated at an infrastructural scale, marking the transition in scale between the river and an individual building. I had found a similar condition at Hombroich, where the infrastructure of paths made sense of the site. But this was also an infrastructure of lightness, small and yet large enough to act like a network across the landscape – as the array of poles in The Lightning Field that covered 1 kilometre of the desert floor.

Walking offered a strategic link between the various strands of the research. Firstly, it had potential to form a level of infrastructure beyond the scope of a building. To walk offered an engagement with the landscape that was not possible inside a building, bringing the walker into contact with the weather, the site and the land. I had in mind the type of contact with the weather and site that had been discovered in the Water Theatre installation. Secondly, walking could thus provide the link with the stated objectives outlined in policy documents that desired a meaningful destination to raise educational and public awareness of the wetlands’ ecology and its cultural and natural heritage. Designing a walk had become a genre of project that is not without

1-5) Museum Insel Hombroich. A network of paths links the dispersed museum, bringing the landscape, visitor and museum into relationship.
local precedent. In Western Australia, Donaldson and Warn have designed the Tree Top Walk\textsuperscript{14}, a project that takes delight in moving the visitor into the canopies of ancient Tingle Trees. In the Grampians in Victoria, the Pinnacle walk\textsuperscript{15} takes the visitor through narrow ravines next to cascading streams, between rock crevices and onto mountain tops. The Pinnacle walk, like the others I have mentioned, is free of signage or didactic messages. Instead, they have been conceived and placed with the lightest of touches to bring the landscape to life. They are in the tradition of Alison and Peter Smithson’s notion of the minimal intervention referred to in chapter one.\textsuperscript{16}

**Tidal Garden**

Tidal Garden is a designed landscape, transforming Wyndgate from a second into a third nature.\textsuperscript{17} It is a proposition to inhabit a dynamic landscape. Uncertainty from future inundation and a mobile edge between land and water are seen as design opportunities, rather than impediments. Tidal Garden is conceived as a place that transforms over time, from slow to fast: over hourly intervals, days, to weeks, to seasons and decades – each visit would be different to the next.

Tidal Garden is a combination of new programs, buildings and landscape infrastructure, providing a ‘meaningful visitor destination to the mouth of Australia’s great river and gateway to the Coorong’. Programs have been developed in response to key objectives outlined in management policy documents.\textsuperscript{18} Presently, access is by road from Goolwa. Infrastructural scale interventions re-organise the site, reorientating road access and additional access from the water. These adjustments prepare the site for a further layer of smaller scale interventions.

Transitory elements of the estuary landscape play a strategic role in determining how and where to intervene. Drawn investigations revealed a thick shoreline where water and land are constantly shifting in relation to one another. Images from the archive have shown that this is even more prolific over time. Interventions explore ways to engage with the changing shoreline. As a design problem, this requires anticipation of what may or may not happen in the future: it is to design for uncertainty. Tidal Garden is a transitory place, changing, adapting, and evolving. Interventions are designed to reveal and intensify the dynamic aspects of the site.

**Siting**

Tidal Garden is conceived as three separate layers: the first is an infrastructural layer and reorganises Wyndgate; a second layer of small scale buildings is nested into the infrastructure; and the third is a series of new planting programs. Collectively, they transform Wyndgate into a Tidal Garden. Each of these interventions has been derived from a close reading of the site and its surrounding context as outlined below.

**Landscape Infrastructure:** Drawn studies imagine the site as a series of edges, comprised of lines: some permanent, others fading and reappearing, others mobile. Three additional lines are layered onto these pre-existing conditions. The line is a formal device: it enables me to move from a site (description) towards to site (action). The
diagrammatic and abstract nature of the line has an allegiance to the language of cartography and drawing. But it is through the projection of lines onto the site that they become increasingly layered with the lived complexity of the ground. They are progressively layered and brought into existence through the act of design, (scale shift, testing, sections, model making) – this is what differentiates my use of the line from those of the land artists19, who would often project lines (derived from cartography) onto the ground to mark the site.

Three lines are projected back onto the ground surface. Each is conceived:

- as landscape infrastructure, capable of re-organising the site
- to be derived from a close reading of the surrounding landscape
- to establish clear rules to engage with the site’s topography
- to explore different ways of engaging with the transitory aspects of the landscape
- to explore different ways of negotiating the shoreline

They are conceived as landscape infrastructures, each given an identity forged from an understanding of the estuary landscape. Through their location and placement they make present the lived complexity of the landscape. They are developed as three different walks, of different length and duration. Walking encourages mobility, entwining the lived time of the walker with the other elements of transitory order already present in the site. The three walks are:

1. **Landscape Walk (3 kilometres)**
   This is a transformation of the site’s topography through the construction of a new ground-form. It is constructed from the relocation of one year (880,000 cubic metres) of river sediment dredged from the mouth of the river (dredge is presently pumped into the ocean). It inverts a process of subtraction into addition. Its form appropriates the levee and the river meander. It is placed to not quite touch three wetland edges. Its only direct contact with water would be in a 1:100 year flood, or from rising sea levels. As an intervention, it is a provocation – a visual reminder of the consequences of failing to act.

   The landscape walk makes a new horizontal datum of plus 8 metres (above the Australian height datum) and this is derived from a sectional reading of the surrounding dune system. Even the slightest increase in elevation in the flat estuary terrain can give an overview. This height will also make the walk exposed to the fierce southerly winds. Its profile allows for an elevated walk connecting the Goolwa and Mundoo Channels, terminating by the 1956 flood level and an ephemeral wetland. Its meandering plan form and sectional profile recalls the levee common in many river towns. Geo-textiles and planting will assist its stabilisation – it is intended that it will become grown-over with time; one side will be maintained, the other left wild.

2. **Urban Walk (1.5 kilometres)**
   Its decisive linearity echoes other human interventions on the island, such as the road grid and survey grid and barrages. However, it differs from these in its carefully constructed relationship to localised site conditions. It follows the subtle
topography of the peninsular, articulates the rise and fall of the ground across its length. It is positioned to pass between the most diverse and congested moments of the site – a strategy of intensification. It explores two ways of mediating the shoreline: firstly by deviating and running parallel to it, and secondly, bisecting it. Water terminates the urban line, creating a walkscape that is altered daily, depending upon the rise and fall of the tides. Its middle section negotiates the adjacency of the shack settlement. In the evening it becomes a 1.5 kilometre line of light across the lands surface. Ferries connect the urban walk to Goolwa.

The material of the walkway is a combination of in-situ and pre-cast concrete with a crushed limestone aggregate. Its surface, texture, finish and profile are articulated to capture, channel, and store rain water run-off.

3. Tidal Walk (16 kilometres).
The most ephemeral and minimal of the interventions: it is a found line, a shoreline exposed during periods of low tidal levels. Two minimal bridges connect separate parts of shoreline into a continuous walking circuit. Walking has to be timed to coincide with periods of low water. Several bird hides are distributed along its length. It provides the most remote of the three walks, bringing the walker into direct contact with birdlife, solitude and silence.

Buildings: the second layer of interventions.
Boat-buildings: attached to the urban walk will provide accommodation for exhibition, information, education, shade, and public amenity. They are fabricated from timber, and are to be made by the remaining timber boat building yards along the Murray. Their form and profile have allegiance to the hull construction of boats rather than buildings. Each building will be transported to site by barge and then site assembled. These buildings have been designed to be dismantled should future circumstances require their relocation. They extend the scatter of buildings typified by the shack settlement.

Land-form buildings: will provide accommodation for field offices/experimental farm/and car-park. They are conceived as spaces subtracted from the sectional profile of the landscape walk. Materials are lightweight steel framing, sheet metal cladding and perforated metal cladding. Their material allegiance is to the agricultural sheds of the island.

Planting: a third layer of interventions
Planting program native: planting of 8000 saltwater paperbarks (Melaleuca Haelstrom), a tree native to Hindmarsh Island, integrates an ongoing community driven program. Planting is organised on a grid layout to articulate it as a garden. The growth time of this paperbark forest will gradually transform the open landscape.

Planting program experimental: a field pattern of small plots for experimental crop production. A program for researching dry land farming techniques. It is anticipated that this will gradually expand across the Wyndgate property.

Living with the River Murray
Tidal Garden is a place filled with time. It has been conceived to coincide with, and intensify, systems of transitory order discovered in the site: tidal
cycles, and flood time. Overlaid onto this are slow and fast durations of time. Interventions are seen as additional layers onto the existing situation – creating a density to the ground surface. They are transformative and re-organise the site without destroying the site’s past. Tidal Garden will continue to change over time, over days, years and centuries. Each element has been conceived in relation to the ground, working with the subtle gradients of the topography, anticipating daily tidal variation, future flooding and rising sea levels.

The urban walk stretches out into the Goolwa Channel. Coiled back upon itself, its topography and sectional development anticipate the tidal range and future flood events. Its interaction with the fluctuating water levels creates a dynamic causeway that will change daily: tidal levels concealing and revealing its profile. Accessibility will be dependant upon the timing of the visitor.

A slower process of change is anticipated with the saltwater paperbark forest. It explores the slowness of growth time, where the open vistas across the peninsular will gradually be replaced by a dense canopy of foliage. This will reinstate the indigenous vegetation that once covered the shores of the island. Once the paperbarks come to maturity, the open vistas between the Goolwa and Mundoo Channels will exist only as a memory.

Position and orientation of the boat-buildings anticipate diurnal time and seasonal change as well as a range of damp to dry ground conditions. Orientation is toward morning light, midday, or afternoon light. Their external skins are detailed to channel and capture rainwater. Rather than program specific, spaces have a loose fit relationship to use. Spaces are considered in relation to seasonal time – winter spaces and summer spaces. Building design anticipates ways of conceiving the lived time of inhabitation with the external relationships of weather and sunlight and the landscape.

An event is marked by the landscape walk. Its volume registers a year of dredging the river’s mouth. Its elevation above the existing ground minimises its contact with cycles of inundation. Contact with water will be over long spans of time, when water levels exceed 1:100-year levels. Should predictions of rising sea level take place then the landscape walk will become an island, severed from Hindmarsh Island.

Regulation of the river attempted to control the movement of the river; Tidal Garden attempts to explore an alternative river of unpredictable levels. Over time, parts of the garden will be inaccessible. Access will be dependant upon the timing of the visit. Uncertainty is seen as a design condition to be embraced - a way of living with the river rather than against it.
A series of devices outlined below have been used throughout the project as a means of siting various elements of Tidal Garden. These devices contribute to the design of the site. They can be seen as a catalogue of operations that contribute to the design of the site – it is how relationships are structured between what the site has been, what it is now and what it will become.

- Displacement: taking something from one place and relocating it to another location (dredge)
- Inversion: taking something found, but putting it to work for different ends (urban walk)
- Transitoriness: consideration of the life of the project (how tides are embraced, growth time, etc)
- Scale: always imagining a site in relationship to wider landscape (mouth, island, estuary, river)
- Layering: addition and accumulation of interventions without destroying what already exists (placing the three lines)
- Intensification (the causeway)
- Ground: the datum that connects everything (Tidal Garden)
- Adjustments, reorientate, adjacencies (accepting what is already present)

Orthogonal projection has been used constantly, particularly the combination of plan and section to map everything precisely to the terrain. Such precision and careful placement mirrors the measuring of the river by surveyors. However, my ambitions are in opposition to those of the surveyors who measured the river to control its flow. I, on the other hand, have done so to give freedom back to the river. This is a kind of counter cartography that seeks to free water by anticipating how it might move, enter into and engage the ground and its spaces.

These devices are used with a further strategic connection in mind: to embrace different communities up and down the river. This occurs at a number of levels and has motivated several strategic decisions in the development of Tidal Garden. Firstly, it provides a new programmatic structure (experimental farm) that would provide for partnerships between the Ngarrindjeri people and organisations involved in research and development of dry land, sustainable land-use of the agricultural land of the of the Murray-Darling Basin. Secondly, the notion of construction and fabrication of the boat buildings was conceived to connect to the dying traditions of the timber boat building trades that still exist upstream in places such as Goolwa, Mannum and Echuca. Thirdly, the planting program is conceived to be undertaken by the local LAP groups (equivalent to the Landcare organisation) to involve grass roots community participation to rehabilitate the landscape through the proposed planting regime. Collectively, these different communities would help construct the ongoing life of Tidal Garden and weave it back into the social fabric of the river.
Diagrams showing the three primary landscape infrastructural elements that transform the site into Tidal Garden.
Tidal Walk: a found line following the present shoreline of the Mundoo Channel and the 1956 flood contour
Tidal Walk: removed from context
Location of dredging channel cut through the silt at the Murray mouth since 2003.
One year of dredge (880,000 cubic metres) to be relocated onto Hindmarsh Island. Landscape Walk, a new landform made from the relocated dredge. Its plan form and profile echo the river meander, levee bank and subtle folds in the islands topography.
Overlay of the off-site shoreline drawings and shack settlement.
Urban Walk: a line echoing other human interventions onto the lands surface such as the road grid. It is placed to pass through the most congested part of the site.
Three walks / lines, three ways to inhabit the site.
The next sequence of drawings track a range of explorations that test and examine the opportunities of the three lines. Some have been taken from my sketch journals, others from a collection of studies on charette, cartridge paper. The diagrammatic nature of the drawings acts a visual shorthand to explore what might be taking place in the project. This is where scale shift becomes a useful tool to develop the design.

Above. Studies exploring the relationship of the three landscape infrastructures

Opposite. An early study of the urban walk passing from shoreline to shoreline and between the shack settlement
Studies of the Landscape Walk
Studies of the Landscape Walk and how it interacts with the existing site conditions.
Studies of the Urban Walk (west) where it extends into the water. It is positioned in close relation to the tides so that it will always be above and below the water line – an intensification of the processes discovered in the estuary.
Subtle moves can animate the flatness of the landscape. Being aware of each move in relation to the wider landscape.
Studies of the boat buildings
Studies of the boat buildings, layered skins, how each works with the sites topography
Preliminary test of a floating boat building
Design studies outlined on the previous pages helped evolve the three landscape infrastructures. Each of the landscape infrastructures were tested in relationship to existing site conditions and in relationship to further interventions and the development of program. The plan sequence to follow reveals the three landscape infrastructures and how these have provided an armature for additional interventions.
Existing Shack Settlement
Planting program: salt water paperbark trees
Planting program: crops, experimental farm
Study of adjacent site conditions.
Sections: Urban Walk (west)
Sections: Urban Walk (west)

Elevation: Urban Walk (west)
Tidal Sequence: Urban Walk (west)

January 15 03.27hrs 460mm A.H.D

January 18 18.54hrs 160mm A.H.D

January 21 23.09hrs 390mm A.H.D

January 24 00.40hrs 520mm A.H.D

January 27 02.07hrs 600mm A.H.D
Plan detail: Urban Walk (east)

Location Plan: Urban Walk
Sections: Urban Walk (east)
Composite section: coordination of ground and tidal levels
Perspective sequence: Urban Walk (east)
Perspective sequence: Urban Walk (east)
Perspective sequence: Urban Walk (east)
Perspective sequence: Urban Walk (east)
Perspective: Urban Walk (west)
Perspective: Urban Walk (west)
Boat building interior: Urban Walk (west)
Flood sequence: low tide, Urban Walk (west)
Flood sequence: high tide, Urban Walk (west)
Flood sequence: 1956 flood level, Urban Walk (west)
**Conclusion**
The PhD commenced with the question: what are the consequences for a range of architectures of living with the River Murray – rather than living against the River Murray?

Tidal Garden can be grouped into four responses.  
1. Amphibious Architectures: This study of the estuary has examined ways of inhabiting the shifting edge of land and water. Underlying this work has been a growing awareness of environmental histories, and their part in revealing patterns of flood and drought. The designed landscape encourages overlaps and adjacencies with larger evolving landscape processes. This has placed emphasis on the life of the project over its completion. Living with the river requires the architect to be receptive to the presence of water at a range of scales. Tidal Garden has developed amphibious architectures for living with the Murray. They include landscape infrastructures, planting programs and built interventions. Amphibious architectures can be derived from, and designed with, the regeneration of a river system. Amphibious architectures:
   - have a reciprocal relationship at the scale of a room - a settlement - a river system
   - exploit the material properties of water
   - are mapped closely and evocatively to the terrain
   - work with the ecological systems of the floodplain
   - take delight in living as a verb

2. Site knowledge: Tidal Garden has provided a laboratory in which I have been able to test the architectural potential of site knowledge. The initial phase of the study involved the construction of knowledge about the river. Site knowledge, then, is considered to be the sum of investigations of the Murray River undertaken for the duration of this PhD. It has included a range of encounters with a river system, ranging from personal experience, the archive, the act of drawing, meeting communities along the river, and other disciplinary points of view. To operate on floodplains necessitates interaction with knowledge beyond the scope of architecture’s disciplinary boundaries. For me, insights from this process have helped transform the river from an unknown into something that is known. This experience recalls the writer Robert Macfarlane, whom I have referred to previously, especially when he writes: ‘To understand even a little about geology gives you special spectacles through which to see a landscape. They allow you to see back in time to worlds where rocks liquefy and seas petrify, where granite slops like porridge, basalt bubbles like stew, and layers of limestone are folded as easily as blankets’. If the PhD has done one thing, it has given me an insight into the hidden processes that connect a river and its floodplain. But an architect’s understanding of a river will differ from that of the ecologist, the irrigator, the river engineer and author. While I have borrowed arguments from these adjacent disciplines, they are transformed when assimilated with my spatial intelligence. Site knowledge equips me with a point of view, an ethos, to be able to act.
3. **On-site and off-site operations.** Site knowledge is generated through on-site and off-site operations. On-site and off-site operations are in a reciprocal and dynamic relationship. This way of operating has been derived from encounters with dynamic landscapes, often beyond any equivalent architectural or urban scale. The literature review discussed the role of site in the design process and outlined a series of gaps occurring between site analysis and the design process. On-site and off-site operations provide a contribution to this area of architectural production. As an approach, they bring the site investigation into relationship with its inhabitation. It is through the act of drawing and imaging the site that these processes overlap. As Edward Robbins has stated, ‘drawing, today, is at the root of architecture. It is the instrument through which architecture is most often brought into virtual and actual existence’. I would argue that to draw the site is to make the first design decision. Drawing a site is to imagine it – to bring it into existence. Selecting what to include is as important as what to exclude from the drawing. Site drawings therefore need to be designed – they are never given.

4. **Designing for uncertainty.** During the PhD, I have encountered many people who have perhaps doubted and wondered why an architect would be concerned with a river system. The floodplain provides a potent example of the limitations of disciplinary knowledge. Ecologists wonder at the intricate complexity of the river; biologists, engineers, and river managers are all concerned with some aspect of what could be considered the nature of the river. It is as if the towns that have urbanised the floodplain do not exist, as these ecological processes being hotly debated are seldom seen to overlap onto the urban communities that populate the floodplain. The town and the ecology of the river still seem to me to be conceived by the broader community as two separate entities, not overlapping into one another. The PhD has revealed the lack of overlap between ecology and the built environment in rural communities. How a floodplain town interacts with a river is a significant design challenge. Site knowledge has given me an insight into the architectural and urban implications of living with the river. Over 8 years of travelling the Murray, I have yet to encounter any other design professionals engaged with the architectural and urban implications of living with the Murray.
comply with the Convention’s criteria for wetlands of international importance. The Coorong and the Lower Murray Lakes, Albert and Alexandrina, together with the islands in the lakes were designated as a wetland of international importance in 1985. See Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan, South Australian Department for Environment and Heritage, Adelaide, 2000.

5. A barrage is ‘a construction across the mouth of a river that prevents the entry of seawater; behind a barrage, the water is fresh’. Quoted in N Mackay and D Eastburn, The Murray, Murray-Darling Basin Commission, Canberra, 1990, p. 356. The barrages at the Murray Estuary are the: Goolwa, Mundoo, Ewe Island, and Tauwitchere.


7. ‘Another scientist, Robert Curry, has argued that the watershed (the area the river drains, its body, as it were) is the most appropriate unit for thinking about and dealing with nature’. Quoted in D Worster, The wealth of nature: environmental history and the ecological imagination, Oxford University Press, New York, 1993, p. 124. This thinking is also discussed in relationship to the River Murray in, D Connell, Water politics in the Murray-Darling Basin, Federation Press, Annandale, 2007.

8. Media release: Australian Government titled, Crucial Murray Mouth Land Protected, and states, ‘Crucial property of international significance at the Murray Mouth has been secured by the State and Federal Governments so the area can be better managed for conservation’ by Senator the Hon Robert Hill, 10 August 2001, Department for Environment and Heritage, Commonwealth of Australia.

9. ‘This is discussed in the: Coorong, and Lakes Alexandrina and Albert Ramsar Management Plan.


13. I visited the museum at Hombroich in 1998 and 2005. On the second visit it was remarkable how the museum had evolved since my previous visit: several new buildings had been constructed and the landscape had grown to consume some of the buildings. The museum has been published in several sources that give an account of its evolving status. Particularly useful for comparison are: P Rumpf, ‘With Hermes over the Island. Erwin Heerich’s Pavilions at Hombroich’ in Daidalos, Architektur Kunst Kultur, No 26, 15 December 1987, pp. 102–113, and JP Kastner, ‘Stereometric Sanctuaries. New Pavilions on the Museum Island of Hombroich’, in Daidalos, Architektur Kunst Kultur, no 53, 15 September 1994, pp. 68–77.


15. The Pinnacles walk is near Halls Gap in the Grampians Mountains, Victoria.

16. Alison and Peter Smithson linked the notion of the ‘Minimal
Intervention’ to the unbuilt design for a twin bridge over the Verbindungskanal, Berlin. ‘The twin bridges … are intended as the lightest of touches to join the two banks by creepers that will climb along their structure. The bridges, thus becoming both routes and arbours, hint at the kind of minimal intervention, the starting point of processes that could rescue other areas from slipping into urban sadness’. A and P Smithson, The charged void: urbanism, The Monacelli Press, Inc, New York, p. 324.

17. Third nature is used by John Dixon Hunt to differentiate the design of the garden from the landscape of bridges, roads, harbours fields, etc (second nature); see ‘Introduction: Reading and Writing the Site’, in JD Hunt, Gardens and the picturesque: studies in the history of landscape architecture, The MIT Press, Cambridge, 1994, pp. 3–16.


19. Some notable examples where lines have been projected onto the ground as part of a work include: Walter de Maria, for instance, Las Vegas Piece, 1969; Denis Oppenheim, Time Line, 1968; and Richard Long, A Walk by All Roads and Lanes Touching or Crossing an Imaginary Circle, 1977 – all in J Kastner and B Wallis, Land and environmental art, Phaidon, London, 1998.


21. A term I attribute to my supervisor, used frequently by him in lectures and throughout the reflective practice model of design research. See L van Schaik, Spatial intelligence: new futures for architecture, Wiley & Sons Ltd, Chichester, 2008.

PhD diagram
4. Conclusion - Designing the Site

‘But in reality, intuition is the condensation of vast prior experience; it is analysis compressed and crystallized ... It is the product of analytic processes being condensed to such a degree that its internal structure may elude even the person benefiting from it ...’

The PhD commenced with the question: what are the consequences for a range of architectures of living with the River Murray – rather than living against the River Murray? Over the last 100 years the Murray has transformed from a river into an irrigation canal. While this has been good for agriculture this transformation has been detrimental to the health of the river. Now, with the river near collapse, ecologists have argued for a return to the flow patterns that had once been a hallmark of the Murray prior to regulation. This would mean varying water levels artificially to replicate the cycles of flood and drought now understood to be essential components of Australia’s wetland ecology. While the ecological benefits have been well documented, little has been mentioned about the consequences for those living on the floodplain. In section three, ‘Living with the River Murray’, the research explored new ways of inhabiting the floodplain compatible with its rehabilitation. Over the past 8 years, the river and its floodplain have been my laboratory to examine the role of site in the design process. It has taken me into unfamiliar territory, encountering new landscapes and disciplinary knowledge beyond architecture. A floodplain is a place where multiple disciplinary points of view can potentially intersect and overlap: especially where urban systems confront fragile ecologies. Overlaps may well be occurring between scientific disciplines, but I have yet to discover any design professions engaged in the issues at a government or regional level. Clearly, many only see the problems facing the Murray as a scientific and ecological problem. At one level, the PhD poses future engagement with communities that do not presently consider living on a floodplain as a spatial or architectural problem. In the Netherlands, however, architects and landscape architects are commonly included in strategic stages of landscape infrastructure design. As an architectural problem, the selection of a river system as site has called upon a range of operating procedures capable of engaging a regional and continental scale – which has been beyond any equivalent architectural scale.

In the literature review I identified a field of concerns pivoting around site and its role within the design process. I argued for an understanding of the noun and verb definitions of site and the potential of their reciprocal relation to motivate action. The River Murray has consumed the last 8 years of my life. I have travelled its length, looked at it from many different vantage points, traversing thousands of kilometres in the process. The French landscape architect Christophe Girot has noted that: ‘A designer seldom belongs to the place in which he or she is asked to intervene. How can outside designers acquire the understanding of a place that will enable them to act wisely and knowledgeably’?2

Girot’s question is poignant, perhaps a ubiquitous question that could be posed of almost every design professional but, nonetheless, reflects my concerns with the Murray. However, I would add to this question the need to also understand how a place interacts with a larger context. I have spent the last 8 years working out how to relate to a river and its floodplain, and how such an understanding then informs action. I now understand why an ecologist would suggest that ‘the watershed is the most appropriate unit for thinking about and dealing with nature’.3 In the process I have opened up a way of imaging a site at a range of scales and times, and at many levels of engagement, from ecological, to the political and the personal.

The consequence of architectures for living with the Murray is to consider how site knowledge is generated and how it is used in the design process. Only then can it be possible to start living with the Murray. Earlier in this document I cited Raimund Abraham, who suggested that architecture begins at the moment of intervention. I would argue otherwise, suggesting that the necessity of
understanding a location is the true beginning of architecture; only then is it possible to know how and where to act. This PhD has provided me with the tools for operating in dynamic contexts, for designing architectures that are derived from and work with the rehabilitation of a river system. The true beginning of architecture is with the site – not an intervention. How and where to intervene in a location are decisions that can be informed by site knowledge. Site knowledge is generated by on-site and off-site operations. I now refer to this process as designing the site. These are the consequences of living with the Murray, and the area in which my PhD can contribute to an understanding of site and its influence upon the design process.

Designing the Site
The PhD-diagram and notes below summarise my understanding of site and its impact upon my design process. The diagram is an attempt to reveal my design intelligence so that others can learn from it, but not replicate it.

On-site and off-site operations
On-site operations: include the walk, the journey, photographic documentation, on-site drawing, meetings with communities, timing of the site visit … morning, afternoon, evening, and a site over 24 hours. They generate intimate knowledge of the site. Off-site operations: include from the archive, pictorial collections, flood reports, flood diaries, different types of writing, maps, surveys, from the air, the site over 100 years. They generate an overview of the site, bringing aspects of the past to bear upon the present.

On-site and off-site operations are always in dynamic relationship. To be on-site is to be aware of the off-site conditions. It is the architect’s role to be alert to areas of overlap that may emerge through the performance of these operations. In Tidal Garden, the 3 minute drawings worked in this way. They were made in-situ while observing the incoming tide, but resonated with the overview of the river and its flood events I had gained from remote observation. Here, the overlap occurred where remote and near observation came into relationship. On-site and off-site operations are in dynamic relationship - like the swinging of a pendulum. This process shifts from a plancentric mode of engaging a site to one that implicates time into the site engagement, thus bringing the past into relationship with the here and now. The process also confronts scale as a condition of encountering a place, by considering detail in relationship to the overview. It shifts the notion of site from a static entity into a dynamic place with multiple boundaries and edges.

Site Knowledge
On-site and off-site operations generate drawings. Observed phenomena, personal experience and data (generated by these operations) are translated into drawings. This is where site knowledge is constructed. The act of drawing brings things into relationship: near and far, 100 years and 24 hours. Andrea Kahn has suggested that representation ‘is not about depicting reality, but about making knowledge. For design, it is a mode of conceptual operation, a process of knowledge formation. More than simply amassing facts, figures, and impressions of a given situation, the description and analyses that designers produce actually generate the knowledge necessary to engage a given condition of a site’.

Again, this reiterates the importance of drawing in the process of constructing noun and verb understandings of site. Because on-site and off-site operations implicate scale and time as a condition of approaching a site, they introduce specificity into the drawings that are produced. Drawings become time specific, rather than out of time. And this is why forms of representation such as ‘standard’ site plans and topographic surveys are inadequate methods of documenting a location. Such drawings miss the generative potential of imaging the site. Lines of my drawings are charged with site knowledge. These lines take time to materialise and rely upon the accumulation of on-site and off-site operations. The PhD diagram shows the accumulation of site knowledge as a topographic form. This form represents the sum of my site knowledge. It can
be read as thus: more distant projects, precedent, personal experience, tools and techniques are located in a lower strata at the base. Each successive project can be considered contributing another layer onto this topography. As more knowledge of a location is constructed, on-site and off-site operations tend to overlap and converge toward a moment of clarity. This moment is depicted by the crest of the topographic form. Movement towards the crest involves drawings that start to invent the site, by drawing it into existence (for instance, shoreline drawings of Tidal Garden), exploring its limits, how to weave additional things into its surface, drawing the site as a series of transitory edges. This is where the site starts to be invented, imagined and brought to life.

To Site
Moving upward, towards the crest of my diagram suggests a point of clarity, where there is a convergence of site knowledge – at the moment of intervention. This moment is defined by the act of deciding how and where to intervene in a location. In Tidal Garden this moment arrived with the strategy of three lines/walks to rehabilitate the site. The use of the line is derived from the drawing of the site at various scales and is used as a formal device to anchor a range of transitory processes and new programmatic activity. This is the moment of transition between the site as a noun to its definition as a verb. Moving over the crest of the diagram suggests a continuation of siting strategies that may be considered additional layers to the project. At Tidal Garden, this is where various smaller scaled elements become nested within the primary landscape infrastructure components.

Designing the site
In the literature review I tended to consider site and design as two separate but connected processes. Upon reflection, I now have a different insight into their relationship. Every move and decision I make is about the site: I design the site. Built interventions are often secondary, and support the way in which the site has been imagined and invented.

NOTES
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aben, R &amp; S de Wit</td>
<td>The enclosed garden of the Hortus Conclusus and its reintroduction into the present day urban landscape, 010 Publishers, Rotterdam, 1999.</td>
</tr>
<tr>
<td>Abrahams, J &amp; P Hall</td>
<td>Else/Where: Mapping New Cartographies of Networks and Territories, University of Minnesota Design Institute, Minneapolis, 2006.</td>
</tr>
<tr>
<td>Beigel, F &amp; P Christou &amp; P Misselwitz</td>
<td>‘Constructing the site’ in A+T Memory (II), no 17, 2001, pp. 60–73.</td>
</tr>
</tbody>
</table>


Czerniak, J, ‘Challenging the pictorial: recent landscape practice’, in Assemblage no 34, pp.110-120.


Goodwin, N & S Bennett (eds), The Murray Mouth, exploring the implications of closure or restricted flow, Department of Water, Land and Biodiversity Conservation, Adelaide, 2002.


Grothofer, B, Raimund Abraham (un)built, Springer Verlag, Vienna, 1996.


Hawkinson, L, B Kruger, N Quennell & H Smith-Miller 'Imperfect utopia/un-occupied territory' in Assemblage no 10, pp. 19–46

Hemming, S, P Jones & P Clarke, Ngurunderi: an Aboriginal Dreaming, the culture of the Ngarrindjeri people, South Australian Museum, Adelaide, 2000.

Hill, E, Water into gold, Robertson and Mullins, Melbourne, 1937.


Krucker, B, Complex ordinariness: the Upper Lawn Pavilion by Alison and Peter Smithson, Zurich: gta Verlag,


Lindsay, R, Fred Williams, water, McClelland Gallery and Sculpture Park, Langwarrin, 2005.


Masheck, J, 'The Panama Canal and some other works of work, in Artrorum, May 1971, pp. 38–41. (Robert Smithson Movie Treatment for Panama Passage, drawing, 1970.)


Mosser, M & G Teyssot (ed), The history of garden design: the Western tradition from the Renaissance to the present day, Thames and Hudson, London, 1991.


Nordman, M, De Sculptura: works in the city, some ongoing questions, Schirmer/Mosel, Munich, 1986.


Ray, M & R Mangurian, ‘City proposals: 29 drawings for East West Hollywood’, in Catherine Spellman (ed), Re-


Sijmons, D, =Landscape, Architectura + Natura, Amsterdam, 2002.


South Australia, Department of Lands, River Murray flood line 1956 (cartographic material): aerial photo mosaic series, Department of Lands, Adelaide, 1956.


Steenbergen, C & W Reh, Architecture and landscape: the design experiment of the great European gardens and landscapes, Prestel-Verlag, Munich, 1996.


Turnbull, D, Maps are territories, science is an atlas, Deakin University, Geelong, Victoria, 1989.


Wentworth Group, Blueprint for a Living Continent: a way forward from the Wentworth Group of Concerned Scientists, WWF – Australia, Sydney, 2002


ILLUSTRATIONS

Dimmity Walker (No2, p.16); C Rowe & F Koetter, Collage City, The MIT Press, Cambridge, 1978 (No1, p.18); Gandalenсонas, M, The urban text, The MIT Press, Cambridge Massachusetts, 1991 (No2, p.18); K Feireiss, Morphosis, Rhythm / Movement, project in Chiba, Japan, Aedes, Berlin, 1990 (No3, p.18 and No4, p.19); G Domenig, Steinhaus-Stonehouse, Folio XI, Architectural Association, London, 1986 (No1, p.20); C Spellman, Re-envisioning landscape/architecture, Actar, Barcelona, 2003 (No3 p.21); J Corner & A MacLean, Taking measures across the American landscape, Yale University Press, New Haven, 1996 (No1, p.22); R Koolhaas & B Mau, S, M, L, XL, The Monacelli Press Inc, New York, 1995 (No2, p.22); C Steenbergen & W Reh, Architecture and landscape: the design experiment of the great European gardens and landscapes, Prestel-Verlag, Munich, 1996 (No2, p.26); Alexander Beck (No1, p.26); J Kastner & B Wallis, Land and environmental art, Phaidon, London, 1998 (No3, p.27); B Krucker, Complex ordinariness: the Upper Lawn Pavilion by Alison and Peter Smithson, Zurich: gta Verlag, 2000 (No3, p.29); I Zdanowicz & S Coppel, Fred Williams, an Australian vision, The British Museum Press, Bloomsbury, 2003 (No1, p.36); L Lindsay, Fred Williams Water, McClelland Gallery + Sculpture Park, 2005 (p.37); A Vaughan, The River Murray general plan (cartographic material): showing levels etc. for determining position of locks and weirs, Engineer-in-Chief, Adelaide, 1910. For the New South Wales and Victorian part of the river (p.44); State Library of South Australia, State Library of Victoria B23213 (No1 p.46), RWG/M2136 (No4 p.46), B20264 (No6 p.46); E Storry, Pictorial History of Renmark, Celebrating 100 years 1887-1987, incorporating the Renmark & Paringa Districts, Murray Pioneer, Renmark (No2 p.46); State Library of Victoria, RWG/U2136 (No3 p.46), RWP/M144 (No 5, p.46); Cameron McNamara Pty Ltd; Gutteridge, Haskins and Davey; New South Wales Water Resources Commission; Laurie, Montgomery & Petit, Murray River Flood Plain Atlas, Rural Water Commission of Victoria, Armadale, 1986 (No1, p.47); Murray-Goulburn Water (No2, No 4 p.47); Renmark Paringa Council (No3, p.47); State Library of Victoria RWP/M188 (No1, p.48), RWG/B19 (No6 p.48), State Library of South Australia B20274 (No2, p.48), B23201 (No3 p.48), B23228 (No4, p.48), B20273 (No5, p.48); Aerial Photography: South Australia, Department of Lands, River Murray flood line 1956 (cartographic material): aerial photo mosaic series, Department of Lands, Adelaide, 1956; Daidalos Architektur, Kunst, Kultur, No 26, 15 December 1987 (No1, p.103); Murray-Darling Basin Commission The River Murray System, the regulation and distribution of the River Murray waters, Murray-Darling Basin Commission, Canberra, (No2, p. 103), (No1,2, p.104), Murray-Darling Basin Commission (No1, p.105); Carlo Scarpa at the Querini Stampalia, Onlus, Venice, 2002 (p. 106, p.108); Paul Fennis, Art Unlimited Amsterdam (No1, p. 110); Karel Tomei, Art Unlimited Amsterdam (No2, p.110); T Kawamata, Tadashi Kawamata: works in progress in Zug, 1996-1999, Hatje Cantz Verlag, Ostfildern, 2000 (No1, 2 p.111); Mapland, Department of Environment and Heritage, South Australia. (No1, p.115); State Library of South Australia B6159 (No2, p.115); Education Department of Victoria, How do towns change? – Tallangatta, study print set No. 89, Audio Visual Education Centre, Melbourne, 1978, (No1,2,5,6,7, p.120); (p.121); Riverine Herald, 1977 (p.123); State Library of Victoria, RWG/M128B (p.125); Mackay, N & D Eastburn, The Murray, Murray-Darling Basin Commission, Canberra, 1990 (p.125); Aerial Photography: South Australia, Department of Lands, River Murray flood line 1956 (cartographic material): aerial photo mosaic series, Department of Lands, Adelaide, 1956. (p.142) State Library of South Australia (p.144-145); London, G & D Richards, Donaldson + Warn, Crossing Midfield, Birkhäuser, Basel, 2000, (No2, p156); J Kastner & B Wallis, Land and environmental art, Phaidon, London, 1998 (No3, p.156); Mapland, Department of Environment and Heritage, South Australia, (p.161)
I have many people to thank for their assistance and support. Firstly, my supervisor Professor Leon van Schaik has provided encouragement and insightful critique when it was most needed. Michelle and Oscar have lived with the PhD and have been my travel companions for thousands of kilometres along the Murray. Michelle as a partner in practice, teaching and life has been a fantastic companion, offering critique and encouragement as well as co-authoring several design studios based along the Murray. The many guest critics at the GRC weekends, particularly Ranulf Glanville.

Part of the PhD has filtered through into my teaching practice. Here I thank my colleagues at RMIT, particularly Sand Helsel, Martyn Hook, Anna Johnson and Brent Allpress. They have all helped shape and refine the direction of the work. I am also grateful to Anna Johnson for reading the draft manuscript and her insightful comments. Dr Paul Sinclair was generous enough to share his research with me and the student groups I have taught. Niki Kalms as project manager for the Unused exhibition.

The architecture program and the School of Architecture and Design at RMIT.

The production of this document would not have been possible without the assistance of Solveig Almo, who has finessed its layout and shown extra ordinary commitment in the process. Sam Hunter assisted with diagrams near the end.

Maps have shaped my understanding of the River Murray. Merridy Lawler at the State Library of South Australia, and Judy Schofield, at the State Library of Victoria Australia have attended to every request, providing valuable assistance. The Murray-Goulburn Water Authority, at Tatura Victoria.

Several people in communities along the river went out of their way to provide access to various collections and share with me their knowledge of the River and its people. At Tallangatta: Beverly Stuart, Jennifer Catherell, Harold Craig, Jerry Purvis and John Stevenson from Albury Historical Society. At Wentworth: Leanne W atmuff, librarian at the Wentworth Regional Library, At Renmark: David Case, Town Planner Renmark Paringa Council; Grant Whiteman General Manager, Australian Landscape Trust, Manager Riverland Operations, Calperum Station; Chris Alderton Riverland Local Action Planning Case Study Officer. At Hindmarsh Island: Tim Wilson and Russel Seaman, Department for Environment and Heritage South Australia.

Student assistants, Jeffrey Liew, Mei Fong Ng, Michelle MacMahon (mapping), Nor Azriah Hassan (modelling and exhibition), Nick Ashby (rihnomodel and renders).