CRC for
Water Sensitive Cities

REPORT: Project A3.2. Better Regulatory Frameworks for Water Sensitive Cities

Kalkallo: a case study in technological innovation amidst complex regulation

An Australian Government Initiative

CRC AUSTRALIA

Report: Project A3.2
Better Regulatory Frameworks For Water Sensitive Cities
Kalkallo: a case study in technological innovation amidst complex regulation

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Table of Abbreviations

ABBREVIATION	FULL REFERENCE
BRF	Better Regulatory Frameworks
CRC	Cooperative Research Centre for Water Sensitive Cities
DH	Department of Health
EPA	Environment Protection Authority
ESC	Essential Services Commission
IWCM	Integrated water cycle management
Kalkallo IWCMP	Kalkallo Integrated Water Cycle Management Plan
Kalkallo Project	Kalkallo stormwater harvesting and reuse project
MAB	MAB Corporation
MW	Melbourne Water
SDWA	*Safe Drinking Water Act 2003* (Vic)
Stormwater Guidelines	Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – Stormwater Harvesting and Reuse
VPPs	The Victorian Planning Provisions
Water Act	*Water Act 1989* (Vic)
WSC	Water Sensitive City
WSUD	Water Sensitive Urban Design
YVW	Yarra Valley Water

Executive Summary

This is a report of a case study undertaken over 2014, which investigated how current regulatory and risk allocation frameworks impacted upon the innovative Kalkallo stormwater harvesting and reuse project (**Kalkallo Project**). The Kalkallo Project is a precinct level project in Melbourne's northern growth corridor. Our research sought not only to identify the regulatory and risk allocation frameworks that impacted on the Kalkallo Project, but also to understand the role these played in decision making. Interviews were held with 11 participants across the main organisations involved in establishing the Kalkallo Project: Yarra Valley Water (**YVW**), the Victorian Department of Health, Melbourne Water and MAB Corporation.

The Kalkallo Project's key innovation was the attempt to treat stormwater to a standard suitable for direct injection into potable supplies. There was no formal regulatory process in existence in Victoria governing how such a stormwater reuse project should be designed and implemented. The treatment plant has now been built but is yet to commence operating because delays in the wider development have meant that adequate stormwater run-off quantities are not yet available. Agreement has been reached that, once the catchment yields a suitable volume of run-off, the treatment system will be operated for a testing period to validate the treatment process. For now, therefore, the Kalkallo Project is best categorised as an example of a partially successful implementation of an innovative urban water management practice within current regulatory and risk management frameworks. It has become a successful *proof of concept* project rather than an operating plant.

There were a number of different regulatory approvals that were required. However, to date, the securing of these does not appear to have been unduly difficult. Moreover, and interestingly, several common types of approval, such as public health approval and environmental approval, were not required. This contrasts sharply with the formal requirement placed on those undertaking large scale sewage recycling projects in Victoria, who must secure express regulatory approvals in these domains.

We observed how the availability of Commonwealth funding operated as a strong regulatory intervention, in a broad sense, by providing an incentive for YVW and its partners to experiment with new ways to deliver water supply in growth areas. This experimentation is leading to new learning, both from a technical and a policy perspective. Our case study furthers such policy learning by disseminating knowledge about the ways in which this experimentation was influenced by existing regulatory and risk allocation arrangements.

In particular, we observed that elements within existing legislative and regulative frameworks played a crucial role, both directly and indirectly, as project enablers; either by providing an incentive to take action, or by providing a broader supportive environment within which innovation could occur.

Conversely, we did not identify any particular barrier in current legislation that operated as a significant impediment to the Kalkallo Project. Indeed, when regulation was identified as an impediment to action, this often involved gaps in the formal regulatory frameworks in relation to projects involving stormwater as a source. Our analysis acknowledged that where there was no specific regulation concerning a WSC innovation, the background law inhabits the space, albeit that this may be obscure, costly to discern or unsuitable for the purposes of WSC innovation. Indeed, some saw this lack of clear regulation as a *regulatory void*, which left room for discretion, interpretation and new direction setting. However, another way to understand the regulatory void is as an enabling space that can act as an incubator within which early, test cases of innovation can occur. In this *regulatory test case* we saw how YVW, in the absence of an express regulatory scheme for this type of water use and treatment, mirrored the requirements that would have applied to a recycled sewage project. This included approaching the water quality regulator for advice. From such test cases new regulatory regimes suitable for new treatment methods may eventually emerge.

This suggests that we may need to reframe how regulation is understood in the context of WSC innovation. Urban water practitioners may have historically interpreted regulation as *black letter law* (prescriptive rules with legal force) but our research shows both that regulation is far broader than this and that regulation plays an important role in enabling innovation and adoption. Space within an existing regulatory framework can enable controlled experimentation to occur at the margins by trusted players, and policy makers make discoveries about what type of regulation is needed by observing the experiment. Following this, clarification of the regulatory environment can enable further innovation by providing certainty; by guiding decision-making; and by ensuring that risk is allocated to appropriate parties. By setting clear requirements that must be satisfied, regulation may also align disparate stakeholders around a course of action that may have been impossible without such an explicit compliance requirement.

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Section 1
Introduction

1

Introduction

1.1 THE BRF PROJECT

A Water Sensitive City (**WSC**) has an urban environment that is 'resilient, liveable, productive and sustainable'.[1] The Cooperative Research Centre for Water Sensitive Cities (**CRC**) is a major interdisciplinary and multi-institutional collaborative research initiative aimed at revolutionising water management within Australia and overseas. Through an extensive consultation process, CRC participants and stakeholders identified a number of key challenges to the necessary urban water reforms that would be required to transform Australian cities into WSCs; these challenges included current regulatory and risk allocation frameworks (Brown, Farrelly et al. 2009, Brown, Keath et al. 2009, Farrelly and Brown 2011).

Our research project is the Better Regulatory Frameworks (**BRF**) project, which is sub-project A3.2 of the CRC. The BRF project seeks to better understand the challenges posed to innovation in the urban water sector by current regulatory and risk allocation frameworks. The BRF project will produce a series of reports, articles and presentations under the general aim of working towards better regulatory frameworks for WSC activities and reducing institutional and practice barriers to innovation in Water Sensitive Urban Design (**WSUD**).

1.2 ABOUT THIS REPORT

This report, '*Kalkallo - a case study in technological innovation amidst complex regulation',* is the fifth publication of the BRF project. Undertaken by researchers at Monash University, it is a report of a case study undertaken in 2014. We investigated how current regulatory and risk allocation frameworks influenced and impacted upon the Kalkallo stormwater harvesting and reuse project (**Kalkallo Project**). This report builds upon the first four reports of the BRF project which have provided a stock-take of the legislation relating to urban water regulation across three Australian states and proposed a preliminary conceptual model of the Australian urban water regulatory space.[2]

Our preliminary mapping work (De Sousa 2013, DeSousa 2014, McCallum 2014) has identified a picture of great complexity in the current regulatory frameworks that impact upon urban water management in both Melbourne and Perth. De Sousa's legislative mapping (2013, 2014) identified many existing legislative provisions that could be used to promote the uptake of more water sensitive practices, alongside many other provisions that may act as blockers or which may hinder the adoption of such practices. These observations on the place of legislation in helping or hindering water sensitive activities come on top of a wealth

1 See http://watersensitivecities.org.au/what-is-a-water-sensitive-city/ accessed 14.10.14.

2 Reports one, three and four, *'Results of Legislative Stocktake for Victoria'*, *'Results of Legislative Stocktake for Western Australia'*, and *'Results of Legislative Stocktake for Queensland'* were undertaken by Maddocks law firm, a CRC partner. Report four was published in December 2014. These provide a legislative stock-take of primary and selected secondary legislation relating to urban water legislation across Victoria, Western Australia and Queensland. Report two, *'Conceptualising Urban Water Regulation – the Melbourne System'*, was undertaken by researchers at Monash University and mapped the regulatory frameworks that impact on urban water management in Victoria, with a particular focus on the Melbourne metropolitan region. This second report also included a preliminary conceptual model of Melbourne's regulatory space and an issues paper.

of more general reflections from the regulation literature. This broader academic and practice literature on regulatory frameworks makes many claims about the need for regulatory reform, and indicates that significant gaps and barriers exist, at least at a theoretical level, in current regulatory frameworks (Frontier Economics 2008, Power 2010, Productivity Commission 2011, PwC Australia 2011). Added to this are the many other factors which are likely to influence innovation. Dobbie, Brookes et al (2013), for instance, argue that actual and perceived risks and their allocation can act as barriers to innovation.

However, moving from an identification of the myriad potential regulatory and risk allocation impediments and facilitators, to an assessment of what are the most significant to the uptake of particular new technologies, remains a challenge. Indeed, as Brown, Farelly et al (2009) observe 'few of the identified barriers have been rigorously informed by the tacit and experiential knowledge of on-ground practitioners responsible for delivering water services' (2009, p.17). This tension between our views of regulation acting as a barrier to innovation at a general level, and its effects at a more real world pragmatic level, has been observed in our conversations with researchers and practitioners. Anecdotally, our discussions with researchers and practitioners found general support for the notion that regulation was impeding innovative WSC activities, but those sampled also found it difficult to identify specific examples of current regulatory frameworks acting as a hindrance to a particular project.

To date, very little work has been conducted at the scale of implementation of innovative urban water projects into analysing where regulatory and risk allocation problems actually lie and what has been done to resolve any problems that arose. Accordingly, we identified a need to take the research beyond an abstract determination of barriers and facilitators to identify, in practical terms, what matters to implementation in the context of particular projects.

In this report the term *enabler* is used to describe those factors which encouraged or allowed the Kalkallo Project to proceed. These include both direct enablers, that provided specific incentives for action, and indirect enablers, that created a supportive environment in which the Kalkallo Project could occur. In contrast, the term *impediment* is used to describe those factors which discouraged the Kalkallo Project from proceeding. Surmountable impediments, that slowed the Kalkallo Project or made it harder than it would otherwise have been, have been termed *hindrances*. Insurmountable impediments have been termed *barriers*.

1.3 ABOUT OUR CASE

The Kalkallo Project is a partially constructed project which, when fully operational, is intended to capture and reuse stormwater, for a variety of purposes. The project is being undertaken in Merrifield, a major new greenfield development in Melbourne's northern development corridor. The aim of our case study was to identify and gain critical insights into what were the real impediments and enablers to implementation of the Kalkallo Project, and in particular which of these related to current regulatory and risk allocation frameworks. We were also interested in understanding how any project impediments had been successfully overcome.

The reuse of stormwater is a topic that was of particular interest to the previous Victorian Government and our selection of the Kalkallo Project as a suitable case study was directly recommended by the BRF project's Victorian stakeholder advisory group.[3]

3 The previous Victorian Government being the Victorian Coalition Government of 2010-2014.

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1.4 OUR CONCEPTUAL FRAME

Regulatory frameworks

The BRF project adopts a broad conception of *regulation* as 'an intentional measure or intervention that seeks to change the behaviour of individuals or groups' (Freiberg 2010,p.4). This conceptualisation of regulation itself builds upon earlier work such as, for example, that of Black (2002) and Selznick (1985). Regulation as a practice focused on behaviour change encompasses both activities undertaken by governments and those undertaken by a wide array of non-governmental actors. In other words, this conception of regulation includes both interventions by way of formal legal rules and interventions by a host of other mechanisms. Using this lens, then, what becomes important is not the legal form of the action but its influence on behaviour.

One result of adopting a wide conception of regulation is that the regulatory framework surrounding urban water management cannot be visualised in a simple linear fashion as a set of cause and effect relationships solely focused on the actions of government. The framework must be visualised as a web of regulatory tools originating from a variety of sources. Indeed, an issue as complex as urban water management will be impacted upon by a multitude of webs layered over each other in three dimensions. For example, webs relating to the protection of the environment and public health will be layered over, and will connect in complex ways, with those relating to urban planning, which in turn are layered over and connecting to those relating to resource management. Regulatory scholars term this concept the *regulatory space* (Hancher and Moran 1989). Earlier work in this BRF project (McCallum 2014) discerned five key systems of regulation that most significantly impact on urban water management in Australian cities.[4] Each of these systems targets the achievement of a different set of objectives.

Taking such a broad conception of regulation is important for the BRF project, so that the full range of potential regulatory impediments to, or enablers of, WSCs can be considered and their relative influence established. Without an understanding of the extremely rich regulatory space in which Australian urban water management practices exist, it will not be possible to identify those parts of the framework that most significantly influence the successful uptake of new technologies.

4 These can be called the Water Resource Regulation System, the Service Delivery and Price Regulation System, the Built Environment Regulation System, the Environmental Health Regulation System and the Public Health Regulation System.

Risk allocation frameworks

The BRF project's conceptual risk frame for understanding WSC risks is based on the observation that there are four categories of *traditional harms* that are managed by current urban water management frameworks: security of supply harms; environmental harms; flooding/stormwater damage harms; and health harms. In addition, there are three categories of *emerging harm arenas* that have been identified by WSC advocates; these arenas are liveability, sustainability and resilience.

There is a common view that managing the traditional harms through currently successful practices and existing operating systems may actually be acting as a constraint to innovation. Therefore, managing these harms in different ways, so that innovation is not stifled, may be a significant potential enabler of WSCs. While risk management encompasses a range of approaches, including mitigation and avoidance strategies, our focus is primarily on allocation of risk through legal mechanisms.

Using this lens, risk allocation frameworks can best be understood as those parts of the regulatory framework that allocate, re-allocate or constrain the allocation of legal risks. Only by understanding what project risks are being identified by project participants and how these are being allocated and re-allocated between the parties can we begin to disentangle where problems of inappropriate risk allocation are arising in innovative water management projects.

1.5 OUR RESEARCH QUESTIONS AND INITIAL HYPOTHESIS

Our research sought to answer two related questions:

1. What were the regulatory and risk allocation frameworks that impacted on the Kalkallo Project?
2. What role did these frameworks play in decision-making in relation to the Kalkallo Project, and in particular, how did these frameworks act as impediments and/or enablers to the implementation of innovation?

Based on information provided by the BRF project's Victorian stakeholder advisory group, our initial hypothesis was that the current regulatory and risk allocation frameworks, and specifically a failure to secure the necessary approvals required from these frameworks, had acted as a barrier to the successful implementation of the Kalkallo Project. This initial hypothesis is represented by the logic model shown in by Figure 1.1 on the next page. The case study sought to test this initial hypothesis against the actual data collected about the role such frameworks played on the Kalkallo Project.

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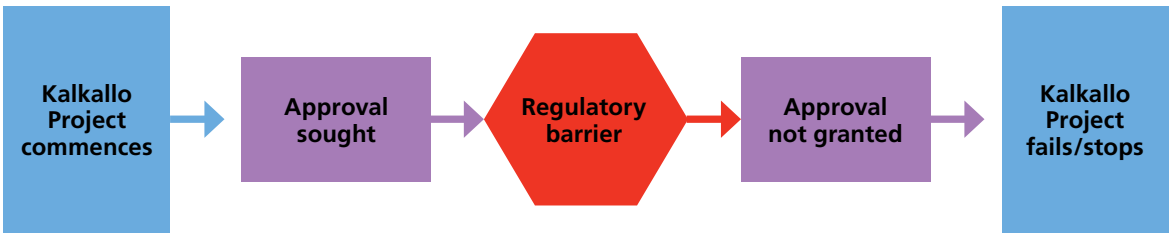
Figure 1.1: Initial hypothesis - current regulatory and risk allocation frameworks acted as a barrier to the Kalkallo Project



1.6 CONTENT OF THIS REPORT

This Section 1 outlines the reasons why the BRF project undertook a case study into the Kalkallo Project and the research questions our case study sought to answer. Section 2 provides some background information and surrounding context to the Kalkallo Project. Section 3 then describes the methodology used to conduct the case study research, while in Section 4, we present a factual description of the Kalkallo Project. In Section 5 we first analyse what project participants said about the success of the Kalkallo Project and the factors that acted both as enablers and as impediments to the Kalkallo Project. In doing so, we answer the first part of our research question. Section 5 then discusses these findings and attempts to answer the second part of the research question. In this section two other innovative stormwater projects that were being progressed at the same time in Melbourne are contrasted with the Kalkallo Project. Finally, Section 6 provides some concluding remarks about our understanding of how regulatory and risk allocation frameworks acted as enablers and impediments to the Kalkallo Project, and what this case suggests as far as concerns developing a better understanding of how regulatory and risk allocation frameworks actually influence innovative urban water management projects.

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Section 2

Background and context

2

Background and context

2.1 URBAN WATER MANAGEMENT IN METROPOLITAN MELBOURNE

Institutional context

In metropolitan Melbourne three state-owned water corporations YVW, South East Water and City West Water, provide water supply and sewerage services to customers, on a monopoly basis, in defined geographical areas. The provision of drainage services is a shared responsibility between Melbourne Water (**MW**), a further state-owned water corporation, and the municipal councils. Melbourne Water is also responsible for bulk water supply and for ensuring waterways health in the metropolitan area.[5]

Historical context

The majority of water used in Melbourne comes from protected forested water catchments and is stored in dams before use. However, in recent years the supply system has been augmented by the addition of a desalination facility and by the use of recycled water, and locally collected stormwater and rainwater, for non-potable purposes (Office of Living Victoria 2013). Over time, the focus of urban water management in Melbourne has moved beyond the early goals of securing a safe drinking water supply, and ensuring the adequate removal of sewage and stormwater, to encompass additional goals around flood protection, dealing with the environmental damage caused by wastewater, and increasing public amenity (Office of Living Victoria 2013). Meanwhile, growing environmental concerns about the effect that the stormwater run-off produced by urban areas is having on urban waterways (Wong, Allen et al. 2013) has led to the incorporation of WSUD practices into developments in urban areas. These WSUD practices seek to retain stormwater in the urban environment rather than quickly conveying it away in storm drains.

From the mid to late 1990s until 2009 Melbourne, along with much of Australia, experienced extreme weather conditions due to the *millennium drought*. During this period, concerns about water security and the provision of green infrastructure became a key focus for Australian governments (Productivity Commission 2011). In this context, the harvesting of stormwater as a potential resource began to receive attention (Wong, Allen et al. 2013).

5 See http://www.depi.vic.gov.au/water/governing-water-resources/water-corporations accessed 16.09.14.

Alongside these developments in urban water management, Melbourne has undergone a period of rapid population expansion. This is expected to continue into the medium term, and this is pushing an expansion of the urban area (State of Victoria 2014). While such growth imposes additional constraints upon available water sources, and exacerbates problems of environmental degradation, it also offers opportunities to implement new practices in the growth areas (Office of Living Victoria 2013).

Policy context

As the millennium drought progressed, the Victorian Government responded in a variety of ways all aiming to control demand for water resources and address environmental concerns (Ferguson, Brown et al. 2013). Key policy statements from this time were:

1. The 2004, '*Our Water Our Future White Paper'* (Department of Sustainability and the Environment 2004), which proposed a long term plan for sustainable water management in Victoria.
2. The 2006, '*Central Region Sustainable Water Strategy' (Department of Sustainability and Environment 2006).*
3. The 2007, '*Our Water Our Future - The Next Stage of the Government's Water Plan'* (Department of Sustainability and Environment and 2007), which included proposals for large scale infrastructure projects to boost supply.

Meanwhile, at the federal level, the Commonwealth Government developed a long term strategy aimed at better water resource management in a drying climate called '*Water for the Future*' (Department of Sustainability 2010). Substantial amounts of federal grant funding was made available from a fund associated with this initiative for suitable projects, including stormwater harvesting and reuse projects, showcasing new technologies.

State level planning context

The enabling framework for the Victorian planning system is the *Planning and Environment Act 1987 (Vic)* which sets broad objectives, rules and principles, and defines the roles of those who operate in the system. The Victorian Planning Provisions (**VPPs**) are quasi-legislative rules operating under this Act that set out standard provisions to guide the development of specific municipal level Planning Schemes. The VPPs take effect through the Planning Scheme for an individual municipal area. A Planning Scheme determines the zoning of land, specifies how land in a zone may be used and/or developed, and specifies the uses and developments for which a planning permit is required. Unless a particular land use or development is allowed, as of right, under the relevant Planning Scheme, it will require authorisation through the issue of a planning permit by the local council.

In 2002, the Victorian Government released a strategic planning framework document for Melbourne entitled, '*Melbourne 2030',* which identified five designated growth areas in metropolitan Melbourne. The Growth Areas Authority was made responsible for the planned release of land and the development, together with other appropriate stakeholders, of Precinct Structure Plans for these growth areas. Such Precinct Structure Plans should include appropriate water servicing options and integrated water cycle management options (Office of Living Victoria 2013).

2

The integrated water management objectives under Clause 56.07 of the VPPs were introduced in October 2006 and apply to all new residential subdivisions with three or more lots. Clause 56.07-2 contains the reused and recycled water objective, which enables a water corporation to mandate the substitution of drinking water with reused and recycled water, for non-drinking purposes, in a residential development. Clause 56.07-4 contains the urban run-off management objectives. These require developers to put in place WSUD features in all new residential developments.

Legal and regulatory context

Victoria's state-owned water corporations are principally governed by the *Water Act 1989 (Vic)* (**Water Act**) which contains the overarching legislative framework for water law in Victoria (McCallum 2014). Together with the Statement of Obligations, the Water Act sets out the water and sewerage service delivery requirements of the water corporations. These include provisions which require the water corporations to be sustainable in their use of water resources.[6] The quality and price of service delivery by the water corporations is also regulated by Victoria's independent economic regulator the Essential Services Commission (**ESC**).

The Water Act also governs MW's bulk water supply, drainage service provision and waterways management roles. The current Statement of Obligations requires integrated water cycle management (**IWCM**) be taken into account in the planning of drainage services. MW seeks to recover the cost of providing drainage services to new developments from developers in the form of a new developer contribution. Local councils are given the power in the *Local Government Act 1989 (Vic)* to manage local drainage assets.

When delivering services the water corporations must also comply with state health and environmental laws such as the *Safe Drinking Water Act 2003 (Vic)* (**SDWA**), the *Environment Protection Act 1970 (Vic),* and the State Environment Protection Policy (Waters of Victoria). The Victorian Department of Health (**DH**) is the public health regulator and the Environment Protection Authority (**EPA**) acts as the environmental health regulator.

2.2 BACKGROUND TO THE KALKALLO PROJECT

Site location

The Kalkallo Project is sited within the Merrifield Development, which is located in the suburb of Mickleham, 30km north of the Melbourne's central business district and adjacent to the existing Kalkallo township. The site location is shown at Figure 2.1 on the next page. The Merrifield Development covers approximately 410 hectares and is mostly flat. It is bounded by the Hume Freeway to the east, Gunns Gully Road to the north, Donnybrook Road to the south and the proposed Outer Metropolitan Ring Road to the west. The Kalkallo Creek, a tributary of the Merri Creek, crosses the north-east corner of the development. The Merrifield Development is located within the Hume City local municipality and water and sewerage services to the surrounding area are provided by YVW.

6 See Section 93 of the Water Act.

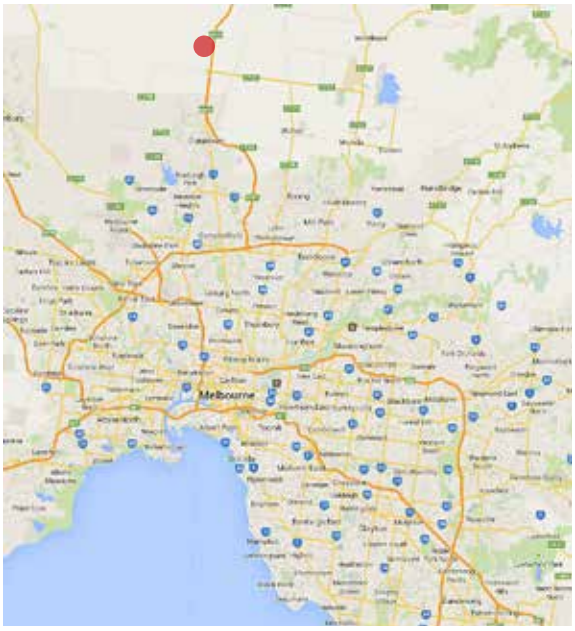

Figure 2.1: Site location map
(Source: Google Maps)

On completion, the mixed use Merrifield Development is expected to provide 4000 dwellings, a 300-hectare business park, the Merrifield City Centre, 110-hectares of commercial space for the northern corridor, primary and secondary schools, a community centre and a regional park. The Kalkallo Project is located within the commercial part of the development, see Figure 2.2 below.

Figure 2.2: Merrifield Development Master Plan (Source: MAB Corporation)

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Local history of recycled water provision

Early plans for Melbourne's north designated the area around the Merrifield Development part of a green wedge. As a consequence, the area was not serviced by water and sewerage infrastructure. However, during the 1990s a significant amount of land to Melbourne's north was designated for development by the Victorian Government. This posed significant challenges to YVW in respect of the delivery of services to the proposed outlying developments which sat outside of existing supply networks. [7]

By the early 2000s, YVW was exploring ways of being more environmentally sustainable. To address both upcoming infrastructure requirements and its environmental sustainability goals, YVW installed a localised plant for sewerage treatment at the Aurora Estate, an earlier development in the northern growth corridor. This plant had made Class A recycled water available to residents in the development via a third pipe system.[8] [9] At the time this was extremely innovative. As the millennium drought progressed, the availability of recycled water through third pipe systems became increasingly popular with purchasers and developers in this part of Melbourne.

Meanwhile MW was becoming more aware of the detrimental environmental impacts, in terms of erosion, biodiversity loss and poor water quality, increased stormwater runoff flows from new developments were having on Melbourne's waterways. As a consequence, MW was pursuing ways in which, as an organisation, it could support IWCM projects to better manage these impacts.

Local planning and regulatory context

Hume City was identified a designated growth area in *Melbourne 2030* and much of Hume City, including the Merrifield Development site, was placed within the Urban Growth Boundary.[10] The Merrifield Estate Precinct Structure Plan was approved by the Victorian Government in June 2012 and the Metropolitan Planning Authority has endorsed the Merrifield Development. The site has been rezoned to facilitate the development.

Taking advantage of powers available to it Cl 56 in the VPPs, YVW mandated that all residential developments in Melbourne's northern growth corridor be supplied with recycled water via a third pipe system.

7 From the reflections and observations of a YVW participant in a case study interview.
8 A third pipe system, otherwise known as a purple pipe system, supplies recycled water to a property through an additional set of pipes which can then be connected to devices such as toilets and washing machines.
9 The supply of water to the Aurora Estate development was undertaken by YVW in conjunction with VicUrban, a public development body.
10 This vision is now also reflected in the Hume Planning Scheme and the Hume Growth Area Framework Plan.

3

Section 3
Methodology

3 Methodology

3.1 RESEARCH DESIGN

Our research seeks to understand a complex phenomenon; how regulatory and risk allocation frameworks influenced a specific attempt to implement an innovative urban water management practice, without destroying the complexity or the context. Answering the research questions, therefore, required the use of a qualitative methodology (Richards and Morse 2013). Within the spectrum of qualitative methods, the case study method was felt to be most appropriate, as the research questions involved an attempt to understand a bounded complex phenomenon in a real-life setting (Richards and Morse 2013, Yin 2014).

It is intended that a comparative case study method will be used by the BRF project to explore how current regulatory and risk frameworks influenced various different attempts to implement new urban water management practices. The Kalkallo Project is the subject of the first case study. The study has been conducted by Monash University researchers. The case study design is also intended to be applied in later years of the BRF project through further case studies in Western Australia and Queensland. By undertaking multiple case studies, both the findings of the studies and the analytic conclusions, will be more robust. The projects are likely to be at different stages of development, but will all connect with the objectives of the CRC in that they embody specific aspects of the WSC ideal. Case study selection will be informed by stakeholders in each jurisdiction. Melbourne stakeholders directly informed choice of this case.

Two sources of data were collected for the Kalkallo Project case study. The primary data source was semi-structured interviews with key project participants who had direct experience of the phenomenon of interest. A secondary data source was documentation about the Kalkallo Project, both that supplied by participants, and publicly available documentation about the Kalkallo Project and its surrounding context. Appropriate human ethics approval was sought, and obtained, from the Monash University Human Ethics Committee, before commencing data collection through interviews. The terms of this approval guided the processes of participant selection, participant identification, data collection and data handling.

Validity and rigour were ensured in the research design through a variety of mechanisms. Purposive sampling techniques (Richards and Morse 2013) were used to choose participants for interview based on their direct and personal knowledge of the Kalkallo Project. Snowball sampling was then used to identify further participants who also meet these criteria. Data collection was continued until the interview data reached saturation, and the data collection team formed an impression that no new perspectives were being given. Finally, a clear audit trail of the data collection process was kept.

3.2 DATA COLLECTION

Fieldwork was conducted by Professor Graeme Hodge, Associate Professor Pamela O'Connor, Dr Ruth Lane, Ms Tara McCallum and Ms Linda Choi. Interviews were held with 11 participants representing key staff involved with the Kalkallo Project across the main organisations involved in its implementation. These organisations were YVW, DH, MAB Corporation (**MAB**) and MW.

Initial contact was made with participants within these organisations through recommendations from the CRC partner network. The snowball technique was then adopted to identify others by recommendation. All those contacted received a copy of an Explanatory Statement about the case study and its purpose, and inviting their participation.

All interviews were approximately one hour in duration and involved Tara McCallum and one other member of the research team. Consent to take part in the data collection process was obtained prior each interview commencing. The interviews were audio recorded, transcribed and approved by the participants prior to data analysis. Interviews were based around the semi-structured questions contained in Appendix 1, which represented our initial view of the topics that should be covered during the interviews. These initial topics developed during the course of data collection, with the expansion of knowledge and new ideas that occurs during the process of fieldwork. They were also supplemented by additional questions prepared for individual participants.

During one interview the recording equipment failed. A written record of the interview was produced, based on contemporaneous notes taken by the interviewer. This record was agreed to be an accurate record of the interview by all those present during the interview and was analysed alongside the transcript data.

Documentary data was sought from participants before and during the interview, for copying and documentary analysis. Publicly available regulatory documents such as legislation, regulations, guidelines and codes were also gathered for analysis.

3.3 DATA ANALYSIS STRATEGY

The analytical strategy used in this case study involved the descriptive task of identifying what the relevant regulatory and risk allocation frameworks were and what role they played in decision making. This involved:

1. A legal analysis of publicly available legal and regulatory documents, informed by participant data, to identify what the legal and regulatory requirements for the Kalkallo Project were likely to have been and to place these within the BRF project's conceptual framing of Australian urban water regulation.
2. Developing a chronology to describe how key events and decisions in the Kalkallo Project were related to each other in a temporal sense.
3. Developing a full case description of the Kalkallo Project with a particular focus on why the Kalkallo Project was instigated, how it was innovative, what regulatory approvals were required, how these were obtained, the current status of the Kalkallo Project and how it has performed against expectations.
4. The identification of the factors that played a role in enabling the Kalkallo Project and tabulating these.
5. The identification of the factors that played a role in impeding the Kalkallo Project and tabulating these.

3

However, analysing how current regulatory and risk allocation frameworks acted as impediments and/or enablers to the Kalkallo Project involved going beyond the descriptive to begin to develop an explanation for what was being observed. This involved pattern matching the collected empirical data both against the initial hypothesis (that regulatory barriers had caused project failure) and an alternative hypothesis. The alternative hypothesis which evolved was that different parts of regulatory and risk allocation frameworks may be acting variously as both enablers and impediments to the success of the Kalkallo Project.

This alternative hypothesis was founded on a broader observation by McCallum (2014) that the regulatory space in which urban water management exists in Victoria is very busy because it seeks to balance many competing regulatory objectives. This logically suggests that some parts of the complex regulatory space may be pushing innovation. However, any attempt at a new practice would have to navigate a complex regulatory environment in which there are many potential impediments to success. This is likely to be challenging. In addition, the lack of a clear pathway through the regulatory space may make implementation of innovative projects difficult and diminish their chances of success. These difficulties may be increased if there are gaps in regulatory frameworks which mean contradictory positions can be taken and if key decision makers have a risk adverse professional culture. A lack of suitable risk allocation tools may also be a problem if this results in no party being comfortable bearing the risks inherent in the new practice.

3.4 APPLYING THE STRATEGY

The case study analysis adopted Nvivo software as a tool to manage and code the data and to perform initial queries within the coded data. Once data collection was substantially complete, initial categories were developed for coding the interview transcript data. These categories were based on the need to capture context for the case description and to capture data about what participants believed were the actual impediments and enablers to the Kalkallo Project. A model of the initial coding structure used is attached in Appendix 2. Alongside the coding process, detailed memos were produced to explore the coded categories, and other emerging observations, in greater depth. This enabled the development of a rich picture of the enablers and impediments to the Kalkallo Project, how risk was allocated and how any impediments were overcome.

The data was also analysed to identify where participants discussed other innovative water projects they had been involved with. The purpose of this was to investigate how the Kalkallo Project was similar to, or different from, other cases the interviewees were familiar with. This would enable some broader comparative observations to be made about regulatory and risk allocation impediments and enablers.

4

Section 4
The case

4 The case

4.1 DESCRIPTION OF THE KALKALLO PROJECT

The Kalkallo Project involves the capture and treatment of stormwater, from a 160-hectare catchment area within the commercial precinct at the Merrifield Development, via traditional stormwater drains, as shown in Figure 4.1 below (Yarra Valley Water 2010). The collected stormwater is intended to be treated in a series of architecturally designed wetlands and settling ponds, stored in a large storage dam along the Hume Highway frontage of the site, before being passed through a state-of-the-art treatment plant. The treated water will then be stored in batch tanks, and tested for water quality assurance purposes, before being released into the supply network. YVW (2010) aims to produce 1M/L a day of a potable quality end product which could ultimately be used to supplement drinking water supplies both across the development and Melbourne's wider northern growth corridor. However, in the short term, the water will be used to supplement the recycled water network and/or for irrigation purposes.

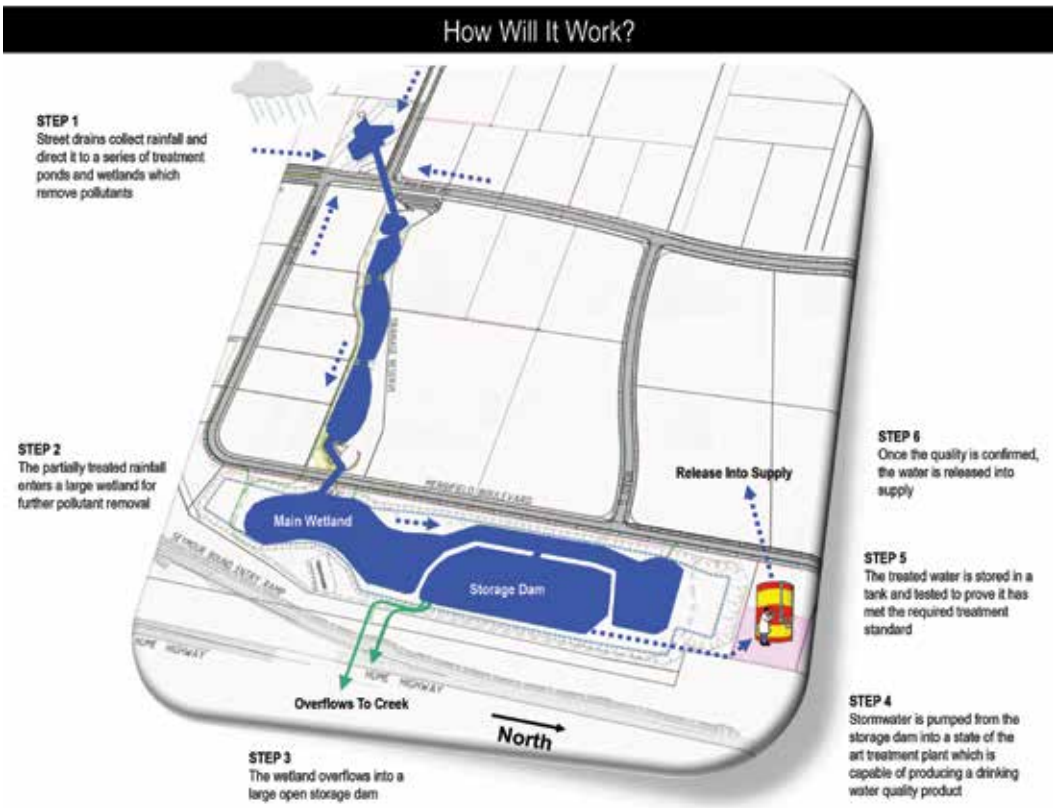

Figure 4.1: The Kalkallo Project – how will it work? (Source: Yarra Valley Water (2010))

4.2 HOW WAS THE KALKALLO PROJECT INNOVATIVE?

Whilst the technologies adopted are not necessarily new, the way in which they have been combined in the Kalkallo Project is unique. As the first large scale development to recycle stormwater for potential potable use in Australia, the Kalkallo Project is seen by its proponents as being of:

> 'international significance showcasing how urban water infrastructure can be designed differently to deliver a more resilient water solution' (Yarra Valley Water).

The key innovation of the Kalkallo Project is the attempt to treat stormwater to a standard suitable for direct injection into potable supplies, using a precinct scale catchment and modest storage times.[11] The Kalkallo Project's direct contribution to this development's water supply is likely to be modest, as it was conceived as a case study to test the viability of the concept, rather than as a scaled implementation of a new technology. Nevertheless, if successful in proving the concept, the Kalkallo Project's success may enable future residential developments to harvest stormwater directly for potable reuse. This would avoid having to install third pipe systems to supply recycled water for non-potable use, as all water captured would be of a potable standard, thus reducing costs in the long term. In addition, stormwater reuse at such a scale would enable a far greater proportion of stormwater to be reused than is possible through current non-potable uses. This would offer significantly greater environmental benefits in terms of stormwater quality and flow than are possible using existing approaches.

4.3 KEY ACTORS AND THEIR ROLES IN THE KALKALLO PROJECT

The developer of the entire Merrifield Development is MAB. MAB is responsible for ensuring that appropriate infrastructure is incorporated into the evolving development to service the planned residential and commercial buildings that will be built there. YVW, as the local water corporation, is responsible for providing water and sewerage services to the new development.

MW is responsible for the planning of suitable drainage works for development sites in metropolitan Melbourne and MAB is obliged to obtain MW's and Hume City's approval to the drainage works it will incorporate into the development. Once built, MW will be responsible for the maintenance of drainage at the large catchment scale while Hume City, as the local council, will be responsible for street drains and drainage works at the smaller catchment scale.

Broadly speaking, Hume City, as the local council, is responsible for issuing planning approvals and approvals for subdivision for the development.

Pursuant to the requirement in Cl 56.4-7 of the VPPs MAB is obliged to incorporate a level of WSUD into the development. However, ultimately responsibility for maintenance of these features will revert to Hume City.

DH has a role to play in administering the SDWA and advising more generally on public health issues.

11 One participant noted that while Singapore places recycled stormwater into potable supplies this is done with much larger catchments and with longer storage times. Conversely, another participant reflected that many existing stormwater capture and reuse schemes in Australia operate at a smaller scale and tend to only supply water for irrigation use.

4

4.4 PROJECT CHRONOLOGY

Servicing the new development

Appendix 3 contains a timeline which sets out the key events that occurred on the Kalkallo Project. By the mid-2000s MAB was progressing plans for a significant new development at the site and was keen for water, sewerage and drainage servicing to be available soon. MAB developed its own drainage and WSUD solutions for the site. These reflected conventional good practice at the time.

From 2007 onwards YVW, MW and Hume City were jointly involved in a broad options study for the planning of water, sewerage and drainage services for the proposed development. In 2008 they jointly adopted the Kalkallo Integrated Water Cycle Management Plan (**Kalkallo IWCMP**). The Kalkallo IWCMP recommended (Yarra Valley Water 2010) either rainwater or stormwater harvesting and reuse at this location, as this offered the best financial and environmental benefits.[12]

YVW took their proposal, for a stormwater treatment and reuse project at the Merrifield Development, to MAB and received MAB's support for this proposal. From this point onwards there was continuing liaison between YVW, MW and MAB about how the preferred option would be achieved in practice.

Box 4.1: Why was this servicing option proposed and supported?

Qu. A: Why did YVW propose the option of large scale stormwater reuse at Kalkallo when this had no precedent anywhere else at the time?

This can best be understood by appreciating the unique combination of time and location related motivating factors, identified by participants, that resulted in the preferred option being pursued by YVW:

- Time related factors – these include the strong desire by all stakeholders during the height of the millennium drought to thoroughly explore all potential alternative water supplies. In particular, individuals at YVW believed that while the community intuitively felt that reusing stormwater made sense, little empirical assessment about the viability of this had been done. As participants from YVW explained:

  'we would probably say it was irresponsible of no-one to be pushing into this space in light of the drought and in light of the Victorian broader concerns like town versus country… Someone had to have a look at it. Test the paradigm' (Interviewee D)

  'Look it's like these projects are fascinating because people have asked us, why are you doing this and we've said, because someone has to.' (Interviewee E)

  Moving to the potable reuse of stormwater would significantly increase the amount of potable water able to be saved compared to existing models, such as non-potable reuse of sewage, and would enable YVW to operate optimally as a sustainable business.

12 Financial benefits would occur as YVW would be able to defer the cost of extending the existing water supply network, and the pumping of existing water supplies to the site, for several years. Moreover, by capturing stormwater on site the environmental damage caused to local creeks by the development would be avoided and YVW's financial costs of allowing polluted stormwater into Port Phillip Bay would be largely avoided.

- Location related factors – at this particular geographic location, the costs of pumping water and sewage between existing locations and a new suburb are extremely high. This made the exploration of alternative servicing solutions very attractive. YVW had already successfully attempted sewage recycling nearby. Exploring stormwater reuse, in a way that removed the need for third pipes and additional infrastructure, was seen as a logical extension to this.

Qu B: By placing the preferred option on the table YVW were attempting to instigate a paradigm change around the potable reuse of stormwater in Victoria. Why did other stakeholders support this?

YVW's decision was supported by other important stakeholders for a variety of reasons:

- MAB had a desire to be associated with a cutting edge, iconic project with significant visual appeal. This would enable it to differentiate its commercial development from those of its competitors.
- MAB was also keen to future-proof the development by having a long term reliable source of water available. Participants explained that Class A, or equivalent, recycled water is now expected at this type of location by purchasers of both commercial and residential properties.
- MW's integrated water team had a desire to support projects which might prove innovative concepts that could be vital in future for IWCM at other locations and/or which might, in the long term, mean more water can be made available to be allocated to the environment.

Controversy over potable reuse – the events of mid 2009

By 2009, the option of capturing and reusing stormwater at the site, potentially for potable substitution, was progressing through the design stage and the concept for the Kalkallo Project had received several industry awards.[13]

At this point, water quality specialists at MW and DH became aware of the Kalkallo Project and voiced their concerns surrounding YVW's proposal to use the treated stormwater for potable purposes. There was no formal regulatory process in existence at this time governing how a stormwater reuse project should be designed and implemented, and even the current voluntary guidance on stormwater schemes, *'Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – Stormwater Harvesting and Reuse*' (**the Stormwater Guidelines**) were only in draft form at this time.[14]

13 The Kalkallo Project won the '*Master Planning and Design category'* of the 2009 Victorian Stormwater Excellence Awards and received a '*highly commended'* at the subsequent national awards. See http://www.yvw.com.au/Home/Aboutus/Ourprojects/Completedprojects/Kalkallostormwaterharvesting/index.htm accessed on 18.09.14

14 National Water Quality Management Strategy, Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) – Stormwater Harvesting and Reuse, July 2009.

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Figure 4.2: Timeline of the events of mid 2009

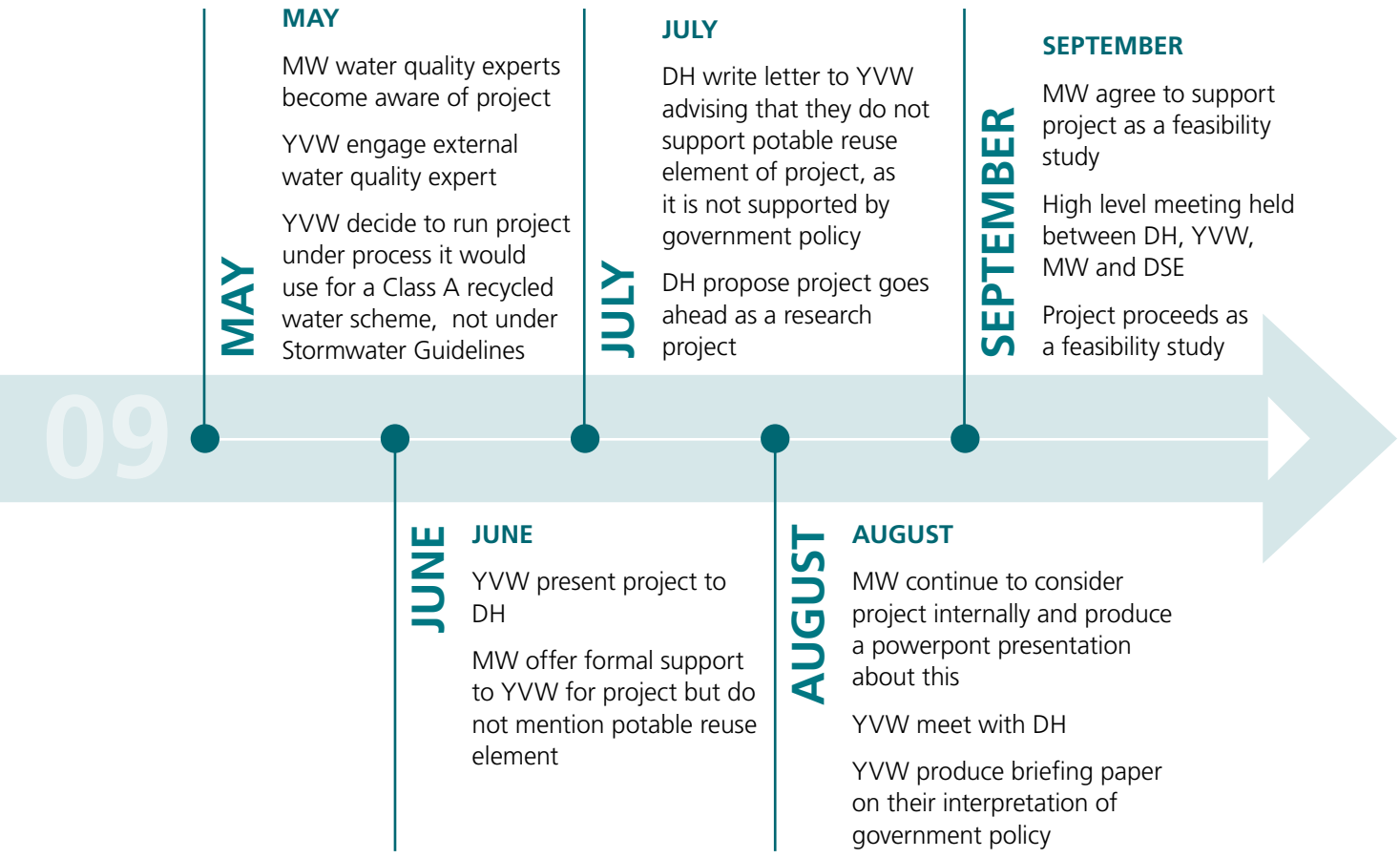

Figure 4.2 above provides a timeline of the events that took place over the winter of 2009, as DH and MW considered the water quality risks of the proposal and how the proposal fitted within the Victorian Government's stated policies. Although initially the parties took contrary positions as to how government policy could be interpreted, by the latter part of 2009 there was agreement that both MW and DH would support the Kalkallo Project progressing as a *feasibility study.* This meant the stormwater would be treated and tested for a period of time without being added to drinking water supplies.[15][16] MW and DH were thus able to support the Kalkallo Project's role in enabling new data to be collected on stormwater quality and its treatment.

15 In a letter from the Managing Director of MW to the Managing Director of YVW, dated 26 June 2009, MW explicitly supported the Kalkallo Project's ability to enable potable water substitution, improved stormwater quality beyond then current minimum requirements and a reduction in the volumes passing to the Kalkallo Creek.

16 In a letter from the Assistant Director of the Environmental Health, Public Health Branch of DH to the Managing Director of YVW, dated 30 July 2009, DH supported the Kalkallo Project in as far as it furthered stormwater management and the use of stormwater for potable substitution purposes and as a research project into the treating of water from urban areas to drinking water standards.

Construction of the Kalkallo Project

In 2009, YVW received a federal grant of $9.6 million for the Kalkallo Project under the first round of the Commonwealth Government's *Water for the Future — National Urban Water and Desalination Fund*.[17] However, by this time the global financial crisis had hit and MAB's development had come to a halt. As the grant funding was time-limited, YVW decided to proceed with the Kalkallo Project despite the delay in the development, and construction on the treatment plant commenced in 2010/11. Meanwhile, DH were involved in advising on YVW's water quality risk management plan for the Kalkallo Project from 2009 until its finalisation in early 2014.

Current status of the Kalkallo Project

The treatment plant has been built, although is currently not operating, while half of the anticipated wetland system is in place. The commercial part of the anticipated development has still not occurred. Due to these factors, the catchment is not yet developed and because of this there are not yet any roads or drains in place to capture run-off. Nor are there any significant buildings in place which would increase run-off volumes. Accordingly, stormwater run-off quantities are much smaller than anticipated, as current run-off is limited to surface run-off over pasture lands.[18] However, development of the site is now looking imminent.

Meanwhile, next to the catchment a large federal quarantine facility has been proposed. This has raised new concerns for those involved in the Kalkallo Project, in particular in relation to the public health risks which may arise if there is contamination of the stormwater in the catchment by the quarantined animals at the facility. YVW have engaged specialists to advise on the risk management implications of this development and acknowledge that it may raise future concerns in the public realm.

17 This funding scheme was announced as part of the 2008 Federal Budget and was set up to support infrastructure projects and research in desalination, water recycling and stormwater harvesting with the aim of helping major towns and cities to secure their water supplies and reduce their reliance on rainfall dependent sources. See Australian Government Department of Environment, *National Urban Water Desalination Plan*, Department of Environmen<http://www.environment.gov.au/topics/water/water-cities-and-towns/national-urban-water-and-desalination-plan>.

18 The catchment is currently used as pasture by a Waygu beef farmer.

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What is likely to happen in the future?

Agreement has been reached between YVW and DH that, once the catchment is yielding a level and type of run-off likely to be representative of future run-off, the plant and entire treatment system will then be operated for a testing period. This testing period will enable YVW to validate that the treatment process works. This period is likely to be at least two years. During this testing period the treated water will be put into the existing third pipe recycled water network in the northern suburbs. Further discussions will then be held between YVW and DH about the long term use of the treated water.

Once the development is complete, MAB have indicated that they may offer Hume City an extended maintenance period for the business park. This would involve MAB agreeing to maintain the roads, local drainage system and public open space in the commercial area for a number of years beyond the end of the construction period, when responsibility would otherwise have reverted to Hume City. However, Hume City will ultimately be responsible for maintaining these assets.

In the meantime, YVW and MW are involved in planning for the servicing of the next 40 years of proposed development to Melbourne's north. Interestingly, one potential long term option they are considering involves the use of the nearby Kalkallo retarding basin for a much larger stormwater capture and reuse project.

5

Section 5
Analysis and discussion

5

Analysis and discussion

5.1 HAS THE KALKALLO PROJECT BEEN A SUCCESS?

What do we mean by success or failure?

'We're finished, we've constructed and - we've ended up with a strong water harvesting project at Kalkallo and purposely designed to harvest storm water for potable, for drinking water use. So that's it in a nutshell.' (Interviewee B)

A functional state-of-the-art water treatment plant now sits in a field of cows in one corner of the Merrifield Development. In light of this, it would not be accurate to label the Kalkallo Project a whole-hearted success at this stage. However, it would also be misleading to label it a failure. In assessing whether or not the Kalkallo Project reflects the successful implementation of an innovative practice it is important to understand the original aspirations YVW and other stakeholders held for the Kalkallo Project. Yet unpicking these is not simple, as there is likely to have been a gap between some of the rhetoric used at the time of project conception, and what may have been realistically hoped for.

Two levels of aspiration

Two levels of aspiration for the Kalkallo Project can be identified: a modest and an ambitious one.

The modest aspiration may be termed *project as an experiment.* This aspired for the Kalkallo Project to produce environmental benefits, in the form of reduced stormwater pollution and flow control, and to prove whether or not the potable reuse of stormwater was both technically viable and possible within existing regulatory frameworks. The Kalkallo Project would then make a modest contribution of water, potentially for non-potable uses, to the northern growth corridor.

In contrast, the ambitious aspiration may be termed *project as the start of new paradigm.* This aspired for the Kalkallo Project to not only produce environmental benefits but also to produce water for potable use, in the northern growth corridor, heralding a new paradigm in stormwater reuse.

The Kalkallo Project assessed against these aspirations

Assessed against the modest aspiration, the Kalkallo Project is on track to deliver, even if it is currently in a state of suspended animation due to the delay in the wider development. There is every expectation that once the catchment is eventually developed, and the plant tested, the Kalkallo Project will be a valuable research experiment:

> 'I don't see Kalkallo as indicative of the future for the Melbourne system. I can sort of tell you it was an experiment - it is an experiment, it's worth doing' (Interviewee I)

However, when assessed against the more ambitious aspiration, the Kalkallo Project measures up less strongly. An imminent paradigm shift in stormwater reuse looks unlikely.[19] Indeed, the conversation within the water industry about the best way to use stormwater, within an Australian urban environment, may have moved on since the Kalkallo Project was conceived. As a MW interviewee noted:

> 'Since 2009 the industry has moved on I think about stormwater. Our approach now would be that if you want to improve public health and better the disease burden, you're better off using your stormwater to irrigate the green open space or create more green open space and encourage people to go outside and not go with the finicky, very expensive potable supply options, because we have enough of those at the moment.' (Interviewee C)

Despite this, some at YVW remain optimistic that the Kalkallo Project will eventually deliver water that will be put into the drinking water supply:

> 'I think ultimately it will put water into the potable network. I think that will happen. Whether it's in five years' time or a little bit longer, I'd be very, very surprised if the water quality testing shows that there's risk that is worth - that should be avoided as such.' (Interviewee D)

If this does happen, and if a future stormwater reuse project is pursued at the Kalkallo retarding basin, paradigm change may indeed still occur. However, at the moment the Kalkallo Project is best categorised as an example of a partially successful implementation of an innovative urban water management practice, in an experimental way, within current regulatory and risk management frameworks.

5.2 WHAT REGULATORY APPROVALS WERE REQUIRED TO IMPLEMENT THE KALKALLO PROJECT?

As with all major infrastructure projects, there were a number of different regulatory approvals that needed to be secured to enable the Kalkallo Project to progress. To date, the securing of these approvals does not appear to have been unduly difficult.

Interestingly, a number of approvals which may ordinarily have been expected to have been required for a substantial water infrastructure project were not in fact required for the Kalkallo Project.[20] These *absent approvals* include public health approval, environmental health approval, planning approval and economic regulatory approval. Appendix 4 identifies the regulatory approvals that were, and were not, required for the Kalkallo Project.

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19 A paradigm shift would also require the not insignificant economic issues around stormwater capture and reuse to be resolved. It is important to appreciate that the Kalkallo Project did not achieve, nor was it designed to achieve, a demonstration of the economic viability of stormwater reuse for potable purposes at a precinct scale as a YVW interviewee acknowledges: '*this system will be a showcase of what's possible technically, but the economics are a completely different issue.*' (Interviewee A)

20 The reasons for the absent approvals varied but included gaps within the regulatory framework for projects of this nature, the project specific funding in place and site specific planning reasons.

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The absence of any requirement to seek public health and environmental approvals for the Kalkallo Project contrasts sharply with the formal requirements placed on those undertaking large scale sewerage recycling projects in Victoria to secure express regulatory approval. Victorian sewerage recycling projects that produce water intended for certain higher risk non-potable purposes, such as toilet flushing and laundry use, are known as *Class A recycled projects*. Under existing legislation both the EPA and DH have a formal role to play in assessing and endorsing the risk management plans that the scheme proponents produce for Class A recycled projects.[21]

5.3 PROJECT ENABLERS

What factors played a role in the success of the Kalkallo Project?

As noted in Box 4.1, a number of factors positively influenced the Kalkallo Project's innovative design and its implementation. These factors can be termed *project enablers*. During interviews, the participants identified several factors which had acted as project enablers. These can be broadly categorised as economic enablers, regulatory enablers and cultural enablers.[22] Appendix 5 identifies these project enablers and explains how these appear to have influenced project decision-making.

These project enablers operated in a variety of ways. Some enablers shaped the way early decisions were made about the project design and the objectives it should fulfil. For example, certain regulatory enablers that mandated the taking of particular actions or the pricing of environmental externalities into decision making directly influenced the Kalkallo Project's design. Similarly, the context provided by the millennium drought encouraged innovative decision making about the types of water supply projects that should be pursued at that time.

In contrast, other enablers allowed potential setbacks and problems that arose during implementation of the Kalkallo Project to be successfully overcome. For example, we see the economic enablers, and particularly the availability of federal government grant funding, operating to overcome common cost barriers to innovative stormwater projects.[23] We also see cultural factors related to YVW, MW and MAB as organisations, and to one particular figure within YVW, providing the necessary support and momentum to see the Kalkallo Project through. The absent approvals also worked in a similar fashion.

The enabling role of regulation on the Kalkallo Project

Elements within existing legislative and regulative frameworks played a crucial role as project enablers in two distinct ways. This was achieved both directly, by imposing specific requirements on stakeholders that were satisfied by undertaking the Kalkallo Project, but also indirectly, by providing a broad enabling environment within which innovation was able to take place. An example of a direct regulatory requirement is the requirement in Cl56.07-4 of the VPPs that MAB provide WSUD at the development.

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21 The Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 enable an exemption to be granted to environmental licensing requirements for individual recycled sewerage projects. EPA guidelines '*Guidelines for Environmental Management: Dual Pipe Water Recycling Schemes - Health and Environmental Risk Management*' sets out when such an exemption may be granted and requires the production of a Health and Environment Plan for the project. Class A recycled projects must also produce a Recycled Water Quality Management Plan endorsed by DH.

22 The broad conceptualisation of regulation outlined in Section 1.4 would categorise some of these economic enablers, such as government grants, as regulatory tools. However, participants tended to understand the term regulation in a narrower sense as being involved with legal rules. Accordingly, this case study uses the term regulatory enabler to mean those parts of the legal framework that influenced the Kalkallo Project.

23 Participants indicated that economic impediments often operated as a barrier to being able to undertake innovative projects using stormwater. These impediments may arise due to the high cost of providing adequate storage for the collected stormwater and because of the difficulty in attaching a dollar value to the positive environmental externalities of stormwater capture. These impediments did not arise on the Kalkallo Project due to the significant level of federal government grant funding made available.

In contrast, an example of an indirect enabling regulatory environment is the regulatory framework set up by the SDWA and the institutional arrangements put in place by the Water Act. These institutional arrangements made YVW monopoly water supplier for the entire northern growth corridor and, consequently, a designated drinking *water supplier* for the purpose of the SDWA.[24] The SDWA requires Victorian drinking water suppliers to operate their own risk management processes, which are independently audited, rather than being formally approved by an external regulator. This model requires Victoria's existing drinking water providers to assume the legal risk of water quality failure.[25] It also places a high level of trust in these providers.

5.4 PROJECT IMPEDIMENTS

What factors acted as impediments to the Kalkallo Project's success?

Participants identified a number of risks and challenges that arose in undertaking the Kalkallo Project. These factors can be termed *project impediments* and are set out in Appendix 6. These impediments can be categorised variously as technical impediments, time-related impediments, policy impediments, regulatory impediments, institutional impediments, communication and process impediments and professional culture impediments.

As the Kalkallo Project is still proceeding, albeit at a slow rate, none of these project impediments has completely prevented the Kalkallo Project's implementation. Indeed, we observe these project impediments acting as hindrances, that may be ultimately overcome, rather than insurmountable barriers to implementation. However, these impediments are likely to have slowed the Kalkallo Project down and made it harder than it would otherwise have been. These impediments are also likely to have contributed to the Kalkallo Project proceeding as a research experiment not as a full commercialisation of the technology.

In reality, the various project impediments often arose in combination with each other. For example, an unfortunate combination of poorly managed communication and process, entrenched professional attitudes, institutional silos and a lack of clarity about government policy came together in the events of mid-2009. During this period the water quality specialists were brought into the decision making process for the Kalkallo Project and some participants believe this was too late in the process. We observed how a failure to consult the water quality specialists, in a timely fashion, led to the stakeholders taking positions that were more combative than collaborative. As one MW interviewee commented, this in turn led to the labelling of process tensions as policy issues:

> 'then what happened was, because people were on the back foot about process, policy was talked about as like some sort of thing, like there's a machine that does policy or something.' (Interviewee I)

Meanwhile, the lack of a clear institutional mandate for any organisation to act differently than it had done in the past meant it was often more comfortable to fall back on pre-existing professional practices. These problems were only resolved when all parties reached agreement to support the Kalkallo Project and enable it to proceed as a feasibility study.

24 See Section 3 of the SDWA.
25 However, a participant at MW noted that reputational risk was actually allocated somewhat wider than this. All those involved in water supply are likely to be reputationally tainted should a significant incident of contamination occur.

5

How project impediments presented

Various technical challenges arose in undertaking the Kalkallo Project. To a large extent these have now been overcome. Participants hope that data gathered from the Kalkallo Project will be able to inform future technical guidelines for similar projects. However, there have been significant practical problems caused by the delay to the anticipated development and these have not been resolved. The catchment remains unbuilt.

Problems also arose due to a lack of clarity about what was the appropriate government policy on the potable reuse of stormwater. This resulted in contradictory positions being taken by participants. In the short term these have been resolved by moving ahead with the Kalkallo Project as a research project. This matter is discussed further in the following section.

Some YVW participants took the view that current regulations had not been an impediment to the Kalkallo Project in any way:

> So, when you talk about regulations and regulatory framework, I'm - for all the effort that I've put into the project, that wasn't the barrier.' (Interviewee B)

However, this was probably not accurate. While there was no single legislative provision that acted as an insurmountable barrier to implementing the Kalkallo Project (this is discussed further in Section 5.5) complexity, uncertainty and gaps within current regulatory frameworks did mean YVW had to spend time identifying a suitable process to follow. In addition, institutional impediments arose because of a lack of clarity about which organisations, and even which parts of an organisation such as MW, should be involved in decision-making about the Kalkallo Project and what decisions they would be mandated to make.

Inappropriate levels of communication with certain stakeholders and not including stakeholders, in a timely fashion, in decision-making were observed to have been problematic. These problems do seem to have been resolved. In addition, the Kalkallo Project required participants to step outside of existing professional cultural practices, such as simply delivering safe and affordable water, to acknowledge new and additional practices around stormwater flow management, without a clear mandate to do so. This was at times challenging. These impediments have been overcome sufficiently to allow the Kalkallo Project to proceed as a research experiment.

Unclear government policy as an impediment

'It's kind of not policy but it's kind of policy. It's in the grey land.' (Interviewee D)

Participants involved in the Kalkallo Project representing three key organisations, arrived at opposing interpretations of what the then current Victorian Government's policy on the potable reuse of stormwater allowed. One view, from MW and DH, saw the potable re-use of stormwater as not within government policy. Opposing this perspective, YVW argued that, as there was no government policy against treating stormwater for potable re-use, water authorities ought to be free to pursue this option. Appendix 7 to this report outlines the three organisational views both about the content of the policy and about what this enabled or prohibited.

Such divergence of interpretation was made possible because the policy was vague and not clearly expressed in any one publicly available document.[26] Therefore, it was possible to take a cautious and narrow interpretation, as did DH and MW, and infer the policy on this particular issue from publicly stated policy on the potable reuse of recycled sewage.[27] YVW, in contrast, took a wide and facilitative interpretation to conclude that, as there was not a specific policy ban on the potable reuse of stormwater, and as appropriate technological innovations were supported by the Victorian Government, potable reuse, if not prohibited, was allowed. YVW's interpretation relied upon the interpretation of government policy in light of subsequent scientific advances and availability of new technologies.[28]

Government policy in Victoria, today, is still unclear about this particular issue (Office of Living Victoria 2013).

Overcoming project impediments

A number of techniques were used by the participants to overcome the project impediments that presented. These include the development of technical solutions, over engineering the treatment process, data gathering and the development of new guidelines to overcome technical impediments. On the other hand, the partial resolution of institutional impediments was achieved by organisational restructuring, to provide clarity about the various roles and responsibilities within a particular organisation. We observe policy impediments being side-stepped by the negotiation of a compromise between the parties that did not so obviously sit in the contested policy territory of potable reuse of stormwater. We also observe YVW seeking to overcome these impediments by attempting to change the conversation surrounding policy decisions on potable reuse by changing supporting professional guidance. Regulatory impediments were resolved through communication, with regulators and other stakeholders, about ways to overcome formal gaps whilst still protecting ultimate regulatory goals. We also observed YVW assuming significant project risks in the absence of any methods to share risk. Finally, we observe communication and process impediments being resolved through communication with all relevant stakeholders.

5.5 REGULATORY IMPEDIMENTS

Difficulties in establishing what the regulatory impediments truly were

Many issues that arose on the Kalkallo Project are not able to be easily categorised as regulatory impediments because what participants identified as problems related to regulation was not clear-cut. In particular, we see significant points of crossover between what participants viewed as regulatory impediments and impediments that were related to policy, communication and process and institutional arrangements. This made disentangling what participants meant by regulatory problems difficult. As one YVW participant remarked, it also enabled regulatory impediments to be used as an excuse for inaction:

> 'I think it's very easy to blame regulation, and I think it's also - I don't want to be disparaging - hide behind regulations as an excuse not to change. Regulation by its nature lags, it never leads in my experience.' (Interviewee A)

26 In particular, there was a divergence of views about whether the type of stormwater being collected in the Kalkallo Project was, or was equivalent to, *recycled water* and whether policy commitments not to put recycled water into the drinking water supply applied to recycled sewage.

27 We have no information about what interpretation the Department of Sustainability and the Environment applied to the policy and its implications.

28 For example a strict interpretation of pre-existing policy would have prohibited the use of desalinated water for potable purposes. However, precisely this was being actively pursued at this time by the Victorian Government.

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The researchers have noticed a tendency of industry participants to characterise barriers to innovative WSUD practices as regulatory, when they actually arise from other factors. It is common for innovation to present cost challenges when compared to business as usual. It is also not unusual for economic issues to present, on first impressions, as regulatory issues. This may be because regulation can often be a convenient label to attach to the economic challenges posed by innovation. Box 5.1 below discusses how this labelling problem presented on another innovative urban water project in Melbourne.

Box 5.1: The Davis Road project

Other CRC researchers recommended that the BRF project investigate a proposed innovative water project in Melbourne's west, involving a new greenfield residential development, that had failed to progress due to *regulatory impediments*. After discussions with the developer of the proposed project, the BRF project team came to understand that the difficulties encountered lay elsewhere and more accurately represented a lack of economic incentives than regulatory impediments, per se.

The chosen development site lay at the bottom of a catchment and ensuring adequate drainage for the site was an issue. The developer initially proposed an innovative design solution, involving WSUD, based upon a series of sub-catchment level wetlands that would trap water on site for lower scale flooding events. The intention was that this solution would both:

- Deliver commercial benefits, as a smaller retarding basin would be needed at the bottom of the catchment resulting in more land being available for development.
- Deliver a drainage solution that would significantly contribute to liveability at the site.

Subsequent events have made it unlikely that this initial vision will be achieved, as it is no longer commercially viable. This is due to a combination of factors:

- Key issue 1 – the local council would not grant any open space credit for the wetlands. Nor would it agree to take on maintenance of these assets after construction. This meant the developer would need to provide an additional 10% open space in the scheme which is not commercially viable.
- Key issue 2 – whilst the proposed scheme offers many potential community benefits, these are long term. Individual purchasers in this area cannot afford to pay more for WSUD features. MW would not grant any reduction in drainage levy to the developer for the WSUD features.

In addition, the project also suffered from a general deterioration in economic conditions, planning delays which had not been modelled into the project funding and hydrological modelling which showed the solution would not deliver the drainage benefits hoped for in the lower catchment.

No direct legislative prohibition to the Kalkallo Project

'So we've had to work around regulations that were written at a different time for a different purpose. So yes, that was a challenge, but look it was a couple of meetings and we found a solution.' (Interviewee B)

Whilst undoubtedly significant amounts of time and energy were spent investigating and obtaining project approvals, regulatory impediments have not been identified by the participants as the highest order impediments to achieving success in the Kalkallo Project. Indeed, a common viewpoint was that navigating a pathway through existing regulatory frameworks was just part of the necessary process of developing and implementing the Kalkallo Project.

Perhaps more interestingly, we have not identified any single barrier in current legislation which acted as the primary hurdle to innovation. Specifically, the legislation in Victoria that regulates the public health risks of drinking water supply was not such a barrier. As one MW participant remarked:

> 'when you look at the Safe Drinking Water Act it's designed, in fact, for a whole range of different water sources to be used to produce drinking water, including recycled water. So if you took some recycled water - some waste water from Eastern Treatment Plant and treated that to potable that would be entirely consistent with the Safe Drinking Water Act. There would be no regulatory or legislative hurdle there that you couldn't overcome. Look, provided you had a risk management plan and you'd thought that all through,' (Interviewee I)

How regulatory frameworks did act as an impediment on the Kalkallo Project

Despite the lack of a direct legislative barrier, when we look more closely, we do see regulatory frameworks acting as a project impediment in several different ways due to:

1. The complexity of existing regulatory frameworks and a lack of a coordinating mechanism. In particular, IWCM requires that all elements of the water cycle be linked. Where separate institutions are responsible for different goals, the regulatory framework could play a crucial role in making sure these institutions factor other IWCM goals into their decision-making. However, the current regulatory frameworks in Victoria lack strong coordinating mechanisms that would enable such linking to occur.
2. Definitional gaps. Principally, such gaps involve whether stormwater is a sub-category of recycled water for the purposes of various policy documents and regulatory instruments, such as the national water quality guidelines.[29] Unclear definitions increase uncertainty, may potentially increase costs and may also be acting as a hindrance to effective communication with the public.
3. Uncertainty and a lack of guidance in the regulatory frameworks about how to progress a project of this nature, both technically and from a process perspective. As we saw in Section 4 the lack of a clear process for consultation caused significant problems for the project in mid-2009.
4. A lack of incentives in the regulatory framework to act in a different way from previous practice.

29 These definitional debates are a manifestation of broader difficulties concerning the definition of water sources from a legal perspective, for the purposes of a regulatory regime, when the reality of how water physically flows through the water cycle makes such distinctions highly artificial.

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5. A lack of a clear legislative mandate on the stakeholders to innovate in such a fashion.

A consequence of these impediments is that there continues to be a lack of clarity about how existing frameworks cope with innovation.

Have any regulatory impediments not been fully resolved?

A final assessment about how regulatory and risk allocation frameworks presented as issues in relation to the Kalkallo Project is premature as the Kalkallo Project is currently stalled and not yet operational. It is entirely possible that additional regulatory issues may arise as the Kalkallo Project progresses through the future testing and operational phases. Potential future challenges may arise in relation to the storage basin that holds water for YVW's supply purposes, and which also acts as a drainage asset for MW. The complexity of arrangements involved in the ownership of, and maintenance of, these shared assets was alluded to by participants. Participants believed that there was now a legal agreement in place between MW, YVW and MAB in respect of the storage basin. However, none of the participants knew the details of this arrangement. In addition, securing the right to access and use water in the Hume City drains, which have not yet been constructed, remains an outstanding issue.

5.6 HOW NEW REGIMES MAY EMERGE FROM THE REGULATORY VOID

The regulatory void

Tellingly, when regulation was identified by participants as an impediment to action this tended to be where there were gaps in formal regulatory frameworks in relation to projects involving stormwater as a source. One YVW participant labelled this space the *regulatory void*. In other words, issues were arising in practice which fell outside of the scope of existing formal legislative frameworks and approaches:

> 'Simplistically, it goes back to the fact that the stormwater to potable side is largely in a regulatory void and if you want to take the risk and are happy and willing to trust your engineering solutions and the risk analysis …. It's just a little bit of a trust in engineering kind of thing and off you go and you do it.' (Interviewee D)

However, in reality, there are no unregulated spaces, strictly speaking, and the regulatory void is not empty. Even where there is no specific regulation concerning a WSC innovation the background law, such as the law of negligence, inhabits the space. Moreover, the duty of care that negligence imposes is itself likely to be heavily informed by behavioural standards contained in ostensibly informal water management guidelines and codes. Yet, in the absence of a specific and tailored regulatory approvals regime, the background law may be obscure, costly to discern and may be unsuitable for the purposes of WSC innovation.

Therefore, in the absence of any specific regulatory framework to govern stormwater reuse schemes, the background law of the Water Act, SDWA and the law of negligence will allocate project risks. While we have seen that the background law of the SDWA was open enough to enable the Kalkallo Project to proceed, it did result in YVW bearing the majority of the project risks, particularly those regarding the safety of the supplied water, as no mechanism existed in the existing regulatory frameworks to share these.[30]

30 Farelly observed a similar assumption of project risks by another water corporation, South East Water, on the Inkerman Oasis project in inner Melbourne. See , Farelly, M. and C. Davis (2009). Demonstration Projects: Case Studies from Melbourne, Australia. Melbourne, Victoria, National urban water governance program.

How did the parties act in the face of the void?

'I think probably we as an organisation have learnt to deal with what we would call regulatory uncertainty that the lawyers might say it is not regulatory uncertainty. But I think we've learnt how to deal with that a bit better. I think that's really good for us as an organisation to stand on our own two feet and manage our risks ourselves instead of relying on a regulator such as Department of Health to rubber stamp something.' (Interviewee D)

Yet, when faced with this regulatory void, the Kalkallo Project still proceeded. We observe YVW, in the absence of a regulatory requirement to act in a certain way, making its own decisions about water use and treatment. In doing so YVW mirrored the requirements that would have applied to a Class A recycled water project as this represented the closest existing regulatory framework. This provided YVW with a framework within which it could develop an appropriate water quality risk management process to follow.

Similarly, YVW still approached DH and MW for advice in preparing a suitable risk management plan for the Kalkallo Project, and about the proposed treatment train. This was despite there being no legal requirement on it to seek the formal approval of DH. Once consulted, DH participants saw their role as one of providing advice on the compatibility of the Kalkallo Project with published guidance. In addition, YVW participants observed that the EPA had been kept abreast of the Kalkallo Project, and of YVW's intention to mirror the risk management process required for a Class A recycled project. Ultimately, this resulted in YVW, MW and DH negotiating a four stage process whereby YVW will initially operate the Kalkallo Project as a research project, to treat captured stormwater to a potable standard and to monitor the quality of the water produced during a testing period.

In allowing YVW to develop the Kalkallo Project's process, and in agreeing to the research project boundaries to the Kalkallo Project, we observe a carefully orchestrated manoeuvre by DH. DH, as the public health regulator, has effectively allowed a trusted player to innovate in a ring-fenced manner. This can be viewed as a *regulatory test case*.

What enabled this regulatory test case to proceed?

Three significant factors enabled this regulatory test case to proceed. Firstly, the model for ensuring drinking water quality regulation in Victoria is itself an unusual regulatory regime. Existing drinking water suppliers have significant freedom to act, but only a limited number of bodies are entitled to be drinking water suppliers. These bodies are all large, well-resourced, publicly owned water corporations which often themselves have a significant regulatory function. These bodies have a proven track-record in safe water delivery. Thus, there exists a high level of trust between the health regulator and these bodies, and there is also a high degree of trust placed by the health regulator in the current model of regulation. One MW participant called this model one of *earned autonomy* observing that:

> 'the whole thing about the Safe Drinking Water Act, is that it's sort of this earned autonomy that - because it came along 100 years after the water industry.' (Interviewee I)

This earned autonomy model of regulation represented an enabling environment in which innovation could occur.

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The second influential factor was YVW's decision to assume, at a corporate level, the potential risks of water quality failure that the Kalkallo Project, presented. As one YVW participant explained:

> 'So the business basically has to take risk, basically had to shoulder the risk burden to get it up and running I'd say that's a key thing. The business had to think about that we weren't going to able to say look, the department signed this off. They'll say they endorsed the approach potentially but at the end of the day we're going to have to sit with the risk on our shoulders. That was something to think about.' (Interviewee D)

However, even here the risks that YVW currently feels able to take on are those relating to running a research project, not yet those related to putting recycled stormwater into the potable supply.

Finally, in its behaviour negotiating a research project solution with YVW, we see the regulator being interested in the intent behind the regulatory regime, and not just in applying the black letter law.

Potential for future regulatory evolution

'we would use this is a case study to seek to influence the Department of Health who are the regulator for water quality in Melbourne.' (Interviewee E)

Is the regulatory test case likely to lead to any future change in the formal regulatory frameworks around stormwater reuse projects in Victoria? YVW certainly hope so and were clear that they would like to use the Kalkallo Project as a template for developing future regulatory requirements for stormwater reuse:

> 'Will we be negotiating and trying to influence the regulatory environment to get a proper regulatory framework? The answer is yes. All I'm saying is, the answer is yes to your question but I suspect it will come from the industry. The regulator's only respond, they're mostly not the initiators. They respond to changes and, like all regulators, they're very slow in responding. Because they're by nature careful and considered and conservative because of their role.' (Interviewee E)

However, the regulatory test case involves a fairly specific set of circumstances. One key issue that any future regulatory regime would need to resolve is the extent to which it could operate successfully outside of today's existing institutional structure, whereby water supply is largely reserved to government controlled, centralised water monopolies. DH participants believed that a greater regulation of the capabilities and competencies of water suppliers would be required if the institutional structure were to change in future:[31]

> 'At the moment we've got a regulatory framework that's really government, regulating government agencies. Opening up the market to decentralise is a completely different risk paradigm and you'd need to sort of review the regulatory framework to make sure that it complemented that new different regulatory paradigm.' (Interviewee F)

31 The NSW model of water supplier regulation by licensing contained in the *Water Industry Competition Act 2006 (NSW)* provides one model for how this could be done.

5.7 WHAT ENABLED THE KALKALLO PROJECT TO PROGRESS, WHILE YVW'S OTHER ATTEMPTS AT INNOVATION DID NOT?

'There were two or three marquee projects that we were doing, that perfectly aligned with the Living Melbourne plan, and we were struggling with all three of them. One's dead, one's built but we can't use, and the other one's in a state of limbo' (Interviewee J)

During the course of interviews participants also reflected on two other IWCM projects YVW had been progressing contemporaneously with the Kalkallo Project which had failed to progress. These were the Coburg project and the Doncaster Hill project; Boxes 5.2 and 5.3 present a summary of these projects.

Box 5.2: The Coburg project

The Coburg Principal Activity Area is a mixed use redevelopment of an existing urban area, 8k north of Melbourne's central business district, in the City of Moreland municipality (Moreland City Council 2006). The City of Moreland placed a sustainability overlay on the area which requires all new buildings to include sustainability features, such as WSUD and potable water conservation.

To mitigate the environmental impact of future development, particularly due to increased stormwater flows, YVW proposed a precinct level stormwater collection and reuse project. This would have involved YVW extracting stormwater from drains, its storage in a new underground tank, its treatment in a new treatment plant and resupply via a third pipe system to new buildings on the development (Yarra Valley Water 2013). The project would have received significant funding from the federal government.

Participants identified a combination of factors behind this innovative project not proceeding:

- Most significant were the economic factors that made the project unviable. These resulted from higher than anticipated construction costs which arose due to unexpected site conditions and because of the local council's requirement that the storage be located underground.
- A lack of appreciation by the local council of the wider environmental and flood protection benefits of the project and of the potential direct benefit of having access to virtually free irrigation water. This resulted in reluctance to part fund the project.

In contrast, participants felt that the relationship between YVW and MW had been extremely positive on this project. In particular, to keep the project economically viable for YVW, MW had been prepared to allow YVW to harvest all stormwater flows and not just the increased flows above the baseline which were due to the development. Working in a collaborative fashion YVW and MW had been prepared to change existing internal standards to achieve common goals.

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Box 5.3: The Doncaster Hill project

The Doncaster Hill development is a planned mixed-use development, situated 15k to the east of Melbourne's central business district, in the City of Manningham municipality. It comprises residential apartments, retail and commercial spaces in an existing urban location.[33] The City of Manningham (City of Manningham and DesignInc) has in place planning controls for the development that mandate the incorporation of various sustainability features into new buildings. The City of Manningham also provides suggestions about appropriate WSUD and alternative water source options. The area is mandated for recycled water use by YVW. This requires all new buildings to have a third pipe system for laundry use and toilet flushing. To mitigate the environmental impact of the development YVW had intended to build a precinct scale recycled water treatment plant to service the entire development.[34] This project stalled when YVW were unable to secure the necessary planning permit to build the facility.

The Coburg and Doncaster Hill projects were in existing urban areas, and their failure to progress represented a missed opportunity for YVW to showcase how precinct level IWCM projects may be able to deliver more benefits than efforts in such areas made at the building level. Together the three IWCM projects represented YVW's corporate response to the challenges posed by both the millennium drought and significant population growth in metropolitan Melbourne, and the opportunities presented by federal government grant funding. None has been a total success. At Kalkallo and Doncaster Hill the projects have stalled, albeit at different stages, whilst at Coburg the project has not proceeded. Doncaster Hill stalled for reasons related to existing regulatory frameworks around planning. However, on the Coburg project we observe how existing regulatory frameworks did not stand in the way of innovation but that the economic constraints were insurmountable.

32 See http://www.doncasterhill.com/ accessed on 8 September 2014 for more information about this development.
33 See http://www.livingvictoria.vic.gov.au/announcements/doncaster-hill-ESD accessed on 8 September 2014 for more information on the project that YVW had proposed for the development.

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Section 6
Conclusion

6

Conclusion

6.1 WHAT ROLE DID CURRENT REGULATORY AND RISK ALLOCATION FRAMEWORKS PLAY IN DECISION-MAKING ON THE KALKALLO PROJECT?

Notwithstanding the significant challenges presented by disentangling regulatory impediments from other project impediments, in our case study we did not observe current regulatory and risk allocation frameworks acting as insurmountable barriers to undertaking the Kalkallo Project. On this basis, the initial hypothesis must be rejected.

Instead, we observed a slow and controlled regulatory test case being undertaken, within the confines of existing frameworks, involving YVW as project instigator and DH as public health regulator. As this test case progressed, we observed multiple roles being played by current regulatory and risk allocation frameworks and support for the alternative hypothesis; that regulatory and risk allocation frameworks can play both an enabling and a hindering role in relation to urban water innovation.

Interestingly, regulation has been seen to act in two quite distinct ways in the Kalkallo Project in its enabling role as a facilitator to action. It acted directly, by providing a prompt to explore a more innovative solution and indirectly, by providing a broader supportive environment within which innovation could be undertaken.

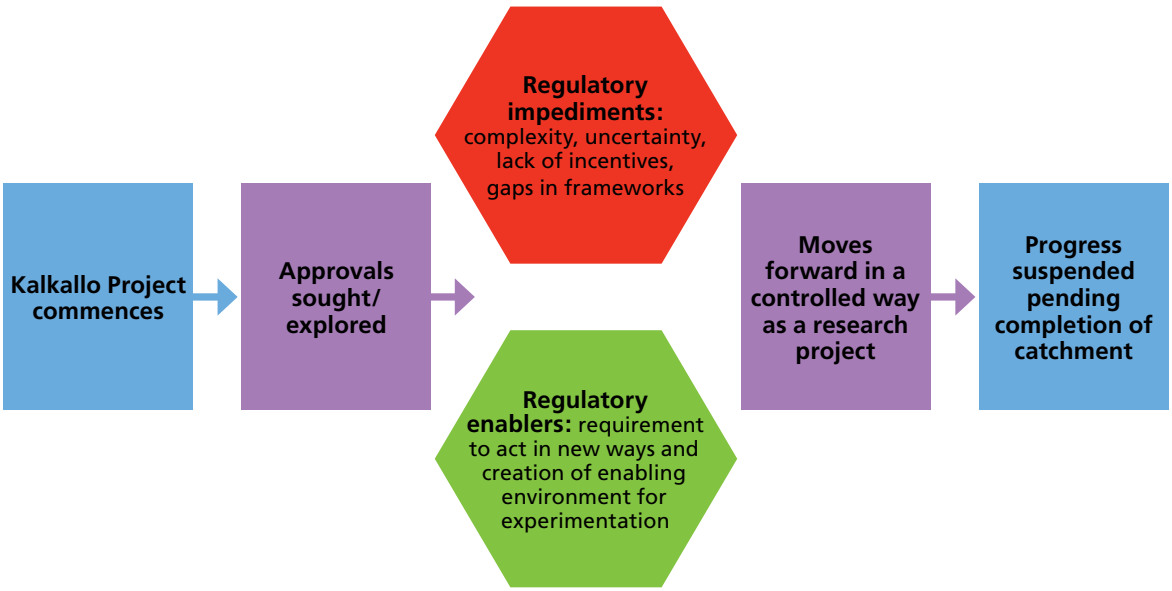
Conversely, the risk allocation frameworks reflected the background law. These offered the parties little opportunity to share risks in a tailored fashion and required that YVW acted as primary risk taker in relation to the risk of water quality failure. While this appears to have been an approach that was satisfactory to the parties involved in the Kalkallo Project, such risk allocation may not be as attractive to other initiators of alternative water source projects.

6.2 THE RED LIGHT AND GREEN LIGHT METAPHOR

Building on the scholarship of Harlow and Rawlings (2009), one way of interpreting our case findings about the role of regulatory and risk allocation frameworks on the Kalkallo Project is to think of regulation as simply a red or green light.[34] A red light perspective on WSC regulation focuses on the ways in which the law may act as a brake, or blocker, to acting in ways that would encourage more water sensitive practices. In contrast, a green light perspective involves consideration of the myriad ways in which legal regulation can facilitate acting in ways that encourage more water sensitive urban practices. Figure 6.1 on the following page illustrates the red and green light roles played by current regulatory and risk allocation frameworks on the Kalkallo Project.

34 Harlow and Rawlings identify two competing views in legal scholarship, about the role and purpose of legal rules in relation to public power, which they colourfully term red light and green light theories. These are two ways of understanding the same phenomenon.

Figure 6.1: How regulatory and risk allocation frameworks actually impacted on the Kalkallo Project



What does this mean for legal regulation in relation to WSC innovation? Perhaps instead of looking for legislative blockers, which were not found in our case, a more fruitful line of inquiry for those interested in encouraging more water sensitive practices in our cities may be to better understand regulatory enablers and to make greater use of these levers.

6.3 MAKING MORE OF THE GREEN LIGHT ROLE OF REGULATION

If a green light view of regulation is a more constructive prism through which to consider interventions to further WSC innovations, how can this facilitative and enabling role be strengthened?

In its direct enabling capacity, regulation changes the incentives for parties and pushes their behaviour in one direction rather than another. We see in our case how elements of the existing Melbourne regulatory space encouraged YVW to choose the potable reuse of stormwater option over a more business as usual option for servicing new properties.

In its indirect enabling capacity regulation provides a space in which innovation is possible and a crucible in which experimentation can take place. Indeed, an alternative way to understand the regulatory void is as an enabling space that can act as an incubator within which early, test cases of innovation can occur. As Kirby observes, government inaction in the face of technological innovation is itself a decision and can be a 'green light to experiments in that technology' (2008, p.375). In our regulatory test case we saw how YVW, in the absence of any express regulatory requirement, made its own decisions about water use and treatment and mirrored the requirements that would have applied to a recycled sewage project. From such test cases new regulatory regimes may eventually emerge, as the regulator is able to learn more about the nature and extent of the appropriate rules that should be put in place to regulate such innovation.

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What factors within existing frameworks enabled this test case to proceed? Our case identified a culture of trust around existing institutional arrangements for the safe delivery of drinking water in Melbourne.[35] Furthermore, existing regulatory procedures and processes for securing Melbourne's public health, where a strong role is being played by process based regulation, appear to be working well. As Coglianese and Lazer (2003) suggest, the success of such a model appears to require a regulatory culture with high levels of mutual trust and co-operation between the regulator and regulatee. Our initial impression is that Melbourne currently has a culture that has fostered such co-operation. We also see in YVW a willing risk-taker with an appetite for assuming the risks of project failure.

Yet this model is unlikely to be suitable to regulate the innovative practice at a greater level of uptake of this type of technology. To facilitate wider adoption, certainty is important and risk allocation may need to be reconsidered. Clarification of the regulatory environment can enable, or facilitate, the wider uptake of innovation by providing certainty, guiding decision-making and ensuring that risk is allocated to appropriate parties. By setting clear requirements that must be achieved, it may also align disparate stakeholders around a course of action that may have been impossible without such an explicit compliance requirement.

A specific and tailored regulatory regime governing stormwater harvesting and reuse could variously:

1. Provide stakeholders with a mandate for action.
2. Provide incentives for innovation.
3. Share the risks of innovation between stakeholders.
4. Set out a clear pathway for obtaining any regulatory approvals.
5. Provide clarity about best practice in process and communication between stakeholders.
6. Expressly permit scientifically robust new practices, even if inconsistent with professional cultural beliefs.

This finds support in the views of commentators (Vaisman 2014) who have argued that, from a practitioner perspective, the lack of comprehensive stormwater harvesting guidelines is a significant impediment to the greater uptake of stormwater harvesting schemes.[36]

However, as stormwater recycling for potable use has only recently been considered to be technologically feasible, current Victorian Government policy does not explicitly address this issue. As a result, we saw that the policy on stormwater reuse for potable purposes was not contained in a definitive document and there were multiple understandings and constructions of the implicit government policy by the various project participants. A well-considered, tailored regulatory regime would first require clarity about the underlying government policy on the reuse of stormwater as a resource, and in particular, its reuse for potable purposes.

35 Specifically, the reservation of drinking water service provision to large, centralised government-owned entities has ensured a historically high level of water quality in Melbourne.

36 Vaisman suggests such guidelines should be based upon current legislation and regulations, best engineering practice and a consideration of operation and maintenance issues informed by case studies. Vaisman also speculates that the development of a verification process for stormwater projects may result in greater risk sharing on such projects as industry would be then able to guarantee performance.

6.4 WHAT IS SUCCESS IN THE CONTEXT OF OUR CASE?

McConnell (2010) provides a multi-faceted way of understanding policy success which understands that success in relation to public policy is not one dimensional but exists across at least three levels; a process level, programme level and a political level. His insight is to acknowledge that success may be achieved in some dimensions and not in others. Furthermore, success in each dimension may be complicated by the fact that what is a successful outcome for one individual, or group, may not be a successful outcome for another.

Using this frame, process success involves those policy making and implementation processes which confer legitimacy and support on a policy. In contrast, programme success involves meeting the goals and objectives originally set for the policy. Meanwhile, political success involves more overtly political outcomes, such as securing electoral success, controlling the policy agenda, and undertaking action that symbolises important values and directions[37]. This framing is a useful one to apply to the Kalkallo Project as it enables us to understand the nuanced story that we found on the extent to which WSC innovation was successful.

When assessed against McConnell's three dimensions, we observe that the Kalkallo Project represents a reasonable degree of success in the process dimension. Despite some setbacks, all key stakeholders seem to have been involved in the development and implementation of the project. In particular, the involvement of the health regulator has lent legitimacy to the agreed direction taken. In contrast, from a programme perspective, for now at least, the Kalkallo Project represents a far more modest degree of success (or perhaps even a failure) as it is stalled part way through implementation. If the plant is eventually used to produce water for potable use (i.e. the project as the start of a new paradigm) the Kalkallo Project may end up achieving a high degree of programme success. However, if the water is only used for non-potable purposes (i.e. project as an experiment) only a moderate level of programme success would be achieved.

A political assessment is probably the hardest to undertake. The Kalkallo Project certainly represents a new and innovative direction for stormwater management in the Melbourne metropolitan area. And whilst the project may not have been a specific vote winner for electoral success, it has enabled government to take symbolic action on important values central to sustainability, liveability and resilience. Moreover, a degree of innovation has occurred, whilst controlling the policy agenda and avoiding the sticky issue of high profile and colourful public debates surrounding the drinking of recycled water. In this light, we suggest the Kalkallo Project may actually represent significant success in the political dimension. Overall then, our conclusion might be that the Kalkallo project achieved a measurable degree of success at all three of McConnell's levels of success; process, programme and politics. It was certainly not a failure as we had initially assumed.

37 A fuller summary of McConnell's framing of success is provided in Hodge, G. and C. Greve (2013). Introduction: Public-Private Partnerships in Turbulent Times. Rethinking Public-Private Partnerships: Strategies for Turbulent Times. C. Greve and G. Hodge, Routledge**:** 1-32.

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6.5 WHAT DOES THIS MEAN FOR OUR BRF PROJECT?

As cities transform their urban water management practices, governments are attempting to secure an ever-greater number of disparate objectives, such as essential service delivery, the management of limited resources, securing public health, delivering environmental remediation and enhancing the liveability of our urban environments. The progressive build-up of regulatory frameworks supporting each of these objectives, however, has resulted in strong criticism from stakeholders that today's cumulative frameworks themselves, too often hinder innovative practices. In other words, the regulatory framework has become a barrier to better practices and needs reform.

Yet in our case we observed how the availability of Commonwealth funding operated as a strong regulatory intervention, in a broad sense, by providing an incentive for YVW and its partners to experiment with new ways to deliver water supply in growth areas. This experimentation is leading to new learning, both from a technical and a policy perspective. Our case study furthers such policy learning by disseminating knowledge about the ways in which this experimentation was influenced by existing regulatory and risk allocation arrangements.

Our case study analysis also suggests that we need to reframe how regulation is understood in the context of WSC innovation. Urban water practitioners may have historically interpreted regulation as *black letter law* (prescriptive rules with legal force) but our research shows both that regulation is far broader than this and that regulation plays an important role in enabling innovation and adoption. While the relative role of regulation as an enabler and impediment will vary depending on the specific geographic, regulatory and social context of a project, the enabling roles regulation may play in overcoming impediments to innovation appear to be significant.

Of paramount importance is the creation of a culture of trust. In situations where the formal regulatory frameworks lag behind innovation, and there are gaps in the regulatory fabric within which experimentation may occur, risk management and allocation becomes an issue for businesses to take the lead on rather than being set by the regulator. This is what we saw happen on the Kalkallo Project. Risk assumption by business may be an acceptable outcome on some projects, but the consequent uncertainty may raise costs and reduce the appetite for broader uptake of innovation.

Clarification of the regulatory environment can enable or facilitate the wider uptake of innovation by providing certainty, guiding decision-making and ensuring the appropriate allocation of risk. By setting clear requirements that must be achieved, it also aligns disparate stakeholders around a course of action that may have been impossible without such an explicit compliance requirement. It may, therefore, be a powerful force for action by firmly placing on the agenda actions that society values. However, such a response can logically only follow from policy clarity.

References

References

Black, J. (2002). "Critical reflections on regulation." Australian journal of legal philosophy **27**: 1-95.

Brown, R., M. Farrelly and N. Keath (2009). "Practitioner perceptions of social and institutional barriers to advancing a diverse water source approach in Australia." International journal of water resources development **25**(1): 15-28.

Brown, R., N. Keath and T. Wong (2009). "Urban water management in cities; historical, current and future regimes." Water science & technology **59**(5).

City of Manningham and DesignInc Doncaster Hill sustainabilty guidelines.

Coglianese, C. and D. Lazer (2003). "Management-Based Regulation: Prescribing Private Management to Achieve Public Goals." Law and Society Review **37**: 691–730.

De Sousa, D. (2013). Final Report: Results of Legislative Stock-take for Victoria. Melbourne, Australia, Maddocks Lawyers.

De Sousa, D. (2014). Final report: results of a legislative stock-take for Western Australia. Melbourne, Victoria Maddcoks Lawyers.

Department of Sustainability and Environment (2006). Central Region Sustainable Water Strategy, Melbourne, Victoria, Victorian Government.

Department of Sustainability and Environment and (2007). Our water our future: the next stage of the government's water plan. Melbourne Victorian Government

Department of Sustainability and the Environment (2004). Our Water Our Future: white paper - securing our water future. Melbourne, Victoira, Victorian Government.

Department of Sustainability, E., Water, Population and Communities, (2010). Water for the future fact sheet. Canberra, Australian Government.

Dobbie, M. F., K. L. Brookes and R. R. Brown (2013). "Transition to a water-cycle city: risk perceptions and receptivity of Australian urban water practitioners." Urban Water Journal.

Farelly, M. and C. Davis (2009). Demonstration Projects: Case Studies from Melbourne, Australia, Melbourne, Victoria, National urban water governance program.

Farrelly, M. and R. Brown (2011). "Rethinking urban water management: experimentation as a way forward." Global environmental change **21**(2): 721-732.

Ferguson, B. C., R. R. Brown, N. Frantzeskaki, F. J. d. Hann and A. Delectic (2013). "The

enabling institutional context for integrated water management: lessons from Melbourne." Water Research **47**(20).

Freiberg, A. (2010). The tools of regulation. Sydney, The Federation Press.

Frontier Economics (2008). Review of urban water entitlements in Australia. A report prepared for the joint steering committee for water sensitive cities. Melbourne, Frontier Economics Pty Ltd.

Hancher, L. and M. Moran (1989). Organising regulatory space. Capitalism, culture and economic regulation. L. Hancher and M. Moran. Oxford, Clarendon Press.

Harlow, C. and R. Rawlings (2009). Law and Administration.

Hodge, G. and C. Greve (2013). Introduction: Public-Private Partnerships in Turbulent Times. Rethinking Public-Private Partnerships: Strategies for Turbulent Times. C. Greve and G. Hodge, Routledge**:** 1-32.

Kirby, M. (2008). New Frontier: Regulating Technlogy by Law and 'Code'. Regulating Technologies: Legal Futures, Regulatory Frames and Technological Fixes. R. Brownsword and K. Yeung. Oxford, Hart Publishing Ltd.

McCallum, T. (2014). Conceptualising urban water regulation - the Melbourne System. Melbourne , Australia.

McConnell, A. (2010). Understanding policy success: rethinking public policy, Palgrave Macmillan

Moreland City Council (2006). Central Coburg 2020 Structure Plan. Melbourne.

Office of Living Victoria (2013). Melbourne's water future. Consultation draft. Melbourne, Victorian Government.

Power, K. (2010). Recycled water use in Australia: regulations, guidelines and validation requirements for a national approach. Waterlines report series No. 26. Canberra, National Water Commission.

Productivity Commission (2011). Australia's urban water sector. Inquiry report No.55. Canberra, Commonwealth of Australia.

PwC Australia (2011). Review of urban water quality regulation in Australia. Waterlines report. Canberra, National Water Commission.

Richards, L. and J. M. Morse (2013). Readme first for a users guide to qualitative methods, SAGE publications Inc.

Selznick (1985). Focusing organisational research on regulation. Regulatory policy and the social sciences. R. Noll. Berkley CA.

State of Victoria (2014). Plan Melbourne Metropolitan Planning Strategy. Department of Transport, Planning and Local Infrastructure, Melbourne, Victoria, Victrorian Government.

Vaisman, L. (2014). "Capturing the potential of stormwater " Australian Water Association Water Journal **41**(3): 40-43.

Wong, T. H. F., R. Allen, R. R. Brown, A. Deletic, L. Gangadharan, W. Gernjak, C. Jakob, P.

Johnstone, M. Reeder, N. Tapper, G. Vietz and C. J. Walsh (2013). Stormwater Management in a Water Sensitive City. blueprint2013. Melbourne, Cooperative Research Centre for Water Sensitive Cities.

Yarra Valley Water Construction Begins on Innovative Stormwater Harvesting Scheme. http://www.yvw.com.au/Home/Aboutus/news/Sustainabilitynews/Kalkalloconstructionunderway/index.htm.Yarra Valley Water (2010). Kalkallo Stormwater Harvesting And Reuse Project. Victorian Water Industry Association Sustainability Seminar.

Yarra Valley Water (2013). Factsheet - Coburg stormwater harvesting and reuse project.

Appendices

Appendix 1

SEMI-STRUCTURED INTERVIEW QUESTIONS

Question 1 - Scene setting

1.1 What was the role of your organisation in the Kalkallo stormwater harvesting scheme?

1.2 What was your own role in relation to this scheme?

Question 2 - Reasons for the scheme

From your perspective what were the reasons or motivating factors for the scheme?

Question 3 - Approvals

Could you describe how you navigated the approvals process for the scheme?

Question 4 - Challenges and issues

4.1 What were some of the challenging aspects about the scheme and why? E.g. technical, governance, legal/regulatory, environmental and/or social/cultural?

4.2 How did you resolve these challenges?

Question 5 - Reflection

If you had a chance to do this same project again would you have done anything differently?

Question 6 - Follow up

Are there other people in your organisation better placed to answer these questions and/or able to provide additional knowledge to the research team?

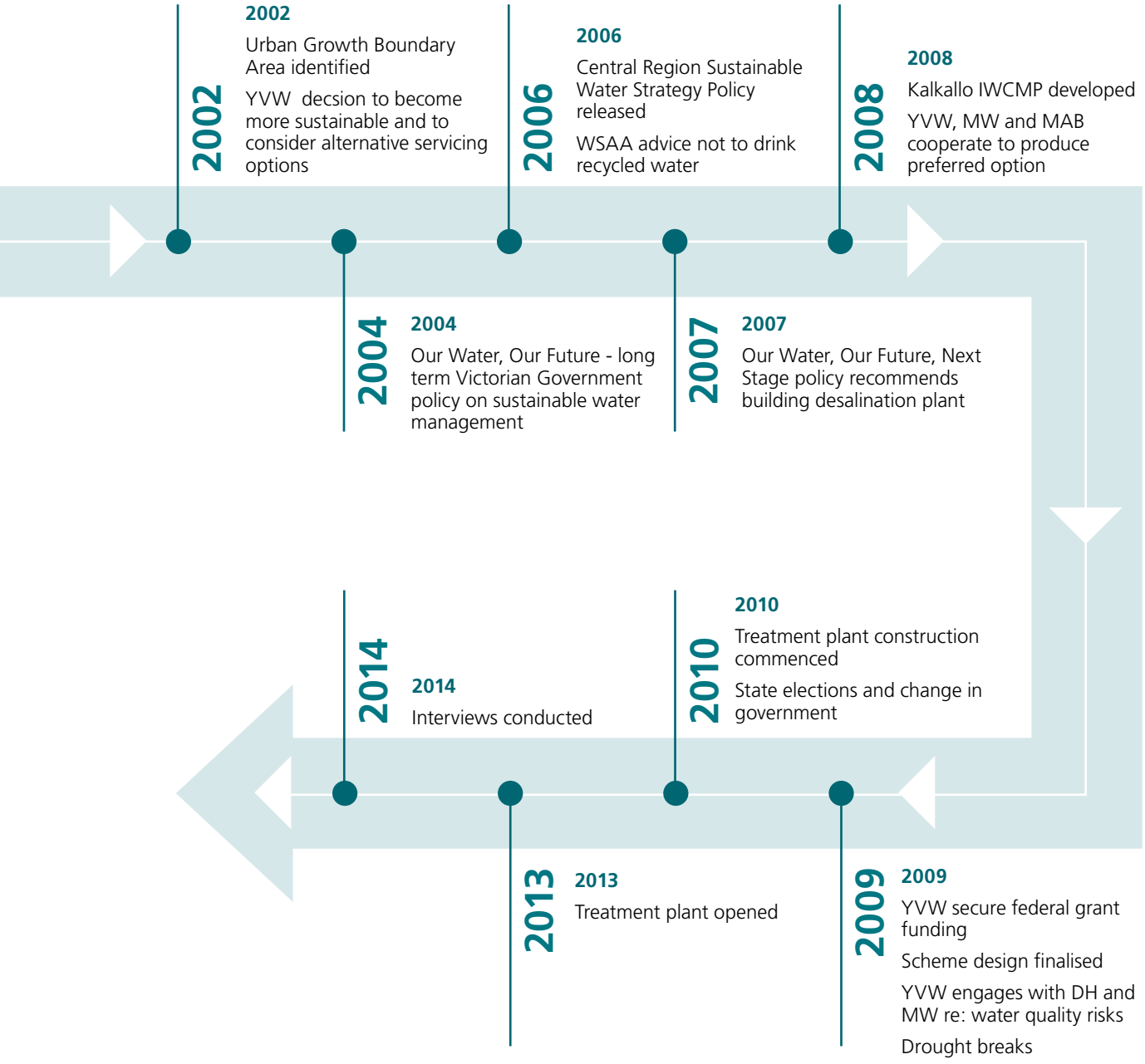
Appendix 2

INITIAL CODING STRUCTURE

1. **Barriers to project** (Intended to explore in depth what the actual barriers to the Kalkallo Project were and how these were presenting):
    a. Economic
    b. Government policy related
    c. Institutional
    d. Political
    e. Process related
    f. Professional culture related
    g. Regulatory
    h. Risk related
    i. Technical
2. **Context** (Intended to explore specific aspects of the Kalkallo Project in depth and how participants differed in their views about these):
    a. Approvals process
    b. Assessment of success of project
    c. Benefits of project?
    d. Current status of project
    e. Facilitating factors?
    f. Lessons learnt from project
    g. Reason for project?
    h. Risks/challenges of project?
    i. Timeline
    j. What was innovative?
3. **Overcoming barriers** (Intended to explore in depth how identified barriers were overcome. This category is likely to expand during the process of coding the data):
    a. Communication and process
    b. Demonstration project
    c. Technical solutions
    d. Trust
    e. Use of models/tools

Appendix 3

KALKALLO PROJECT TIMELINE



Appendix 4

TABLE OF REGULATORY APPROVALS REQUIRED FOR THE KALKALLO PROJECT
(as identified by the participants)

Regulatory approval	Required?	Not required?
Public health approval		The regulatory regime that applies to water supply projects in Victoria differs depending on whether or not the water is to be used for potable purposes. However, regardless of the intended use of the treated water there is currently no requirement for formal approval of any stormwater reuse project by DH as public health regulator. **Potable use -** there is a legislative requirement in the SDWA requiring YVW to prepare a risk management plan, which complies with the SDWA, for all drinking water supply projects. As the Kalkallo Project involves storage of potential potable water in MW's retarding basin under the SDWA, MW also has a formal role as a water storage manager. This requires it to prepare its own risk management plan. There is no requirement for DH formally to approve such plans. **Non-potable use -** the use of stormwater for non-potable purposes is not currently subject to any specific legislative regime in Victoria and there is no formal role for DH to play in terms of approving such projects.
Environmental approval		Ordinarily, the EPA is involved in approving certain types of large scale facilities which when operational are likely to cause environmental harm. For example, recycled sewerage plants. However, there is no formal role for the EPA to play, under existing regulatory frameworks, in respect of stormwater reuse plants.
Planning approval		In the normal course of events there would have been a requirement for YVW to obtain a planning permit from Hume City to undertake a project such as this. However, such a permit was not required in this instance due to the particular zoning of the land.

Regulatory approval	Required?	Not required?
Economic regulatory approval		The ESC, as Victoria's independent economic regulator, has a role to play in approving major expenditure by Victorian water corporations as part of the five yearly price setting process. However, due to the significant level of federal funding that the Kalkallo Project received it did not require approval.
Building approval	Building approvals from Hume City were required for the treatment plant. Participants were not aware of any problems having been experienced in obtaining these.	
Drainage approval	Under the Water Act, MW has a role to play in approving the design of the drainage works that will be included by a developer in a new development. MW approved the designs of the wetlands and retarding basin.	
Securing water entitlements	To operate the Kalkallo Project YVW needs to secure the right to legally take and use the required stormwater. Currently, the stormwater at the site takes the form of overland flows. YVW wishes to use those overland flows which are in excess of the flows that would occur naturally in an undeveloped area. To enable this YVW has bought a tradeable water right, entitling it to take a certain allocation of these flows that would otherwise be allocated to the Merri Creek. Obtaining this does not seem to have been problematic. In future, once the roads and drains are constructed YVW will presumably need to obtain a licence from Hume City to take the water from the drains. YVW did not envisage that obtaining such a licence would be difficult.	

Appendix 5

TABLE OF PROJECT ENABLERS
(as identified by the participants)

Project enabler	How this influenced decision making
Economic enablers	
Federal funding	The availability of significant federal grant funding was an important factor in enabling the Kalkallo Project to proceed. As one YVW participant noted: 'this project is only viable for us at the moment because we have a 50 per cent subsidy from the Federal Government. If we didn't have that subsidy this project would be an absolute dog and we wouldn't have proceeded.' (Interviewee A)
Cheap storage	The ability to use an existing MW retarding basin for storage was a significant economic enabler. This meant that cost barriers regarding the reliability of stormwater were not as significant as they may otherwise have been.
Regulatory enablers	
Regulations mandating action	Clear regulatory requirements to undertake certain actions in respect to WSUD and IWCM meant these were factored into decision making. For example, the requirements placed on MAB by Cl56.07 of the VPPs to incorporate recycled water provision into the residential development and to incorporate WSUD features into the development to improve stormwater quality.
Regulations requiring the pricing of environmental externalities	Regulatory requirements requiring certain environmental externalities to be priced, for example the level of nutrients released by YVW into MW's waterways, were a factor in shaping the Kalkallo Project's design.
Regulatory framework enabling action without approval	The regulatory framework regulating the quality of potable water supplied in Victoria, as set out in the SDWA, enabled YVW to progress with the Kalkallo Project without the need for formal approval from DH. Similarly, not needing to obtain planning approval, EPA works approval and approval from the ESC is likely to have been helpful to the Kalkallo Project.
Cultural enablers	
Corporate culture	YVW's culture of encouraging environmental sustainability and social responsibility enabled the Kalkallo Project to be supported and pursued.
Strong project advocate	The existence of an individual advocate within YVW determined to push the Kalkallo Project forward despite setbacks was very important.
Other supportive stakeholders	There was support from MAB who was keen to provide recycled water to the commercial development even when not required to do so.[39] MW was also supportive of the Kalkallo Project at a corporate level.
Millennium drought	Increased the desire on all stakeholders to push the envelope with alternative water source projects.

39 YVW only mandate the use of recycled water in residential developments.

Appendix 6

TABLE OF PROJECT IMPEDIMENTS
(as identified by participants)

Project impediment	Description of impediment and how it influenced decision making	Methods for overcoming impediment
Technical impediments	Technical challenges included: a. Dealing with extreme variability in the quality of the water that will be collected from the catchment. This is exacerbated by YVW having a lack of control over the potential future uses of the catchment. Typically, catchment managers control water quality risks by limiting the activities that can be conducted in existing catchments. b. Devising an appropriate treatment train for this source of water in the absence of guidelines.	Most of the technical challenges appear to have been overcome in the design of the treatment process, or are expected to be resolved during the testing period. One solution has been to batch and then test the treated water before allowing this to be released. There has also been some deliberate over-design of the system as one YVW interviewee noted: 'we were also cognisant of the fact that this was the first time that anybody had done this and, to coin a phrase, we didn't want to stuff it up for everybody. So we've been very conservative - sorry there's been an extra element of conservatism to ensure that it's right. The only thing we haven't included up there is a reverse osmosis but we left room for it.' (Interviewee E) Participants hope that data gathered from the Kalkallo Project will inform the development of guidelines for similar projects in the future.

Project impediment	Description of impediment and how it influenced decision making	Methods for overcoming impediment
Time related impediments	The ordering of work and delay has been the source of many of the problems faced by the Kalkallo Project. Federal funding was only available if the works commenced by a certain date. However, the impact of the global financial crisis meant that MAB's development at Merrifield stalled. This resulted in YVW building a state-of-the-art treatment plant which currently has no water source, as the commercial development which will be its catchment has not yet been built. As a YVW participant commented: 'We've built a 65 mega litre storage and last winter we harvested 15 mega litres for the whole of the winter. Now we'd be wanting to turn that over four times in that period. So it's been difficult.' (Interviewee E) In addition, there is an inherent timing problem built into the Kalkallo Project's design. Without a catchment, the necessary testing and validation of the treatment process will not be possible to satisfy YVW and DH that the treatment will be adequate. However, this testing and validation process, which may take several years, cannot commence until there is some development on the catchment to produce enough run-off to be a water source.	The timing dilemma has still not been resolved and the catchment remains unbuilt. Some of the explicit learning participants identified from the Kalkallo Project involved the future optimum staging of stormwater capture and reuse projects within the context of new developments.
Policy impediments	There was significant uncertainty and confusion about what the Victorian Government's actual policy position on the potable reuse of stormwater was, see also Appendix 7. This lack of clarity resulted in participants taking contrary positions on the interpretation of a policy that needed to be inferred from a number of publicly available documents. For DH this uncertainty seems to have led to a belief that the issue was outside of their mandate and not open for discussion. Consequently they were not empowered to engage with YVW about the potable reuse aspect of the Kalkallo Project. For YVW the lack of a clearly stated direct prohibition meant they felt able, as an organisation, to push the boundaries and undertake something new.	'The way that we came to agreement was that the Health Department said they would support it as a feasibility study and we had a big workshop where that was determined.' (Interviewee C) YVW took the decision to proceed in face of policy ambiguity and side stepped this impediment by labelling the Kalkallo Project a research project. This impediment may still arise when a future decision needs to be made about the use of the treated water once the testing period is over. However, YVW is working on changing the debate surrounding such future policy discussions by lobbying for amendments to national water quality guidance on stormwater.

Project impediment	Description of impediment and how it influenced decision making	Methods for overcoming impediment
Regulatory impediments	Not all project participants identified current regulatory frameworks as an impediment with one YVW interviewee observing: 'Our experience would be that regulations don't get in way if you're brave enough.' (Interviewee A) While it is true that participants did not identify any specific project barriers which arose from a prohibition contained in existing legislation they did still identify project impediments which related to current regulatory frameworks. These frameworks presented as project impediments in a variety of more nuanced ways due to: 1. The significant complexity in surrounding regulatory frameworks and in the potential multiple layers of approvals required for the Kalkallo Project. This was compounded by a lack of precedent about how to negotiate the approvals process, as one YVW interviewee stated: 'The rules are not clear, they were written in another time when water management was different. These sorts of schemes actually present new issues.' (Interviewee E) 2. A lack of clarity about the rights that YVW required to harvest overland flows in the pre-development stage of the Kalkallo Project. 3. A lack of clarity in the definitions used for different water sources across the regulatory framework. 4. Current regulatory frameworks containing no mechanism whereby YVW, as an organisation, could share the risks of water quality failure. For example by sharing these with a regulator by way of approval or endorsement of its actions. This required YVW to progress as sole risk taker on the Kalkallo Project. Just as importantly, gaps in the current regulatory frameworks around stormwater reuse, particularly from an environmental and public health perspective, were identified as problematic. When discussing these gaps participants contrasted the frameworks regulating Class A recycled projects to the *unregulated* stormwater reuse projects. This resulted in there being no clear process for bringing in the water quality specialists into the Kalkallo Project, nor for deciding how to validate the equipment and treatment train used in the Kalkallo Project.	Regulatory complexity, lack of clarity and gaps within current frameworks have now been navigated, largely by YVW choosing to mirror the process it would have been required to undertake had the Kalkallo Project been a Class A recycled water project. In the absence of any regulatory framework to share risks with the regulator, YVW is itself assuming all the risks inherent in water supply. However, in developing the approach whereby the Kalkallo Project is labelled a research project, the public health regulator has been able to be involved in advising on suitable risk management, even in the absence of a formal framework for such involvement. YVW were clear that they would prefer to have greater regulatory certainly and would be lobbying for this.

Project impediment	Description of impediment and how it influenced decision making	Methods for overcoming impediment
Institutional impediments	At the time the Kalkallo Project was conceived there were significant institutional impediments in Melbourne to the undertaking of IWCM projects in a co-ordinated fashion. As one MW participant observed: 'each organisation's not clear enough on how far they should be going into this new area that they have - I suppose they're just falling back on what they've - their normal processes. So to me, that's really what's limiting it. I think if that was more clearly defined, it'd be clearer when you got down to the detail' (Interviewee H) This made decision making extremely hard. These barriers included: a. The complex interaction between YVW and MW in a project involving both supply and waterways health protection. YVW having the corporate mandate to supply water and MW having the mandate to protect waterways health. As one YVW participant observed: 'because it's stormwater and it's us playing in a field that's not necessarily our accountability so we didn't really have a mandate to build a case to look at how can we make the management of stormwater in this corridor cheaper or whatever. We were just looking at water supply perspective.' (Interviewee D) b. MW having several corporate views about the Kalkallo Project, not all of which aligned. This meant it was extremely hard to identify which decision makers (for example, drainage engineers, water quality specialists, waterway health specialists) needed to be involved with which decisions. As a YVW participant observed: 'They had five different views and they really struggled with it' (Interviewee B) c. In addition, without any party having a clear institutional mandate to do things differently than they had in the past there was, as one MW participant noted, a tendency to fall back on 'normal processes'.	Eventually through discussion and agreement these institutional impediments were overcome sufficiently to enable the Kalkallo Project to proceed. However, they certainly added to the time and effort required to undertake the Kalkallo Project. MW has subsequently undergone a corporate restructure and now operates in a significantly more joined up fashion in respect to IWCM. However, as one MW participant observed this is still a potential hindrance to innovation: 'I think the questions that were being asked and still are really unresolved is who's responsible for these extra things, were being asked at that time and it was still - there was obviously no answer and there probably still isn't an answer because it's all still a moving space within the water industry in Victoria and Australia probably.' (Interviewee H)

Project impediment	Description of impediment and how it influenced decision making	Methods for overcoming impediment
Communication and process impediments	As there was no clear regulatory process to follow there was significant discretion about how to operate the communication and development process for the Kalkallo Project. This discretion does not appear to have been helpful as YVW does not appear to have involved the water quality specialists (whether at DH, MW or internally at YVW) in the Kalkallo Project until 2009 when the project scope was reasonably far advanced. While some participants considered this to have been an appropriate time to seek such involvement this view does not appear to have been shared by all. As one MW participant noted such communication and process difficulties are not uncommon in innovative projects: 'The times we've come unstuck, particularly with - this is not the first time with a recycling project that had problems - was where the public health issues had been ignored until the engineering issues had been sorted out and then of course everybody then thinks well, it's all sorted out and then we have to come in and deliver challenging news.' (Interviewee C)	These communication and process impediments were overcome.

Project impediment	Description of impediment and how it influenced decision making	Methods for overcoming impediment
Professional culture impediments	'this project, particularly, is really challenging a lot of traditional approaches because of issues - it's one thing to harvest stormwater to irrigate a park but it's a very different thing to put it back in the drinking water.' (Interviewee H) By definition, IWCM projects require the involvement of a whole range of professional skill sets including those in civil engineering, biochemical engineering, environmental science, planning and development. This in itself is likely to be complex. Moreover many of these professions are involved in applying existing regulatory frameworks, such as the protection of public health or the prevention of flooding, to urban water management. Innovative projects that operate outside these frameworks are inevitably challenging. As one MW participant stated: 'We've been collecting data on drinking water and sewage for a long time so we're pretty confident we know what's in there, but you just don't for stormwater. Well, it's painful I guess in that it takes us outside our comfort zone,' (Interviewee C) Some professionals involved in the Kalkallo Project seem to have been reluctant to step outside these frames, particularly without a clear mandate to do so. As one YVW participant observed: 'the positive people found ways that it would make sense and make it work and the people who were a bit more cautious and conservative would find lots of reasons that it maybe shouldn't have been proceeding.' (Interviewee D)	These professional culture impediments have been overcome sufficiently to enable the Kalkallo Project to proceed as a research project. In addition, participants observed that future changes to intuitive professional knowledge may be secured by advocates lobbying to challenge old views. Scientific advances also have the ability to change over time the macro environment surrounding the profession in regard to what are considered safe water sources.

Appendix 7

TABLE OF ORGANISATIONAL INTERPRETATIONS OF GOVERNMENT POLICY
(as identified by the participants)

Organisation	Interpretation of current policy	Evidence used to support this	Implications of interpretation
YVW[40]	Potable reuse of stormwater not current policy but may become future policy if circumstances require this. Policy support for monitoring the technical development of alternative water sources for potable purposes and conducting feasibility studies into these.	*Our Water Our Future White Paper.* *Central Region Sustainable Water Strategy.* *Our Water, Our Future - The next stage of the Government's Water Plan.*	There is no government policy against harvesting and treating stormwater for potable use. This leaves YVW free to pursue this option.
MW[41]	Potable reuse of stormwater not current policy.	*Central Region Sustainable Water Strategy.*	MW unable to support the potable reuse element of the Kalkallo Project.
DH[42]	Potable reuse of stormwater not current policy.	*Our Water Our Future White Paper.*	DH unable to support the potable reuse element of the Kalkallo Project.

40 Interpretation set out in briefing paper produced by YVW, dated 20 August 2009.
41 Interpretation set out in internal MW power point presentation, dated 26 August 2009.
42 Interpretation set out in letter from Jan Bowman, Assistant Director, Environmental Health, Public Health Branch, Department of Human Services sent to YVW, dated 30 July 2009. At this point in time the DH was called the Department of Human Services.

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