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Exploring the potential contribution of Environmental Impact Assessments for water resilience: a case study of *in-situ* upgrading of the Monwabisi Park informal settlement, Cape Town, South Africa.

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Abstract

Internationally, water resource management is complicated by a myriad of factors. Climate change is just one of such factors that has globally complicated water resource management due to erratic weather patterns, including extreme and prolonged drought. However, there also exist other factors such as rapid urbanisation, migration and inadequate infrastructure which have contributed towards water resource management being complicated. Water resource management therefore spans a wide scope ranging from managing the direct impacts of climate change on water availability to ensuring that water remains accessible to all. From a national perspective, water access is particularly a topical issue in South Africa, due to its ever-expanding cities and informal settlements. Cape Town is no different and in the same way, water access is directly affected by a myriad of factors including natural and social. Natural factors include drought, while social factors include rapid urban expansion, wastage and increasing demand by competing user groups. However, for informal settlements where limited access to water and inadequate socio-economic living conditions are the norm, water access remains a problem. The pre-existing conditions in this regard heightens informal settlements' challenge for access to water. Learning from the severe drought of 2015 to 2018 one of the impacts of climate change in the context of this research, the City of Cape Town introduced long-term policy interventions to ensure water access and promote water resilience by developing both the Cape Town Resilience Strategy and Water Strategy. Despite this progress at a strategic level, guidance on tools for environmental governance of project and local level water resilience remains lacking. This research uses a case study approach to explore Environmental Impact Assessments' potential contribution for water resilience in informal settlements. Water resilience in the context of this research implies that actions are implemented so that water remains accessible for informal settlements while its more vulnerable residents are empowered, in spite of the threat and impacts of future drought scenarios. The Environmental Impact Assessment is therefore explored as a 'vehicle' or means through which such actions could be implemented and in so doing, contribute towards water resilience in the real-world context.

An Environmental Impact Assessment application of the *in-situ* upgrade of the Monwabisi Park Informal Settlement in Cape Town, South Africa, is analysed based on three themes of how contributions towards water resilience relevant to informal urban settings could be implemented, namely: (1) addressing the relationship between the ecological and social elements of the environment, (2) engaging with aspects of future threats of drought and the need to plan ahead and (3) supporting the Cape Town Resilience Strategy and Water Strategy with implementation to further achieve water resilience.

The shortcomings of the case study revealed that the Environmental Impact Assessment addressed pragmatic issues relating to the decision-making attributes of the tool rather than substantive water resilience matters. Social and ecological elements were not treated as one system and planning ahead failed to incorporate relevant water resilience imperatives, even though the opportunities to do so exists through need and desirability criteria, which requires the tool to use forward planning policy and frameworks to inform development projects. Despite these two shortcomings, EIAs hold potential to align with and strengthen environmental governance plans, policies or programmes. This was found to be possible through mandated procedures and normative outcomes such as public participation, environmental education and community involvement, conserving and diversifying sources of water and environmental monitoring. These synergies between Environmental Impact Assessment and the Cape Town Resilience Strategy and Water Strategy provide entry points for Environmental Impact Assessments to contribute towards water resilience. However, the potential contribution of Environmental Impact Assessments to water resilience in informal settlements remains highly contingent on addressing systemic vulnerabilities exhibited in the social-ecological context and adequate preparation for future shocks and stressors.

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List of Abbreviations

BAR:	Basic Assessment Report
CoCT:	City of Cape Town
CTRS:	Cape Town Resilience Strategy
CTSDF:	Cape Town Spatial Development Framework
EA:	Environmental Authorisation
EIA:	Environmental Impact Assessment
EMPr:	Environmental Management Programme
DEA&DP:	Department of Environmental Affairs and Development Planning
DEAT:	Department of Environmental Affairs and Tourism
DWS:	Department of Water and Sanitation
EMF:	Environmental Management Framework
IAIA:	International Association for Impact Assessment
IDP:	Integrated and Development Plan
IEM:	Integrated Environmental Management
NEMA:	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEPA:	National Environmental Policy Act, 1969 (Public Law 91-190)
PPP:	Public Participation Process
PSDF:	Provincial Spatial Development Framework
SDF:	Spatial Development Framework(s)
SDGs:	Sustainable Development Goals
VPUU:	Violence Prevention Through Urban Upgrading
WS:	Water Strategy
WSUD:	Water sensitive urban design

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1. Chapter 1: Introduction

1.1. Introduction to the study

Internationally under the banner of extreme weather events spurred on by climate change, drought, amongst *inter alia* flooding, heat waves and hurricanes will continue in its frequency and severity (Linnenluecke *et al.*, 2012). It is these scenarios which have not only complicated water resource management, but has also necessitated the need to promote and institute action against the impacts of extreme weather events. While Europe largely experiences episodic events of drought but at the same time enjoys abundance of water resources (Bressers *et al.*, 2016), quite the opposite applies to the African continent. According to Masih *et al.* (2014), previous studies indicates that the semi-arid and sub-humid regions of Africa are the most drought prone regions. The regions' high vulnerability to severe drought is directly caused by the continent's climatic variability, El Niño-Southern Oscillation and sea surface temperature, while anthropogenic factors such as climate change and landuse practices have also induced drought mechanisms.

Nationally, Olivier *et al.* (2018) highlights that South Africa has experienced and also remains vulnerable to drought. Olivier *et al.* (2018) makes it clear that while droughts are caused by atmospheric drivers of change, additional factors exacerbate the impacts associated with drought. In this regard the impacts of water access and scarcity are also driven by factors that are applicable to South Africa. These include migration and urbanisation (Vogel and Zyl, 2016 in Olivier *et al.*, 2018), growing settlements and inadequate infrastructure (Department of Water Affairs, 2013 in Olivier *et al.*, 2018). Water resource management and drought in South Africa therefore requires dynamic responses, which in the past was limited to finding monetary solutions to protect the rural, commercial and agricultural sectors from its impacts (Olivier *et al.*, 2018). Part of these dynamic responses would certainly require protecting South Africa's urban and informal settlements from the impacts of drought. Vogel *et al.* (2015) emphasises that while biophysical and technocratic approaches to drought and the water sector have only begun to grapple with social and economic components, aspects of implementation and taking action greatly lags. The authors attributes this to factors such as the complexity and reframing of problems relating to climate change, having to include multiple organisational boundaries, engaging the public and political restructurings affecting the public sector. Ziervogel (2018) also confirms that implementation to manage the impacts of drought in Southern Africa, such as water management has been slow.

The City of Cape Town (hereafter CoCT) is emerging from a severe drought that catalysed the adoption of a Cape Town Resilience Strategy (hereafter CTRS) in 2019 (CoCT, 2019) and Water Strategy (hereafter WS) in 2020 (CoCT, 2019). These strategies have been introduced by the CoCT amongst its

chief instruments designed to improve the city's resilience against acute shocks and chronic stresses. According to the CoCT (2019: 2), more specifically, the CTRS was developed to "give guidance on how the City and the whole of society can build resilience to shocks and chronic stresses relevant to Cape Town. According to the CoCT (2019), more specifically, the WS was developed to provide guidance on how the twin challenges of improving water resilience and improving the quality of life of all citizens are responded to. To be successful in achieving water resilience, these strategies must be supported by and integrated with tools for local level environmental decision-making in order to achieve its intended outcomes. Many such as Ziervogel (2018) and Vogel *et al.* (2015) have emphasised that while advances in responses to drought are prevalent, implementation still lacks given the complexity of how aspects of climate change should be responded as well as the many role-players required. The lack of implementation likely implies that the intended outcome, namely water resilience will not be achieved. This research therefore explores Environmental Impact Assessment(s) (hereafter EIAs) potential contribution for water resilience, specifically in the context drought as one of the impacts of climate change. It uses a case study approach to analyse the EIA application of the *in-situ* upgrade of the Monwabisi Park Informal Settlement in Cape Town, South Africa, and explores how EIA can potentially contribute towards the promotion of water resilience at the local level, and particularly for informal settlements (DEA&DP, 2016). It also identifies key areas where EIA can implement the actions of the CTRS and WS at the project level, thereby enhancing the relevance of EIA to water scarce contexts.

Cape Town, like many other cities, is at a high risk of drought. Through climate modelling studying regional climate and extremes, it is projected that drought will become a common occurrence in Cape Town (Pascale *et al.* 2020). This presents a challenge for Cape Town which remains an unequal city, as evident in the urban fabric of the city, with its sprawling informal settlements in low-lying areas, juxtaposed with the green leafy suburbia set against the foothills of its mountains. At the basis of these differences exists the legacy of the apartheid ideology in the City's urban planning, which extenuates pervasive socio-economic disparities and inequalities (Dewar in Wagner *et al.* 2015). These inequalities in a variety of ways are deleterious to peoples' capabilities to respond to and safeguard against the impacts of drought and lack of access to water. Millington *et al.* (2020) for example argues that the local government's response to Cape Town's water crises largely focused on water tariff restructuring which further deepened the city's existing inequalities. Simpson *et al.* (2020) also argues that more comprehensive solutions to Cape Town's water crises that safeguard against further entrenching inequality are required. As such, Enqvist *et al.* (2019) reflects that water governance remains complex and spans various aspects such as water conservation, demand management and constrained supply, while also ensuring that aspects of justice and inequality in water access and

vulnerability of the poor are addressed. The latter aspect alone presents a challenge to government, as the more vulnerable may have a curtailed capability to safeguard against the impacts of drought in Cape Town. Simpson *et al.* (2019) for example, highlight how Cape Town's higher income households harboured the financial means to invest in off-grid technologies to secure water when municipal supply was low due to drought. The poor were less likely to afford these technological solutions to the drought, and although innovative at the household level, remained dependent on the threatened municipal water supply. Further, Ouweneel *et al.* (2020) found that selected lower-income areas in Cape Town such as Langa and Bonteheuwel lowered water use due to the increased water tariffs, while lowered water use in high-income areas such as Newlands and Meadowridge was attributed to the use of alternative sources of water. The risk of drought and its direct impact on livelihoods is therefore more acute in informal settlements.

According to Smit (2020), approximately 146 000 households in Cape Town reside in informal settlements, where residents do not have legal tenure; and reside in dwellings that often lack basic services and do not comply with formal building and planning regulations. Together with high levels of poverty, people living in informal settlements remain most vulnerable to the effects of climate change, since they barely have the resources to satisfy their immediate basic needs alone. Rodina (2019) emphasises that decision-makers are now faced with the dual responsibility of both promoting water resilience, while also ensuring that services are equitably distributed to the residents of Cape Town as a city with an extant apartheid urban planning legacy. These aspects all signifies important considerations to be taken into account when actions are to be implemented to promote water resilience for the most vulnerable of society.

Resilience is understood and defined in many ways. Holling (1973) defined resilience to the capability of ecological systems to maintain a state of balance when being disturbed by external forces. Further interpretations of the term have since emerged, including a specific focus on water resilience. Some of the definitions of water resilience ranges from approaches to strengthen a water system's capacity to cope with change while retaining its same structure (Rockstörn *et al.* 2011 in Grafton *et al.* 2011) to approaches which builds the capacity of the system to adapt or transform in the face of change (Folke *et al.* 2016). These definitions signify some shifts from Holling's original definition (1973). Firstly, the focus has stretched beyond ecology to also include human elements within the system, this may include people and the government. This is often understood as interconnected social-ecological systems (Arnold, 2014; Williams *et al.* 2017). Secondly, the approaches are intended to not only cope with change but to also adapt or transform, as a form of water resilience. Rodina (2018: 7) defines water resilience as water systems' (including their technological, ecological and social dimensions) "ability to bounce back/return to normal, or the ability to adapt or transform in response to changes

or disturbances". Rodina (2018) therefore combined the abovementioned definitions into one consolidated understanding of water resilience. Water resilience can therefore be concept laden with one, e.g. to cope, or have multiple outcomes, e.g. adapt and transform. Therefore, for the purposes of this research, a working definition of water resilience was adopted, which refers to the implementation of actions geared towards ensuring that drought as one of the impacts of climate change receives adequate attention, such that inadequate water access in informal settlements is avoided and its residents are empowered, in spite of the threat and impacts of future drought scenarios. Having established this working definition, the research focuses on exploring the potential of project-level EIAs to contribute towards promoting water resilience at community scale. At this scale, the unique circumstances of residents of informal settlements becomes relevant, due to their greater need for assistance to attain water access and water resilience in general.

EIAs are legislated tools comprising a "systematic process of identifying, assessing and reporting environmental impacts associated with an activity" (Republic of South Africa, 2014: 10). There exists a rich supply of literature that introduces the tool by describing the generic procedural and legislated requirements of EIAs. Sandham *et al.* (2013) for example describes the different procedural phases of EIAs, comprising the submission of the EIA application, the compilation of application reports providing the required information, the review of the information contained in the reports by the competent authority and the issuing of an environmental authorisation. These phases are accompanied by specific legislated requirements that must be met, including *inter alia* impact assessment, public participation as well as monitoring and auditing. Impact assessment entails generating information and assessing the impacts should an activity or development project be implemented. According to Morrison-Saunders *et al.* (2014), since EIAs' inception, specific type of assessments has emerged and used in the EIA process. Each assessment type specialises in a specific area of focus such as social impact assessment which focuses on the social impacts of development project. According to Bond *et al.* (2014), public participation includes mobilizing and involving the public and other stakeholders in the EIA process and thereby influence decision-making. According to Hulett *et al.* (2002), monitoring and auditing takes place after the environmental authorisation has been issued. The purpose of monitoring and auditing is to determine whether the conditions and recommendations were being implemented and adhered to. Although these aforesaid procedural and legislated requirements have ensured that EIAs can be implemented from a practical perspective, the tool should also be examined from a critical perspective in order to determine its effectiveness and ability to engage current environmental crises. According to Jay *et al.* (2007: 290) questioning the effectiveness involves evaluating "how much difference the EIA is making" and whether it is meeting its intended goals of sustainable development and "restoring and maintaining

environmental quality” (NEPA, Section 101 (a) cited in Jay *et al.*, 2007). Retief *et al.* (2016) on the other hand argue that since EIAs are anticipatory in nature whereby it predicts of impacts that are yet to come, it should be able to start and plan for the futures of uncertainty where global megatrends, including resource scarcity and climate change remains a threat. In this manner EIAs may contribute towards capabilities to respond to rapid change.

Similarly in South Africa, development projects require Environmental Authorisation (hereafter EA) where these triggers any of the activities listed in terms of the EIA regulations, encompassing the aforementioned procedural and legislated requirements being administered by the government structures in the public sector. With the public sector serving mandates of equity and providing basic services and infrastructure to its citizens, focus is placed on those projects from the public sector that need to take cognisance of aspects relating to access to water, with some being more vulnerable to the risk of drought and its associated impacts than others. These aspects certainly signify EIAs to also grapple with the substantive present-day problems and impacts of climate change that affects society. Failure to do so could imply that the tool is limited in its focus on meeting procedural and legislated requirements without making any real contributions towards alleviating substantive present-day problems and impacts of climate change. Any shortcoming of this nature would be unfortunate for EIAs which aligns itself with the intended goals of sustainable development, while also having the practical means to achieve such outcome. These aspects therefore also warranted the further investigation through an empirical enquiry, and thereby providing an insight into how EIAs in actual practise takes place and determining the specific means in which the tool can contribute towards water resilience.

As illustrated above, both water resilience and EIAs cover a wide range of concerns. In terms of resilience, different types of resilience, such as water resilience have emerged from the original interpretation as addressed by Holling (1973), while at the same the term could be aimed at different outcomes, as addressed by Rockström *et al.* (2011) as well as Folke *et al.* (2016) as discussed above. In terms of EIAs, various generic procedural and legislated requirements of EIAs, as introduced by Sandham *et al.* (2013), Morrison-Saunders *et al.* (2014), Bond *et al.* (2014) and Hulett *et al.* (2002) forms part of the tool. It is for these reasons that this research focused on specific aspects of EIAs and three themes of water resilience for the empirical inquiry. In terms of EIAs, the specific aspects of the tool that were selected include the process, the long-term purpose of EIAs. The process refers to how the impacts of development projects are assessed, and secondly how such impacts are evaluated by decision-makers. The procedural and legislated requirements of EIAs therefore forms the basis of the empirical enquiry in this regard. The long-term purpose in terms of this research refers to how EIAs

engages with aspects of the future where environmental shocks and stresses, including drought caused by climate change remain a threat, as suggested by Retief *et al.* (2016).

The three themes of water resilience that form the basis against which these two EIA foci, namely the decision-making process and long-term purpose are measured, are 'addressing the relationship between the ecological and social elements of the environment'; and the 'need to plan for futures of uncertainty of drought'. Addressing the relationship between the ecological and social elements of the environment refers to the fact that humans interact with their natural environment in a complex manner, and therefore exist as one system, in order to obtain the goods and services from the natural environment required for survival. This is derived from the aspect and thinking of social-ecological systems being interconnected (Arnold, 2014; Williams *et al.* 2017). The impact assessment and decision-making procedures of the EIA are evaluated so as to determine whether the process adheres to these understandings of the social-ecological system. The need to plan ahead is used to determine whether the long-term purpose of EIAs engages with aspects of the future where drought remains a threat. The need to plan ahead in the context of water resilience means that, in order to anticipate for the water resilience requirements demanded by the frequency and severity of future events of drought, forward planning is required such that actions to safeguard against the impacts of drought are taken before its anticipated impact. This fits in with anticipating the future in order to enhance capabilities to respond to change, as argued by Retief *et al.* (2016).

The last theme of water resilience determines the extent to which EIA could support the Cape Town Resilience Strategy and Water Strategy with implementation to further achieve water resilience, since the implementing of actions remains a problem (Olivier *et al.*, 2018; Ziervogel, 2018), while informal settlements remain more vulnerable to drought and its associated impacts (Simpson *et al.*, 2019; Ouweneel *et al.*, 2020; Smit, 2020).

Within each of the abovementioned three themes, drought was selected as the key impact of climate change in the context and focus of this research. The context and focus on drought were contributed to Cape Town's experience with the drought of 2015 to 2018, which necessitated the need for solutions and responses to promote water resilience. Having established the baseline and themes against which EIAs will be measured for water resilience the question emerges as to the *rationale* for the research.

1.2. Background to the research

According to the South African census data of 2011, 20.5% of the Cape Town's households live in informal dwellings (Lehola, 2012). Although climate change will affect everyone, those residing in informal settlements are significantly more vulnerable than communities residing in formal areas (Dodman *et al.*, 2018). This is due to three key factors, namely: 1) physical location; 2) socio-economic status of residents of informal settlements; and 3) political as well as institutional marginalisation of informal settlements (Dodman *et al.*, 2018). Physical location refers to informal settlements that tend to be built in fragile areas more susceptible to environmental disaster caused by climate change, e.g. floodplains, river banks, coastal edges, and unstable slopes. Ziervogel *et al.* (2014) for example mentions how under-serviced informal settlements, due to their location on marginal land are regularly susceptible to localised flooding. The socio-economic characteristics of informal dwellers refer to the high levels of poverty in informal settlements, which undermines and lowers residents' capability to deal with climate change. The political and institutional marginalisation of informal settlements result in them not being considered a part of the larger formalised urban fabric. Informal areas therefore do not receive the necessary services and infrastructure, as with the formalised established areas. Physical location is more applicable to environmental disasters such as landslides, flooding and storm surges, and less so to drought. However, it is aspects of socio-economic status and political marginalisation, which are significantly applicable to residents of informal settlements. According to the Housing Development Agency (2013), informal settlements in Cape Town collectively suffered from a 42% unemployment rate. These unemployment levels, together with high percentage of residents living below the poverty line, are indicative of residents who because of their circumstances, might be unable to deal with impacts such as water scarcity at household-level.

In terms of the marginalisation of informal settlements, the provision of bulk service in informal areas remains undersupplied (The Housing Development Agency 2013). Of particular relevance to the case study is access to water, where figures 1 and 2 below display the percentages of bulk water and sanitation services and supply in informal areas in Cape Town. The most glaring information in figure 1 is that the majority of informal settlements, i.e. 61% need to make use of communal taps. Figure 2 similarly displays that only 42% of informal settlements have conventional water-borne sanitation, meaning that the rest must make use of alternative sanitation options available, while 14% have no access to sanitation whatsoever.

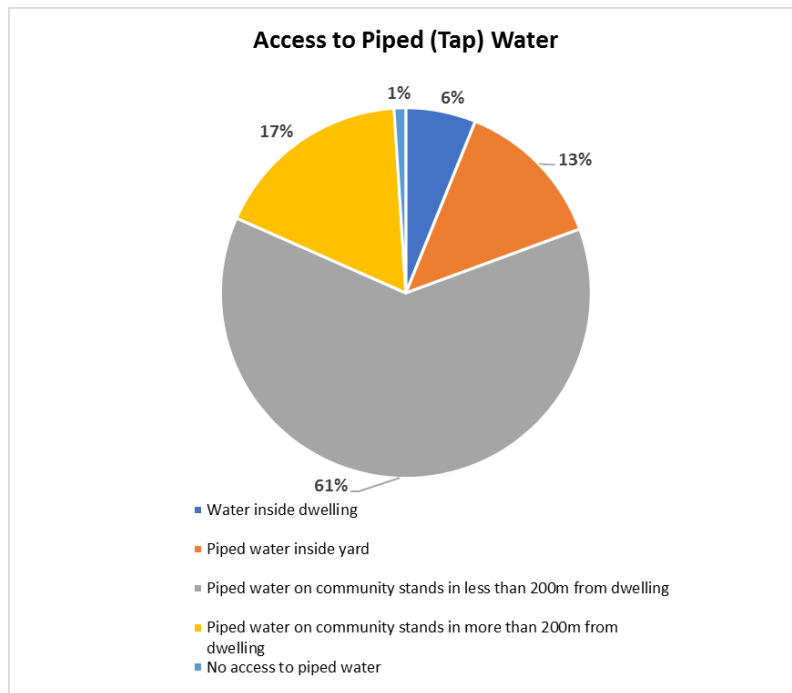


Figure 1: Access to Piped (Tap) Water in Informal Settlements, Cape Town (The Housing Development Agency, 2013)

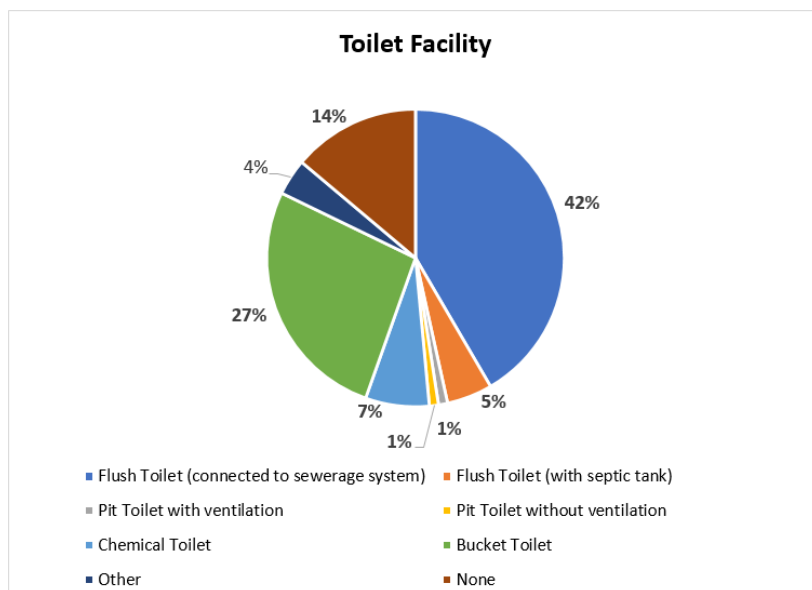


Figure 2: Toilet Facility in Informal Settlements, Cape Town (The Housing Development Agency, 2013)

Access to water and sanitation is not delivered at levels that allow universal access across Cape Town. In addition to limited access to municipal water supply, residents of informal settlements might not have resources or information on what to do in the event of municipal water supplies running dry or being cut off. The dual problem of access to water as well as ensuring water resilience for the more

vulnerable residents of informal settlements presents a complex challenge. What remains clear is that residents of Cape Town's informal settlements are left more vulnerable to the effects of climate change, including drought as per the context and focus of this research.

According to Booysen *et al.* (2019), in 2017, the Western Cape experienced one of the worst droughts since 1904. The drought was mainly caused by extremely low rainfall between 2014 and 2016 (CoCT, 2019). This low rainfall period was furthermore identified as intense based on the calculation that between 2015, 2016, and 2017, Cape Town received the lowest rainfall than any other three-year period combined. While Cape Town embarked on many responses to the drought, these largely targeted the conservation of existing water stocks. This water conservation approach was mainly targeted at formal households. Informal settlements were therefore largely excluded from the attempts by the public sector to enable forms of water resilience against the effects of drought. Furthermore, the responses were largely implemented by one of the three spheres of government, namely local government. These initiatives are described by Ziervogel (2018) as technical and behavioural interventions, which were short-term solutions, since the focus was on coping with a present-day water crisis, as opposed to long-term solutions. The initiatives mentioned were largely limited to imposing water restrictions, installation of water meters, advertising campaigns around water depletion or so-called 'Day Zero' and the hiking of water tariffs. While these initiatives could be viewed as appropriate for dealing with an immediate crisis, long-term and sustainable solutions for an unforeseeable future are necessary. The short-term solutions proposed are also not as easy to implement at a metropolitan scale, where there is unequal access to domestic water supply, and where an increase in water tariffs in informal settlements are not viable.

In addition to the CTRS and WS, there are a myriad of extant tools *inter alia*, plans, policies, strategies and legal frameworks that can support the realisation of water resilience. In terms of environmental legislation alone, the 'Compendium of South African Environmental Legislation' lists more than 40 sets of different forms of legislation, each promulgated to specifically focus on its own mandates regarding the environment (Van der Lind *et al.*, 2010). In order to hone in on the questions of inequality and differential strategies required for addressing water resilience in informal areas, EIAs have been selected as a possible ancillary instrument, due to their application at the project level and neighbourhood scale. EIAs have been a legislated tool in South Africa since 5 September 1997 (Van der Lind *et al.*, 2010). Morrison-Saunders *et al.* (2012) view EIAs as one of those tools in South Africa that embrace the concept of sustainability, as evident in the explicit sustainability mandate that tool adopted. If one considers the viewpoint of Morrison-Saunders *et al.* (2012) that EIAs focus on project-level impact at neighbourhood scale, it appears possible for EIAs to contribute towards water

resilience in informal settlements. Some additional links between EIAs and water resilience were established, which are presented/discussed next.

1.3. Existing links between Environmental Impact Assessments and water resilience

The link(s) between EIAs' association with water resilience are not direct. This anomaly can be partly attributed to its historical roots. The National Environmental Policy Act, 1969 (Public Law 91-190) (hereafter NEPA) was first enacted in the 1970s by the United States government, due to the need for preserving and enhancing the environment by means of evaluating the environmental effects of human induced actions (Clarke, 1997). Much of the literature suggest that EIAs are still in need of including aspects of resilience into their process, since resilience only became topical in the debates around EIAs after the tool linked its long-term purpose to sustainable development. Hacking (2018) argues that although not commonplace, EIAs has a role to play in contributing towards achieving the global economic, social and environmental objectives as defined in terms of the United Nations' Sustainable Development Goals (hereafter SDGs). Hacking (2018) suggest three aspects in which this could be facilitated. Firstly, reference is made to EIAs providing the platform where its own techniques or processes could become focussed on helping to achieve sustainable development (Bisset 1996; Sadler 1996 cited in Hacking 2018). Secondly, it is required that EIAs expand its scope and ambition to include themes of sustainable development. Thirdly, it is recommended that EIAs are implemented alongside other instruments such as Strategic Environmental Assessments, which in itself are aimed ensuring that policy, programs and projects considers sustainable development aspects. Although little to no suggestions are provided as to how these suggestions could be implemented, it becomes clear that EIAs have a place in helping to ensure sustainable development. Morrison-Saunders *et al.* (2019) takes the suggestions made by Hacking (2018) further by addressing the 'how to' question. In this regard, various options are offered to guide on how EIAs could facilitate in its contributions towards help implementing or achieving the SDGs. Morrison-Saunders *et al.* (2019) first proposes that a wider interpretation of the environment is used so that EIAs will not be limited to focus on biophysical elements of the environment, which invites a wider scope of sustainability considerations. It is further proposed that EIAs be influenced by other strategic resources and other higher-level resources such as relevant policies and plans that are aligned with the SDGs. In this manner these resources provide the broader context and goals that EIAs could help to achieve. Hence, Morrison-Saunders *et al.* (2019) lastly motivates for integration whereby EIAs are not only informed but well integrated with resources aligned with achieving the SDGs.

Pope *et al.* (2013), also confirms that there is a need for continued expansion and evolution of EIAs, specifically in practise, so as to ensure that sustainable development is achieved. Jay *et al.* (2007), draws on the work of Cashmore *et al.* (2004) and measures the tool's contribution towards sustainable development through its provisions of allowing stakeholder engagement in environmental decisions. This implies that the tool should contribute towards sustainable development through its provisions for stakeholder engagement. Rozema *et al.* (2015) view the tool's minimisation of impact on the environment as its contribution towards sustainable development. However, there exists a gap in scholarship and practise linking EIAs' goals of sustainable development to questions of resilience. This gap becomes even more acute when considering specific types of resilience, e.g. water resilience. Nevertheless, when considering the fundamental ideas that underpin the concept resilience and purpose EIAs, it is possible to establish some links between the two concepts. Four connections between EIAs and water resilience include, 1) the anticipatory nature and function of both EIAs and resilience; 2) EIAs' goal of contributing towards sustainable development and resilience is included amongst the 17 SDGs as a dimension of sustainability; 3) ideas of avoiding, reducing, or mitigating human-induced impacts and 4) EIAs' function of informing decision-making in order to achieve a desired and sustainable future.

The first link relates to the very nature and function of EIAs, which is to anticipate impacts. In a similar manner, the central goal of resilience is to anticipate implications so that actions can be taken to safeguard against such outcomes. The act of 'anticipating' in fact appears to be one of the main associations with the topic of resilience, since anticipating events allows society to prepare and plan ahead. The legal framework governing EIAs, namely the National Environmental Management Act, 1998 (Act No. 107 of 1998) (hereafter NEMA) identifies and declares amongst one of its core principles that the central goal is sustainable development. It is further explained that "negative impacts on the environment and on people's environmental rights [ought to] be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied" (Republic of South Africa, 1998: 12). This highlights the anticipatory function of EIAs in the same way that resilience does. The question, however, remains, as to whether EIAs anticipate the same things that resilience requires, and more specifically, whether they anticipate events of drought to prevent, minimise and/or remedy impacts. If the central goal of the legal framework that governs EIAs is sustainable development, EIAs as the enabling tool must contribute towards this goal.

The second focus is on how sustainable development connects EIAs to the goal of resilience. When sustainable development is dissected into the individual SDGs, resilience in fact constitutes one of the 17 SDGs' direct outcomes. SDG 11 titled 'Sustainable Cities and Communities' makes direct reference to the topic of resilience. According to the United Nations (2015), this goal means that the ever-

increasing growing urban population makes cities and its inhabitants more vulnerable to the effects of climate change. As such, the United Nations (2015: 2) identifies resilient cities as built cities “where all citizens live a decent quality of life, and form a part of the city’s productive dynamic, creating shared prosperity and social stability without harming the environment”. Although direct reference is not made to drought and water resilience per se, Kaiser *et al.* (2018: 11) point out that, “water traverses many of the seventeen Sustainable Development Goals. It is a common and connecting factor, given that it is essential for basic needs, vital to productive and resilient natural ecosystems and central to food, energy and economic security”. Therefore, while SDG 11 directly focuses on resilience and what it entails, for the fact that it sustains life, water has relevance to all of the 17 SDGs. The aspect of water and sanitation also pertains to SDG 6, where the problem of water scarcity as well as unequal access to clean water and proper sanitation constitute the core focus requiring resolution (United Nations, 2015). This also parallels an important aspect to note that while SDG 11 directly focuses on resilience, the other SDGs also focuses on aspects relating to resilience in an indirect manner and in so doing collectively contribute towards sustainable development. It is therefore argued that given EIAs’ goal of sustainable development and the further dissecting of sustainable development into the relevant SDGs, a link exists between EIAs and water resilience.

The third link was not direct, as it relates to the function of EIAs, where human-induced impacts caused by development projects are assessed prior to commencement. According to Folke *et al.* (2004), much of the destructive disturbances to ecosystems is caused by human-induced impacts, such as exploitation, pollution, and land-use change. These impacts sometimes disturb ecosystems to such a degree that their own ability to be resilient against perturbations is eroded. If EIAs focus on avoiding, reducing or mitigating human-induced impacts, the tool surely has a role to play in aspects of water resilience.

A fourth link considers the function of EIA as tools that generates and uses information on the environmental impacts of development projects in order to help inform a specific outcome and desired future. The desired future in many ways includes the assurance of adequate quantity and quality of water available for society/nature to function/thrive, as part of the goal for water resilience, and ultimately sustainable development.

Having established these four links between EIAs and water resilience allowed for the framing of the research problem.

1.4. The research problem

While all cities are set to suffer from the impacts of climate change, there is a continued threat of drought in Cape Town and the potentially severe impacts it has on water access for residents of the city's informal settlements. As a potential response to this problem, coupled with the lack of implementation of solutions aimed at water resilience, the opportunities of EIA to contribute towards the promotion of water resilience for residents of informal settlements are explored. Particular attention is paid to what water resilience ought to entail for residents of informal settlements, and how EIA could help to facilitate this. EIAs thus form the main medium used to explore how the tool can be used to help promote water resilience in informal settlements. However, since EIAs are made up of various legislated procedures, certain aspects of the tool were selected for further investigations as part of this research. The selected and specific aspects include the process and long-term purpose of the tool. The process refers to EIAs' methods of examining and evaluating impacts of development, and how this aligns with the requirement of addressing the relationship between the ecological and social elements of the environment. The long-term purpose refers to how EIAs engages with aspects of the future where environmental shocks and stresses remain a reality and the need to plan ahead of such events.

To further enhance EIAs' role in promoting water resilience, the CTRS and WS were used to explore how the tool can help implement relevant actions contained in these strategies. In this regard, the EIA could potentially perform a supportive role, that is, to not only help implement the actions, but also to achieve the intended outcomes of the CTRS and WS. This quality remains important in a situation where the public sector invest in many resources to develop myriads of tools to achieve various intended outcomes, and yet little to no consideration is given to implementation and the resources required to achieve the intended outcomes. Enqvist *et al.* (2019) explicitly state that municipalities in particular have struggled to implement post-1994 policies aimed at water resilience, especially in rapidly growing informal settlements. To reinforce the argument around the lack of implementation, the WS devotes one page to the aspect of implementation, whereby it is proposed that the lead key elements of the WS be implemented through the Cape Town Water transition plan (CoCT, 2019). Addressing aspects of how this particular plan will facilitate the implementation of the WS from a practical perspective are not provided. Similarly, in terms of the CTRS various commitments are proposed to ensure implementation. However, further aspects regarding the practical implications of such commitments are not documented (CoCT, 2019). It may therefore be argued that without due considerations relating to implementation, achieving the intended outcomes, namely water resilience remains questionable.

1.5. Core aim of the research: EIAs' potential contribution for water resilience in informal settlements

The case study approach is used to explore EIAs' potential contribution for water resilience in informal settlements, as the core aim of this research. In order to achieve the core aim, three objectives which are aligned with the three selected themes of water resilience, namely (1) addressing the relationship between the ecological and social elements of the environment, (2) engaging with aspects of future threats of drought and the need to plan ahead and (3) supporting the Cape Town Resilience Strategy and Water Strategy with implementation to further achieve water resilience, were formulated for the study, as follows:

1.5.1. Objective 1: Establishing whether the legislated and procedural EIA process addresses the relationship between the ecological and social elements of the environment

The case study itself is based on an actual EIA application process that comprised of various methodological procedures that were legally required and duly followed in terms of the NEMA and applicable EIA Regulations, 2014. These methodological procedures therefore form the basis of the empirical enquiry in relation to objective 1. This research first explores the methodological procedures followed for the Monwabisi EIA application and case study. These methodological procedures include the measures used to assess the impacts of the Monwabisi Project, as well as the measures used to evaluate how these impacts were assessed. This is to establish whether these methodological procedures address the relationship between the ecological and social elements of the environment, and if so, whether this leads to aims of sustaining this relationship, so that water remains available and accessible despite drought.

1.5.2. Objective 2: Establishing whether EIAs' long-term purpose engages with aspects of future threats of drought and the need to plan ahead

The Monwabisi EIA application is further used to establish whether any engagement with aspects of the future where drought remains a threat forms part of its consideration. Specific focus is steered towards whether considerations are given to the need to plan ahead, such that vulnerable residents of informal settlements are safeguarded prior to the onset of climate related impacts, such as drought, as a form of water resilience.

1.5.3. Objective 3: Determining the extent to which EIA could support the Cape Town Resilience Strategy and Water Strategy with implementation to further achieve water resilience

The third objective is to analyse the extent to which EIAs can support the Cape Town Resilience Strategy and Water Strategy to achieve water resilience in informal settlements in Cape Town. In this manner EIAs could help these strategies to also achieve its own intended outcomes for ensuring water resilience for Cape Town's residents, including those who reside in informal settlements.

In order to ensure that the above-mentioned three objectives can be further examined as part of the empirical enquiry so that the core aim of this research is achieved, sub-questions are formulated.

1.6. Sub-questions to be addressed as part of the empirical enquiry

The research core aim is to explore EIAs' potential contribution for water resilience in informal settlements through the defined three objectives. The following sub-research questions are formulated to further facilitate the empirical enquiry:

- Sub-question 1: To what extent does the EIA assessment and evaluation processes address the relationship between the ecological and social elements of the environment, so that the relationship is sustained?
- Sub-question 2: What is the purpose of the EIA and does it align with the need to plan ahead for future droughts in order to safeguard and promote water resilience for the most vulnerable?
- Sub-question 3: How could the EIA support the CTRS and WS to implement its actions and thereby further helping these strategies to reach its intended outcomes of water resilience?

Each of these sub-questions also structure the analysis and discussion Chapters 4, 5, 6 later in the dissertation with the final conclusion and recommendations regarding the research's findings included in Chapter 7. In order to address these sub-questions, a case study was selected comprising an EIA application that included water resilience and informality imperatives. This research uses a case study approach which comprises the EIA application of the *in-situ* upgrade of the Monwabisi Park Informal Settlement in Khayelitsha to explore the potential contribution of EIAs for water resilience, and particularly for informal settlements, as also confirmed in terms of the research's core aim defined in subsection 1.5 above.

1.7. Outline of this thesis

This thesis comprises seven Chapters. Chapter 1 provides an introduction to the research, including the background information to the study, the key research problem and the questions formulated to address the research problem. Chapter 2 follows with a literature review, which first looks at how water resilience could be promoted through the selected themes of addressing the relationship between the social and ecological element of the environment and planning ahead for drought and its impacts. With the focus on informal settlements, approaches to promoting water resilience specifically for the most vulnerable are reviewed. This is followed by a review on the literature which looked at topics of water resilience specifically in the context of EIAs. Chapter 3 provides the various methods that are used to conduct the empirical research. At the end of Chapter 3, an analytical framework follows which uses existing themes of resilience, which are used to guide the process of analysis.

The subsequent Chapters 4, 5 and 6 includes a presentation of the findings, including the analysis of the Monwabisi EIA application, which presents the data that are hereafter critically evaluated to answer each of the three sub-questions. Chapter 4 provides a presentation and findings on whether the relationship between the social and ecological elements was considered as part of the Monwabisi EIA application process. Chapter 5 provides a presentation and findings on whether EIAs can be used to help with planning ahead for drought so that informal settlements become water resilient. Chapter 6 provide a presentation and findings on the ability of EIAs to support the WS and CTRS with implementation to further achieve water resilience. Chapter 7 concludes the research with a summary of findings, what these findings mean, and highlighting recommendations and important avenues for further study.

2. Chapter 2: Literature Review

2.1. Literature Review: An introduction

The themes of resilience against environmental shock and stress relevant to this research are firstly identified. Firstly, the theme of needing to address the relationship between the natural and human elements of the environment is considered, which relates to objective 1 and the subsequent sub-question 1 as detailed in chapter 1. Secondly, the theme of needing to plan ahead to promote resilience for the most vulnerable of society is considered, which relates to objective 2 and the subsequent sub-question 2. Thirdly, with both WS and CTRS as well as EIAs being tools developed by the government, the theme of providing a supporting role to the WS and CTRS is considered, which relates to objective 3 and the subsequent sub-question 3. These three sets of information provide the baseline against which EIAs are measured, so as to explore the extent to which the tool addresses the relationship between the natural and human elements of the environment, planning ahead for the future and supporting WS and CTRS with implementation in order to further achieve water resilience. Further consideration is also given as to how scholars have viewed EIAs' ability to contribute towards promotion of resilience against environmental shocks and stresses.

2.2. The need and requirements of water resilience

2.2.1. Addressing the social-ecological relationship

According to Colding *et al.* (2019) socio-ecological systems have emerged over a 20-year period from a concept to a framework to study the intertwined and interacting system comprising of human and natural or ecological elements. An understanding of the ecology as providing those ecosystem goods and services that sustain life firstly form the basis of the understanding of the social-ecological relationship as a system, and secondly, the reason why the resilience of this relationship must be ensured. This is explained by Adger *et al.* (2005), as resilience denoting the capacity of social-ecological systems to absorb disturbances and retain the system's existing functions and processes. Understanding social-ecological systems within the context of resilience is no trivial feat, as these systems are complex in nature. According to Walker *et al.* (2012), this can be attributed to the three factors. Firstly, it is necessary to decide what is in or outside the system. Secondly, deciding the role of people in the system is difficult, due to having to decide whether people be viewed as the mere users of ecosystemic goods and services, or whether they have influence over the natural system and its ability to render them. Lastly, the conceptualisation of social-ecological systems as comprising variables that interact, often in a complex manner, affects the system to react and result in different

outcomes. The understanding of these conceptualisations and the dynamics remains the main source of confusion and conceptual contestation, particularly when considered in the context of resilience.

Holling (2001) highlights how these systems, for the pure reason of comprising people, have unique capabilities to assist with goal of resilience. These capabilities include foresight, communication, and technology. Foresight refers to the forward-looking behaviours and abilities of people to forecast looming crises and being able do something to reduce or even avoid the impact. Communication refers to humans having the ability to communicate ideas and use it to their advantage to avoid/reduce negative impact of crises. Technology refers specifically to human-made technology, which has progressively advanced over time to assists people in avoiding/reducing the negative impact of crises (Holling, 2001). The use of foresight, communication and technology can, therefore, potentially form part of decision-making tools to promote resilience. While these options are practical enough for decision-makers to incorporate into their existing processes, there are still fundamental principles that underpin social-ecological systems. As detailed in Table 1, these principles have implications for decision-makers who serve a role to play in promoting resilience.

Table 1: Underlying principles of conventional ecosystems versus social-ecological systems and resilience (Schlüter *et al.*, 2012 in Biggs *et al.*, 2015)

Conventional view of Ecosystems	Social-ecological systems
1) System dynamics are linear and monotonic	1) System dynamics exhibit thresholds, hysteresis
2) Uncertainty is largely ignored: probability distributions for key drivers and decision variables are treated as known	2) Complexity and uncertainty of Social-ecological systems are explicitly considered: probability distributions for key drivers and decision variables are highly uncertain, as are outcomes; some uncertainties are irreducible
3) Individual elements can be treated in isolation	3) Complex systems of interacting entities at micro-scale from which macro-scale patterns emerge
4) Focus on impact of human behaviour on resource	4) Incorporate reflexive response of humans to forecasts and interventions
5) Actors are rational and have full information and computational capacity	5) Actors have imperfect knowledge, are boundedly rational or follow more complex decision patterns
6) Management objectives are based on simple reference points	6) Management involves complex trade-offs
7) Managed by a command-and-control approach, management of resource stocks and condition, not wider ecosystem	7) Managed for resilience and adaptive capacity, management of stabilising and amplifying feedbacks within a broader context

Table 1 juxtaposes the implications of social-ecological systems for decision-makers, with that of the principles of conventional view of ecosystems. It is evident from Table 1 that the conventional view of ecosystems comprises most, if not all the principles that remain in conflict with the approach, so as to ensure resilience of social-ecological systems. According to Schlüter *et al.* (2012) in Biggs *et al.* (2015) this includes the sole focus on the impact that the social environment has on the natural environment,

as opposed to the relationship between the two. The impact is further established through the use of scientific methodologies, where elements of the natural environment are simplified and dissected into separate layers, e.g. the flora and fauna. The purpose of all of this is to preserve the natural environment and defend it against disturbances. This proves how the conventional view of ecosystems stands in conflict with the approach to ensure resilience of social-ecological systems (Biggs *et al.*, 2015). The social-ecological systems viewpoint in Table 1 instead focuses on system dynamics in which people and nature interacts as one complex system. It is this interacting at which the question of resilience becomes relevant, since it is when the system is disturbed that it reacts in complex ways. Hence, Schlüter *et al.* (2012) in Biggs *et al.* (2015), assigns aspects of complexity, unpredictability, and uncertainty to social-ecological systems. The main purpose of the social-ecological systems principles, as displayed in Table 1, is therefore to promote resilience against uncertainty, as also caused by disturbances. Social-ecological systems viewpoint, therefore present a challenge to the traditional forms of decision-making that have their roots embedded in the conventional view of ecosystems.

Given the aspects of complexity, unpredictability, and uncertainty being applicable to social-ecological systems, Biggs *et al.* (2015) present suggestions to operationalise the social-ecological systems viewpoint. This all relates to conceptualising the understandings of social-ecological systems. These conceptualisations focus on the behaviour of the systems when disturbed. The system may either self-organise, adapt, transform, and/or decline. To illustrate, drought in Colombia's largest coastal mangrove-lagoon and wetland system, La Ciénaga Grande de Santa Marta, has altered social-ecological systems in different ways. Drought has particularly caused changes to the wetland system, including variability in the salinity levels, the manner in which the system was being managed, and a decline in fishing stock. These changes in turn transformed livelihoods that began to suffer from the loss of income-generating capacity, higher competition for natural resources, and a scarcity of food and drinking water (Whitfield *et al.*, 2019). These changes suffered are simply evident of the system's decline, which are attributable to the failure to take action to promote resilience against drought.

Biggs *et al.* (2015) further introduces concepts such as feedback, diversity, and redundancy to provide understandings of social-ecological systems. Feedback refers to those interactive processes between ecological and social components, where ecological goods and services are extracted. These interactions may reconfigure or even trap a system into a state where little to no ecosystem goods and services are rendered, which warrants interventions of resilience. This would require decision-makers to understand which feedback needs to be managed or controlled in order to promote resilience. Diversity and redundancy are the components that make up the system and have relationships with one another. In the ecology, this includes molecules, species, or habitat patches, while in the social sector this includes livelihoods, actors, knowledge systems, or institutions. Diversity

refers to the range of different components, how much of each component exists, and how different the components are from one another. Redundancy refers to scenarios where several of the components of the system perform the same function (Biggs *et al.*, 2015). In this context, resilience is relevant when social-ecological systems suffer from low levels of diversity and redundancy. Biggs *et al.* (2015) view maintaining redundancy as form of 'back-up'; this allows for substitution when one component fails to deliver a good or service, while the other component(s) that serves the same function still provides it. Cape Town, for example, relies largely on rain-fed dams for domestic water supply and use. If more houses are equipped with components for water recycling so that water can be made available for certain domestic uses, the inability of rain-fed dams for domestic supply is substituted. It is, however, important that these considerations are underpinned by social realities, where the most vulnerable of society will have limited means of investing in alternative measures to access water when municipal supply runs dry. Instruments of the public sector, whether policies or regulations, therefore need to give special recognition to most vulnerable of society, in one form or another. Simpson *et al.* (2020), for example, highlight how responses to Cape Town's drought from private actors can be viewed as 'partial functional redundancy', as the solutions to secure household level water supply were implemented by those who could afford to do so. Hence, Simpson *et al.* (2020) caution that, while 'partial functional redundancy' means that private actors could play a role in augmenting water supply, strategies that embrace a 'whole of society approach' are also required. This rings true for an unequal city such as Cape Town comprising both the poor and the not so poor residents. Broadly speaking, these residents include those who can partake in 'partial functional redundancy', as illustrated by Simpson *et al.* (2020), as well as those who cannot afford to do so, as determined by vastly varying socio-economic circumstances. With the author being part of the few who proposes redundancy as a response to building resilience, Simpson *et al.* (2019) also illustrate how municipal resource allocations, including water, was largely addressed from a financial perspective in terms of the revenue it would generate. Since Cape Town continues to face disruptive events, Simpson *et al.* (2019) suggest that municipal resource allocations ought to embed resilience principles and qualities, one such being 'redundancy'. It is therefore clear that provision of municipal services must start looking at existing functions with a resilience lens, even if this challenges the *status quo*. Water in particular is of relevance in this argument, whereby its finite nature, life-supporting properties and the risk of future drought demand attention in order for the resource to be addressed from a resilience perspective.

Understanding and engaging with the abovementioned conceptual understandings of social-ecological systems provides insight into how to decipher such systems. It also helps to establish the links between social-ecological systems and the need for resilience. Decision-makers do, however, face the responsibility of not only adhering to the principles governing social-ecological systems, but also to ensure that their processes give effect to how social-ecological systems ought to be addressed. This kind of information is greatly lacking, as contributed to the vast and complex relationship that exists within social-ecological systems, which makes the framing of these systems complex (Helfgott, 2018 and Doorn, 2017). While the deciphering of social-ecological systems is beyond the scope of this research, Biggs *et al.* (2015) shed some light on three key considerations decision-makers may attend to that include system dynamics in their decision-making processes. Firstly, it remains important that provisions in decision-making processes be made in order to address the relationship between the social and ecological elements of the system. Secondly, management solutions should be flexible to the realities of change and uncertainty. Lastly, providing opportunities to constantly learn and experiment on how to adapt to change or disturbance, instead of totally eliminating it, remains key (Biggs *et al.*, 2015). These considerations are practical enough to be incorporated into decision-making processes. However, if the same decision-making processes are still embedded in the conventional view of ecosystems, as displayed in Table 1, the likelihood of these considerations forming part thereof and the need to ensure the resilience of the system remains low.

2.2.2. Planning ahead

Being proactive by planning ahead, and specifically prior to inevitable environmental shocks and stresses, are one of the main requirements of resilience. The reasons for doing so varies from anticipating and mitigating risks to being able to absorb perturbations and maintain desired properties (Seidl, 2014). Facing the inevitability of shocks and stresses is noticeably different to previous ideologies that focused on preserving the environment. Instead, the focus has shifted from not only environmental preservation, but also accepting that change is inevitable, and safeguarding against change(s) proves important. Since planning ahead now requires the act of 'doing something', there exist a rich supply of literature focused on the different methods by which this can take place. This includes the use of 'Early Warning Systems' to detect looming shocks and stresses Boyd *et al.* (2013) and Boyd *et al.* (2015), to the use of other technical tools that monitor irregular environmental patterns. The use of these methods appears to be popular in detecting unusual weather patterns such as impending drought. Boyd *et al.* (2013), for example, document how a geographic monitoring system named 'Rainwatch' is used in West Africa for such purposes, while Haro-Monteagudo *et al.* (2017) document how water managers in the Jucar River Basin in Spain use monitoring systems to detect potential events of drought. The use of these systems certainly provides the benefit of affording time

to decision-makers to not only be warned of an impending crisis, but if timeously considered, designing the actions required to safeguard against the impact of these crises. Hence, Figueiredo *et al.* (2018) view these approaches to planning ahead (as illustrated in Table 2), including Early Warning Systems, as risk reducing tools, with risk specifically denoting the likelihood of a crisis and affording time to plan ahead. As such, while these risk-reducing tools presented in Table 2 below in terms of their purpose, denotes the likelihood of a crisis and affording time to plan ahead, planning ahead requires further actions to be developed in order to safeguard against impending shock and stresses. As such, using the risk-reducing tools in table 2 on its own will not fully help to build resilience to “uncertainty” or future unknowns. Furthermore, Cape Town remains at a high risk of drought, due to its Mediterranean climate (Schreiber, 2019) and the effects of climate change (Booyesen *et al.*, 2019). As such, planning ahead by means of using methods such as long-term policies aimed at water resilience together with appropriate risk reducing tools mentioned in Table 2 will prove to be more appropriate in building resilience. In so doing, risks are not only identified, but actions also put forward to promote resilience against the impact of the impending crisis.

Table 2: Risk reducing tools (Adapted from: Jha *et al.*, 2013)

Risk reducing tool	Purpose of tool
Risk assessment	Risk assessment is a tool of risk management that informs about previous disaster events and estimates the impact of future shocks. This detailed record-keeping helps city leaders to identify the risks that the city is most often subject to, at which frequency, in what territories, and at what levels of loss. It also aims at better predicting the future, by quantifying the probability and impact of hazards.
Risk-based land-use planning	Risk-based land-use planning is a non-structural approach that identifies the safest locations and regulations for guiding urban development. Land-use plans influence the location, type, design, quality, and timing of development. The plan is a reference for taking decisions about ordinances and permits, as well as allocating finances.
Emergency response plan	Emergency response plans have both operational and logistical components, including procedures for damage and needs assessment after a disaster. An emergency response plan ought to identify patterns for stakeholder co-ordination, both horizontally with local actors, and vertically with regional and national authorities.
Early-warning system	An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses, and others to take timely action to reduce disaster risks in advance of hazardous events.
Urban ecosystem management	Ecosystem management approaches make use of natural infrastructure and can decrease the cost of urban infrastructure projects. Watershed management, coastal zone management, urban landscape design, green and blue infrastructure, and environmental buffers are examples of relevant ecosystem management strategies. Integrating ecosystem services into urban resilience planning requires that planners raise awareness of ecological approaches, generate useful information, turn knowledge into action, and effectively monitor and evaluate project implementation.
Data collection	Promoting data accessibility is an important component of any technical disaster or climate risk project. To ensure sustainability of project results, all data collected and created should be preserved, consolidated and transferred to stakeholders upon project completion in a well-known or standard electronic format.
Training and	Capacity development is the process by which people, organisations and society systematically stimulate and develop their capacities over time to achieve social and economic goals. It involves learning and various types of training, but also continuous efforts

awareness	to develop institutions, political awareness, financial resources, technology systems and the wider enabling environment.
Community and stakeholder participation	Participation of communities and other stakeholders in urban programming and planning initiatives enhances urban resilience. It is vital to ensure that vulnerable and marginalised populations are full and meaningful participants in all processes. It can also be fostered via multi-sector and multi-level partnerships with government and civil society, including community-based organisations, the private sector, and academia.
Risk financing	Disaster risk financing and insurance instruments can protect against the financial impact of natural disasters but do not reduce the amount of damage and loss. Risk retention, risk financing and risk transfer instruments should be selected to cover disasters of different frequency and severity. Examples of instruments are risk pools, reserve funds, weather derivatives, indemnity-based reinsurance, parametric insurance and catastrophe bonds.

At the onset of planning ahead by means of long-term solutions, specific methods to apply foresight in order to attain resilience are favoured. The lack of foresight, according to Visser (2018), is what largely lead to Cape Town’s water crisis of 2015 and ‘Day Zero’ scenario, as the public sector was reactive by only implementing solutions as ‘Day Zero’ became more of a likelihood. This reinforces the importance of taking action long before crises arise, and not as the likelihood of it increases or when crises take shape. According to O’Malley (2013), applying foresight requires a shift from bureaucratic notions, whereby governmental processes rely on techniques to make precise predictions. Instead, the liberty should exist to make estimates about the future and to imagine what the responses to the future could be. O’Malley (2013) attributes this requirement to being able to generate innovative responses to problems of the futures of uncertainty, which in terms of this research includes the lack of access to water caused by drought. To generate innovative responses that are less dependent on bureaucratic processes suggests that decision-making ought to be opened to extend beyond the enclaves of government. As an example, Karuri-Sebina *et al.* (2012), capture how South Africa adopted foresight to address challenges, especially those left by the legacies of apartheid. Ngangelizwe, a township in the Eastern Cape Province, suffered from dire economic conditions such unemployment, inadequate housing, deteriorating infrastructure, and fragile social structures. Foresight planning was therefore used to transform the township into a sustainable community. Although the purpose was not to promote resilience against shocks and stresses, it does capture the very blueprint of what planning ahead and foresight entail in the context of the latter. In this regard, the whole process is founded on a collective decision-making process. The process requires active participation of stakeholders to converse and sketch the scenarios and visions of the futures that ought to be achieved. Ultimately, the outcomes of this process are that the desired visions of the futures, can be used either to design actions that will ensure that such visions are achieved, or in the case of Ngangelizwe, used to inform town planning tools, such as the Integrated Development Plan (hereafter IDP) and masterplans (Karuri-Sebina *et al.* 2012).

Similarly, scenario planning is also used as means of planning ahead. According to Bennett *et al.* (2016) it was first used by corporations, military and governments, but recently within the context of climate change. The process involved collaboratively determining desired future scenarios and designing actions to mitigate actions to adapt to or to mitigate against undesired outcomes (Bennett *et al.* 2016: 1776). In terms of scenario planning, it is noted that much more emphasis is placed on the participatory manner in which the process takes place, since multiple desired futures need to be envisioned. This largely relates to the unique needs of people, where some are more vulnerable to the effects of climate change than others, requiring greater assistance and resources to build resilience. The process of planning ahead, as detailed by Bennett *et al.* (2016), follows a sort of 'blueprint', which comprises certain elements, including scenario planning, setting a vision, involving the public in creating that vision, and eventually creating actions to promote resilience.

It can therefore be deduced that planning ahead provides means of affording time to take action before shocks and stresses occur, and thereby being proactive. The act of planning ahead furthermore favours the inclusive and participative approaches whereby those outside the enclaves of government, such as the general public, contribute towards the process. Ideas around inclusivity and participation parallel the way in which decision-making to promote resilience ought to be approached.

2.2.3. Collective governance

It will be difficult to find any sources that do not motivate for governance to be inclusive when the topic of resilience is relevant. The act of 'governance' in itself denotes inclusivity and the move away from processes, whereby one central governmental state assumes a chief decision-making role. Termeer *et al.* (2011) in fact argues that since the ramifications of adaptation to climate stretch across different policy domains and institutional levels, a polycentric system comprising of multi-actor, multi-sector, and multi-level governance is more appropriate. South Africa is compliant with multi-level governance in the sense that a three-tiered system applies comprising national, provincial and local government structures. However, more than this Demetropoulou *et al.* (2010: 341) defines governance as "...encompasses laws, regulations, and organizations [sic], as well as governmental policies and actions, domestic activities and networks of influence, including international market forces, the private sector and civil society." Governance is therefore the act according to which these role-players collectively interact and share the responsibility of making decisions for a specific purpose, and in terms of this research, promoting water resilience in informal settlements. It is in this regard that 'adaptive governance' is preferred within the spheres of resilience against shock and stresses, since it focuses on aspects of collaborating with all stakeholders, learning and empowerment to foster resilience (Seeliger *et al.*, 2013). More specific to the case study, Cisneros (2019) emphasises

that, in terms of the SDGs related to water and sanitation, the central mandate is to implement collaborative approaches to secure water for all by 2030. Kaiser *et al.* (2018) also emphasise water as a life sustaining resource traversing many of the SDGs, which should not be treated in isolation. The author further asserts that water is a cross-cutting resource that can play a unifying role in addressing other problems. Hence, terminology such as collaboration, integration, participation, collective and inclusivity, engagement, integration, community involvement, and partnerships are widely used to describe the type of decision-making required to promote resilience.

Australia, which suffers the same fate as South Africa in terms of its high risk of drought, has implemented Water sensitive urban design (hereafter WSUD) through collaborative governance for the purpose of contributing towards water resilience. According to Morison *et al.* (2011) and Rijke *et al.* (2012), WSUD is used in Melbourne, whereby multiple disciplines, stakeholder groups, research institutes, and water retailers, together with sectors of government, design solutions to drought and water scarcity, and collectively find ways of implementing said solutions. The collaborations allowed Australia to become more comprehensive in the manner it manages its water, since WSUD provided the platform to do so. Rijke *et al.* (2012) highlight that the traditional urban water management strategies of government that solely revolve around providing large-scale infrastructure for water supply, have also shifted towards questions of water resilience. This has led to the development of innovative solutions to drought, such as potable water conservation, water reuse and improved stormwater management (Morison *et al.*, 2011 and Rijke *et al.*, 2012). Collective governance may therefore also provide opportunities to balance the traditional roles of government, where the provision of basic services and bulk infrastructure remains the main priority, and thereby also finding solutions to problems caused by climate change. For an unequal city such as Cape Town, that faces both unequal distribution of basic services, but also remains at high risk of drought and its impact, collective decision-making is even more relevant. It can therefore be argued that collective governance would somehow also help to address the dual problem that Cape Town faces, as discussed earlier on.

Collective governance does, however, require that all who participates in decision-making play a role, especially within the context of administering state-led tools. As displayed by Morison *et al.* (2011), and Rijke *et al.* (2012), within the context of WSUD, the purpose of involving multiple stakeholders was so that solutions could be garnered from various sources. Decision-making tools in this regard ought to be democratic and open, for active participation by stakeholders who will make contributions to the goal, be it water resilience or anything else. It could be argued that opening up decision-making processes within the public sector may be met with reluctance. This may contribute to the State's concern with a devolving of power when other stakeholders outside of the enclaves of government

play a role and thereby diminishing the State's own role and authority. To the contrary, within the context of achieving resilience, it does appear that the State still plays an important role, especially if resilience is aimed at the most vulnerable of society. Since the most vulnerable suffer from low capabilities and resources to safeguard against shocks and stresses, it is the State who needs to facilitate the process of safeguarding in the name of resilience. As an example, facilitating environmental education to further empower local communities to become water resilient is one such measure that could be facilitated by the State using their own in-house skills. Visser (2018) highlights the way in which publication of *Vanishing Waters* by Davies and Day (1998), specifically advocated for public education as means of addressing Cape Town's impending water crisis. I hereby specifically mention 'facilitation' and 'further enhancing' in order to emphasise that local communities may still have their own inherent qualities, such as local knowledge, to aid in building resilience, as also further discussed in this Chapter.

Collective governance meanwhile strongly aligns with the democratisation of decision-making, whereby the public sector is not solely responsible for such a task. At the same time, collective governance applied in the context of promoting resilience does demand certain types of participation to take place. In this regard, active participation – allowing for all stakeholders to contribute towards the decision-making process – is key even where participation is highly unequal and participation capabilities vary greatly (Simpson *et al.* 2018). Hence, many case studies exist where active participation can be seen to be enabled through workshops, brainstorming sessions, making presentations, and conducting feedback sessions. Bennett *et al.* (2016) for example documents how workshops and brainstorming sessions, were used as part of scenario planning to facilitate discussions, produce and prioritised adaptive response strategies that would help coastal fishing communities in Thailand to adapt to shocks caused by climate change. Similarly, Brown *et al.* (2016) demonstrates how workshops with communities and relevant stakeholders (including *inter alia* local politicians, non-governmental organisations and environmental agencies) in Mexico, Argentina and Colombia were used a medium to generate adaptive responses to the various environmental challenges caused by *inter alia* climate change. Helfgott (2018) discusses how resilience in communities can be enabled through firstly taking into account the integrated social, economic, political and environmental systems in which they are embedded and thereby understanding their unique circumstances. Hence, Helfgott (2018) further illustrates how Nepalese farmer district communities, including the Madheye Nagar (Dang District), Chutara (Chitwan District) and Durua, Kanjiwar (Dang District) were actively engaged with through workshops, discussions, focus groups and interviews as part of the 'Systemic Integrated Adaptation Program' which focuses on promoting the resilience of small holder farming communities to climate change. The process involved the exchanging of information on the farmer

district communities' climate related challenges so that community planning, desired visions for their future and collective action against such challenges could be explored and implemented.

Tschakert *et al.* (2010) motivates similarly for participatory approaches that promote adaptation as well as resilience, which ought to allow for platforms where knowledge can be shared and responded to while innovation and experimental learning might also take shape, including targeted participation support for vulnerable groups. Support in this sense is particularly warranted in scenarios where stakeholders comprise the marginalised whom are constraint by their circumstances to effectively participate in decision-making processes (Simpson *et al.*, 2018).

Collective governance therefore requires that everyone contributes towards actions and solutions geared at resilience. While acts of participation is the manner in which these solutions are generated, there appears less indications on how such solutions will be implemented. This implies that it is less likely that solutions will reach its intended outcomes, namely water resilience. This reinforces and correlates with the argument regarding lack of focus on implementation, as highlighted by Ziervogel (2018) and Vogel *et al.* (2015). Practical considerations with regards to collective governance and the solutions that it offers, therefore lacks attention. Practical considerations with regards to collective governance and the solutions that it offers, therefore lacks attention. This applies to Cape Town where the CTRS and WS as produced by local government may further benefit from being implemented through existing governmental resources, such as the EIAs. Implementation becomes especially important where the more vulnerable of society are set to benefit from government's solutions aimed at water resilience, for it is this sector of society who may lack capabilities to do so on their own, as also emphasised by Simpson *et al.* (2018).

2.2.4. Focusing on the most vulnerable

Resilience largely relates to the 'capacity' to do something when or if confronted by shocks and stresses. Capacity in turn denotes that whomever or whatever is 'doing something' has the capability to do so, which needs careful considerations given factors such as inequality and diversity (Simpson *et al.*, 2018). Social-ecological systems possesses for example different capabilities to respond to shocks and stresses, which imply that some more than others will be left more vulnerable to its impact. It is at this point that a plethora of literature exists that highlights how certain sectors of society remains more vulnerable to shocks and stresses, based on the reasons provided. Pelling (2003) defines vulnerability in the context of environmental shocks and stresses as the level of exposure to risk and the inability to avoid or absorb potential harm. Taking the author's definition of vulnerability into account, along with the three factors that Dodman *et al.* (2018) poses to justify why the urban poor are more vulnerable to shocks and stresses (see Chapter 1), Cape Town's residents of informal

settlements certainly qualify as more vulnerable to the exposure to risk, and have a greater inability to avoid or absorb potential harm.

Residents of informal settlements in Cape Town suffer from pre-existing conditions, where a lack of access to water and sanitation and little to no capability and access to resources to safeguard against future risks of drought, presents a dual problem for decision-makers, where they are required to ensure that both the pre-existing conditions as well as the question of water resilience are addressed. Ensuring water resilience for the more vulnerable thus requires giving more in-depth thought as to 'what' exactly needs to be achieved. Furthermore, the question of 'what' needs to be achieved is the point at which the argument around 'bouncing back' is relevant. Given the pre-existing and impoverished conditions of informal settlements and its residents, the option of 'bouncing back' to simply recover from the impacts of drought and residents returning to their less than adequate pre-existing living conditions are less desired. This argument therefore challenges definitions of resilience as "the ability of something to rebound or resume its original shape following exposure to a stressor" (Welsh, 2014: 5). Kaika (2017), for example, goes so far as to present the argument that simply insisting that communities be resilient does little to alleviate their pre-existing conditions, where socio-environmental inequalities exist, including severe deprivations and human development challenges, which also requires fixing in the first place (Simpson *et al.*, 2018). Therefore, resilience in the context of the more vulnerable of society more aptly fits into a definition presented by the World Economic Forum (2008), who defines it as the capacity to adapt and thrive in the face of a challenge, which is similar to Rodina (2018) whom identifies adaptation and transformation as forms of water resilience. Therefore, expanding on the definition presented by World Economic Forum (2008), the ACF-International (2013) presents the following actions to move society beyond the capacity to only 'bounce back', and therefore become more viable. These include actions to build capacity to:

- a) withstand or absorb from sudden or chronic shock, which collectively refers to the act of resistance;
- b) cope with temporary disruption while minimising the damages and costs from hazard, which collectively refers to the act of preparedness;
- c) manage or maintain basic functions and structures to become suitable for future situation, which collectively refers to the act of adaptation; and
- d) opportunities to change the abilities to take advantage of an adverse situation, which collectively refers to the act of transformation (ACF-International 2013: 5).

This is not to say that the most vulnerable are totally helpless in the quest for resilience. A rich supply of literature documents how local and poor communities harness their own capabilities to counterbalance vulnerabilities. According to Usamah *et al.* (2014), trust, communication and social cohesion amongst such communities enables them to support each other when disasters strike.

Dobson *et al.* (2015) documents how residents of informal settlements in Uganda are directly involved in activities to cope with adverse weather conditions and achieve long-term resilience. In 2002, Uganda formed its own federation to closely work with government to improve the lives of the urban poor. These federations focus on grassroots approaches to mobilise communities to collect data for the design of projects and source funding to eventually implement projects. Water shortages caused by lengthy dry seasons have led to communities implementing projects through the federation. These projects included harvesting water during the rainy season to ensure water resilience when water is scarce during the dry seasons. At the same time, the use of social ties is also a means by which the most vulnerable might harness their own capabilities. Social ties refer to communities helping one another as neighbours to overcome the effects shocks and stresses. Harte *et al.* (2009) found that an informal settlement in the Cape Town, Imizama Yethu, relied on community networks as a resource to aid in disaster management efforts. Community networks includes the dominant roles that elected members of communities can play to organise and access resources required to reduce their own communities' vulnerability to shocks and stresses. South Africa in particular acknowledges the role that community networks serve in informal settlements, which, according to Massey (2014), is what partly prompted the concept of *in-situ* upgrading of informal settlements (the underlying rationale for the selected case study). This concept is based on the goal of maintaining community networks that exist in informal settlements by means of not uprooting and relocating settlements, but rather upgrading and improving the settlement in its existing location. Decision-makers need to acknowledge that while most vulnerable deserves their focus, while at the same time acting as an enabler to ensure that communities harness their own capabilities. Hambati *et al.* (2018) shed some light on the way in which decision-makers could approach this. Decision-makers could, for example, implement skills training and education, encouraging participation in decision-making and efforts to strengthen relations amongst stakeholders. With the role of decision-makers as the enabler or facilitator to promote resilience in communities, while communities having different degrees of capabilities to also contribute towards ensuring their own resilience, it reinforces the argument for the collective governance made earlier on under subsection 2.2.3. This more specifically relates to actions geared towards the promotion of water resilience being a collective effort wherein both the State and relevant stakeholders, including local communities contribute towards the promotion of resilience.

2.3. Environmental Impact Assessments in the context of resilience

2.3.1. How Environmental Impact Assessments can contribute towards water resilience

Bond *et al.* (2015) argue for EIAs to focus on longer time-scales that go beyond the focuses on single-base projects and their impact. To envision and account for future scenarios would thus require forms of forward planning, which remain one of the key requirements of resilience, as argued earlier on. EIAs could also better focus on uncontrollable threats that will change the future, thus requiring emphasis on adaptation as well as mitigation, particularly during follow-up. EIAs must therefore develop measures to not only mitigate impact, but also adapt to future scenarios. Bond *et al.* (2015) further advocates that adaptation measures are particularly important for the follow-up phase of EIA projects. The follow-up phase of EIA projects comprise the monitoring and evaluation of conditions imposed on development projects. Pinto *et al.* (2019) includes further aspects as being part of EIAs' follow-up phase, namely management, communication and governance. Management entails making decisions and taking appropriate action in response to issues arising from monitoring and evaluation. Communication entails informing the stakeholders about the results of EIA follow-up in order to provide the appropriate feedback. Governance refers to all arrangements for implementing the follow-up process mentioned by Pinto *et al.* (2019). Follow-up can in this regard be interpreted as the phase where implementation of the project and its imposed conditions are executed through the processes mentioned by Pinto *et al.* (2019). The follow-up phase is thus where real outcomes of the project and its environmental impact(s) take shape (Morrison-Saunders *et al.* 2021), hence, whichever conditions are imposed ought to be carefully considered. Therefore, although EIAs have the legal means to impose conditions, such provisions may prove fruitless if topical issues such as drought and reducing the impact thereof are not included amongst the conditions that are imposed by decision-makers. Hamilton (2010), cited in Sok *et al.* (2011), suggest that explicitly addressing climate change issues in EIAs is required for the single reason that it presents a threat to life systems. EIAs in the context of Cape Town would therefore need to impose conditions that would safeguard its residents against water scarcity caused by drought.

Bond *et al.* (2015) also stress the need to use analytic-deliberative techniques that are based on decision-making that is open for participation from all stakeholders, including civil society, and State authorities. This is so as to ensure that decisions are based on a participatory process, where information is gathered from a wide-ranging audience. Furthermore, participation ought to largely adopt the techniques that will encourage dialogue and interaction from participants. This correlates with the need for active forms of participation, as argued earlier on. Particularly in terms of this research, participation needs to stretch beyond the deliberation of the impact of single development projects and include topics of water resilience. This is also emphasised in terms of the fourth and last

points, whereby Bond *et al.* (2015) suggest embedding resilience in scenarios that focus not only on mitigation, but also on adaptation to uncertain events. Lastly, a recognition is required that the future is likely to be different. The last point generally requires EIA focus to be steered towards aspects of resilience. It is for such reasons that others have also made determinations on how EIAs could contribute towards resilience against shocks and stresses. These determinations largely relate to the practise of EIAs, and how this practise should be applied in a real-world context.

2.3.2. Improving the practise of Environmental Impact Assessments and Resilience

According to Sok *et al.* (2011) the International Association for Impact Assessment (hereafter IAIA), as the body overseeing the practise of EIAs, provided the same suggestions as elsewhere documented in this chapter, of how the tool could contribute towards resilience. These include the use of multi-stakeholder and local knowledge, the use of climate change scenarios to stimulate resilience thinking and solutions and the monitoring of projects to ensure compliance with the conditions of authorisation. There is a broadly discernible call for decision-making to include everyone for the purpose of deliberating scenarios and formulating the solutions to promote resilience, much like the concept of scenario planning, as discussed earlier. The monitoring of projects to ensure compliance with the conditions of authorisation could further contribute towards water resilience, if such conditions are designed around aims the conservation of water, in order to avoid scarcity when drought threatens supply. This reverts back to the need to explicitly address climate change issues in EIAs, as suggested by Hamilton (2010) in Sok *et al.* (2011). Besides imposing conditions aimed at conserving water at the end of the assessment process, other opportunities also exist at the ‘post-decision stages’ of EIAs.

Brownlie *et al.* (2018) also highlight nine principles that the IAIA proposes, such that EIAs might contribute towards the resilience of ecosystems, providing sustained goods and services to society. Principles 4 and 9 are of particular relevance to the case study. Principle 4 states the need to: “address the rights, values, dependencies, and benefits that people derive from biodiversity and ecosystems in EIAs, taking a participatory and transparent approach throughout”, (Brownlie *et al.*, 2018: 2). Principle 9 states the need to: “establish robust adaptive management systems to ensure that EIA commitments will be met, mitigation measures will be implemented and that no net loss/net gain outcomes can be demonstrated through monitoring, auditing and reporting” (Brownlie *et al.*, 2018: 2). Principle 4 asserts that, given the dependence of people on ecosystem goods and services, people must be fully involved in EIAs, particularly where the management and mitigation of development projects take place. People’s dependency on the ecology for survival speaks to the need for addressing this relationship from a systems perspective, which ought to filter through the EIA process. This principle

further alludes to the need to fully involve people in the EIA process (Brownlie *et al.*, 2018). Pope *et al.* (2013), Marshall *et al.* (2005) and Lemos *et al.* (2007) further view participation as providing the opportunities for social learning and transformation. According Lemos *et al.* (2007), learning by engaging with communities allows society to better build adaptive capacity so as to manage risks and stresses related to climate change.

According Brownlie *et al.* (2018), Principle 9 draws attention to one of the main aspects of resilience, namely adaptive management. Adaptive management is defined as the “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm and exploits beneficial opportunities” (Ireland, 2012: 93). Adaptive management involves actions so that social-ecological systems survive and thrive, despite the impacts of climate change. It can therefore be argued that adaptive management somehow challenges the *status quo*, given the myriad dangers that climate change poses for social-ecological systems. This is why Ireland (2012) refers to adaptive management as the break from the ‘business as usual’ approach in favour of a discourse that gives recognition to a changing world caused by climate change. Focusing on water resilience, the ‘business as usual’ approach refers to simply providing potable water to people without recognising the threats of water scarcity, and thereby not imposing adaptive management to survive and thrive amidst the threat of water scarcity. Brownlie *et al.* (2018) identifies specific stages of EIAs, where adaptive management can be implemented, including monitoring and auditing, which takes place at the outcomes phase of EIAs.

Other suggestions in which the practise of EIAs could contribute towards water resilience and address climate change in general appear to exist outside of the tool itself. Sadler (1996), for example, argues that EIAs must comply with International Environmental Assessment Standards, while Sok (2011) calls for the use of guidelines and the need to synchronise EIAs with other instruments. Synchronising EIAs with other instruments correlates with the main suggestions by Morrison-Saunders *et al.* (2019) who similarly proposes that EIAs be influenced by other strategic resources and other higher-level resources. This also further confirms the need for EIAs to balance their rigidity and solely adhering to their own legal requirements by linking with other instruments to reach the common goal of promoting resilience against climate change. It is in this light that Noble (2000) cautions decision-makers to not limit the process of EIAs to a strict ‘traditional reactive blueprint approach’, where predetermined and inflexible legal frameworks dictate how the EIA process ought to unfold.

2.3.3. Environmental Impact Assessments' inherent problems

Based on the work of Burton (1983), EIAs comprises the following characteristics which are in conflict with some of requirements of resilience:

- a) the rigid structure and a narrow focus of the tool;
- b) the focus being steered towards impact as opposed to risks and trends;
- c) the finalisation of the assessment process once a project is authorised;
- d) ineffective public participation; and
- e) overreliance on the use of scientifically valid and neutral information to make decisions (adapted from Burton, 1983).

The first point refers to the strict frameworks in which EIAs operate, which only focuses on one project at a time. These frameworks are determined by legal and regulatory powers governing EIAs, such as the NEMA and EIA Regulations, 2014. Adding to the rigidity is that both the type of impact that the tool assesses and the methodology according to which the assessment process takes place, are predetermined, and as with all regulatory tools, can only be amended via bureaucratic legal processes. This characteristic already appears in conflict with one of the key considerations of Biggs *et al.* (2015), who call for flexible management solutions, as explained earlier. The narrow focus of the tool refers to the scope of EIAs being limited to the focus on the impact of individual development projects, whereas ideas around the holistic sense of systems, and all that these encompass, forms the basis of addressing the resilience of social-ecological systems. The second point refers to EIAs assessing the impact of development proposals, as opposed to risks and trends. Risks and trends remain one of the very reasons why the quest for resilience has become important, e.g. the high risk of drought being of relevant in Cape Town. The finalisation of the assessment process once a project is authorised refers to how, with the exception of monitoring, the lifecycle of EIAs end when a final decision is made as to whether to authorise or refuse a development. The exception of monitoring refers to decision-makers who are required to monitor, whether or not there is compliance with the conditions imposed as part of their final decisions.

Ineffective public participation refers to participation solely being used as a form of 'tokenism', and thus, having little effect on the outcomes of projects. If this rings true (as later established through the empirical enquiry), the use of public participation is in conflict with the requirements of resilience, which greatly emphasises the importance of collective governance. Lastly, there is overreliance on the use of scientifically valid and neutral information to make decisions relates to EIAs' theoretical underpinnings and its embeddedness in 'rationalism'. According to Morgan (2012), this relates to the mechanistic and technocratic approach to collecting and processing information, which is largely free from values and politics. Weston (2000) traces the historical roots of EIAs in rational decision-making to the 1960s, when a demand for a more systematic and practical approach to environmental decision-

making was fuelled by the growth in environmental concerns. The focus on the systematic and practical approaches to decision-making is why Jay *et al.* (2007) in Wallington *et al.* (2007) argues that the rational model's core focus on procedural requirements takes place at the expense of addressing more substantive environmental issues. These may include the issue of water resilience. Kolhoff *et al.* (2016) for example documents through the use of case studies of low and middle income countries such as Ghana and Georgia how EIAs substantive performance, which includes it meeting the objectives of environmental protection or, sustainable development is weak. This is contributed to project proponents not taking ownership in meeting EIA standards and focused more so being steered towards meeting legal and procedural requirements.

Having now established areas in which EIAs appear to be in conflict with the requirements of resilience, there does appear suggestions in which EIAs could improve its contribution towards resilience, while still retaining its traditional role of predicting impact.

2.4. Main conclusions drawn from the literature review

Resilience against shocks and stresses requires certain aspects to be addressed as part of the environmental decision-making process. Firstly, social-ecological systems are relevant. As explained by many, such as Walker (2012), there is a need to consider the holistic sense of the environment, which comprises both social and ecological elements. Furthermore, these elements interact as one system, where the social elements are dependent on goods and services from the ecosystem for survival. Sustaining this relationship is the point at which questions of resilience are relevant. Exploring whether these understandings of social-ecological systems form part of the EIA process is therefore considered.

Secondly, the aspect of planning ahead for environmental shocks and stresses so as to ensure that residents of informal settlements survive and thrive the impact of drought remains relevant. Resilience requires proactiveness of doing something prior to the onslaught of shocks and stresses. The need to do so is further derived from the argument for ensuring that the most vulnerable of society are enabled to progress beyond the ability to just bounce back from the impact of a shock such as drought.

Thirdly, the practise of EIAs and using its key features to further enhance its contribution towards water resilience is relevant, based on the most of the literature pointing to suggestions around how the practise of EIAs could enhance resilience in practical terms. According to Sok *et al.* (2011), and Brownlie *et al.* (2018), this could include the conditions of authorisation and the monitoring thereof to contribute towards resilience. Pope *et al.* (2013), Marshall *et al.* (2005) and Lemos *et al.* (2007)

suggest participation to not only fully include people in the decision-making process (Brownlie *et al.*, 2018), but to enhance adaptive capacity in people. Synchronising EIAs with other resources, as suggested by Sok (2011) and Morrison-Saunders *et al.* (2019) is also posed as a solution to improve the EIA practise. It may also further imply that the tool in itself could serve a viable supporting role in helping other resources, including policies or strategies such as the CTRS and WS to achieve its own outcomes aimed at water resilience. Hence, it is important to investigate this suggestion further from a practical perspective to determine how EIAs may fulfil its supporting role.

The above-mentioned three themes derived from the literature review now allows for the identification of the key areas which are investigated as part of the empirical inquiry. With these areas relating to the practise of EIAs, the empirical investigation ought to reveal the way in which the tool could, or has used, the abovementioned suggestions to make a contribution towards water resilience. The areas in which the tool could have used these suggestions will reveal itself as the areas of opportunity in which EIAs might contribute towards water resilience.

3. Chapter 3: Research Methodology

3.1. Introduction

This paper draws on the use of one EIA application to explore EIAs' potential contribution for water resilience in informal settlements. For the case study analysis, qualitative data was used from four main data sources: the EIA application in the format it was submitted to the decision-maker(s), the legal frameworks which governed EIAs, the policies and other resources used as part of the EIA application, and lastly the two strategies (CTRS and WS) used to further explore EIAs supporting role to help implement these strategies.

3.2. The Research Framework

3.2.1. Qualitative Research Methodology

According to Williams (2007: 67), "qualitative research is a holistic approach that involves discovery". In terms of this research this entails exploring EIAs' potential contribution for water resilience in informal settlements. This implies that the main subject matter is observed and studied in accordance with specific research questions (as detailed in subsection 1.5 of Chapter 1), based upon which the determinations and general conclusions are made. This further aligns with the principles of qualitative research, viewed by Williams (2007: 67) as building "premises on inductive, rather than deductive reasoning." To elaborate, Williams (2007) explains inductive reasoning as being based on the observations made by the researcher and posed questions that are being explained and answered throughout the research process. The *modus operandi* explained by Williams (2007) is also applied in terms of this research whereby a research problem was observed and three sub-questions posed in chapter 1 which are analysed and hereafter discussed and answered, as per chapter 4, 5 and 6 of this dissertation. It is also in this regard that inductive reasoning through qualitative research differs from quantitative research "where the researcher is strictly outside of the phenomena being investigated" (Williams, 2007: 67).

Leonard (2019) identifies a total of six widely used qualitative research strategies, including the Phenomenological Method, Ethnographic Model, Grounded Theory Method, Historical Model, Narrative Model and the Case Study Model. Each of these research strategies has its own capabilities to produce certain types of data by means of which to address the research topic. The Case Study Model is selected, which according to Leonard (2019), allows for an in-depth look into the subject matter. Broadly speaking, the case study comprises a completed EIA application, which is studied in detail together with its local context, and more specifically exploring EIAs' potential contribution for water resilience in informal settlements in terms of addressing the relationship between the ecological

and social elements of the environment, planning ahead for future drought and supporting the CTRS and WS with implementation to further achieve water resilience.

3.2.2. The Research Strategy: Single Case Study Model

There are broader aspects that need to be taken into consideration when the Case Study Model is selected. As confirmed by Biggam (2008), the research strategy refers to the specific technique adopted to complete the empirical study, which in terms of this research is the Case Study Model. According to Yin (1993) and Anderson (1997), cited in Noor (2008), a case study can refer to an event, unit of analysis, entity or an individual studied in a 'real-life' context using multiple sources of evidence. According to Noor (2008), case studies focus on a particular issue by means of questions as to how and why things happen, thereby revealing the contextual realities of what was planned, and what actually occurred; where Noor (2008) emphasises that a case study will focus on a particular issue or aspect of the selected subject matter, and not the broader subject matter in its entirety. It is in this regard that only certain aspects of EIAs were selected as the key focus areas, namely the process and purpose of the tool, as first discussed in Chapter 1 under subsection 1.5.

Yin (2003) presents two factors that make case studies a valid model. As mentioned above, the research questions of 'how' and 'why' are suited to the Case Study Model. Yin (2003) justifies this by explaining that a case study is more exploratory, and requires an examination of specific topic over time. An EIA application is analysed so as to explore how far the tool may be aligning with the requirements and selected themes of water resilience, as detailed in the analytical framework which appears in subsections 3.6 and 3.6.1 of Chapter 3, as well as exploring EIAs potential to contribute towards water resilience. The study also asks 'why' the EIA process does or does not align with the requirements and selected themes of water resilience. The response to the 'why' question depended on the findings of the analysis of the case study, which are detailed throughout chapter 4, 5 and 6. The second factor relates to the extent of control an investigator has over actual behavioural events and the degree of focus on contemporary as opposed to historical events (Yin, 2003). A case study is also justified in this regard, as this research focuses on a contemporary event, namely the EIA application for the upgrade of the Monwabisi Park Informal Settlement authorised on 27 May 2016 in terms of the relevant EIA Regulations (DEA&DP, 2016).

Yin (1984) identifies three main categories of a case study, each with its own purpose: the explanatory, the exploratory, and the descriptive. The explanatory case study serves the purpose of explaining a research phenomenon based on detailed predetermined hypotheses and/or research questions designed to gather the data required to explain the research phenomenon. The exploratory case study is more general, and serves the purpose of constructing a hypothesis, proposition or theory generated

by means of the researcher conducting his/her own fieldwork, and thereafter analysing the raw data obtained. The descriptive case study serves the purpose of surveying and analysing data as they occur in order specifically to describe the theory or topic being researched. Taking these explanations into consideration, this research falls into the category of being an explanatory case study based on two reasons. Firstly, predetermined research questions were already established in Chapter 1. Secondly, the research questions were examined in detail so as to explain the main research topic, i.e. the potential contribution of EIAs for water resilience.

3.2.3. Validity of the Single Case Study Model

While the use of a single case study was explained earlier as means to largely explore the potential of EIAs without being linked to a true sample, further aspects to validate the single case study must also be considered. These relate to carefully detailing how the research will be undertaken, and selecting a case study that presents a typical scenario. To further explain these two aspects, it is described in the article of Schofield (2011) as it appears and cited in Gomm *et al.* (2011: 3) that “the goal is not to produce a standardised set of results that any other careful researcher in the same situation or studying the same issue would have produced”. Rather it is to produce a coherent and illuminating description of and perspective on a situation that is based on and consistent with detailed study of that situation.” This is why a detailed account of how the single case study was investigated is provided. This includes the identification of the research problem, as detailed in subsection 1.4 of Chapter 1, what the core aim and objectives of the research are, as detailed in subsections 1.5 to 1.5.3 of Chapter 1, providing an outline of the research questions, as detailed in subsection 1.6 of Chapter 1 and presenting an analytical framework pointing to the variables of this research, as detailed in subsections 3.6 and 3.6.1 of Chapter 3, which are then further investigated.

Regarding the typical scenario selection, Schofield (2011) as the article appears and included in Gomm *et al.* (2011), emphasises that the selected case study must display characteristics that are so typical that the subject matter is largely similar when compared with any other area of focus or subject matter of the same kind. To further explain, it is hereby argued that the target population and area of focus in terms of this research, i.e. the Monwabisi Park Informal Settlement, displays the typical informal urban scenario in comparison to any other informal settlements in Cape Town. According to Brown-Luthango *et al.* (2017), the characteristics of Monwabisi Park Informal Settlement that are typical of an informal settlement include that the settlement was started by people erecting 1000 informal dwellings in 1996, which in 2013 expanded to 6318 informal dwellings; and which comprises of an unplanned grid that provides limited routes of circulation through the settlement, as well as water

and sanitation that is supplied through shared facilities. These constitute the urban characteristics typical to most informal settlements in Cape Town.

According to Schofield (2011) as it appears in Gomm *et al.* (2011), producing a coherent description and perspective on the subject matter also helps a single case study to arrive at conclusions which may help to stimulate further research. This therefore necessitates a description of the Monwabisi Park Informal Settlement of Khayelitsha as a case study.

3.3. The Monwabisi Park Informal Settlement, Khayelitsha case study

3.3.1. The Monwabisi Park Informal Settlement Application

On 26 February 2016 the decision-making authority, the Department of Environmental Affairs and Development Planning (hereafter DEA&DP), received an EIA application from the applicant; the CoCT (DEA&DP, 2016). The application was required as the project for the upgrade of the existing Monwabisi Park Informal Settlement required the removal of indigenous vegetation. Prior to receiving the above-mentioned application, the DEA&DP also received an exemption application on 17 September 2015 as the project, applicant, namely the CoCT applied for approval so that an internal CoCT staff member could manage the EIA application process. On 7 October 2015 the DEA&DP authorised and permitted that an internal CoCT staff member could manage the EIA application process, including the assessment of the impacts relating to the Monwabisi project (DEA&DP, 2016). This research therefore and hereafter refers to this delegated and authorised CoCT staff member as the assessor.

Figure 3 below presents the location of the EIA case study. According to the Worcester Polytechnic Institute (year unknown: 2) Monwabisi Park Informal Settlement comprises “some 5,500 households located along the southern boundary of Khayelitsha, Cape Town’s largest township”. The informal Settlement was formed in 1997, when people began to build shacks on an adjacent, unoccupied nature reserve, (Worcester Polytechnic Institute, year unknown). Worcester Polytechnic Institute (year unknown) projects that some 20,000 people, the majority from the Eastern Cape, now live in the informal settlement and suffer from negative socio-economic impacts, including unemployment, poverty and inadequate living conditions. On 27 May 2017, the DEA&DP authorised the Monwabisi Park Informal Settlement project in terms of the EIA Regulations, 2014 (DEA&DP, 2016).

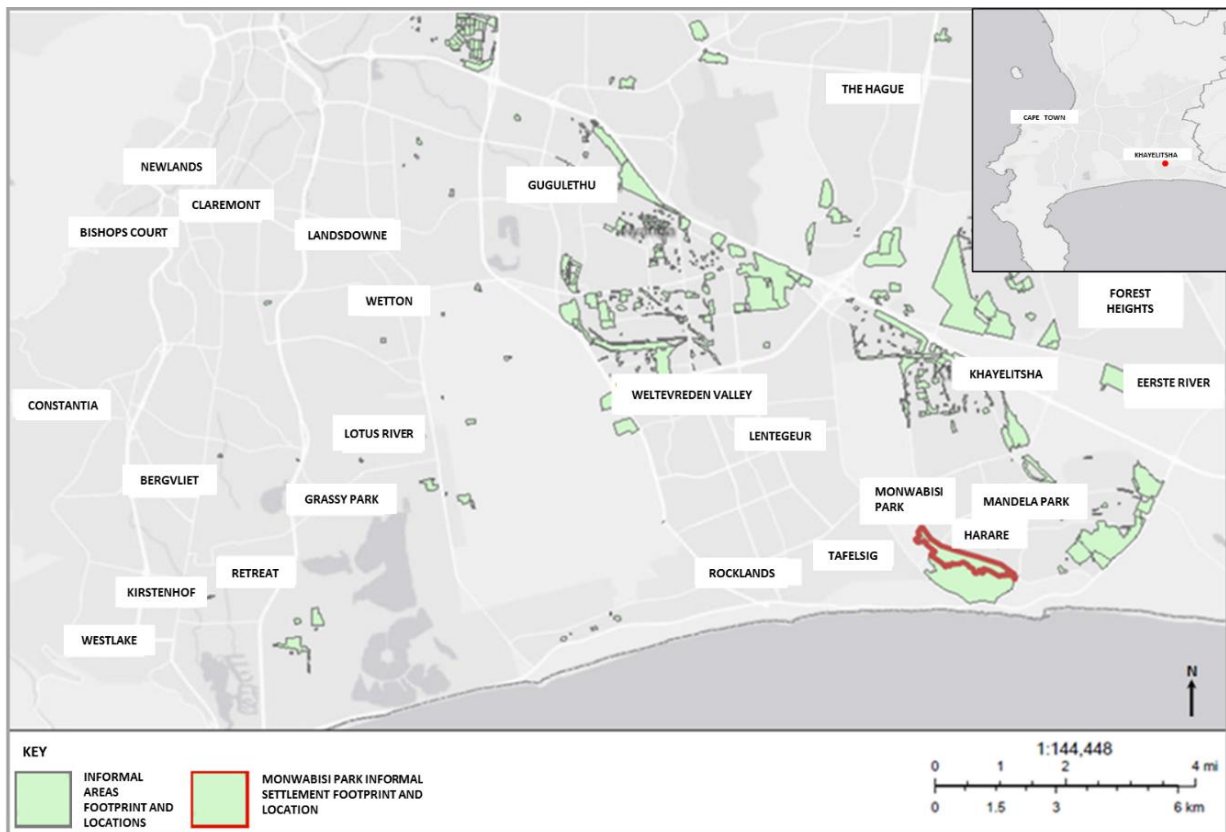


Figure 3: Location of the Environmental Impact Assessment case study (DEA&DP, 2021)

3.3.2. The Monwabisi Park Informal Settlement Project

The project entailed the *in-situ* upgrade of the Monwabisi Park Informal Settlement measuring 900 000 square metres. These included the provision of community facilities, formalised roads, and infrastructure. The community facilities and infrastructure include the construction of serviced plots, education facilities, play parks, sport and youth development areas, open space areas and stormwater ponds. Furthermore, the project included the connecting and providing the residents to municipal bulk services, including water, sewerage and solid waste management. Figure 4 below displays the development framework of the project which the applicant presented to the decision-maker. Figure 4 is a conceptual depiction of Monwabisi Park Informal Settlement project and the abovementioned components it comprises.

Although a development framework was used by the CoCT, as part of the Monwabisi EIA application, the framework itself was derived from a programme entitled the Violence Prevention Through Urban Upgrading (hereafter VPUU). The framework was commissioned by the VPUU, a community development organisation to specifically improve urban living environments of poorer communities through interventions, such as improving the quality as well as access to basic services; particularly running water and sanitation (VPUU, 2018). Ensuring the poor and the more vulnerable have access

to basic services addresses one half of the dual problem of securing water resilience, as the need to reducing peoples' vulnerability to impact such as water scarcity is still required, and needs to be addressed. This reverts back to the previous arguments included in chapter 1 of how aspects of access and provision of water must at the same time also address aspects of water resilience (Rodina, 2019) as well as the vulnerabilities of the poor (Enqvist *et al.*, 2019).

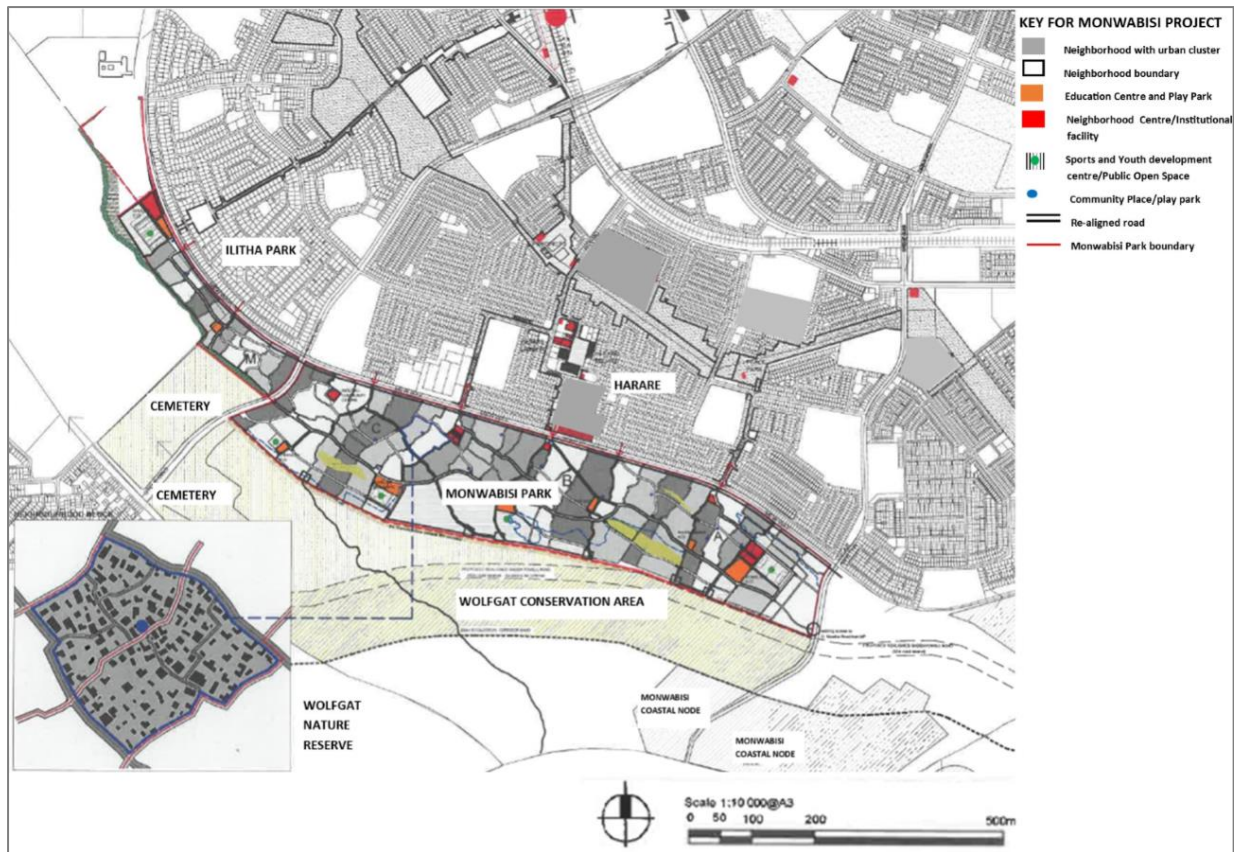


Figure 4: The conceptual development framework of the Monwabisi Project (VPUU, 2018)

The framework in Figure 4 was submitted together with the EIA application which underwent the required regulatory EIA process.

3.3.3. The Regulatory Process

A Basic Assessment Report (hereafter BAR), which assesses the potential impacts of the Monwabisi Project on the environment, was submitted to the decision-maker in both a draft and final format. According to the DEA&DP (2016), the draft BAR was circulated for comment to all stakeholders, including the decision-maker, while the final BAR contains all of the results, having circulated the draft BAR to stakeholders.

Both the draft and final BAR documents the assessment of the impact on the local geology, vegetation, fauna, local community, traffic, stormwater, and local archaeology. The final BAR further documents the assessment of noise and visual impact (DEA&DP, 2016). Appendix 1 provides a detailed account of how these respective impacts were assessed, as also further discussed in Chapter 4.

In addition to the assessment of the identified impact, additional EIA regulatory requirements were also met. According to the DEA&DP (2016), additional studies were commissioned in order to substantiate the impacts of the Monwabisi Project, where an engineering study focused on matters relating to road infrastructure within the vicinity of the site. According to the specialist report conducted by Jeffares and Green (Pty) Ltd. (2011), as included in the DEA&DP (2016), the specific focus was on the Main Road, Mew Way, located in close proximity to Monwabisi Park. While this study was done solely from a traffic and engineering perspective to determine what future road improvements were required to adequately improve the local traffic conditions, it could be interpreted as an opportunity that while EIAs have been criticised for being rigid, as argued by Burton (1983), the process is open to allow for additional resources to form part of the EIA application and process. To further substantiate this, various other resources including policies, plans, frameworks and guidelines which in some instances are products of other authorities other than the decision-maker, formed part of the Monwabisi EIA application.

The policy considered was the Policy on Minimising the Impacts of Stormwater from Urban Development on the Receiving Environment approval by the CoCT in 2009 “to minimise the undesirable impacts of stormwater runoff from developed areas by introducing Water Sensitive Urban Design principles to urban planning and stormwater management in the Cape Town metropolitan area” (CoCT, 2009: 3). The plan considered was the IDP of 2012 – 2017 from the CoCT which is a five-year “strategic framework through which the CoCT aims to realise its vision for Cape Town” of being a caring, safe, inclusive, caring and well-run city providing opportunities to its residents (CoCT, 2012: 3). The frameworks considered included the Cape Town Spatial Development Framework (hereafter CTSDF) from the CoCT and the Provincial Spatial Development Framework (hereafter PSDF) from the DEA&DP. According to the CoCT (2012: 9), the vision of the CTSDF is “to, by 2040, turn Cape Town into one of the world’s greatest cities in which to live and learn, work, invest and discover, a place of possibility and innovation, with a diverse urban community, and all the opportunities and amenities of city life, within a natural environment that supports economic vibrancy, and inspires a sense of belonging in all”. According to the DEA&DP (2014), the PSDF is a long-term plan, with multiple visions for the future. These include ensuring residents have access to education, employment, and basic services, while the environment is adequately managed in terms of resource efficiency, safety, and inclusivity. The guidelines included those produced by decision-makers themselves to help inform the

EIA application process. These included the Guideline and Information Document Series Guideline on Specialist Input (2005), the Guideline and Information Document Series Guideline on Public Participation (2013), the Guideline and Information Document Series Guideline on Alternatives (2013), and the Guideline on Need and Desirability (2013). According to the DEA&DP (2005), the Guideline and Information Document Series Guideline on Specialist Input (2005) provides guidance as to how a specialist ought to be included in the EIA process so as to help identify, assess, and avoid or effectively manage negative impact, and enhance the benefits of projects (DEA&DP, 2005). According to the DEA&DP (2013), the Guideline and Information Document Series Guideline on Public Participation provides guidance on the approach and how public participation must be conducted throughout the application process. According to the DEA&DP (2013) the Guideline and Information Document Series Guideline on Alternatives provides guidance as to how to consider different options to meet the same purpose of development projects, but with less negative and more positive impact on the environment. According to the DEA&DP (2013: 5), the Guideline on Need and Desirability provides guidance regarding how “strategic concerns such as climate change, food security, as well as the sustainability in supply of natural resources and the status of our ecosystem services” must form part of the focus of EIAs. The DEA&DP notes that “IDPs, SDFs, EMFs and other relevant plans, frameworks and strategies must be taken into account when considering the merits of each application” (DEA&DP, 2013: 9). The assessor briefly confirmed throughout the Final BAR that the abovementioned policies, plans, frameworks, and guidelines were all taken into consideration as part of the Monwabisi EIA application (DEA&DP, 2016).

The Final BAR further provides an account of having circulated the draft BAR to stakeholders, as per the requirements of public participation and the Section 240 of the NEMA. According to the Republic of South Africa (2014: 11) the NEMA sees the Public Participation Process (hereafter PPP) as a means “...by which potential interested and affected parties are given opportunity to comment on, or raise issues relevant to, the application.” In terms of the requirements of Section 240 of NEMA, State and other authorities similarly provided input regarding the Monwabisi EIA application (The Republic of South Africa, 2014). Comments from the both the public and authorities were provided on the Monwabisi EIA application. Appendix 2 provides a detailed account of the comments obtained, as well as the response that the assessor provided to such comments.

After having received the Final BAR, the decision-maker decided on 27 May 2016 to issue the CoCT with an EA for the *in-situ* upgrade of the Monwabisi Park Informal Settlement, Khayelitsha.

The abovementioned information is a consolidated account of the regulatory process that was followed in order to reach the phase where the Monwabisi EIA application was authorised. The

regulatory process briefly provides an insight into how an EIA have begun to grapple with some of the arguments made in chapter 2 of how the tool could contribute towards water resilience. Firstly, it is clear that EIAs no longer only focuses on the ecological elements of the environment, hence it is mentioned above that the Monwabisi EIA application also assessed impacts on the local community, traffic and local archaeology. An empirical enquiry is however warranted to establish if these elements are addressed from a systems perspective, as first detailed under subsection 2.2.1 of chapter 2. Secondly, while the regulatory process confirms its 'traditional reactive blueprint approach' and rigidity, as previously explained under subsections 2.3.2 and 2.3.3 of chapter 2, it also becomes apparent that the tool has begun to balance its rigidity. With the rigidity largely referring to the regulatory requirements that were met such as the abovementioned impact assessment and the prescribed public participation processes, the abovementioned policies, plans, frameworks and guidelines indicates a level of balance whereby the EIA regulatory process was also open to consider other resources to influence decision-making. This is interpreted as a sign of EIAs having reach the phase of finding synchronisation with other resources that exist outside its own strict regulatory frameworks, as proposed by Sok (2011) and Morrison-Saunders *et al.* (2019) under subsection 2.3.2 of chapter 2. However, it also remains a question of whether EIAs have begun to shed its rigidity and in so doing contribute towards water resilience. This also warrants the need for the empirical enquiry.

3.4. Research Design

According to Abutabenjeh *et al.* (2018), the research design guides the research process so that it moves from the research question(s) to the findings and outcomes. The research design therefore includes activities involving collecting and analysing data to illustrate the understanding of the research topic, present the findings, answer the research question(s), and draw conclusions. Hence, Bhat (2020) identifies three main types of research design, namely data collection, measurement, and analysis, which ought to lead the researcher to complete the research process. Data collection refers to the techniques by means of which to obtain primary data used to answer the research question(s). Measurement refers to observing and recording the observations collected as part of the research process. Data analysis refers to the ways in which the researcher refines and examine the collected data into information that can be used to achieve the research goal(s) and form conclusions (Bhat, 2020). These three aspects are now discussed in the context of the current study.

3.4.1. Data Collection Techniques

Table 3 represents the main data collection techniques as well as the sources from where the data were obtained.

Table 3: Data collection techniques and the sources from where the data were obtained

Data Collection Technique	Sources of data
Examining existing documents and materials	<ul style="list-style-type: none">• EIA application/impact assessment report• Records and tools used by the decision-makers to review the EIA application/impact assessment report• The WS and CTRS

In terms of Table 3, the examination of existing documents and materials forms the basis of the case study, which in turn forms part of the broader desktop study. Firstly, as part of the desktop study, the EIA application report and the accompanying impact assessments are consulted. Secondly, the records of how decision-makers evaluated the EIA application report and the accompanying impact assessments in order to make a final decision regarding the Monwabisi EIA application are reviewed. This review also documented the various tools that decision-makers used to support the decision-making process, which included the Evaluation Control Sheet and File Summary (see Appendix 3) and the legislative requirements (see Appendix 4) as revealed in the EIA application file of the DEA&DP (2016). More specifically, the Evaluation Control Sheet was used and designed by the decision-maker in order to establish the adequacy of the manner in which the impacts of the Monwabisi Park project were assessed. The legislative requirements refer to the promulgated EIA Regulations, 2014 as contained in the Republic of South Africa (2014), which were used by the decision-maker to establish whether the Monwabisi Park EIA application complied with such requirements. Lastly, the WS (CoCT, 2019) and CTRS (CoCT, 2019) as first introduced in Chapter 1 as the CoCT's chief instruments to help build resilience against identified shocks and stresses are used to address sub-question 3, regarding the supportive role of EIAs.

3.4.2. Measurement of data and study limitations

Bhat (2020) refers to the measuring of data involving activities of observing and recording the observations collected as part of the research process. According to Trochim (2020) the act of measuring data in the context of social research often involves the use of interviews and questionnaires. Atta-Asiedu (2020) views the measuring of data as a means of giving a clear picture of what is going on, understanding situations, and communicating these to others.

This research was originally aimed at self-administering questionnaires to the community members of the Monwabisi Park Informal Settlement and conducting face-to-face interviews with selected decision-makers. However, the Covid-19 pandemic impacted this, given the risk of transmissions when conducting the aforesaid research methods. The risk was heightened, due to a selected sample size aimed at conducting multiple questionnaires and face-to-face interviews. Furthermore, the research process was also underway when South Africa's 'hard' lockdown was imposed, which restricted peoples' movement and contact, thereby further curtailing the data collection process. It is in this regard that the research had to be adapted in order to sufficiently continue with process, while in the midst South Africa's 'hard' lockdown. This more specifically entailed the design of a new focus area that would yield information and results which are still directly linked to the research's core aim as detailed in subsection 1.5 of chapter 1. Redesigning the research process therefore required further considerations on the manner in which the new focus area would be approached, from where data would be obtained, analysed as well as evaluated in terms of the empirical enquiry. Therefore, as a means to mitigate the impact of the Covid-19 pandemic on this research, Sub-question 3 was formulated. Sub-question 3 is of relevance to the case study, as both the CRTS and WS are aimed at promoting water resilience for Cape Town and its residents, and in certain ways, this includes the more vulnerable. As detailed in the previous Chapters, the residents of Monwabisi Park suffer from pre-existing conditions, which do indeed make the residents more vulnerable and in need of water resilience. It is in this regard that Sub-question 3 focuses on determining the extent to which EIA could support the CRTS and WS with implementation to further achieve water resilience for the more vulnerable.

3.5. Data analysis

According to Creswell (2013), data analysis comprises methods to examine, represent and discuss the data that was collected through the research process. This involves activities of preparing and organising data, as well as separating data into relevant themes, through processes such as coding. Each of the three sub-questions were categorised into three aspects that each represents the key areas of focus, which are further explained below. The methods of analysing the data in terms of each question is also described below.

The second level of analysis was interpretative, meaning that the results of analysing the case study in terms of the three sub-questions are firstly presented. These results were then used to provide the discussion on EIAs' potential to contribute towards water resilience, as illustrated throughout the Monwabisi EIA application. The discussions were based on the arguments and material gathered from the literature review in Chapter 2. The second level of analysis appears in Chapters 4, 5 and 6.

3.5.1. Data analysis for Sub-question 1 - “To what extent does the EIA assessment and evaluation processes address the relationship between the ecological and social elements of the environment, so that the relationship is sustained?”

This question focuses on the aspect of establishing that of which the impact assessment process comprises. To do this, the EIA application report is assessed with a focus on the methodology that was applied by the assessor who assessed the impacts of the Monwabisi development proposal and also who compiled the Basic Assessment Reports that was submitted to the decision-maker. A descriptive data analysis is also conducted of the methods by which the decision-maker reviewed the impact assessment, which was conducted by the assessor. The data obtained from this analysis is interpreted so as to evaluate whether the environment is considered as a complex system consisting of ecological and social elements. It is further evaluated whether the EIA process made provisions to address the relationship between the ecological and social elements so that goods and services remain available, even when drought threatens the availability thereof.

3.5.2. Data analysis for Sub-question 2 - “What is the purpose of the EIA and does it align with the need to plan ahead of future droughts in order to safeguard and promote water resilience for the most vulnerable?”

This question focuses on the aspect of establishing whether any aspect of the Monwabisi EIA application focuses on planning ahead, and how this was facilitated. As such, the actual EIA application report, including the associated impact studies, which formed part of the Monwabisi EIA application, are also assessed by means of a descriptive data analysis, particularly focusing on the specific areas where aspects of planning ahead formed part of the EIA application. These specific areas are furthermore analysed so as to establish whether the aim of planning ahead related to promoting water resilience against the impact of drought, and thereby evaluating the supporting frameworks and plans, such as Spatial Development Frameworks (hereafter SDFs), IDPs and guidelines, which formed part of the Monwabisi EIA application. The data obtained from this analysis is interpreted so as to evaluate whether EIAs could help to promote water resilience for the most vulnerable prior to the onslaught and impact of drought.

3.5.3. Data analysis for Sub-question 3 - “How could the EIA support the CTRS and WS to implement its actions and thereby further helping these strategies to reach its intended outcomes of water resilience?”

This question focuses on the extent to which EIAs can serve a supportive role in the implementation of the relevant actions proposed in the WS and CTRS. Both the WS and CTRS were analysed in descriptive manner to serve two functions. Firstly, the actions of the WS and CTRS, as well as the procedures and actions that made up the EIA, are outlined. This outline served to establish whether contradiction or alignment respectively exists between the actions of the CTRS and WS and the procedures and actions making up the EIA. This leads to the second part of the analysis. The actions of the CTRS and WS, which are found to align with the procedures and actions that made up the EIA, are used to determine how the EIA could support with the implementation of the actions of the WS and CTRS at the project level.

3.6. The guiding analytical framework

3.6.1. The structure and outline of the analytical framework

This research utilises an analytical framework to guide the format and framing of the research. The first two themes relate to the requirements of water resilience, while the third theme looks at the how the practise of EIAs could further contribute towards water resilience. These themes serve as the variables further investigated as part of the case study. Figure 5 below schematically displays the outline of the analytical framework.

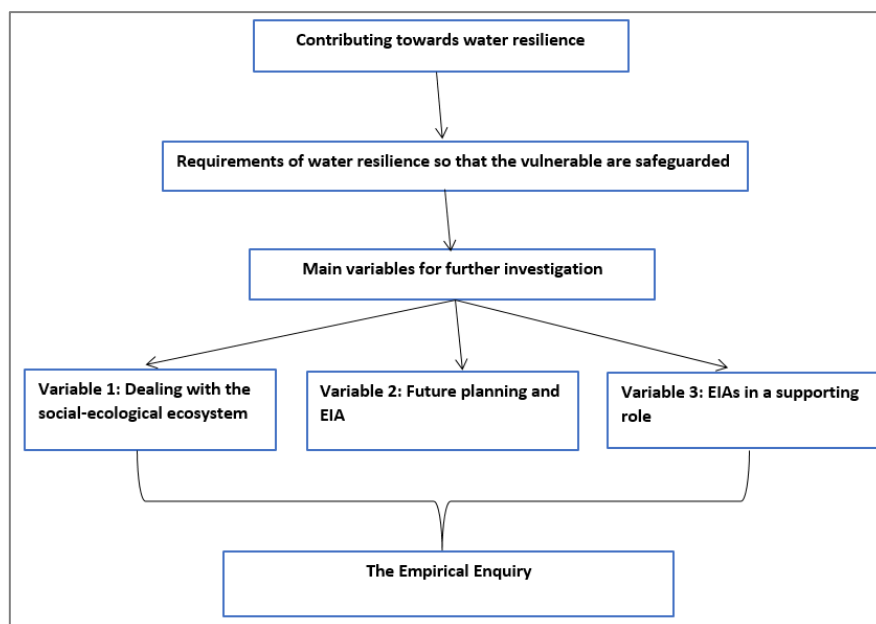


Figure 5: The schematic illustration of the analytical framework

According to Adom *et al.* (2018), besides the analytical framework delineating how the research problem will be explored, it should also explain how the variables under consideration relate to one another. Therefore, in terms of Figure 5, the main variables selected to form part of the empirical inquiry broadly all relate to the contributions that EIAs could make towards the promotion of water resilience for residents of informal settlements in Cape Town. Each of these variables relate to specific aspects that make up the tool and the manner it is practised through the application process.

The first variable relates to the process that EIAs use to assess the impact of development and to what extent the process aligns with the need to ensure that the social-ecological relationship is addressed, so that the resilience of the system is ensured. The second variable relates to whole aim or purpose of EIAs, i.e. sustainable development and thereby determining the extent to which the tool aligns with the need of forward planning to better anticipate the impact of drought and promote water resilience. The third variable relates to the various procedural requirements that EIAs comprises as per its legal frameworks so as to determine which of these requirements can be used to implement actions of the WS and CTRS, and thereby provide a supportive role to help promote water resilience. Investigating these three variables therefore forms the basis of the empirical inquiry.

3.7. Conclusion

The case study is largely analysed through qualitative methods, with a focus on the methodology and processes that formed part of the Monwabisi EIA application. This allowed for exploring the tool's areas and features that it comprises, which may help to contribute towards water resilience, particularly for the more vulnerable amongst society. The Monwabisi EIA application therefore exemplifies the tool's potential, as well as areas of opportunity to help contribute towards water resilience. Hence, the single case study was the method used for this empirical enquiry, as included in the chapters to follow.

4. Chapter 4: Results and discussion: EIAs and Ecological and Social Systems

This chapter addresses sub-question 1: To what extent does the EIA assessment and evaluation processes address the relationship between the ecological and social elements of the environment, so that the relationship is sustained?

This chapter first analyses the methodological procedures that were used by the assessor to assess the impacts of the Monwabisi project. Hereafter, the methodological procedures used by the decision-maker to evaluate the assessor's information on the assessment of the impacts of the Monwabisi project are analysed.

The above-mentioned information gathered are then used in the discussion section to evaluate the methodological procedures used by the assessor as well as the methodological procedures used by the decision-maker. The evaluation moreover focuses on establishing whether the aforementioned methodological procedures addresses the relationship between the ecological and social elements of the environment and if so, whether this leads to aims of sustaining this relationship, so that water remains available and accessible despite drought.

The discussion and evaluation chapter ends with the conclusion on the findings which provides an answer to the sub-question 1, as mentioned above.

4.1. Descriptive analysis

4.1.1. Results and observed data from the case study: An introduction

The results of this empirical data observed is based on the requirement of resilience giving effect to social and ecological elements of the environment being addressed as integrated systems. As discussed in Chapter 2, these arguments are derived from the understandings of social-ecological systems by Schlüter *et al.* (2012) as it appears in Biggs *et al.* (2015), as well as the conceptualisations thereof, as presented by Biggs *et al.* (2015). This Chapter details the assessment processes employed by the assessor, namely the CoCT staff member who was delegated by the project applicant, namely the CoCT to assess the impacts of the Monwabisi project and manage the EIA application process in terms of the EIA Regulations, 2014 and secondly, the review processes used by the decision-maker as part of the Monwabisi EIA application. Using the results of this documentation, a discussion follows to evaluate whether the assessment and decision-making processes align in any way with the understandings and conceptualisations of social-ecological systems, such that the EIA process contribute towards water resilience.

4.2. Results of the assessment processes conducted by the assessor

4.2.1. The impact assessment conducted by the assessor

4.2.1.1. Content and regulatory requirements of the Monwabisi Environmental Impact Assessment

The final BAR documents the EIA regulatory requirements to which assessor was required to adhere as part of the Monwabisi EIA application. The final BAR is the pre-set template designed by the decision-maker to aid assessors in fulfilling the regulatory requirements applicable to development projects. Appendix 4 documents these regulatory requirements related to: administrative data, details about the Monwabisi Project and its scope, the applicable policies and legislative context, the need and desirability context, details of the PPP, the alternatives considered, and ultimately, the methods by which the impacts relating to the Monwabisi Project were assessed. Table 4, provides the information that the assessor was required to provide in terms of the Monwabisi EIA application.

Table 4: The regulatory information required and produced by the assessor (DEA&DP, 2016)

Regulatory Requirements	Information provided in the final BAR
Administrative data	It was revealed that the CoCT is the assessor for the application. The details regarding the site being located on the corner of Mew Way and Oscar Mpetha Road in Khayelitsha, as well as the applicable erven, the zoning thereof being 'Limited Use' and 'Agriculture', co-ordinates and surveyor digit codes were provided.
Details about the Monwabisi Project and its scope	It was revealed that the project entails upgrading of an existing informal settlement, which includes: <ul style="list-style-type: none"> . serviced sites; . education centres; . play park areas; . sport and youth development centres; . open space areas; . stormwater ponds; . community facilities; . institutional facilities; and . municipal infrastructure such as water, sewerage network, and waste management.
The policies, guideline and legislative context	Requiring that the assessor indicate which policies and other legislation bear relevance to the Monwabisi EIA Project, the assessor listed this information as follows: <p><u>Legislation</u></p> <ul style="list-style-type: none"> . National Heritage Resources Act (Act No. 25 of 1998), 1999 . Subdivision of Agricultural Land (Act No. 70 of 1970), 1970 . Land Use Planning Ordinance (Ordinance 15 of 1985), 1985 . CoCT Air Quality Act Management by-law . NEMA . National Environmental Management Air Quality Act <p><u>Policies</u></p> <ul style="list-style-type: none"> . Policy on Minimising the Impacts of Stormwater from Urban Development on Receiving Environment . PSDF . CTSDF . IDP <p><u>Guideline</u></p>

	<ul style="list-style-type: none"> . DEA&DP NEMA EIA Guideline & Information Document Series Guideline on Public Participation . DEA&DP NEMA EIA Guideline & Information Document Series Guideline on Specialist Input . DEA&DP NEMA EIA Guideline & Information Document Series Guideline on Alternatives
The need and desirability context	<p>The need and desirability context (as later discussed in Chapter 5) required the assessor to illustrate how the development is in line with the applicable forward planning policies, including:</p> <ul style="list-style-type: none"> . PSDF . CTSDF . IDP
Details of the PPP	<p>The assessor confirmed that the following requisite steps to involving the public (including authorities) in the EIA process were complied with:</p> <ul style="list-style-type: none"> . fixing a site notice to communicate the details about the Monwabisi EIA application; . giving written notice about the Monwabisi EIA application to all relevant authorities and persons; . placing an advert of the Monwabisi EIA application in a local newspaper; . providing proof of how the BAR was circulated to the relevant persons; and . proving a report on the comments received and the responses to such comments.
Alternatives considered	<p>Alternatives required the assessor to document the different options considered to meet the same purpose of providing necessary upgrades and services to the Monwabisi Informal Settlement, including the option of not proceeding with the development and the consequences thereof.</p>
Methods of assessing the project's impacts	<p>The methods to assess the impacts of the Monwabisi Project were prescribed by the decision-maker and used by the assessor.</p>

Table 4 illustrates that the first three sets of information, i.e. the administrative data, details about the Monwabisi Project and its scope, as well as the policies, guidelines, and legislative context provides are baseline information. The remaining sets of information required the assessor to provide the more substantive information pertaining to the Monwabisi EIA application. With a focus on exploring whether the assessment processes adhere to the principles of social-ecological systems, particular attention is paid to the last aspect included in Table 4, i.e. methods of assessing the project's impacts.

4.2.1.2. The prescribed methodology to assess impacts

The final BAR restricted the assessor to assess the impacts of the Monwabisi EIA application in accordance with a prescribed methodology, as included in Appendix 1. This implies that everything which pertains to the legislated impact assessment procedures are strictly determined and dictated by prescribed methodologies that the assessor had to adhere to. We therefore begin to signs of EIAs' rigidity addressed in the previous chapters. The impacts related to the planning, design, and construction phase, as well as operational phases of the Monwabisi EIA Project. According to the DEA&DP (2016), this methodology required the assessor to provide the:

- a. nature of the impact;
- b. the extent and duration of the impact;
- c. the probability of its occurrence;
- d. the degree to which the impact can be reversed;
- e. the degree to which the impact may cause irreplaceable loss of resources;
- f. cumulative impact prior to mitigation;
- g. significance rating of impact prior to mitigation (low, medium, medium-high, high, or very-high);
- h. degree to which the impact can be mitigated;
- i. proposed mitigation;
- j. cumulative impact post mitigation; and
- k. significance rating of impact after mitigation (low, medium, medium-high, high, or very-high).

Using the abovementioned methodology as prescribed by the decision-maker, namely the DEA&DP, the assessor assessed each of the impact of the Monwabisi Project separately, as displayed in Appendix 1. As such, for each of the identified impact to be assessed, the same methodology had to be used by the assessor. The impacts assessed through the use of the methodology, included: a. geographical and physical elements; b. indigenous vegetation; c. biological elements; d. socio-economic elements; e. cultural-historical elements; f. noise; g. visual; h. traffic. These were the elements on which the Monwabisi Project will have an impact on during its planning, design, and construction phases. The impacts assessed, which pertains to the operational phase, included: a. geographical and physical; b. biological elements; c. socio-economic elements; d. cultural-historical elements; e. noise; f. visual; and g. stormwater (DEA&DP, 2016).

Having analysed the abovementioned information which revealed the prescribed methodologies that were followed by the assessor in terms of the Monwabisi EIA application, the discussion and further evaluation of this information follows in sub-section 4.4. of chapter 4 below.

4.2.1.3. The assessment of the impacts of the Monwabisi Project

Using the methodology that was prescribed by the decision-maker, as also included in Appendix 1, the assessor presented the assessment of the impact on the identified elements. In terms of geographical and physical elements, the nature of the impact related to the consolidation of sands, and reforming of the land, caused by preparing the ground in order to accommodate construction activities. The impact on indigenous vegetation pertained to the removal of critically endangered vegetation. The biological elements concerned the displacement of the local fauna, while the socio-economic elements concerned the provision of employment opportunities during the construction phase, which

illustrates that impact can also be positive. The cultural-historical elements related to the likelihood of the site having archaeological remains. Noise related to the construction activities raised noise levels for existing residents. With regards to visual impact, construction activities causing unsightly visual conditions for the immediate area was assessed. With regards to impact on traffic, construction activities causing traffic interruptions on roads, including Oscar Mpetha Road, Steve Biko Road, and Mew Way was assessed (DEA&DP, 2016). These were the nature of the impacts that the assessor determined to be relevant in terms of the Monwabisi Project, as applicable to the planning, design, and construction phase.

The assessor also assessed the impacts as applicable to the operational phase. In terms of the geographical and physical elements, the site contained no significant geographical features that would see impact. The biological elements included habitat loss for local fauna on-site, which having to move elsewhere. The socio-economic elements included the Monwabisi Project resulting in safe and dignified living spaces, as well as the provision of municipal services. The cultural-historical elements related to the transformed nature of the site, in which case, no significant cultural-historical impacts are expected. The noise elements related to the site already being occupied by residents, and therefore no additional noise impacts are expected. The visual elements concern improving visual appearance of the site, as the Monwabisi Project proposes the upgrade and formalisation of an existing informal settlement. Lastly, the stormwater elements concern an increased hardened surfaces that will impact on the local stormwater system (DEA&DP, 2016).

Appendix 1 displayed the manner in which the abovementioned impacts were assessed. There are two deductions that can be made from the impact assessment included in Appendix 1. Firstly, impacts resulting from the Monwabisi Project were either interpreted as positive, or negative, respectively. The positive impacts include *inter alia*, the Monwabisi informal settlement being upgraded in terms of its visual conditions and living conditions, which in turn also result in employment opportunities. The negative impact includes, *inter alia*, the impacts that the upgrading of the Monwabisi informal settlement will have on stormwater and the local environment, including the displacement of fauna, increase levels of traffic, and the removal of critically endangered vegetation. The latter also relates to the second deduction whereby the removal of Critically Endangered vegetation, which is the only impact assigned a 'high' rating prior to the said impact being mitigated. This evidences the concern for the more biophysical related impacts on the environment.

The outcome of the assessor using the prescribed methodology not only allowed for the assessment of impacts, but also propose the measures to mitigate the identified impacts, as evident in Appendix 1. The purpose of mitigation, as deduced from Appendix 1, is in most cases to reduce the intensity of any negative impact. By way of example, the only impact with a high rating, is where the removal of approximately 13.5ha of Cape Flats Dune Strandveld was mitigated by the proposed measure of searching and rescuing the critically endangered vegetation prior to the commencement of construction. Specific to the case study, impacts relating to water was limited to the aspect of stormwater, which was assessed from a negative perspective; hence, focus was placed on the increase of hardened surfacing, which will require management in terms of a stormwater plan, and other design measures. In the context of the development taking place in a water-stressed city, there are consequences to connecting more households to municipal supply. This impact, which largely translates into the increase of water demand and usage, was noticeably absent from the impact assessment process, as evident in Appendix 1. Hence, any measures to potentially mitigate the impact were not proposed.

The information presented in Appendix 1 was presented to the decision-maker for evaluation. The decision-maker used its own internal instruments to evaluate the information contained in Appendix 1, and thereupon determine a way forward.

Having analysed the abovementioned information which revealed both the type and manner in which the assessor assessed the impacts of the Monwabisi Project in terms of the Monwabisi EIA application, the discussion and further evaluation of this information follows in sub-section 4.4. of chapter 4 below.

4.3. Results of the evaluation process conducted by the decision-maker

4.3.1. Evaluating the impact assessment of the Monwabisi Environmental Impact Assessment application

4.3.1.1. The instruments used for evaluating the Basic Assessment Report

According to the DEA&DP (2016), the decision-maker used an evaluation control sheet and a file summary as a means of evaluating the impact assessment contained in Appendix 1. The evaluation control sheet included in Appendix 3 was designed in a manner whereby categories information regarding the Monwabisi EIA application could be captured and/or simply 'fact checked' by the decision-maker. This information can be divided into categories of basic administrative information, the record of authorities who provided input, the key issues relevant to the Monwabisi Project, and the adequacy of the BAR. The basic administrative information required the decision-maker to *inter alia*, indicate whether the Monwabisi Project is controversial, what the purpose of the project is, the

status of the application, the applicable policies, whether or not any permission was required from the National Department Environmental Affairs and Tourism (hereafter DEAT) (as known at the time of the application) to oversee the application, and confirmation of whether a site visit was performed. The information regarding status of the application was captured, where it was indicated that the BAR was received. Regarding the record of authorities who provided inputs, it was indicated that the CoCT and Department of Human Settlements provided inputs. In terms of the key issues relevant to the Monwabisi Project, the decision-maker did not identify any such issues. Lastly, the adequacy of the BAR required the decision-maker to determine whether the BAR met general and legal requirements.

As displayed in Appendix 3, the general requirements revolved around the matters of whether the information presented in the BAR was adequate, and whether this information was compiled in an ethical manner. It is worth mentioning that a broad interpretation of the environment was one of the general requirements to be met, as displayed in Appendix 3. The legal requirement related to aspects of the EIA Regulations of 2014, including a determination regarding whether or not the alternatives were adequate if the applicable legislation, policies, and plans were considered, as well as whether public participation took place, as required. More specifically relating to the impacts of the Monwabisi Project, the decision-maker was required to evaluate whether the affected environment was adequately presented, the impacts on the environment adequately assessed, and the measures to control the impacts as well as the responsibilities for the implementation and monitoring of such measures were identified (DEA&DP, 2016).

The File Summary also included in Appendix 3 required the decision-maker to capture basic administrative information; descriptive information such as details of the public participation; site description and alternatives; and lastly, a confirmation regarding whether regulatory requirements were met. The basic administrative information included the reference number, project title, the official overseeing the application, the site description, and the EIA listed activities relevant to the application. The descriptive information, as an example, reveals that the site comprises an existing informal settlement with the presence of indigenous vegetation, and possibly wetlands (DEA&DP, 2016). In terms of regulatory requirements, the decision-maker confirmed that the BAR did not meet all the requirements for two reasons. According to the DEA&DP (2016), the Environmental Management Programme (hereafter EMPr), which documents how the impacts of the Monwabisi Project will be managed throughout its lifecycle, was inadequate. The project alternatives were inadequate, as one of the alternatives refers to an area set aside for agriculture, yet the layout does not include this area. Having used the file summary and evaluation control sheet allowed the decision-maker to confirm the shortcomings and issues of the BAR.

Having analysed the abovementioned information which revealed instruments that the decision-maker used to evaluate the Basic Assessment Report in terms of the Monwabisi EIA application, the discussion and further evaluation of this information follows in sub-section 4.4. of chapter 4 below.

4.3.1.2. The confirmed shortcomings of the draft Basic Assessment Report

Eight shortcomings were identified by the decision-maker after having evaluated the draft BAR. The first shortcoming required the landowner or the person control of the land on which certain components of the Monwabisi Project are proposed to provide consent. The second shortcoming required a detailed description of the Monwabisi Project, such as the footprint of each component, the infrastructure required and confirmation as to whether or not a new or expansion of a cemetery is required. The third shortcoming related to authorisation being sought for the construction of a road in the draft BAR, but the road not being applied for. The fourth shortcoming required layouts plan to include clear descriptions, footprints of subdivided land parcels, and legends/keys. The fifth shortcoming related to the layout plan, which ought to reflect the total area that will be conserved as part of the Wolfgat Nature Reserve. The sixth shortcoming related to the inadequacy of the public participation, in which case, comments from Heritage Western Cape and Department of Water and Sanitation (hereafter DWS) were required. In addition, it was required that the comments from CoCT be addressed, where liaising with the DWS to confirm the presence of wetlands was required, and an engineering and geotechnical assessment needed to be undertaken. The seventh shortcoming was the requisite confirmation from service providers that the necessary capacity exists to provide water and sewerage services. The last shortcoming related to the EMPr requiring additional information, namely dust mitigation measures, a stormwater management plan, a maintenance plan focusing on maintenance of infrastructure, a firebreak, and the inclusion of all the mitigation measures that formed part of the BAR to be included in the EMPr.

The abovementioned determinations represented the decision-maker's perspectives on what the pressing issues and shortcomings were that needed to be addressed. Addressing these issues and shortcomings in the Final BAR meant that the decision-maker had the necessary information to hand to make the final decision regarding the Monwabisi EIA application. As mentioned in Chapter 3, the Monwabisi EIA application was viewed favourably and therefore authorised by the decision-maker.

Having analysed the abovementioned information which revealed what the decision-maker regarded as the shortcomings of the draft Basic Assessment Report in terms of the Monwabisi EIA application, the discussion and further evaluation of this information follows in sub-section 4.4. of chapter 4 below.

4.4. Discussion of the results about addressing the relationship between the ecological and social elements of the environment in the Environmental Impact Assessment process: An Introduction

Based on the information obtained from the observed data, this section evaluates whether the assessment procedure used by the assessor and the evaluation measures used by the decision-maker aligns with the principles of the social-ecological systems, so that the EIA process contributes towards water resilience. The principles include the interpretation of the environment, so as to include both the social and ecological elements, while at the same time, addressing the relationship between these elements. Addressing these relationships is largely derived from Biggs *et al.* (2015) and Schlüter *et al.* (2012). The former focuses on ensuring that these systems are resilient against events of uncertainty, whereby life-sustaining goods and services remain available. In this regard, particular attention is also paid to whether the aspect of water is addressed from a resilience perspective, i.e. ensuring that the resource remains available given Cape Town's experience with Day Zero.

4.4.1. Socio and ecological elements of the environment considered

It is evident that the assessment of the impacts did consider both the social and ecological elements of the environment to be affected by the Monwabisi Project. According to Appendix 1, both the social and ecological elements of the environment also have further subcategories, which were considered as part of the assessment process. The social elements, for example, considered the impacts that the Monwabisi Project will have on the local residents and cultural historical artefacts. The ecological elements considered the impact on the local fauna and flora, as well as geographical and physical aspects. EIAs may, therefore, as a starting point, comply with the very basic requirement of social-ecological systems, where the environment comprises both social and ecological elements. It is, however, the relationship between the elements that underlies the understanding of social-ecological systems particular to the context of resilience. It is clear from Appendix 1 that no room is made to address the relationship between the social and ecological elements of the local environment to be affected by the Monwabisi Project. This is largely a result of the prescribed methodology designed by the decision-maker, which requires that each element of the environment be assessed separately. As such, the EIA assessment procedure is not fully aligned with perspectives around social-ecological systems, as addressed by Biggs *et al.* (2015), given the absence of addressing the complex relationship of these systems. The aspect of complexity is in fact in conflict with the assessment procedures included in Appendix 2, which favoured simplified measures according to which the impacts on the environment could be assessed. This is evident in the manner in which each element of the environment was separately assessed. It could, therefore, be argued that, while EIAs have made some

progress towards a wider interpretation of the environment, it however still clings to one of the overarching elements of the conventional view of ecosystems, as highlighted by Schlüter *et al.* (2012, cited in Biggs *et al.*, 2015). This refers to the focus on the impacts of the environment, as opposed to the relationship between the elements of the environment.

While the argument could be made that assessing impacts on the environment is the core focus of EIAs, the failure to also consider the relationship between the different elements of the environment has further implications. In this regard, Walker *et al.* (2012) present the argument that, although it is difficult to decipher, the underlying reason why the thinking around social-ecological systems must for part of the considerations of decision-making processes is to ensure that the relationship that exists within these systems are sustained, namely the ecological goods and services continually being rendered to sustain life. This approach is not evident in Appendix 1, where aspects relating to water resilience and ensuring the availability of water as a life-sustaining ecosystem good is not of direct concern. This constitutes a serious shortcoming, especially for development projects such as the Monwabisi Project, which will have an impact on water availability when connecting more people to municipal supply. This shortcoming can also be further attributed to both the assessor, and the decision-maker. On the part of the assessor, it is noted that while the prescribed methodology restricts the manner in which the impacts had to be assessed, the prescribed methodology does not dictate the type of impacts that ought to be assessed. On the part of the decision-maker, it is noted that the only question raised regarding water after having reviewed the draft BAR, was the need to obtain confirmation that water supply will be available for the Monwabisi Project.

It is therefore arguable that, while social and ecological elements of the environment formed part of the assessment process, a failure to address the relationship between the two meant that questions of sustaining the social-ecological relationship were absent. The prescribed methodology played a role in this regard, since each impact on a different element of the environment had to be assessed separately. Ultimately, this resulted in questions around the topics of water resilience not directly forming part of the assessment process itself. Appendix 1 therefore confirms that EIAs remains concerned with avoiding, or if not possible, mitigating project-level impacts. The EIA method of assessing project-level impacts is therefore less likely to lead to questions of water resilience, unless the assessment methodology is redesigned to make provisions to address the relationship between the ecological and social elements of the environment. In this way, sustaining and enhancing this relationship, given the threats of drought and water shortage, will likely form part of the focus of the EIA assessment process.

4.4.2. Simplified understandings of the environment

As per the requirements of the methods in which the assessment as well as evaluation process were undertaken, it is apparent that understanding of the environment was simplified for practical reasons. This moreover refers to the prescribed methodology serving the purpose of simplifying the environment into separate layers, so that the impact on each of the layers or elements could be assessed. The simplification of the environment is in conflict with the understandings of the environment, as comprising levels of complexity attributed to the relationship of the social and ecological elements. This simplified interpretation of the environment contributed to the methods of assessment and decision-making being void of any conceptualisations of social-ecological systems, as first presented by Biggs *et al.* (2015). Engaging concepts such as feedbacks, diversity and redundancy so as to enable contributions towards water resilience are therefore still far-reaching in terms of the EIA assessment and evaluation process. Given this shortcoming, the final decision authorising the Monwabisi Project is also void of any conditions aimed directly at aspects relevant to resilience against shocks and stresses. Instead, and as a result of largely adopting the conventional view of ecosystems outlined by Schlüter *et al.* (2012, cited in Biggs *et al.*, 2015), focus was placed on mitigating impact on the natural environment. This also evidences that EIA still clings to its historical roots, where it was enacted in terms of the NEPA to evaluate the environmental effects of actions (Clarke, 1997). The EA for the Monwabisi Project, for example, contained conditions aimed at a form of mitigation requiring that conservation-worthy vegetation be sought out and rescued, such that it is reused in landscaping, or replanted (DEA&DP, 2016).

The simplification of the environment through the assessment and evaluation process is, therefore, less likely to be an area in which EIAs contribute towards the goals of water resilience. This is regrettable for a tool that includes both social and ecological elements in its interpretation of the environment, where the omission of EIAs oversimplifies the understandings of the environment, limiting the focus to natural or ecological elements. Practise and theory are therefore at play, where EIAs are on par with current theoretical interpretations of the environment, and comprise more than ecological elements. However, it is the practise of the tool, particularly through its assessment and evaluation methodologies, which favours simplified understandings of the environment, for practical reasons. The methodology, which is based on the EIA Regulations in Appendix 1, further confirms the simplified view of the environment, whereby the geographical, physical, biological, social, economic, heritage and cultural aspects must form part of the assessment process. Addressing the environment from a less simplified and obvious perspectives does not form part of the EIA Regulations, which leaves questions around resilience in the EIA process unanswered. Given this problem stemming from the EIA Regulations, as much as the redesign of the methods of impact assessment is warranted, law

reform is also required. At the basis of law reform, the need exists to ensure that the relationship between the ecological and social elements of the environment are addressed so that aspects of resilience against shocks and stresses form part of the EIA process. In the context of this research, this would imply that the conceptual understandings of the environment as comprising interrelationships between the social and ecological elements form part of the process, while the outcomes lead to actions that does not only focus on impact mitigation, but also sustaining the aforementioned interrelationship. It is in this manner forms of adaptation to the impact of drought, and most notably water scarcity, will likely form part of the key considerations of the assessment and evaluation process. It is therefore critical that both decision-makers as well as law-makers play a role in the redesign and reform of the EIA process. The simplified understandings of the environment and the manner in which this is operationalised through the EIA assessment process is therefore less able to lead to outcomes aimed at water resilience.

4.4.3. Pragmatism over substantiveness

The assessment conducted by the assessor and the evaluation thereof by the decision-maker focuses on the practical side of the process. The practical side refers to ensuring that the Monwabisi EIA application meets all the regulatory requirements, and ensuring that the practical tools are designed to help meet these requirements. This confirms the argument made by Jay *et al.* (2007) in Wallington *et al.* (2007), where EIA decision-making rest more on the procedural aspects of the process. The procedural aspects are furthermore designed to simplify both the decision-making as well as assessment process at the expense of addressing substantive environmental issues. This is further confirmed in the decision-maker's evaluation of the BAR, whereby the eight identified shortcomings required the assessor to provide additional baseline and administrative type information, as opposed to readdressing any substantive environmental issues. Even if the loss of indigenous vegetation remained one of the main concerns of the EIA, the decision-maker did not raise any environmental concerns in this regard.

Ensuring compliance of the Monwabisi EIA application with all regulatory and administrative requirements became the core focus of the decision-maker and assessor. The structured manner in which the Monwabisi EIA application was required to meet these regulatory and administrative requirements makes the process appear mechanical, and restrictive, with the latter specifically referring to the predetermined assessment and evaluation methodology. The decision-maker and assessor were limited to cover only those aspects as required in terms of the predetermined methodology. Since no aspects directly relate to resilience against shocks and stresses (let alone water resilience), it can also be argued that concerns for substantive environmental issues fell to wayside.

This is also consistent with the arguments made by Jay *et al.* (2007) in Wallington *et al.* (2007) regarding EIAs' rational model's core focus on procedural requirements, as opposed to substantive issues. It can therefore be understood how and why EIAs' overly exclusive concentration on procedural requirements remains the most critiqued areas of the tool.

4.5. Conclusion

It can be deduced from the analysis of the impact assessment and decision-making process that, while EIAs have made progress in considering a wider interpretation of the environment, this interpretation does not extend beyond including the ecological and social elements of the environment in the assessment and decision-making process. The failure to consider the relationship between these elements, or considering it from a systems perspective, means that EIAs do not fully align with the underlying principles of social-ecological systems, as addressed by Biggs *et al.* (2015). EIAs' focus on interpretations of the environment into separate layers so that impact on each layer could be assessed was enabled through the prescribed methodology included in Appendix 1. It is also in this regard that the structured manner in which the assessment of each impact was assessed stands in conflict with the concept of complexity that exists within social-ecological systems. Other and less obvious conceptual understandings of social-ecological systems introduced by Biggs *et al.* (2015), such as feedback and redundancy, were also not included in the assessment and decision-making process. Given this shortcoming, any thinking around aspects of contributing towards resilience of social-ecological systems, nor water resilience is not directly evident in the assessment and decision-making process. Instead, a streamlined process was followed, which confirms the EIA adhering to its traditional role of assessing the immediate project-level impacts of the Monwabisi Project. This, at the same time, shows EIAs favouring the conventional view of ecosystems, as highlighted by Schlüter *et al.* (2012) cited in Biggs *et al.* (2015), where the key focus remains the impacts on the environment through simple methodologies, while ignoring other key principles, such as uncertainty and complexity.

At the same time, pragmatism dominated the impact assessment and decision-making process, where meeting the regulatory requirements included in Appendix 4 was more important. While this is obvious for a regulatory process such as EIA, it is argued that this has overshadowed the need to address substantive issues. This is confirmed in shortcomings of the BAR, where the decision-maker only required the assessor to provide additional information relating to the Monwabisi Project, public participation, different management plans, and input from authorities. This extended to the aspect of water, whereby confirmation from service providers that the necessary capacity exists to provide water was requested. There was a lack of engagement with any substantive aspects relating to water,

particularly from a resilience perspective. The use of the tools to assess and evaluate projects therefore restricted the aspects under focus for the assessor and decision-maker. These tools therefore only served the purpose of ensuring that the assessor and decision-maker had the practical means to assess and evaluate the Monwabisi Project. While these tools, and in particular the assessment methodology in Appendix 1, are based on the regulatory requirements in Appendix 4, these requirements also do not make any direct mention of resilience, let alone water resilience. The focus on the practical and procedural aspects presented by Jay *et al.* (2007) in Wallington *et al.* (2007) are therefore confirmed to be true. The assessment and evaluation processes and methodologies evident in terms of the case study are less likely to make a contribution towards water resilience. However, since EIAs are comprehensive tools, their contribution towards water resilience may be possible in other ways and/or areas of the tool.

5. Chapter 5: Results and discussion: EIAs and forward planning

This chapter addresses sub-question 2: What is the purpose of the EIA and does it align with the need to plan ahead of future droughts in order to safeguard and promote water resilience for the most vulnerable?

This chapter first analyses the specific manner in which the EIA application had addressed the aspect of needing to plan ahead. An analysis follows of the applicable strategic and forward planning policy and frameworks that were used as the means of planning ahead in terms of Monwabisi EIA application. It was then determined whether needing to plan ahead and the manner it was applied in terms of the EIA application had any influence on the outcomes of the Monwabisi Park informal settlement.

The above-mentioned information gathered are then used in the discussion section to evaluate whether the manner in which planning ahead was facilitated throughout the EIA application has, or has not (and for what reason) engaged with relevant aspects of how water resilience should be promoted for the more vulnerable of society, such as informal settlements.

The discussion and evaluation chapter ends with the conclusion on the findings which provides an answer to the sub-question 2, as mentioned above.

5.1. Descriptive analysis

5.1.1. Results and observed data from the case study: An introduction

Planning ahead includes taking action prior to the onslaught of shocks and stresses and its resultant impacts. In accordance with Boyd *et al.* (2013) and Boyd *et al.* (2015), Haro-Monteagudo *et al.* (2017), O'Malley (2013) Bennett *et al.* (2016) and Karuri-Sebina *et al.* (2012), attention is paid to whether any of the methods of planning ahead, as presented by these authors, were used as part of the Monwabisi EIA application, and whether the purpose thereof was for the promotion of water resilience for the residents of the Monwabisi Park informal settlement.

5.1.2. The 'need' and 'desirability' criteria that relate to planning ahead

According to the DEA&DP (2010), 'Need' refers to the timing of the development project, i.e. whether the type of development is suitable in the location where it is proposed. In this regard, strategic and forward planning policy and frameworks such as SDFs serve the purpose of designating certain landuse and resources for specific areas. 'Desirability' refers to whether the development project will result in the most benefits and least amount of negative impact to the environment, i.e. the best environmental option. The DEA&DP (2010: 12) highlights that if these considerations form part of EIAs,

development will be “equitable and serves broader societal needs now and in the future”. Planning for the future and meeting broader societal needs aligns with the requirement of planning ahead within the context of this research, especially where meeting broader societal needs focuses on reducing the vulnerabilities residents of informal settlements facing the impact of inadequate access to water. The requirement of need and desirability has the potential for EIAs to contribute towards water resilience by means of planning ahead of drought and reducing people’s vulnerabilities in that regard. According to the DEA&DP (2016), the predesigned template of the BAR prescribes the manner in which information must be provided. The BAR template in this regard required the assessor to indicate and provide reasons why the Monwabisi Project was either consistent or inconsistent with the relevant strategic and forward planning policy and frameworks as well as additional considerations. These included, the Provincial Spatial Development Framework (hereafter PSDF) of 2014, the Cape Town Spatial Development Framework (hereafter CTSDF) of 2012 and the Integrated Development Plan (hereafter IDP) of 2012-2017. Additional considerations included aspects on the Environmental Management Framework (hereafter EMF) of 2012, zoning rights, the urban edge and municipal structure plan, and further motivations regarding how the development will result in positive outcomes, including upgrades and provision of services and infrastructure (DEA&DP, 2016). Aside from the EMF, the zoning rights, the urban edge and municipal structure plan town planning tools designed to control development, which have little to no relevance when it comes to aspects of water resilience. The EMF was produced by the CoCT to demarcate biophysically sensitive and assign the type of development suitable to such areas (CoCT, 2012).

The assessor indicated that the Monwabisi Project is consistent with the PSDF of 2014, as the necessary civil services will be provided to the existing informal settlement. The assessor also indicated that the Monwabisi Project is consistent with the IDP of 2012–2017 and the CTSDF of 2012, due to its focus on building safe and integrated communities and make provision for sustainable urban infrastructure and service. Regarding the additional considerations, the zoning rights, which refer to the demarcated uses land, it is indicated that the Monwabisi Project is inconsistently zoned for Limited Use and Agricultural purposes, respectively. Regarding the urban edge, a tool used to limit the outward spread of urban growth, it is indicated that the Monwabisi Project is consistent, as the site is bounded by existing urban development. Regarding the municipal structure plan, which also controls the way in which land must be used, it is indicated that the Monwabisi Project is consistent, as most the site is and existing informal settlement, while only a certain portion is botanically sensitive. Regarding the EMF, which largely demarcates the biophysical and other sensitive areas, it is indicated that portions of the site are demarcated as sensitive due to the presence of natural vegetation, dunes, underlying aquifer, cemetery, and natural heritage. It was further indicated that although the site has

biophysical sensitivities and, in some portions, is not demarcated for urban use, the site hosts an existing informal settlement. The project will therefore have positive impact in providing *in-situ* upgrading and the necessary municipal services to the local community (DEA&DP, 2016).

The abovementioned information depicts the assessor's presentation on the requirement of need and desirability. The decision-maker in turn did not raise any concerns regarding the need and desirability context of the Monwabisi Project, nor the information provided by the assessor. Given the manner in which the assessor provided the abovementioned information, it can be deduced that the requirements of need and desirability was superficially engaged. This can be attributed to the template of the BAR, which limited the assessor to only recording the reasons why the Monwabisi Project is either deemed to be consistent or inconsistent with each of the strategic and forward planning policy and frameworks. As such, engaging with the strategic and forward planning policy and frameworks to a level where this may have an influence over the outcome of the Monwabisi Project was not warranted, nor was it attempted by the assessor. As an example, if any of the strategic and forward planning policy and frameworks included any goals relating to water resilience, the Monwabisi Project could have been redesigned, such that it would contribute towards such goals through finding synergies with such policies and frameworks. However, in order to verify this point, an analysis of the abovementioned strategic and forward planning policies and frameworks applicable to the Monwabisi Project is required.

5.1.3. Analysing the strategic and forward planning policy and frameworks

The PSDF of 2014 of the DEA&DP (2014), presents multiple visions it wants to achieve. It however remains a question as to whether this long-term plan has any relevance to safeguarding against futures of uncertainty concerning water, and whether water resilience forms any part of its multiple visions it wants to achieve. Therefore, amongst the multiple visions a 'green Cape', as included in the PSDF is of relevance of to the case study. According to the DEA&DP (2014: 29), achieving this would mean that "all households can access basic services that are delivered resource efficiently, residents use land and finite resources prudently, and safeguard their ecosystems." Accessing basic services that are delivered with resource efficiently speaks to the dual problem of Cape Town mentioned in Chapter 2, where residents of informal settlements need access to water and sanitation, but also need to safeguard against the future uncertainty of drought which will directly impact the availability and access to water resources. The PSDF provides different strategies aiming to achieve these multiple visions. These include the "sustainable use of the Western Cape's spatial assets, opening-up opportunities in the Provincial space-economy and developing integrated and sustainable settlements" (DEA&DP, 2014: 36). The sustainable use of the Western Cape's spatial assets proposes

that the province's life-supporting ecosystem services, including water, is sustainably managed, and safeguarded against risks. This strategy is of relevance to the case study, through its emphasis on: protection of biophysical aquatic features that produces ecosystem goods and services; ensuring that the built environment adopts water-wise planning and design (e.g. water saving technologies); the use of alternative water resources (desalination and groundwater extraction); and implementing programmes of adaptation to climate change and manage water demand and conservation. These actions could potentially contribute towards water resilience and future impact of drought and water scarcity, if any were to have been made part of the Monwabisi Project.

The CTSDF of 2012 is a similarly forward planning framework produced by the CoCT. According to the CoCT (2012), the vision of turning Cape Town into the world's greatest city will be achieved through six spatial development goals, including resilience and adaptability; creating a city within a region; respecting natural assets; providing a multidirectional accessibility grid; encouraging land use intensification; and managing growth through urban informants (CoCT, 2012). The first goal of resilience and adaptability, focuses on the city's ability to be proactive and use a precautionary approach to respond to change. These changes include urbanisation, contrasting wealth and poverty, high unemployment, infrastructure and service backlogs, resource scarcity, depleting oil reserves, energy and water supply constraints, and climate change (CoCT, 2012: 29). Most of these changes are of direct relevance to the case study, most notably: resource scarcity, water supply constraints, and climate change. The other spatial development goals focus more on protecting natural elements, so that these continue to deliver their benefits, or using town planning measures to enhance the growth of the city. The CTSDF further provides three strategies to further ensure that the vision will be achieved. Out of these strategies, managing urban growth, and creating a balance between urban development and environmental protection stipulates direct actions geared towards water resilience. The actions aim to protect the City's hydrological systems, such groundwater and surface water sources, and to reduce the impact of development on these systems. These actions include:

- implementing ecological buffers/setback lines to permit the full range of flow regimes and flood attenuation;
- promote the sustainable use and sourcing of water supply;
- maintain the natural hydrological behaviours of catchments;
- minimise demand on the potable water supply system;
- minimise sewage discharges into the natural environment;
- integrate water with the landscape to enhance visual, social, cultural and ecological values; and
- utilise sustainable practices and technologies that assist in reducing water demand and support the recycling of water, (CoCT, 2012).

These actions have the potential to conserve the city's water stocks, and in so doing, plan ahead for the impact of drought. However, due to the superficial nature in which the assessor simply provides the reasons why the Monwabisi Project is consistent with the CTSDf, these actions were not used in any way to inform or influence the Monwabisi Project.

The IDP 2012 – 2017 was produced by the CoCT, and focuses on planning ahead for the five-year period. Environmental shock and stresses, and the call to become resilient, are not directly featured amongst the key concerns of the plan. However, true to the issue of water being a fundamental life-sustaining resource (Kaiser *et al.*, 2018), the IDP steered attention towards it. According to the CoCT (2012), focus was on provision of adequate water and sanitation services and aims to address backlogs and demands of an ever-growing city, as opposed to explicitly promoting water resilience. Nevertheless, the IDP 2012-2017 further briefly mentions the need to invest in green technologies aimed at conserving and managing scarce natural resources, such as water. However, there was no inclusion of green technologies in the Monwabisi Project. The decision-maker also did not include any provisions for green technologies in the description of the Monwabisi Project when it decided to authorise the application. According to the DEA&DP (2016: 3 of the Environmental Authorisation) the decision-maker simply mentioned that "the development will connect to the following municipal infrastructure: Bulk water supply, sewerage network; and solid waste management". This proves how no provisions or thought to include measures such as green technologies to reduce the demand on scarce resources, including water were considered.

Given the EMF's focus on biophysical aspects, these actions largely relate to restoring and protecting hydrological systems. These include restoring river systems, retaining and protecting river corridors, wetlands, the aquifer, and the services provided and protecting floodplains. Other actions include avoiding unsustainable abstraction volumes from the local aquifer, removal of alien vegetation that unnecessarily absorbs water, implementing principles of WSUD, environmental education, and maximising local involvement in conservation (CoCT, 2012). Clearly, these actions are in line with the present-day solutions to promote water resilience. For example, WSUD, as addressed by Morison *et al.* (2011) and Rijke *et al.* (2012) already saw success in Australia, where Davies *et al.* (1998) motivate for environmental education to address water crises, while maximising local involvement correlates with the requirements of collective governance.

It is clear that the use of strategic and forward planning policies and frameworks corresponds with the way in which methods of planning ahead have been approached in South Africa. As captured by Karuri-Sebina *et al.* (2012), forward planning instruments have been used to address the challenges introduced by the CTSDf of 2012, which also includes actions to address rapid urban expansion and

climate change. Real potential therefore exists to actually use the need and desirability context whereby the actions included in the forward planning policy and frameworks forms part of development projects. In this manner development projects are designed to respond to the challenge of promoting water resilience.

5.1.4. The outcomes of need and desirability

The Monwabisi EIA application contains no evidence that need and desirability had any influence on the outcomes of the Monwabisi Project. The authorising of the Monwabisi Project was not subject to any conditions relating to the promotion of water resilience. None of the actions contained in the applicable policies and frameworks formed part of the outcomes of the Monwabisi EIA application, as attributed to the predesigned BAR template, which dictates the manner in which the EIA process must be conducted. Specifically, the BAR template does not contain any requirements obligating assessors to illustrate how the actions of the forward planning instruments were made part of the Monwabisi Project.

The need and desirability context bears testament to EIAs' trajectory towards focusing on other pertinent issues related to climate change, besides the focus on immediate project-level impacts. This aligns with Bond *et al.* (2015), who view EIAs' need to focus on longer time-scales, on problems of the future, and solutions thereto. However, it is equally important that the EIA process is redesigned, so that its new focus areas have a real influence on the outcomes of development projects including increasing demand for water and urban expansion and development.

Since the full potential of the requirements of need and desirability do not have any influence on the outcome of the Monwabisi Project, promoting water resilience for the residents of the informal settlement did not materialise. The Monwabisi EIA application contains evidence of special attention being paid to the fact that the receiving community comprises an informal settlement. According to the DEA&DP (2016: 12), the decision-maker regarded the application as an "exceptional circumstance", given the extreme need for the proposed upgrading and infrastructure that the informal settlement requires. The decision-maker further used this reasoning to justify the project's authorisation whereby they agreed with the key authority mandated to oversee the management of the biophysical aspects in the Western Cape, namely CapeNature. According to DEA&DP (2016: 12) the following is revealed in the EA:

"CapeNature indicated (in their comment dated 17 May 2016) that although the proposed development can be framed within the context of biodiversity offsets and the relevant guidelines, the proposed development could be excluded from undertaking the necessary offset specialist studies due to the exceptional circumstances associated with the proposed development."

This implied that the impact of loss of biodiversity need not be compensated for. This confirms that, while the EIA recognises the needs of the most vulnerable, ensuring both access to resources, as well as ensuring resources remains available through actions to promote resilience did not receive similar attention.

5.2. Discussion of findings about the purpose of planning ahead: An introduction

Based on the information obtained from the observed data, it was confirmed that through need and desirability, forward planning and promoting of water resilience is possible. This section evaluates whether this approach also prescribes to the need to focus on the most vulnerable of society, which ties in with Dodman *et al.* (2018), who highlights the factors that make others, including residents of informal settlements, more vulnerable to drought and its impact. Given the need to build capacities of vulnerable residents, an evaluation is also undertaken regarding whether attempts were made to move the more vulnerable beyond capacities to bounce back from drought and its impacts. Lastly, an evaluation is conducted regarding whether forms of collective governance are evident, since many, such as Termeer *et al.* (2011) Seeliger *et al.* (2013) and Tschakert *et al.* (2010) view forms of collective governance as the most viable approach to decision-making concerning aspects of water resilience. This moreover refers to the decision-making process being open and democratic whereby everyone, including all sectors of the State, relevant stakeholders as well as the public are involved in the process. In this context, decision-making can therefore also be understood as a participatory and inclusive process, to a point where even different sectors of the State have to work together. Hence Termeer *et al.* (2011) and more specific to this research, emphasising how the ramifications of adaptation to climate stretch across different institutional levels, in which case a polycentric system comprising multi-actor, multi-sector, and multi-level governance is more appropriate, as first detailed in under subsection 2.2.3 of chapter 2.

5.2.1. Focusing on vulnerabilities through the requirements of need and desirability

Any direct focus on residents of the Monwabisi Park informal settlement as being vulnerable to shocks and stresses is not evident. There is only evidence of thought being given to the needs of residents of informal settlement which related to the EIA application being regarded as an “exceptional circumstance” (DEA&DP 2016: 12). Since this was solely done by considering only the need for the local residents to access services and infrastructure, only half of the dual problem received attention. The other half of the problem concerning questions of resilience and ensuring that resources, including that water remains available, did not receive attention. This oversight is a consequence of the way in which the decision-maker viewed the topic of water in terms of the Monwabisi EIA application. According to the DEA&DP (2016), it was only required that the local municipality, i.e. the

CoCT confirm that water is available for Monwabisi Project, which is the only direct engagement with the topic of water by the decision-maker. It may therefore be argued that the decision-maker views the availability of water as matter of concern that the CoCT needs to resolve. If this perspective on water is maintained, EIAs may have better opportunities to help promote water resilience for the more vulnerable, through need and desirability context. The fact that the forward planning policies and frameworks focus on a myriad of issues reinforces this argument.

With a focus on the increased vulnerabilities of residents of informal settlements, the PSDF of 2014, the CTSDF of 2012 and IDP of 2012-2017 draws attention to the plight of these residents. The PSDF of 2014, for example, highlights that 25% of the population of the Western Cape still live in informal dwellings and is vulnerable to various risks (DEA&DP, 2014). The CTSDF of 2012 highlights that informal settlements grow at a steady rate, prompting the need to improve the living conditions of the residents (CoCT, 2012). The IDP 2012–2017 highlights this same need, while at the same time drawing attention to improving living conditions, due to vulnerabilities caused by poor socio-economic circumstances and/or marginalisation (CoCT, 2012). These are also two of the three factors confirmed by Dodman *et al.* (2018), concerning why residents of informal settlements are more vulnerable. This proves that forward planning policies and frameworks brings focus to the increased vulnerabilities of residents of informal settlements. The question, however, remains as to whether this focus translates into action that will move the vulnerable beyond the capacity to only ‘bounce back’ from the impacts of drought.

With the forward planning policies and frameworks firstly proposing to improve living conditions, while also providing the actions aimed at water resilience (as detailed in the previous section), this implies that residents are likely to benefit from not having to bounce back to their dire pre-existing living conditions, as well as water resilience. This approach is also in line with the arguments presented by Kaika (2017), who emphasises that the aims of resilience should also entail alleviating existing socio-environmental inequalities. In this manner, a response to the dual problem is also afforded, that is, addressing people’s need to live in proper conditions where basic services are available, but at the same time, ensuring that questions of resilience are addressed. It is therefore necessary to evaluate whether the very policies and frameworks which formed part of the Monwabisi EIA application does indeed include actions aimed at capacitating the vulnerable. Capacitating the vulnerable in this context specifically refers to the argument made by World Economic Forum (2008) and ACF-International (2013) whereby actions aimed at resilience will ensure that society:

- does not only survive the impacts of shocks and stresses and bounce back to their pre-existing living conditions; but are also
- empowered and made to thrive, despite the impacts of future shocks and stresses.

5.2.2. The nature of the actions contained in the policies and frameworks

As adapted from the World Economic Forum (2008) and ACF-International (2013), resilience is interpreted as the capacity to adapt, thrive, resist, be prepared and/or transform amidst shocks and stresses, and their impacts. These interpretations imply that it is not enough to just survive the impact of shocks and stresses. Surviving would imply that water continues to remain available, despite the impact of drought, while the aforementioned interpretations of resilience would imply that empowering people to be able either adapt, thrive, resist, be prepared and/or transform is required. The PSDF of 2014, the Cape Town SDF of 2012 and the IDP 2012 – 2017 largely concentrate on actions that either protects hydrological systems so that these continue to render goods and services, or engineering solutions to conserve water as a finite resource, e.g. green technologies (CoCT, 2012). However, in some instances, certain actions can be linked to elements of empowering people (although to a lesser extent). The PSDF of 2014, for example, directly proposes the implementation of programmes to ensure adaptation to climate change by managing water demand and conservation (DEA&DP, 2014). The opportunity to involve local communities in such programmes can be harnessed in terms of the EIA, especially if the EIA application comprises a vulnerable community, as applicable in terms of the Monwabisi Project. Although the EMF is not a forward-planning tool, it also contains actions linked to elements of empowering people. According to the CoCT (2012), these include environmental education and maximising local involvement in conservation.

Using extant knowledge within local communities, and in particular, imparting knowledge, is one of the core mechanisms by means of which resilience, and especially adaptation is ultimately ensured. The case studies mentioned in Chapter 2 by Dobson *et al.* (2015) and Harte *et al.* (2009) serve as precedent for local communities harnessing their own capabilities, to avoid being negatively affected by the impact of shocks and stresses. Imparting knowledge so that decision-makers enable communities to harness their own capabilities as suggested by Hambati *et al.* (2018) can take place in the form of skills training, education, and encouraging participation, as also proposed in terms of the PSDF of 2014 and EMF, as mentioned above. This further confirms EIAs' role of working in a synergistic manner with other external resources to help promote water resilience. In this instance, the actions that the policies and frameworks contain must form part of the conditions of authorisation when an EIA project is permitted by the decision-maker. This will only be possible if these policies and frameworks are properly engaged, as opposed to merely broadly confirming that projects are

consistent with these resources, as in the case of the Monwabisi Project. The use of external resources to promote water resilience also speaks to the requirement to some extent of collective decision-making.

5.2.3. Collective decision-making through need and desirability

As confirmed in the previous sections, with the exception of the PSDF of 2014, the CTSDf of 2012, IDP 2012 – 2017 and EMF were all produced by the CoCT. The use of these resources produced by an authority other than the decision-maker overseeing the EIA process is an indication that EIAs are also on the trajectory towards collective decision-making. The EIA process can benefit from using the contributions and actions proposed by the CoCT to enhance its own outcomes. In this regard, it is now apparent that EIAs' only struggle is the superficial manner in which the need and desirability context was considered throughout the Monwabisi EIA application.

Upon further consideration of the abovementioned resources, it is evident that these policies and frameworks are themselves the outcome of having followed rigorous participation processes. According to the DEA&DP (2014), the PSDF of 2014 was formulated through governmental collaborations, as well as contributions from private sector organisations, academia, non-governmental organisations, and the public. Similarly, the Cape Town SDF of 2012 was formulated after a rigorous public engagement process involving the public and other stakeholders (CoCT, 2012). The IDP 2012-2017 more so highlights how local communities were approached for input regarding the problems that must be addressed (CoCT, 2012). According to the CoCT (2012), the EMF was also included public engagement processes to elicit stakeholder views, to table and discuss the proposals, and to allow for final comments on the proposals contained in the EMF. It is therefore likely that the goals, objectives and actions that the abovementioned resources comprise are the end-products of having undergone these collective engagements. This largely speaks to act of governance being undertaken in accordance with a polycentric system, whereby multiple actors from both the private and public sector collectively contribute to matters relating to climate adaptation, as noted by Termeer *et al.* (2011). Whilst all these efforts are in line with the requirements of using collective governance, these policies and frameworks also lack forms of implementation of how it will reach its own goals. It is also in this regard that EIAs' could serve a secondary role, whereby the inclusion of the actions as part of its conditions when projects are authorised also helps these resources to achieve their own goals, which in some cases, includes water resilience. With Cape Town's ever-present risk of recurring Day Zero scenarios, achieving real outcomes – especially for the city's most vulnerable – proves critical.

5.3. Conclusion

Need and desirability confirms that EIAs have come to balance their focus on predicting the impacts of projects by also linking and opening up the process to other strategic matters of concern. These matters of concern, as contained in the illustrated policies and frameworks above, focus in some instances on planning ahead for uncertainties, envisioning desired futures, and proposing actions to counter the threats to the desired futures. At the same time, these policies and frameworks focus on improving the living conditions of the most vulnerable, while at the same time, in different ways, proposing actions to promote water resilience. While EIAs have come to consider these policies and frameworks as part of the application process, this is done in a superficial manner. With the pre-designed assessment methodology, which largely requires that confirmation be provided as to whether the development project is consistent with the provisions of the policies and frameworks, these resources have no real influence on the outcome of development projects. This shortfall means that development projects will not be able to make a contribution towards the goals and objectives contained in the policies and frameworks.

Need and desirability further confirms how EIAs in an indirect manner contributes to the requirements of collective governance, due to the policies and frameworks which formed part of the need and desirability context that were formulated through the participative processes. These included the participation by different levels and sectors, relevant stakeholders as well as the general public. With particular focus on including the general public in decision-making also being an important aspect of collective governance, the requirement of the Public Participation Process is also documented in chapter 6.

It has been shown throughout this Chapter that most of the policies and frameworks do in fact comprise the very requirements of water resilience. These include setting visions, planning ahead for the desired future, utilising forms of collective governance, and ultimately proposing actions to promote water resilience. EIAs are therefore in greater need of ensuring that its assessment and decision-making methodologies are adapted so that the policies and frameworks forming part of the need and desirability context have real impacts on the outcome of development projects. Most notably, the actions that these policies and frameworks comprise ought to be included in either the design of development projects, or form part of the conditions to be adhered to, when the decision-maker authorises the EIA application.

6. Chapter 6: Results and discussion: Alignment between EIAs and policy frameworks

This chapter addresses sub-question 3: How could the EIA support the CTRS and WS to implement its actions and thereby further helping these strategies to reach its intended outcomes of water resilience?

The interpretation of this empirical data explores the possibilities of EIAs providing a supporting role to the WS and the CTRS. The supporting role entails examining the specific pillars, goals, actions and initiatives of the WS and CTRS, which are aimed at water resilience, and evaluating how EIAs could help to reach this aim through the existing features of the tool. The existing features include the act of monitoring and enforcement, using the EMPr to implement initiatives aimed at water resilience, using the provisions of Section 24O of the NEMA to improve intergovernmental relations and using PPP as a form of active engagement and facilitate scenario planning and spearhead the message of wise use of water.

This Chapter therefore firstly provides a descriptive analysis of the WS and CTRS to document the aspects that these resources comprise as relevant to water resilience. This information is then used as the criteria to compare the similarities and differences between the WS and CTRS and the EIA process. The areas of similarities, namely collaborative governance, practical means to reach a desired outcomes and the act of anticipation are further used as part of the discussion sections, which evaluates those aspects of the WS and CTRS that could form part of the EIA process, so that the tool potentially help the WS and CTRS to reach the aim of water resilience.

The discussion and evaluation chapter ends with the conclusion on the findings which provides an answer to the sub-question 3, as mentioned above.

6.1. Descriptive analyses of the relevant strategies

6.1.1. A descriptive analysis of the Water Strategy

6.1.1.1. The Water Strategy: an introduction

The WS emerged out of Cape Town's experience with drought. The WS highlights that Cape Town is highly vulnerable to drought, but the socio-economic marginalisation of certain residents also means there are spatial and socio-economic concentrations of vulnerability. Attaining water resilience, while also improving the quality of life for its residents, is the main goal of the WS. As a long-term planning instrument, the vision of the WS is for Cape Town to become water-sensitive by 2040, where the City optimises and integrates "the management of water resources to improve resilience, competitiveness and liveability for the prosperity of its people" (CoCT, 2019: 10). According to Kaiser *et al.* (2019), the

WS aims to provide a clear vision, and to prioritise actions to guide Cape Town in becoming more water resilient.

The WS introduce 10 principles that informed the strategy, namely respecting that water is life, growing inclusivity and trust, building capabilities to manage water supply, working together and across boundaries, adopting an adaptive approach to the management of water, supporting rehabilitation of urban water resources, supporting the protection and enhancement of the environment, improving stormwater management, improving preparedness and response to shocks and securing water and harnessing the opportunities of the green economy (CoCT, 2019). The principles therefore emphasise the importance of water, as well as how and what is required to manage it to secure water resilience. According to the CoCT (2019) ways of managing water to secure water resilience include: promoting proactive and adaptive measures to deal with change; building capabilities and fostering collaborative approaches; protecting and rehabilitating water resources; and improving preparedness for shocks to stimulating the green economy. The principles therefore read as commitments that both the public sector and civil society ought to adhere to, so as to play a role in achieving the vision of the WS. It is, however, the five pillars of the WS that introduce some practical means to ensure that the vision is achieved. The WS emphasises that the commitments are for everyone to follow, including residents (CoCT, 2019). Similarly, Kaiser *et al.* (2019) emphasise that a collaborative approach is required in order to implement the WS. Since this case study focus on actions that will contribute towards water resilience, it is the pillars of the WS which are further analysed.

6.1.1.2. Pillars of the Water Strategy

The WS has five pillars: “Safe Access to Water and Sanitation”, “Wise Use”, “Sufficient Reliable Water”, “Shared benefits from Regional Water Resources”, and “A Water-Sensitive City”. The first pillar, i.e. “Safe Access to Water and Sanitation”, focuses on working with communities to provide quality services. Emphasis is also placed on the difficulty encountered in engaging with some communities. Informal settlements, for example, comprise high densities, while being located on unsuitable land, which makes the provision of services difficult. The pillar, therefore, presents multidisciplinary approaches to service delivery, meaning that water and sanitation services need not only be provided, but ought also to lead to building trust, social cohesion and dignity (CoCT, 2019).

The second pillar, “Wise Use”, focuses on using water wisely, by avoiding wastage and promoting conservation. The pillar presents various means of doing this, including: paying for water used in excess amounts, water-sensitive design, working with relevant authorities to explore the use of alternative sources of water, engaging citizens to promote water conservation awareness, and working with experts to develop technologies and guidelines to promote water efficiency. The pillar

further proposes the need to effectively manage the water network through leak detection and optimisation of network water pressure (CoCT, 2019).

The third pillar, “Sufficient Reliable Water”, focuses on reducing the need of solely relying on rainwater for water supply, while also reducing the risk of water shortages. The pillar proposes the use of other sources such as groundwater, water reuse, and desalination, to diversify sources of water supply. Implementing methods to reduce the risk of water shortages includes scenario-planning; which factors into the impact of low rainfall and water demand; new learnings to ensure the most cost-effective approach to the use of alternative sources of water are followed; the use of treated waste water and enabling new water supply capacity, e.g. expanding dam storage capacity and various programmes and interventions to augment water supply, such as alien clearing programmes (CoCT, 2019).

The fourth pillar, “Shared benefits from Regional Water Resources”, focuses on collaboratively working with stakeholders to optimise the benefits of regional water resources, and to reduce the risks. The pillar firstly presents a myriad of options to consider, while suggesting the manner in which collaboration should take place. The options to consider include: improving legal agreements that specify water rights, while the rest focus on improving the management and operations through information sharing, securing funding, ensuring professionalism, and improving metering and monitoring. Collaboration shall take place through: integrated planning and partnerships, stakeholders sharing expertise, information, infrastructure and finances, and using robust and transparent management of system water resources (CoCT, 2019).

The fifth pillar, “A Water-Sensitive City”, focuses on implementing new incentives, regulatory mechanisms, and investing in infrastructure and urban design so as to diversify the city’s sources of water, and optimise the use stormwater and the city’s waterways. The pillar emphasises the implementation of infrastructure to ensure that water is not wasted, but instead used in various ways, and presents benefits, e.g. flood control, aquifer recharge, water reuse and recreation. By way of example, capturing of stormwater through channels means that the water may be used for other purposes, such as irrigation or toilet flushing (CoCT, 2019).

Each of these pillars signify implications for EIAs if helping the WS to contribute towards water resilience are to be realised. The first pillar signifies the complexities of planning for informal settlements, especially accessing and gaining support from these communities so that services can be rendered. The implication for EIAs is to provide some means of assisting with the challenge of accessing such communities, especially when EIA applications, such as the Monwabisi Project, is directed at an informal settlement. The second, third, and fifth pillar all signifies the implementation

of various solutions to avoid the impact of water scarcity and efficiently managing the existing supply. The implication for EIAs is to find ways in which these solutions could potentially form part of the outcomes of development projects. The fourth pillar signifies the need to collaboratively working towards overcoming water wastage and diversifying sources of water. The fourth pillar also signifies how the WS would be actioned, as proposed by the CoCT. According to the CoCT (2019), the WS will be undertaken through partnerships, collaborations, and multidisciplinary approaches. This will include civil society, business, government, labour, researchers, key customers and international stakeholders. The implication for EIAs is to possibly provide a platform where forms of collaboration could take place, especially where relevant issues such as water wastage and diversifying sources of water could be deliberated. It is therefore necessary to find the ways in which some of these pillars and their focus areas could be facilitated through the EIA process.

6.2. A descriptive analysis of the Cape Town Resilience Strategy

6.2.1. The Cape Town Resilience Strategy: an introduction

The CTRS prioritises various shocks and stresses that necessitate response. The CTRS draws attention to how the effects of Day Zero necessitated the need for the CTRS to prioritised and address various other shocks and stresses, which collectively contribute to different levels of vulnerabilities of the city's residents and environment (CoCT, 2019). Amongst these shocks and stresses, 'drought' is identified as a prioritised shock and 'poverty and inequality' as a prioritised stress (CoCT, 2019). Both drought and 'poverty and inequality' are of relevance to the case study, since 'poverty and inequality', amongst the other factors presented by Dodman *et al.* (2018), make residents of informal settlements more vulnerable to drought and its impact. Having identified the various shocks and stresses that require response, the CTRS provides a structural framework comprising pillars, goals, initiatives, actions and desired outcomes aimed at water resilience, and how this will be enabled.

6.2.2. Pillars of the Cape Town Resilience Strategy

Five pillars are provided, each linked to a vision that signals what each pillar hopes to achieve. The first pillar creates a "compassionate, holistically-healthy city", where the vision is to make "Capetonians feel welcome, safe and accepted in our city and neighbourhoods" (CoCT, 2019: 6). The CTRS elaborates that this entails nurturing children to thrive, strengthening the social fabric of society, improving mental health, harnessing the power of people and networks, improving the safety of communities, and achieving social cohesion.

The second pillar is “connected, climate-adaptive city” where the vision is to make “Capetonians work together to create place-based responses to shocks and stresses” (CoCT, 2019: 6). The CTRS elaborates that this entails supporting existing actions that build resilience by partnering with all stakeholders.

The third pillar is “capable job-creating city,” where the vision is to make “Capetonians turn the challenges of resource constraints and rapid technological change into new opportunities” (CoCT, 2019: 7). The CTRS elaborates that this entails entail creation of employment opportunities, overcoming resource constraints, establishing infrastructure for a knowledge economy, attracting foreign direct investment, and supporting Small Medium and Micro-enterprises within the local economy.

The fourth pillar is “collectively shock-ready city”, where the vision is to make “Capetonians prepare for, respond to and recover from disasters while building back stronger” (CoCT, 2019: 7). The CTRS elaborates that this entails creating awareness about risks, and enabling preparedness.

The fifth pillar is “collaborative, forward-looking City”, where the vision is to make the City government work collaboratively to mainstream applications of resilience across systems and silos. The CTRS elaborates that this entails ensuring that resilience thinking forms part of government systems (CoCT, 2019: 7).

It is clear that the above-mentioned pillars place much emphasis on Capetonians, and provincial government, as the main actors in the quest for resilience as one cornerstone of collaborative governance addressed in Chapter 2. To further refine the above-mentioned pillars and accompanying visions, the CTRS presents goals specific to each of the five pillars.

6.2.3. Goals of the Cape Town Resilience Strategy

The 20 goals of the CTRS displayed in Table 5 indicate what is required to ensure that Cape Town moves onto the path of resilience against the prioritised shocks and stresses.

Table 5: The 20 goals of each pillar of the Cape Town Resilience Strategy (CoCT, 2019)

Pillar of the CTRS	Goals
1. Compassionate, holistically-healthy city	Goal 1.1: Increase awareness, access to and uptake of mental health support Goal 1.2: Embrace a more holistic approach to policing and crime prevention to break the cycle of violence and decrease recidivism rates and trauma Goal 1.3: Combat discrimination and build social cohesion Goal 1.4: Promote a culture of health that increases well-being and decreases trauma
2. Connected, climate-adaptive city	Goal 2.1: Grow partnerships that strengthen transportation systems and improve mobility Goal 2.2: Engage communities and the private sector to improve public spaces Goal 2.3: Build climate resilience Goal 2.4: Innovate for improved conditions, service delivery, and well-being in informal settlements
3. Capable job-creating city	Goal 3.1: Foster green economic growth Goal 3.2: Enable enterprise development in the informal economy Goal 3.3: Connect the workforce with a changing economy Goal 3.4: Partner with businesses to achieve a resilient local economy
4. Collectively shock-ready city	Goal 4.1: Future-proof urban systems Goal 4.2: Strengthen individual, household and community resilience Goal 4.3: Encourage responsible investment in household and business resilience Goal 4.4: Explore funding mechanisms for shock events
5. Collaborative, forward looking City	Goal 5.1: Develop and approve portfolios of projects that maximise the resilience dividend Goal 5.2: Mainstream resilience in decision-making Goal 5.3: Enhance knowledge management and data-use Goal 5.4: Monitor and evaluate resilience outcomes

Each of the goals contained Table 5 are further elaborated on in the CTRS. With this research's focus on water resilience for the more vulnerable, such the residents of informal settlements, only certain goals fall within the scope of the case study, and were further considered. These include goals 2.3, 2.4, 3.1, 3.4, 4.2, 4.3, 5.2, 5.3 and 5.4 included in Table 5.

Goal 2.3 specifically focuses on the design of adaptive responses to climate change (and particularly the more vulnerable areas) while also contributing to national and global targets to stabilise and reduce greenhouse gas emissions. Goal 2.4 focuses on reducing the vulnerabilities of residents of informal settlements through improving their living conditions and providing basic services. Goal 3.1 focuses on capitalising on the opportunities that the green economy presents, e.g. creation of employment, and stimulating investment in the production of clean and resource efficient products and services. Goal 3.4 focuses on enhancing society's ability to work together to collectively respond and take action against shocks and stresses. Goal 4.2 focuses on building resilience, especially that for the most vulnerable through enhancing their resources (physical, financial, human, and social assets) to defeat the effects of shock events. Goal 4.3 focuses on overcoming loss of public revenue when private persons invest in alternative sources of energy and water as a result of resources scarcity caused by shocks. Goal 5.2 focuses on efforts to coordinate local, provincial, and national systems so

that increased resilience in the urban environment is ensured without bureaucratic delays. Goal 5.3 focuses on improving the generation of data for decision-makers so that responses such as long-term planning to shock and stresses are robust and flexible. Goal 5.4 focuses on the use of tools that will make it possible to measure, evaluate, and monitor regress or progress made with respect to the efforts of resilience against shocks and stresses, as well as provide insights into modifying efforts where regress is evident (CoCT, 2019).

Based on the abovementioned goals, common themes relating to the promotion of resilience against environmental shocks and stresses are evident. These themes include the use of alternative technologies and resources to increase resource efficiency, addressing the underlying causes that leaves others more vulnerable to shocks and stresses and the need for collectively working towards promoting resilience. Taking the goals into consideration, the CTRS moves onto actions and initiatives that are each linked to a specific outcome.

6.2.4. Actions, initiatives and outcomes of the Cape Town Resilience Strategy

The CTRS proposes 75 actions, each linked to an initiative and a specific outcome. The action is the start of the CTRS proposing of how each goal will be achieved, while the initiative further provides specific methods according to which each goal shall be reached. Ultimately, the actions and accompanying initiatives are linked to a desired outcome, which represents a further refinement of what each goal means in terms of the CTRS. With the scope of this research focusing on water resilience, only relevant goals and its accompanying actions and initiatives were selected for further discussion. The selected goals include **Goal 2.3: Build climate resilience**, **Goal 3.1: Foster green economic growth** and **Goal 5.2: Mainstream resilience in decision-making**.

Goal 2.3 proposes the action of strengthening the capacity to interpret and integrate climate impact into planning. The initiative serves to strengthen ways of gathering information to build climate resilience, with emphasis on the use of scenario building at a downscaled level. Scenario building and planning was first defined in Chapter 1 and requires input from many stakeholders, including local communities, to explore means of responding to the impact of shocks and stresses. Implementing this initiative would therefore require mechanisms to ensure that participation is encourage for the purpose of exploring scenarios, and what the responses to these scenarios ought to be. In terms of drought and water resilience, these scenarios could range from having no access to water, to access to alternative sources of water. The desired outcome of Goal 2.3 is to have data and insights of climate change impact and projections so that long-term planning can be robust, and can result in reducing vulnerability and increasing adaptive capacity (CoCT, 2019).

Goal 3.1 proposes the action of mainstreaming sustainable procurement in supply chain management. The initiative is to aid the use of green technologies in response climate change (amongst many other stresses). Green technologies have the ability to reduce demand on scarce resources such as water. Implementing this initiative would therefore require finding ways in which the EIA can make it compulsory for projects to include green technologies, and specifically in terms of this research, technologies that will reduce water demand. The desired outcome of Goal 3.1 is to increase public spending on green goods and services (CoCT, 2019).

Goal 5.2 proposes two actions of relevance. The first action is improving intergovernmental relations for resilience. The initiative serves to develop a guide to successfully implement approaches to intergovernmental relations. The desired outcome is to have effective and streamlined intergovernmental relations for the purpose of building resilience. The second action is to engage in inclusive PPP that empower Capetonians. The initiative ought to use innovative and engaging participation processes with all citizens. The desired outcome is to use methods of participation, which result in reflective learning; to be solution-driven; and to allow for co-design and co-ownership of projects and plans that are responsive to the need for resilience (CoCT, 2019). The actions and initiatives related to Goal 5.2 are clearly aimed at improving participation so that both decision-makers and the general public can contribute towards resilience against shocks and stresses (CoCT, 2019). This fits in with the requirements of employing participatory approaches to the quest for resilience, as proposed by many such as Termeer *et al.* (2011), Seeliger *et al.* (2013) and Tschakert *et al.* (2010). Implementing these initiatives under Goal 5.2. would therefore require finding ways in which EIAs could serve a role to foster intergovernmental relations and participation for the purpose of stakeholder' active contribution towards water resilience.

Taking the pillars of the WS as well as the actions and initiatives of the CTRS into consideration, the implications for EIAs were highlighted in order for the tool to provide the supporting role to these strategies, finding the exact areas of EIAs where these pillars, actions, and initiatives could be implemented or form part of the process that needs to be established. In order to do this, the differences and similarities between the WS and CTRS and the EIA process is now required, so that the areas of similarity(s) can be further evaluated in terms of EIAs supportive role.

6.3. Differences and similarities of the Water Strategy, Cape Town Resilience Strategy and the Environmental Impact Assessment

Table 6 provides an outline of the differences and similarities of the WS, CTRS, and the EIA. This information is based on the descriptive analysis of the WS and CTRS and information revealed throughout the Monwabisi EIA application, as further discussed below.

Table 6: The differences and similarities of Environmental Impact Assessment, the Water Strategy and the Cape Town Resilience Strategy

Area of difference	EIAs	WS	CTRS
Shocks and Stresses versus Environmental Impact	environmental impact caused by development	fostering water resilience against drought	fostering resilience against multiple shocks and stresses
Differing scope of works	assessing and evaluating impact of development	broader scope of addressing vulnerabilities, especially those relating to water scarcity	broader scope of addressing multiple vulnerabilities affecting Capetonians
Differing scales of focus	project-level impact affecting the receiving community	intended outcomes for all Capetonians	intended outcomes for all Capetonians
Area of similarity	EIA	WS	CTRS
Collaborative governance	participation by all	participation by all	participation by all
Practical means to reach desired outcomes	conditions of authorisation to reach the desired outcomes	pillars to reach the desired outcomes	actions and initiatives to reach the desired outcomes
To Anticipate	anticipating impact before it happens	anticipating impact before it happens	anticipating impact before it happens

6.3.1. Area of difference: Shocks and Stresses *versus* Environmental Impact

The WS and CTRS directly focuses on fostering resilience against shocks and stresses, while EIAs direct focus is on environmental impacts caused by development. These differences moreover relate to the reasons why the WS and CTRS were developed, and why EIAs were legislated. The CoCT developed the WS and CTRS as in response to Cape Town’s need for resilience against identified shocks and stresses. EIAs, as first addressed by Clarke (1997), were legislated to evaluate the impacts of human-induced actions (caused by development) on the environment, and the need to preserve and enhance the natural environment. These reasons are illustrative of WS and CTRS accepting the inevitability of climate change, whereas, EIAs largely focus on preserving the environment.

While environmental preservation is necessary, the focus on climate change, due its inevitability, is also necessary. Bond *et al.* (2015) also present this argument, along with the solutions for EIAs to play a role in dealing with unwanted future scenarios. Some of these solutions are also consistent with how the WS and CTRS proposes to take action in aid of resilience. As suggested by Bond *et al.* (2015), EIAs ought to impose measures to not only mitigate impact, but also to adapt to future scenarios. Both the WS and CTRS provide actions to adapt to scenarios where water scarcity is a reality, e.g. the use of diversified sources of water, and the use of green technologies. Another solution proposed by Bond *et al.* (2015) is for participation to be open to all, where topics around resilience and adapting to uncertain events can be deliberated. The CTRS and WS also proposes the use of collaborative efforts to collectively exploring solutions to overcome the impact of shocks and stresses. At the base of these solutions is the need to explicitly focus on shocks and stresses, and to find ways of adaptation. This remains a challenge for EIAs, which favour a focus on mitigating biophysical impacts on the environment. This was evident in the Monwabisi application, where the loss of indigenous vegetation dominated the focus of the EIA process.

6.3.2. Area of difference: Differing scope of works and scales of focus

The WS and CTRS present a broader scope than EIAs. The broader scope of works of the CTRS in particular is derived from the host of shocks and stresses that it aims to address. According to the CoCT (2019), these actions and initiatives ranges from addressing mental health and community safety, to the risks of cyber-attacks. Such aspects not only fall outside the scope of works in terms of EIAs, but are also not in line with the immediate purpose of EIAs. The WS and CTRS are long-term strategic tools, intended to address a comprehensive list of vulnerabilities, and foster resilience against shocks and stresses. EIAs however, constitute a standalone legal tool, whose main purpose does not directly relate to comprehensively addressing the vulnerabilities of society.

As illustrated in terms of the Monwabisi EIA application, focus is placed at the project and community scale, meaning that its core focus is on how the community and its associated environment will be impacted. The WS and CTRS focus on a more extensive city-wide scale, where its intended outcomes are aimed at all of Cape Town. Both the WS and CTRS do, however, place some focus on the more vulnerable of society, in terms of the residents of informal settlements.

6.3.3. Area of similarity: Collaborative governance

EIAs, WS and CTRS all embrace the principles of collaborative governance, whereby participation is extended to all, including government, as well as civil society. All three do not place limitations regarding which levels of government or which members of civil society may partake in decision-making. The Monwabisi EIA application, for example, integrated all spheres of government into the decision-making process; local (CoCT); provincial (Western Cape Provincial Department of Transport); as well as national (WS). Much of the focus of the WS and CTRS is placed on creating partnerships with various government departments for the purpose of enabling the proposed initiatives and actions and achieving the desired outcomes.

In terms of integrating civil society, all three focus on the community scale. There is however much scope for EIAs to also include active forms of participation, which extend beyond the focus on the impacts of a development project, and encourage dialogue around aspects of reducing vulnerabilities through actions that promote resilience. This is possible through EIAs applying mechanisms to engage with people during the PPP, such as hosting workshops, and other forms that encourage interactive engagements. The PPP for the Monwabisi EIA application was largely undertaken with the public being introduced to what the project entailed, and thereby inviting comments in response thereto. It is in this regard that the argument made by Hamilton (2010) in Sok *et al.* (2011) becomes relevant to EIAs' need to also begin to explicitly address climate change issues. In this manner, these issues become part of the scope of the application process, as much as the details of the project itself. This widened scope means that the legislated components of EIAs, including public participation, are likely to start also engaging aspects relating to reducing vulnerabilities through actions that promote resilience. Since EIAs are legislated tools, widening the scope of works will largely only take place through law reform, and if such a cause is spearheaded by both the professional and political administrations of government.

6.3.4. Area of similarity: Practical means to reach desired outcomes

The WS proposes pillars, which must be followed to promote water resilience, while the CTRS proposes actions and initiatives to build resilience against certain shocks and stresses. EIAs also propose practical means to reach their own desired outcomes, that is, to avoid reducing and mitigating environmental impacts. This is done through the conditions of authorisation and implementation of the EMPr, which both contain the practical measures to reach the desired outcomes. These areas of EIAs can also be interpreted as some of the tool's strongest qualities, since conditions of authorisation are monitored so as to ensure that it is implemented as intended. Hence, Bond *et al.* (2015) value the 'follow-up phase' of EIA projects, where monitoring and evaluation of imposed conditions takes place,

and even more so if such conditions include measures of adaptation, as well as mitigation. Practical means or taking action ensures that society will ultimately benefit from the intended outcomes. However, it is noteworthy that the WS and CTRS lack measures regarding aspects of implementation and the resources required to do so. This raises questions as to whether their desired outcomes would eventually materialise, and move Capetonians onto the path of resilience against shocks and stresses.

6.3.5. Area of similarity: To Anticipate

EIAs, WS and CTRS all focus on anticipating impact before it happens. EIAs are, however, limited to anticipating immediate project-level impact, whereas the WS and CTRS anticipates the impact of shocks and stresses. EIAs are criticised in this regard for their pure focus on project-level impacts and needing to contribute towards anticipating future impacts, hence Bond *et al.* (2015) suggested that EIAs need to also focus on future scenarios and longer timescales that go beyond the focus on single-base projects and its impact. Anticipating what is yet to come in the context of resilience against shocks and stresses allows society to plan ahead and implement actions to act against their impact. Similarly, anticipating what is yet to come in the context of EIAs allows the impact of proposed development projects to be assessed and evaluated, so that actions can be taken to avoid and/or mitigate such impact.

6.4. Discussion of findings: An introduction

Based on the information obtained from the observed data, it was confirmed that although there are differences between the CTRS, WS and EIAs, there are also areas of similarity. In certain instances, these areas of similarity were also linked to how others have identified the areas where EIAs could serve a role in contributing towards resilience. These include the use of collaborative governance so that everyone contributes towards reaching goals, anticipating of what is yet to come, and taking actions to counter the impact of what is yet to come. Areas of similarity are further considered below in order to explore how EIA could serve a supporting role in helping the WS and CTRS attain water resilience.

6.4.1. How the Environmental Impact Assessments could help the Cape Town Resilience Strategy attain water resilience

6.4.1.1. Implementing and Monitoring CTRS actions and initiatives

EIA aims to reduce or mitigate impact through imposing of conditions as part of an Environmental Authorisation, which must be complied with by the project proponent. The CTRS focuses on actions and implementable measures that might ensure that water resilience can be achieved. At the most basic level, water resilience ought to aim for methods to conserve a finite and non-renewable resource

such as water. The CTRS, in terms of Goal 3.1m focus on the promotion of green technologies due to Cape Town facing resource constraints caused by climate change. Action 3.1.2, *i.e.* mainstream sustainable procurement in supply chain management, includes initiatives aimed at the use of municipal systems and tools to encourage the use of green goods and services, thereby resulting in resilience dividends. For municipal projects such as the Monwabisi Park, the use of green technologies would enable the CoCT to derive resilience dividends from its own projects. Green technologies could include practical design measures to ensure that the demand for water is reduced, or kept low. These could include rainwater harvesting technologies (tanks), water borne sanitation systems that uses less water (dual flush systems), and water-saving devices fitted to taps (tap aerators, flow restrictors). These are all implementable measures that could form part of the conditions of authorisation when municipal projects are authorised in terms of the EIA Regulations. These conditions therefore form the first line of municipality procurement of green goods, as the conditions of authorisation is legally binding. The same requirements could in fact be imposed on development projects from the private sector and thereby increasing water resilience throughout the metropole and the greater Western Cape Province.

The need for environmental education was raised during the PPP for the Monwabisi EIA application. Therefore, besides the use of green technologies to ensure water resilience, the need for environmental education with the local community set to benefit from the development project could also form part of the conditions of authorisation. Environmental education that specifically focuses on water resilience and how local communities could contribute towards such goals could have been the core-focus of the condition of authorisation and a co-benefit for resilience. Since environmental education will require forms of engagement from two or more parties, namely the project proponent and members of the community, environmental education presents an opportunity where both parties could collectively decide on how to approach the challenge of water resilience. This is important to consider, since it was argued earlier in Chapter 1 that the promotion of water resilience may imply different challenges for different types of communities, especially residents of informal settlements with increased vulnerabilities.

The legally binding quality of conditions plays an important role in ensuring that conditions are complied with and actually implemented, as the aspect of not complying does have repercussions. According to Regulation 48 of the EIA Regulations, 2014 not complying with the conditions of authorisation is considered an offence for which penalties are liable (Republic of South Africa, 2014). These penalties include prosecution, the payment of fines, imprisonment, and/or any combination thereof (Republic of South Africa, 1998). Imposing the conditions through legally binding measures

may therefore influence implementation when compared with policy frameworks that have little or no legal standing with regards to implementation.

6.4.1.2. Including the CTRS initiatives aimed at water resilience in the EMPr

The EMPr carried the same weight as have the conditions of authorisation, in terms of being required to legally comply with the provisions thereof. The EMPr serves a similar purpose, as with the conditions of authorisation, in which it aims to manage the impacts throughout the life-cycle of a project. Including provisions relating to the procurement of green goods and services in the EMPr can therefore also contribute toward water resilience. The case study EMPr was specifically focused on managing impact throughout the construction phase of the development. Reducing demand for water can also be incorporated into the EMPr, depending on the phase of the project in question. For urban development projects such as the Monwabisi Park Informal Settlement, there are provisions that can be included in the EMPr to reduce demand for water during the construction phase. These include the use of non-potable water for construction related purposes, on-site practices, including the reuse and recycling of water and environmental education for construction personnel on how to ensure water resilience.

Based on the regulatory requirements of the EMPr, additional measures regarding the impact management actions must be provided by a project applicant. According to the Republic of South Africa (2014) these include the method of monitoring the implementation of the impact management actions, the frequency of monitoring implementation, the parties who will be responsible for implementation, the time periods of implementation, and how monitoring compliance with the impact management actions will take place. These measures serve to provide further guidance as to how to practically approach implementation, when actions of the CTRS reaches such phases. Regarding the need for roles and responsibilities, the case study EMPr illustrates that a multitude of parties are responsible for the implementation of the EMPr. These included the project proponent (CoCT), the Western Cape Department of Human Settlements, Site Engineers and the Environmental Control Officer, and the appointed Contractor (DEA&DP, 2016). The need for including many parties in the implementation process reinforces the importance of collaborative governance as a requirement to enable resilience. The EMPr therefore aligns with this requirement, although room exists to also involve local communities in the process of ensuring the implementation of provisions, which can, amongst other things, ensure water resilience and managing impacts on the environment. Involving communities in interventions aimed at resilience not only enables 'buy-in' or support, but could also promote awareness, and help communities learn to adapt and collectively contribute towards resilience. Sánchez *et al.* (2017) for example, affirm the opportunity for mutual learning at

the post-approval phases of development. In this case, the local community ‘learns by doing’, as provided of by means of helping to oversee the implementation of the EMPr.

6.4.1.3. Comprehensive monitoring as part of the follow-up phase

According to Marshall *et al.* (2005), follow-up is essential to determining the outcomes of EIAs. Monitoring as part of follow-up has the potential to further ensure that the conditions of the EA and provisions of the EMPr are implemented as intended. This is based on the legal obligation of project applicant, who is obliged to comply with whatever is required as per the imposed conditions and/or provisions of the EMPr, and thereby achieve the intended outcomes. Ahammed *et al.* (2006) highlight that in Australia, monitoring is discretionary, and may therefore not even take place. However, the NEMA makes monitoring a legal requirement. Hence, the NEMA further including provisions relating enforcement, as well as the key mandates for those responsible for enforcement.

Enforcement has a critical role to play in ensuring compliance with the imposed conditions and/or provisions of the EMPr, and is the means by which decision-makers verify whether compliance has been met. Having the initiatives of the CTRS made part of the conditions of the EA and the provisions of the EMPr therefore guarantees a higher likelihood of implementation, while non-compliance with regulatory requirements has various consequences that may deter any intentions of non-compliance. Implementing initiatives *via* standalone policy instruments has little to no obligation for either implementation or compliance. EIAs may thus serve to ensure a greater influence on implementation, and lend a supporting role to an instrument such as the CTRS, which aims to ensure water resilience for a city remaining at the risk of future drought scenarios.

While EIAs can potentially help to implement the initiatives of CTRS, the inclusion of the CTRS’ initiatives in turn can also help EIAs to balance against its intense focus on avoiding, reducing, and/or mitigating impact on the environment by introducing focus on aspects of resilience against shocks and stresses. In this manner, EIAs may benefit from improving its own contribution towards the promotion of water resilience. This gain on the part of EIAs is what Bond *et al.* (2015) have in part argued for, where the call is not to totally dissolve the primary role and focus of EIAs (avoiding, reducing, and/or mitigating impacts on the environment), but rather, enabling the tool to start focus on aspects of resilience. Marshall *et al.* (2005) interestingly mentions the key aspects resulting from the follow-up phase is making EIAs more capable to contribute a greater degree towards water resilience. The follow-up phase allows for feedback, where information obtained during monitoring can be used to facilitate learning, and address uncertainty in the process itself. If information obtained during the follow-up phase is used in this manner, EIAs may also gradually start to identify with other aspects of resilience, which require decision-making to be more dynamic and flexible (Biggs *et al.*, 2015).

6.4.1.4. Balancing public participation with active forms of engagement

Active forms of engagement are motivated for across a spectrum of goals and initiatives of the CTRS. Specifically, in response to drought, action 2.3.1 includes the initiative of developing scenarios on the impact of climate change at a downscaled level, so as to aid long-term city planning. Scenario planning was first discussed in Chapter 1 as a means of providing platforms through active forms of engagement, for communities to present different perspectives regarding how to best anticipate and manage the future in response to shocks and stresses. The Monwabisi EIA project concentrated on the community level to the extent that individual members of the local community formed part of the participation process. Although the Monwabisi EIA Project relied on passive forms of engagement, such as the distribution of information to which the community responded, active forms of engagement can be accommodated in the PPP. The Guideline on Public Participation (2013), which were also confirmed to have informed the Monwabisi EIA Project, do provide for active forms of engagement to form part of public participation. Active forms of engagement that ought to form part of the process include public meetings, open days, conferences, and workshops (DEA&DP, 2006). These are the very platforms in which scenario planning can take place, as this allows participants to engage and present different perspectives on how to best anticipate and manage the future in response to shocks and stresses. While the scale of an EIA presents the opportunity to implement the CTRS' goal of scenario planning, the focus of an EIA requires balance. Active forms of engagement as displayed in terms of the case studies as documented in subsection 2.2.3 also extends the power of decision-making towards communities and allowing them to negotiate and present their own vision for the future as well as the actions that will achieve the vision. In this sense the challenge for EIAs remains to fully harness the benefits of active participation in order to help promote water resilience for the most vulnerable of society. It therefore remains key for EIA applications to extend the Public Participation Process to beyond the aim of simply introducing local communities to development projects which forms part of EIA applications.

The Monwabisi EIA application confirmed how the focus was to a great extent steered towards the development project and its associated impacts. It does, however, appear that this is an inherent weakness, as the legal frameworks governing EIAs do not make it compulsory to focus strictly on a development project. It is therefore still possible for an EIA to balance its focus on the impacts of development with that of other topical issues, such as drought (which remains relevant and within scope in the case of Cape Town). Bond *et al.* (2015) view public participation through scenario planning as a means for EIAs to extend their focus beyond the deliberation of impacts of single development projects, and thereby including topics of resilience. Decision-makers must in this regard assume agenda-setting roles, which will start the dialogue around the topic of drought and water resilience.

This is more than feasible, since water and access to it were a topic of concern for many residents during the public participation for the Monwabisi EIA Project. According to Appendix 2, forty-five Monwabisi Community Members specifically provided comments during the PPP of the Monwabisi EIA Project regarding their requirements for proper water and sanitation facilities (DEA&DP, 2016). If access to water as well as the need to ensure that the resource is conserved becomes a topic receiving further deliberation in the PPP, scenario planning ought to align itself with SDG 6, as highlighted in Chapter 1. This moreover refers to the need to address the dual problem of water resilience to overcome water scarcity, as well as unequal access to clean water and proper sanitation (United Nations, 2015).

The EIA therefore provides the enabling framework, i.e. public participation, through which scenario planning at the community scale can take place. However, it is only the focus of public participation which needs to be expanded to include topics such as drought and water resilience. This will allow the tool to assist the CTRS to realise its goal of 'building climate resilience', which is enabled through action 2.3.1, and the initiative of developing scenarios on the impact of climate change at a downscaled level. The data, which will be generated through public participation that deliberates both the impacts of development, topics of shocks and stresses as well as water resilience will provide insights to the public sector. This may include the methods that local communities wish to see planning against potential shocks and stresses in the future should take place.

6.4.1.5. Improving intergovernmental relations for resilience

EIAs are firmly entrenched in the process of being open to all sectors of government, as illustrated in the Monwabisi EIA Project, where various other government sectors were involved in the application process. According to the DEA&DP (2016) the local government, namely the CoCT, governmental organisation, namely CapeNature, provincial government, namely the Western Cape Department of Transport all provided comment and input during the Monwabisi EIA application process.

Similarly, action 5.2.2 includes the initiative of developing an Intergovernmental Relations Policy for the purpose of guiding City approaches to intergovernmental relations, and thereby streamlining relations to build resilience. According to the CoCT (2019: 123), improving intergovernmental relations greater includes "greater collaboration among all spheres of government", including local, national, and provincial spheres of government.

Intergovernmental relations are facilitated in EIA at two levels: firstly, at a legal level, whereby the NEMA, in terms of Section 240, requires that all relevant government departments be consulted to deliver inputs and provide comments pertaining to EIA applications (Republic of South Africa, 1998); and secondly, at the policy level, whereby the provisions of Integrated Environmental Management

(hereafter IEM) is used, amongst many other things, as a mechanism “for co-operating among government departments” (DEAT, 2004: 8). IEM recognises that in terms of the NEMA, the interest and mandates pertaining to the environment rest with many different spheres of government. IEM therefore presents principles that decision-making tools such as EIAs ought to follow. Some of the relevant principles, such as holistic decision-making and institutional co-ordination, are directly linked to improving intergovernmental relations, and a solution to the fragmented nature in which environmental decision-making has historically taken place in South Africa. The EIA therefore presents an enabling framework, where intergovernmental relations for the purpose of resilience building at project-level can take place. EIAs therefore present the opportunity and platform whereby relevant authorities might deliberate, participate and ultimately contribute towards the way in which development projects contribute towards water resilience.

6.5. How Environmental Impact Assessments could help the Water Strategy attain water resilience

6.5.1. Designing development projects that are water-sensitive

With water-sensitive design focusing on the use of built infrastructure to optimally use stormwater and waterways, EIAs can potentially play a role in this regard. As evident in the Monwabisi EIA application, the focus was steered towards the impacts at the scale of the project, which is also the scale at which water-sensitive design features are implemented. To illustrate further, various water-sensitive design features could have been implemented at the project scale of Monwabisi Project, such as the use of permeable surfacing to facilitate groundwater recharge, and designing channelling so that stormwater can be reused by the local community for non-drinking purposes. The Monwabisi EIA application, however, contains no evidence of water being addressed from a resilience perspective. It is however the tool’s inherent features which can play a role in promoting water-sensitive urban design.

Designing projects that are water-sensitive requires integrated decision-making, where expertise and role players from various sectors contribute to the process. For this reason, the WS further requires three tools to make help Cape Town become water-sensitive. Firstly, economic and financial incentives are required, which refers to the way in which the CoCT levies taxes and service charges; secondly, regulatory mechanisms refer to changing the rules of the game through, for example, land use permissions and building codes; and lastly, direct investment in infrastructure (CoCT, 2019). Professionals from different sectors will therefore need to form part of the EIA process if water-sensitive designs are to form part of development projects. Based on the abovementioned three tools required, these professionals would have to include investors in such project infrastructure, as well as

town planners and urban design professionals, who oversee landuse planning matters and applications, and CoCT employees responsible for granting economic and financial incentives. By making use of IEM, the EIA requires that various decision-makers from different sectors of government be involved in the EIA process, making the designing of development projects that are water-sensitive possible. In particular, including town planners, urban design professionals and the CoCT employees responsible for granting incentives will further contribute towards realising this goal. It is, however, important to ensure that involving these professionals in the EIA process is also mandated so as to ensure that development projects are designed to be water-sensitive. It is apparent from the Monwabisi EIA application that great reliance is placed on the use of guidelines to aid the EIA process with specific matters. The Guideline on Need and Desirability (2010) discussed in Chapter 1, for example, aids the EIA projects to use the applicable forward planning policies so as to ensure that development is sustainable. In the same manner, a guideline aiding EIAs and decision-makers to design development projects that are water-sensitive is a feasible option. Barton *et al.* (2007), for example, document how the implementation of water-sensitive urban design is operationalised by the government in Melbourne through the use of instruments such as guidelines as well as technical and design manuals. The use of these instruments aided new residential developments to incorporate water-sensitive urban design elements to either enable on-site water treatment and/or conserve water through reuse. The use of guideline(s) to implement water-sensitive urban design is therefore a credible option by which EIA can contribute towards designing development projects that are water-sensitive.

6.5.2. Promoting Wise Use through the Environmental Impact Assessment process

EIAs do have a role to play in the promotion of wise use of water as detailed in the WS. In particular, the WS emphasises that wise use focuses on the principles of avoiding wastage and promoting conservation of water (CoCT, 2019). As a practical means of promoting these principles, EIAs have the potential to expand the scope of works whereby aspects of wise use of scarce resources can be communicated to local communities, who are the beneficiaries of the development projects. It is particularly feasible that when the project applicant is the CoCT, as in case of the Monwabisi EIA application, spearheads messages around Wise Use, as proposed in terms of the second pillar of the WS, i.e. Wise Use (CoCT, 2019). These actions could potentially be facilitated throughout the PPP that engage local communities, which would require levels of commitments from both the decision-maker as well as the project applicant, and assessors who manage the EIA application. Expanding EIAs' focus in terms of public participation again aligns with the argument of Bond *et al.* (2015), where EIAs are able to focus not only on avoiding, reducing and/or mitigating impacts on the environment, but also on aspects of resilience.

6.6. Conclusion

EIAs in many ways have inherent features, which may potentially contribute toward water resilience. However, the manner in which these features are used lacks steering towards the promotion of water resilience. A wide range of actions and initiatives of the WS and CTRS can be implemented through the features of EIAs, and in ways that benefit the strategies as well as strengthen EIA. These include: EIAs' ability to include conditions of authorisation aimed at water resilience, such as conserving and diversifying sources of water; conducting monitoring during the follow-up phase; using public participation to promote wise use, as well as environmental education and community involvement; and lastly, enabling collective decision-making and IEM so as to aid in the implementation of the actions and initiatives of the WS and CTRS. While EIAs may not be the perfect tool to enable these supportive roles, it is the tool's inherent features which make the implementation of relevant pillars of the WS and actions and initiatives of the CTRS possible. This supportive role does not only mean that these strategies reach their own desired outcomes, but also means that the underlying principle of prioritising water resilience for residents of informal settlements ought to materialise. Both strategies steer focus towards the need of residents of informal settlements, given their increased vulnerabilities to drought and other shocks and stresses affecting Cape Town. EIAs may, therefore, further help to ensure that the more vulnerable of society benefits from water resilience, as proposed in these strategies, especially through the EIA applications targeted at these communities.

7. Chapter 7: Conclusion and Recommendations

7.1. Conclusion

This research used a case study approach to explore EIAs' potential contribution for water resilience in informal settlements. The exploratory actions which formed part of the empirical enquiry were facilitated through an analysis and evaluation of the methodological processes that were applicable and followed in terms of the Monwabisi EIA application. Given the heightened socio-economic vulnerability of informal settlements and its residents, promoting water resilience required actions to help resolve both pre-existing conditions as well as the impacts which are yet to come, as a result of future events of drought. In terms of the case study this included the pre-existing inadequate access to water and sanitation as well as inadequate access to resources to safeguard against future unavailability of municipal water supply. These concerns formed the context in which three themes of water resilience relevant to informal urban settings were selected, namely: (1) addressing the relationship between the ecological and social elements of the environment, (2) engaging with aspects of future threats of drought and the need to plan ahead and (3) supporting the Cape Town Resilience Strategy and Water Strategy with implementation to further achieve water resilience were analysed. Through these themes three objectives were formulated that were linked to each theme. In terms of theme (1) above, the objective was to establish whether the legislated and procedural EIA process addresses the relationship between the ecological and social elements of the environment. In terms of theme (2) above, the objective was to establish whether EIAs' long-term purpose engages with aspects of future threats of drought and the need to plan ahead. In terms of theme (3) above, the objective was to determine the extent to which EIA could support the Cape Town Resilience Strategy and Water Strategy with implementation to further achieve water resilience. To further research these themes and achieve the objectives in terms of the empirical enquiry, three sub-questions were formulated, namely: (1) To what extent does the EIA assessment and evaluation processes address the relationship between the ecological and social elements of the environment, so that the relationship is sustained?, (2) What is the purpose of the EIA and does it align with the need to plan ahead of future droughts in order to safeguard and promote water resilience for the most vulnerable? and (3) How could the EIA support the CTRS and WS to implement its actions and thereby further helping these strategies to reach its intended outcomes of water resilience? These sub-questions provided the information on how EIAs can potentially contribute towards water resilience in informal settlements, as revealed throughout the case study of the EIA application for the in-situ upgrade of the Monwabisi Park Informal Settlement in Cape Town, South Africa.

In terms of sub-question 1 as mentioned above, the EIA process used to assess and evaluate the impacts of the Monwabisi Park Informal Settlement development project displayed that only one key aspect to promote social and ecological integrity was addressed. This related to how the EIA process considered the environment as comprising both ecological and social elements, but failed to address the relationship between these elements. Addressing this relationship forms the key requirement of promoting water resilience whereby the ability of the ecology to continue to provide goods and service, namely water, is ensured in order to sustain life. This requirement which is enabled through understanding of social-ecological systems was not met in terms of the EIA process. Therefore, despite the EIA moving beyond the previous notions to interpret the environment as only comprising ecological elements which needs protection from human interference, the implications of the environment as comprising social and ecological elements are not fully addressed in the EIA process.

It was therefore apparent that the EIA tool's ability to ensure that interpretations of the environment are carried through to the assessment and review processes are limited. This was clearly evident in the practical measures, namely the assessment methodology which was used to assess the impacts of the Monwabisi Project and the control evaluation control sheet that was used to evaluate the impacts which were assessed. These measures all oversimplified understandings of the environment by treating the elements thereof as separate entities, so that each of the impacts of these elements can be assessed and reviewed within the context of the EIA process. This approach was in direct conflict with the understanding of social-ecological systems which are understood as complex interacting systems.

EIAs therefore have not fully reached this level of thinking around social-ecological systems and the implications thereof which needs to be filtered through and reflected in its impact assessment methodologies and evaluation procedures. These further aligns with both Noble (2000) and Burton (1983) views on the rigid and narrow focus of the assessment methodologies as EIAs' key problem areas which are in conflict with the requirements of resilience. The unfortunate result is that questions of water resilience were not of direct concern nor considered as part of the assessment and evaluation process, which ultimately meant that social and ecological integrity within the context of water resilience was not addressed.

In terms of sub-question 2 as mentioned above, it was found that the need and desirability context, as per the EIA regulations is a more likely means to promote water resilience. Need and desirability imperatives allows EIAs to balance its sole focus on project level impacts on the environment, and also direct its focus towards strategic level concerns. These strategic levels of concerns are all derived from the forward planning policy and frameworks that needs to be considered as part of the EIA application.

Consideration is particularly mentioned in this regard as the Monwabisi EIA application displayed how these forward planning policy and frameworks had little to no influence on the outcome of the Monwabisi project. This was also contributed to the pre-designed template which did not require any in-depth considerations of how the Monwabisi Project could conform to the relevant water resilience requirements as included in the various forward planning policy and frameworks. This again illustrates how EIAs has made strides in adopting approaches to improve the tool, yet making sure that the implications of adopting such approaches filters through the assessment and decision-making process not being considered. Failure to do so resulted in defeating the purpose of why the tool has introduced the need and desirability context. This was regrettable as some of the forward planning policy and frameworks applicable to the Monwabisi EIA application has provided actions to promote water resilience for the most vulnerable of society for futures of uncertainty where the risk of drought is high. The focus on aspects of the future and longer timescales through the need and desirability context is consistent with how Bond *et al.* (2015) argue for EIAs to focus on longer time-scales. Hence, need and desirability nonetheless illustrate how EIAs are able to find synergies with resources outside its own legal frameworks and enclaves to improve its long-term purpose. This is parallel to the third theme of the case study, namely aligning EIAs with relevant environmental governance policies, particularly implementation of the Cape Town Resilience Strategy and Water Strategy.

In terms of sub-question 3 as mentioned above, strong evidence indicates that EIAs have existing features which could be used to implement some of the actions of the Cape Town Resilience Strategy and Water Strategy, which are aimed at water resilience. These features include public participation, Section 24O of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Integrated Environmental Management, monitoring and auditing, the conditions of the Environmental Authorisation and the provisions of Environmental Management Programme. Public participation, if used in a manner whereby stakeholders actively contribute towards the process of building resilience as opposed to solely focusing on issues pertaining to a development proposal, could serve as a valuable platform to promote water resilience. The platform is specifically mention here due to one of the key requirements of promoting water resilience in terms of the Cape Town Resilience Strategy and Water Strategy is the need to include local communities within all aspects of decision-making. In the same manner, Section 24O of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and Integrated Environmental Management provides the platform for collaborative and integrated decision-making whereby it is legally required that all government sectors be involved in the decision-making process. Lastly, monitoring and auditing, the conditions of the Environmental Authorisation and the provisions of Environmental Management Programme presents some of the more practical features of the tool. Since all of these features are instruments of EIAs to influence the

outcome of development projects, actions of the Cape Town Resilience Strategy and Water Strategy could directly form part of these practical features of EIAs and be implemented as part of development projects that are authorised. The aspect of implementation is further enhanced by the fact that EIAs are legally binding and includes consequences for non-compliance.

It was therefore found that EIAs existing legal features presents strong opportunities to contribute towards water resilience for the most vulnerable of society, especially in relation to projects which seeks to improve the living conditions of informal settlements. In this sense such projects may come to address the dual problem as presented by Rodina (2019) and United Nations (2015) of alleviating impoverished living conditions of such communities while at the same promote water resilience. Potentially in this manner, EIAs could address the problem of partial redundancy introduced by Simpson *et al.* (2020) and thereby promoting water resilience for those who because of their circumstances are not able to do so themselves.

7.2. Recommendations

There remain areas in EIAs which requires further attention so that EIAs contribution towards water resilience can be enhanced.

It was evident that EIAs are in need of ensuring that the implications of reinterpreting the environment beyond the ecological elements are filtered through to its assessment methodologies and review processes. Redesigning these procedural measures so that the relationship between the social and ecological elements are addressed and ways of sustaining this relationship must form the basis of the redesigning requirements. This aligns with and would better apply to practice the 'integration' principle of impact assessment. Since EIAs are legislated tools, a tiered approach is warranted whereby the revision of legal frameworks, namely NEMA and EIA Regulations which governs the assessment and review process is required first. Hereafter decision-makers ought to use the revised legal frameworks to redesign the accompanying assessment methodologies and review processes with cautious approach. The cautious approach is particularly warranted since the Monwabisi case study illustrated how the assessment methodologies and review processes are designed to largely capture the administrative and baseline information of the development project such as the site description and all that it comprises.

In the same way of redesigning the assessment and decision-making procedures to address the relationship between the social and ecological elements, the assessment and decision-making procedures must be redesigned so that the requirements of need and desirability are fully met. This implies that the assessment procedures must obligate those who assess EIAs to illustrated how the

actions of water resilience, as contained in the forward planning policy and frameworks were incorporated into the design and outcome of development projects.

Although EIAs have the existing features to contribute towards water resilience, it still lacks a specific focus on the topic of water resilience and the requirements thereof being explicitly address as part of these features. This is a pertinent requirement of EIAs presented by Hamilton (2010) as cited in Sok *et al.* (2011), for climate change issues presents a threat to life systems. Since the empirical data indicates that the additional resources, namely guidelines, were used to ensure that the Monwabisi EIA application meets the EIA regulatory requirements, it does suggest that further guidelines could be developed which more so focuses on climate change issues, including water resilience. This will not only help to improve EIAs' response and contribution to water resilience, but may also come to help balance the tool's main focus on impacts of development projects and the practical procedures of how to conduct the regulated process. At the same time these practical procedures must be flexible and adaptable to changing contexts, including drought. Decision-making tools cannot be static, as it must evolve as circumstances evolve. Law Reform therefore needs to make provisions for such requirements when EIAs are redesigned for the purpose of improving its contributions to the promotion of water resilience. This argument is in line with Biggs *et al.* (2015) who emphasised that management solutions should be flexible to the realities of change and uncertainty.

In its current form, EIAs' strongest role in contributing towards water resilience exists in its synchronisation with other policies as displayed in terms of the need and desirability context and having using EIAs existing features to implement actions of the Cape Town Resilience Strategy and Water Strategy. This is not to say that its contribution towards water resilience for the more vulnerable of society should stop there. It is particularly important that topics around EIAs extend beyond notions of criticising the tool, which in most case is traced back to its embeddedness in the rational decision-making model. Instead, the need exists to look at how improvements to the tool can be made so that a balance is achieved of assessing impacts of development projects, while also contributing towards the goal of promoting water resilience. The emphasis is therefore to improve and help EIAs become more robust, whereby the tool is enhanced so that the opportunities to contribute towards water resilience are also improved. The first point of entry is looking at ways in which the topic of water resilience could also explicitly become part of the focus areas and concern of EIAs. The imperative to address a closer alignment between EIAs and water resilience is catalysed by the vast inequalities that exist in Cape Town. Furthermore, other impacts such as the ongoing spread of the Covid-19 virus also serve to underscore the need to ensure access to clean and reliable potable water as a key requirement to safeguard the vulnerable in the City. A city without equal access to water will

ultimately further plunge its residents into further vulnerabilities of where Covid-19 is now a risk, in addition to drought.

The Covid-19 pandemic has also provided a learning curve with regards to how research design and the process of research must be adapted in the same way that shocks and stresses requires forms of adaptation. While adhering to preventive measures assigned by various authorities serves as general protection in reducing the risk and spread of the Covid-19 virus, there are certain factors that should be taken into account in this challenging research context. These factors remain essential where 'waves' of Covid-19 infections rate will recur for the foreseeable future on global scale. These factors furthermore are especially applicable where in-person research activities are required. Hence, the first factor relating to timing whereby research activities should as far as possible be scheduled around times when the Covid-19 infections rate is low, as opposed to high. Timing may also prove important in scenarios 'hard lockdowns' are declared that restricts the movement of people. This also relates to the second factor regarding the use of technology. With advances in technology many options are available to use to also collect data during times when in-person research activities may not be possible, due to the Covid-19 pandemic. These options such as conducting research activities through drone technology, telephonic and video calls and the use of online applications must however be exercised with caution. Target populations that comprise underprivileged groups for this reason might not have access to technological resources to participate in the research process. Therefore, to avoid the risk of exclusion and distorted data being collected, the researcher must be aware and find ways to avoid such pitfalls. It is also in this regard that a researcher should be aware of community structures and human resources such as local ward councillors who may assist in guiding and alleviating the pressures of conducting research during the Covid-19 pandemic. On the one hand, these latter considerations also form one of the pillars of collective governance whereby no-one should be excluded from finding solutions aimed at achieving resilience. On the other hand, it also highlights an area for further research whereby EIAs which relies on public participation to inform decision-making need to find practical solutions to navigate the conduct of public participation when the Covid-19 pandemic may curtail such activities at certain times. The cautious use of technological advances, especially in scenarios where the more vulnerable of society may not have access to such resources may prove to be one of such areas where further research are now warranted.

Being aware of the unique circumstances of society also extends towards participation through the EIA process whereby opportunities are provided for people to sketch their own desired futures and the State contributing towards achieving it. The urge in doing extends beyond EIAs itself, as it is necessitated by the frequency and intensity of events spurred on by climate change, the widening gap between the rich and poor while society now also faces the impacts of current and future pandemics.

Given these conditions which plagues society, the need to effectively implement existing governmental tools and legislation into action should be of key concern, as this is one of the main ways in which these resources will ultimately achieve its intended outcomes. It is therefore important that future studies of a similar nature focus on solutions that would ensure that existing governmental tools and legislation are equipped and designed to promote resilience, while aspects of implementation equally receive attention. The public sector may therefore benefit from these type of research areas which sheds light on not only improving existing tools and resources for the benefit of society, but also presents practical solutions to ensure that the tools and resources reach a stage of implementation and the goals contained therein are achieved. Bridging the gap between theory and practice therefore remains key.

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Appendix 1

The assessment of the impacts relating to the Monwabisi Project using the prescribed methodology (DEA&DP, 2016: 34-39).

Impacts related to the planning, design and construction phase:

Potential impacts on geographical and physical aspects	
Nature of impact:	Consolidation of sands and reforming of the land to reasonable graded engineered platforms
Extent and duration of impact:	The entire site will be affected and the impact will be permanent
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	N/A, do not want to mitigate a positive impact
Degree to the impact may cause irreplaceable loss of resources:	N/A
Cumulative impact prior to mitigation:	Low positive
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low Positive
Degree to which the impact can be mitigated	N/A, do not want to mitigate a positive impact
Proposed mitigation:	Consolidation of the sand will limit the amount of sand blowing around in the area. Do not want to mitigate a positive impact.
Cumulative impact post mitigation	Low positive
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low positive

Potential impacts on indigenous vegetation	
Nature of impact:	Negative impact of the removal of ± 13.5ha of Cape Flats Dune Strandveld
Extent and duration of impact:	The impact will be limited to the ± 13.5ha of vegetation that will be removed for the proposed upgrade of the informal settlement and will be permanent
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	High (referring to vegetation loss only)
Cumulative impact prior to mitigation:	High
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	High
Degree to which the impact can be mitigated	Low
Proposed mitigation:	Search and rescue of critically endangered vegetation before construction commences. However, since there will be a defined boundary between the upgraded settlement and the vacant site, it will be easier to manage the biodiversity present on the vacant portion of erf 37-18370/2.
Cumulative impact post mitigation	High
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	High
Potential impact on biological aspects	
Nature of impact:	Displacement and/or destruction of remaining small animals on the site (small rodents and reptiles living on the site)
Extent and duration of impact:	The impact will be limited to ± 22ha of the site that is currently standing vacant and will be cleared and constructed upon. The impact will be permanent. These areas have already been impacted somewhat

	by the presence and activities of people in the informal settlement.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	Low Improbable
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low
Proposed mitigation:	<p><u>All activities on site must comply with:</u></p> <p>The regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962)</p> <p>All construction workers must be informed that the intentional killing of any animal is not permitted as faunal species are a benefit to society. Poaching is illegal and it must be a condition of employment that any employee caught poaching will be dismissed. Employees must be trained on how to deal with faunal species, as intentional killing will not be tolerated. In the case of a problem animal e.g. a large snake, a specialist must be called in to safely relocate the animal if the EO or ECO is not able to.</p>
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Potential impact on socio-economic aspects:	
Nature of impact:	Positive impacts of the provision of temporary jobs during the construction phase.
Extent and duration of impact:	Short term-construction. The extent will include the areas where the workers will be sourced from.
Probability of occurrence:	Definite

Degree to which the impact can be reversed:	N/A- do not want to reverse positive social impact
Degree to the impact may cause irreplaceable loss of resources:	N/A
Cumulative impact prior to mitigation:	Low Positive
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low Positive
Degree to which the impact can be mitigated	N/A- do not want to mitigate positive impact. To maximise benefits, as many as possible people from the surrounding area should be employed in the construction phase.
Proposed mitigation:	N/A do not want to mitigate positive impact
Cumulative impact post mitigation	Low positive
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low positive

Potential impacts on cultural-historical aspects	
Nature of impact:	Potential impact on cultural historical artefacts present on the site.
Extent and duration of impact:	The impact will be on the entire development footprint. The impact will be permanent
Probability of occurrence:	Unlikely
Degree to which the impact can be reversed:	High
Degree to the impact may cause irreplaceable loss of resources:	Highly Unlikely
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low
Proposed mitigation:	Should any archaeological artefacts or human remains be exposed during construction activities, work on the area where the artefacts were found

	<p>shall cease immediately and the ECO, Heritage Western Cape as well as the Local Council shall be notified within 24 hours.</p> <p>Upon receipt of such notification, the ECO will arrange for the excavation to be examined by an Archaeologist.</p> <p>Under no circumstances shall archaeological artefacts be removed, destroyed or interfered with. Any archaeological sites exposed during demolition or construction activities must not be disturbed prior to authorisation by the Heritage Western Cape and/o South African Heritage Resources Agency on the appropriate heritage resource agency.</p>
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Potential noise impacts	
Nature of impact:	Negative noise impact on the residential developments to the north of the site and the residents in the Monwabisi Park.
Extent and duration of impact:	Short term/temporary. The Monwabisi Park residents and the residential developments to the north will be affected by the noise impact.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low to Medium
Degree to the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low to Medium
Degree to which the impact can be mitigated	<p>All construction vehicles must be in a good working order to reduce possible noise pollution.</p> <p>Work hours during construction phase shall be strictly enforced unless permission is given (08H00 - 17H00). Permission shall not be granted without consultation with the local residents by the EO. No work to be done on Sundays.</p>

Proposed mitigation:	Low
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Potential visual impacts	
Nature of impact:	Negative visual impact of the construction activities
Extent and duration of impact:	Short term/temporary. There will be a visual impact on Mew Way, Oscar Mpetha Road and the residential development facing the informal settlement.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low to medium
Degree to the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low to Medium
Proposed mitigation:	Shade cloth may be utilised to conceal and minimise the visual impact of contractor camps, lay down and storage areas. Rubble and litter must be removed every two weeks or more often as the need arises and be disposed of at a registered landfill site as designated by the City of Cape Town, Solid Waste removal department
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Potential traffic impacts	
Nature of impact:	Negative traffic impacts during the construction phase
Extent and duration of impact:	Traffic impacts during the construction phase will be temporary and limited to the roads in the surrounding area, mostly Oscar Mpetha, Steve Biko and Mew Way.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low to medium
Degree to the impact may cause irreplaceable loss of resources:	High unlikely
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low to medium
Proposed mitigation:	<p>On the Site, and if so required, within such distance of the Site, as may be stated by the Engineer, the Contractor shall control the movement of all vehicles and construction equipment, including that of his suppliers, so that they remain on designated routes, are distributed so as to not cause an undue concentration of traffic, and that all relevant laws are complied with. In addition, the movement of such vehicles and construction equipment shall be planned and operated so as to minimise disruption to regular users of the routes.</p> <p>Any directional signage required by the Contractor for the purpose of directing the movement of his own vehicles and construction equipment (or that of his subcontractors or suppliers) must be of a design and in a location approved by the Engineer.</p> <p>Directional signage may not be erected in such a manner that it interferes with sight lines or pedestrian movement.</p>
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Impacts related to the operational phase:

Potential impacts on geographical and physical aspects	
Nature of impact:	No significant impacts are expected since there are no significant geographical features on the site
Extent and duration of impact:	The ± 22ha that is currently standing vacant. Any impact will be permanent.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	Low
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low
Proposed mitigation:	N/A since there are no significant geographical features on the site
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Potential impact on biological aspects	
Nature of impact:	No significant impacts are expected since the small animals (small rodents and reptiles) are that lived on the site before construction would have moved to surrounding vacant sites.
Extent and duration of impact:	Any impact will be on the ±22 ha of the site that is currently standing vacant. The impact will be permanent.
Probability of occurrence:	Unlikely since the small animals that used to live on the site would have moved to the abutting vacant sites.

Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	Unlikely
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low
Proposed mitigation:	N/A The small animals currently living on the site (small rodents and reptiles) will move to neighbouring vacant sites once construction begins. It is therefore not expected that there will be any significant impact on the animals during the operational phase.
Cumulative impact post mitigation	Low
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low

Potential impacts on the socio-economic aspects	
Nature of impact:	Positive impact by providing a safe and dignified living space for the residents of Monwabisi Park. The provisional of municipal services will also have a positive socio-economic impact.
Extent and duration of impact:	The impact will be on the entire Monwabisi Park Informal Settlement and will be permanent.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	N/A do not want to reverse positive impact
Degree to the impact may cause irreplaceable loss of resources:	N/A
Cumulative impact prior to mitigation:	High Positive
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	High Positive
Degree to which the impact can be mitigated	N/A do not want to reverse positive impact
Proposed mitigation:	N/A

Cumulative impact post mitigation	High Positive
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	High Positive

Potential impacts on the cultural-historical aspects	
Nature of impact:	No significant cultural-historical aspects are expected since most of the site has been significantly disturbed in the past.
Extent and duration of impact:	Any impact will be permanent and will affect development footprint and the surrounding area.
Probability of occurrence:	Unlikely
Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	Unlikely
Cumulative impact prior to mitigation:	Low
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low
Proposed mitigation:	N/A since it is unlikely that the proposed development will have any significant cultural-historical impact.
Cumulative impact post mitigation	No significant impact expected
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	No significant impact expected

Potential noise impacts	
Nature of impact:	There will be no impact during the operational phase of the upgraded settlement, however the noise impact will be similar to the current noise impact as there will be no additional people living on the site.
Extent and duration of impact:	The noise impact will be similar to the current noise impact of the informal settlement.
Probability of occurrence:	Since there will not be any additional people living in the settlement it is unlikely that there will be more noise than at present.
Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	Highly unlikely
Cumulative impact prior to mitigation:	No significant impacts expected
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low
Degree to which the impact can be mitigated	Low
Proposed mitigation:	N/A since there will not be any additional people living on the site, no additional noise impacts are expected during the operational phase.
Cumulative impact post mitigation	No significant impacts expected
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	No significant impacts expected

Potential visual impacts	
Nature of impact:	The upgraded will improve the overall visual appearance and liveability of the site. The new interface between the settlement and the vacant site (firebreak and fence)
Extent and duration of impact:	The visual impact of the new roads and infrastructure, therefore the overall appearance of the settlement will be positive and permanent. The new firebreak and fence will not have positive visual impact but is necessary for prevention of fires from one site to the other, for security purposes and

	for better management of the biodiversity present on the vacant site.
Probability of occurrence:	Definite, since the upgrades and new firebreak & fence is part of the proposed development
Degree to which the impact can be reversed:	Low
Degree to the impact may cause irreplaceable loss of resources:	Highly Unlikely
Cumulative impact prior to mitigation:	Low for the visual impact of the overall upgraded settlement. Medium for the new firebreak and fence between the settlement and the vacant site.
Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	Low and medium
Degree to which the impact can be mitigated	Low
Proposed mitigation:	The positive visual impact of the upgraded settlement will not be mitigated. The negative visual impact of the new fence and road/firebreak cannot be mitigated. These two structures are important for the security of the settlement, to prevent fires from spreading between the two site and protect the biodiversity present on the vacant site.
Cumulative impact post mitigation	Low and medium
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Low and medium

Potential stormwater impacts	
Nature of impact:	The impact of additional storm-water from an approximately 22ha area of hardened surfaces.
Extent and duration of impact:	The impact will be permanent and will impact on the surrounding storm-water system.
Probability of occurrence:	Definitely
Degree to which the impact can be reversed:	Medium
Degree to the impact may cause irreplaceable loss of resources:	Highly Unlikely
Cumulative impact prior to mitigation:	High

Significance rating of impact prior to mitigation (Low, Medium-High, High, or Very-High):	High
Degree to which the impact can be mitigated	High
Proposed mitigation:	The implementation of a storm-water management plan. Roads will be designed to follow the topography and will include permeable pavement materials as much as possible. The use of stormwater culverts or road kerbs & channels will be avoided wherever possible to reduce the concentration of or run-off
Cumulative impact post mitigation	Medium
Significance rating of impact after mitigation (Low, Medium-High, High, or Very-High):	Medium

Appendix 2

An account of the comments obtained, as well as the response that the assessor provided to such comments (DEA&DP, 2016: contained in the Comments and Response Report of the final BAR).

Interested and Affected Party	Comment(s)	Response(s)
Twelve Monwabisi Community Members	Agree with the proposed rezoning, upgrading and road infrastructure	Noted
Sixteen Monwabisi Community Members	Agreed with the project, but also want new houses and streets	Noted. Houses does however not form part of the project.
Forty-five Monwabisi Community Members	Specifically requires proper sanitation, e.g. their own tap and toilet	Water and sanitation will be provided as part of the upgrading
On-hundred and twenty-eight Monwabisi Community Members	Happy to support the project	Noted
Eight Monwabisi Community Members	The local community have been waiting a long time for this and progress is needed	Noted
Monwabisi Community Member	A need exists to work with the community	Noted, and the PPP is ongoing
Monwabisi Community Member	Project supported as it will change life for the better	Noted
Monwabisi Community Member	Electricity also required	Electricity forms part of the project
Monwabisi Community Member	Concern regarding where the community will be moved to while the project is underway	People will be moved not far from where they were and will be returned to where they came from
Monwabisi Community Member	In support by the existing graveyard must not be lost due to the project	Noted
Ten Monwabisi Community Members	Agree with the project but plots are also required	Noted
Two Monwabisi Community Members	Since 1997 only promises were made, but no development taking place as well as delays caused by political issues.	Noted. The development plans are being finalised.
Western Cape Provincial Department of Transport	No proclaimed roads will be affected, except for a class 2 road. The development is supported.	Noted
CapeNature	The development will result in relocating informal dwellings into a Critical Biodiversity Area.	The loss of the vegetation will be similar for both alternatives proposed. The wetlands were ground-truthed and confirmed to not

	<p>The preferred alternative will result in the loss of critically endangered vegetation to the amount of 13.5ha.</p> <p>Two wetlands have been mapped and exists on the site.</p> <p>Development on steep slopes may cause impact such as destabilisation.</p> <p>Insufficient information regarding stormwater management is provided.</p> <p>The inclusion of part of the site into the Wolfgat nature Reserve is supported. The rest of the development is not supported in the form it is being proposed.</p> <p>Despite the biodiversity issues, the nature of the project can be regarded as an 'exceptional circumstance'.</p>	<p>be wetlands. Engineering solutions will be used during the construction phase regarding steep slopes. A stormwater management plan is provided.</p>
CoCT (City Health)	Dust nuisance during the construction phase and adherence dust control regulations to must be addressed in a dust management plan.	A dust management plan will form part of the EMPr.
CoCT (Environmental Health)	No objections provided that conditions pertaining to waste management and general health and safety regulations are adhered to.	Agreed that the specified requirements will be further considered and adhered to.
CoCT (Spatial Development and Urban Design)	<p>The development site is partly located in areas designated for conservation as well as urban use.</p> <p>More information/assessments regarding the social, education and health facilities and public open spaces are required.</p> <p>The development must adhere to the establishing buffers between the houses and the existing burials/cemetery.</p> <p>The local topography will make the provision of bulk service infrastructure challenging.</p>	<p>The construction in the designated conservation area will result in negative botanical impact, but the benefits include creating a boundary between the development and the natural area, creating firebreaks and defined edge prevent encroachment.</p> <p>Existing health and education facilities should also serve the Monwabisi Informal Settlement. However, enlarging the schools should be considered. Sport facilities and open spaces forms part of the project.</p>

		<p>A departure of having to comply with the buffering from the cemetery will requested, as the site comprises of an existing informal settlement, which cannot be accommodated elsewhere.</p> <p>Engineering solutions will be used regarding the complex topographical conditions of the site.</p>
CoCT (Biodiversity)	<p>The Endangered status of the on-site vegetation and open spaces must be acknowledged, while further encroachment must be halted.</p> <p>Capital resources should be allocated for road upgrades, fencing and environmental education with the community.</p> <p>Intensive management and ongoing interaction with the community is required to secure the remaining Critical Biodiversity Area on the site.</p>	<p>The fire break will halt further encroachment.</p> <p>Road construction forms part of the development.</p>
CoCT (Solid Waste)	No objection, but municipal waste by-laws must be adhered to.	Noted
CoCT (Health)	Dust management by-laws must be adhered to.	Noted and further addressed in the EMPr
Heritage Western Cape	Archaeological issues must be addressed	Archaeological issues will be addressed
DEA&DP	<p>Landowner's consent must be supplied.</p> <p>The description of the project is inadequate.</p> <p>Confirmation of the extend of land to be conserved is required.</p> <p>Comments from Heritage Western Cape and DWS are required.</p> <p>Adequate responses to the comments obtained must be provided.</p> <p>Confirmation of bulk services supply to the development project must be supplied.</p>	*No response supplied

	Dust management, stormwater management, mitigation and maintenance must be included in the EMPr.	
Department of Water and Sanitation	<p>No abstraction of groundwater permitted without authorisation.</p> <p>No water pollution as a result of the development permitted.</p> <p>Solid waste must be disposed of as legally required.</p> <p>The National Water Act, 1998 (Act No. 36 of 1998) must be adhered to.</p>	*No response supplied

Appendix 3

The Evaluation Control Sheet and File Summary used by the decision-maker (DEA&DP, 2016).

The Evaluation Control Sheet

EVALUATION CONTROL SHEET										
										DATE: 04/04/2016
APPLICATION CATEGORY		National importance	Regional importance	Municipal Housing	Basic services	High profile / controversial case?			N/A	
URP/ISRDP										
STATUS:	Intent/ Application	Screening report		Scoping Report		Revision of report	EIA report	Additional information	Submission of review period	ROD completed
		received	accepted	received	accepted					
Date received/issued:		Received application form & DEAR.								
Type of receiving environment	Natural vegetation	Coast	River	Mountain	Wetland	Urban	Rural			
	Transformed	Urban Edge	Industrial	Residential	Commercial	Agriculture				
DOCUMENT CONTROL PROCEDURES:										
DEAT delegation requested and received?		N/A			Requested	Received				
Which of the Dept'l policies were considered:		N/A	PSDF	Urban Edge	Resort	PPP				
		Scoping	Alternatives	Gold/Polo	Coastal	Specialist Studies				
		Mountain	Oil Industry	Telecomm.	Bio-regional					
Site Visit performed and Report attached				N/A	YES	NO	Photos attached	GIS Map Attached		
Reasons for not performing site visit:										
Review performed (insert initials):										
AUTHORITY INTERACTION:										
	Tick Relevant Authority	Statutory approval required?	Meetings Held	Telephonic Discussion	Written Comments	OUTCOME				
						supported	not supported	Conditions?		
Dev. Planning										
Dir. PWM										
Heritage W. Cape										
Dept. Health										
Dept. Transport										
Municipality										
District Municipality										
DWAF										
Dept. Agric										
DME										
DEAT										
OTHER										
KEY ISSUES	Issue Identified				KEY ISSUES	Issue Identified				
	PPP	Key Authority	DEADP			PPP	Key Authority	DEADP		
Botanical					Compatible land use					
Fauna					Pollution					
Geobotanical					Visual/Aesthetic					
Archaeological/Paleo					Adaptability services					
Ecosystem functioning					Cumulative impact					
1 VERIFIED BY:		SUPERVISOR	PEO	OTHER	DATE:					

Assessment Form

REVIEW AREA	ADEQUATE	INADEQUATE	General comments and Actions to be taken to address inadequacy of information					
			Specialist input	Additional information	Peer review	Authorize with conditions	Revise report	Other
Overall Quality Assurance								
A. Ethics								
A.1								
A.2								
A.3								
A.4								
A.5								
B. Adequacy of Information								
B.1								
B.2								
B.3								
C. Clarity of Report								
C.1								
C.2								
C.3								
D. Alternatives								
D.1								
D.2								
Key Stages of EIA Procedure								
E. Description of Project and Affected Environment								
E.1								
E.2								
E.3								
E.4								
F. Legislation, Policies and Plans								
F.1								
F.2								
F.3								
F.4								

REVIEW AREA	ADEQUATE	INADEQUATE	General comments and Actions to be taken to address inadequacy of information					
			Specialist input	Additional information	Peer review	Authorize with conditions	Revise report	Other
requirements clearly considered or met?								
G. Scoping and Participation by Interested and Affected Parties (PPP)								
G.1 Was scoping/PPP initiated early on in the project?								
G.2 Was scoping/PPP fair and reasonable?								
G.3 Adequate description of scoping/PPP in documentation?								
G.4 Is the identification of potential impacts through scoping/PPP adequate?								
G.5 Has scoping/PPP succeeded in bringing the key issues into focus, and has a preliminary evaluation of potential significance been undertaken?								
G.6 Have issues raised and alternatives suggested by IAPs during scoping/PPP, and in comment on draft documents, been addressed satisfactorily?								
H. Assessment and Evaluation of Impacts								
H.1 Clear, sufficient and explicit criteria used to assess impacts of different alternatives?								
H.2 Adequate attention to indirect or cumulative effects on significant or sensitive resources within the CMA?								
H.3 Explicit and sufficient criteria used to evaluate significance of impacts of alternatives, taking into account the planned mitigation and management?								
H.4 Systematic, explicit and rational links from identification of key issues, through assessment to evaluation of significance?								
H.5 Overall evaluation of project and alternatives made in terms of its ecological sustainability?								
H.6 Overall evaluation of project and alternatives made in terms of its social sustainability, equity and environmental justice considerations?								
H.7 Overall evaluation of project and its alternatives in terms of efficiency considerations?								
I. Mitigation, Enhancement, Management and Monitoring								
I.1 Mitigation and/or enhancement of the key issues systematically addressed?								
I.2 Responsibility for management and monitoring during project implementation addressed adequately?								
I.3 Are liabilities for damage to person/s or property made clear?								
I.4 Adequate assurance that mitigation, management and monitoring would be implemented satisfactorily?								
Description of other action proposed:								

File Summary



DIRECTORATE: DEVELOPMENT MANAGEMENT
REGION 1

6

FILE SUMMARY
Updated Version no. ____

1. Reference no.: 16/2/31/1A4/37/3012/16
2. Project title: proposed upgrade of Marwabasi Park Informal settlement on erven 37-18370/2, 37-18370/3, 37-25032RE and
3. Case officer responsible for drafting summary: CA 54415, Khayelitsha
4. Previous case officer, if applicable: N/A
5. Description of the development (including alternatives):
 2 alternatives
 Alt 1 (preferred)
 - upgrade of informal settlement
 - includes education facilities, institutional, sports, etc
 - removal of ± 13.5ha vegetation to move some residents of informal settlement out of road reserve
 - section of erf 37-18390/2 to form part of Wolfgat Nature reserve
 - 5m fire break betw reserve & settlement
 - generic space
 Alt 2
 - same as alternative 1 but includes storm water management areas in area to be designated as part of Wolfgat Nature reserve
6. Listed activities: listed activities - Activity 27 (LN1) ✓ triggered - Endangered vegetation.
 Activity 12 (LN3) ✓
7. Delegation:
8. Site visit undertaken:

Yes	<input checked="" type="checkbox"/> No
-----	--

If yes please attach Site Visit Report – Appendix A
9. Site description:
 - informal settlement
 - unsure if wetlands on site
 - Endangered vegetation
 ✓ Solid waste removal confirmed

Openature concerns not addressed or responded to. Not supported

FILE

* Acceptance from Wolfgat to expand?

10. Public participation process:

Proof of PPP as part of NOI unclear
 Date civic notice placed on site (pictures unclear)

11. Issues:

APPLICATION FORM			
Issue	Response (EAP / applicant's response.)	Addressed sufficiently?	Supervisor Comments
DRAFT BAR			
Issue	Response (EAP / applicant's response.)	Addressed sufficiently? Mitigation / condition / change in design, etc.)	Supervisor Comments
City Health request dust management plan to be submitted to City. EAP responded to say it will be included in EAP			
no responses to comments			Not done
FINAL BAR			
Issue	Response (EAP / applicant's response.)	Addressed sufficiently? (Mitigation / condition / change in design, etc.)	Supervisor Comments
stormwater management plan issues			
no maintenance plan.			



Have all issues raised during application phase and draft phase been addressed in the Final BAR?

Yes No

12. Regulatory requirements

Does the report meet the requirements of the NEMA ²⁰¹⁴ ~~2010~~ Regulations? (If not, indicate shortcomings)

No - EMLr inadequate
 Alternatives inadequate
 Motivation provided for A1+2 refers to transition area for urban agriculture & layout provided. Does not indicate agriculture area.

- See Appendix B - Regulatory requirements' checklist
- See Appendix C - Process flow chart

13. Overall Comment

13.1 Agree / Disagree with Information on file (e.g. listed activities, content, DEA&DP opinion differing with another Department's opinion?). Reasons for disagreement with info on file, if applicable.

* CoCT: ERM comment (3/07/2015) requests Engineering & geotech assessment

13.2 Report ~~accepted~~ / rejected? (consult SOP for grounds for rejection)

13.3 Reasons for rejection of report, if applicable.

- * Open Nature input?
- * DNS input?
- * Hinc input?

* include DDF

14. File Control

Please attach File Control Sheet – Appendix D

Case officer signature: _____ Date: 05/04/16

15. Supervisor Overall Comment

Supervisor signature: _____ Date: _____



FILE SUMMARY

Updated Version no. ____

1. Reference no.: 16/3/2/11A/137/3012/16
2. Project title: Proposed Nonwabisi Part Informal Settlement upgrade
3. Case officer responsible for drafting summary:
4. Previous case officer, if applicable: N/A
5. Description of the development (Including alternatives):

6. Listed activities: LN 1 - 27 LN 3 - 4, 12

7. Delegation:

8. Site visit undertaken:

Yes	<u>No</u>
-----	-----------

If yes please attach Site Visit Report – Appendix A

9. Site description:

10. Public participation process:

Ad in newspaper : Vukani 23/04/2015

Notification : 27/02/2016

Site Notice : 23/04/2015

Proof : 24/04/2015

11. Issues:

APPLICATION FORM			
Issue	Response (EAP / applicant's response.)	Addressed sufficiently?	Supervisor Comments
DRAFT BAR			
Issue	Response (EAP / applicant's response.)	Addressed sufficiently? (Mitigation / condition / change in design, etc.)	Supervisor Comments
FINAL BAR			
Issue	Response (EAP / applicant's response.)	Addressed sufficiently? (Mitigation / condition / change in design, etc.)	Supervisor Comments



Have all issues raised during application phase and draft phase been addressed in the Final BAR?

Yes	No
-----	----

12. Regulatory requirements

Does the report meet the requirements of the NEMA 2010 Regulations? (If not, indicate shortcomings)

- See Appendix B - Regulatory requirements' checklist
- See Appendix C – Process flow chart

13. Overall Comment

13.1 Agree / Disagree with Information on file (e.g. listed activities, content, DEA&DP opinion differing with another Department's opinion?). Reasons for disagreement with info on file, if applicable.

13.2 Report accepted / rejected? (consult SOP for grounds for rejection)

13.3 Reasons for rejection of report, if applicable.

14. File Control

Please attach File Control Sheet – Appendix D

Case officer signature: _____

Date: 19/05/2016

15. Supervisor Overall Comment

Supervisor signature: _____

Date: _____

Appendix 4

The legislative requirements (Republic of South Africa, 2014 as used in the DEA&DP, 2016).

Scope of assessment and content of basic assessment reports

- “3. (1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-
- (a) details of-
 - (i) the EAP who prepared the report; and
 - (ii) the expertise of the EAP, including a curriculum vitae;
 - (b) the location of the activity, including:
 - (i) the 21 digit Surveyor General code of each cadastral land parcel;
 - (ii) where available, the physical address and farm name;
 - (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;
 - (c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is-
 - (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;
 - (ii) or on land where the property has not been defined, the coordinates within which the activity is to be undertaken;
 - (d) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the activities to be undertaken including associated structures and infrastructure;
 - (e) a description of the policy and legislative context within which the development is proposed including-
 - (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and
 - (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;
 - (f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;
 - (g) a motivation for the preferred site, activity and technology alternative;

- (h) a full description of the process followed to reach the proposed preferred alternative within the site, including:
- (i) details of all the alternatives considered;
 - (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
 - (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
 - (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
 - (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources; and
 - (cc) can be avoided, managed or mitigated;
 - (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;
 - (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
 - (viii) the possible mitigation measures that could be applied and level of residual risk;
 - (ix) the outcome of the site selection matrix;
 - (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and
 - (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;
- (i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-
- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and

- (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;
- (j) an assessment of each identified potentially significant impact and risk, including-
 - (i) cumulative impacts;
 - (ii) the nature, significance and consequences of the impact and risk;
 - (iii) the extent and duration of the impact and risk;
 - (iv) the probability of the impact and risk occurring;
 - (v) the degree to which the impact and risk can be reversed;
 - (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and
 - (vii) the degree to which the impact and risk can be avoided, managed or mitigated;
- (k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;
- (l) an environmental impact statement which contains-
 - (i) a summary of the key findings of the environmental impact assessment;
 - (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
 - (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
- (m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;
- (n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
- (o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;
- (p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
- (q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;

- (r) an undertaking under oath or affirmation by the EAP in relation to:
- (i) the correctness of the information provided in the reports;
 - (ii) the inclusion of comments and inputs from stakeholders and I&APs;
 - (iii) the inclusion of inputs and recommendations from the specialist reports where relevant;
and
 - (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and
- (s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;
- (t) any specific information that may be required by the competent authority; and
- (u) any other matters required in terms of section 24(4)(a) and (b) of the Act”, (Republic of South Africa, 2014: 52).