



# Co-design of water-sensitive settlement upgrading

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## What is RISE?

**The challenge** — Informal settlements are home to more than a billion people who suffer from poor health and wellbeing as a result of inadequate water and sanitation services, and environmental exposure to pathogens, pollutants and disease vectors.

**Our vision** — Our vision is to improve human, environmental, and ecological health in informal urban settlements across the developing world through a new approach — a water-sensitive approach — to the delivery of urban water services, bridging the gap between WASH and big pipes infrastructure.

**Our aim** — RISE is a research program that aims to collect the first-ever rigorous scientific evidence if a localised, water-sensitive approach to upgrading informal settlements can deliver sustainable, cost-effective improvements to health and the environment.

**Our method** — We are conducting a randomised control trial involving 12 informal settlements in Suva, Fiji and 12 in Makassar, Indonesia. In the first phase of the trial, six settlements in each country will undergo a water and sanitation upgrade. The impacts of the upgrades on the health of the environment and the health of the communities will be monitored, and compared against the other six settlements in each country.

**Our demonstration projects** — In parallel to the randomised control trial, we have also upgraded a settlement in Makassar and Suva to demonstrate the approach and range of technologies. The content of this report draws from this experience.

**Want to know more?** — visit our website at: [www.rise-program.org](http://www.rise-program.org)

RISE is aligned with the ADB Strategy 2030's Operational Priorities to achieve prosperous, inclusive, resilient and sustainable Asia and the Pacific <https://www.adb.org/documents/strategy-2030-prosperous-inclusive-resilient-sustainable-asia-pacific>. RISE is supported by the Urban Climate Change Resilience Trust Fund (UCCRTF) in Makassar, Indonesia and the Urban Environment Infrastructure Fund (UEIF) in Suva, Fiji.

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## Acronyms and key terms

<b>ADB</b>	Asian Development Bank
<b>CRCWSC</b>	Cooperative Research Centre for Water Sensitive Cities
<b>MSDI</b>	Monash Sustainable Development Institute
<b>RISE</b>	Revitalising Informal Settlements and their Environments program
<b>SDG</b>	Sustainable Development Goal
<b>UCCRTF</b>	Urban Climate Change Resilience Trust Fund
<b>WASH</b>	Water, Sanitation and Hygiene
<b>WSC</b>	Water-sensitive cities (approach)
<b>WHO</b>	World Health Organization
<b>Bio-filtration</b>	The process of using beneficial bacteria to clean water on a molecular level to remove contaminants. Biofilters contain grains (e.g., sand, granular activated carbon) that are covered with biofilms, which break down nutrients and organic carbon as well as capture other unwanted contaminants in the influent water.
<b>Blackwater</b>	Solid and liquid waste from toilets that contains faecal matter and urine.
<b>Co-benefits</b>	Achieving multiple positive outcomes from a single intervention/investment
<b>Co-design</b>	A participatory and inclusive process of involving all relevant stakeholders, especially community members, in the conceptualisation, planning, design and implementation, and monitoring and operation/maintenance of programs and projects that affect their lives.
<b>Demand Management</b>	Encouraging households to reduce (water) consumption and adopt energy efficiency measures.
<b>Greywater</b>	Wastewater that has been used for washing, laundering, bathing or showering.
<b>Informal settlements</b>	Defined as having at least one of five deficiencies according to UN-Habitat's (2003) criteria: poor quality of housing, unsafe water, unsafe sanitation, overcrowding, and/or lacking tenure security.
<b>Intersectionality</b>	A theoretical framework for understanding how aspects of a person's social and political identities (e.g., gender, sex, race) combine to create modes of discrimination and privilege.
<b>Land tenure</b>	The rights that determine who can use land, for how long and under what conditions based both on official laws and policies, and on informal customs.
<b>Nature-based solutions</b>	Actions that work with and enhance nature so as to help people adapt to change and disasters and protect, sustainably manage, and restore natural or modified ecosystems.

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<b>Pressure tank</b>	A rotomolded plastic tank, one of the components in a pressure pod.
<b>Pressure pod</b>	The unit that collects, stores and discharges wastewater, as part of the treatment train. It houses a grinder pump and level sensor and float switch.
<b>Resilience</b>	Resilience is the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.
<b>Retention time</b>	The length of time that a compound remains in a wastewater treatment tank or unit.
<b>Reticulated water supply</b>	The piped-water network (as opposed to well water).
<b>Safeguards</b>	A framework to help to ensure that, at the very least, a project doesn't inadvertently harm people or the environment.
<b>Septic tank</b>	A chamber through which domestic wastewater flows for basic treatment where settling and anaerobic processes reduce solids and organics.
<b>Subsurface wetland</b>	An engineered system that uses vegetation, soils and organisms to treat wastewater which is below the surface of the soil, with the interaction between the plant roots removing contaminants.
<b>Surface (flow) wetland</b>	Saturated engineered systems with wastewater above the soil exposed to the atmosphere for final treatment.
<b>Social capital</b>	A set of shared values that allows individuals to work together in a group to effectively achieve a common purpose.
<b>Tenure security</b>	A continuum of tenure with multiple forms, underpinned by the ability of residents to remain and utilise the land and dwelling they occupy.
<b>Treatment train</b>	An engineered sequence of multiple wastewater treatment technologies to treat and safely discharge wastewater.
<b>Wastewater</b>	Water that has been contaminated by human use, including blackwater and greywater.
<b>Water-sensitive</b>	Actions to complement conventional approaches to deliver services by working with nature to improve urban liveability, access to services, and restore the natural environment. The water-sensitive approach includes 'nature-based' technologies such as constructed wetlands, rainwater harvesting, and bio-filtration gardens.



*The Water-Sensitive Cities approach to informal settlement upgrading requires engagement with diverse stakeholders through all stages of the design and implementation process.*

## Executive summary

The importance of involving diverse stakeholders, particularly communities, in informal settlement upgrading projects has been reinforced through decades of policy and practice. Co-design is a process not an event, and is crucial through all phases of the project cycle in order to ensure project sustainability and that no one is left behind. Implementation with communities, at-scale, requires the development, institutionalisation and mainstreaming of appropriate co-design approaches.

The Water-Sensitive Cities (WSC) approach provides an opportunity to deliver services within informal settlements with a range of co-benefits to ecology, health and well-being. Operating through a decentralised or distributed model of service delivery, the WSC approach relies on the integration

of stakeholders across different levels, spatial and temporal scales- with users and providers jointly participating in design, delivery, operations and management.

This Report provides an overview of a community-based, co-design process for water-sensitive upgrading informal settlements. It outlines the three main steps and their activities: Step 1: Laying foundations for co-design; Step 2: Building understanding and co-designing options; and Step 3: Reviewing options and refining the Concept Plan. Activities under each step are outlined along with representative outcomes and outputs. It draws from experience with the Revitalising Informal Settlements and their Environments (RISE) program, implemented in Indonesia and Fiji. The Report reflects on co-design with the two demonstration projects as well as the first six neighbourhoods in Makassar. It outlines the approaches and activities that can foster meaningful participation of settlement residents, as well as government, industry and service provider stakeholders, into the design and delivery of water-sensitive upgrading projects.

## A three-part series

This report, *Co-design of water-sensitive settlement upgrading*, is Part Two in a trilogy of Reports addressing the opportunities and best practices in water-sensitive upgrading of urban informal settlements. The series aims to provide the reader with the background knowledge, concepts and guidance for how to re-think service delivery in hard to reach urban informal settlements using a nature-based approach. The Series has three volumes.

The series is *not* intended to be a step-by-step guidebook. Rather, it aims to showcase the possibilities, principles, best practices and main considerations for policy makers and practitioners. It draws on experiences since

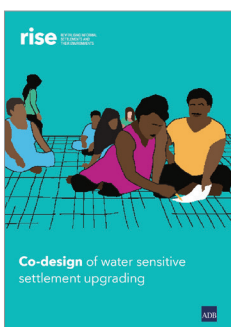
2017 with the Revitalising Informal Settlements and their Environments Program (RISE), a decade-long transdisciplinary impact research (TIR) endeavour that aims to improve human and environmental health in urban informal settlements by trialling the water-sensitive cities (WSC) approach to water and sanitation servicing ([www.rise-program.org](http://www.rise-program.org)).

This co-design report draws on the experience in Indonesia and Fiji with the demonstration projects at Batua and Tamavua-i-Wai, as well the experience with co-design in six other sites under phase 1 of upgrading in Makassar, Indonesia as part of an Asian Development Bank grant.



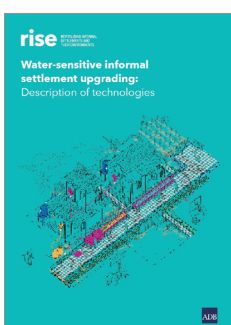
### Part One

*Water-sensitive informal settlement upgrading: overall principles and approach* provides the entry-point for understanding the rationale and concepts for a WSC approach, and a high-level summary of the main components and considerations for policy-makers and practitioners interested to utilise the approach in the Asia and the Pacific.



### Part Two

*Co-design of water-sensitive settlement upgrading*, provides more detailed information and guidance on how to design and deliver a community-based, participatory process for project implementation. This Part equips the reader with an understanding of the tools and techniques that can foster meaningful participation of settlement residents, as well as government, industry and service provider stakeholders, into the design and delivery of WSC upgrading projects.



### Part Three

*Water-sensitive informal settlement upgrading: description technologies* builds on the other two reports by providing foundational knowledge of the technical requirements and considerations for implementing nature-based technologies in urban informal settlements, with particular emphasis on Indonesia. It provides an overview of criteria and design considerations for technical audiences, answering common technical questions regarding the functioning of nature-based technologies and interventions.

## Table of contents

<b>Executive Summary</b>	<b>5</b>
<b>1. Introduction</b>	<b>8</b>
<b>2. Key considerations</b>	<b>11</b>
<b>3. Overall steps and activities of the WSC co-design approach</b>	<b>15</b>
3.1. The overarching framework of six steps	15
3.2 Reaching a concept plan through Steps 1–3	17
<b>4. Step 1: Laying foundations for co-design</b>	<b>19</b>
4.1 Representative activities in Step 1	19
4.2 Representative outcomes for Step 1	28
<b>5. Step 2: Building understanding and co-designing options</b>	<b>30</b>
5.1 Representative activities in Step 2	30
5.2 Representative outcomes for Step 2	41
<b>6. Step 3: Reviewing options and refining the concept plan</b>	<b>42</b>
6.1 Representative activities in Step 3	42
6.2 Representative outcomes for Step 3	45
<b>7. After the concept plan, Steps 4–6</b>	<b>48</b>
<b>8. The Dos and Don'ts of co-design for water-sensitive settlement upgrading</b>	<b>49</b>
<b>References</b>	<b>50</b>



*The interconnection between the communities and the infrastructure is central to designing and implementing a co-design process that can achieve impact and be sustainable.*

## 1. Introduction

Decades of informal settlement upgrading policy and practice has shown the critical importance of involving the full range of stakeholders, especially communities, in upgrading projects.

Participation is crucial at all phases of the project cycle, including conceptualising, designing, implementing and maintaining interventions in urban informal settlements (UN-Habitat, 2015). With almost one billion people living in informal settlements, the scale of the challenge is vast. If solutions are to be implemented hand-in-hand with communities at scale, participatory approaches need to be institutionalised and ultimately mainstreamed. This will help in achieving the impact envisaged in the Sustainable Development Goals (SDGs) where no one is left behind.

The water-sensitive approach demands specific and unique co-design approaches, tools and activities compared with conventional informal settlement upgrading practice. The complexity and novelty of technologies, when compared to traditional upgrading praxis (i.e. paving streets and laying stormwater drains), require conceptualising, designing and implementation across different spatial and temporal scales in order to address dynamics of hydrology and climate change. This calls for the participation of diverse stakeholders, the involvement of a range of expertise, and the engagement with complex dynamics of land management, ecology and society. Co-design can harness contemporary data and information-gathering tools (e.g. satellite imagery and flood

mapping) to expand a community's understanding of the problem context, to supplement their rich local knowledge and appreciate the interlinkages of local solutions to the wider city context." These are best supported by locally anchored co-design and implementation.

This report describes a co-design approach to participatory design for upgrading informal settlements with a water-sensitive technologies intervention. It draws from experience with the Revitalising Informal Settlements and their Environments (RISE) program, implemented in Fiji and Indonesia. The Report draws best practices and lessons from both demonstration projects as well as the first six neighbourhoods in Makassar that are to receive the built intervention with Asian Development Bank (ADB) funding.

Although many toolkits and guides exist for implementing community-based sanitation and neighbourhood upgrading, it is critical that engagement approaches and activities are tailored to both the project scope and socio-cultural contexts of communities and neighbourhoods that the project is being implemented within. This will support long term project adoption and sustainability.

### A socio-technical, decentralised upgrading approach

As Volume 1 in this series explains, the Water-sensitive Cities (WSC) approach to upgrading is based on a decentralised or distributed socio-technical system that aims to address servicing deficiencies in informal settlement neighbourhoods. These include nature based sanitation infrastructure, or 'green technologies', including wetlands,

greywater biofilters and pressure sewers which are integrated into residential buildings and urban landscapes. See Volume 1 and Volume 3 of this series for an introduction to the principles and approach, and a detailed technical description of the technologies.

The WSC approach is underpinned by a view of interventions within settlements as complex socio-technical systems. “A socio-technical system (STS) is one that considers requirements spanning hardware, software, personal, *and* community aspects. It applies an understanding of the social structures, roles and rights (the social sciences) to inform the design of systems that involve communities of people and technology” (Interaction Design Foundation, n.d.). This position of the interconnection between the social (communities) and technical (the infrastructure) is central to designing and implementing a co-design process that can achieve impact and be sustainable.

Successful implementation of distributed systems requires the adoption and commitment of dedicated people (Manzini 2015). “Moving beyond the sustainable development calls for participation, socio-technical approaches emphasize public deliberation, co-design, and co-production, where the public are directly involved in design and decisions rather than the recipients of technology and infrastructure and customers of water utilities” (Bell 2020).

### What is co-design?

In order to implement the WSC socio-technical system a participatory design approach, bringing together a multi-disciplinary, international community of practitioners can offer important value in generating innovative solutions. Participatory design is rooted in involving everyone who will be affected by emerging design, whether a new service, technology, infra- or super-structure. In the context of RISE, participatory design is used to refer to the overall engagement activities undertaken to deliver the program. Co-design refers particularly to the stage in which local communities and other stakeholders are involved in the materialisation of their needs and wants around water infrastructure and future development of their natural and built environment.

Co-production, now a recognised approach for service delivery at the international level, broadly refers to the joint production of urban services by users and public providers, and users take on a role as active asset holders (Brudney & England, 1983; Mitlin, 2008; Nabatchi et al., 2017). As an alternative for delivering water and sanitation services to the urban poor, it can improve effectiveness and efficiency of local governments’ action (Parks et al. 1981 in Faldi et al. 2019). As a social practice, co-production changes the relationship between service providers and users, or other members of the community, by modifying the socio-technical and environmental dynamics of the services (Faldi et al 2019). In this arrangement, technical support is provided by local authorities, while the day-to-day management and basic maintenance is undertaken by communities, such as through sanitation committees.

Six key guiding principles in the development of a WSC upgrading co-design approach include:


- ✓ Do no harm: all work is undertaken in a safe, ethical and inclusive manner
- ✓ Reduce burden on communities when planning for their participation
- ✓ Be flexible and adaptive, incorporating learning through the process
- ✓ Engage communities in culturally & contextually appropriate activities
- ✓ Build local capacity in country
- ✓ Support integrated urban design and multifunctional infrastructure.

## The Structure of the Report

This report is structured to follow engagement activities that were defined for the delivery of the RISE program in Indonesia and Fiji. The report describes each step and its representative outcomes- both tangible and intangible- and outputs, along with examples of the activities that can be undertaken to achieve these. Key considerations for each activity, and how and why stakeholders are engaged are discussed.

It is important to note that these stages, outcomes and activities were developed specifically to support the RISE program and its implementation contexts. Therefore, this Report is not a toolkit or guide to be followed, but a description of the approach for the co-design of a water-sensitive upgrade. As such, the report includes a brief description of some of the significant activities and materials as they were developed to support the participatory design of the RISE intervention, its implementation, and operations and maintenance based on these particular implementation contexts. Where relevant, it articulates the process, purpose and mechanisms for capturing and recording critical information required for project delivery and documentation.

**“A socio-technical system (STS) is one that considers requirements spanning hardware, software, personal, and community aspects.”**



*A co-design approach to water-sensitive settlement upgrading involves the public directly in design and decisions rather seeing them as the recipients of technology and infrastructure and customers of water utilities.*

## 2. Key considerations

When designing and implementing an effective co-design process for water-sensitive settlement upgrading there are 6 key considerations to take into account from the outset. These are not unique to water-sensitive interventions, however, the novel aspects of WSC technologies, the need to identify and understand a wide variety of stakeholders, and the importance of ensuring careful and detailed implementation plans necessitate greater attention to these considerations compared with conventional upgrading.





**Consideration 1: Meaningfully reach everyone through co-design**

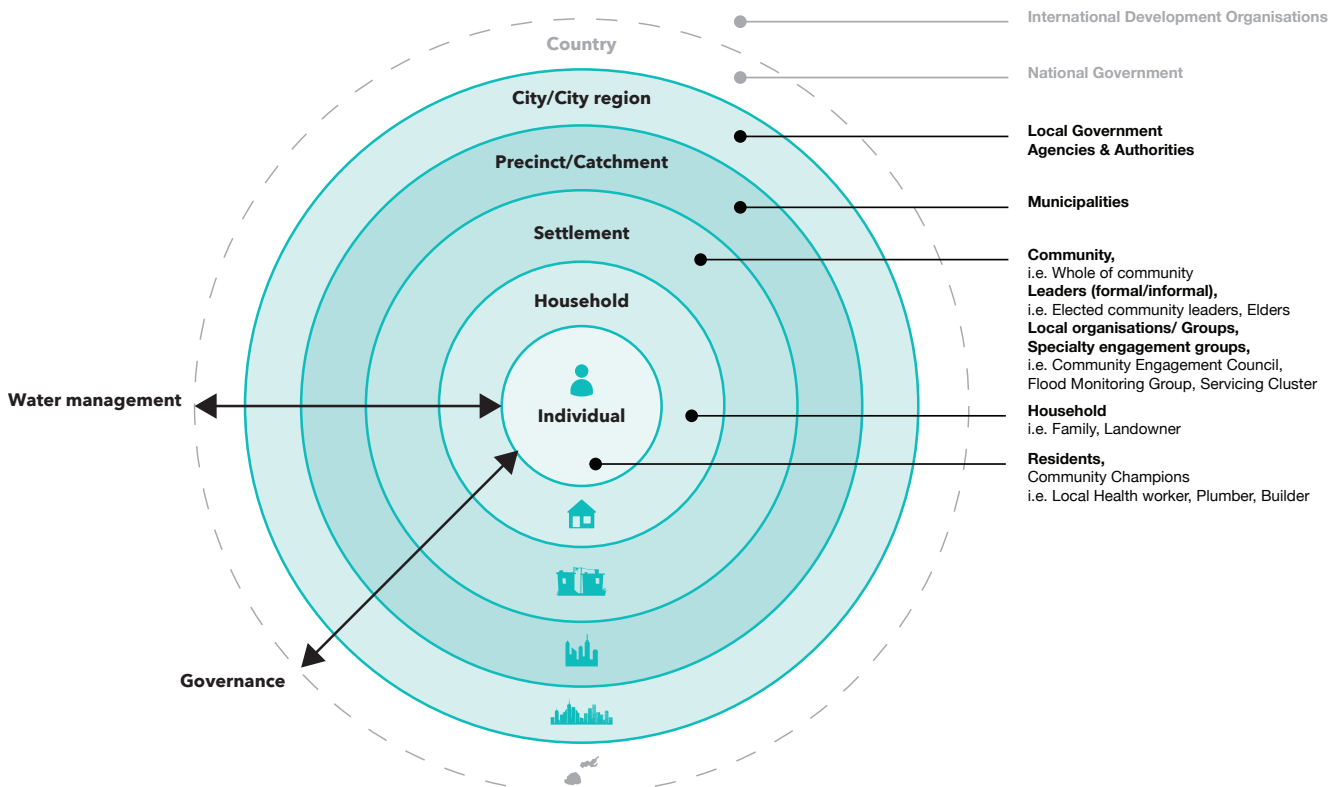
**Co-design should include many perspectives.** Co-design activities should achieve genuine and meaningful engagement with all residents, particularly the poor and vulnerable who often do not have a voice within existing formal and informal governance structures within the community. The co-design process should involve inclusive activities that take into account power dynamics, vulnerabilities and social structures such as community organisation. Particular emphasis is placed on inclusion, to ensure that men, women, youth, children, elderly, disabled and other groups that may have specific needs are engaged. This ensures that the whole community — both weak and strong voices — are involved in decision making.



**Consideration 2: Involve diverse stakeholders in co-design activities**

**Co-design is not only for communities.** Engagement should cross the nested scales of design, incorporating stakeholders from city, catchment or precinct, settlement, household and individual scales (see diagram below). Refer to Section 3 in Volume 1: Water-sensitive informal settlement upgrading: overall principles and approach for a description of the nested scales. Engagement across these different stakeholder groups is critical across the program timeline — this includes co-design of the intervention, as well as planning around co-implementation and co-management. While close and strategic coordination with local government is required for implementation and management, engagement with communities in an inclusive and meaningful manner also necessitates careful planning.

Engagements with the community can offer opportunities for participation at a range of levels, including: Whole of community, Leaders (formal and informal) and elders, Specialty engagement groups; Community Champions; and households and individuals. The community should be brought in early, and involved through the process.



Example of stakeholders within a water-sensitive upgrading co-design process, crossing the nested scales of design.



### Consideration 3: Engage a range of technical and social expertise

**WSC co-design requires a range of expertise.** The water-sensitive upgrade project scope extends beyond technical implementation of engineering solutions. Crossing a range of spatial and temporal scales, it necessitates the expertise of staff with experience in community development and engagement, along with experience in technical design and implementation. This includes: engineers; urban planners; ecologists; social/community workers; and designers, such as architects or landscape architects. These complementary skill sets and backgrounds are instrumental in creating an effective WSC implementation team.



### Consideration 4: Recognise land rights and negotiations are central to effective co-design

**An effective co-design process cannot ignore land rights and existing land uses.** Land tenure and land regularisation processes are critical to the successful delivery of WSC upgrading and must be considered and worked through from the outset. Delivering infrastructure in dense urban settlements with tenure ambiguities and a scarce provision of publicly available land for services and infrastructure comes with extraordinary challenges. Through a process of co-design, a water-sensitive settlement upgrading project can facilitate a design solution that allows flexibility for residents to locate infrastructure within their community, and supports ongoing land regularisation processes to improve tenure security. For example through community leasing or legal documentation of ownership. Where infrastructure must be located on private land, there should be flexibility for agreements and compensation on the use of the land, so as to not shift risk from the project back to the poor and vulnerable members of the community. Land tenure considerations including the development of fit-for-purpose land agreements are described in detail in Section 2.2 of Volume 3 Water-sensitive informal settlement upgrading: Description of technologies.



### Consideration 5: Uphold safeguards: protect vulnerable people and environments

**The project safeguard framework should be established and socialised with communities before co-design starts,** so that there is a common understanding with all stakeholders (project staff, local government, communities) on what can and cannot be done. Ideally the safeguards framework should be co-designed with communities, so that it's not something applied top down and is flexible, so the water-sensitive upgrade is possible.

Safeguards are integral to planning and implementing the process. The delivery of the intervention should offer a technically feasible solution that has been developed with meaningful co-design with communities and consideration of the existing environment. It is paramount that, on the whole, individuals or households are not worse off as a result of the project, paying particular attention to vulnerable or disadvantaged community members. Communication should be transparent, and include communicating clear timelines, entitlements, and roles and responsibilities. All engagement with communities should be clearly documented — what was said, by who, and when, along with details of agreements, trade-offs or co-benefits, and compensation.



### Consideration 6: Ensure co-design is locally anchored and implemented

**Don't implement co-design activities with foreigners or staff from other cities.** Effective co-design requires the establishment of dedicated teams with local knowledge and experiences, with local leadership that will anchor and implement the co-design. The team will be at the front of activities, and skill sets and backgrounds of team members need to take into account both social and technical aspects, and reflect the ethnic and cultural diversity of the communities that the project is engaging with.



*The local implementation team is at the forefront of activities with all stakeholders and should reflect the diversity of the communities with whom they work.*

## 3. Overall steps and activities of the WSC co-design approach

### 3.1. The overarching framework of six steps

The WSC engagement approach consists of six steps that are closely tied to- and run parallel to- the infrastructure implementation timeline (Figure 3). The steps may be broken down into two critical phases of designing and implementing the water-sensitive settlement upgrade: Co-designing the System, and Life with the System. Each step is characterised by a number of discussion topics that are related to site dynamics and the intervention scope and aims. These are: contamination and health stressors (tied to community triggering); future settlement development; existing social practices (water, social-cohesion, and building); land tenure; the water-sensitive technologies; and maintenance and servicing. In addition to building local communities' skills and knowledge about the water-sensitive cities approach, these steps offer users different participation opportunities and seek to strengthen their motivation to change unsustainable practices (i.e. unhealthy). Each step has a set of representative outcomes- both tangible and intangible- and outputs that are necessary to progress to the next step and have been identified to be necessary to achieve program sustainability.

*Co-designing the System* was conceived as the formative pre-build components of the process with intensive stakeholder engagement framed through a participatory design process. A key output of this phase is the development and finalisation of the Concept Plan for the water-sensitive settlement upgrade. This includes the following steps:

- ✓ Step 1: Laying foundations for co-design;
- ✓ Step 2: Building understanding and co-designing options;
- ✓ Step 3: Reviewing options and refining the Concept Plan.

Meanwhile, *Life with the System* constitutes the formative build and post-build components of the process that includes the following steps: Step 4: Constructing; Step 5: Establishing; Step 6: Institutionalising. A key output of this phase is the implementation of the water-sensitive settlement upgrade.

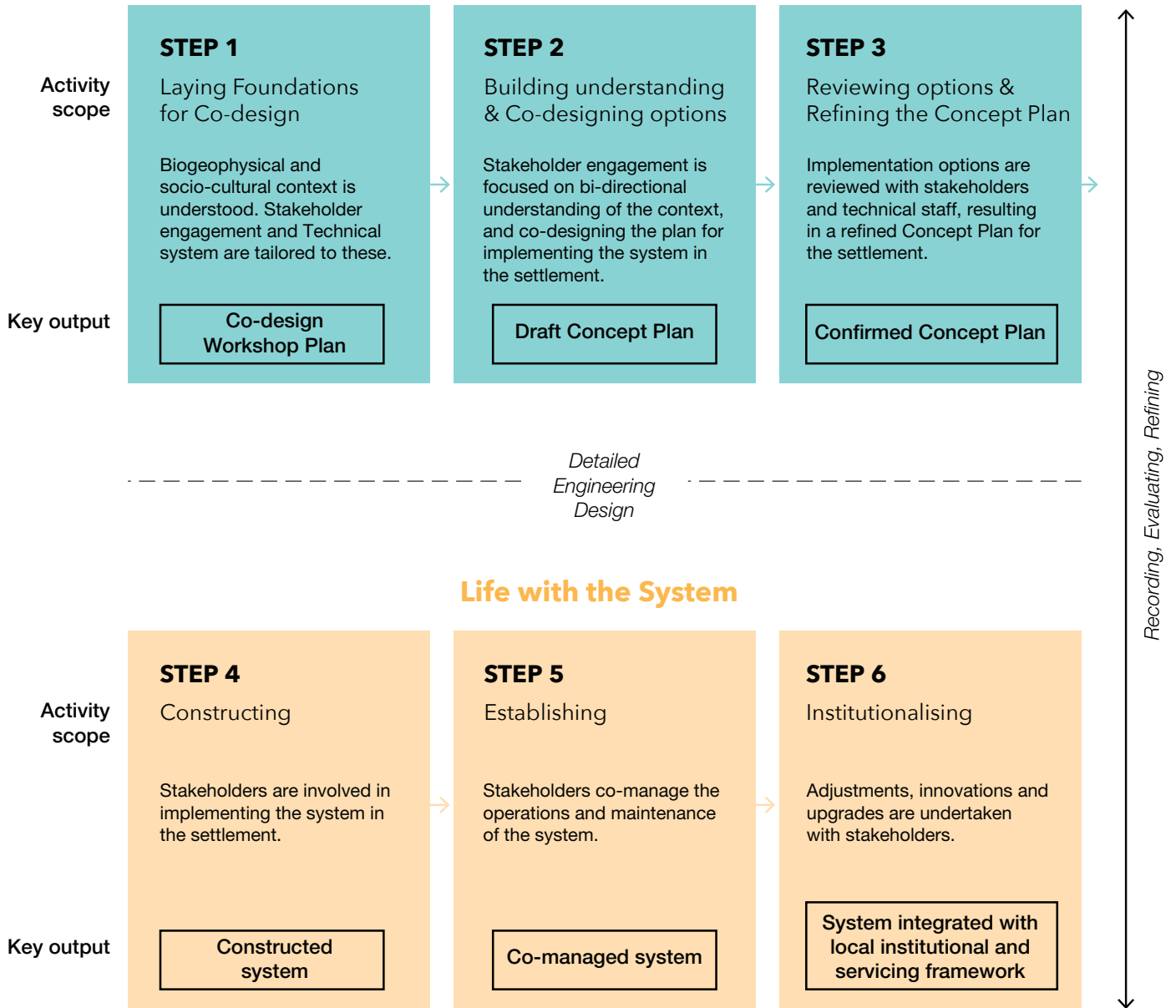
This Report focuses on the WSC co-design approach and activities that can be implemented to support the development of the Concept Plan through Steps 1, 2 and 3. An evaluative mindset is applied throughout the process to allow the team to learn from interactions and outcomes.

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**“Co-design happens over time and across structures – it requires a different kind of relationship between people which incorporates trust, open and active communication and mutual learning. Co-design is a process not an event.”**

(Burkett 2012, p8)

### Co-designing the System



The steps involved in the WSC co-design process. Activities and key outputs are linked to each step. Applying an evaluative mindset throughout the process allows the implementing team to learn from interactions and outcomes.

### 3.2 Reaching a Concept Plan through Steps 1-3

It is important to dedicate adequate time for meaningful consultation with stakeholders to co-design water and sanitation interventions.

**Step 1 is critical to prepare for the co-design with stakeholders, and requires a deep understanding of the neighbourhood context and of the water-sensitive technologies that are being considered.** It is important to allocate a sufficient period of time and associated body of preliminary work prior to community engagement. This step is crucial to develop a contextual understanding and project specific participatory design approach. It represents the period in which teams are established, sites are selected based on transparent criteria (if not completed already), and teams develop familiarity with the local context with a focus on stakeholder networks, culturally appropriate engagement, local ways of knowing, and settlement and community characteristics. This information and processes are crucial to build implementation capacity and understanding of the WSC approach applicability to a context. This is necessary before beginning co-design so that the information and scope of the project is clear to avoid miscommunication or raising community expectations.

It is crucial that project funding is secured before embarking on community co-design. Project funding could be through, for example, grants or loans from development banks, central or local government budgets, philanthropy, or non-profit or United Nations project funding. Common to all sources is the importance of securing project funding before significant engagement with communities so the scope of the project is known and therefore this can be transparently communicated to communities from the outset.

**Steps 2 and 3 are critical to develop a Concept Plan for the water-sensitive neighbourhood upgrade which will be sustainable in the long term.** Together these steps represent the period in which diverse men, women, youth and children come together with the implementation team to describe and record settlement and community

characteristics and aspirations, and co-design the location of the infrastructure. This information and processes are critical to adapt the water and sanitation infrastructure and integrate it within the biogeographical and socio-cultural context of the neighbourhood in order to support sustainability and uptake.

The Concept Plan is an output of the co design process and is a spatial, scaled map that shows the location of water and sanitation infrastructure as agreed and marked out with the community that will inform the Detailed Engineering Design (DED) — is the result of a sequence of activities that involve the community in a range of different ways while establishing a common understanding of the neighbourhood's characteristics and challenges, the water-sensitive system and its technologies, technical requirements, and social and environmental benefits.

The following key design principles can be used to develop the Concept Plan for the water-sensitive neighbourhood upgrade with the community:

- ✓ Design directly relates to the neighbourhood, as defined by the community.
- ✓ Design is equitable — anyone has the opportunity to connect and no one should be adversely affected by the project.
- ✓ Design considers the neighbourhood's resources (both physical and social).
- ✓ Design does not obstruct important and valued everyday practices.
- ✓ Delivers maximum benefits in the smallest footprint possible.
- ✓ It adds value — provides multifunctional spaces, and treated water can be reused.
- ✓ Provides safe collection and treatment of blackwater.
- ✓ Provides safe collection, and — if possible — treatment of stormwater and greywater.
- ✓ Considers the full lifecycle of system components and aims to minimise maintenance cost.

The activities in Steps 1, 2 and 3 should be designed so that they promote meaningful engagement and informed decision making with residents. Since engagement needs to be tailored to the local socio-cultural context, and project scope, the following sections describe representative activities and outcomes that have been developed to deliver the RISE water-sensitive settlement upgrade. In line with the objective of co-designing a plan for water-sensitive settlement upgrading, it is important that the activities that support the development of the Concept Plan are undertaken from the following principles:

- ✓ Participants can freely share the challenges faced by their community, their tacit knowledge of existing water practices and associated challenges, and their preferences for solutions for these.
- ✓ Discussions are broad and include identification of challenges within the community beyond water and sanitation. The co-development of infrastructure solutions should aim to address these broader challenges wherever possible. For example, poor access (footpaths and roads) is often addressed separately from the challenge of providing water and sanitation, but in many cases the two can be solved together with improved flood management and drainage. On a practical level, improved/raised pathways typically reduce exposure to faecal contamination in the environment.
- ✓ Participants can gain a sufficiently deep understanding of the water-sensitive technologies (pressure sewers, wetlands, biofilters etc.) to ensure they can make informed choices about the location of any such infrastructure, with an understanding of long-term commitments for operation and maintenance.



**“PANRITA (co-design) is about the environmental improvement of our informal neighbourhood. We went to measure the place for the pressure tank, the septic tank, and also the wetlands. We also sprayed paint [outlining where infrastructure could go]”.**

Community member from Makassar, Indonesia

## 4. Step 1: Laying Foundations for Co-design

### 4.1 Representative activities in Step 1

#### *Activity 1.1: Develop a 'fit-for-purpose' co-design approach*

While many toolkits and guides exist for implementing community-based sanitation and neighbourhood upgrading, it is understood that engagement approaches and activities must be tailored to both the project scope — in this case the indicative outcomes and technologies — and socio-cultural contexts of communities and neighbourhoods that the project is being implemented within.

Undertaking research and development of a participatory design approach needs dedicated time to scope existing practices and build on existing efforts. Developing co-design activities and/or tools should also pay attention to existing practices (good and bad) to build on existing networks, tacit knowledge, and capacities, and most importantly avoid repeating past mistakes with community engagement practices.

A range of activities can be undertaken as part of the scoping. Key examples include: identifying project timeline and activity sequencing; defining scope of intervention and identifying key topics that needed to be taken into account; and identifying potential challenges, sensitive topics and risk factors. A review of other approaches including guides and toolkits for community-based sanitation and upgrading can also offer important lessons and direction for generating an effective co-design process.

#### *Activity 1.2: Pilot activities and tools (to adapt to local context and project scope)*

It is important to test and iterate activities and materials. Involving communities in the design of tools can ensure that the co-design activities, tools and sequences meet the local conditions and cultural norms. If relevant, these can be piloted during in-country testing and demonstration of technologies. Refer to Box 1: Contextualising participatory design processes and Box 5: Testing and demonstrating technologies in context.

The process of piloting the WSC participatory design approach includes developing, testing and refining activities to help understand culturally appropriate ways to engage, local ways of knowing, and settlement and community characteristics. In doing so, community members will be engaged in a meaningful way that contributes to both project outcomes and social outcomes. Refer to Box 2: Piloting co-design in different socio-geographical contexts.

### **Box 1: Contextualising co-design processes**

In the RISE Makassar project the participatory design process described in Step 2 and Step 3 was locally named *PANRITA* - short for 'PerencanaanAN RI kampung TA', which means planning in your neighbourhood. The acronym *PANRITA* is also a word that refers to a highly respected person in a community, who is capable of seeing a situation from different perspectives, a good listener capable of coming up with the right advice for complex situations. *Panrita* comes from a local tradition where a craftsperson works with a community to design and build within a holistic approach with their environment. Based on the research and development, it was important that the process was contextualised and perceived to be related to local culture and existing processes in order for the program and its infrastructure to be accepted.

## Box 2: Piloting co-design in different socio-geographical contexts

Within the RISE program, in Step 1 the teams undertook research and development of the WSC participatory design approach. This included piloting activities as part of the water-sensitive technologies demonstration in Makassar and Suva to develop and test co-design activities, tools and content. These activities provided contextual grounding for the approach. They were developed on the basis of established approaches and tools, and enacted with an evaluative mindset that allowed the team to learn from interactions and outcomes, making necessary adaptations.

Key lessons from the piloting included the importance of:

- ✓ Workshops to be held in a neutral space in order to facilitate representation of the whole community;
- ✓ Trained facilitators that were from the same cultural and ethnic backgrounds as the communities;
- ✓ Workshop activities and materials that supported delivery of outcomes required by the project while being adapted to local ways of knowing and interacting.



*Before running co-design activities with communities activities and tools were developed by the teams, and then piloted with students, academics and practitioners.*

### *Activity 1.3: Engage project stakeholders and establish partnership with community*

Partnerships should be established with project stakeholders from early on. Local government, agency and authority stakeholders should be actively involved in preparatory activities such as site selection, infrastructure selection, and potential complementary works. Partnerships with communities can be initiated through existing community organisational structures, such as leaders and groups, but may also include groups established by the project as representatives of the community, such as Community Engagement Councils. If specific project engagement groups are to be established, membership should be representative of gender and social groups. Refer to Box 3: Involving communities in implementation in a range of ways and Box 9: Establishing a bridge between communities and the program.

### *Activity 1.4: Undertake Integrated Water Management training with stakeholders*

Ideally the diverse stakeholder groups (local government, agencies and community) are involved in training activities for the water-sensitive technologies before co-developing operation and maintenance (O&M) responsibilities. Refer to Volume 3 for a description of these technologies. If undertaking a city-wide program, it is essential that this is undertaken prior to the principle co-design workshops with communities. This information and any agreements around collaborative management can then be shared and discussed with communities, as part of the neighbourhood-specific infrastructure design and planning. Refer to Box 4: Capacity building for collaborative infrastructure management.

## **Box 3: Involving communities in implementation in a range of ways**

Specialty engagement groups bridge between the program and community facilitating two-way communication. This can include groups that are established from the outset as representatives of the community, such as Community Engagement Councils, and groups that are established relating to the water-sensitive infrastructure implementation. These could include groups relating to neighbourhood specific data collection, such as a Community-based flood monitoring group which can support understanding neighbourhood hydrology, or Servicing clusters formed as part of the implementation and management of the infrastructure.

As the program progresses, it may be beneficial to involve other members of the community with relevant experiences and interests that are aligned to the delivery of the system and can act as Community Champions becoming project advocates, involved in early prototyping and/or during Co-design, Construction and Establishment steps to ensure appropriate contextualisation. These community members can be important advocates for water-sensitive upgrading, helping to communicate the technical aspects of the infrastructure system and its benefits.

## Box 4: Capacity building for collaborative infrastructure management

One of the most important factors for the longevity and success of RISE's infrastructure is that there are clearly delegated responsibilities for who will operate and maintain it. Training sessions on the technology used in the RISE water-sensitive settlement upgrade — such as the pressure sewer system — were undertaken in Makassar and Suva. These were supported by South East Water, a RISE industry partner. The sessions sought to initiate conversations around operation and maintenance (O&M) with stakeholders, to see who people thought these should fall to, and create an environment where everyone could workshop ideas about future arrangements together.

For the RISE Makassar project, this included a focused training day on the pressure sewer installation, commissioning and O&M attended by community representatives and staff from the technical implementation unit for wastewater treatment (UPTD PAL). The RISE team were later invited as guest speakers at a UPTD PAL Management and Information Systems training where they also presented on O&M of the pressure sewer system.

For the RISE Fiji project, community representatives came together with local RISE partner organisations the Water Authority of Fiji, the Department of Water and Sewerage, Suva City Council and the project engineering consultant, for a two-day training on infrastructure O&M. Participants engaged in hands-on learning about the technical aspects of RISE's infrastructure, and discussed shared responsibility for

its maintenance. After opening remarks from the Ministry of Waterways and Environment and the Water Authority of Fiji, participants were shown how the systems worked. They then broke into groups to brainstorm different ideas of who maintenance responsibilities might lie with.

Following these initial sessions, further training was planned for both community members and agencies — aligning with (i) installation, (ii) commissioning, and (iii) ongoing O&M.

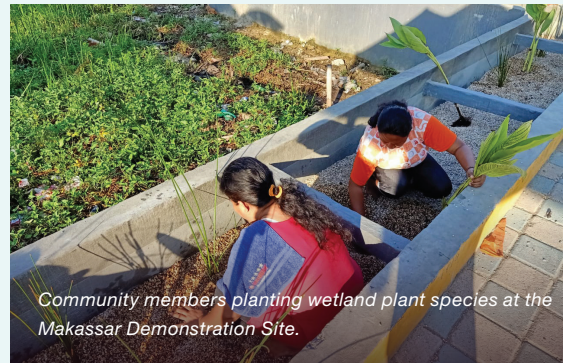


### Activity 1.5: Confirm project scope

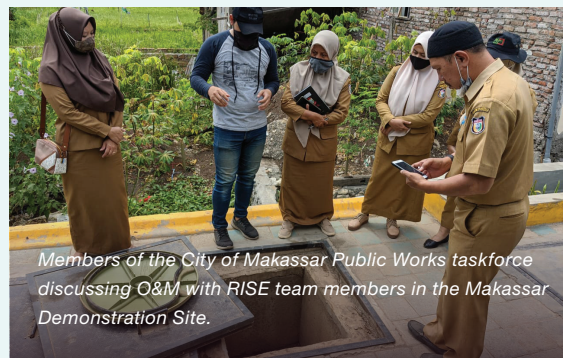
It is crucial to confirm the project scope before beginning co-design to avoid raising community expectations or miscommunication. Confirming the project scope will include a range of activities necessary to ensure that the water-sensitive approach is suitable and adapted for its implementation context and to build implementation capacity. This is essential to establish in advance of undertaking the participatory design workshops with communities as these formed limit conditions that would need to be discussed with communities as part of the infrastructure design and planning — such as extent of works, feasible locations for infrastructure on sites, costings, and O&M considerations. The following paragraphs describe some of these activities that can be undertaken and help prepare the team and stakeholders for co-design.

### Activity 1.6. Identify and review water-sensitive technologies in context

Based upon the range of water-sensitive technologies, and O&M and servicing of these, and the environmental and health stressors that the project seeks to address, during Step 1 it is opportune to identify and confirm any local adaptations that may be required, along with potential risks to the intervention's success. This can be identified through undertaking a case study review of relevant implemented projects or, if timing and funding allow, demonstrating or trialling technologies in context. Local adaptations and potential risks can then be addressed with stakeholders in discussions around operations, maintenance and servicing, and through specific co-design workshops to ensure that technologies are integrated in communities in an appropriate way. Refer to Box 4: Capacity building for collaborative infrastructure management and Box 5: Testing and demonstrating technologies in context.



Community members planting wetland plant species at the Makassar Demonstration Site.



Members of the City of Makassar Public Works taskforce discussing O&M with RISE team members in the Makassar Demonstration Site.

## Box 5: Testing and demonstrating technologies in context

As the water-sensitive cities (WSC) approach is based on adapting the green infrastructure to context, it can be useful to implement demonstration projects to establish the application of the technologies in the context of a new city or country. This provides an opportunity for testing, developing and implementing the technologies within the environmental and socio-cultural contexts, as well as providing valuable information around plant availability, material sourcing, community-based construction approaches before full-scale program (and then project) design and implementation can occur. Additionally, the demonstration sites can be a useful capacity building opportunity with team members and institutional partners collaborating in their implementation from the early concept design stage undertaken with communities and technical experts, through to Detailed Engineering Design (DED) and construction.

### Activity 1.7. Identify topics critical to implementation and sustainability

Topics that are critical to the project's implementation and sustainability should be established during Step 1. These may be related to the scope of the project to be implemented, such as: the range of water-sensitive technologies, and O&M and servicing of these; and the environmental and health stressors that the project seeks to address. In addition, they may relate to the particular implementation context, such as: biogeophysical characteristics of the neighbourhood(s); settlement characteristics (morphology and tenure) of the neighbourhood(s); and social and cultural practices of the community. Refer to Box 6: How do you use your toilet? Developing a culturally appropriate toilet.

These will need to be considered in terms of when and how they influence the implementation and sustainability of the upgrade. These influences should be incorporated at various points within the co-design with stakeholders in Steps 2 and 3, such as in dedicated participatory workshops, and during later steps, such as Step 4: Construction and Step 5: Establishment.

### Activity 1.8. Site assessment and planning

During Step 1 a range of base information should be prepared that will help to refine the scope of the water-sensitive settlement upgrade, and inform the development of the participatory activities and tools that can be used during Step 2 and Step 3. Activities to collect this base information may include: a technical survey, including hydrological and geological assessment; and a community/neighbourhood survey, including demographic and sanitation assessment.

*It is important to tailor the structure of co-design with communities to the project's biogeophysical characteristics, built environment characteristics, and community social and cultural practices.*



## Box 6: How do you use your toilet? Developing a culturally appropriate toilet

In the RISE program, one of the activities that was particularly useful for both the refinement of project scope and developing engagement approaches was the Toilet Workshop. This workshop was part of the Demonstration Site engagement in the RISE Indonesia project and the RISE Fiji project. Role-play and 1:1 mapping was used to identify potential exposure pathways to contamination, and to develop contextually appropriate designs for water and sanitation infrastructure (for example dedicated areas with toilets, bathing areas and raised hand basins). The designs — which began with the same starting layout — were adapted significantly as a result of this,

and took into account experiences and preferences of communities, teams and the RISE program's public health researchers.

Observing the participation of community members within the workshops also helped the team understand levels of spatial awareness in communities. This meant activities and materials could be developed for other workshops that would provide meaningful opportunities for involvement in spatialising the layout and design of infrastructure, and ensure that any agreements were based on understanding.



*Understanding local water and hygiene practices and adapting the design of the toilet for communities in Makassar and Suva.*

### Technical survey

WSC approaches rely on a context-specific understanding of site conditions, including terrain and local hydrology, the characterisation of environmental water flows and levels across sites. For a detailed description of this refer to Volume 3, Section 8 on drainage.

Where cadastral data does not already exist, aerial and feature surveys can be undertaken for the purpose of preparing accurate base datasets for each neighbourhood. This information is important for both technical design to inform project scope, system design and by relation community engagement. Aerial photography can also be used to support direct engagement with the community, as a base upon which to synthesise their experiences spatially, to relate directly to the design. Refer to Box 12: Bringing community knowledge and experience together with infrastructure planning.

When sufficient data is not held by the local government, this can be an opportunity to engage the community in mapping and monitoring, building off citizen-science and participatory approaches. This activity can be used to help identify critical contextual issues for neighbourhoods, and vulnerabilities. It can also contribute to local capacity-building around environmental literacy. For example, in the absence of hydrological data, communities could be engaged in flood monitoring. Refer to Box 7: Developing water literacy- how does flooding affect your neighbourhood? Hydrologists and civil engineers can then use this locally-collected water level data to supplement coarser government datasets and produce computer models of local catchment flows, understanding how hydrology and drainage impact communities and to what extent the intervention might interact with these.



*Involve community members in identifying critical contextual issues for their neighbourhoods, and vulnerabilities. This can build local capacity around environmental literacy.*

### Community/neighbourhood survey

Community characteristics should be mapped with the community during Step 2. However, in order to scope the project and refine the selection of water-sensitive technologies, preliminary mapping can be undertaken to understand a range of community and neighbourhood characteristics, such as:

- ✓ Site context — location and adjacencies, predominant geographic and demographic characteristics;
- ✓ Land use and tenure — existing land use, open space, tenure conditions, locations of economic, social and recreational activities;
- ✓ People — number of families, household composition, socio-economic characteristics, ethnic/social/gender dimensions and vulnerabilities;
- ✓ Housing — number of dwellings and households, housing quality;
- ✓ Precinct and local hydrology — ponding or flooding, culverts and drains, permanent water bodies, potential sources of faecal contamination (septics and toilets);
- ✓ Topography — site terrain (flat, steep or undulating), areas of ponding;
- ✓ Water services — water sources including access, reliability, use, cost and whether it is shared;
- ✓ Sanitation services — toilet location, usage (by household or shared) and type (pit, pour flush or flush, shared or individual septic); solid waste disposal; greywater management.

Information on water and sanitation services - coupled with topography and hydrology — will support the assessment of the existing level of treatment and potential exposure risks within a neighbourhood, and is necessary to refine the scope of the water-sensitive intervention.

## Box 7: How does flooding affect your neighbourhood? Developing water literacy

To address gaps in hydrological information about the neighbourhoods that the program was upgrading, the RISE team installed flood gauges and crest level meters within flood-prone neighbourhoods. This included seven in Makassar and six in Suva. The aim was to gain a more accurate understanding of water flow and levels, to eventually inform the design of RISE's infrastructure intervention.

The program involved volunteers from communities reporting daily water levels in their neighbourhood throughout the wet season using an instant messaging app on their mobile phones. In Fiji, these residents came to self-identify as the *bati ni draki* – or 'Weather Warriors'. In Indonesia they became the *KePoAir*, the 'Water Monitoring Group'. Levels

were registered by taking photos of the flood gauge that the RISE team had installed. During high rainfall events the volunteers sent through hourly images – while safe to do so – to provide information on rates of water level change.

By the end of the rainy season in 2020, the residents in Fiji and Indonesia shared more than 5,000 photos with the RISE team. Of those, more than 500 photos provided researchers with water level references documenting the floods experienced by the communities in 2018, 2019 and 2020. This both filled in missing data, and provided a mechanism for ongoing engagement with communities during the project initiation phase.



Water level monitoring in the RISE Makassar project.



Water level monitoring in the RISE Suva project.



#### Activity 1.9. Investigate land aspects

Based upon the local context, it may be required to address tenure conditions in advance of and/or during Steps 2 and 3. First, the land status of the neighbourhood should be confirmed along with any requirements for formalisation or regularisation identified and initiated with relevant stakeholders. For example, based upon discussions around operations, maintenance and servicing of the water-sensitive technologies it may be necessary for infrastructure to be located on public land, or if on private land within easements. Relevant information could then be prepared- for example information on current land status, potential changes to land status as a result of project involvement and implications (for example taxes, greater security of tenure), land agreements, ready for co-design with the community to identify infrastructure locations. Refer also to Volume 3, Section 2.2.

#### Activity 1.10. Prepare preliminary designs

A preliminary design, or servicing scenarios activity, can be undertaken by the implementation team to develop a series of technically feasible infrastructure servicing options for each site. The purpose of developing these options is not for presentation to the community, but to help the implementing team scope the intervention based on available financing, and set limit conditions for locations and size of infrastructure based on site conditions.

The activity builds off information collected in the site assessment activities to develop a range of options for treating blackwater and greywater, and managing stormwater through improved drainage. The costing of these options should be based on local supply and construction rates and with sufficient detail to confirm project budget requirements.

This activity helps build familiarity of the implementing team with the technologies and their applications, as well as cost implications of particular strategies, in order to prepare for community co-design. The team can then be responsive when engaging with the community around what the project can and can't achieve.

#### 4.2 Representative outcomes for Step 1

The activities undertaken in Step 1, cumulatively contribute to a number of outcomes that support the implementation of the WSC approach, along with the core output- the Co-design Workshop Plan. The types and range of tangible and intangible outcomes from this step are as follows:

- ✓ Engagement approaches, activities and tools are developed;
- ✓ Partnerships and communication channels are established-
  - Local government actively involved (site selection, operation and maintenance discussion, complementary works);
  - Local authority capacity building for water-sensitive technologies started and running;
  - Communities engaged;
- ✓ Social and environmental safeguards are established;
- ✓ Project scope is confirmed-
  - Water-sensitive technologies identified;
  - Project-critical topics identified;
  - Risks to intervention's success identified;
  - Site assessment and planning completed;
  - Contamination pathways in relation to human health and environment identified;
  - Land regularisation processes identified and initiated;
  - National, regional and local government guidance understood;
  - Preliminary designs to establish project feasibility completed and budget confirmed.



*Understanding local water and sanitation services will support the assessment of the existing level of treatment and potential exposure risks within a neighbourhood and is essential to the contextualisation of the water-sensitive intervention.*

## 5. Step 2: Building Understanding and Co-designing Options

### 5.1 Representative activities in Step 2

In Step 2 the activities provide opportunities for the community to: share information about their neighbourhood; learn about the water-sensitive approaches, including the technologies and their O&M requirements; and mark potential locations of those technologies with the implementing team in unbuilt spaces and along roads and access ways. Based on a participatory design approach, it is critical that there is no one person drawing the plan, that everyone in the community has the opportunity to contribute to spatialising the upgrade — marking it out together. The understanding that is built through these activities is multi-directional, the implementing team and external stakeholders — such as agencies - are developing knowledge about the neighbourhood and the communities' knowledge and lived experiences, while the community are learning about the water-sensitive technologies and design.

#### *Activity 2.1: Establish an inclusive workshop space*

The emphasis in co-design should be on hearing many perspectives. It is important to establish a neutral space for gathering for the purpose of reaching everyone. Ideally, this space should not be aligned to particular denominations, families, or power dynamics, and should be visible and accessible. It should be large enough to accommodate the number of people within the largest level of community engagement — for example the whole community. The space should be comfortable to be in and have adequate shelter for the local climate. The community can be involved in identifying a suitable location in the neighbourhood. If a suitable space does not already exist, then it may be possible to install tents or canopies within an open space with the community's agreement and support. Refer to Box 8: Openness and transparency for all: a tent exhibition of the WSC approach.



*If a suitable space does not already exist, then it may be possible to install tents or canopies within an open space with the community's agreement and support.*

### Box 8: Openness and transparency for all: a tent exhibition of the WSC approach

For the RISE Makassar project a tent was used to create a sheltered, neutral space for the workshops as permanent community spaces that could accommodate at least one representative from each household did not exist. When the implementation team installed the tents and posters in each neighbourhood, community members spontaneously got involved. This collaborative work helped to build familiarity with the team and excitement about the project. It is the start of a process through which the team and community work closely together to develop the Concept Plan.

Inside the tent was a series of posters that related to different parts of the design process, and project delivery. It was divided into 3 main topics: 1) *Panrita*

– explaining the participatory process timeline and activities; 2) *Our neighbourhood* – explaining the main information about the specific neighbourhood, which is added to over the course of the week; and 3) *Nature based system* - explaining functional and maintenance aspects of the RISE infrastructure.

Having the posters installed in the tent meant that all the information that was discussed with the community would be available throughout the duration of the workshops (throughout Step 1 and finishing with the start of Step 2), around 2 weeks. Those that were unable to attend the main activities could look at the information in their own time.



Working together to install the exhibition helped build familiarity between the team and community- before discussing complex topics.



Co-design should involve all members of the community – including children.



The support of community leaders throughout the co-design process can be crucial to the project's acceptance.



It is important to establish a neutral space for co-design, so that all members of the community feel able to participate.

## Box 9: Establishing a bridge between communities and the program

The Community Engagement Councils (CEC) have been an important structural aspect bridging RISE with communities and vice versa. These groups were established by the broader RISE project in 2018 in each of the 24 communities across Makassar and Suva. They play an important role as community representatives, building strong cooperation between the program and the communities.

In the RISE Makassar project these groups have even been renamed, and are called KePoLink, which is short for Kelompok Pengelola Lingkungan translating to 'Environmental Management Group'. In the RISE Fiji project, regular quarterly meetings have been coordinated to bring the CECs and team together for information sharing and capacity building. RISE teams

present on upcoming activities and CEC members may have the opportunity to provide input on how these will best fit in their community based on space limitations, community dynamics etc.

Regular meetings contribute to developing trust and open communication between the communities and program. In both countries the members of the CEC have been important two-way connections between the project and communities- for both the RISE assessment activities and intervention activities. The CEC groups have also been instrumental in coordinating community gatherings, identifying vulnerable households and individuals, and connecting with absent landowners.



*Regular meetings can bring the CECs and team together for information sharing and capacity building.*

### Activity 2.2: Capture communities' lived experiences and environmental knowledge

It is important that the co-design workshop provides a space for the community to share their local knowledge, as experts of their own lived experiences and environments. Here, the implementation team takes on a listening role, recording what is shared.

The activity can provide a forum to hear residents' different knowledge and perspectives of their neighbourhood. Activity format and materials should take into account the lessons from Step 1, about communities' ways of knowing, and dealing with social dynamics and vulnerabilities, among others. It is important to develop documentation methods that both record and spatialise everything that is described. The information can then be tied into the design of the water-sensitive intervention. Refer to Box 12: Bringing community knowledge and experience together with infrastructure planning.

In order to be inclusive and manage power dynamics within the community, these sessions can include tailored focus group activities for adults, youth and children. If information is shared in different groups it should be shared back with the whole community to bring the different opinions and perspectives together and reach a common understanding. This will assist with achieving consensus for decision making later on.

The topics discussed in *focus groups* should be aligned with the water-sensitive settlement upgrading. Potential topics include:

- ✓ **Environment** — Residents map positive and negative aspects of the environment. For example: trees and plantations that are valued by households and groups — for produce, shade, or other reasons; poorly functioning roads and drains; greywater and blackwater ponding; and areas that flood.
- ✓ **Access and transportation network** — Residents map the usage of streets and pathways in the neighbourhood and their plans for future access. For example: locations of private and public access ways; types of vehicles that access way accommodates.

- ✓ **Community spaces** — Residents map places that are used by the community in the neighbourhood. For example: religious buildings; gathering spaces; play areas; markets.
- ✓ **Water and sanitation** — Residents map all water sources in the neighbourhood and houses with poor sanitation (i.e. no toilets, broken septic tanks). Depending on the level of water access and exposure risks that was identified in Step 1, it may be important to also qualify these. For example: recording what each water source is used for (drinking, washing food or dishes, bathing, washing clothes), or households sharing facilities.

This activity can contribute to improved environmental literacy in the community, through making contamination pathways tangible by recognising unhealthy environments and practices. For example: the need to have a toilet, impacts of unlined septic tanks, unhealthy hygiene practices. The spatial component of this activity — how things are mapped and located — can be useful to link these together and contribute to triggering. Refer to Box 10: Navigating domestic (private) infrastructure provision and Box 11: Building community capacity to understand contamination.



**“We worked closely with community members, as equals, to understand their lived experience and how they use their environment. This local knowledge was crucial to develop a concept plan that reflects what the residents want and need”.**

**Noor Ilhamsyah, Community Architect / Engineer, Makassar**

## Box 10: Navigating domestic (private) infrastructure provision

Based on RISE program timelines it was not possible to trigger all households to finance and build their own toilet. For the Makassar project, a criteria to identify vulnerable households was developed relative to the local context, and government markers. These included: being below the poverty threshold and unable to afford a toilet, and having a disability, among others. Households that were lacking existing sanitation facilities, or had facilities in poor condition, were identified as vulnerable and potentially requiring support to improve sanitation conditions.

Based on the workshop objectives and community dynamics, the team agreed that it was appropriate to identify vulnerable households within the group forum, and then use other subsequent activities to add to and reconfirm this information. In the group

session, households that did not have their own toilet were identified. Then, during house visits later in the workshop the team identified within a private discussion how that household currently met their sanitation needs, why they had not built a toilet, and whether they met the other criteria.

Although the team was responsible for final allocation of new private toilet facilities with funding support by RISE, by identifying and confirming the households at a number of points in the process, and providing a public forum for early identification, the team felt that this helped tie the infrastructure provision to unhealthy environments and practices and clarify for communities how and why infrastructure is being assigned. It was hoped that this would reduce the potential for perceived inequity or favouritism.



*Mapping water and sanitation practices in Makassar co-design activities.*



*A toilet identified to be in poor condition, without walls and a roof.*



*Explaining the criteria for toilet allocation, in line with government markers.*

## Box 11: Building community capacity to understand contamination

During the Makassar project's *Panrita* workshop the community also had the opportunity to select locations in the neighbourhood to take water and soil samples for testing — called the community Science Day. The concentration of E.coli — one of the main indicators of faecal contamination — was measured in the RISE lab and the results reported back to the community

during the Step 3 Concept Plan presentation. This activity aimed to connect the built intervention with the scientific side of the project, as well as to trigger the community to understand the need to act on the unhealthy environment. This activity was jointly facilitated by the RISE Build Team facilitators and the RISE Assessment Team lab staff.



Collecting a water sample from a drain.



Processing water samples with RISE lab staff and members of the community.



RISE Lab staff explaining the process of sampling and testing for unhealthy water and soil quality.

## Box 12: Bringing community knowledge and experience together with infrastructure planning

During the Makassar project's *Panrita* workshop a high-resolution aerial photograph of the neighbourhood was used across a range of activities to help orientate residents and the team to the neighbourhood and to synthesise the information that was being shared and integrated into the design. The facilitators were responsible for noting locations and descriptions of information that was shared.

For the whole-of-community sessions, the aerial orthophoto was printed on water-proof vinyl. It was used to: 1) orientate all households to recognise the

neighbourhood and the location of their home in map format, 2) collate, confirm and visualise information shared in Focus Groups, 3) discuss and agree on servicing clusters as a group, 4) discuss preliminary options for infrastructure distribution. With the image printed at a large scale, many members of the community could gather around and be included in the conversations about the planning of their community.



Mapping information on the aerial photograph during focus group discussions about neighbourhood features and characteristics.



Using the aerial photograph to orient households.



Bringing together information shared in smaller focus groups on the large aerial photograph printed on vinyl to share perspectives.



Discussing potential arrangements of infrastructure around the large aerial photograph printed on vinyl.

### *Activity 2.3: Undertake water-sensitive technologies training with the community*

It is important that the community's infrastructure literacy is also developed through the engagement process. This includes understanding the scope of the water-sensitive settlement upgrade, what each of the technologies are, their functions, and related O&M requirements. This is important because the community needs to understand their prospective responsibilities and commitment from the start. Although this information is technical, infrastructure literacy can contribute to sustainability and uptake in the long term. It is therefore useful to make the explanation fun and engaging for the community. For example, this might include finding ways to involve members of the community in the explanation and demonstration. Refer to Box 13: Bringing infrastructure to life, the RISE System Theatre.

Having the whole community represented at these sessions is important, since the first design decisions and important explanations about the technologies and their implementation — such as allocation, costs, and land — should be discussed. Hearing this information at the same time can strengthen collaboration and avoid misunderstandings.

Activities covering the following topics should be included:

- ✓ **How does the System work?** What are the maintenance requirements and running costs? — Introduction of each of the water-sensitive technologies and their function. Introduction of the maintenance requirements and running costs. For example, what are the activities, who are they undertaken by, and how frequently are they required. In the case of costs, are these shared among the community, or added to rates that are paid to the relevant authority?

- ✓ **Land aspects** — Land aspects, including potential changes to land status and agreements, should be discussed at this point. For example, does the technology need to be located on public land, or if it is on private land is there a requirement for easements and access. Where location of infrastructure on private land may be required, a full description of land agreement options, including their relevant benefits and drawbacks, and any compensation entitlements, should be discussed. It should be made clear that all participation is voluntary. Any community or household contributions should be equitable and fair.
- ✓ **Servicing clusters** — Are there any collective aspects to the implementation of the water-sensitive technologies, for example- shared infrastructure or payments? These may be affected by community dynamics such as family relationships, clan groups or religious denominations among others. The parameters for these should be discussed with the community and basic principles can be established in the large group. Further detail and decision making can then occur within Servicing cluster and household discussions.

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**“In the context of informality, people are often focused on the urgency of their immediate needs, shelter and economy. Therefore, it can be challenging to explain and demonstrate the value of a [project] that is focused on the communal benefits of a healthy environment, designing systems for flood mitigation, climate change resilience, objects and things that are either underground (and invisible) or for the not-so-near future.”**

(Ramirez-Lovering et al 2020)

### Box 13: Bringing infrastructure to life, the RISE System Theatre

During the RISE Makassar project's *Panrita* workshop the technical aspects of the system function were explained to the community through an interactive 'theatre' activity. Each technology of the blackwater and greywater treatment systems was introduced by one member of the RISE team, in local language and/or dialect. Each element was shown on a poster which was held by a child from the community. Blue rope, representing water, was used to show the connections between the elements that the wastewater moves through. Each poster was held at a different height, illustrating where each part of the system fitted in relation to the others, and where the wastewater flowed by gravity or by pressure. The children

were encouraged by the team to have fun and make movements that reflected the process of each element- for example the 'blending' of the pressure tank pump. The activity was usually accompanied by humour and laughter, making speaking about these processes less awkward and helping residents remember the function of each element.

Through the explanation and roleplay, the community's infrastructure literacy was improved and they understood the core benefits of having a lined septic tank, a pressure tank, wetland, and greywater bio-filter, along with additional benefits.



RISE team and local children demonstrating the arrangement and function of the water-sensitive technologies through the RISE system theatre.

*Activity 2.4: Visioning workshops: Listen to and document community aspirations. Identify potential alignments to project scope*

It is important that the impact of infrastructure on individuals and households is understood, and fostered through the engagement activities since this can contribute to uptake and sustainability. It is important that the community's vision for their neighbourhood in the future is supported by the project, and the project in-turn is supported by the community. This might include connecting infrastructure to values and aspirations of the community, such as by including a community visioning session among early 'listening and sharing' stages of the process.

Different members of the community may have different hopes for the future. A common community vision for the future can be identified through a visioning exercise. For example, asking residents to imagine their neighbourhood in 10 years' time — focusing on what their aspirations for the future are. These aspirations should be shared with the whole group. In order to manage expectations, the facilitator can identify at the end of the session which of these are aligned to the project scope. The community can then build off the project in the future to achieve other aspirations.

*Activity 2.5: Identify and mark potential infrastructure locations with the community*

Mapping the infrastructure on the ground at full-size (1:1 scale) helps to facilitate community understanding of the system as a whole, drawing out the relationships between each technology. Spatializing the locations of infrastructure can trigger collaborative planning by allowing for a complex, grounded discussion about real impacts of the infrastructure implementation among the team of technical experts and groups of residents. It is key to mark both communal or shared infrastructure, and private infrastructure, that services individual households. These locations form the basis of the Concept Plan. Refer to Box 14: Marking the infrastructure at 1:1.

*Activity 2.6: Household visits: Visit each household to map and discuss arrangements for infrastructure connection, provision, O&M*

Individual discussions with each household provide an opportunity to cross-check information about potential vulnerability in relation to water and sanitation coverage. They also provide an important opportunity to hear perspectives that may not have been present, or overlooked, in larger whole-of-community workshops. These guide the design of

household interfaces with the water-sensitive upgrade— such as connections to communal infrastructure and allocation of private infrastructure (such as toilets or treatment systems). These discussions are an important part of including the community in an informed decision making process about the infrastructure. Refer to Box 15: Safeguarding gender and social inclusion.

These discussions, and notes of any decisions that are made, should be recorded and stored somewhere for easy reference during the design process to ensure that this information is carried through into Detailed Engineering Design (DED) and that safeguard requirements are met. The record of the conversation(s) for each household could be structured based on the required outcomes, and might also include technical information, photographs of the existing situation, and maps and sketches relevant to the interface of that house with the water-sensitive upgrade.

*Activity 2.7: Servicing Clusters: Co-design collective arrangements for infrastructure provision, O&M*

Collective arrangements for infrastructure provision, O&M, called 'servicing clusters', may be considered during project implementation. By marking the infrastructure that has a collective overlay, community dynamics can be revealed early on and potential issues that might affect the ongoing sustainability of infrastructure can be addressed. These discussions should include the exact position of the infrastructure so that negotiations of collective and individual impacts and benefits can be discussed including financing costs and responsibilities for O&M. For example, the location of infrastructure may affect current or planned use of private spaces, or shared spaces and access ways. Where required, plot boundaries should be mapped to clearly identify extents of private land and public space. When planning for infrastructure with this collective overlay, representatives from all included households should be present.

*Activity 2.8: Draft Concept Plan and undertake technical review*

Following the collaborative planning activities the implementation team can prepare the first draft of the Concept Plan and undertake a technical review. If arrangements that have been discussed with the community are not possible, the team may return to redesign these aspects with those community members that are directly affected. Further whole-of-community meetings may be required during this period.

## Box 14: Marking the infrastructure at 1:1

During the RISE Makassar *Panrita* workshops, the water-sensitive technologies (septic tanks, pressure tanks and wetlands) and their connections were first marked using flexible markers- coloured plastic containers- and tape- yellow for connections between infrastructural elements, and red for property boundaries, at 1:1 scale (1 metre = 1 metre). Once agreed they were re-marked with spray paint. This staged process allowed for flexibility as residents and the team discussed and negotiated the current and future uses of land.

Households were made aware that what was marked on that day did not need to be the 'final' location of the infrastructure and that they could discuss these locations with their family and neighbours, before readjusting the location to accommodate other trade-offs that might arise. In some cases it took several days for the location to be agreed upon by the groups of households that were included in collective arrangements for infrastructure provision, O&M, called 'servicing clusters'. Having the infrastructure physically mapped on the ground meant that they were able to discuss the size and impacts with family members and neighbours who were not present later on.

Once the location of each infrastructural element was agreed, the team took a photo of the household representatives and this element. Along with notes from the discussions this was part of the project's process of obtaining informed agreement, balancing household needs and expectations with project requirements.



*Representatives from several households marking the location of a pressure pod together.*



*Discussing and marking connections between infrastructural elements, from private toilets to pressure pods.*

## 5.2 Representative outcomes for Step 2: Building understanding

The activities undertaken in Step 1, cumulatively contribute to a number of outcomes that support the implementation of the WSC approach, along with the core output- the Draft Concept Plan. The types and range of tangible and intangible outcomes from this step are as follows:

- ✓ Lessons from case studies or demonstration sites are incorporated and acted on;
- ✓ Engagement groups are formed and operating;
- ✓ Community is triggered through improved water literacy;
  - Everyone is reached and wants to connect to the system;
  - Everyone values the system;
  - Everyone is prepared and excited about the upcoming change;
  - Concept Plan for communal infrastructure is drafted;
  - Community co-contribution agreed;
  - Vulnerable households identified;
  - Communal and private infrastructure requirements identified (includes collective arrangements, or servicing clusters);
  - Collaborative spatial planning triggered.

### Box 15: Safeguarding gender and social inclusion

From an implementation perspective it is key to understand neighbourhood dynamics relating to leadership, inclusion and gender, and other factors which might affect the implementation and sustainability of the intervention in a neighbourhood.

In RISE Makassar, the team found that meetings with formal (elected) and informal community leaders and elders within the neighbourhood provided useful information on past history of other projects that have or haven't worked and minority groups in the community. A water and sanitation discussion was also conducted with members of the community in each neighbourhood. This aimed to understand challenges and aspirations in relation to water supply, use, contamination pathways and sanitation. This activity provided deep insight into the sensitivity of these topics and issues that would not be discussed in a larger group.

These two additional activities, in conjunction with the others, helped the team to cross-reference information shared – such as the understanding of vulnerability – on a number of levels. For example, across the community mapping in sessions focused on understanding the neighbourhood from the community's perspective, and the servicing cluster and household discussions.

## 6. Step 3: Reviewing Options and Refining the Concept Plan

In Step 3 the aim is to refine and confirm the Concept Plan with the support of all stakeholders, individuals, communities, local government and agencies, businesses etc. There may be a range of activities that spread over several months during the transition from Concept Plan into DED. Following this step, the engagement shifts in focus from collaborative planning on the integration of infrastructure, to engagement around service design and the enhancement of understanding and uptake of the technologies.

### 6.1 Representative activities in Step 3

#### *Activity 3.1: Review Concept Plan with the whole community*

After the technical review of the Draft Concept Plan, the Concept Plan can be presented back to the whole community for feedback and discussion. All proposed project works that have been discussed separately at activities with servicing clusters and households can now be summarised in front of the whole community. This ensures transparency and acknowledges the importance of the community's role in developing and implementing the program.

Based on the findings from Step 1, care should be taken to describe the project works for the neighbourhood in a clear and simple manner that identifies the spatial implications of the design (where the infrastructure is going) and any co-benefits (positive outcomes that have been agreed with the community to integrate the infrastructure with current and future uses). For example, this could be through re-marking the locations at 1:1 scale, or by presenting the Concept Plan in a graphical-way. Refer to Box 16: Communicating the water-sensitive upgrade.

At this point in time any further changes that may need to be made can be noted by the team to integrate prior to the Concept Plan transitioning into DED.

#### *Activity 3.2: Other stakeholders's review of Concept Plan*

##### **Involve local government and agency stakeholders in co-design activities and Concept Plan review**

Local government and agencies that will be part of the servicing, O&M should be involved in community-based activities. This helps build trust between communities, the implementing program, and service managers. Stakeholder presence at activities can also create buy-in and goodwill among the project and result in a range of positive benefits. Refer to Box 17: Creating connections between communities and local government and agencies.

##### **Meet with external stakeholders to resolve design issues identified in the Concept Plan**

A range of other meetings should be held with external stakeholders between the resolution of the Concept Design and DED. These activities are critical to ensure the long term sustainability through having a sense of ownership from the start but also ensuring that the design is applicable to or adapted to existing frameworks for management. Meetings with agencies and local government may include groups relating to land management and planning such as land agencies, customary landowners, neighbouring landowners, and relevant planning authority, as well as those relating to the asset and its management, such as water and electricity authorities, and if relevant the future asset owner in line with long term O&M. This may also include meetings with neighbouring landowners- such as developers- to consult over site boundaries and land contributions.

Opportunities for co-funding additional infrastructure (solid waste management, street lighting, and water supply) can also be identified through ongoing involvement of these stakeholders to maximise benefits. It may be easier for other agencies to implement programs within the context of the existing co-design underway, as well as to address other needs that may be identified during the co-design but lie outside the project scope.

## Box 16: Communicating the water-sensitive upgrade

For the RISE Makassar *Panrita* workshops two maps were prepared to help communicate the integration of the water-sensitive upgrade in the settlement: the Community Map, and the RISE Infrastructure Map. While the RISE Infrastructure Map was considered to be the Concept Plan for the RISE Makassar project, the Community Map was an important supporting document. These maps were produced at the same size as the vinyl map that was used during other workshop sessions. Both maps used the aerial photograph as a base to easily orientate residents.

The *Community Map* documented a broad set of discussions, within the settlement which occurred across the community, cluster, household and individual levels during the *Panrita* activities throughout Step 2. The map attempted to record the social, economic, ecological or cultural functions of physical spaces, reflecting the values and aspirations of the community. By representing these characteristics the team acknowledged that they had heard what was said, and that these things were important. Where relevant, the map classified what might be addressed through the RISE program, what might be addressed by the community, and what could be addressed by the community with the support of other stakeholders.

The *RISE Infrastructure Map*, the Concept Plan, illustrates the position and size of infrastructural elements, as well as the connections with the existing houses. It represents a record of the agreement about elements that will be constructed in the near future. This map is used as the basis of the Detailed Engineering Design, along with the documentation of the *Panrita* workshop that relates the information shared at community, cluster and household levels.

During this final session the tent was set up like an exhibition of the workshop outcomes. Photos of the community participating in each activity from the earlier workshops, and a video with members of the community sharing their reflections on being involved

in the project, were displayed. This included photographs from the household connection and servicing cluster agreements. This demonstrated the involvement and commitment of the community in the project. The video helped to summarise the range of activities that had happened over the two-week period and also gave community members a ‘voice’ during the day.

Results from the Science Day were also presented back to the community by the RISE Lab staff- reinforcing the potential exposure pathways that could be improved through the water-sensitive neighbourhood upgrade. See Box 11: Building community capacity to understand contamination.



*RISE team member presenting the Community Map and describing the values and aspirations of the community.*



*Community members discussing the Community Map with the RISE team at the end of the workshop.*

### Box 17: Connecting communities and local government and agencies

In the RISE Fiji project, representatives from local government and agencies — such as the Water Authority of Fiji (WAF) and local council — were involved throughout the co-design workshops. For example, WAF staff were responsible for presenting information on easements and demand management during the technical sessions in Step 2. Meanwhile local council staff discussed topics such as planning around waste management, and answered questions from the community. This involvement demonstrates the support of these groups and builds trust in the community regarding the long term O&M of the water-sensitive upgrade. In the RISE Makassar project, representatives from local government and agencies were invited to attend the one-day event that marked the

conclusion of the *Panrita* workshop during Step 3. The co-designed Concept Plan was presented and roles and responsibilities were reinforced- across RISE, the community, and government and agencies. This gave the community an opportunity to raise issues that were outside the scope of RISE, such as things that they had raised in their community vision which required support from outside the community. For example, some communities identified street lighting and skills development as future aspirations for their neighbourhood. Following the *Panrita* workshops, having seen the strength of community support, the local government expressed a desire to implement similar community engagement processes as part of their own project delivery.



Representatives from the Water Authority of Fiji addressing the community in community workshops in Suva.



Agency and government representatives addressing the community in community workshops in Makassar.

### *Activity 3.3 Confirm community support of the Concept Plan*

The sustainability of decentralised, socio-technical systems is reliant on the community in which it is implemented. Decentralised systems also have decentralised O&M requirements. It is therefore important that communities are part of the decision making on what O&M costs and activities fall to them, and that the informed agreement of participating households and communities to the Concept Plan and connection to the system is secured. This should be undertaken across two levels: community and household, and at a range of points to ensure that all within the community are included in decision-making, and that decisions do not disadvantage individuals or groups. It is critical that all households significantly impacted by the intervention are approached for agreement and amendments to the design are made as required resulting in the final confirmed Concept Plan. Refer to Box 18: Sharing lived experiences, bringing the technologies to life and Box 19: Check-points for community and household support.

### **6.2 Representative outcomes for Step 3: Reviewing Options and Refining the Concept Plan**

The activities undertaken in Step 1, cumulatively contribute to a number of outcomes that support the implementation of the WSC approach, along with the core output- the Concept Plan. The types and range of tangible and intangible outcomes from this step are as follows:

- ✓ Concept Plan is adapted based on the community consultation;
  - Social and environmental safeguards met by design;
- ✓ Community is triggered through improved water literacy;
  - Community level agreement;
  - Household level agreement;
- ✓ Roles, responsibilities and budget for Operations & Maintenance of the system are understood and agreed;
  - By community, and
  - By local government and agencies;
  - Approved design developed into DED.

## Box 18: Sharing lived experiences, bringing the technologies to life

Community representatives in Makassar had the opportunity to visit the RISE Demonstration Site in Batua subdistrict. The visit provided them a means to see and experience directly the development of RISE infrastructure in the pilot location. A community leader representing one of the communities observed that the pictures of wetlands and septic tanks that they had seen during the Panrita workshop had been brought to life through the visit. It gave them the opportunity to have a better understanding of the water-sensitive technologies, and operational and maintenance aspects, as well as helping them believe that the project was real and would be built.

Visiting community representatives were able to speak with the residents of the Demonstration Site to hear about their experience of the technologies so far. One of the residents from the Demonstration Site opened up her home to visitors who were curious to see her bathroom which had been renovated to accommodate the system connection. 'The biggest difference we feel is that besides being comfortable and clean, we can use the toilet now without worrying that people will see us from holes or behind the curtain', she said. 'There is also a washing area as part of the renovations'.



### Box 19: Check-points for community and household support

In RISE Makassar the WSC co-design process featured a number of different check-points where community and household agreement was confirmed.

Community agreement was addressed in several stages. First, communities were consulted at the beginning of the program about their prospective involvement in the activities. Later on, these communities were involved in the co-design of the infrastructure. Following the *Panrita* workshops representatives of the community signed the Concept Plan, represented through the *RISE infrastructure Map*, to register their support.

Household agreement was also addressed in several stages. Households participated in tailored activities as part of the design process to formulate the community concept plan, signifying their interest in the program. As part of Step 2, during the *Panrita* activities,

households were asked if they agreed to connect to the system- demonstrating they understood the health and environmental benefits of the program. If so, these connections were designed together with the team and documented through notes, plan drawings and photographs. If they were connecting to a pressure pod this was also documented with the servicing cluster. These photographed agreements were displayed as part of the final *Panrita* workshop to demonstrate the community’s support of the project and documented on the *RISE infrastructure Map*. This was not binding, and households had the opportunity to withdraw if their mindset changed. Later on, at the end of Step 3, a representative of the servicing cluster formally signed off to agree to the final location of infrastructure for each cluster.



*RISE team member explaining the agreed infrastructure locations, co-benefits, and connected households at the final Concept Plan presentation in the RISE Makassar project.*



*Posters documenting servicing cluster and household connections displayed in a neighbourhood mosque in the RISE Makassar project.*

## 7. After the Concept Plan, Steps 4-6

It is important to remember that co-design is a process, a journey to a built and operational outcome, not a single event or workshop. The process is characterized by a number of outcomes, reflecting the cumulative impact of engagement. After the co-designed Concept Plan has been formally signed off, the project transitions into the Detailed Engineering Design Phase (DED). Following the finalisation of the DED, steps 4-6 will commence. Ongoing engagement with all stakeholders through these steps is critical to the success of the water-sensitive settlement upgrade.

### Detailed Engineering Design

The DED should include a verification of the design and detailed assessment of household level connections. It should not be done in isolation and any changes to the Concept Plan as result of a technical assessment should be reviewed with the community. Ideally this review should be facilitated by the same team that has undertaken the co-design, as this is a continuation of the discussions that have already been undertaken and can therefore build off trust and understanding.

### Step 4: Construction

This step relates to the engagement of local stakeholders during the construction phase. The activities during this step are important because they can serve to reinforce community understanding of the connections and functions of the nature-based infrastructure, since most of the elements and their connections are only visible during the construction. Following the construction many parts of the infrastructure are buried or concealed in some way. Since the community is to be involved in a range of aspects relating to the operations and the maintenance of the system, in collaboration with local government and agencies, it is important that they are included throughout the Construction stage. Best practice engagement with communities through the Construction stage has a community facilitator involved in all discussions with residents.

The following outcomes are expected from this step:

- ✓ Ongoing communication channels established and functioning;
- ✓ Community is meaningfully involved in the construction process.

### Step 5: Establishment

This step follows the construction completion and relates to the commissioning and operation of the nature-based sanitation system put in use. This stage provides the opportunity for intensive stakeholder mobilisation, promotion of the design concept, learning around the operation and maintenance of the system in context. While community, program, local government and agencies have been involved in service design around O&M throughout the implementation process, it is assumed that there will be an ongoing need to engage with stakeholders around responsibilities once the system is constructed and operating in their direct environment. This would include support and training of all stakeholders responsible for long term O&M of any of the assets as well as ensuring agreements on institutional arrangements for the long-term management (financial and operations) to ensure the sustainability of the investment. Refer to Volume 3, Section 10.

The following outcomes are expected from this step:

- ✓ Communal infrastructure is handed over to responsible body/agency/authority for long-term operation and maintenance;
- ✓ Collaborative maintenance/servicing plans are established on the household, community and city level;
- ✓ On-going water-sensitive technologies training plan created and running.

### Step 6: Institutionalisation

Finally, the Institutionalising step refers to all long-term changes to the system, its adjustments, innovations and upgrades as it integrates in the local institutional and servicing framework. It is anticipated that this step would also continue to include coordinated co-design workshops that engage the community and other stakeholders in the institutionalisation of the system.

## 8. The Dos and Don'ts of co-design

	Do	Don't
<b>Overall considerations for an effective co-design process</b>	<ul style="list-style-type: none"> <li>✓ Involve all members of the community in decision-making.</li> <li>✓ Ensure that the needs and abilities of marginalised groups are recognised in the design of an engagement process.</li> <li>✓ Include all stakeholders: government, agencies, industry, community members, women's groups, etc.</li> <li>✓ Build on existing groups and networks.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Don't undertake token 'consulting' workshops to get a community to endorse previously-decided plans.</li> <li>✗ Don't only speak with the vocal members of a community and/or those who hold formal positions of authority.</li> <li>✗ Don't ignore existing efforts and community organisations operating.</li> <li>✗ Don't rush or ignore complexity or conflict.</li> </ul>
<b>Step 1: Laying foundations for co-design</b>	<ul style="list-style-type: none"> <li>✓ Pilot co-design activities and tools to ensure they are fit-for-purpose in each location.</li> <li>✓ Ensure the project scope, safeguards, and financing are clear before engaging with communities.</li> <li>✓ Undertake technical servicing options to assess the feasibility of different solutions, to avoid burdening the community discussing technically infeasible solutions.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Don't copy-paste tools and activities across locations without considering their local appropriateness.</li> <li>✗ Don't start co-design unless the project financing is secured and the project scope is clear.</li> <li>✗ Don't jump to present technical servicing options to the community.</li> </ul>
<b>Step 2: Building understanding and co-designing options</b>	<ul style="list-style-type: none"> <li>✓ Listen to and understand existing space use from a variety of perspectives.</li> <li>✓ Ensure that all stakeholders agree on O&amp;M responsibilities.</li> <li>✓ Vision the future of settlements beyond the immediate water and sanitation project components.</li> <li>✓ Locate all infrastructure components with the community in the neighbourhood to align to existing space use, community values and aspirations.</li> <li>✓ Ensure shared infrastructure arrangements take into account social dynamics.</li> <li>✓ Visit every single household to understand the existing conditions and ensure everyone is reached and considered for connection to the system.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Don't pre-design the solution without engaging with existing space use.</li> <li>✗ Don't rush to come up with a technical concept plan; allow time for ideas and options to percolate and be heard by all stakeholders.</li> <li>✗ Don't assume that communities will be ok with O&amp;M responsibilities or changes to land tenure that result in additional costs.</li> <li>✗ Don't assume everyone is being reached through conventional communications mechanisms.</li> </ul>
<b>Step 3: Reviewing options and refining the concept plan</b>	<ul style="list-style-type: none"> <li>✓ Ensure the proposed concept plan is publicly accessible.</li> <li>✓ Ensure sufficient time for review. It takes time for community and households to understand the implications and make an informed decision.</li> </ul>	<ul style="list-style-type: none"> <li>✗ Don't make changes to accommodate technical aspects without consulting the community about impacts.</li> <li>✗ Don't force households or communities to agree to concept plans on short timeframes.</li> <li>✗ Don't only consult the leaders or senior stakeholders.</li> </ul>

## References

- Bell, S.J., 2020. Frameworks for urban water sustainability. *Wiley Interdisciplinary Reviews: Water*, 7(2), p.e1411.
- Brudney, J. L., & England, R. E. 1983. Toward a definition of the co-production concept. *Public Administration Review*, 43(1), 59–65.
- Burkett, I. 2019. An introduction to co-design. Centre for Social Impact. Retrieved from: <https://www.yacwa.org.au/wp-content/uploads/2016/09/An-Introduction-to-Co-Design-by-Ingrid-Burkett.pdf> Accessed 7 October 2020, 8.
- Eales, K., Blackett, I., Siregar, R., & Febriani, E. 2013. Review of community-managed decentralized wastewater treatment systems in Indonesia.
- Faldi, G., Rosati, F.N., Moretto, L. and Teller, J., 2019. A comprehensive framework for analyzing co-production of urban water and sanitation services in the Global South. *Water International*, 44(8), pp.886-918.
- Interaction Design Foundation. No Date. Socio-Technical Systems. <https://www.interaction-design.org/literature/topics/socio-technical-systems>. Accessed 8 August 2020.
- Manzini, E., 2015. *Design, when everybody designs: An introduction to design for social innovation*. MIT press.
- Mitlin, D. 2008. With and beyond the state — Co-production as a route to political influence, power and transformation for grassroots organizations. *Environment & Urbanization*, 20(2), 339–360.
- Nabatchi, T., Sancino, A., & Sicilia, M. 2017. Varieties of participation in public services: The who, when, and what of co-production. *Public Administration Review*, 77, 766–776.
- Parks, R. B., Baker, P. C., Kiser, L., Oakerson, R., Ostrom, E., Ostrom, V., ... Wilson, R. 1981. Consumers as coproducers of public services: Some economic and institutional considerations. *Policy Studies Journal*, 9(7), 1001–1011.
- Ramirez-Lovering, D., Spasojevic, D. and Prescott, M.F., 2020. Mapping informal settlements: A process for action. In *Ecologies Design: Transforming Architecture, Landscape, and Urbanism* (pp. 138-148). Routledge.

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