

**7.1 Diverse fit-for-purpose water supply system – To provide a flexible and adaptive water supply system appropriate to the quality water and demand requirements of the end user.**

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. Water supply system is vulnerable and not backed up by systems and processes that make it secure. It often relies for the most part on a <b>single centralised distribution network</b> supplied by <b>one source</b> for consumers. The system is <b>locked in</b>, and the only change considered to meet increasing demand is augmentation of legacy infrastructure.</p> <p>2. Water supply system relies for the most part on a <b>single centralised distribution network</b> supplied by <b>one source</b> and may be <b>supplemented</b> by a <b>secondary centralised supply network</b> based on a <b>fit-for-purpose water supply in some areas</b>. The <b>system is substantially locked in</b> even though some alternative solutions may be present. Radical system change would be necessary as the alternatives are technically or politically challenging or simply not viable.</p> <p>3. Water supply system relies for the most part on a <b>single centralised distribution network</b> but is supplied by <b>more than one source</b> for consumers. Alternative augmentation options are being considered but yet to be confirmed. There is still a strong commitment to maintaining the existing centralised supply model.</p> <p>4. Water supply system relies on a <b>diversified mode of supply</b> with <b>access to multiple fit-for-purpose water supplies</b> across different areas. The system is reasonably flexible, and a <b>portfolio of alternative options</b> is available and implementation plans are ready for augmentations or responding to supply shortages.</p> <p>5. A <b>diversified water supply system provides fit-for-purpose water</b>. Appropriate source and quality water for different end uses, is available to (almost) <b>all consumers</b>. The system is highly flexible; and local supply and treatment options are designed and managed in an integrated manner. <b>Portfolios of alternative options</b> for augmentation are available and implementation plans are ready. <b>Implementation can be gradual</b> and step wise because a <b>long-term strategy is in place for adaptation of legacy infrastructure</b>. The system is able to rapidly switch between sources.</p>	<p><b>Water system design</b></p> <p>What sources of supply are currently available and at what capacities?</p> <p>How easy is it to switch between them? Are alternative options and contingency plans in place to respond to shortages of supply if required?</p> <p>Are any sources of water dependant on supplies from other countries?</p> <p>What are the city water policies and strategies that take into account fit-for-purpose water supplies?</p> <p>Are there plans that identify alternative options?</p> <p>Does legacy infrastructure lock the system into high cost or high impact (environmental or social) augmentation?</p> <p>Have alternative water supply options with lower cost or impacts been explored?</p> <p>Have alternative water supply options with lower cost or impacts been implemented? To what extent?</p> <p>Are contingency plans in place for alternative water supply options to be implemented when shortages or other supply issues arise?</p> <p>Are there policies and regulations in place to allow for third parties to provide alternative water supply systems?</p>	<p>Proportion of customers (residential and industrial) that have alternative water assets, e.g. recycled water, rainwater tanks, onsite recycled water</p> <p>Existing policies and strategies</p> <p>Inventory of assets (identify sources outside of country borders) and supplies:</p> <ul style="list-style-type: none"> <li>- catchment/river sources</li> <li>- recycled water</li> <li>- rainwater (roof runoff)</li> <li>- groundwater</li> <li>- stormwater</li> <li>- desalination or other</li> </ul> <p>Overview of water supply system</p> <p>Plans and strategies e.g. long-term strategies for the water supply system to accommodate population growth and a changing climate</p> <p>Thresholds and triggers for implementing alternative options</p>

**7.2 Multi-functional water system infrastructure – To provide multi-functional water infrastructure seamlessly integrated into the urban landscape.**

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. Water infrastructure assets typically function to serve a <b>single purpose</b>. <b>These assets</b> (including the surrounding land) are <b>generally not available</b> for public access which is seen as conflicting with operational requirements.</p> <p>2. <b>Most</b> water infrastructure assets (function to serve a <b>single purpose</b>. <b>Few</b> assets (including the surrounding land) are <b>available</b> for public access where not seen as conflicting with operational requirements.</p> <p>3. <b>Some</b> water infrastructure assets are <b>multi-functional and co-located</b> with other assets to deliver multiple beneficial outcomes for the community. <b>Some</b> assets (including the surrounding land) are available for <b>public access</b>. Policy recognises public access as a benefit.</p> <p>4. <b>Most</b> water infrastructure assets are <b>multi-functional and co-located</b> with other assets to deliver multiple beneficial outcomes for the community. <b>Most</b> assets (including the surrounding land) are available for <b>public access</b>. <b>Policies</b> are in place which recognise the benefit of multipurpose infrastructure and encourage public access.</p> <p>5. <b>Almost all</b> water infrastructure assets are <b>multi-functional and co-located</b> with other assets to deliver multiple beneficial outcomes for the community. <b>Almost all</b> assets (including the surrounding land) are available for <b>public access</b>. The importance of multipurpose infrastructure and public access is taken for granted.</p>	<p><b>Water system design</b> What is the major infrastructure for supply, wastewater treatment, flood and stormwater management (for example, reservoirs, treatment plants, retarding basins and floodplains)?</p> <p>What services do they provide beyond essential services?</p> <p>Do the site and/or assets have public access? Which assets?</p> <p>Do retarding basins or floodplains include stormwater treatment assets such as wetlands?</p> <p>Do they form part of an open space network?</p> <p>Is land, such as pipe easements, also used for other beneficial purposes?</p> <p>Are there policies in place which recognise the benefit of multipurpose infrastructure and encourage public access?</p>	<p>Water system description. What is the main purpose of the infrastructure? What other services do they provide?</p> <p>Refer to relevant websites - do the assets or surrounding land have public access?</p> <p>Contact water authorities about infrastructure services?</p>

**7.3 Integration and intelligent control – To optimise water system network performance through the use of a smart city approach.**

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. <b>Limited monitoring</b> and automated <b>control systems</b> in place.</p> <p>2. <b>Intelligent control</b> typically limited to the <b>control of systems</b> in <b>isolation</b> (e.g. water supply system only).</p> <p>3. There are some examples of <b>monitoring and control</b> systems that are <b>integrated</b>. <b>Some assets owned by water authorities</b> are equipped with intelligent control systems. Where automated monitoring exists on council owned assets a manual response is typical.</p> <p>4. <b>Intelligent control</b> is used in <b>some parts</b> of the system allowing <b>multifunctional assets</b> to be <b>optimised</b>. Local examples of managing parts of the urban water cycle in an integrated manner exist.</p> <p>5. <b>Integrated intelligent system controls</b> are typical across <b>all scales</b>, and allows operation and performance of multifunctional assets to be <b>optimised</b>. System capacity and resources across all levels can typically be monitored and adjusted in real time.</p>	<p>Water system design Is there planning and management of water systems to achieve integration?</p> <p>Can the available solutions be applied for different benefits if required?</p> <p>What processes and techniques are in place (e.g. IT solutions, real time control systems, etc.)?</p>	<p>Water system description and infrastructure arrangements for managing supply (including alternative water sources), sewerage and drainage/flood control</p>

**7.4 Robust infrastructures – To create a water system network that is virtually insensitive to stresses through the use of redundancy measures and by-pass systems.**

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. The system is <b>highly sensitive</b> to stresses and the number and frequency of <b>failures</b> per capita per year is <b>very high</b>.</p> <p>2. The system is <b>sensitive</b> to stresses though <b>some redundancy</b> measures are in place. The number and frequency of <b>failures</b> per capita per year is <b>moderate</b>.</p> <p>3. The system is <b>fairly robust</b>. There are <b>some redundancy</b> measures and by-pass systems. Infrastructure integrity is <b>checked</b> on an <b>ad hoc basis</b>. The number and frequency of <b>failures</b> per capita per year is <b>low</b>.</p> <p>4. The system is <b>robust</b>. There are <b>redundancy measures</b> and <b>by-pass systems</b>. Infrastructure integrity is <b>checked</b> on a <b>regular basis</b>. The number and frequency of <b>failures</b> per capita per year is <b>very low</b>.</p> <p>5. The system is <b>highly robust</b> and <b>virtually insensitive to stresses and failures</b>. The system has <b>redundancy</b> and <b>by-pass systems</b> and infrastructure integrity is <b>actively monitored</b>. The number and frequency of <b>failures</b> per capita per year is <b>extremely low</b>.</p>	<p><b>Water system design</b> What is the specified performance of key assets and the water system (level of service, design standards)?</p> <p>Is capacity sufficient to meet demand or loads?</p> <p>How often does the system fail? Can the system cope well with occasional failures?</p> <p>Are failures monitored and reported? What system or asset failures have occurred and how often?</p>	<p>Performance standards relative to the stressors of the water system and the operational capacity</p> <p>KPI's and performance data (including failure data)</p> <p>Complaints made by the community</p>

**7.5 Infrastructure and ownership at multiple scales – To optimise water system performance through the integration of centralised and decentralised infrastructure.**

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. Essential services owned and operated by <b>one or a very small number of centralised authorities</b>. <b>Decentralised and onsite water systems</b> such as rainwater tanks, domestic wastewater systems and groundwater bores, are used by property owners to supplement poor or non-existent central services and are often poorly constructed and maintained by property owners.</p> <p>2. Essential services are owned and operated by <b>one or a very small number of centralised authorities</b>. <b>Policy and regulation</b> discourage or are silent on the use of decentralised and on-site systems.</p> <p>3. Essential services are mostly owned and operated by <b>one or a very small number of centralised authorities</b>. <b>Decentralised and onsite systems</b> are <b>encouraged</b> and part of integrated water system planning for the city.</p> <p>4. Essential services are owned and operated by <b>one or more authorities</b>. A <b>combination of centralised/decentralised</b> infrastructure is common and is planned and operated as part of an <b>integrated and well-maintained system</b>. Private companies have opportunities to own and operate water system assets and be part of the integrated service provision.</p> <p>5. Essential services are owned and operated by a <b>combination of property owners, companies and one or more authorities</b>. Diversified and decentralised water system services are <b>planned and operated</b> as part of an integrated system which includes increasing neighbourhood run cooperative facilities such as rainwater harvesting schemes.</p>	<p><b>Water system design</b></p> <p>What are the available water services and what scale do the different services operate? (e.g. bore water in x% households)</p> <p>Who owns and operates the services?</p> <p>Is there integrated oversight and management?</p>	<p>Ownership the water system with respect to supply (including alternative water sources), sewerage and drainage/flood control</p> <p>Policies and strategies related to the planning and operation of the water system</p>

**7.6 Adequate maintenance - To undertake appropriate maintenance practices ensuring the long term integrity and provide policies for the operation and maintenance of all water infrastructure (including green infrastructure)**

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. Evidence of <b>systematic failure</b> of traditional water infrastructure. There are <b>inadequate budgets</b> allocated to maintain the long term water system performance.</p> <p>2. <b>Some</b> evidence of <b>systematic failure</b> of traditional water infrastructure. System <b>maintenance</b> addresses immediate needs of <b>aging infrastructure</b>, although an extensive backlog of activities may exist in some areas resulting in a <b>decline in the standard of service</b> provided.</p> <p>3. Access to adequate <b>funding</b> for maintenance activities is <b>limited</b>. <b>Maintenance guidelines</b> and procedures are <b>widely available</b> for traditional water infrastructure. Long term maintenance needs of traditional water infrastructure are well understood and undertaken to a reasonable standard. Maintenance procedures for <b>green-blue assets</b> are <b>less well understood</b> and often <b>inadequately undertaken</b>. Asset registers for green/blue infrastructure are starting to be developed.</p> <p>4. Access to <b>funding</b> for maintenance activities is <b>available</b>. Long term maintenance needs of traditional water infrastructure and <b>green-blue assets</b> is <b>well understood</b>, planned for and <b>undertaken</b> to a reasonable standard. <b>Maintenance guidelines</b> and procedures are <b>widely available</b> for all water related infrastructure including green-blue assets. <b>Assets</b> are all recorded on a GIS system supported by <b>comprehensive databases</b>.</p> <p>5. Access to <b>adequate funding</b> for maintenance activities is available (perhaps secured through user-based charges). Long term maintenance needs of traditional water infrastructure and <b>green-blue assets</b> is <b>well understood</b>, planned for and <b>undertaken</b> to a reasonable standard. <b>Maintenance guidelines</b> and procedures are <b>widely available</b> for all water related and green-blue infrastructure. <b>Assets</b> are all recorded on a GIS system supported by <b>comprehensive databases</b>. Asset audits and <b>proactive maintenance</b> programs are undertaken. <b>Asset information</b> is used to <b>adapt practices</b> and <b>support innovation</b>. <b>Co-operation</b> between <b>multiple asset owners</b> occurs to ensure all assets at all scales are maintained to enable integrated operation.</p>	<p><b>Operation and maintenance</b></p> <p>What is the specified maintenance of the water related assets (supply, sanitation and stormwater, including blue-green infrastructure)?</p> <p>Do responsible authorities allocate appropriate budgets to maintenance to ensure there is no decline in the condition of the asset? What is the budget allocation for maintenance?</p> <p>Are failures monitored and reported?</p> <p>A formal asset management systems in place? Do they include all asset types e.g. waterways, vegetation?</p> <p><b>Policy and strategy</b></p> <p>What are the existing policies and strategies related to the operation and maintenance of the water system?</p> <p>What maintenance guidelines are available? What asset management systems are used?</p>	<p>WSUD maintenance manuals and audits</p> <p>Budget allocations for maintenance</p> <p>Formal asset management systems</p>