

5.1 Healthy and biodiverse habitat – To ensure water system services help to protect, restore and create well-functioning ecosystems that contribute to ecological resilience.

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. The urban habitats supported by water system services and/or assets (including streamside habitat) are not or virtually not connected at all and biodiversity is very low even considering the development context (e.g. inner, middle, outer and peri-urban). The quality of the vegetation offers little in regards to functioning ecological systems.</p> <p>2. The urban habitats supported by water system services and/or assets (including streamside habitats) are patchy and some areas connected, and biodiversity is low considering the development context (e.g. inner, middle, outer and peri-urban). The quality of the vegetation provides some functioning ecological systems given the development context (e.g. inner, middle, outer and peri-urban).</p> <p>3. The urban habitats supported by water system services and/or assets (including streamside habitats) are reasonably connected along waterway or infrastructure networks. The biodiversity and quality of the vegetation provides fair functioning ecological systems given the development context (e.g. inner, middle, outer and peri-urban).</p> <p>4. The urban habitats supported by water system services and/or assets (including streamside habitats) are well connected along waterway or infrastructure networks and patches exist across the catchments. The biodiversity and quality of the vegetation provides high functioning ecological systems given the development context (e.g. inner, middle, outer and peri-urban).</p> <p>5. The urban habitats supported by water system services and/or assets (including streamside habitats) are very well connected along waterway or infrastructure networks and extend across the catchments. The biodiversity and quality of the vegetation provides very high functioning ecological systems given the development context (e.g. inner, middle, outer and peri-urban).</p>	<p>Urban landscape design To what extent do water system services and assets help to support biodiversity and functioning terrestrial ecosystems?</p> <p>Are patches of vegetation connected or isolated?</p> <p>What is the state and condition of vegetation and habitats? How has it changed over time?</p>	<p>Policy for the protection of biodiversity in urban areas</p> <p>GIS layers of vegetation – areas and average distances between patches</p> <p>Normalised Difference Vegetation Index (NDVI) to assess the extent and quality of vegetation using satellite remote sensing data. Access to website which maps NDVI 'on demand': http://ivfl-info.boku.ac.at/index.php/eo-data-processing/dataprocess-global</p> <p>Change Matters http://changematters.esri.com/compare to compare Normalised Difference Vegetation Index (NDVI) across different years to show increase/decrease in extent and quality of vegetation.</p> <p>Biological surveys, biodiversity trends, local research reported in scientific papers, biodiversity reports</p>

5.2 Surface water quality and flows – To improve and protect the quality of surface waters and marine environments.

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. The quality and flow characteristics of surface and marine waters in the area is detrimental to functioning ecosystems and leads to deterioration over time. Little action is undertaken to prevent or treat point source pollution (such as, domestic and industrial wastewater prior to discharge to the environment) or urban runoff.</p> <p>2. The quality and flow characteristics of surface and marine waters in the area falls short in supporting functioning ecosystems. In some parts of the area it may be better than others, but on the whole it is still deteriorating. Action in some areas is undertaken to prevent or treat wastewater prior to discharge to the environment. Little, if any, action is undertaken to address urban runoff quality prior to discharge.</p> <p>3. The quality and flow characteristics of surface and marine waters in the area supports reasonably healthy ecosystems. Though perhaps not everywhere, mostly the waters are of this quality, and it is not deteriorating. Action addresses almost all point source pollution (such as, appropriate treatment of domestic and industrial wastewater prior to discharge). Some action is undertaken to address urban runoff quality prior to discharge.</p> <p>4. The quality and flow characteristics of surface and marine waters in the area supports healthy ecosystems – this quality is fairly consistently observed throughout the area. Action addresses all point source pollution (such as, appropriate treatment of domestic and industrial wastewater prior to discharge) and urban runoff is treated using green infrastructure (such as, wetlands and rain gardens) in some areas. Some harvesting of urban runoff may occur in some areas.</p> <p>5. The quality and flow characteristics of surface and marine waters in the area supports very healthy ecosystems – this quality is consistently observed throughout the area. Action addresses all point source pollution (such as appropriate treatment of domestic and industrial wastewater prior to discharge) and urban runoff is treated using green infrastructure (such as, wetlands and rain gardens) across many areas. Extensive harvesting of urban runoff reduces flow related impacts on aquatic ecosystems. Actions improve and restore the water quality that flows through the city.</p>	<p>Policy and strategy What proportion of domestic and industrial wastewater is treated prior to discharge to receiving waters?</p> <p>Do flow regimes or water quality significantly constrain instream biodiversity?</p> <p>What are the 3 key pollutants of concern to local water bodies?</p> <p>'Healthy' freshwater or marine ecosystems are defined as biodiverse and functioning. Ecosystems may be substantially altered from the pre-urban 'natural' state, but a 'functioning ecosystem', will have basic ecosystem elements in place. Increasing ecosystem health will be characterised by increasing biodiversity and resilience to system shocks.</p>	<p>Policy for protection of surface water quality</p> <p>Data monitoring and exceedance of acceptable water quality thresholds</p> <p>Number and types of WSUD assets (including stormwater harvesting)</p> <p>% of urban runoff treated by WSUD/harvesting schemes</p> <p>Data monitoring of instream biodiversity/ecosystem health</p>

5.3 Groundwater quality and replenishment – To improve and protect the quality of groundwater-connected environments.

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. The quality and/or replenishment of groundwater in the area is detrimental to valued ecosystem services (e.g. groundwater dependant ecosystems). No action is undertaken to address domestic and industrial wastewater, and urban runoff, impacting on groundwater.</p> <p>2. The quality and/or replenishment of groundwater in the area falls short in supporting valued ecosystem services (e.g. groundwater dependant ecosystems). In some areas it may be better managed than others, but on the whole it falls short. Little action is undertaken to address domestic and industrial wastewater, or urban runoff, impacting on groundwater.</p> <p>3. The quality and replenishment of groundwater in the area supports reasonably healthy ecosystems and valued ecosystem services (e.g. groundwater dependant ecosystems). Though perhaps not everywhere, mostly the groundwaters are of good quality and not being depleted. Some action is undertaken to address domestic and industrial wastewater, or urban runoff, impacting on groundwater.</p> <p>4. The quality and replenishment of groundwater in the area supports healthy ecosystems and valued ecosystem services (e.g. groundwater dependant ecosystems). Mostly the groundwaters are of good quality and not being depleted – this is fairly consistently observed throughout the area, with hardly any negative exceptions. Significant action is undertaken to address domestic and industrial wastewater, and urban runoff, impacting on groundwater.</p> <p>5. The quality and replenishment of groundwater in the area supports very healthy ecosystems and valued ecosystem services (e.g. groundwater dependant ecosystems). Mostly the groundwaters are of good quality and not being depleted – this is consistently observed throughout the area. Extensive action is undertaken to address domestic and industrial wastewater, and urban runoff, impacting on groundwater.</p>	<p>Policy and strategy What are the existing groundwater dependant ecosystems etc.?</p> <p>Does monitoring data indicate a decline in quality or seasonal depth of the groundwater?</p>	<p>Groundwater reporting by relevant government authority</p> <p>Policy for the protection of groundwater</p> <p>Data monitoring and exceedance of acceptable water quality or depth thresholds</p> <p>Number of use of licenced and private bores</p> <p>Active replenishment of groundwater – Aquifer Storage and Recovery schemes</p>

5.4 Protect existing areas of high ecological value – To protect existing areas of high ecological value from the impacts of catchment urbanisation.

Rating Scale	Guiding questions	Suggested data collection sources
<p>1. Little, or no, recognition of existing or remnant areas with significant ecological value. No mechanisms exist to ensure the protection of native flora and fauna from urban development and urban water systems.</p> <p>2. Some recognition of the significance of existing or remnant areas with significant ecological value. Policy may be present but not enforced. Limited mapping and records of native flora and fauna are available. The planning and constructions of urban development and urban water systems are only restricted by internationally recognised sites of significance (such as, Ramsar listings).</p> <p>3. Policy is in place to protect and conserve landscapes of existing or remnant areas with significant ecological value. Extensive mapping and records of endangered and protected species are available. Some urban development are excluded in some areas through designated conservation zones (including national and state parks, etc.) and urban water systems that impact on major sites of significance are restricted.</p> <p>4. Legislation and policy are in place to protect and conserve landscapes of ecological significance. Extensive mapping and records of endangered and protected species are available. Urban development is excluded in some areas through designated conservation zones (including national and state parks, etc.) and urban water systems that impact on major sites of significance are restricted. Appropriate development activities are undertaken in other areas given the landscape type and permits are required for vegetation removal. Vegetation offsets are stipulated where vegetation is permitted to be removed.</p> <p>5. Legislation and policy are in place to protect and conserve landscapes of ecological significance. Extensive mapping and records of endangered and protected species are available. Urban development is excluded in some areas through designated conservation zones (including national and state parks, etc.) and urban water systems that impact on major sites of significance are restricted. Appropriate development activities are undertaken in other areas given the landscape type and permits are required for vegetation removal. Vegetation offsets are stipulated where vegetation is permitted to be removed. The community recognises the importance of water systems designed to support ecological significant landscapes and they actively contribute towards protecting and enhancing landscape conservation values in the public and private realm.</p>	<p>Policy and strategy What are the existing areas designated as protected land/conservation areas (e.g. national or state forest)?</p> <p>Do areas of international significance exist (e.g. Ramsar listed sites)?</p> <p>Have rare and threatened species been identified and where?</p> <p>What are the measures in place to protect areas of significant ecological value from the impacts of urban development and water systems?</p> <p>What community driven initiatives are in place and how active is the community in protecting and enhancing areas of significant ecological value?</p>	<p>Regulation and legislation</p> <p>Mapping and surveys of rare and threatened species</p> <p>Percentage of protected area from GIS zoning or relevant maps</p> <p>Policy, planning reports and strategic plans to identify solutions in place to protect areas of significance from urban development</p>