

**Table S1.** Strategic Dimension objectives, criteria, and metrics.

<b>Objective</b>	<b>S1 - Institutional capacity</b>	
<b>Criteria</b>	<b>S1.1 - Resilience planning and policies</b>	Answer rate
<b>Metric</b>	<b>S1.1.1 - Stormwater Strategic Plan</b>	
Source	Adapted from RESCCUE RAF [28]	
Answer type	Single choice <sup>1</sup>	
Question	Does the service have an implemented Drainage/Stormwater Plan with adequate monitoring and review?	
	1) The strategic plan does not exist.	0.00
	2) The strategic plan exists but is not implemented (outdated/unmonitored).	0.33
	3) The strategic plan is implemented but considers only a technical component.	0.67
	4) The strategic plan is implemented and considers technical and non-technical components.	1.00
<b>Metric</b>	<b>S1.1.2 - Plan alignment with the City Master Plan</b>	
Source	Adapted from RESCCUE RAF [28]	
Answer type	Single choice	
Question	Is the plan aligned and complying with the City Master Plan?	
	1) No.	0.00
	2) Partially.	0.50
	3) Yes.	1.00
<b>Metric</b>	<b>S1.1.3 - Plan alignment with Resilience system-thinking</b>	
Source	-	
Answer type	Single choice	
Question	Does the plan have an explicit resilience-oriented view?	
	1) No.	0.00
	2) Partially or indirectly.	0.50
	3) Yes.	1.00
<b>Criteria</b>	<b>S1.2 - Service system thinking</b>	
<b>Metric</b>	<b>S1.2.1 - Service management inclusion in city planning and strategic involvement</b>	
Source	-	
Answer type	Single choice	
Question	Is the stormwater service included in the city's strategic planning?	
	1) No strategic involvement.	0.00
	2) Yes, but indirectly, marginally, or sporadically.	0.50
	3) Yes.	1.00
<b>Metric</b>	<b>S1.2.2 - Knowledge exchange with other urban services</b>	
Source	Adapted from RESCCUE RAF [28]	
Answer type	Single choice	
Question	Does the service have knowledge exchange procedures with other urban services (partnerships, participation in conferences, etc.)?	
	1) No explicit knowledge exchange procedures are in place.	0.00
	2) Yes, but informally or unofficially.	0.50
	3) Yes.	1.00

<b>Metric</b>	<b>S1.2.3 - Service involvement in R&amp;D activities</b>		
Source	-		
Answer type	Single choice		
Question	Is the service involved in R&D or other innovation activities or projects?		
	1) No involvement in the last 5 years.		0.00
	2) Yes, in the last 5 years, but not at the moment.		0.50
	3) Yes, at the moment or up to the next 5 years.		1.00
<b>Metric</b>	<b>S1.2.4 - Service contribution to societal change</b>		
Source	-		
Answer type	Single choice		
Question	Does the service provide opportunities for public engagement and participation?		
	1) Not explicitly.		0.00
	2) Only when mandatory.		0.50
	3) Yes, regularly.		1.00
<b>Objective</b>	<b>S2 - Urban service relationships</b>		
<b>Criteria</b>	<b>S2.1 - Interdependencies</b>		
<b>Metric</b>	<b>S2.1.1 - Stormwater service dependencies on other urban services</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	To what extent are dependencies on other services known?		
	1) No knowledge or formal understanding of dependencies.		0.00
	2) Minor understanding of dependencies.		0.33
	3) Critical dependencies are known.		0.67
	4) The entire map of dependencies is depicted.		1.00
<b>Metric</b>	<b>S2.1.2 - Urban services dependencies on Stormwater service</b>		
Source	Adapted from RAF RESCCUE [28]		
Answer type	Single choice		
Question	To what extent are dependencies from other services known?		
	1) No knowledge or formal understanding of dependencies.		0.00
	2) Minor understanding of dependencies.		0.33
	3) Critical dependencies are known.		0.67
	4) The entire map of dependencies is depicted.		1.00
<b>Metric</b>	<b>S2.1.3 - Autonomy capacity</b>		
Source	-		
Answer type	Single choice		
Question	Do infrastructures that are dependent on other services have any degree of autonomy?		
	1) No		0.00
	2) Yes, but for short-term service disruptions		0.50
	3) Yes, including above-average service disruptions		1.00

Criteria	S2.2 - Redundancies	
<b>Metric</b>	<b>S2.2.1 - Type of redundancies in place</b>	
Source	Adapted from RESCCUE RAF [28]	
Answer type	Multiple choice	
Question	What type of redundancies are purposely in place?	
	1) None.	0.00
	2) Meshed network (relief sewers)	0.14
	3) Oversized sewers (onsite storage)	0.14
	4) Storm tanks	0.14
	5) Multi-purpose flooding areas	0.14
	6) Alternative flow pathways	0.14
	7) Detention/Retention ponds	0.14
	8) Other NBS	0.14
<b>Metric</b>	<b>S2.2.2 - Redundancies communication</b>	
Source	-	
Answer type	Single choice	
Question	Are redundancies communicated to the population?	
	1) No.	0.00
	2) Yes, passively.	0.50
	3) Yes, actively.	1.00
Objective	S3 - System knowledge	
Criteria	S3.1 - Monitoring, real-time control, and early warning	
<b>Metric</b>	<b>S3.1.1 - Monitoring equipment in place</b>	
Source	-	
Answer type	Multiple choice	
Question	What type of monitoring equipment is installed?	
	1) None.	0.00
	2) Rain gauges	0.13
	3) Rainfall radar/satellite data	0.13
	4) Flow level in underground infrastructures	0.13
	5) Flow rate in underground infrastructures	0.13
	6) Flow quality in underground infrastructures/outfall	0.13
	7) Flow level at the surface	0.13
	8) Storm overflows	0.13
	9) Other(s)	0.13
<b>Metric</b>	<b>S3.1.2 - Monitoring data treatment, usage and sharing</b>	
Source	-	
Answer type	Multiple choice	
Question	How is monitoring data used?	
	1) No specific treatment	0.25
	2) Real-time performance dashboard	0.25
	3) Early warning indicators	0.25
	4) Real-time control of equipment	0.25

<b>Metric</b>	<b>S3.1.3 - Real-time control equipment in place</b>		
Source	-		
Answer type	Single choice		
Question	Is there real-time controlled equipment installed?		
	1) No		0.00
	2) Yes		1.00
<b>Metric</b>	<b>S3.1.4 - Early warning procedures</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	Are there forecasts and/or early warning procedures?		
	1) No		0.00
	2) Yes, with an internal early warning only		0.50
	3) Yes, internal and public early warning procedures exist		1.00
<b>Criteria</b>	<b>S3.2 - Human and financial resources</b>		
<b>Metric</b>	<b>S3.2.1 - Human resources adequacy for service cover</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	Does the service have adequate human resources?		
	1) No		0.00
	2) Yes, for normal conditions		0.50
	3) Yes, for normal conditions and emergencies		1.00
<b>Metric</b>	<b>S3.2.2 - Financial plan and budget allocation</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	Does the service have a financial plan with a dedicated budget for resilience building/disaster risk reduction (DRR)?		
	1) There is no clear financial plan.		0.00
	2) The financial plan indirectly includes resilience building/DRR, but budgets are not ring-fenced.		0.50
	3) The financial plan directly considers resilience building/DRR, and budgets are ring-fenced.		1.00
<b>Metric</b>	<b>S3.2.3 - Service material resources in case of failure</b>		
Source	-		
Answer type	Single choice		
Question	Does the service have adequate material resources?		
	1) No		0.00
	2) Yes, for normal conditions		0.50
	3) Yes, for normal conditions and emergencies		1.00
<b>Criteria</b>	<b>S3.3 - Disturbing events</b>		
<b>Metric</b>	<b>S3.3.1 - Response protocol for disturbing events</b>		
Source	-		
Answer type	Single choice		
Question	Does the service have a standard protocol for emergencies?		
	1) No formal/informal protocol exists.		0.00
	2) Protocol exists, but informally (based on past occurrences and available resources)		0.33
	3) Protocol exists formally but is not integrated/aligned with a city-wide emergency plan		0.67
	4) Protocol exists formally and is integrated/aligned with a city-wide emergency plan		1.00

<b>Metric</b>	<b>S3.3.2 - Recording procedures for disturbing events</b>		
Source	-		
Answer type	Multiple choice		
Question	Are recording procedures implemented in the case of a disruptive event?		
	1) No recording procedures are implemented.		0.00
	2) Emergency/civil protection calls.		0.17
	3) Flood duration is measured/estimated.		0.17
	4) Flood hazardousness (e.g., depth) is measured/estimated.		0.17
	5) Flooded area is measured/estimated.		0.17
	6) Infrastructure failure is registered.		0.17
	7) Other(s)		0.17
<b>Metric</b>	<b>S3.3.3 - Adaptation capacity after disturbing events</b>		
Source	-		
Answer type	Single choice		
Question	Does the service have cases of adaptation measures/strategies taken due to past disruptive events?		
	1) No		0.00
	2) Yes		1.00
<b>Metric</b>	<b>S3.3.4 - Transformability capacity after disturbing events</b>		
Source	-		
Answer type	Single choice		
Question	Does the service have cases of transformational measures/strategies taken due to past disruptive events?		
	1) No		0.00
	2) Yes		1.00
<b>Criteria</b>	<b>S3.4 - Climate change preparedness</b>		
<b>Metric</b>	<b>S3.4.1 - Commitment to CC mitigation (%GHG reduction)</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	Is the service committed to CC mitigation through the reduction of GHG emissions?		
	1) No commitment.		0.00
	2) Yes, but the target is lower than 20% or is not defined.		0.33
	3) Yes, with a 20 - 49% reduction target.		0.67
	4) Yes, with a minimum 50% reduction target.		1.00
<b>Metric</b>	<b>S3.4.2 - Existence of local/downscaled CC scenarios</b>		
Source	-		
Answer type	Multiple choice		
Question	Which relevant climate variables/events are there agreed CC scenarios/local projections?		
	1) None.		0.00
	2) Sea level rise		0.33
	3) Rainfall intensities		0.33
	4) Storm surges or coastal overtopping		0.33
<b>Metric</b>	<b>S3.4.3 - Current performance with future conditions</b>		
Source	-		
Answer type	Single choice		
Question	Has the current system's performance been evaluated based on known CC scenarios?		
	1) No		0.00
	2) Yes, for the minor system		0.50
	3) Yes, for the minor and major systems		1.00

<b>Metric</b>	<b>S3.4.4 - In place or planned CC adaptation measures</b>	
Source	Adapted from RESCCUE RAF [28]	
Answer type	Multiple choice	
Question	What type of measures has the service implemented/planned to address climate change mitigation and adaptation?	
	1) None.	0.00
	2) Stakeholder or public engagement or awareness	0.11
	3) Strengthening relationships between (inter)dependent services	0.11
	4) Improvement of information collection and analysis	0.11
	5) Development of emergency or contingency plans	0.11
	6) Implementation/improvement of green infrastructure	0.11
	7) Implementation/improvement of grey infrastructure	0.11
	8) Power generation in drainage infrastructures (e.g., turbinating)	0.11
	9) Energy consumption reduction (service fleet, pumping station optimization, etc.)	0.11
	10) Other(s)	0.11
<b>Criteria</b>	<b>S3.5 - Stormwater overflow management</b>	
<b>Metric</b>	<b>S3.5.1 - Stormwater overflow control</b>	
Source	-	
Answer type	Single choice	
Question	Are stormwater overflows controlled with adequate equipment?	
	1) No adequate equipment exists for stormwater overflow control.	0.00
	2) Stormwater overflows are partially controlled with adequate equipment.	0.50
	3) Stormwater overflows are globally controlled with adequate equipment.	1.00
<b>Metric</b>	<b>S3.5.2 - Stormwater overflow monitoring</b>	
Source	-	
Answer type	Single choice	
Question	Are stormwater overflows monitored with adequate equipment?	
	1) No adequate equipment exists for stormwater overflow monitoring.	0.00
	2) Stormwater overflow frequency and/or volumes are partially monitored.	0.50
	3) Stormwater overflow frequency and/or volumes are globally monitored.	1.00
<b>Metric</b>	<b>S3.5.3 - Stormwater overflow discharge</b>	
Source	-	
Answer type	Single choice	
Question	Are stormwater overflow outfalls identified?	
	1) No.	0.00
	2) Yes, partially.	0.50
	3) Yes, globally.	1.00
<b>Objective</b>	<b>S4 - Infrastructural knowledge</b>	
<b>Criteria</b>	<b>S4.1 - Infrastructures' register</b>	
<b>Metric</b>	<b>S4.1.1 - Infrastructures' register existence and completeness</b>	
Source	-	
Answer type	Single choice	
Question	Are the infrastructures adequately identified and mapped?	
	1) No structured register of infrastructures exists.	0.00
	2) Global infrastructures' register exists with low detailed level	0.33
	3) Detailed infrastructure' register exists for critical areas	0.67
	4) Global and detailed infrastructure' register exists	1.00

<b>Metric</b>	<b>S4.1.2 - Infrastructures' register update</b>	
Source	-	
Answer type	Multiple choice	
Question	How frequently is the infrastructure register updated?	
	1) No update routines/criteria	0.00
	2) Updated but with no defined frequency or other criteria.	0.33
	3) Updated periodically.	0.33
	4) Updated when infrastructures have any modifications.	0.33
<b>Metric</b>	<b>S4.1.3 - Infrastructures' register format</b>	
Source	-	
Answer type	Single choice	
Question	In what format is the infrastructure register kept?	
	1) Sketched-based register (CAD or similar)	0.00
	2) GIS attribute-based (shapefiles or similar)	1.00
<b>Metric</b>	<b>S4.1.4 - Infrastructures' register sharing</b>	
Source	-	
Answer type	Multiple choice	
Question	What is the infrastructure's register-sharing policy?	
	1) Detailed sharing with other municipal services	0.33
	2) Unrefined sharing with the public	0.33
	3) Detailed sharing with the public	0.33
<b>Criteria</b>	<b>S4.2 - Inspection, maintenance and rehabilitation</b>	
<b>Metric</b>	<b>S4.2.1 - Inspection procedures</b>	
Source	-	
Answer type	Multiple choice	
Question	How are inspection procedures implemented?	
	1) No inspection routines are implemented	0.00
	2) Locally, when issues are reported	0.50
	3) Periodic inspection of critical assets	0.50
<b>Metric</b>	<b>S4.2.2 - Maintenance of inlet devices</b>	
Source	-	
Answer type	Single choice	
Question	Are there inlet devices' maintenance procedures?	
	1) No maintenance procedures	0.00
	2) Maintenance is the responsibility of an external player	0.33
	3) Yes, with no established criteria (arbitrary)	0.67
	4) Yes, regularly and with established criteria	1.00
<b>Metric</b>	<b>S4.2.3 - Maintenance of electromechanical equipment</b>	
Source	-	
Answer type	Single choice	
Question	Are there electromechanical equipment maintenance procedures?	
	1) No maintenance procedures	0.00
	2) Yes, with no established criteria (arbitrary or when needed)	0.50
	3) Yes, regularly and with established criteria	1.00

<b>Metric</b>	<b>S4.2.4 - Rehabilitation of sewers/open channels</b>		
Source	Adapted from ERSAR [51]		
Answer type	Single choice		
Question	What is the average annual percentage of storm sewers/open channels with more than 10 years rehabilitated in the last 5 years?		
	1) Less than 4.0		0.00
	2) Between 4.0 and 20.0		0.50
	3) More than 20.0		1.00
<b>Metric</b>	<b>S4.2.5 - Coverage of expenditure with inspection, maintenance, and rehabilitation</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	What is the ratio between rehabilitation, operation, and infrastructure management expenditure and last year's annual operating budget?		
	1) Less than 0.9 or more than 1.2		0.00
	2) More than or equal to 0.9 and less than 1.0 or more than 1.1 and less than or equal to 1.2		0.50
	3) More than or equal to 1.0 and less than or equal to 1.1		1.00
<b>Criteria</b>	<b>S4.3 - Internal risks understanding</b>		
<b>Metric</b>	<b>S4.3.1 - Known internal risks</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Multiple choice		
Question	Which of the following physical internal risks are currently assessed?		
	1) None.		0.00
	2) Structural conditions of sewers and manholes		0.25
	3) Electromechanical equipment failure		0.25
	4) Inlets' capacity available		0.25
	5) Storm overflows frequency		0.25
<b>Metric</b>	<b>S4.3.2 - Mapping of internal risks</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Single choice		
Question	Are the physical internal risks mapped?		
	1) No		0.00
	2) Partially, not covering all the risks or all the infrastructure		0.50
	3) Yes (if suitable)		1.00
<b>Criteria</b>	<b>S4.4 - External risks understanding</b>		
<b>Metric</b>	<b>S4.4.1 - Known external risks</b>		
Source	Adapted from RESCCUE RAF [28]		
Answer type	Multiple choice		
Question	Which of the following physical external risks are currently assessed?		
	1) None.		0.00
	2) Electromechanical equipment's exposure to flooding		0.20
	3) Equipment's exposure to tides		0.20
	4) Sewers' exposure to tides		0.20
	5) Inlet devices' exposure to clogging		0.20
	6) Sewers' exposure to silting up and deposition of sediments		0.20



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<b>Metric</b>	<b>S4.4.2 - Mapping of external risks</b>	
Source	-	
Answer type	Single choice	
Question	Are the physical external risks mapped?	
	1) No	0.00
	2) Partially, not covering all the risks or all the infrastructure	0.50
	3) Yes (if suitable)	1.00

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## References

28. Cardoso, M.A.; Brito, R.S.; Pereira, C.; Gonzalez, A.; Stevens, J.; Telhado, M.J. RAF Resilience Assessment Framework—A Tool to Support Cities' Action Planning. *Sustainability* **2020**, *12*, 2349. <https://doi.org/10.3390/su12062349>.
51. LNEC. *NOVA Guide for Assessment of the Quality of Water and Waste Services Provided to Users. 4th Generation Assessment System; ERSAR—The Water and Waste Services Regulation Authority*: Lisbon, Portugal, 2023; ISBN 978-989-8360-45-8.