

ISO 24536:2019-10 (E)

Service activities relating to drinking water supply, wastewater and stormwater systems - Stormwater management - Guidelines for stormwater management in urban areas

Contents		Page
Foreword		vi
Introduction		vii
1	Scope	1
2	Normative reference	1
3	Terms and definitions	1
4	General overview	1
4.1	Principles	1
4.2	Basic concepts	2
4.3	Stormwater management process	3
5	Objectives	4
6	Functional requirements	8
6.1	General	8
6.2	Protection from surface water flooding	9
6.3	Protection from sewer flooding	9
6.4	Protection of surface receiving water bodies	10
6.5	Protection of groundwater	10
6.6	Maintainability	10
6.7	Integrity of structures	10
6.8	Sustainable use of products and materials	10
6.9	Sustainable use of energy	10
6.10	Protection of adjacent structures and utility services	10
6.11	Maintaining the flow	10
6.12	Watertightness	10
6.13	Prevention of odours and emission of toxic, explosive and corrosive gases	10
6.14	Prevention of noise and vibration	11
6.15	Input quality	11
6.16	Protection of downstream drainage systems	11
6.17	Protection from natural disaster events	11
6.18	Health and safety	11
6.18.1	General	11
6.18.2	Public health and safety	11
6.18.3	Occupational health and safety	11
7	Performance requirements	12
7.1	General	12
7.2	Examples of performance requirements	12
7.2.1	Protection of receiving water bodies	12
7.2.2	Protection from flooding	14
7.2.3	Structural integrity and design working life	15
8	Design criteria	15
8.1	Introduction	15

8.2	Hydraulic design criteria	16
8.2.1	Introduction	16
8.2.2	Full pipe design rainfall criteria	16
8.2.3	Flooding design criteria	17
8.2.4	Effect on downstream water bodies	18
8.3	Environmental design criteria	19
8.4	Structural design criteria	20
8.5	Operation and maintenance (O&M) design criteria	20
8.6	Amenity and biodiversity design criteria	20
8.6.1	Amenity design criteria	20
8.6.2	Biodiversity design criteria	20
9	Investigation	21
9.1	Introduction	21
9.2	Purpose of investigation	21
9.3	Review of performance information	22
9.4	Determine the scope of investigation	23
9.5	Review existing information	23
9.6	Inventory update	24
9.7	Hydraulic investigation	25
9.8	Hydrology	25
9.8.1	Selection of the design rainfall	25
9.8.2	Flood occurrence probability	27
9.8.3	Water quantity	27
9.8.4	Water quality	27
9.9	Environmental investigation	28
9.10	Structural investigation	28
9.11	Operational investigation	29
9.12	Existing facilities	29
9.13	Social consequences	29
10	Assessment	29
10.1	Introduction	29
10.2	Assessment of the hydraulic performance	30
10.3	Assessment of environmental impact	30
10.4	Assessment of structural condition	31
10.5	Assessment of operational performance	31
10.6	Assessment of social and economic benefits and public satisfaction	31
10.7	Comparison with performance requirements	31
10.8	Identification of unacceptable impacts	31
10.9	Identification of causes of performance deficiencies	31
10.10	Setting goals	31
10.11	Prioritization of measures	31
11	Planning	32
11.1	Planning principles	32
11.2	Basic planning concepts	32
11.3	System components	33
11.3.1	Overview	33
11.3.2	Components for quantity control	33
11.3.3	Components for quality control	34
11.4	Asset-related solutions	35
11.4.1	General	35
11.4.2	Stormwater network	36
11.4.3	Sustainable drainage systems	36
11.4.4	Utilization of existing components	37
11.4.5	Asset-related solutions through collaboration with other projects	38
11.5	Non-asset-related solutions	40
11.5.1	General	40
11.5.2	Demand control	40
11.5.3	Flood resilience approaches	41

11.5.4	Disaster preparedness and response	41
11.5.5	Emergency response and recovery	43
11.5.6	Utilization of information and communication technology (ICT)	44
11.5.7	Insurance	44
11.6	Management aspects of planning	45
11.7	Phased implementation plan	45
12	System performance evaluation	46
12.1	General	46
12.2	Cost-benefit analysis	46
12.3	Evaluation of system performance	46
12.4	Monitoring of system performance	47
12.5	Retrospective evaluation	47
Annex A (informative) The concept of the largest recorded rainfalls		48
Annex B (informative) Cost-benefit analysis: example of calculation methodologies		50
Bibliography		54