

Dunbar Community Center

Little Rock Stormwater Manual Update

City of Little Rock Public Meeting

March 18, 2024

Agenda

PROJECT UPDATE

- Overview of Project
- Website and Survey
- Stakeholder Survey Results
- Planned Changes

WHAT IS A STORMWATER MANAGEMENT MANUAL?

CITY OF LITTLE ROCK



SEPTEMBER, 2016 UPDATE

STORMWATER MANAGEMENT AND DRAINAGE MANUAL

PUBLIC WORKS DEPARTMENT
701 WEST MARKHAM STREET
LITTLE ROCK, ARKANSAS 72201

XXXXXXXXXXXXX
DECEMBER, 2007 UPDATE
XXXXXXXXXXXXX

A stormwater management and drainage design manual (SWMDM) provides guidelines and standards for the design and construction of drainage systems within the city.

THE MANUAL ADDRESSES:



Public Projects and Private Development



Floodplain Management



Water Quality and Stream Protection



State and Federal Regulations and Permits



Construction Site Runoff and Erosion



WHY UPDATE?

Updates will make sure that the manual remains effective and adequately addresses future flood risk, new stormwater practices, and state & federal regulations.



The manual is a part of the City's policies and programs to reduce pollutants in compliance with the Municipal Separate Storm Sewer System (MS4) permit issued by ADEQ.



TO REDUCE FLOOD RISK

Require use of the latest technology, methodologies, and data



TO IMPROVE WATER QUALITY

Encourage use of low impact development (LID) and green infrastructure



TO PROTECT STREAMS

Provide additional resources on use of stormwater best management practices (BMPs)

■ | CHAPTER 13 ARTICLE II. – FLOOD DAMAGE PREVENTION

(c) *Statement of purpose.* The purpose of this article is to promote the public health, safety and general welfare, to prevent adverse impacts from any floodplain development activities, and to minimize public and private losses due to flooding events in identified special flood hazard areas. This article advances the stated purpose through provisions designed to:

- (1) Protect human life and health;
- (2) **Minimize expenditure of public money for costly flood control projects;**
- (3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- (4) Minimize prolonged business interruptions;
- (5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in floodplains;
- (6) **Help maintain a stable tax base by providing for the sound use and development of flood prone areas in such a manner as to minimize future flood blight areas; and**
- (7) Ensure that potential buyers are notified that property is in a flood area.

■ UNREGULATED CONSTRUCTION SITES CREATE COMPLAINTS

Sediment

Trash

Dirty water

Dust

Tracked dirt on roadways

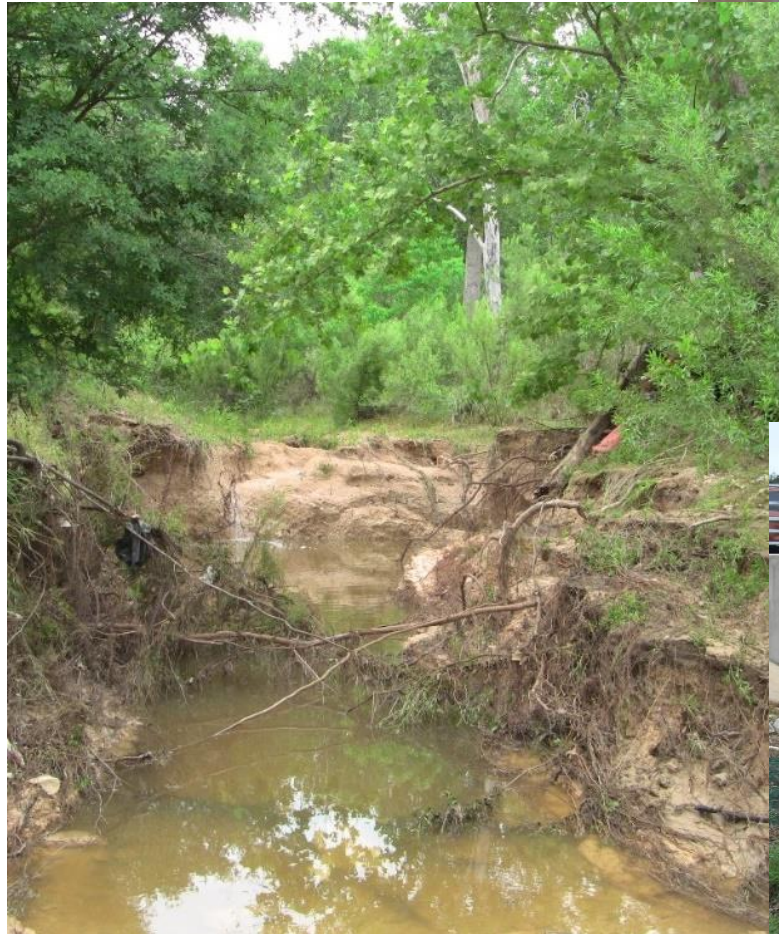
Growth is inevitable, smart growth is possible.



■ INCREASED RUNOFF CHANGES STREAMFLOW CHARACTERISTICS

Streams are valuable and a resource to be protected.

- Water Supply
- Flood Control
- Habitat
- Recreation



PLANNED CHANGES

The City plans to overhaul the manual to improve the resilience of its infrastructure and better protect residents and property from the impacts of extreme weather events.

1



MODERNIZE

Streamline manual and improve readability and usability

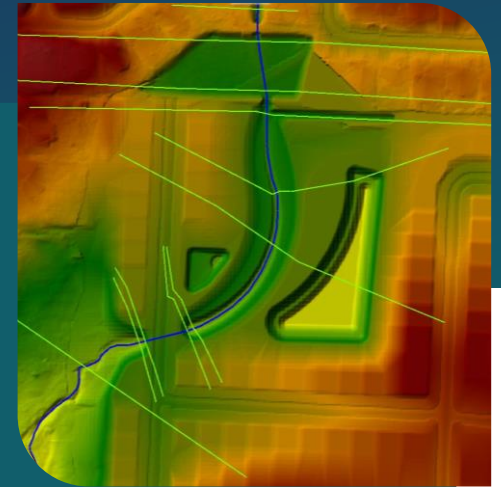
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ADDRESS WQ

Include measures to remove pollutants and incentivize green infrastructure

3



UPDATE METHODS

Utilize latest methods and expand analysis of storm events and offsite impacts

SWMM UPDATE PROCESS





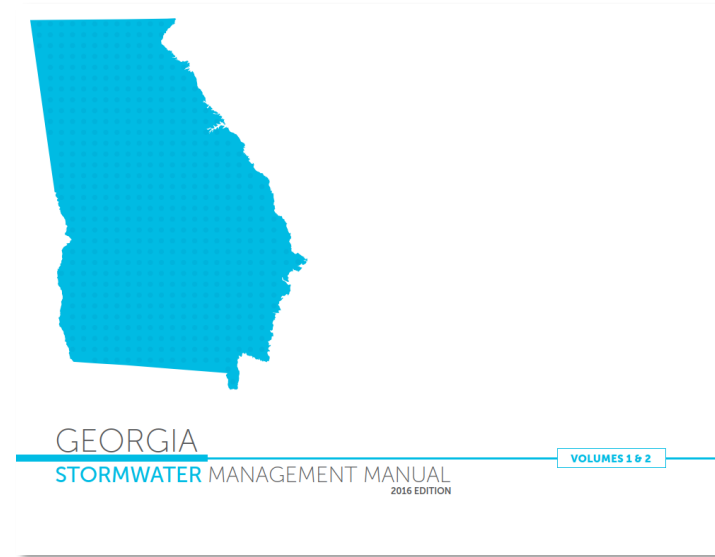
Step 1

REVIEW AND BENCHMARKING

BENCHMARKING

- Peer Communities
 - City of Fayetteville
 - City of Memphis
- State Agencies
 - ARDOT*
 - Georgia Stormwater Manual

*No longer considered a current reference



BENCHMARKING

- Developed a matrix of 38 different criteria for basis of comparison
- Held discussions with city staff from Fayetteville and Memphis

Little Rock Drainage Manual Update - Benchmarking				
	Little Rock Drainage Manual	Fayetteville Drainage Manual	Georgia Stormwater Manual	Memphis Stormwater Management Manual
II. Determination of Storm Runoff				
2.1	Rainfall Hydro 35 & TP 40 IDF Curves 24 hr 10yr - 6.1", 25yr - 7.0", 50yr - 7.8", 100yr - 8.5"	Hydro-35 & TP-40 IDF Curves 24 hr 10yr - 5.3", 25yr - 6.3", 50yr - 7.1", 100yr - 7.9"	refers to Atlas 14	Atlas 14 IDF Curves DDF Curves
2.2	Methodology – SCS, Rational < 200 acres - Rational Method 200 to 2000 acres - SCS TR55 > 2000 acres - HEC I	SCS TR55 up to 2000 acres Rational Method 0 to 40 acres, do not use for detention	Rational Method SCS TR55 for drainage up to 2000 acres. Simplified NRCS TR55	NRCS TR55 Rational Method Unit hydrograph theory
2.3	Parameters – CN, TC, etc. C-Values - Table based on storm event RCN - table based on city zones TC - nomograph	NRCS Soil Survey Data (USDA, SSURGO) RCN - table based on cover type Manning's n for sheet flow see table 3.3 C Values can be found in Table 3.5 min. TC 5 minutes Manning's n see table 3.4	NRCS Soil Survey Table 3.1.5-1 for RCN C Values can be found 3.1.4-2	C-values Table 2-4 Soil Classification Table 2-6 CN values Table 2-7, 2-8, 2-9
2.4	Software HEC I/ HEC II	HEC-HMS See Appendix H	Not specified only mention some software HEC-HMS HYB	See section 2.7.4 HEC-HMS, WinTR-55, EPA-SWMM
III. Storm Drains and Drainage Appurtenances				
3.1	Design Storms – bridges/culverts, roadways Bridges and culverts: 100yr roadways crossing floodplains 50yr for arterial, 25yr for minor arterials and collectors, 10yr all other streets	100-yr for major drainage system 10-yr for minor drainage system	Roadways use 25-yr to 100-yr Storm drainage systems 10-yr to 50-yr depending on the system. See section 5.1.3	10-yr for storm sewers 50yr for cross drain
3.2	Design velocities/slopes min. pipe velocity 2.5 fps min slope 0.4% channels 1.5 to 5.0 fps	min slope 0.5% min velocity 2.5 ft/s	min velocity 2.5 ft/s max slope 5% min slope 1% for grass swales 0.5% min slope for armored pilot channel	max velocity 20 ft/s min velocity 2.5 ft/s
3.3	Roughness coefficients concrete 0.012 CMP 0.024	For artificially lined channels see Table 6.15 Uniform flow values of n see Table 6.16	For artificial lined channels see Table 5.4-4 and Table 5.4-5 for uniform flow values	Only shows data for concrete. There is a sheet flow mannings n table 2-10
3.4	Min. Pipe size 15"	15"	Not specified Min pipe D for detention tanks is 36"	15"
3.5	Manhole location 30" or smaller - max 500 feet over 30" - max 1200 feet	15" to 36" - max 400 ft 42" and larger - max 500 ft		< 42" max spacing 400 feet >42" max spacing 500 feet
3.6	Minor losses Tables of minor loss coefficients			Table 6-5
IV. Culvert Hydraulics				
4.1	End treatments List of guidelines for selection of headwalls or endwalls	Req'd for all culverts installed in public ROW. See sec. 6.3.4.6 for more details regarding apron installation for high depths/velocities.	Headwalls are required for all metal culverts and where buoyancy protection is necessary and use an apron where velocity will cause scour	refers to Table 5-1
4.2	Discharge velocity Max allowable discharge velocity: Earth- 6 fps, Sod earth - 8 fps Paved or Riprap Apron - 15 fps Shale - 10 fps, Rock - 15 fps	See table 6.12 and 6.13 for maximum velocities (ft/s)	See Table 5.4-2 and 5.4-3 for velocity limitations	consistent with channel stability requirements at outlet, see chapter 3 for permissible velocities for channel linings
4.3	Computation method – HYB FHA methods, software with approval	Appendix H softwares	Section 5.5 provides energy dissipation design	FHWA HDS-5 methods HYB
V. Stormwater Detention				



Step 2

STAKEHOLDER INPUT

PUBLIC MEETINGS

For the first round of public engagement, three public meetings were held to gather input from the public:

May 17 th , 2023	Dunbar Community Center
May 22 nd , 2023	East Community Center
May 25 th , 2023	Adolphine Fletcher Terry Library

Upcoming Meetings

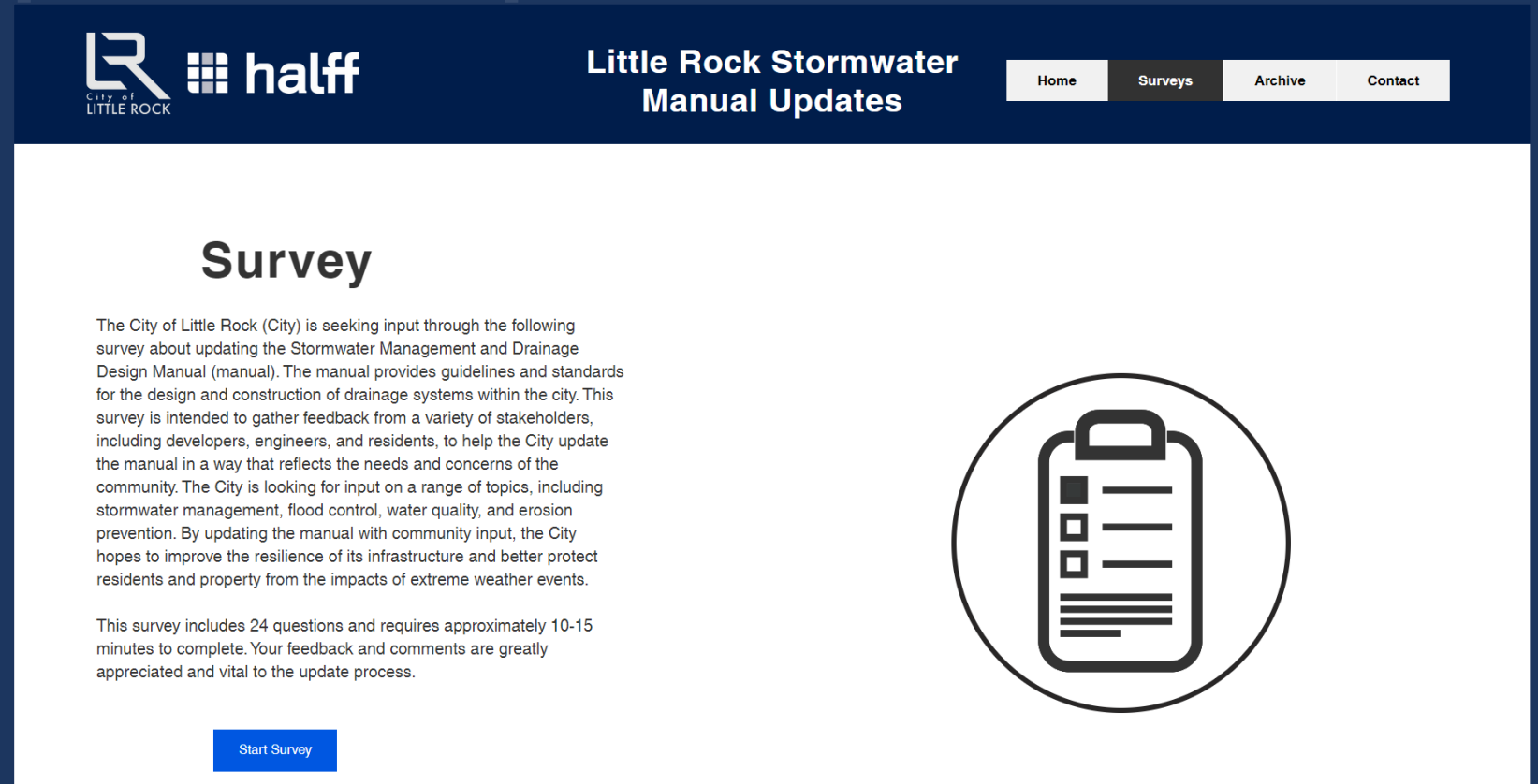
- **March 25th:** West Central Community Center (4521 John Barrow Road) - 6pm - 8pm
- **March 28th:** East Little Rock Community Center (2500 East 6th Street) - 6pm - 8pm
- **April 1st:** Adolphine Fletcher Terry Library (2015 Napa Valley Drive)- 6pm - 8pm



WEBSITE AND SURVEY

The website provides updates on the process, a link to the survey, and upcoming public meeting information.

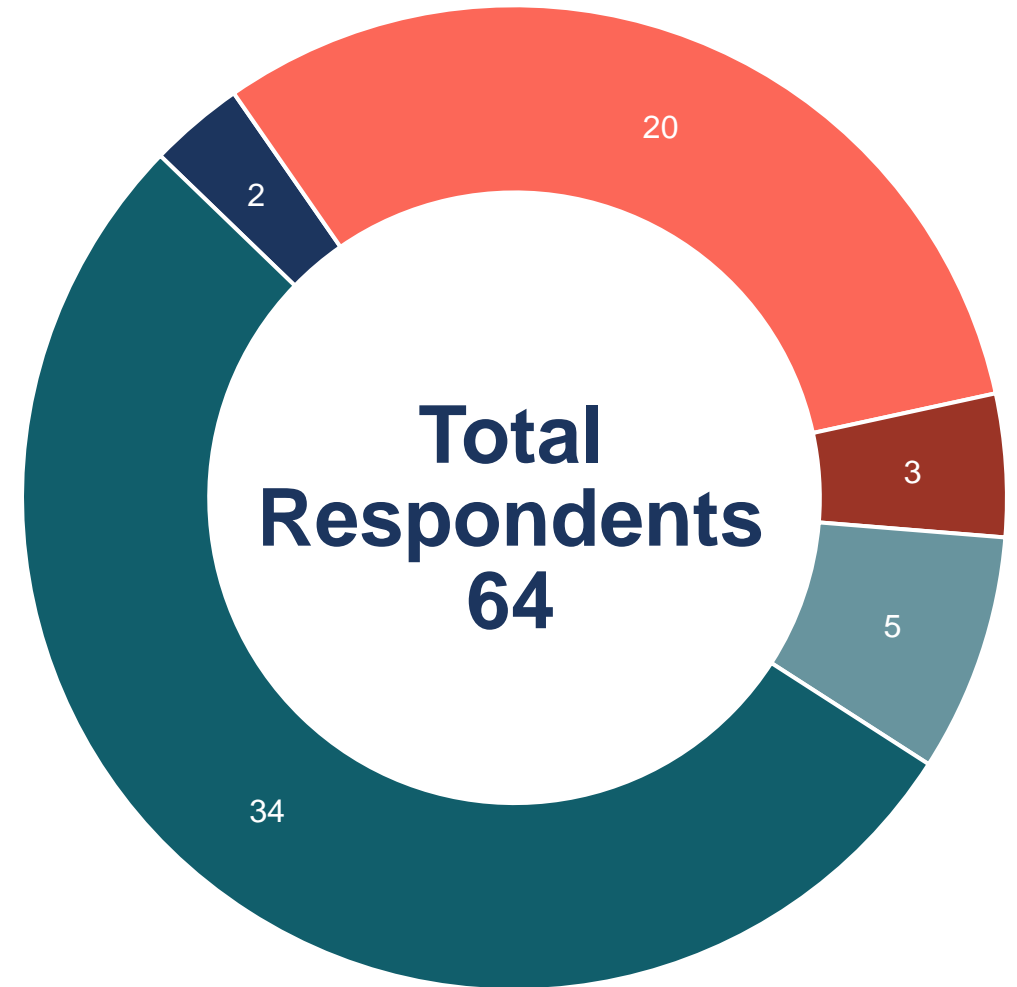
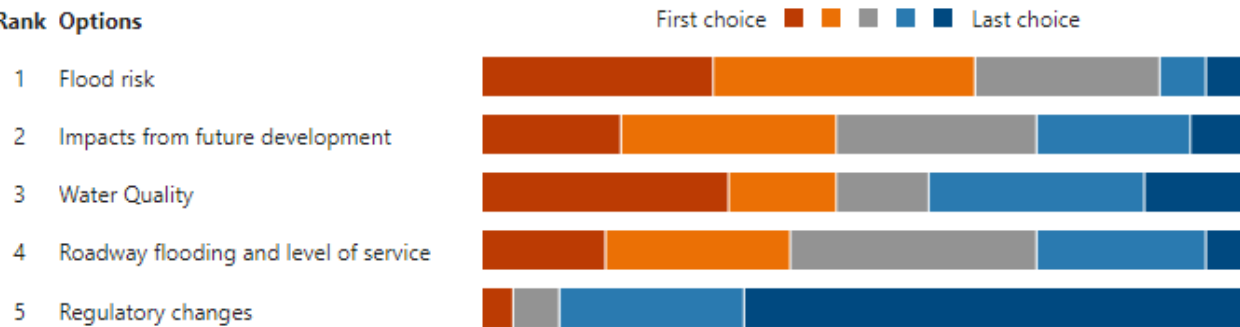
The purpose of the survey was to gather feedback from stakeholders to help the City update the manual in a way that reflects the needs and concerns of the community.



SURVEY RESULTS

- The current Little Rock Stormwater Management and Drainage Manual (LRSMDM) adequately addresses storm water management (flooding, street drainage, offsite impacts, water quality, stream protection, etc.)

Rank Options



■ Developer ■ Engineer/Architect ■ Contractor ■ Government Employee ■ Local Resident



Step 3

DRAFT CHAPTERS



PROPOSED OUTLINE

- In general, the overall layout of the manual is similar. Some chapters were combined and streamlined, and two chapters were added.

Major addition to the manual is the Water Quality chapter.

Current Outline

Outline
Ordinance
Policies
Introduction
I. Submittal Procedures
II. Determination of Storm Runoff
III. Storm Drains and Drainage Appurtenances
IV. Culvert Hydraulics
V. Stormwater Detention
VI. Pavement drainage design
VII. Storm Drain Inlets
VIII. Storm Sewer Design
IX. Open Channel design
X. Erosion and sediment control
~~XI. General Requirements to Prevent Stormwater Damage~~
Appendix A Grading and Drainage Plan Checklist
~~Appendix B Soil Loss Calculation Tables~~
Appendix C Erosion and Sedimentation Controls
Appendix D References

Proposed Outline

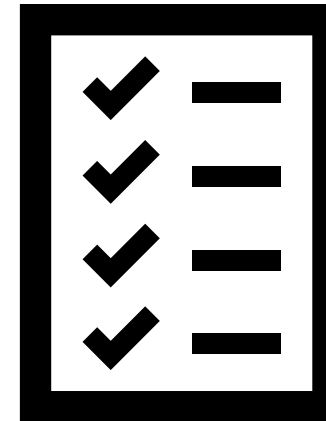
Introduction
I. Submittal Procedures
II. Stormwater Criteria, Planning, and Regulations
III. Determination of Storm Runoff
IV. Storm Drainage System Design
V. Open Channel Design
VI. Culvert Hydraulics
VII. Stormwater Detention
VIII. Water Quality
IX. Construction Site Stormwater Management
Appendix A Drainage Report and Plans & Specifications Checklists
Appendix B Example Submittal
Appendix C Stormwater BMPs
Appendix D Erosion and Sedimentation Controls
Appendix E References

CHAPTER 1 – SUBMITTAL PROCEDURES

- Summarizes the submittal procedures and requirements for a stormwater management and drainage plan.
- This chapter outlines the items to be included in the Final Drainage Report and the Plans and Specifications.

Goals of revision

- Streamline submittal procedures
- Clarify submittal requirements
- Provide example submittal in Appendix B



CHAPTER 2 – STORMWATER CRITERIA

- Summarizes the major stormwater related criteria related to water quality, downstream impacts, and stormwater system Level of Service.

Goals of revision

- Establish primary goal and objectives of the manual
- Summarize main criteria in one location
- Provide accessible location for most common information

The objective of this manual is to:

- Reduce stormwater runoff pollutants and protect water quality
- Reduce downstream overbank flooding and channel erosion
- Safely convey the design storm and extreme storm events

CHAPTER 3 – DETERMINATION OF STORM RUNOFF

- Provides rainfall information and accepted runoff determination methodologies.
- Chapter 3 also provides equations and parameters for multiple hydrologic methodologies.

Goal of revision

- Utilize best available rainfall data, Atlas 14, and provide updated IDF equation parameters
- Modernize hydrologic methods
- Revise applicable methodology based on watershed size
- Remove unnecessary calculation aids

Rainfall	TP-40	Atlas 14
10-year	6.1"	5.94"
25-year	7.0"	7.14"
50-year	7.8"	8.13"
100-year	8.5"	9.17"

Table 3.1 Hydrology Methodology

Methodology (Section)	Watershed Size
Rational Method (3.3)	Less than 20 acres.
SCS TR-55 Method (3.4)	Up to 200 acres.
HEC-HMS Method (3.5)	Greater than 200 acres.
Regression Method (3.6)	Greater than 2,000 acres.

CHAPTER 4 – STORM DRAINAGE SYSTEM DESIGN

- This chapter focuses on the design of the storm drainage system, including inlets, street gutters, roadside ditches, small channels, swales, and the underground pipe system.

Goals of revision

- Combine and condense several chapters
- Update design storm and spread limits based on street classification

Table 4.1 Design Storm for Street Classification

Street Classification	Design Storm
Principal Arterials	100-year
Major and Minor Arterials	100-year
All other streets	25-year

CHAPTER 5 – OPEN CHANNEL DESIGN

- Provides an overview of open channel design criteria and methods.
- In addition to natural channels, dry and wet swales, drainage ditches, riprap channels, concrete lined channels, and grass channels, encompass open channels.

Goals of revision

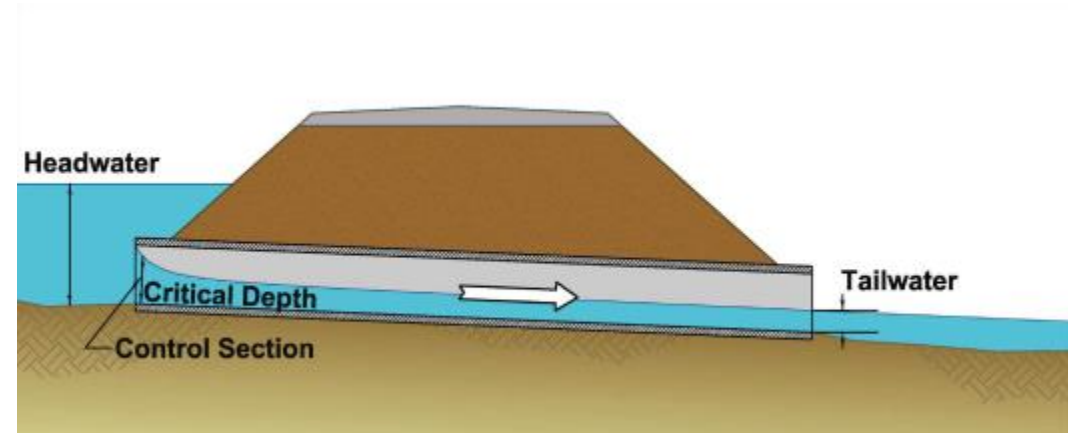
- Streamline chapter
- Update design storm and freeboard requirements
- Remove unnecessary calculation aids

CHAPTER 6 – CULVERT HYDRAULICS

- Outlines the analysis and design of culverts.
- This chapter also provides design criteria for culvert end treatments and energy dissipators.

Goals of revision

- Streamline chapter
- Update design storm and freeboard/headwater requirements
- Remove unnecessary calculation aids

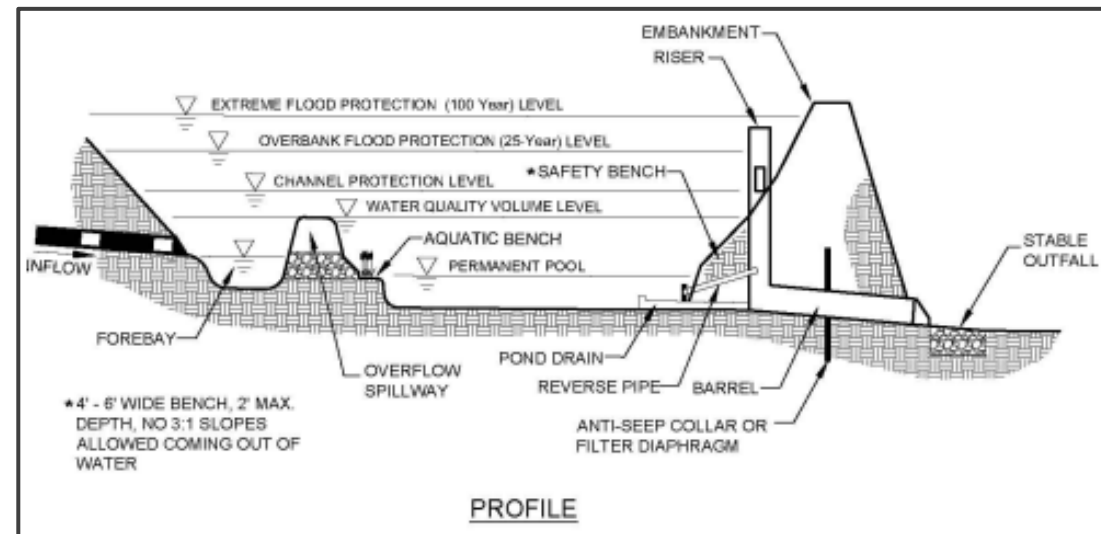


CHAPTER 7 – STORMWATER DETENTION

- Chapter 7 provides guidance on stormwater runoff storage for meeting for downstream channel protection and peak flow attenuation.
- The chapter provides analysis methods and allowable methods of detention storage such as dry ponds, wet ponds, and underground detention.

Goals of revision

- Update methods of analysis and the storm events analyzed
- Require assessment of downstream impacts

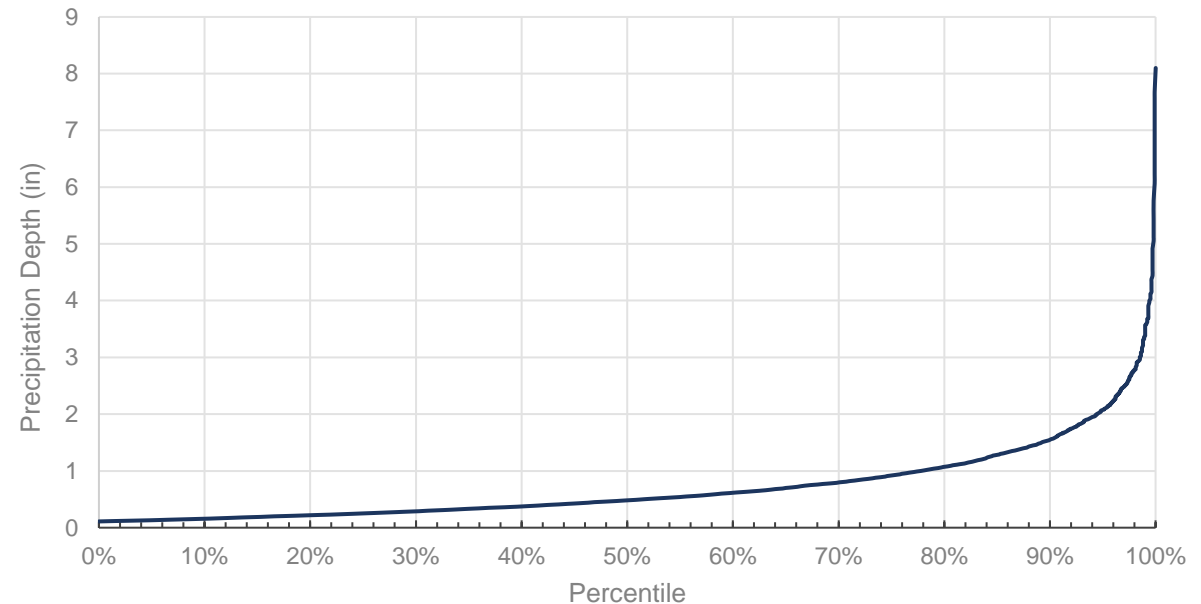


CHAPTER 8 – WATER QUALITY

- Chapter 8 provides criteria for water quality treatment and guidance on the use of Low Impact Development (LID) and stormwater Best Management Practices (BMPs).

Goals of revision

- Develop water quality criteria and BMP guidance
- Establish water quality volume (WQv) based on 90th (1.5") and 85th (1.3") percentile storm events



CHAPTER 8 – WATER QUALITY

- The Water Quality Volume (WQv) provides treatment from a site to reduce post-development total suspended solids (TSS) loadings by 80%, as measured on an average annual basis.
- This performance goal is based on the ADEQ NPDES small MS4 permit in accordance with U.S. EPA guidance.

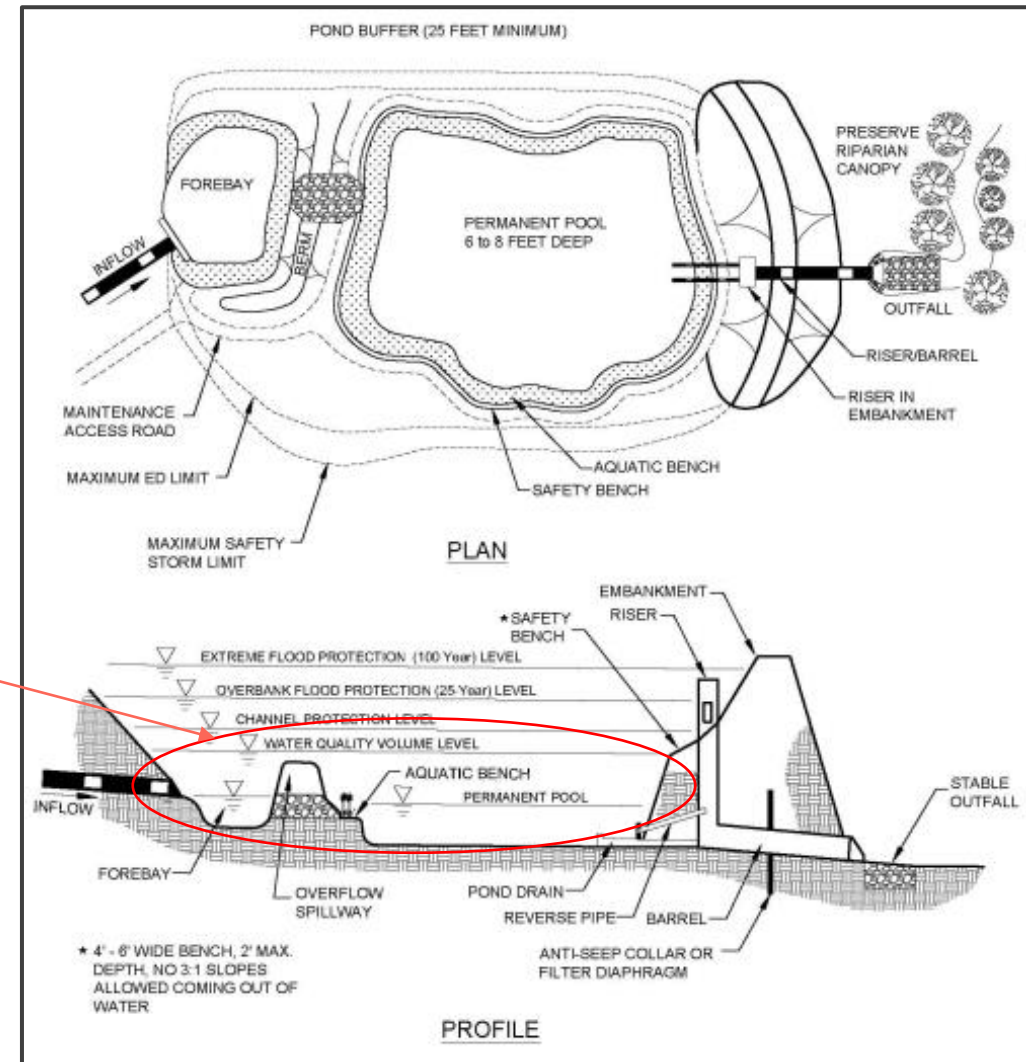
$$WQ_v = \frac{P R_v A}{12}$$

Where: WQv = water quality volume (ac-ft)

$R_v = 0.05 + 0.009(I)$
where I is the percent impervious cover (i.e., 50% impervious is 50 not 0.5)

A = site area (acres)

P = 1.5 inches (new development) or 1.3 inches (redevelopment)



■ CHAPTER 9 – CONSTRUCTION SITE STORMWATER MANAGEMENT

- Provides information on construction site stormwater management practices which control erosion and sedimentation.
- Management practices include stabilization practices, erosion control, site runoff control, and sedimentation controls.

Goals of revision

- Streamline chapter
- Clarify requirements and accepted erosion control methods

APPENDICES

- The appendices provide guidance on submittal items and additional resources for water quality stormwater BMPs and construction site erosion controls.

Goals for revision

- Revise guidance for more consistent submittals
- Provide detailed information for selection and design of water quality BMPs
- Update erosion and sediment controls

Appendix A – Report and Plan Checklists
Appendix B – Example Submittal
Appendix C – Stormwater BMPs
Appendix D – Erosion and Sediment Controls
Appendix E – References

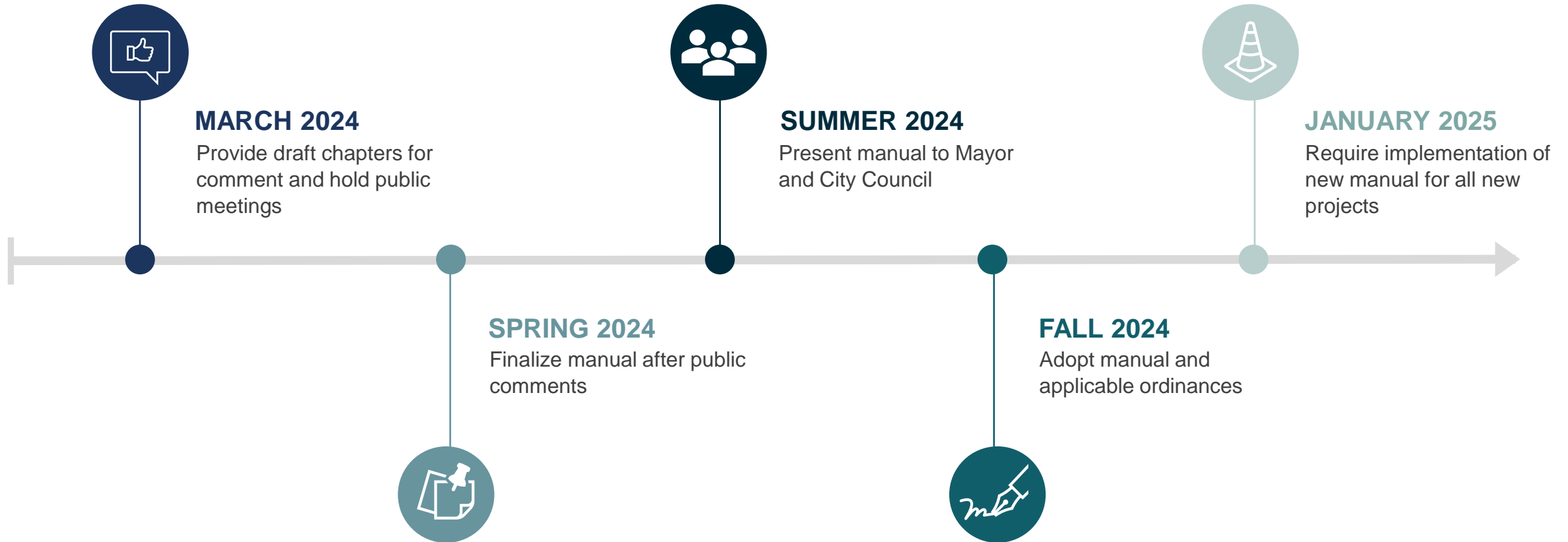


Step 4

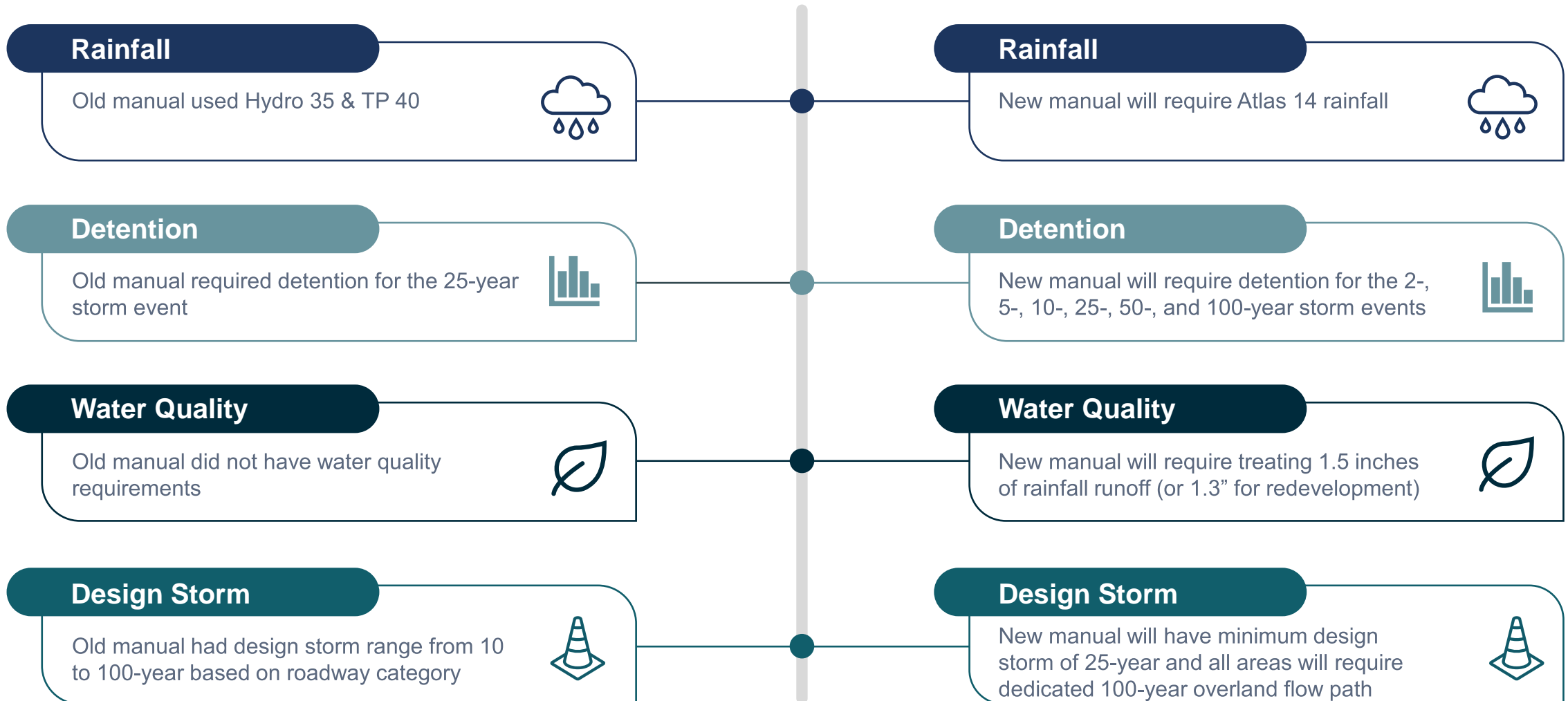
IMPLEMENTATION



UPCOMING TIMELINE



SUMMARY OF MAJOR CHANGES



GET IN TOUCH

Visit the website <https://www.lrsmanualupdate.com/> for the latest updates or contact us below.

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