

ASFPM 2018 – Phoenix, AZ

City of Colorado Springs

**Stormwater
Infrastructure
Master Plan**



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June 21, 2018



Background

History

Goals

Approach

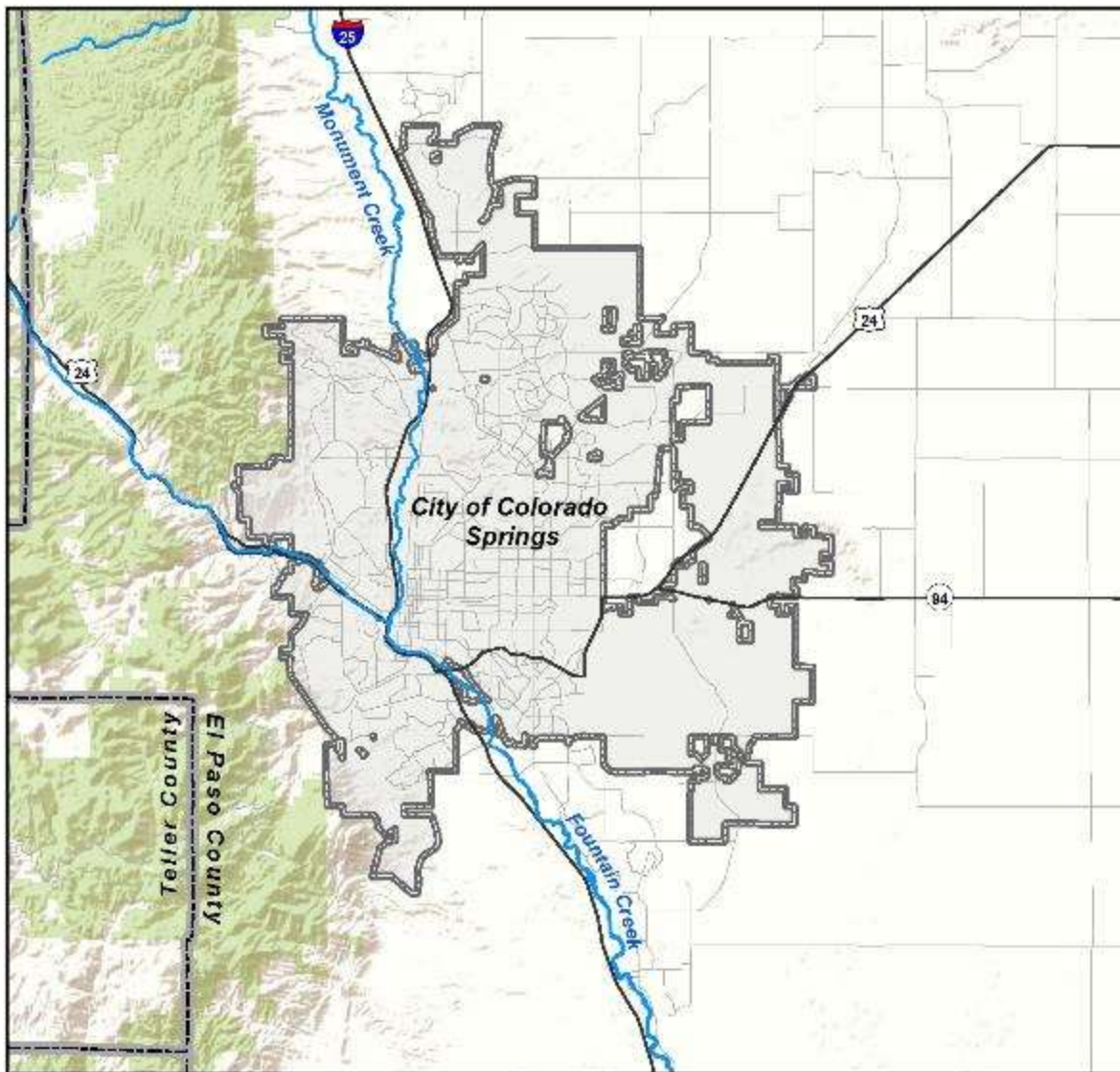
Next Steps

Takeaways



- City of Colorado Springs incorporated 1886
- 2nd most populous city in Colorado but largest by area – 195 mi²
- Semi-arid – 16 in/yr
- Mobile streambeds
- Floodplains – 160-mi
- Fountain Creek Watershed – 460 mi²

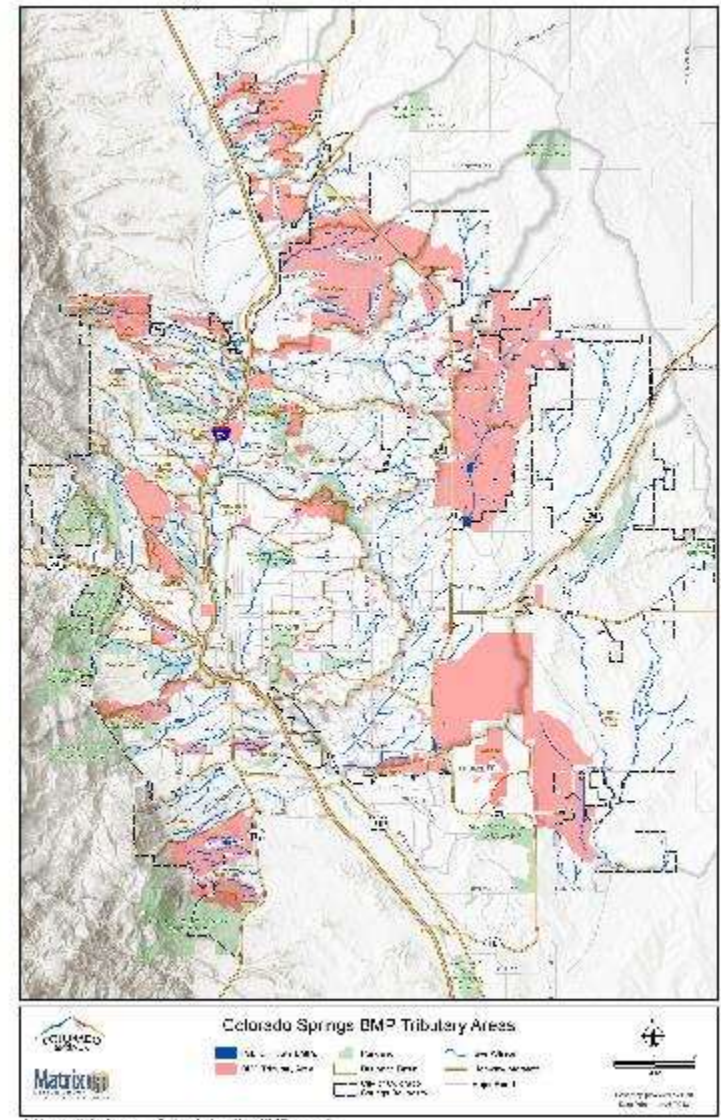




- 🏠 1990 – Southern Delivery System (SDS) Planning Begins
- 🏠 1997 – 1st Colorado Springs MS4 permit
- 🏠 2005 – Stormwater Enterprise Approved
- 🏠 2009 – Stormwater Enterprise Ended by City Council
- 2012 Waldo Canyon Fire 2014 Black Forest Fire**
- 🏠 2014 – Drainage Criteria Manual Adopted
- 🏠 2015 – EPA MS4 permit notice of violation
- 🏠 2016 – Pueblo County Inter-Governmental Agreement (IGA)
- 🏠 2016 – SDS begins operation
- 🏠 2017 – Stormwater fee re-established



- GIS-based web application for CIP planning
- Existing infrastructure gaps
- CIP prioritization and budgeting tool
- Create a Stormwater Channel Assessment Program framework
- BMP tracking system

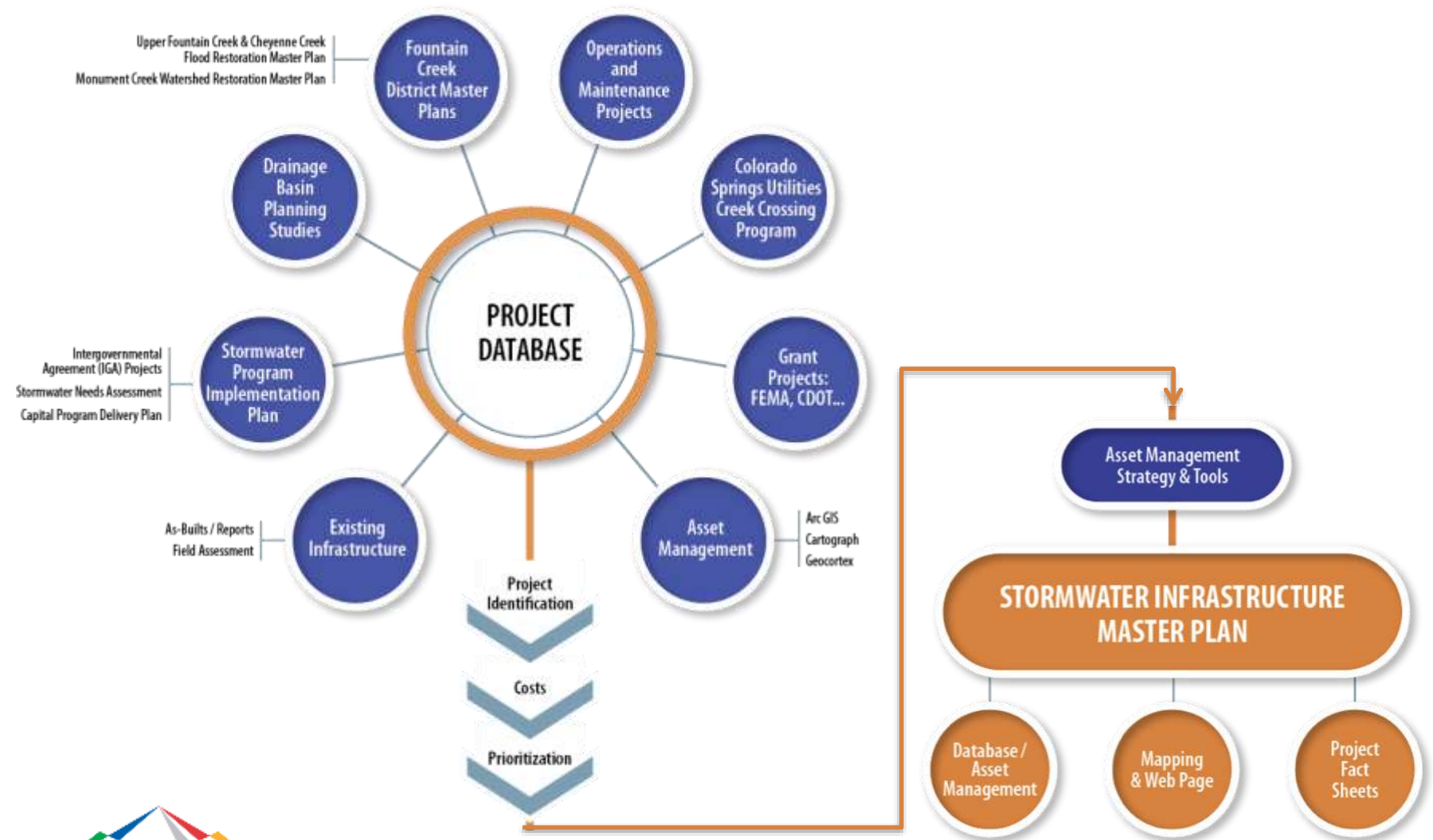


- 🏗️ Colorado Springs Utilities
- 🏗️ Operations & Maintenance
- 🏗️ Development Review
- 🏗️ Fountain Creek Watershed
Flood Control & Greenway
District
- 🏗️ CIP Delivery
- 🏗️ Parks & Open Space
- 🏗️ GIS and IT



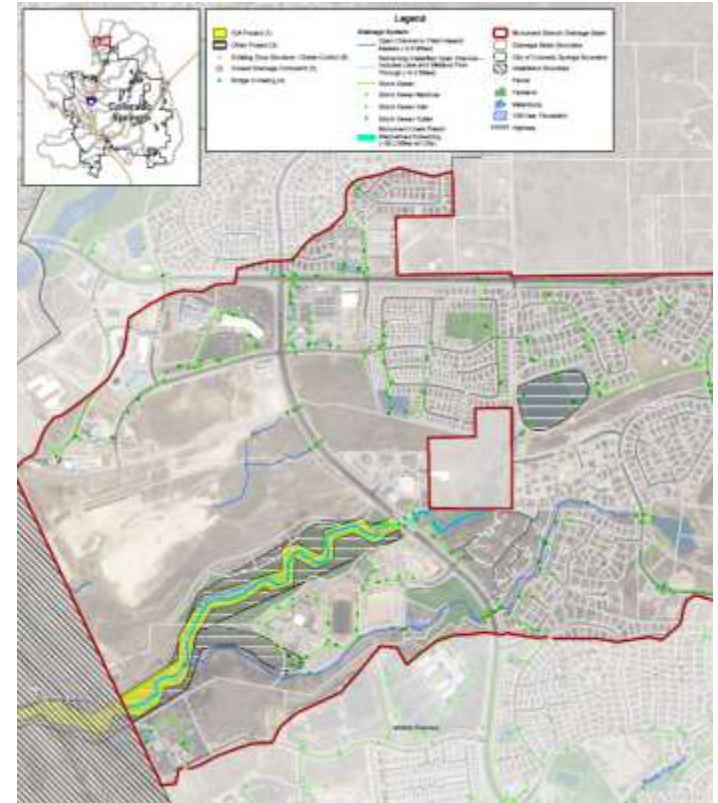
- City of Aurora
 - City & County of Denver
 - Urban Drainage & Flood Control District
- | | |
|---------------------|---------------|
| Project Definitions | Cut Sheets |
| Sub-Projects | Work Flow |
| Prioritization | Cost Index |
| Querying | Editability |
| | Accessibility |





- 37 major drainage basins
- 63 mi improved/195 unimproved
- 1,260 grade control structures
- 800+ existing BMPs

- Tablet data collection
- Geolocated photos



Parameters collected

- Location - GPS
- Improvement type
- Condition
 - Tier 1
 - Tier 2
- Height
- Vegetation



Tier 1 – Infrastructure Condition

- Health/safety/flooding
- Channel stability
- Utility risks
- Road/bridge/structure risk
- Criteria – headcuts, unstable banks, severe floodplain disconnect, undermined drop structures

Tier 2 – Corridor Function

- Recreation
- Habitat/riparian function
- Aesthetics
- Criteria – geomorphic floodplain connection, vegetation quality and connection, bedrock

- 🏗️ Tier 1 – Infrastructure Condition:
Examples
- 🏗️ Good (green) – healthy stream corridor; sustainable [35%]
- 🏗️ Fair (yellow) – some instability but no adjacent risks; at risk in large flood; maintenance [50%]
- 🏗️ Poor (orange) – instability with adjacent risks; could need a CIP [10%]
- 🏗️ Critical (red) – needs immediate attention; imminent risk [<5%]



- 🏗️ Tier 2 – Corridor Value: Examples
- 🏗️ Good (green) – healthy stream corridor; high aesthetic and habitat value [30%]
- 🏗️ Fair (yellow) – some impaired habitat but mostly functioning [45%]
- 🏗️ Poor (orange) – disconnected floodplain, sparse vegetation [20%]
- 🏗️ Critical (red) – minimal habitat value [<5%]

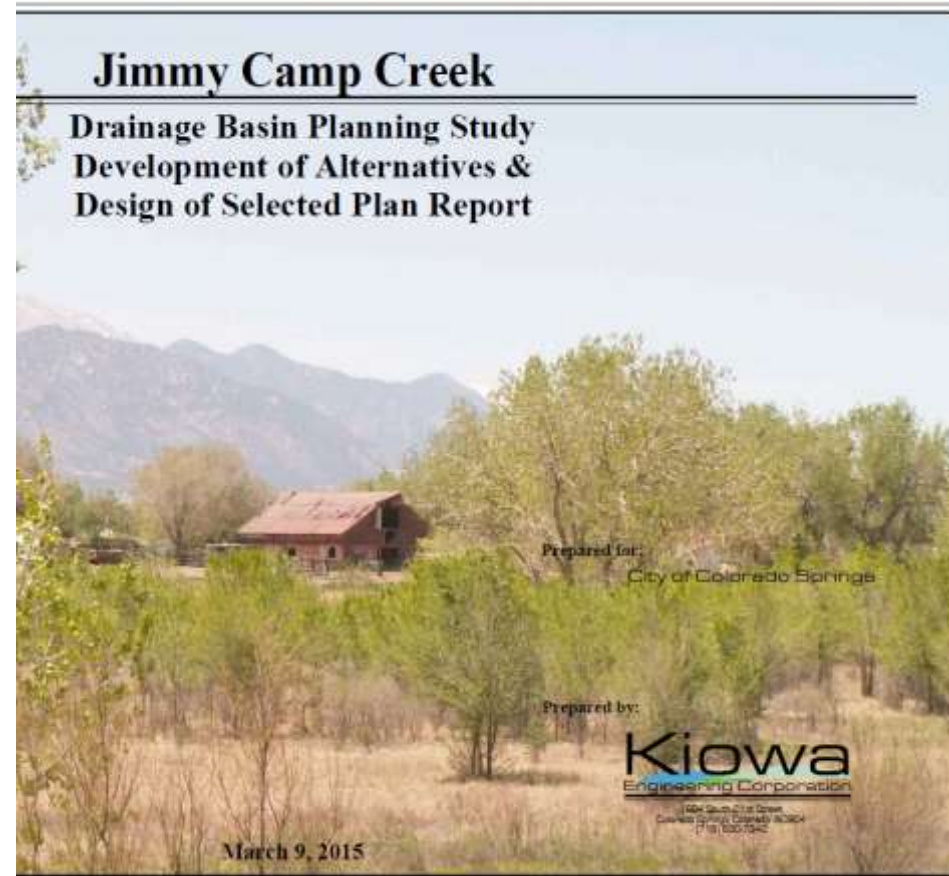


- Examples
- Tier 1 – Good
- Tier 2 - Poor



- Over 400 documents
- Plans/Reports
 - IGA Projects
 - Needs Assessment
 - Databases
 - Spreadsheets
 - Hand written notes
 - Individual staff knowledge

GIS data



PROJECT ORGANIZATION: INVENTORY SPREADSHEET

Document Summary →

Improvement →

Improvement →

No.	ID	Cost Table (SIMP ID) (NEW)	Attribute Only (SIMP ID) (New)	IGA ID (NEW)	Improvement Name	Location (Street Names)	Drainageway	...	Category	Description	Unit	Quantity	Unit Cost	Cost Subtotal	...	Status	...
1	1-0				Sand Creek DBPS - Detention Basin Cost Estimate	Sand Creek Basins			0 - Project summary	-		LS	1	\$\$\$			
1	1-1	SC-C6		-	Sand Creek DBPS	Lower Sand Creek	Sand Creek		X - Channel - Grade Control	Grade control	EA	6	\$27,000	\$162,000		Constructed	
1	1-2	SC-C6		-	Sand Creek DBPS	Lower Sand Creek	Sand Creek		X - Channel - Lining	Sel linings (1 side)	LF	350	\$127	\$44,450		Not constructed	
1	1-3	EFSC-C8		-	Sand Creek DBPS	East Fork Sand Creek Tributaries	East Fork Sand Creek		X - Channel - Lining	Selective riprap lining	LF	5700	\$85	\$484,500		Not constructed	
1	1-4	EFSC-D1		-	Sand Creek DBPS	Constitution Ave and East Fork Sand Creek	East Fork Sand Creek		X - Detention	Public regional 100-year detention with water quality (278 AF)	AC-FT	278	\$10,000	\$2,795,000		Not constructed	
1	1-5	EFSC-D1		-	Sand Creek DBPS	Constitution Ave and East Fork Sand Creek	East Fork Sand Creek		X - Detention	Land acquisition	AC	26.9	\$15,900	\$427,710		Not constructed	
1	1-6	EBSC-B160		-	Sand Creek DBPS - Roadway Culvert Crossing Cost Estimate	Bridlespur Road	East Bierstadt Creek		X - Culvert	2-8'Hx10'W CBC	LF	160	\$750.00	\$120,000		Not constructed	
1	1-7	EBSC-B47A		-	Sand Creek DBPS - East Fork Sand Creek Bridge Crossing Cost Estimate	Unnamed Roadway	East Bierstadt Creek		X - Bridge / Full span	2-10'Hx14'W CBC	LF	250	\$1,250.00	\$312,500		Not constructed	



Project Organization

Legend:

Summary of costs by document.

Project Improvements identified in the reviewed document.

Steps in inventory spreadsheet to define project organization.



Project Organization

Monument Creek

MC-C26

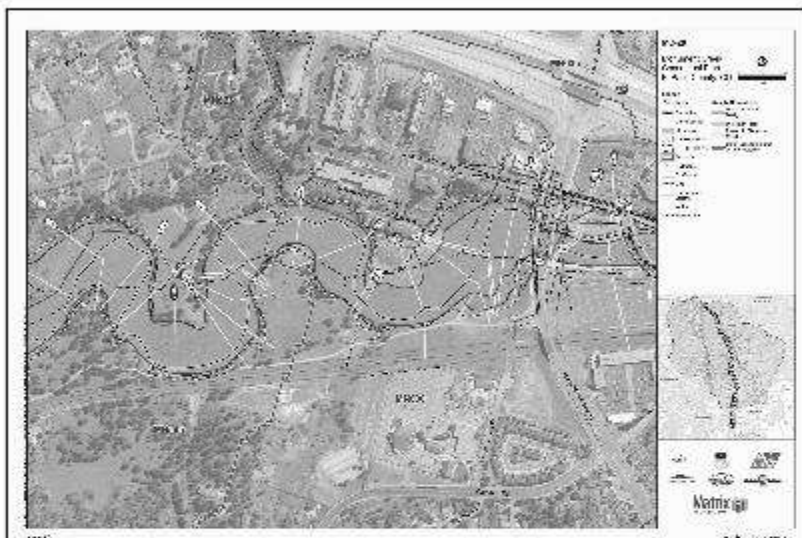
Channel

Priority:

Date Generated: 5/18/2018

Project Description:

Regrade/Revegetate steep eroding bank



Cost Analysis:

	UNIT	QUANTITY	UNIT COST	COST SUBTOTAL
MC-C26				
Right of Way	LS	1	0.00	\$0.00
Shoe	LI	1,000	0.00	\$0.00
Shoe	LI	1,000	0.00	\$0.00
Shoe	LI	1,000	0.00	\$0.00
Regrade baseflow channel	LI	1,000	0.00	\$0.00
Regrade baseflow channel	LI	700	0.00	\$0.00
Regrade baseflow channel	LF	400	0.00	\$0.00
Regrade baseflow channel	LF	1,040	0.00	\$0.00
Regrade baseflow channel	LF	30	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	300	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	220	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	300	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	220	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	20	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	20	0.00	\$0.00
Regrade/Revegetate steep eroding bank	LF	20	0.00	\$0.00
Rock riprap	LF	20	0.00	\$0.00
Vegetated bank	LF	1,540	0.00	\$0.00
Vegetated bank	LF	400	0.00	\$0.00
Vegetated bank	LF	750	0.00	\$0.00
Vegetated bank	LF	10	0.00	\$0.00
Vegetated bank	LF	200	0.00	\$0.00
Vegetated bank	LF	250	0.00	\$0.00
Vegetated bank	LI	200	0.00	\$0.00
Cleaning and grubbing	%	2	0.00	\$0.00
Contingency	%	25	0.00	\$0.00
Demolition/Disposal	%	2	0.00	\$0.00
Vegetation	%	8	0.00	\$0.00
Unlisted items	%	8	0.00	\$0.00
Water control	%	8	0.00	\$0.00

Total: \$1,385,062

Planning

- Drainage Basin Planning Studies
- Existing Infrastructure Needs Assessment

Condition

Capacity

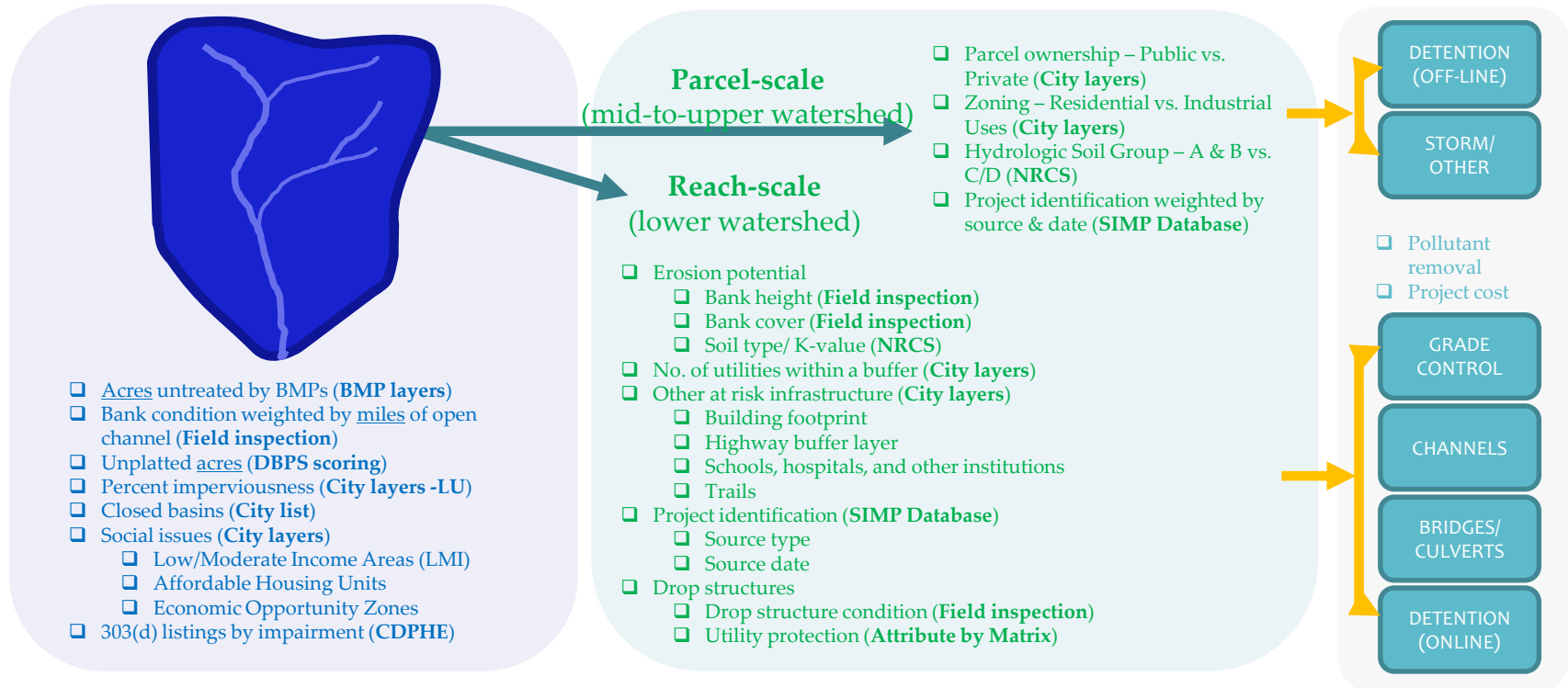


Technical (60%)									Situational Awareness (40%)	Weighted Score
Drainage Basin	DBPS Published Date	Age of DBPS	Design Standard	Degree of Future Development	Existing Regional Detention	Future Regional Detention	Potential Natural Stream Preservation/ Restoration Opportunities	Closed Basin	City-Input (based on economic, social and political climate at the time of ranking)	
Score Range	-	0-3	0-4	0-3	0-3	0-3	0-1	0-1	0-5	0-100
Scaling Multiplier	-	5	5	12	1	1	10	6	5	
Black Canyon	02/01/80	1	3	2	3	1	1	1		63
Black Squirrel Creek	01/01/89	2	3	3	1	1	0	1		61
North Douglas Creek	03/01/81	1	4	2	3	2	0	1		57
South Douglas Creek	03/01/81	1	4	2	3	2	0	1		57
Mesa	03/01/86	1	4	2	2	1	0	1		57
Sand Creek (including Upper Sand Creek)	03/01/96	3	2	3	1	3	0	1		57
Camp Creek	10/01/64	0	4	1	3	1	1	1		56
Westside	10/01/75	0	4	1	2	1	1	1		55
Peterson Field (Sand Creek)	08/01/84	1	4	1	3	1	1	1		55

**LEVEL 1/ LEVEL 2 – WATERSHED/
SUB-BASIN SCALE**
Prioritize Highest Need Drainage
Basins

LEVEL 2 – PARCEL & REACH SCALES
Prioritize Highest Risk Locations Within Drainage
Basins

LEVEL 3 - PROJECT SCALE
Prioritize Solutions
by Project Type



- Project Identification
- Project Prioritization
- Develop Web Application



- 🏗️ Evolution is painful
- 🏗️ Deferred maintenance is not the sum of its parts
- 🏗️ Leverage existing data
- 🏗️ Listen to users
- 🏗️ Communicate





City Project Manager – Tim Biolchini
Engineering Stormwater Division Manager – Richard Mulledy
Stormwater Capital Programs Manager – Brian Kelley



