KAYUGA SOLUTION

LIVERMORE CALIFORNIA

CAMP Committee Meeting

City of Livermore

July 17, 2017

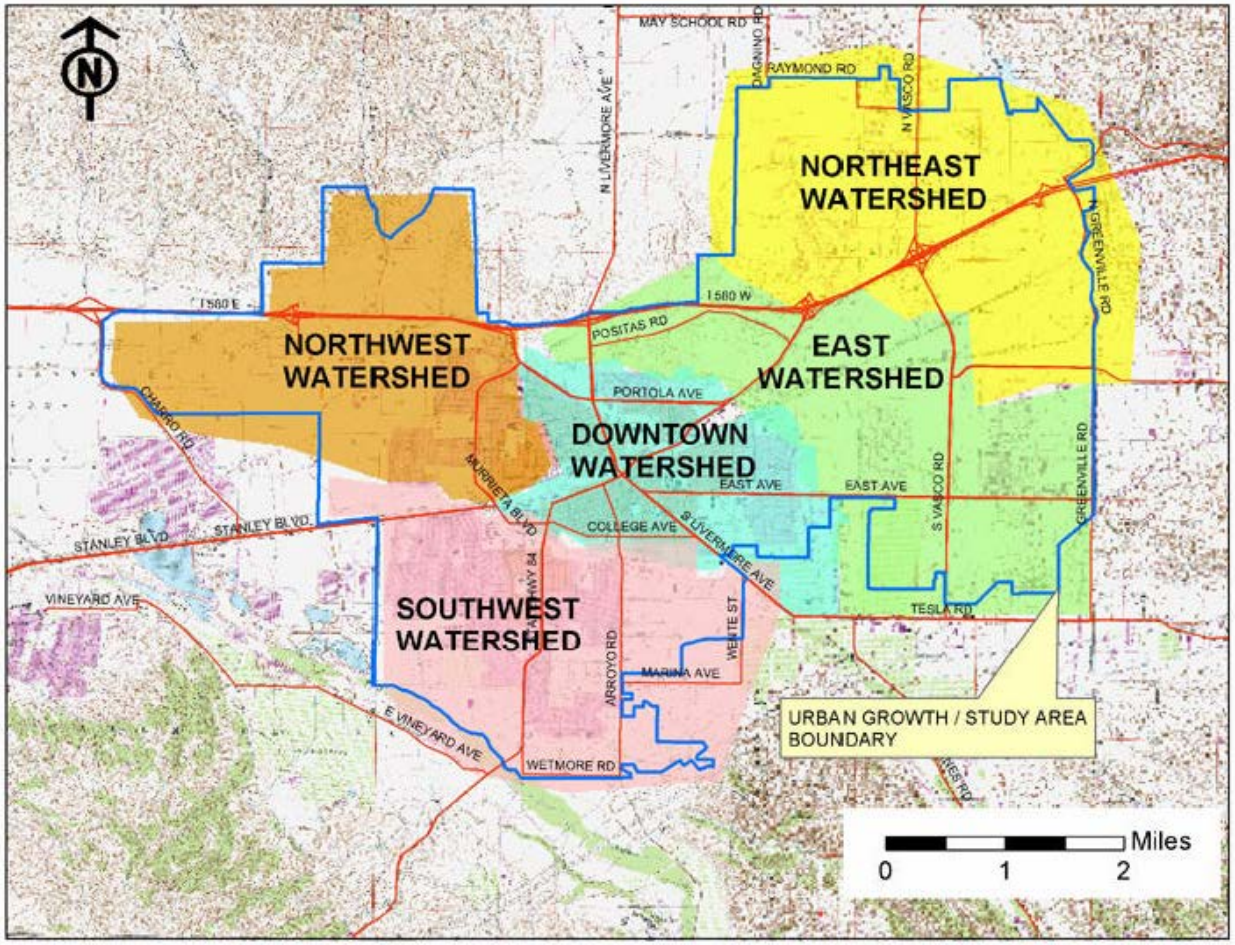
Storm Drain Management System

Purpose of Storm Drain System

1. To provide flood control
2. To protect water quality
3. To provide natural green space

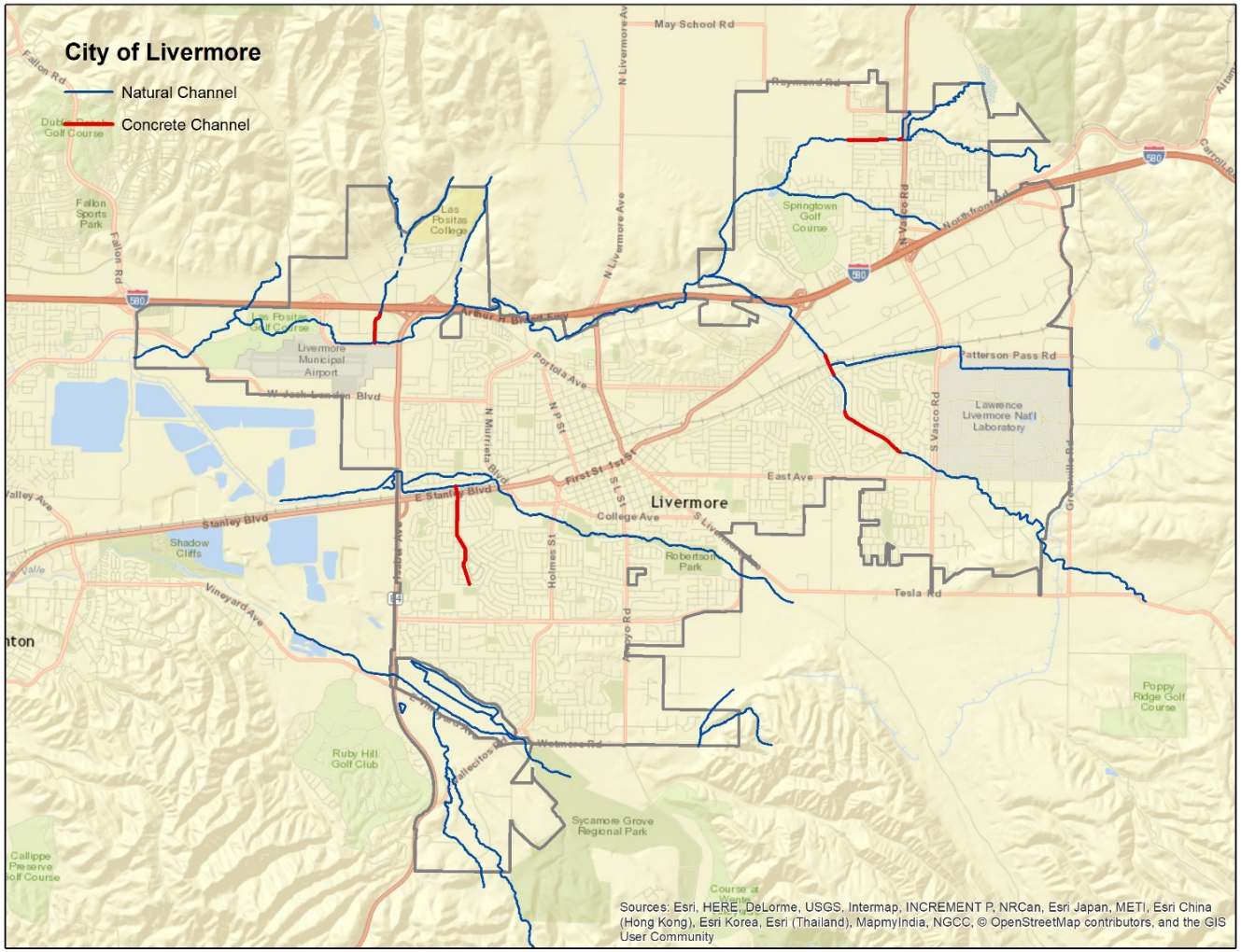
Watersheds

- 5 watersheds (Master Plan)



Waterways

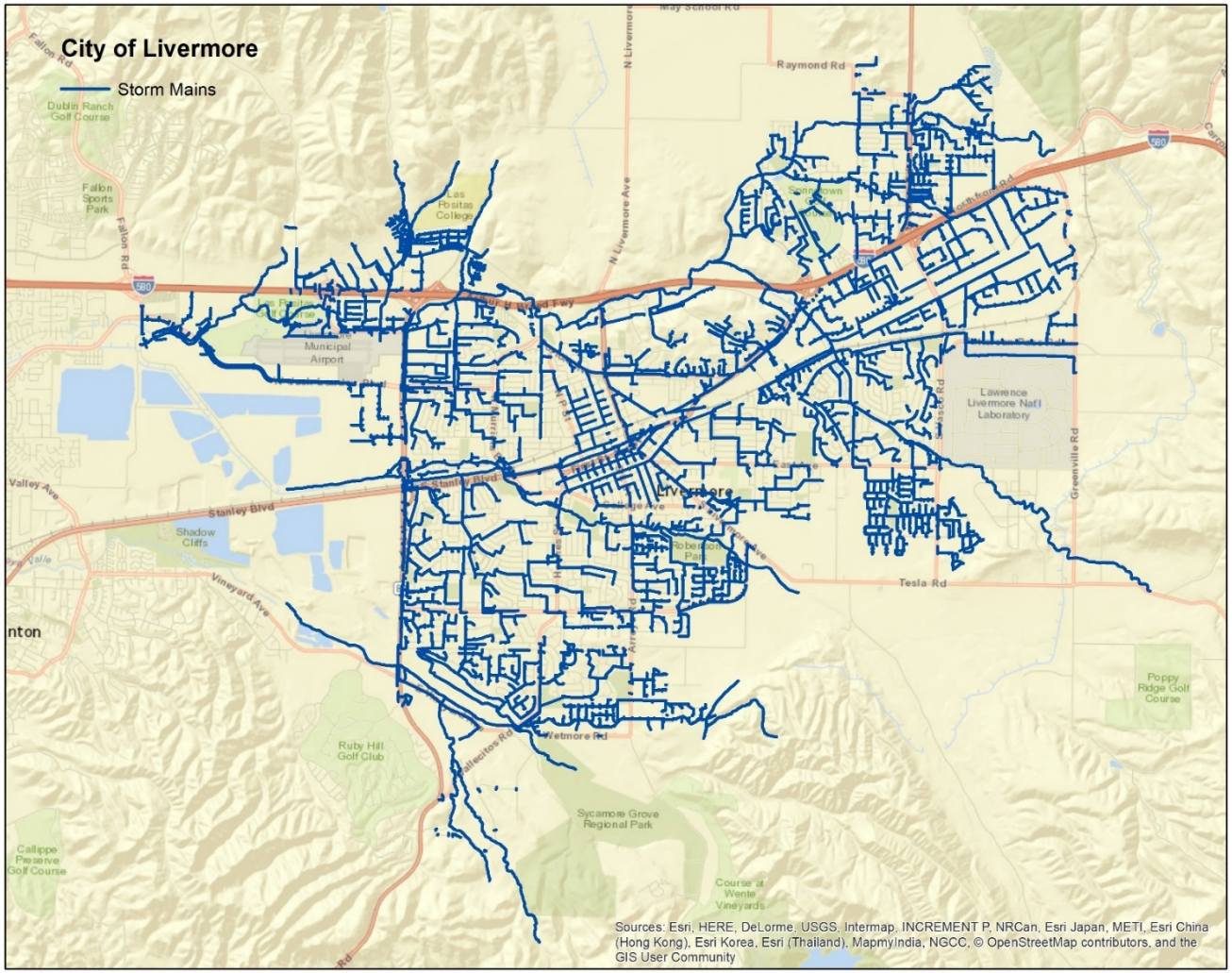
- 22.4 miles



Type	Length (mi)
Natural	20.1
Concrete	2.3

Pipes

- 226 miles of pipes (based on GIS)

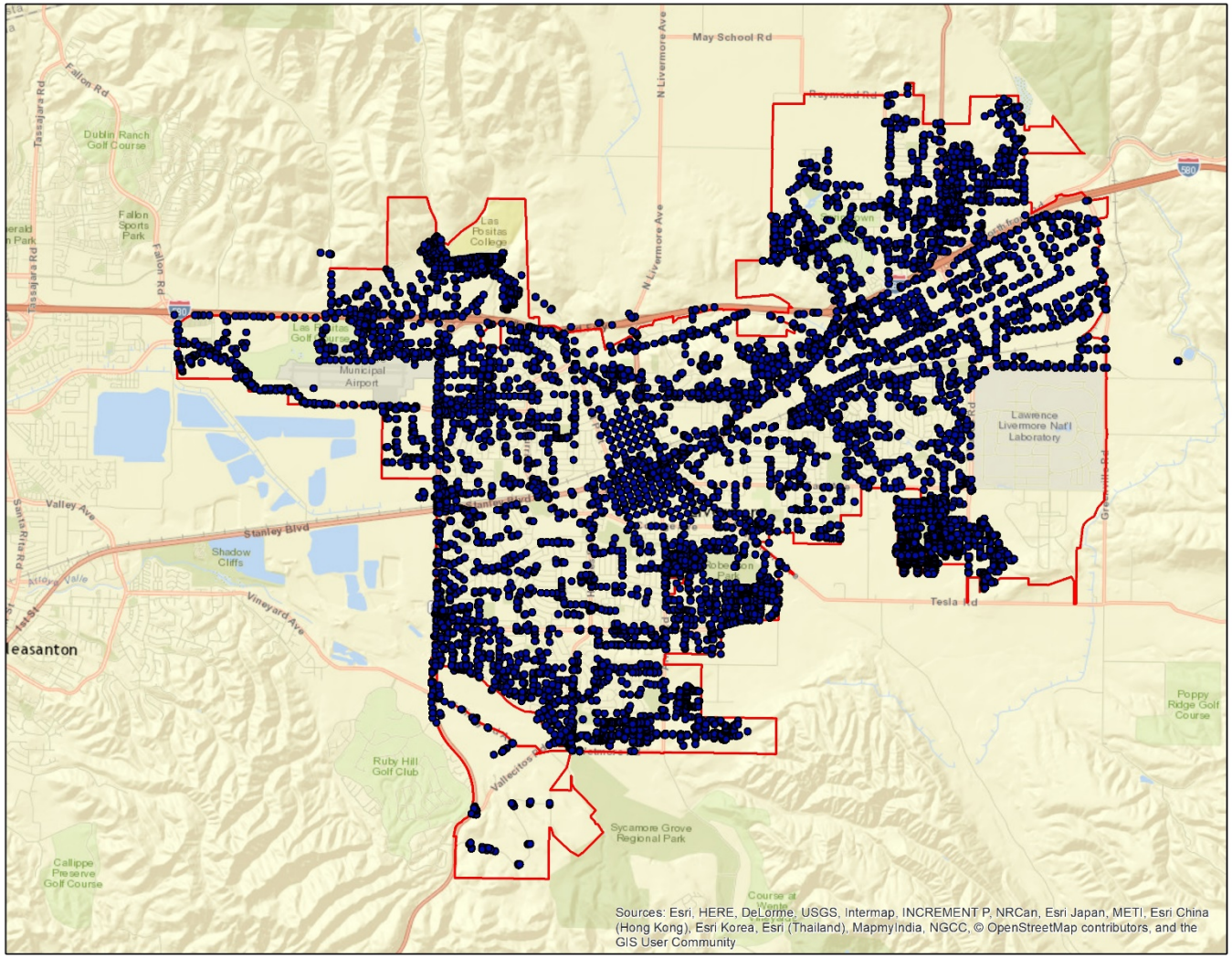


Diameter (in)	Miles	Diameter (in)	Miles
4	1.1	33	2.4
6	1.2	36	13.5
8	2.8	39	0.6
10	0.2	42	10.4
12	45.4	45	0.1
13	0.1	48	7.4
15	29.9	51	0.1
16	0.1	54	4.8
18	38.0	60	2.7
19	0.0	66	1.9
21	11.5	72	2.0
22	0.0	78	0.1
24	28.2	84	0.2
27	6.3	96	0.1
30	14.8		

Material	% of Total
ACP	< 1%
CIP	< 1%
CIP – Lined	< 1%
CMP	< 1%
DIP	< 1%
HDPE	1.8%
PVC	1.1%
RCP	96.4%

Structures

- 8,858 structures



Asset Class	Quantity
Catch Basin	5,114
Cleanout	43
Diversion Structure	1
Drop Inlet	150
Filter	1,488
Headwall	47
Manhole	1,545
Outfall	207
Plug	81
Trash Capture Devices	182
Grand Total	8,858

Pump Station Inventory

- 3 Storm Drain Pump Stations

N Livermore SDPS

Murrieta SDPS

P Street SDPS

Related Management Systems

- Bridge and Culvert Management System

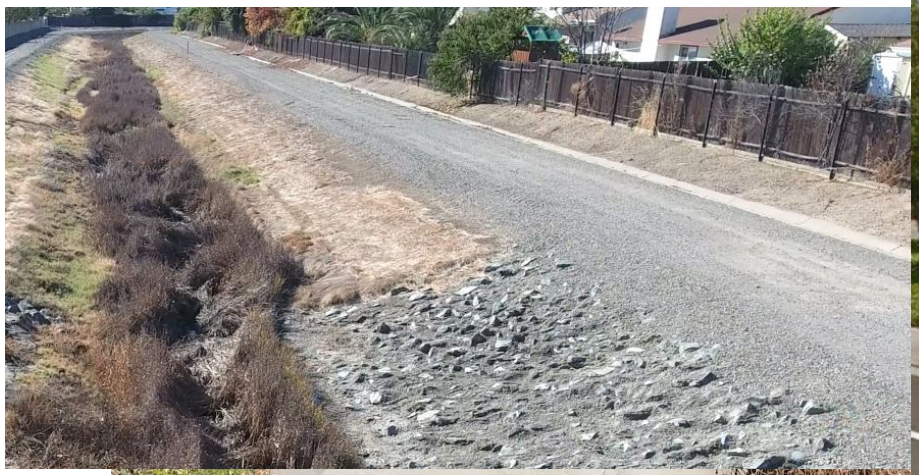
- Curb and Gutter Management System

Storm Drain Assets

- Concrete Channel
- Natural Channel
- Access Road
- Fencing
- Pipes
- Inlet
- Outlet
- Manhole
- Cleanout
- Filter
- Outfall
- Diversion Structure
- Catch Basin
- Pump/Motor
- Wet Well Structure
- Trash Capture Devices
- Detention Basins
- Bioswales
- Mitigation Areas
- Creek Landscaping

Inventory (Natural and Concrete Channels)

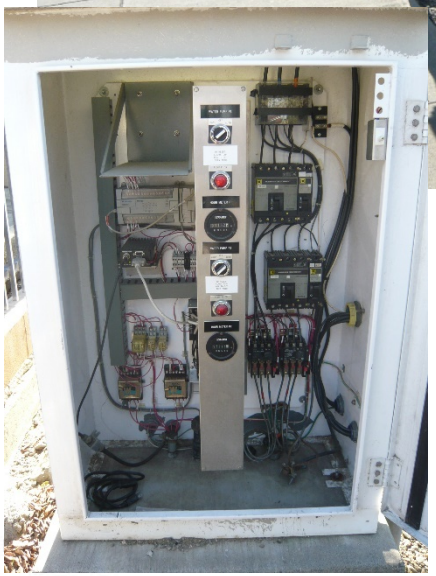
Inventory (Security and Access Assets)



Inventory (Strom Drain Structures)

Inventory (Detention Basins and Bioswales)

Storm Water Pump Station



Inventory/Assessment Process

- Difficult to access
  - Safety
  - Accessibility
  - Damage
- Utilized drone

- https://youtu.be/pEKfG2S_cq0

Assessment (Representative of Ongoing Problems)

Arroyo Las Positas – Golf Course (37°41'55.38"N 121°49'45.35"W)

- Overgrown vegetation / trees

Arroyo Las Positas – Golf Course (37°41'51.10"N 121°49'30.11"W)

- Trash and debris pile up

Assessment

Granada Channel (37°39'56.36"N 121°47'37.34"W)

- Should not have vegetation

Arroyo Seco (37°40'57.47"N 121°43'18.11"W)

- Vegetation causing flow congestion

Assessment

Arroyo Mocho (37°40'19.56"N 121°46'6.81"W)

- Fallen tree causing blockage

Arroyo Mocho (37°40'18.17"N 121°45'56.46"W)

- Trash (cones)
- Dead trees causing blockage
- Homeless encampment

Risk

- Probability of Failure (PoF)
  - Modes of Failure
    - Mortality → structural condition
    - Level of Service → maintenance and water quality
    - Capacity → flood control
  - By condition
  - By age
- Consequence of Failure (CoF)
  - Flood control
    - Pipe size
    - Identified problem areas/known deficiencies
    - Maintenance
  - Water quality
    - BMP/CIP
    - Maintenance

Management Strategies - Channels

Asset Class	Useful Life	Rehab Activity	Frequency	Rehab Activity	Frequency	Rehab Activity	Frequency	Rehab Activity	Frequency
Concrete Channel	100	Channel inspection	1	Rehab concrete	25	Debris removal	5	Sediment removal	5
Natural Channel	Forever	Channel inspection	1	Vegetation removal	5	Debris removal	5	Sediment removal	5
Culvert	100								
Energy Dissipator	100	Rehab	10						
Fencing	30								
Fencing with Vinyl Slats	30	Vinyl slat replacement	5						
Fencing with Wood Slats	30	Wood plank replacement	5						
Gate	35								
Gate with Wood Slats	35	Wood plank replacement	5						

- Additional costs to be assessed
  - Detention Basins
  - Bioswales
  - Mitigation Areas
  - Creek Landscaping

Management Strategies - Mains

Material	Useful Life	Rehab Activity	Frequency
Asbestos Cement Pipe	100		
Cast Iron	60		
Corrugated Metal Pipe	40		
Ductile Iron	100		
High Density Polyethelyne	75		
Polyvinyl Chloride	100		
Reinforced Concrete Pipe	120	Rehabilitate	60

Management Strategies - Structures

Asset Class	Useful Life
Catch Basin	100
Cleanout	100
Connection	100
Drop Inlet	100
Diversion Structure	100
Filter	20
Manhole	100
Outlet	50

Management Strategies – Pump Stations

Asset Class	Useful Life	Rehab Activity	Rehab Frequency
Motor	10		
Pump	15		
Control Panel	20		
Access Hatch	40		
Wet Well Structure	100	Resurfacing / Coating	50
Valve	50		
MCC	20		
SCADA	15		
PLC	10		
UPS	10		
Access Ladder	10		
Stairways	50		
Instrumentation	10		
Radio	10		

Replacement Cost

- Total replacement cost: $581 M
  - Pipes: $432.6 M
  - Channels: $91.6 M
  - Structures: $55.1 M
  - Pump Stations: $1.8 M
- Catch Up: $7.3 M
  - $1.4 M (replacement)
  - $4.7 M (rehabilitation)
  - $1.2 M (maintenance)

Catch Up and Keep Up

- Catch Up: $7.3 M
- Keep Up (30 Years): $10.5 M
- 10 years
  - Catch up spread over 10 years: $730 K
  - Total estimated average annual costs: $10.5 M
- 20 years
  - Catch up spread over 20 years: $365 K
  - Total estimated average annual costs: $10.5 M
- 30 years
  - Catch up spread over 30 years: $244 K
  - Total estimated average annual costs: $10.5 M

Thank you!

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