FROM RISK TO RESILIENCE: A FIVE-YEAR REVIEW OF EPCOR'S STORMWATER INTEGRATED RESOURCE PLAN

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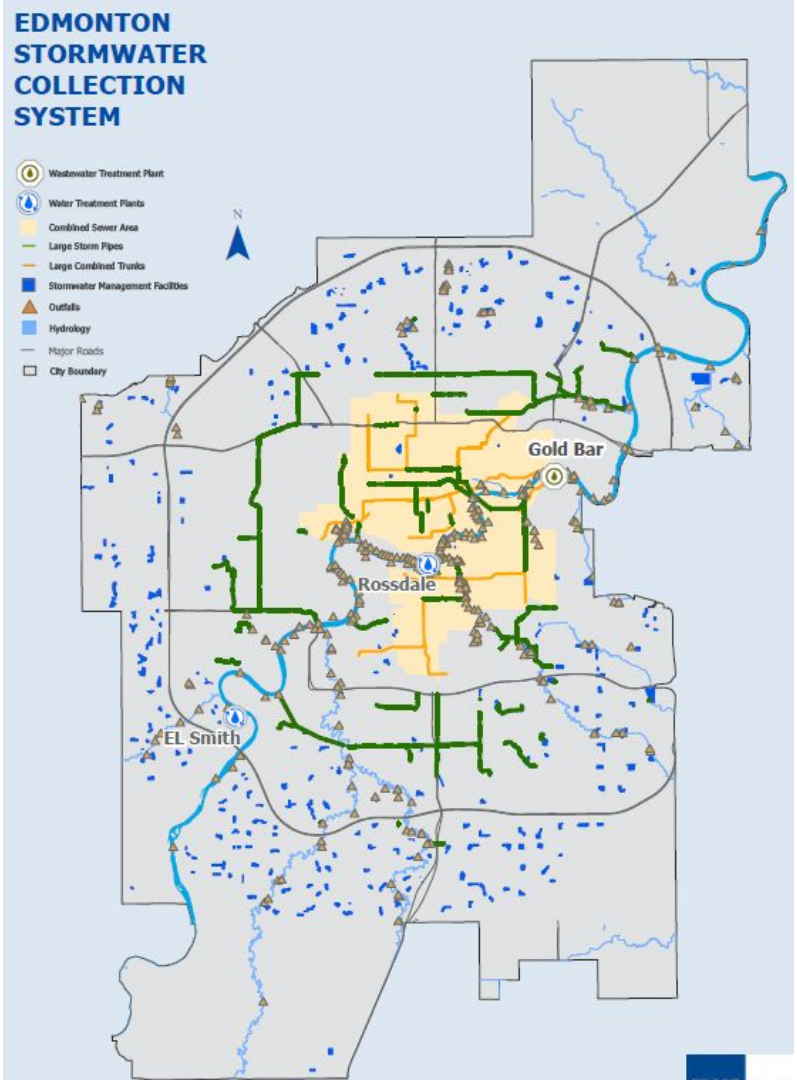
Our System at a Glance

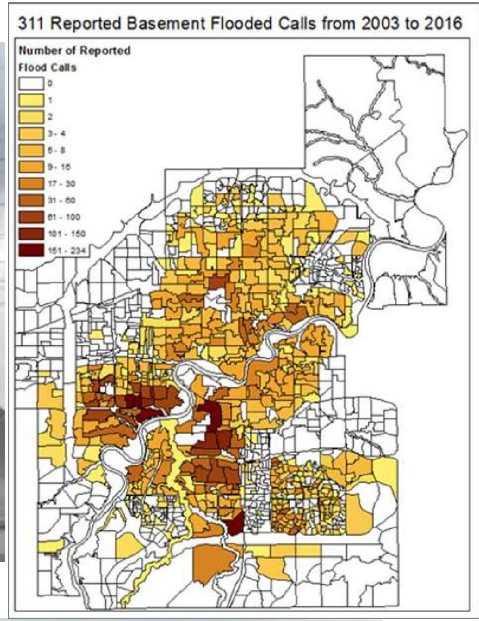
- Wastewater Treatment Plant
- Water Treatment Plants
- Combined Sewer Area
- Large Storm Pipes
- Large Combined Trunks
- Stormwater Management Facilities
- Outfalls
- Hydrology



State of Stormwater System and Planning (pre-2018)

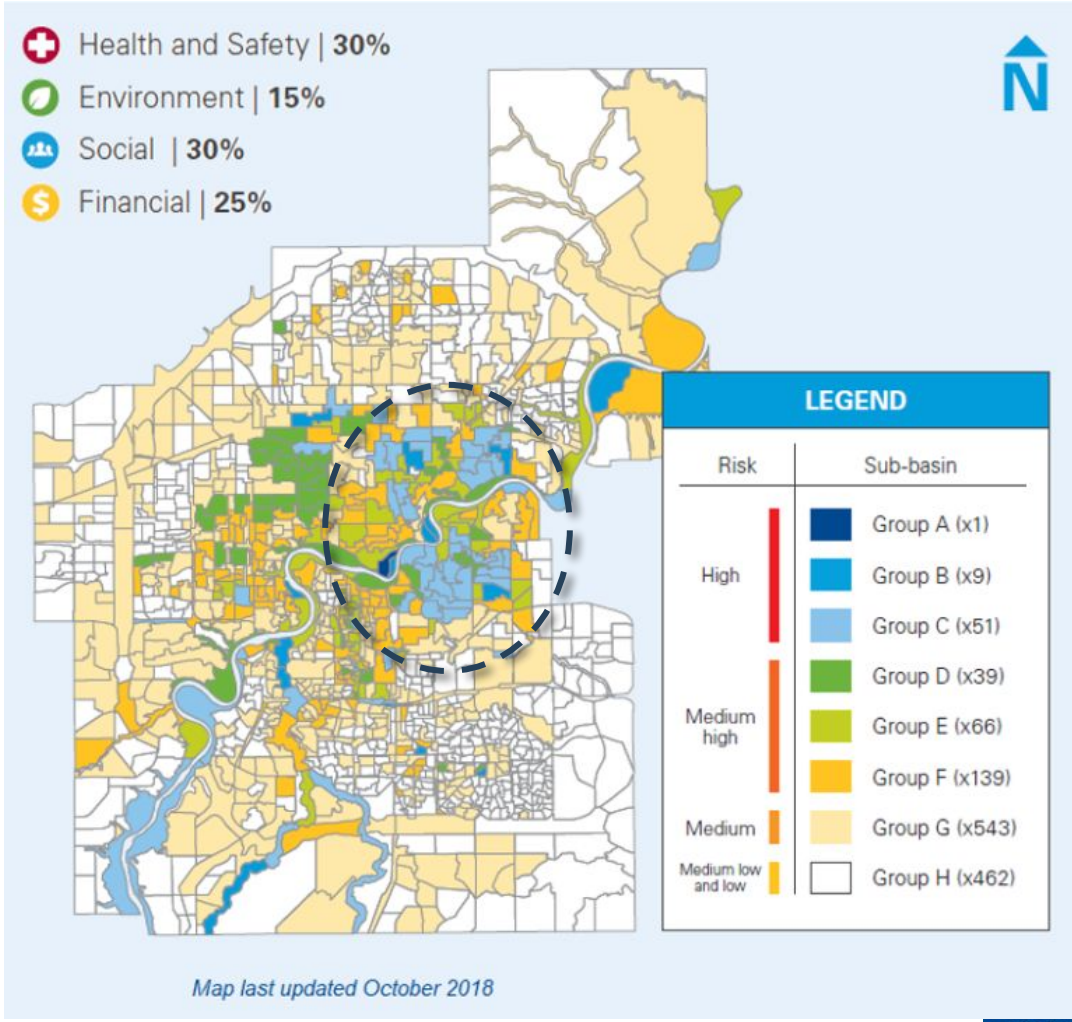
- High volume of basement flood calls
- High inflow / infiltration in sanitary pipe network
- Underpass flooding and safety issues
- More frequent high intensity rainfall events
- Philosophy based on building bigger/ more pipes ($4.6 billion)

Flood mitigation became new planning driver



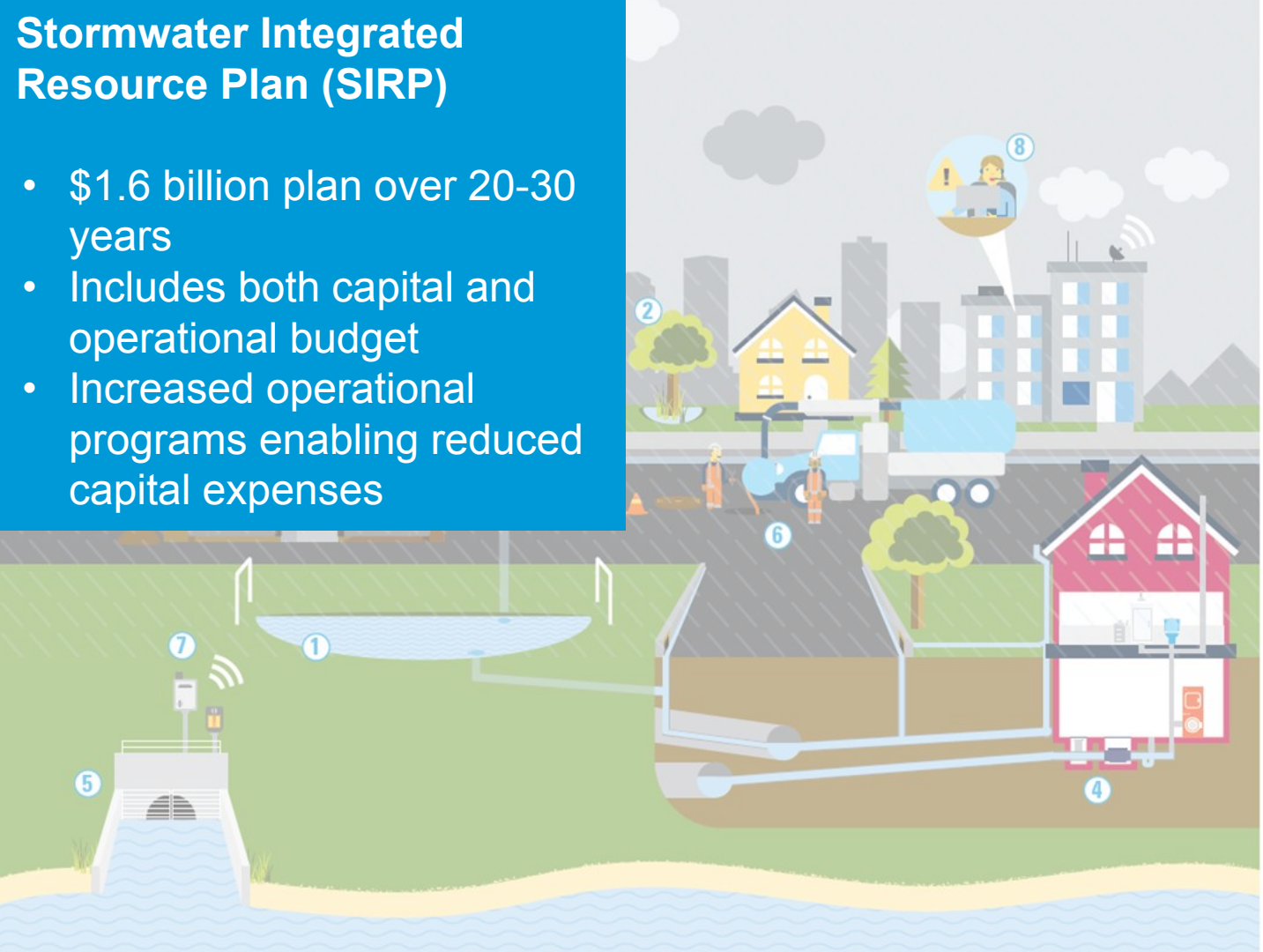
Risk-based Approach

- Evaluated four community flood risks
  - Health and safety, environment, social/service impacts, and potential for financial loss
- Likelihood over five storm intensities
  - 1:20 1:50 1:75 1:100 1:200
- Neighbourhood scale
- Capital improvements targeted in high-risk areas (A, B, C)
- Opportunistic (D to H)



Stormwater Integrated Resource Plan (SIRP)

- $1.6 billion plan over 20-30 years
- Includes both capital and operational budget
- Increased operational programs enabling reduced capital expenses



SLOW

We slow the entry of stormwater into the drainage network by absorbing it in green infrastructure and holding it in ponds.

1 Dry ponds

2 Low impact development — including rain gardens, bioretention basins, box planters and tree soil cells

MOVE

We move excess water safely away from areas at risk.

3 Tunnels and trunks

3 Separation of storm and sanitary sewers

SECURE

We help secure individual properties in higher risk areas.

4 Enhanced Building Flood Proofing Program for residential, multifamily and commercial properties

4 Engage and educate owners of 40,000 homes in targeted high and medium-high risk areas

5 Additional control gates at outfalls

6 Increased maintenance and repair priorities

PREDICT

7 8 We predict and manage the movement of stormwater in real time through smart sensors, automatic controls and operational dashboards

RESPOND

We respond through the fast rollout of flood barriers, traffic diversions and public communications.

8 Emergency response in coordination with the City of Edmonton Office of Emergency Management

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SIRP Projects and Programs

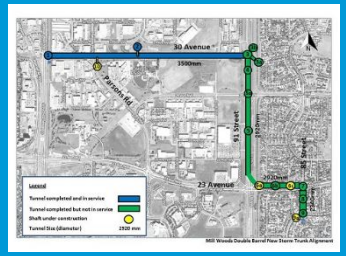
SLOW

Dry Ponds

Low Impact Development

MOVE

Trunks and Sewer Separation



PREDICT

Monitoring and Forecasting

SECURE

Building Flood Proofing

Maintenance Hole and Pipeline Relining

RESPOND

Emergency Response

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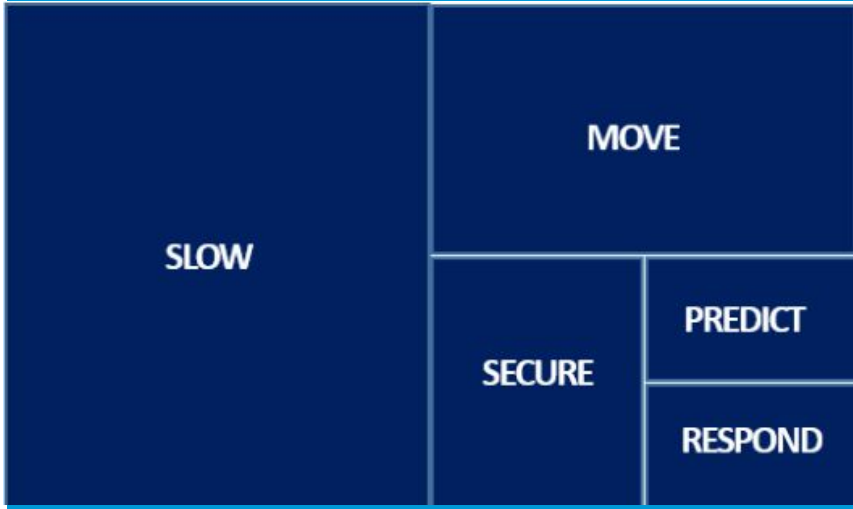
Funding Allocation (20 - 30 Year Investment)

Theme	Projects & Programs	Original Investment ($Million)
Slow	Dry Ponds	$ 520
Slow	Low Impact Development	$ 520
Move	Trunks and Sewer Seperation	$ 300
Secure	Outfalls and Control Gates	$ 30
Secure	Inflow & Infiltration Reduction	$ 100
Secure	Home Flood Proofing	$ 60
Predict	Monitoring and Controls	$ 70
Respond	Emergency Response	$ 45
	Total	**$ 1,645**

Funding by Program



Funding by Theme

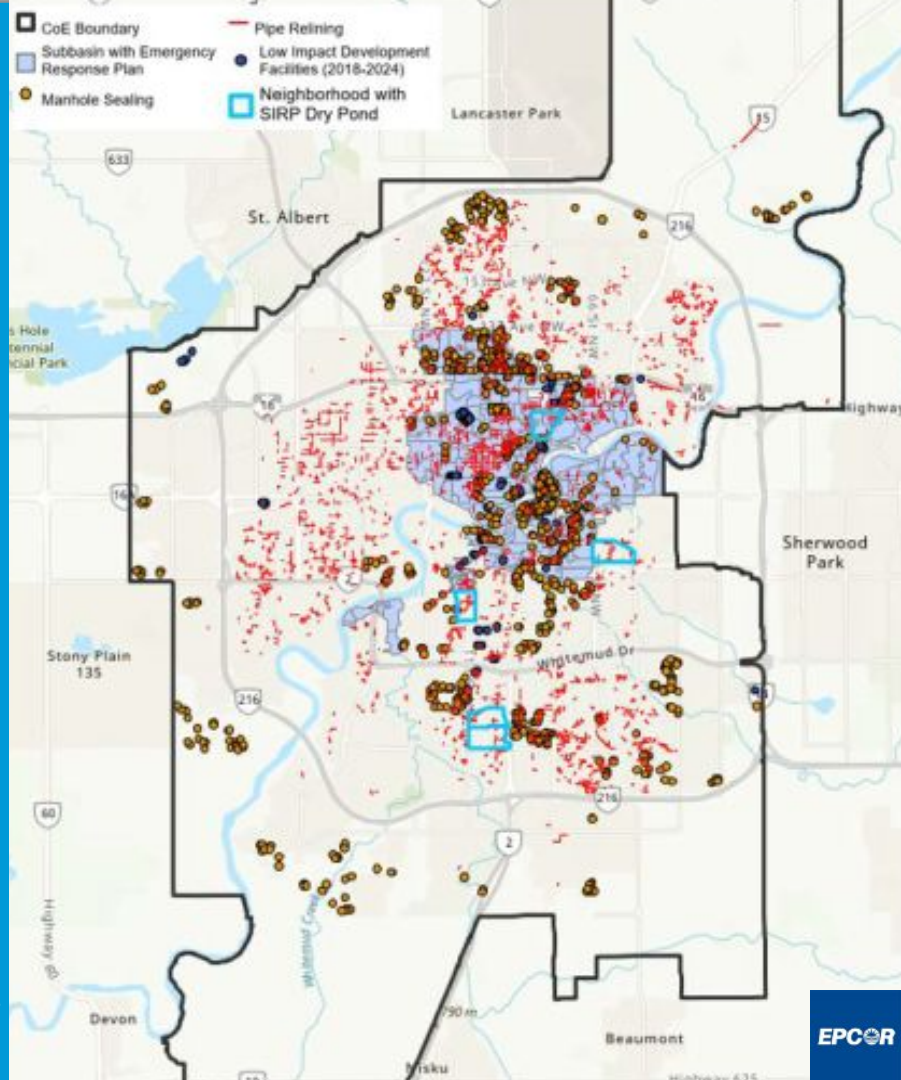
Completed Programs/Projects (2019 – 2024)

SLOW AND MOVE
- Dry Ponds with Sewer Separation
- Low Impact Developments

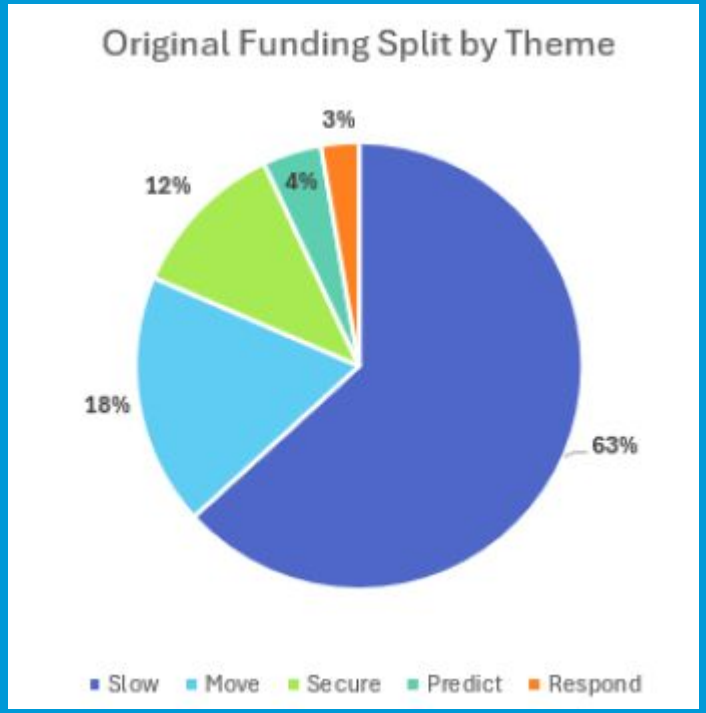
SECURE
- Inflow & Infiltration Reduction
- Enhanced Flood Proofing Program

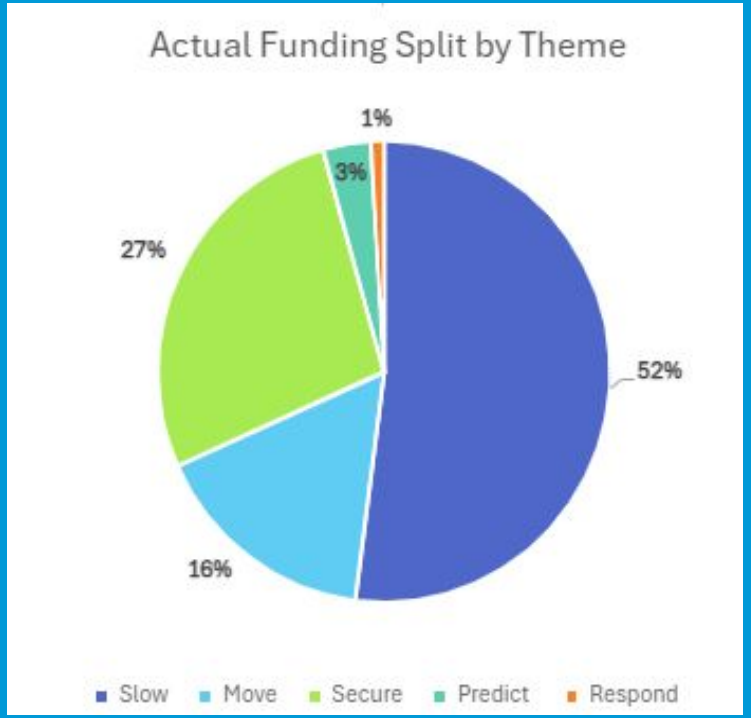
PREDICT
- Operational Dashboard
- Monitoring and Controls

RESPOND
- Emergency Response Plans and Equipment



Financial Progress – By Theme





Original $1.6B

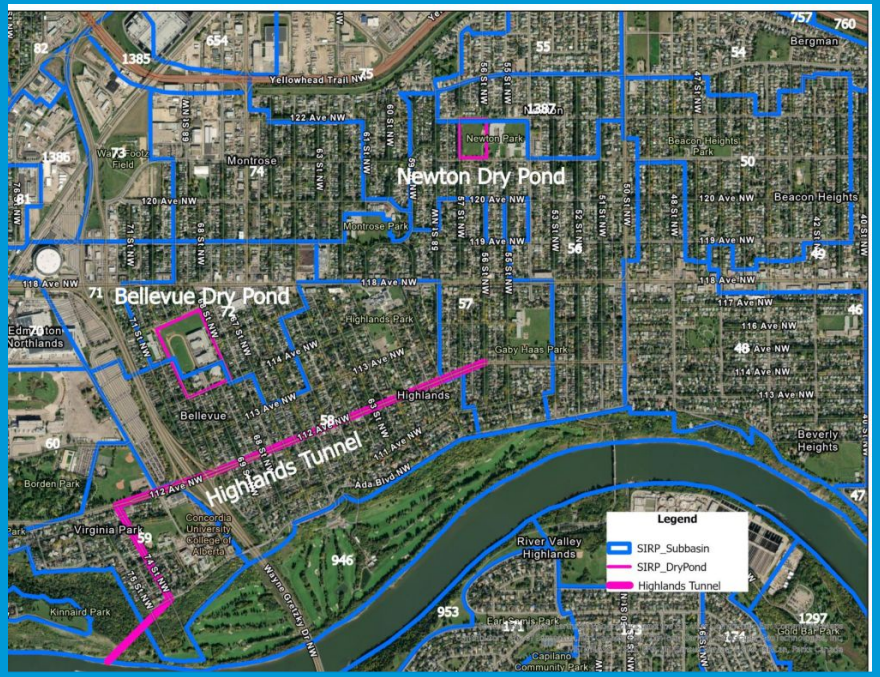
First 5 Years $350M

SLOW and MOVE – Dry Ponds and Sewer Separation

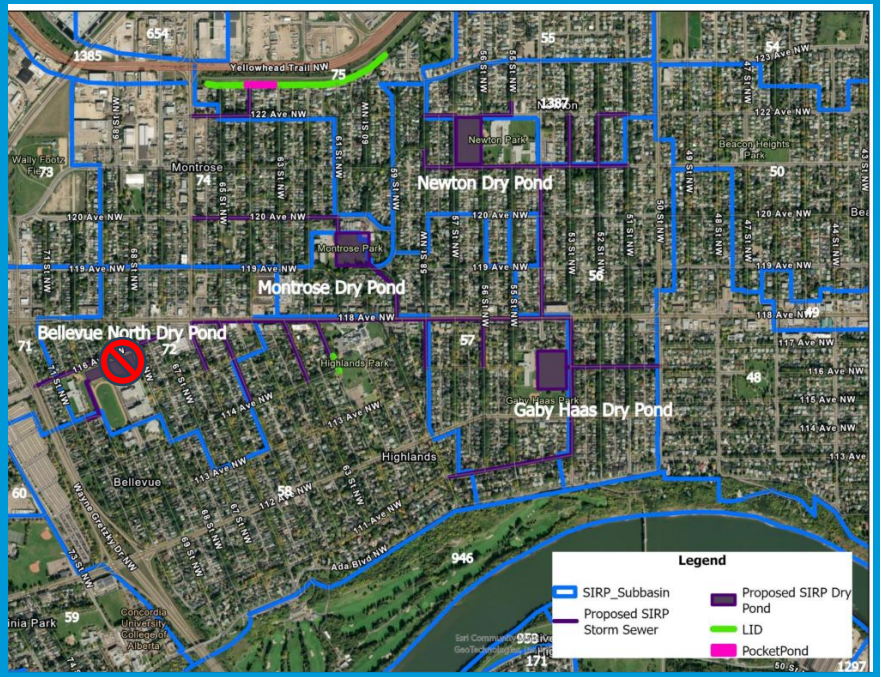
- Cost higher and length of time for construction longer than expected
- Land acquisition challenging for large parcels
- Public impacts due to duration/extent of construction in neighbourhood for pond and connecting pipes
- Pivoting to pocket ponds and basin-wide stormwater management approach

7 dry ponds slowing > 300,000 m^3

Future Dry Pond Concepts



Original – 2 large ponds, new tunnel, neighbourhood based



Revised – 3 small ponds, pocket ponds, LID, basin based

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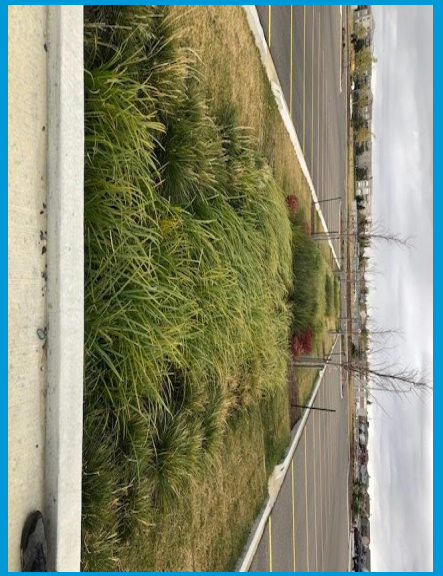
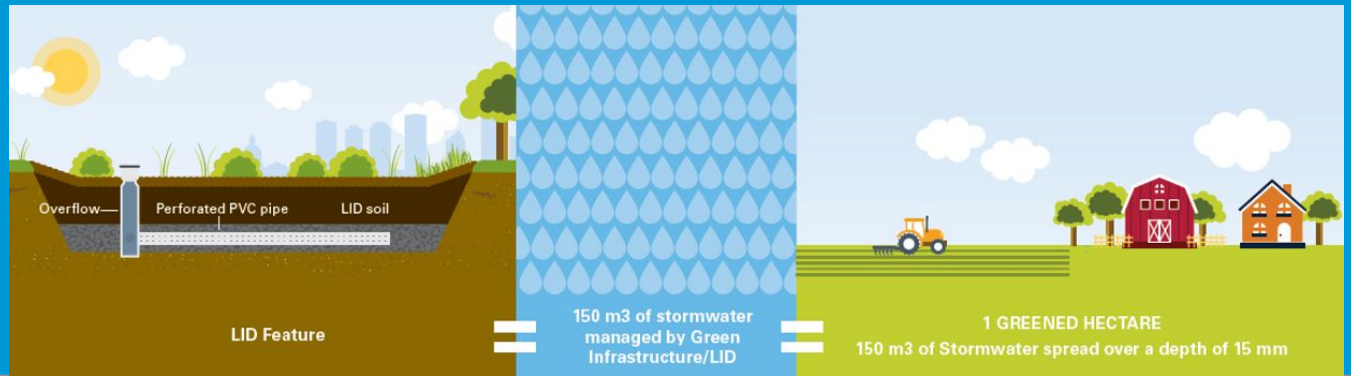
SLOW – Low Impact Developments

- Stormwater storage through soil cells, rain gardens, permeable pavement, bioswales etc. that activate during regular storm events
- Installed 360 greened hectares throughout the city (slowing ~53,000m^3)





SLOW – Low Impact Developments

Project/ Program	Learnings
Low Impact Developments (LIDs)	• Cost and complexity higher than expected • LID on public property has been successful, worked closely with City • Pivoted to stormwater rebate program given limited uptake on commercial LID
RainWise	• >150 projects in first year • Greatest uptake on rain barrels and rain gardens • Targeted advertising can increase participation • No uptake from commercial customers

RAINWISE

EPCOR

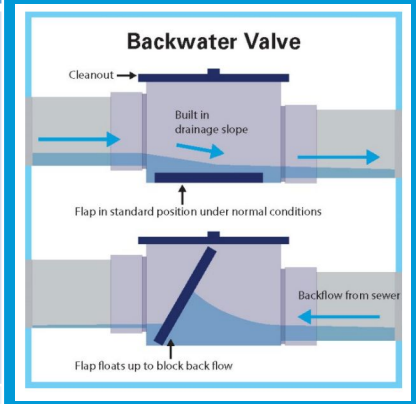
SECURE – Inflow and Infiltration Reduction

Project	Completed
Maintenance Hole Sealing	3,000
Proactive Pipe Relining	21 km

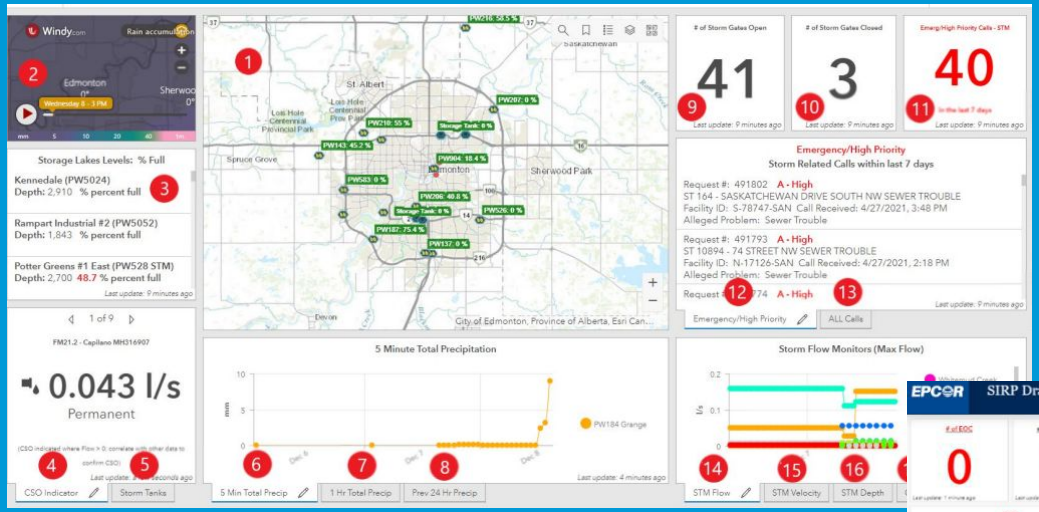
- Maintenance hole sealing and MH cover plugs effective and simple
- Pipeline relining hard to quantify until we have more monitoring data
- High I&I from private property, which we have no control over
- Consider a program to work with property owner to line or replace pipe on their property

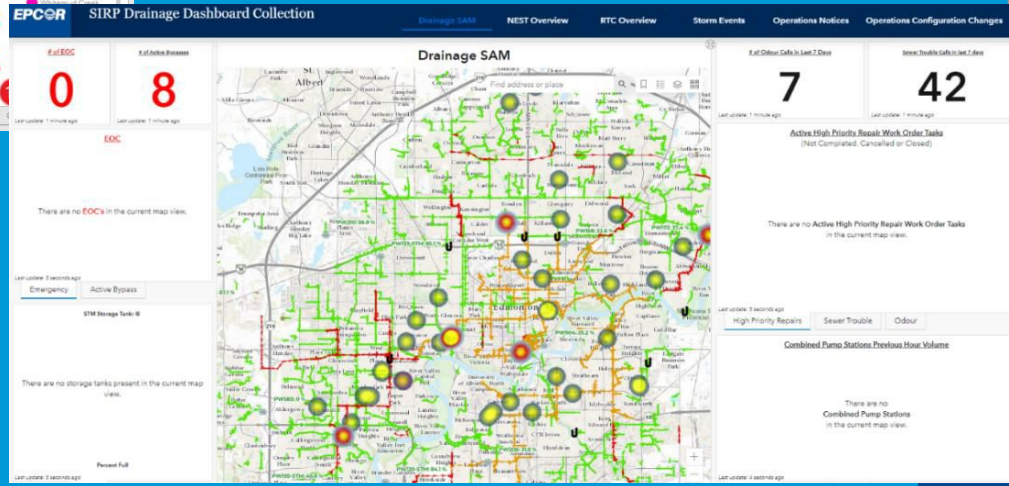
SECURE – Enhanced Flood Proofing Programs

Program	Learnings
Backwater Valve Subsidy	• ~300 installations / year • Expanded from residential to multi-family and commercial • Rebate covers 50-75% cost • Targeted education, advertising and promotion required
Flood Prevention Program	• ~1,500 free home inspections / year • Expanded from residential to multi-family and commercial • Facilitated cross-promotion for RainWise and Backwater Valve programs



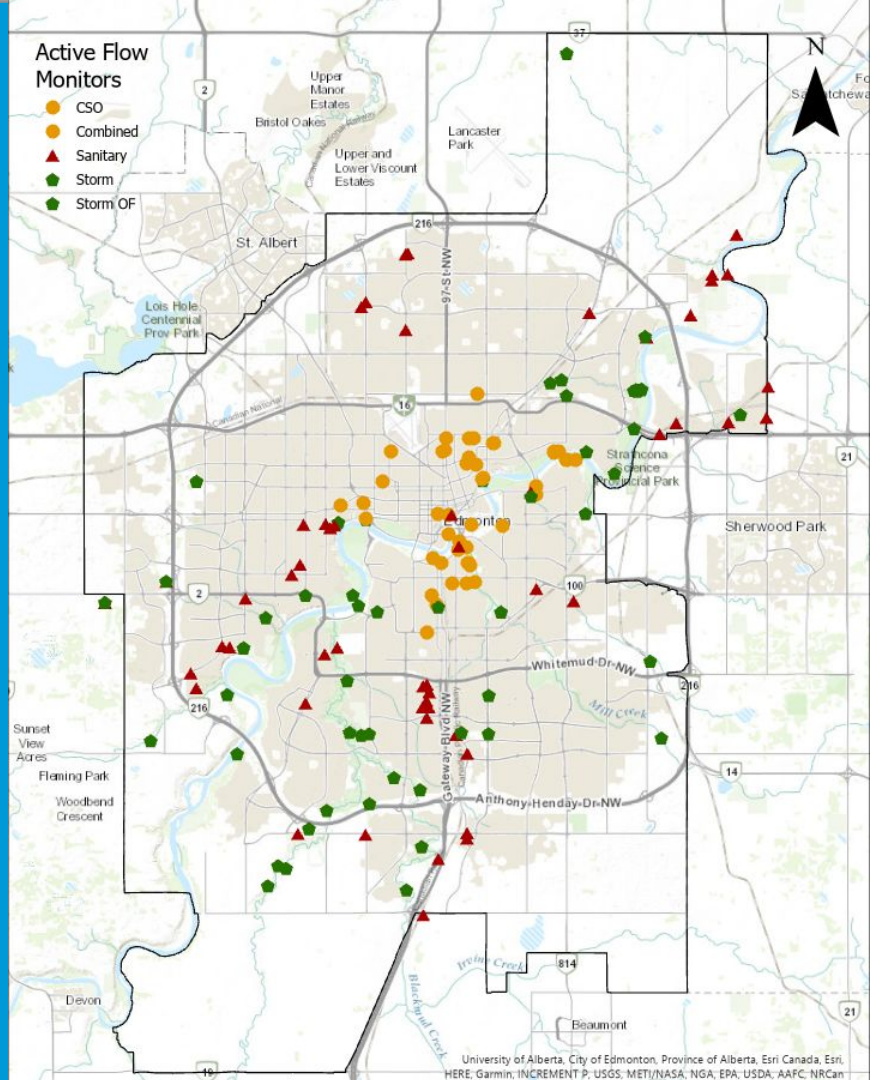
PREDICT – Situational Awareness Dashboard





PREDICT – Monitoring and Controls

Project	Learnings
Monitoring and Controls	• Key to understanding how the storm and sanitary system works • Underpass warning systems installed • Locations selected must consider ease of access • Public consultation when installing in neighbourhoods



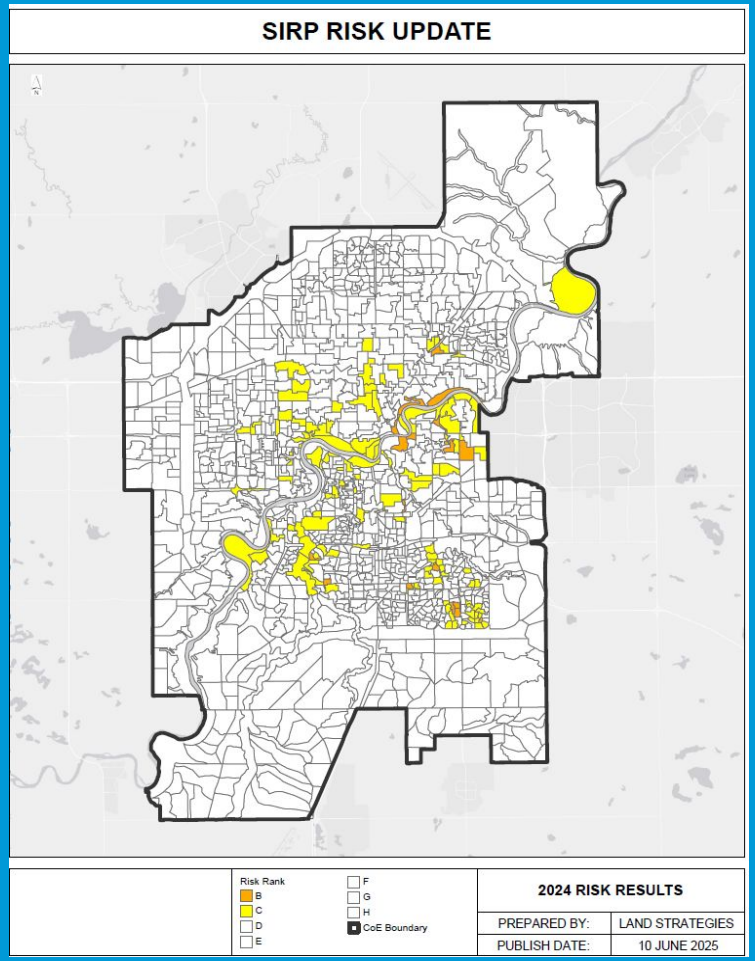
RESPOND – Emergency Response

Project/Program	Learnings
Emergency Response	• Equipment storage and deployment exercises need to be considered • Establishing a Linear Operations Center and integrating our linear operations teams are key to success

- **120 tiger dams**
- **6,000 sand bags**
- **Linear Operations Center under construction**

What's Next

- Update SIRP risk map
- Continue to promote SLOW solutions
- Continue reducing inflow / infiltration
- Enhance RainWise program
- New Projects:
  - Smart Ponds
  - Automated Outfall Control Gates



Key Takeaways

- Bundle capital projects and operating programs to help drive down costs
- Expect some change management
- Don’t be afraid to pivot
- Collaboration needed to effect change
- Partnerships are important to success
- Leverage grant funding opportunities

THANK YOU