Agenda

COMMITTEE OF THE WHOLE
GOVERNING BODY
CITY OF LENEXA, KANSAS
17101 W. 87TH STREET PARKWAY

FEBRUARY 25, 2025
7:00 PM
COMMUNITY FORUM

CALL TO ORDER

ROLL CALL

APPROVE MINUTES January 14, 2025 Committee of the Whole meeting draft minutes (located in the Appendix)

DISCUSSION

1. Stormwater Master Plan update

ADJOURN

APPENDIX

2. January 14, 2025 Committee of the Whole meeting draft minutes

Dist. Governing Body; Management Team; Agenda & Minutes Distribution List

IF YOU NEED ANY ACCOMMODATIONS FOR THE MEETING, PLEASE CONTACT THE CITY ADA COORDINATOR, 913/477-7550. KANSAS RELAY SERVICE 800/766-3777. PLEASE GIVE 48 HOURS NOTICE

ASSISTIVE LISTENING DEVICES ARE AVAILABLE FOR USE IN THE COMMUNITY FORUM BY REQUEST.

COMMITTEE OF THE WHOLE
MEMORANDUM

ITEM 1

SUBJECT: Stormwater Master Plan update

CONTACT: Tom Jacobs, Stormwater Engineer

DATE: February 25, 2025

PROJECT BACKGROUND/DESCRIPTION:
The Stormwater Master Plan ("Master Plan"), established in 1999, served as a comprehensive guide for the development of the Rain to Recreation Program and helped prepare the City for compliance with the Municipal Separate Storm Sewer System ("MS4") permit. Required under the Clean Water Act, the MS4 permit became a City obligation in 2004. The Master Plan also addressed the need to accommodate development in the western portion of the city while ensuring the aging stormwater infrastructure in the eastern area was properly maintained. While the Master Plan has effectively guided the City's stormwater efforts for many years, the time has come to determine the future direction of the City's stormwater program.

Going forward, the Master Plan must reflect recent updates to the Johnson County Stormwater Program to ensure the City is well-positioned to maximize available County funding. Conversion of the Master Plan from a static document into a dynamic database will provide opportunities to adapt to evolving conditions and advancements in the stormwater industry. This new adaptive Master Plan will be regularly updated, providing valuable information for decision-making on flood control, green infrastructure, infrastructure replacement, stream health, and other critical areas.

Staff has been working with Black & Veatch to establish goals for the future and key performance indicators. Through a series of workshops with members of several City departments, the following goals were identified:

- Goal 1: Create and maintain a five-year plan for inclusion of stormwater projects from all focal points in the City's Capital Improvement Program (CIP)
- Goal 2: Streamline Water Quality and MS4 Compliance Reporting
- Goal 3: Monitor and resolve flooding issues for compliance with regulatory programs
- Goal 4: Maintain streams, stream corridors, and open space
- Goal 5: Enhance the City's ability to maintain built and natural stormwater assets
- Goal 6: Plan for future growth
- Goal 7: Leverage outside funding

Each goal will have an associated dashboard in the Master Plan that will be populated with current data (such as condition assessments) or data that may need to be gathered (such as stream corridor assessments).

Staff proposes moving forward with the development of the dashboards, beginning with collecting any missing data, followed by the creation of the dashboards. While some dashboards can be developed

quickly with minimal additional data and at minimal cost, others will require more time. The goal is to achieve a fully populated, adaptive Master Plan within the next several years. The attached report provides an overview of the initial phase of dashboard development, including the process, key deliverables, goals, and data sources necessary to advance this effort.

Staff and representatives of Black & Veatch will present an overview of the Stormwater Management Program and the development of the new, adaptive Master Plan.

FINANCIAL IMPLICATIONS/FUNDING SOURCES:

The cost of completing the first dashboard is estimated at $75,000 and is funded within the existing stormwater administration budget. Additional dashboards will vary in cost and will be requested through future annual budget and CIP processes.

VISION / GUIDING PRINCIPLES ALIGNMENT:

Vision 2040	**Guiding Principles**
Healthy People	Strategic Community Investment
Integrated Infrastructure & Transportation	Sustainable Policies and Practices

ATTACHMENTS

1. Exhibit

DRAFT

LENEXA KEY PERFORMANCE INDICATORS ROADMAP

Technical Memorandum

PREPARED FOR

City of Lenexa, Kansas

1.0 Background

The City of Lenexa has retained Black & Veatch to form a new stormwater master plan for the City, and this report documents the City's drivers for a new master plan, its programmatic stormwater goals that underpin the master planning effort, and a roadmap to create the master plan. The City intends the planning process and its deliverables to be an adaptive master plan that will be an evergreen resource for the City to navigate current challenges while maintaining a dynamic dataset to aid in foreseeing and planning for future needs.

1.1 Stormwater Master Plan Drivers

The City of Lenexa has been well-served by its previous stormwater master plan, using it as a guide to make major accomplishments:

- Implementation of flood reduction projects, which have significantly reduced the number of flood prone areas and overall risk of flood damages within the City;
- Major water quality improvements, including large regional facilities which serve as both community amenities and to complement private, on-site stormwater best management practices;
- Resident satisfaction survey results for overall quality of the City's stormwater system which are nearly double the national average;
- A long-standing successful relationship with the County Stormwater Management Program, which has leveraged significant outside funds to defer stormwater utility ratepayer burden; and,
- An operations and maintenance team that proactively inspects and maintains the City's stormwater assets.

1.2 Current and Future Challenges

The City faces headwinds which are not uncommon for cities of Lenexa's size and makeup, but if they are left unaddressed, they will post a risk to the continued success of the stormwater program. These challenges are summarized in Table 1-1:

Table 1-1 Current and Future Challenges

Challenge	Description
Built-Out Watersheds	The City is nearly built out, and the Rain to Recreation program will shift its focus to maintaining its built stormwater management system.
Evolving County Stormwater Program	Johnson County's Stormwater Management Program (SMP) has updated its business plan, which has reduced the percentage of project matching funds it will provide to cities. Conversely, the County SMP has created new types of projects it will reimburse, creating new opportunities to leverage outside funding into the City.
Continued Development of Watersheds	Not all of the City has been developed, and development pressures in Cedar Creek watershed must be proactively managed to limit the impacts of hydromodification.

Challenge	Description
Changing Regulatory Environment	New State and Federal regulations continue to focus on topics including water quality, sustainability, and environmental/social justice that will continue to affect the ways cities manage stormwater through more stringent criteria and additional requirements. Additionally, many state and federal funding opportunities are predicated on compliance with the latest rules and regulations.
Preservation of Natural Assets	The City has numerous natural amenities that are enjoyed by the public every day. Good stewardship of these assets through effective watershed planning, flood management, and use of sustainable practices will ensure the continued benefit from these areas.
Climate Non-Stationarity	Changing weather patterns have a significant effect on flooding frequency and magnitude, as well as stream and lake health. Planning and construction of resilient infrastructure in critical areas can alleviate the effects of an uncertain climate future more efficiently than reactionary solutions.
Aging Infrastructure	As with many cities of comparable size, Lenexa faces the challenge of aging infrastructure that frequently outpaces the capacity for replacement. To continue to provide adequate service, asset maintenance and replacement must be prioritized in an efficient manner.
Rising Construction Costs	Construction costs have risen dramatically over the previous several years, making efficient design and management of assets critical to effective operations.

In addition to these drivers, the City has exhausted the recommendations of its previous stormwater master plan and seeks a roadmap to navigate these challenges, which this master planning effort will provide.

1.3 Adaptive Stormwater Master Planning – Approach & Advantages

The goal of an adaptive master plan is to provide the city with a flexible set of tools that can monitor the City's stormwater system and regulatory requirements to identify triggers for additional investment in capital projects, maintenance activities, or additional study.

An adaptive master plan differs from a traditional master plan in that it has the ability to drive decisions based on real-time conditions and will adapt into the future as decisions are made. An adaptive master plan is never outdated because the inputs are all updated on a frequent basis, ensuring that any decisions made are based on current information.

Within the overall water industry, and especially within the realm of water and wastewater master planning, adaptive master plans are used to proactively identify needed investment by creating visualizations of asset management system and work order data to yield additional insights which can save time and cost, track changes to systems which trigger the need for additional capital investment, and identify issues early so that they can be address proactively.

Adaptive master plans bring significant benefit compared to traditional master planning when the following conditions are met:

- Decision making must account for conditions which can change throughout the planning horizon;
- There is sufficient relevant data to monitor these changing conditions; and,

- Data can be combined into key performance indicators which drive action.

In planning for this effort, these conditions were explored and validated to exist for Lenexa, and therefore the adaptive master planning process was moved forward.

An adaptive master plan also utilizes project triggers to identify a need for additional investment when a particular threshold is met. This forward-thinking approach allows the user to prepare for future maintenance or capital improvements as they track the master plan goals against the threshold trigger.

Lenexa's Adaptive Master Plan will provide an enhanced ability to address its challenges as described in Table 1-2.

Table 1-2 Adaptive Master Plan Addresses the City's Challenges

Challenge	Adaptive Master Plan Solution
Built-Out Watersheds	Tracking of water quality and streamflow data will assist in identifying hotspots where mitigation solutions, such as retrofitting detention ponds to retain additional stormwater, may provide benefit.
Evolving County Stormwater Program	Proactive approach to asset management that leverages county SMP funding for county-identified high-risk assets.
Continued Development of Watersheds	Active tracking watershed development through monitoring permit applications, changes in mapped impervious area, and changes to streamflow regimes at gages will provide insights into Cedar Creek as it continues to develop, and if actions may be required to remediate emerging issues.
Changing Regulatory Environment	Stormwater regulations are evolving, and tracking of the City's actions to meet existing requirements will demonstrate a good-faith effort should regulations become more stringent. This can help facilitate a level of trust with regulators and a less stringent timeline to implement new regulations.
Preservation of Natural Assets	Enhanced and automated MS4 tracking will enable the City to identify needs for additional water quality measures to improve the quality of the City's waterways. Development of a tool that enables proactive stream protection and restoration.
Climate Non-Stationarity	Tool that enables tracking of emerging flooding impacts caused by changes in rainfall patterns or climate change.
Aging Infrastructure	Effectively leverage county SMP funding to help maintain high-risk assets.
Rising Construction Costs	Effectively leverage county, state, and federal funding, though identification of eligible projects, to minimize City-provided funding for projects.

All five potential phases of the project are presented on .

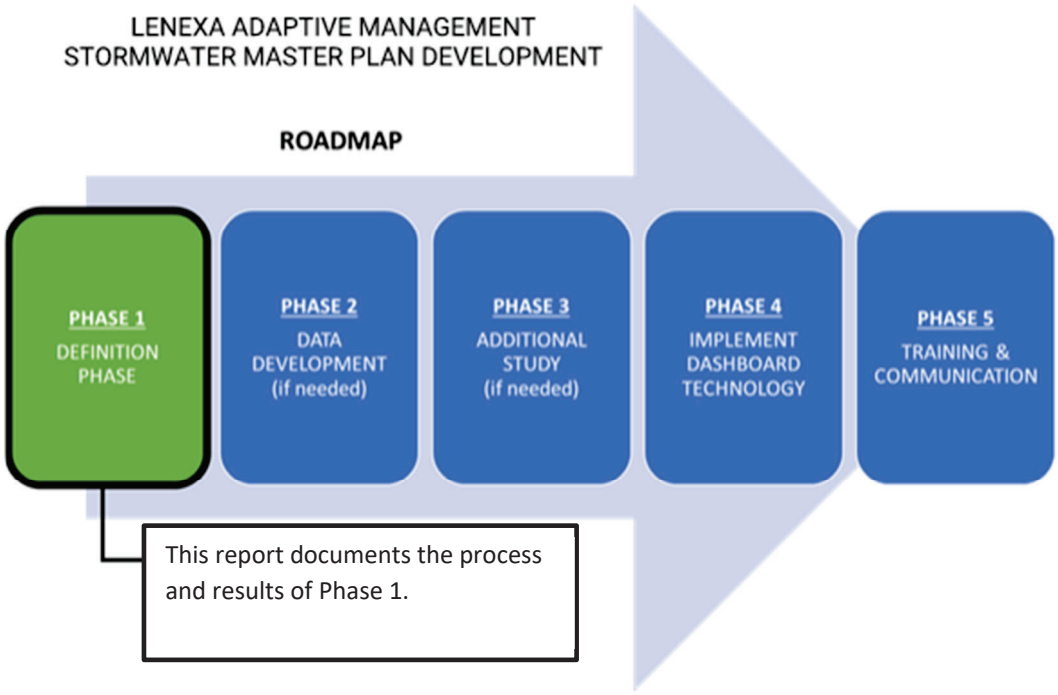


Figure 1-1 **Roadmap for Lenexa's Adaptive Management Stormwater Master Plan Development**

- **Phase 1: Definition Phase (this phase)** – this initial phase identifies long-term goals of the City's stormwater program, risks to those goals, data sources which can be used to track the stormwater system performance and health, and project triggers. The deliverable for this phase will be a detailed report documenting a plan to finish the remaining four phases.

- **Phase 2: Data Development** – this interim phase includes development of any data identified as needed in Phase 1 which not currently available. It will only be executed if data gaps are found. An example of a data development phase task might be a database of unit costs for capital improvements and maintenance activities to be used in the development of project business cases.

- **Phase 3: Additional Study** – this interim phase includes any studies identified as needed in Phase 1 and it will only be executed if needed. An example of a study phase task might be geomorphological assessments of the City's streams to inform stream health metrics.

- **Phase 4: Implement Dashboard Technology** – this phase executes the plan developed in the Definition Phase to construct and deliver digital dashboards. The dashboard technology used will be Power BI, a Microsoft product which does not require a subscription fee. This task will be highly coordinated with Public Works staff to provide at-a-glance dashboards which rapidly provide information needed to determine where capital investment is needed, where operations and maintenance can be optimized, and reports which can be used in capital improvement plan documents.

The deliverables for this task will be Power BI dashboards, databases used by the dashboards, and a manual documenting creation and use of the dashboards.

- **Phase 5: Training and Communication** – this final phase would provide in-person or virtual trainings to dashboard users.

The definition phase included discussion of the following topics, which are documented in the following sections:

- The City's long-term goals (Section 2.2).
- Key performance indicators (KPIs) to support those goals (Section 2.3).
- Metrics (Section 2.3).
- Data sources assessment (Section 3.0).
- A roadmap for Phases 2 through 5 (Section 4.0).

2.0 Program Goals Discussion

2.1 Introduction

The City of Lenexa and Black & Veatch identified long-term master plan goals related to capital improvement planning, water quality and MS4 compliance, flooding, healthy land and waterways, maintenance, and future outlook. To support these long-term goals, Black & Veatch assisted the City in defining Key Performance Indicators (KPIs) and metrics to track progress toward long-term goals. The KPIs and metrics are defined as follows:

- KPIs are specific, measurable benchmarks supported by the performance metrics within each theme based on the long-term goals.
- Metrics also fall within the long-term goal themes and are measured values used to calculate the KPIs. Each metric also has an identified data source.

Additionally, the City of Lenexa and Black & Veatch discussed the existing available information and sources of data that can support the measurement of KPIs and identified future sources of data needed to produce the KPIs calculations.

2.2 Long-Term Goals

Long-term goals were identified in workshop meetings held on January 1, 2024, and February 12, 2024, which convened City staff to identify stormwater program goals for the City's update to its stormwater master plan. City Departments and Divisions represented included:

- Parks & Recreation
- Community Development
- Municipal Services
- Finance

Goals defined in these workshops informed the development of KPIs, and the KPIs in turn will be used to guide the development of digital dashboards. The long-term goals fell under the following six categories:

2.2.1 Goal 1: Maintain a Fully Populated 5-Year Capital Improvement Program with Projects from all Focal Points

Currently, the City plans the stormwater Capital Improvement Program (CIP) for 2 future years (the next fiscal year and the following out year).

This goal aims to enable forecasting of the City's stormwater CIP for at least five years. This master planning effort will provide planning tools, as part of its business intelligence deliverables, that enable this goal.

2.2.2 Goal 2: Streamline Water Quality and MS4 Compliance Reporting

The City is required by its Municipal Separate Storm Sewer System (MS4), held with the Kansas Department of Health and Environment and administered under the National Pollutant Discharge Elimination System (NPDES), to take certain actions to maintain good standing. Deemed Minimum Control Measures, there are six required actions:

- Public Education and Outreach
- Public Participation and Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post Construction Runoff Control
- Pollution Prevention and Good Housekeeping

These actions not only promote regulatory compliance, they also improve the quality of the City's waterways. To assist with tracking the benefits of these actions and to assist in required annual MS4 reporting, the City will track and summarize them in its Adaptive Stormwater Master Plan. These tools will organize and interpret data in a way that simplifies the decision-making process when prioritizing water quality projects.

This goal aims to enhance MS4 compliance reporting through KPIs that aid in identifying needs for additional water quality sampling, new water quality facilities, and enhanced maintenance activities. An additional goal is the automation of MS4 reporting and task tracking through the use of a dashboard.

2.2.3 Goal 3: Monitor and Resolve Flooding Issues for Compliance with Regulatory Programs

Workshop discussions with the City indicated that flooding impacts in City limits are not extensive due to past flood reduction projects, but that it would be beneficial to have the ability to track any emerging areas of flooding that may be caused by changes in rainfall patterns due to climate, or legacy issues within the Federal Emergency Management Agency (FEMA) floodplain.

This goal strives to more effectively manage residual or emerging flood risk and track FEMA Community Rating System (CRS) points. The FEMA CRS is a program the City participates in that rewards communities for engaging in floodplain management practices exceeding those outlined in the National Flood Insurance Program (NFIP). Residents within communities who participate in the CRS receive discounted flood insurance premiums.

2.2.4 Goal 4: Maintain Streams, Stream Corridors, and Open Space

Streams, natural riparian areas, and native open spaces increase resident satisfaction, improve the quality of stormwater runoff, and mitigate the negative impacts of watershed development. These areas are not currently tracked for health, but doing so would provide the City with information to better preserve these areas and the significant benefits they provide.

The City would like to develop a tool that addresses protection of stream corridors, enables proactive stream restoration projects, and classifies open spaces and land use to guide project decisions. This tool would monitor stream and corridor health and enable assessment of the effectiveness of the stream setback ordinance. An understanding of the existing stream and corridor health is important for prioritizing and efficiently addressing areas in need of improvement.

2.2.5 Goal 5: Enhance our Ability to Maintain Built and Natural Stormwater Assets

The City currently conducts limited maintenance on their stormwater and stream corridor assets. This goal aims to maintain a cost-effective approach while promoting a more proactive approach to natural asset management. In particular, this goal seeks to support decision making regarding City stormwater assets, public and private stream corridors, and stormwater assets and native areas within parks owned property in a manner that maximizes the impact of County SMP funding for county-identified high risk assets.

2.2.6 Goal 6: Plan for Future Growth

The City is nearing built-out conditions but would like to track development in the Cedar Creek watershed to determine when a regional water quality facility is required. The City would also like to take a forward-thinking approach to stormwater climate impacts in decision making. Lastly, the City would like to develop a public facing dashboard for residents that will help with public outreach and communication.

2.2.7 Goal 7: Leverage Outside Funding

For years, the City has successfully leveraged County SMP funding to offset the cost to residents to improve stormwater infrastructure, and there is opportunity to build on this success by identifying projects eligible for federal funding programs. One example is the FEMA Hazard Mitigation Assistance program, which offers grants of up to $20 million in federal matching funds for projects which mitigate the risk of flood impacts. The Adaptive Stormwater Master Plan will assist in the identification of projects which would be competitive under federal grant programs.

2.3 Selected Key Performance Indicators

Draft KPIs and metrics were developed by Black & Veatch and the City and refined during progress meetings. The selected KPIs were vetted to ensure that they are measurable and align with the long-term goals established by the City. Black & Veatch discussed the preliminary list of KPIs as well as the definition of the KPIs, calculation, available data to support the calculation, and the source of the data. Table 2-1 through Table 2-5 list selected KPIs and metrics for implementation, their reference number, the relevant data source, and a short description. Appendix A includes the flow charts for each KPI that were shown in the workshop with the City, which demonstrates the relationship between metrics and KPIs.

2.3.1 CIP Planning and Financial Key Performance Indicators

The following two KPIs are included under this theme:

- Projected expenditures versus revenue (CIP.K1) (Subsection 2.3.1.1).
- Dollars outside funding obtained (CIP.K5) (Subsection 2.3.1.2).

Refer to Table 2-1 for additional information on these KPIs.

2.3.1.1 Projected Expenditures Versus Revenue

This KPI will compare expenditures to revenues and forecast annual projections of the comparison for at least 5 years. This KPI will be measured in dollars and will aid in addressing any funding gaps. Supporting metrics for this KPI include the following:

- Revenue projection (CIP.K2).
- Expenditure projection (CIP.K3).
- Value of planned projects (CIP.K4).

2.3.1.2 Dollars Outside Funding Obtained

This KPI will measure outside funding dollars used for Lenexa projects for past and future years. This KPI will be measured in dollars and help quantify past success obtaining outside funding and aid in pursuing outside funding for identified funding gaps. Supporting metrics for this KPI include the following:

- Outside dollars pursued (CIP.K6).
- Number and value of successful outside funding pursuits (CIP.K7).
- Number of outside funding pursuits (CIP.K8).

An additional metric is included in this category to aid in decision making even though it does not feed directly into the KPI. The county RIPP score by watershed (CIP.K9) is included in this category to aid in outside funding decisions.

Table 2-1 CIP Planning KPIs

CIP Planning KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
(KPI), (Supporting Data), (Metric)			
CIP.K1	**Projected expenditures versus revenue**	Department spreadsheet	Provide annual projections of spend versus revenue (at least 5 years).
CIP.K2	Project revenue in dollars per year	Department spreadsheet	List available revenues for stormwater projects for next and out years, split by project category (water quality, flooding, asset renewal, etc.).
CIP.K3	Project spend in dollars per year	Department spreadsheet	List locations of projects, map their extent, estimated cost, link to any studies, or information about the project.
CIP.K4	Planned projects	Department spreadsheet	List locations of planned and completed projects, map their extent, expended cost at completion, link to any studies or information about project.
CIP.K5	**Dollars outside funding obtained**	Revenue - TBD/Spreadsheet	List value of grants and or loans obtained.
CIP.K6	Outside dollars pursued	Revenue - TBD/Spreadsheet	List value of grants and or loans pursued.

CIP Planning KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
CIP.K7	Number of successful outside funding pursuits	Revenue - TBD/Spreadsheet	List grants and or loans obtained.
CIP.K8	Number of outside funding pursuits	Revenue - TBD/Spreadsheet	List outside funding or grants pursued, dollars obtained, what projects these were used to fund, outcomes.
CIP.K9	**County RIPP score by watershed/subwatershed**	Study - to be developed	Identify areas of highest potential for County-funding by aggregated risk-integrated project prioritization scores for watersheds and subwatersheds.

2.3.2 Water Quality and MS4 Compliance Key Performance Indicators

The following two KPIs are included under this theme:

- Water Quality Sampling Results (WQ.K1) (Subsection 2.3.2.1).
- Total MS4 Points (WQ.K13) (Subsection 2.3.2.2).

Refer to Table 2-2 for additional information on these KPIs.

2.3.2.1 Water Quality Sampling Results Versus MS4 or Other Higher Standards

This KPI will report the results of water quality sampling within Lenexa's waterbodies and compare them against MS4 standards or other regulatory standards. This KPI will be measured in pollutant concentrations and will inform decisions to reduce pollutants within the City's waterways and identify needs for additional sampling. Metrics that support this KPI include the following:

- Water quality sampling results (WQ.K1).
- Change in sample results (WQ.K2).
- Number of harmful algal blooms recorded (WQ.K3).
- Total maximum daily loads (TMDLs) (WQ.K4).

A number of additional metrics were identified that do not directly support water quality sampling results, but they still support decision making in regard to water quality. These metrics are related to best management practices (BMPs), impervious land, and open space. Supporting metrics are listed as follows:

- Change in water quality (streams and lakes) downstream of stormwater BMPs (WQ.K5).
- Volume of runoff captured by BMPs (WQ.K6).
- Percentage of City's runoff captured by BMPs (WQ.K7).
- Water quality results versus percent impervious (WQ.K8).
- Ratio of BMP area to developed area (WQ.K9).
- Number of BMP retrofits (WQ.K10).
- Available lands within watershed with poor water quality (WQ.K11).
- Locations of pre-MS4 neighborhoods (WQ.K12).

2.3.2.2 MS4 Reporting Numbers

This KPI is intended to support MS4 compliance by summarizing activities into points required by the MS4 permit. This KPI will be measured in points and will aid in proactive and streamlined MS4 compliance planning and documentation. Project triggers will also be implemented to track percent completion of yearly requirements. These triggers will notify or draw attention to defined thresholds so that those metrics can be addressed specifically or drive decisions. The total points KPI is broken down into MS4 categories such as good housekeeping, public education, management of runoff, public participation, and illicit discharge elimination. Metrics that support the total points category are broken out into their respective category as follows:

- Good Housekeeping in Municipal Operations.
  - Miles of street swept (WQ.K14).
  - Number of times each street swept (WQ.K15).
  - Volume of debris and sediment removed from catch basins (WQ.K16).
- Public Participation and Outreach.
  - Volunteer hours (WQ.K17 and WQ.K29).
  - Education materials distributed (WQ.K18).
- Construction Site Runoff Control.
  - Inspections (WQ.K19).
  - Number of construction sites (WQ.K20).
  - Percentage of sites inspected (WQ.K21).
  - Violations (WQ.K22).
  - Re-inspections (WQ.K23).
- Post Construction Site Runoff Control.
  - Number of new BMPs (WQ.K24).
  - Number of BMPs inspected (WQ.K25).
  - Percentage of BMPs inspected (WQ.K26).
  - Violations (WQ.K27).
  - Re-inspections (WQ.K28).
- Illicit Discharge Detection and Elimination.
  - Number of outfalls inspected (WQ.K30).
  - Violations (WQ.K31).
  - Re-inspections (WQ.K32).

Table 2-2 Water Quality and MS4 KPIs

Water Quality and MS4 KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
(KPI), (Supporting Data), (Metric)			
WQ.K1	**Water Quality Sampling Results versus MS4/other higher standards**	Johnson County SMP/additional study and investigations	Display sampling results relative to regulatory standards, individual points and aggregated.
WQ.K2	Change in sample results	Calculated from Johnson County SMP records	Measure annual changes in sampling results.
WQ.K3	Number harmful algal blooms recorded	KDHE (manual input process), City records (spreadsheet), Resident complaints	Identify and record harmful algal blooms.
WQ.K4	Total maximum daily loads (TMDLs)	KDHE	Water sampling results compared to TMDL threshold.
WQ.K5	**Change in water quality (streams and lakes) downstream of stormwater BMPs**	Johnson County SMP/additional study and investigations	Using water quality sampling data, identify changes in water quality downstream of new/existing stormwater BMPs.
WQ.K6	**Volume runoff captured by BMPs**	Calculated from City data, additional study	Calculate estimated stormwater runoff captured by BMPs.
WQ.K7	**Percentage of City's runoff captured by BMPs**	Calculated from City data, additional study	Calculate estimated percentage of City's total stormwater runoff captured by BMPs (water quality event).
WQ.K8	**Water quality results taken versus upstream percentage of imperviousness**	Calculated from Johnson County SMP records/County AIMS for imperviousness	Normalize sample results to upstream impervious percentages.
WQ.K9	**Ratio of BMP area/developed area**	Calculated from City data, additional study	Proactively identify areas with less water quality BMP service.
WQ.K10	**Number of BMP retrofits**	Central Square EAM	Track the total modifications or retrofits to a BMP, such as a detention basin, as it relates to water quality. An example could be a detention basin that has been modified to retain additional storm runoff volume.
WQ.K11	**Available lands within watersheds with poor water quality**	AIMS parcels	Track public lands for potential to implement water quality improvement measures.
WQ.K12	**Number of pre-MS4 neighborhoods**	County platting data; City records - shapefile	Map and track pre-MS4 permit neighborhoods that may contribute to degraded water quality.
WQ.K13	**Total points**	City records	Total points obtained versus minimum permit requirement.

Water Quality and MS4 KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
WQ.K14	Miles of street swept	Central Square EAM	Track street sweeping extents, especially relative to water quality sampling.
WQ.K15	Number of times each street swept	Central Square EAM	Track number of street sweepings.
WQ.K16	Volume debris and sediment removed from catch basins	Central Square EAM	Track debris and sediment from inlets cleaned.
WQ.K17	Volunteer hours	City records	Track number of volunteers hours toward water quality improvement.
WQ.K18	Education materials distributed	City records	Track number of education materials distributed.
WQ.K19	Inspections	Central Square EAM	Track number of stormwater BMPs inspected during construction.
WQ.K20	Construction sites	City records	Track number of construction sites in City.
WQ.K21	Percentage construction sites inspected	City records	Track percentage of construction sites inspected.
WQ.K22	Violations	City records	Track number of violations reported for construction stormwater BMPs.
WQ.K23	Reinspections	City records	Track number of follow-up inspections following violations.
WQ.K24	Number of new BMPs	Central Square EAM	Track new stormwater BMPs constructed (private or public).
WQ.K25	Number BMPs inspected	Central Square EAM	Track existing stormwater BMPs inspected.
WQ.K26	Percentage BMPs inspected	Central Square EAM	Track percentage of existing stormwater BMPs inspected.
WQ.K27	Violations	City records	Track number of existing stormwater BMP violations issued.
WQ.K28	Reinspections	City records	Track number of follow-up inspections following violations.
WQ.K29	Volunteer hours	City records	Track public participation in accordance with MS4 requirements.
WQ.K30	Number outfalls inspected	Central Square EAM	Track number of stormwater outfalls inspected.
WQ.K31	Violations	City records	Track violations issued for illicit discharges.
WQ.K32	Reinspections	City records	Track re-inspections following illicit discharge violations.

2.3.3 Floodplain Management

The following two high-level KPIs are included under this theme:

- Nexuses of Flood Risk (FL.K1) (Subsection 2.3.3.1).
- FEMA CRS Points (FL.K10) (Subsection 2.3.3.2).

Refer to Table 2-3 for additional information on these KPIs.

2.3.3.1 Nexuses of Flood Risk

This KPI incorporates data sources to determine general areas of flood risk. These areas can be quantified using flood studies, hydrologic modeling, and geographic information system (GIS) spatial data. This KPI will be measured in areas using ArcGIS polygons and will be used to target improvements to reduce flood risk. The following metrics support this KPI:

- Mapped homes in the FEMA floodplain (FL.K2).
- Number of lane miles in the FEMA floodplain (FL.K3).
- Number of lane miles with dangerous flooding (FL.K4).
- Resident flooding complaints (FL.K5).
- Number and repair cost of flood damaged facilities that are repaired (FL.K6 and FL.K7).
- Number and cost of emergency repairs made (FL.K8 and FL.K9).

2.3.3.2 FEMA CRS Points

This KPI is used to quantify FEMA CRS points by category and will be measured in total points. The goal of this KPI is to track and increase CRS activities and points. The following metrics support this KPI:

- Open space within the floodplain (FL.K11).
- Mapped homes in the floodplain (FL.K12).

Table 2-3 Flooding KPIs

Flooding KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
(KPI), (Supporting Data), (Metric)			
FL.K1	**Nexus of Flood Risk**	Areas (ArcGIS polygons)	Quantified areas of flood risk.
FL.K2	Number of homes in FEMA floodplain	AIMS GIS spatial data	Track homes in FEMA floodplain.
FL.K3	Number of lane-miles in FEMA floodplain	AIMS GIS spatial data, additional study	Track street flooding in FEMA floodplain.
FL.K4	Number of streets with dangerous flooding	Additional study - look at RAS models	Track streets identified to experience dangerous flooding (based on frequency, depth, and velocity of flooding).

Flooding KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
FL.K5	Number of resident flooding complaints	311 complaints, calls to Rain to Recreation	Track resident flooding complaints.
FL.K6	Number storm/flood-damaged facilities repaired	Central Square EAM /larger projects for emergency repairs (MUNIS financial software - may not be most efficient long-term)	Track facilities damaged by flooding (i.e., not because of age or other factors).
FL.K7	Cost of storm/flood-damaged facility repairs	Central Square EAM /larger projects for emergency repairs (MUNIS financial software - may not be most efficient long-term)	Track cost of facility repairs.
FL.K8	Number emergency repairs made	Central Square EAM /larger projects for emergency repairs (MUNIS financial software - may not be most efficient long-term)	Track any emergency repairs to stormwater system.
FL.K9	Cost of emergency repairs made	Central Square EAM /larger projects for emergency repairs (MUNIS financial software - may not be most efficient long-term)	Track cost of emergency repairs.
FL.K10	**FEMA CRS Points**	City Records - FEMA report; insurance policies in Lenexa - how much money is being saved in accordance with CRS program efforts	Track FEMA CRS points - potential to add sub-metrics based on points Lenexa realizes under the CRS program.
FL.K11	Open space within floodplain	Land use data source, JoCo AIMS	Track available green space within mapped floodplain.
FL.K12	Number of homes in FEMA floodplain	AIMS GIS spatial data, additional study	Track homes in FEMA floodplain.

2.3.4 Healthy Land and Waterways

The following two KPIs are included under this theme:

- Changes to stream corridor health (HLW.K1) (Subsection 2.3.4.1).
- Acres of preserved and natural lands (HLW.K10) (Subsection 2.3.4.2).

Refer to Table 2-4 for additional information on these KPIs.

2.3.4.1 Changes to Stream Corridor Health

This KPI is an overall measurement of stream health and is measured in stream types. The goal of this KPI is to proactively protect healthy streams and highlight areas to improve the health of degraded streams. The following metrics support this KPI:

- Stream classification and change (HLW.K2).
- Locations of significant stream migration (HLW.K3).
- Locations of poor vegetation health versus good quality vegetation (HLW.K4).

A number of additional metrics were identified that do not directly support the change to stream corridor health KPI, but they still support decision making in regard to healthy land and waterways. These metrics are listed as follows:

- Degree of hydromodification (HLW.K5).
- Change in the watershed percent imperviousness (HLW.K6).
- Change in total suspended solids (TSS) (HLW.K7).
- Dollars saved using stream preservation (HLW.K8).
- Number of stream corridor encroachments (HLW.K9).

2.3.4.2 Acres of Preserved and Natural Lands

This KPI is a measurement of the natural lands that are preserved and managed by the City and is measured in acres. The goal of this KPI is to help protect native landscapes and promote continued resident satisfaction in association with the natural lands. The following metrics support this KPI:

- Acres of natural lands preserved and restored (HLW.K10).
- Value of riparian lands (HLW.K11).
- Acres of prescribed burns completed (HLW.K12).
- Stormwater runoff reduction through infiltration (HLW.K13).
- Value of preserved and natural lands (HLW.K14).
- Value of stormwater runoff reduction through infiltration (HLW.K15).

Table 2-4 Healthy Land and Waterways KPIs

Healthy Land and Waterways KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
(KPI), (Supporting Data), (Metric)			
HLW.K1	Changes to stream corridor health	Change in City classifications	Identify streams where health has changed.
HLW.K2	Stream classification via geomorphic assessment	City classifications (rapid assessments west of Renner); East of Renner - geomorphic study on Little Mill Creek in 2002; LiDAR comparison	Report stream classifications in accordance with recent and historical geomorphic assessments of stream health.
HLW.K3	Number of locations of significant stream migration	Johnson County SMP	Utilize SMP Watershed Master Plan geomorphology analysis results to quantify.
HLW.K4	Poor vegetation health versus good quality vegetation	Additional study, vegetation landcover data source	Compare poor areas of vegetation to areas of good quality vegetation.
HLW.K5	Degree of hydromodification	Johnson County SMP	Compare flow-duration curves to reference curves established in Johnson County SMP Watershed Master Plan and/or develop additional flow-duration curves for comparison to reference reach using Stormwatch gauges.
HLW.K6	Change in watershed percent imperviousness	AIMS data	Compare annual change in percent imperviousness by watershed/subwatershed.
HLW.K7	Changes in TSS	Sampling source	Track stream health via TSS sampling results.
HLW.K8	Dollars saved using stream preservation	Calculation/published research study	Report estimated dollars saved by implementing stream preservation practices and/or projects.
HLW.K9	Stream corridor encroachments	City records	Report encroachments as identified by the City.
HLW.K10	Acres natural lands preserved and restored	City has preserved acres in data source; acres restored - new initiative (invasives removal, opening canopy, natives plantings) - staff do restoration	Track acres of natural lands preserved and restored by City investment and through public-private partnership.
HLW.K11	Value of riparian lands	Calculation/published research study	Report value of riparian lands preserved and maintained.
HLW.K12	Acres prescribed burns completed	Central Square EAM	Track acres of prescribed burns.

Healthy Land and Waterways KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
HLW.K13	Stormwater runoff reduction through infiltration	Calculation - City street tree count; national land use spatial coverages that indicate tree canopy	Quantify beneficial impacts to stormwater of trees and native preserved/restored areas.
HLW.K14	Value of preserved/natural lands	Calculation/published research study	Report value of lands preserved/restored.
HLW.K15	Value stormwater runoff reduction through infiltration	Calculation/published research study	Report estimated stormwater runoff reduction promoted by native lands.

2.3.5 System Maintenance

There are five KPIs included under this theme. These KPIs highlight actions toward asset management outcomes, invasive species management, asset cleaning and inspection, and stormwater areas of need.

- Areas of county identified high-risk Stormwater assets (M.K1) (Subsection 2.3.5.1).
- Trash and debris removal efficiency (M.K11) (Subsection 2.3.5.2).
- Change in risk by watershed and subwatershed (M.K17) (Subsection 2.3.5.3).
- Economic value of land improvement from clearing of invasive species (M.K27) (Subsection 2.3.5.4).
- Change in sediment accumulation in ponds (M.K33) (Subsection 2.3.5.5).

Refer to Table 2-5 for additional information on these KPIs.

2.3.5.1 Areas of County Identified High-Risk Storm Water Assets

This KPI will highlight areas of high risk due to degraded structural integrity of stormwater assets and will be measured by risk scores 1 through 5. The goal of this KPI is to help make decisions on where to invest in replacing high-risk stormwater assets and develop effective requests for Johnson County SMP funding for asset renewal. Metrics that support this KPI are listed below:

- Number and replacement value of county identified high risk stormwater assets (M.K2 and M.K3).
- Structures inspected (M.K4).
- Linear feet of pipe inspected (M.K5).
- Structures ranked by condition (M.K6).
- Linear feet of pipe ranked by condition (M.K7).
- Number high risk assets renewed (M.K8).
- Number of citizen service requests (M.K9).
- Stormwater BMP condition (M.K10).

2.3.5.2 Trash and Debris Removal Efficiency

This KPI measures the efficiency in operations to remove trash and debris from the stormwater management system. The goal of this KPI is to improve the overall efficiency relative to the stormwater system performance and water quality. The following metrics support this KPI:

- Volume of trash and debris accumulated after storm events (M.K12).
- Volume of trash removed from inlets, pipes, and BMPs. (M.K13, M.K14, and M.K15).
- Zones with high trash and debris removal (M.K16).

2.3.5.3 Change in Risk by Watershed and Subwatershed

This KPI will help evaluate the effectiveness of the City's investment in asses renewal as gaged by the Johnson County SMP calculated risk score. This KPI will be summarized by watershed and subwatershed and measured as a risk score from 1 to 5. The goal of this KPI is to promote a cost-efficient investment that is effective in reducing risk. The following metrics support this KPI:

- Existing risk score (M.K17).
- Total repairs made and number of times an asset is repaired (M.K18 and M.K19).
- Number of structures rehabilitated (M.K20).
- Linear feet of pipe rehabilitated (M.K21).
- Number of structures replaced (M.K22).
- Linear feet of pipe replaced (M.K23).
- Linear feet of CMP replaced (M.K24).
- Dollars spent for asset renewal (M.K25).
- Dollars spent per point of risk reduction (M.K26).
- Number of high-risk assets renewed (M.K8).

2.3.5.4 Economic Value of Land Improvement from Clearing of Invasive Species

This KPI places a valuation on the efforts of the city to promote healthy lands and is measured in dollars. The metrics listed below will be measured spatially and have a dollar value assigned to the spatial measurement based on established literature. The City will be able to use the metric measurements and assigned dollar value to estimate the economic value of land improvement efforts. The goal of this KPI is to promote continued investment in the improvement of high-value natural lands. The following metrics support this KPI:

- The miles of stream corridor inspected for invasives (M.K28).
- The change in invasive species in stream corridors (M.K29).
- The extent of healthy stream corridor vegetation (M.K30).
- The number of invasive species clearing projects (M.K31).
- The total area cleared of invasive species (M.K32).

2.3.5.5 Change in Sediment Accumulation in Ponds

This KPI will measure the volume of sediment accumulation within City owned ponds and will be measured in units of volume. The goal of this KPI is to identify areas where improvements such as dredging will be most beneficial as well as quantify the improvement of based on these efforts. The following metrics support this KPI:

- Sediment removed from existing ponds (M.K34).

- Number of planned sediment capture locations (M.K35).
- Sediment removed from planned sediment capture locations (M.K36).

Table 2-5 System Maintenance KPIs

System Maintenance KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
(KPI), (Supporting Data), (Metric)			
M.K1	**Areas of County-identified high-risk stormwater assets**	Calculation using Johnson County SMP Asset Registry	Track areas where there are a number of stormwater assets with an aggregated high risk score (i.e., nexus)
M.K2	Number County-identified high-risk stormwater assets	Johnson County SMP Asset Registry	Track number of county identified high risk stormwater assets.
M.K3	Replacement value County-identified high-risk stormwater assets	Johnson County SMP Asset Registry	Track value of replacing county identified high risk stormwater assets.
M.K4	Structures inspected	Central Square EAM	Track structures inspected.
M.K5	Linear feet pipe inspected	Central Square EAM	Track linear feet of pipe inspected.
M.K6	Number structures by condition	Central Square EAM	Rank structures by condition.
M.K7	Linear feet pipe by condition	Central Square EAM	Rank linear feet of pipe by condition.
M.K8	Number high risk assets renewed	Central Square EAM /larger projects - shapefile database	Track number of high risk assets that have been renewed.
M.K9	Number citizen service requests addressed	311 database	Track number of citizen service requests that have been addressed.
M.K10	Stormwater BMPs condition	Central Square EAM	Track condition of stormwater BMPs.
M.K11	**Trash/debris removal efficiency**	Calculation using Central Square EAM data	Cost per ton of trash/debris removed
M.K12	Volume trash/debris accumulated in stormwater BMPs after storm event(s)	Central Square EAM	After cleaning, record volume trash/debris accumulated in stormwater BMPs versus volume of rainfall event.
M.K13	Inlets cleaned	Central Square EAM	Track inlets cleaned.
M.K14	Linear feet pipe cleaned	Central Square EAM	Track linear feet of pipe cleaned.
M.K15	Volume trash/debris removed from stormwater BMPs	Central Square EAM	Track volume of trash removed from BMPs.
M.K16	BMPs with high volume trash/debris	Central Square EAM	Track areas with high volume of trash removed.
M.K17	**Change in risk by watershed/subwatershed**	County Asset Registry	Track aggregate risk of stormwater assets by watershed and subwatershed.

System Maintenance KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
M.K18	Number repairs made	Central Square EAM /larger projects - shapefile database	Track total number of repairs made.
M.K19	Number of times asset repaired	Central Square EAM /larger projects - shapefile database	Track number of times a given asset has been repaired.
M.K20	Structures rehabilitated	Central Square EAM /larger projects - shapefile database	Track number of structures that have been rehabilitated.
M.K21	Linear feet pipe rehabilitated	Central Square EAM /larger projects - shapefile database	Track linear feet of pipe that has been rehabilitated.
M.K22	Structures replaced	Central Square EAM /larger projects - shapefile database	Track total number of, and list structures replaced.
M.K23	Linear feet pipe replaced	Central Square EAM /larger projects - shapefile database	Track linear feet of pipe replaced.
M.K24	Linear feet CMP replaced	Central Square EAM /larger projects - shapefile database	Track linear feet of CMP replaced.
M.K25	Dollars spent for asset renewal	Central Square EAM /larger projects - shapefile database	Summarize total dollars spent on asset renewal.
M.K26	Dollars spent per point of risk reduction	Calculation using Central Square EAM data and larger project shapefile database and MUNIS	Track investment of City dollars to achieve unit of risk reduction - measure of program efficiency.
M.K27	**Economic value of land improvement via clearing of invasive species**		Estimated using established literature the value of improvement to lands via clearing of invasives.
M.K28	Miles stream corridor inspected for invasives	Central Square EAM - no historical data, new initiative	Track number of miles of stream corridor inspected for invasive species.
M.K29	Change in invasive species in stream corridors	Direct measurement - transects with estimates of invasives	Map invasive species and measure changes to extent.
M.K30	Extent of healthy stream corridor vegetation	Direct measurement - transects with estimates of healthy vegetation	Map the extent of healthy vegetation within the stream corridor.
M.K31	Number of invasive species clearing projects/events	Lucity - Ted tracks toward MS4	Track total number of planned and executed projects.

System Maintenance KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
M.K32	Area cleared invasive species	Central Square EAM - no historical data, new initiative	Track total area of cleared invasive species.
M.K33	**Change in sediment accumulation in ponds**	Future study - bathymetry	Track sediment accumulation via desktop analysis and/or bathymetric survey.
M.K34	Sediment removed from ponds	Central Square EAM - no historical data, new initiative	Track volume of sediment removed from ponds.
M.K35	Number planned sediment capture locations	Central Square EAM - no historical data, new initiative	Report the number of sediment capture locations (e.g., forebays) implemented.
M.K36	Sediment removed from planned sediment capture locations	Central Square EAM - no historical data, new initiative	Track sediment removed from planned capture locations.

2.3.6 Future Outlook

Three KPIs are included in this theme. They are related to managing future development impacts, changes in observed rainfall patterns, and future resident feedback and satisfaction.

- Cedar Creek water quality facility (F.K1) (Subsection 2.3.6.1).
- Change in flow responses to rainfall (F.K5) (Subsection 2.3.6.2).
- Resident satisfaction survey results for Stormwater (F.K8) (Subsection 2.3.6.3).

Refer to Table 2-1 for additional information on these KPIs.

2.3.6.1 Cedar Creek Water Quality Facility

This KPI will track the metrics that indicate the need for a water quality facility in Cedar Creek and will be tracked using rates of watershed development. Triggers can be implemented within the dashboard to notify that action is needed once a metric reaches a certain level (i.e., a level of watershed imperviousness or a level of water quality sampling result that indicated the need for a regional facility). The goal of this KPI is to support decision making that protects the water quality in Cedar Creek as the watershed continues to develop. The following metrics support this KPI:

- Number of development and redevelopment permits at watershed and subwatershed levels (F.K2).
- Change in impervious area in the Cedar Creek watershed (F.K3).
- Change in water quality sampling results in Cedar Creek (F.K4).

2.3.6.2 Change in Flow Responses to Rainfall

This KPI will measure the impacts on stream flow rates due to changing climate conditions and will be measured in stream flowrates. The goal of this KPI is to adapt to changing rainfall patterns and flow response patterns. The following metrics support this KPI:

- Changes to intensity duration frequency (IDF) curves (F.K6).

- Annual peak flows (F.K7).

2.3.6.3 Resident Satisfaction Survey Results for Stormwater

This KPI will keep track of the resident satisfaction scores as measured in the biennial survey. The goal of this KPI is to highlight the areas of strong satisfaction and proactively address any emerging concerns from residents relative to stormwater. The following metrics support this KPI:

- The number of website hits for the public facing dashboard (F.K9).
- The number of resident survey responses (F.K10).

Table 2-6 Future Outlook KPIs

Future Outlook KPIs			
Ref	**Performance Measure**	**Data Source**	**Comments**
(KPI), (Supporting Data), (Metric)			
F.K1	**Projected trend to meet threshold for trigger for water quality facility in Cedar Creek**		Established percent imperviousness required for action for water quality facility and track progress toward this threshold as a trigger for action to implement new water quality facility.
F.K2	Number of development/re-development permits at watershed and subwatershed levels	Accela - permitting software	Track development of watersheds and subwatersheds via permits issued.
F.K3	Change in impervious area in Cedar Creek	AIMS imperviousness data	Track change in impervious area in the watershed using land use data.
F.K4	Change in water quality sampling results in Cedar Creek	Same as above	Track change in water quality in the watershed.
F.K5	**Change in flow responses to rainfall**	USGS/Stormwatch	Compare changes in IDF curves to flow-duration curves.
F.K6	Changes to Intensity-Duration-Frequency (IDF) curves	Low priority	Plot IDF curves annually to compare to reference and measure changes.
F.K7	Annual peak flows	USGS/Stormwatch	Track peak flows annually at USGS and/or Stormwatch gages.
F.K8	**Resident satisfaction survey results for stormwater**	Survey results	Using biennial City-survey results and questions, track citizen satisfaction.
F.K9	Number website hits for public-facing dashboard	IT department	Track total number of website hits for the public facing dashboard.
F.K10	Number resident survey responses	Survey results	Summarize resident survey responses.

3.0 Data Sources Assessment

The data sources assessment is a necessary step in the KPI Roadmap development to properly identify where the data are going to come from and how they will support the KPIs. The data sources assessment is also necessary to start planning for the interconnectivity of the different data sources within the Business Intelligence Platform. This process is completed after the necessary KPIs have been identified, and the City has identified where they believe the respective metrics will come from and provided an example data export from each data source. These exports are then reviewed to confirm or deny the presence of the necessary data and to begin identifying methods for linking the varying data sources together to drive a dashboard. The data sources the City has identified at this time are shown on Figure 3-1.

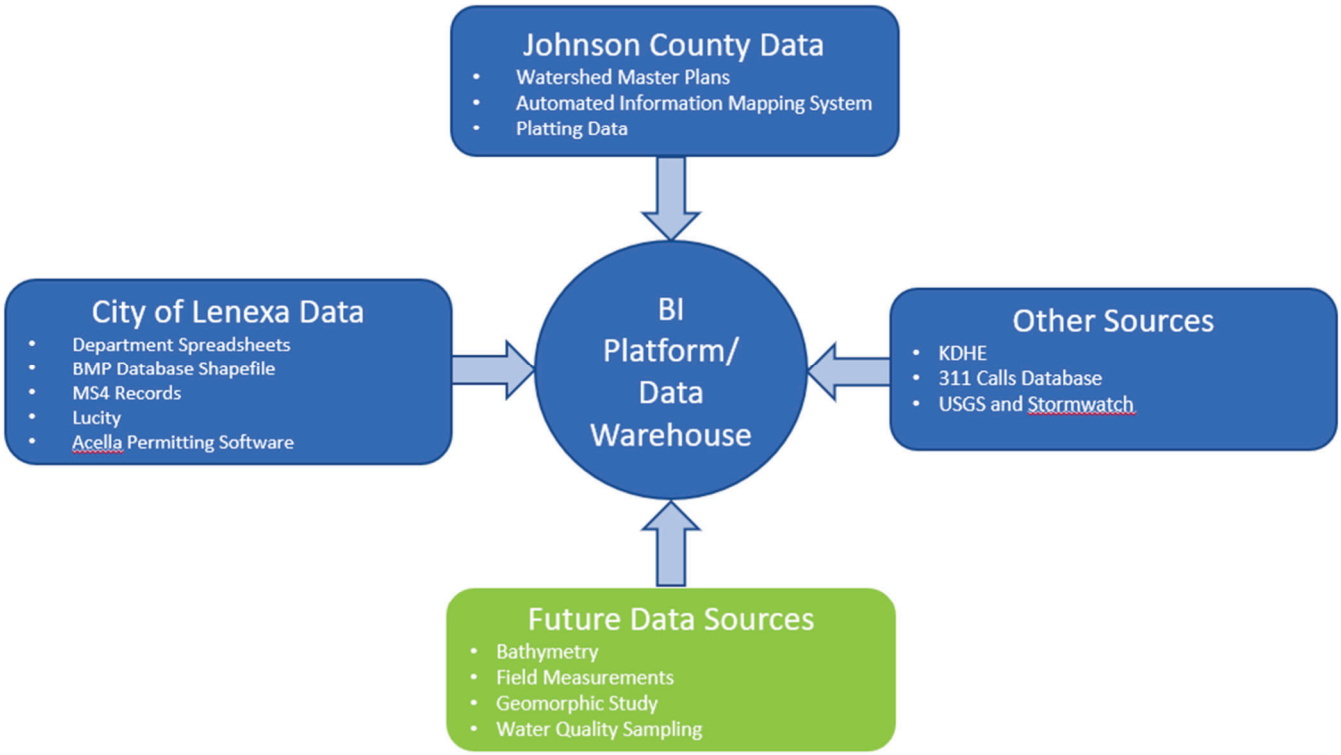


Figure 3-1 City Identified Data Sources

3.1 Johnson County Data Sources

Johnson County has various readily available data sources that can be used in support of the defined KPIs. Johnson County data sources identified during Phase 1 of this project include the JoCo Watershed Master Plan, the JoCo Automated Information Mapping System (AIMS), and JoCo Platting Data.

3.1.1 JoCo Watershed Master Plans

The JoCo Watershed Master Plans were identified to support multiple water quality KPI metrics. The master plan includes water quality sampling results from throughout the County and can be used to compare

results against the City's MS4 standards. The master plan results can also be used to calculate the change in water quality over time and to compare upstream impervious area to a specific sampling location. Results can also be examined against BMP locations to see whether there is water quality improvement.

The Watershed Master Plans will also be used to track the degree of hydromodification and number of locations with significant stream migration in support of healthy land and waterway KPIs. The Watershed Master Plans that the City will most likely reference include:

- Watershed Master Plan – Watershed 1 (Brush Creek and Turkey Creek)
- Watershed Master Plan – Watershed 2 (Indian Creek and Tomahawk Creek)
- Watershed Master Plan – Watershed 6 (Mill Creek and Cedar Creek)

3.1.2 Automated Information Mapping System

The AIMS website contains lots of useful information that can be used to calculate and track the selected KPIs. The AIMS parcel and land use data can be used to look at available open spaces and compare those to watersheds with poor water quality. The land use data will also be used in support of flooding KPIs to calculate the amount of open space within the floodplain.

The AIMS GIS spatial data will also be used to support flooding KPIs by tracking the total number of homes within the FEMA floodplain. The same spatial data can be used to calculate the number of lane-miles within the FEMA floodplain.

The AIMS landcover data will be used to track change in percent impervious for each watershed in support of healthy land and waterway KPIs.

3.1.3 JoCo Platting Data

Platting data are anticipated to be used to support water quality KPIs by mapping and tracking pre-MS4 neighborhoods that could potentially be contributing to degraded water quality.

3.2 City of Lenexa Sources

The City of Lenexa maintains multiple sources of data that will be useful in measuring the selected KPIs. Identified data sources include Finance Department Spreadsheets, City BMP shapefiles, MS4 Records, and Central Square EAM and Accela Permitting Software.

3.2.1 Department Spreadsheet

The City maintains a department spreadsheet that resides on a network shared drive within the finance department. The spreadsheet contains information that can be used to project spending in dollars per year, project revenue in dollars per year, list all planned projects, and calculate projected expenditures versus revenue. The revenue spreadsheet will also be used to compare the number of outside funding pursuits to dollars of outside funding obtained.

The City also maintains a spreadsheet that tracks current construction sites, percentage of construction sites inspected, violations, reinspections, volunteer hours, and education materials distributed. These records will support KPIs that measure MS4 permit progress.

3.2.2 City BMP Database Shapefile

The City's BMP shapefile will be used to support water quality KPIs by calculating the ratio of BMP area to developed areas, volume of captured runoff, and percent of total runoff captured. These KPIs will influence decisions on the effectiveness of existing BMPs and opportunities for future BMPs.

3.2.3 City MS4 Records

City MS4 records will be used to monitor total points obtained and compare that number to the minimum MS4 permit requirement.

Central Square EAM is a large asset management database that the City uses to track a variety of information. Central Square EAM contains data for tracking water quality KPIs such as miles of street swept, number of times each street swept, and volume from debris removed from catch basins.

Central Square EAM also tracks the number of new BMPs and number of BMPs inspected that can be used to calculate the percentage of BMPs that get inspected. Likewise, Central Square EAM will have information regarding the number of outfalls that get inspected.

Central Square EAM and MUNIS financial software will be used to calculate the number of flood damaged facilities that are repaired, the cost of these repairs, and the number and cost of emergency repairs.

3.2.4 Accela Permitting Software

The permitting software will be used to track past and future development permits. This can be viewed at the watershed and subwatershed levels and tracked toward a trigger for BMP or water quality facility construction.

3.3 Other Sources

Other sources outside of Lenexa and Johnson County were identified to support the KPIs, including KDHE, 311 Database, and rainfall sources like USGS and Stormwatch.

3.3.1 KDHE-Algal Blooms

The Kansas Department of Health and Environment (KDHE) maintains records of algal blooms. Any of these records that are located within City limits will be incorporated into the dashboard so the City can visualize areas with algal bloom issues.

3.3.2 311 System Database

The 311 system database will be used to track the number of resident flooding complaints from phone calls and online service requests. These complaints can be spatially analyzed to look for trends or hot spots of flooding.

3.3.3 USGS/Stormwatch

The USGS/Stormwatch database will be used to gauge severity and frequency of storms and track damaging storm events.

3.4 Future Data Sources

Some future study will be required as inputs for the selected KPIs. Future studies that were identified include bathymetry, invasive species measurement, geomorphic study, and water quality sampling.

3.4.1 Future Study-Bathymetry

LiDAR is a valuable source of topographic information that enhances storm water modeling and studies. However, topographic data obtained this way stops at the water's surface. Field investigations conducted to determine bathymetry can assist in monitoring sedimentation in lakes and ponds.

3.4.2 Field Measurements-Invasive Species

Control of invasive species is a significant maintenance step for public lands. Remote sensing and reports from street and parks maintenance staff can by analyzed to get ahead of an invasive species before growth and removal become prohibitively expensive.

3.4.3 Central Square EAM-Invasive Species

The cost of invasive species removal can be tracked in Central Square EAM. With accurate annual cost data, the City can anticipate and budget for this important public land management activity.

3.4.4 Geomorphic Study

Future geomorphic studies of the City's waterways will need to be conducted to establish a baseline and compare against the baseline in the future. These studies will monitor changes in stream health and stream classification.

3.4.5 Water Quality Sampling Plan

A water quality sampling plan will need to be developed to support the water quality sampling results and MS4 KPIs. Results will be compared to MS4, TMDL, and other higher standards for compliance and to highlight areas of need. Consistent sampling will also be used to track changes in water quality.

4.0 Data Management Best Practices

4.1 Benefits of a Data Warehouse

As data challenges increase, due to growth of data collection volume and complexity, it is increasingly important to dedicate a centralized system for storing, managing, and analyzing that data. The centralized system becomes a single source of truth for the city's data. Best data management practices include: setting requirements and objectives, documentation and cataloging of the data, and building a data warehouse. A data warehouse allows an organization advantages such as:

- *Integrate data from multiple sources*: A data warehouse allows an organization to bring data from various sources, such as the metrics mentioned in Section 3.0, into one centralized location. This enables an organization to gain a more complete and accurate view of its data.
- *Improve data quality*: By integrating data from multiple sources, the organization can identify and correct data inconsistencies and errors. This improves the overall quality of data, making it more reliable and trustworthy.
- *Enable more progressive analytics*: A data warehouse stores data typically organized into a dimensional model. Dimensional modeling in a data warehouse is the gold standard for generating analytical answers to data questions.

Dimensional Model
Data structure organization technique optimizing data for storage in a Data warehouse.

- *Improve performance*: A data warehouse allows an organization to optimize and index data for faster query and reporting performance. This improves the speed at which dashboarding solutions can access and analyze data, allowing the organization to make more informed decisions.
- *Improve data security*: A data warehouse creates centralized data management, making it easier to implement security measures such as encryption, access controls, and audit trails.

In summary, a data warehouse is a crucial tool for managing and analyzing the growing volume and complexity of data an organization collects. Rather than silos of disparate data sources, the data warehouse provides the organization with a single source of truth for data, upon which data-driven decisions and actionable insights can be made.

4.2 Building a Data Warehouse

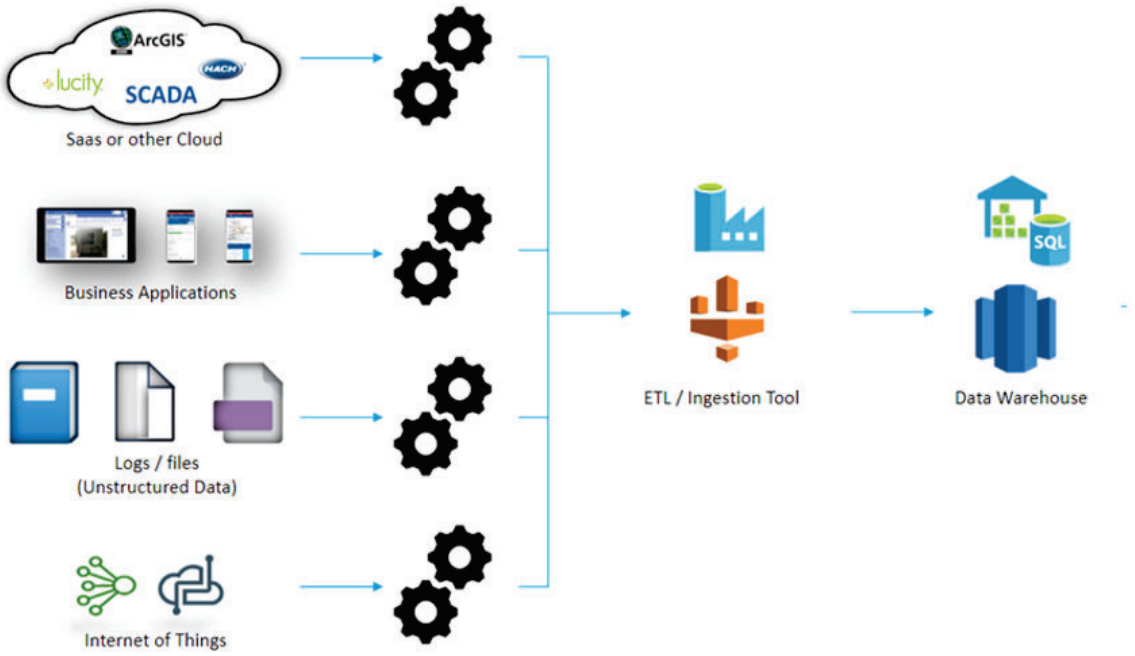


Figure 4-1 Graphical Representation of Data Warehouse Integration

Building a data warehouse is no small effort by any means, typically involving the contribution of several stakeholders within the City's organization. Communication will be necessary between the IT implementation team and the data source owners: the individuals who understand the data source schemas, access methodologies, and security protocols for cloud-hosted solutions. Each of the data sources identified in Section 3.0 will have its own set of challenges to normalize and integrate the data into the warehouse. Black & Veatch has identified the general series of steps the implementation team will need to take to integrate each source into the warehouse.

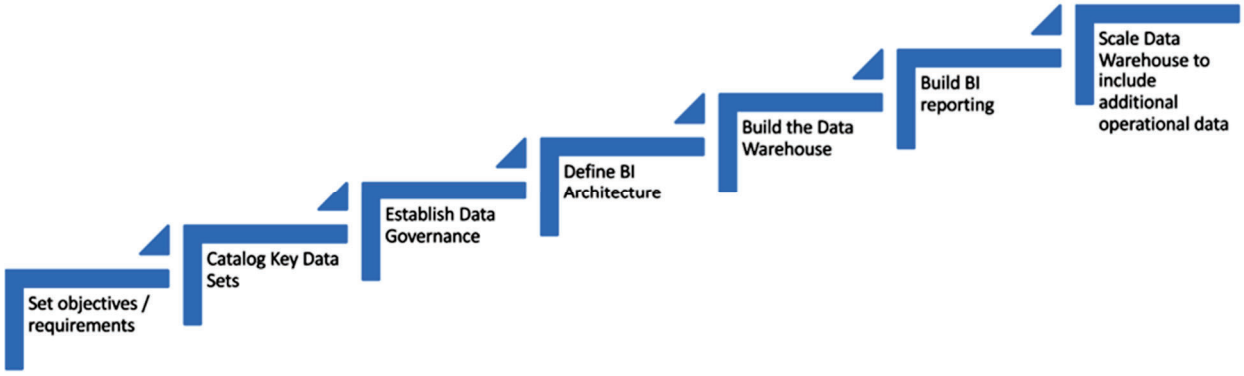


Figure 4-2 Data Warehouse Integration Steps

4.3 Data Warehouse Integration Steps

4.3.1 Step 1. Set Objectives and Requirements

A crucial step in the process is defining the requirements of the warehouse and understanding the business needs and goals. This includes detailing the technical requirements: identifying the types of data that need to be stored, the data sources, and the types of analytics and reporting that will be performed. Included in this step is setting business requirements, such as KPIs, that are based on industry-specific goals or business rules.

4.3.2 Step 2. Catalog Key Data Sets

This step consists of identifying the different data sources available, their access methodologies, permissions, and restrictions. Part of this step includes understanding who the owners of the products are and determining whether there are plans for structural changes on source tables. Included in this step is a data profiling effort: the process of analyzing the tables, indexes, relationships, and schema of each source. This is a crucial step, as it ensures that the source data will be loaded accurately, consistently, and of high quality. Further, by profiling the data against requirements, the implementation team may be able to determine whether all or part of a data source needs to be integrated into the warehouse. By identifying and correcting data quality issues before they are loaded into the data warehouse, data profiling helps ensure that the data warehouse is streamlined, reliable, and trustworthy.

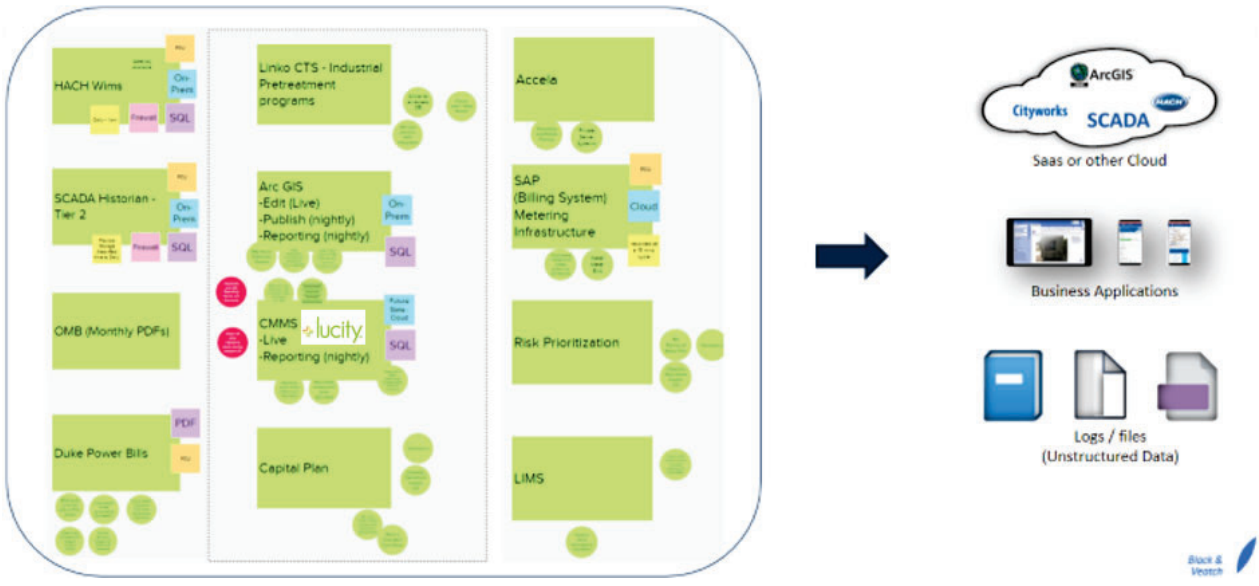


Figure 4-3 Cataloging Data

4.3.3 Step 3. Establish Data Governance

This step aligns the implementation team with the data owners to determine how all the disparate systems will be integrated. The implementation team will work with the data owners to determine the following:

- Communication methods for detailing changes to a source data system.
- How those changes would affect the data system downstream.
- How to build the interdependent rules that can help govern the flow of data into the warehouse.

4.3.4 Step 4. Define BI Architecture

This step outlines the different stages of the flow of data from source to end user. Components include a listing of source systems being integrated, identifying the integration and cleansing tools (ETL tools), and developing the storage table structure and dimensional model to determine the optimal method for processing raw data and converting it to an easily comprehended structure.

Source Systems
Existing systems holding data

ETL
Integration & Cleaning Tool- extract, transform, load—is a data integration process that combines, cleans and organizes data from multiple sources into a single, consistent data set for storage

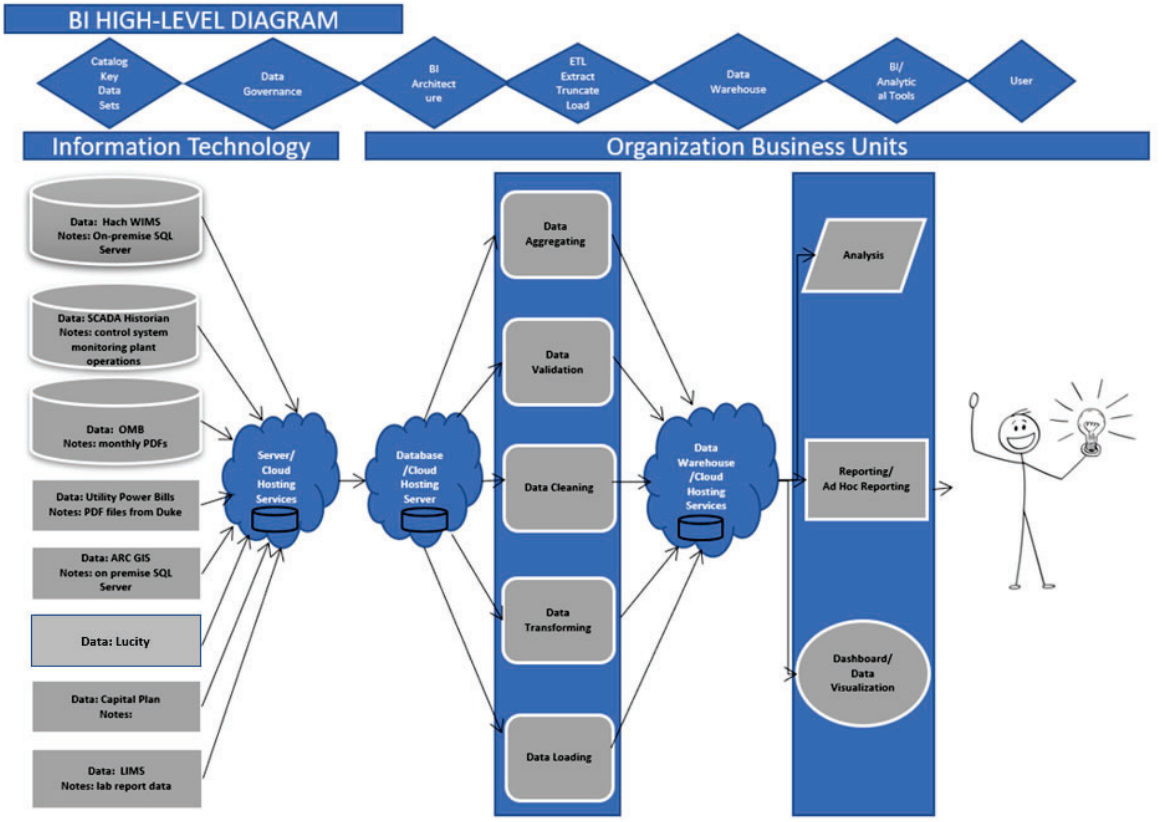


Figure 4-4 BI Architecture Diagram

4.3.5 Step 5. Build the Data Warehouse

This step consists of many individual steps to integrate all the different data sources available to the City. The broad summary of this activity includes first accessing the data sources, replicating copies of the key data sets in loading tables within the warehouse, transforming and categorizing the tables into staging tables, and pulling the staging tables into their separate facts and dimension tables.

Loading Tables
First table holding extracted data and transformed data

Staging Tables
Holds and Isolates raw data from source system adding only system data

Fact Tables
Contains metrics and found at center of the schema, surrounded by dimension tables

Dimension Tables
Stores attributes describing the facts in a fact table

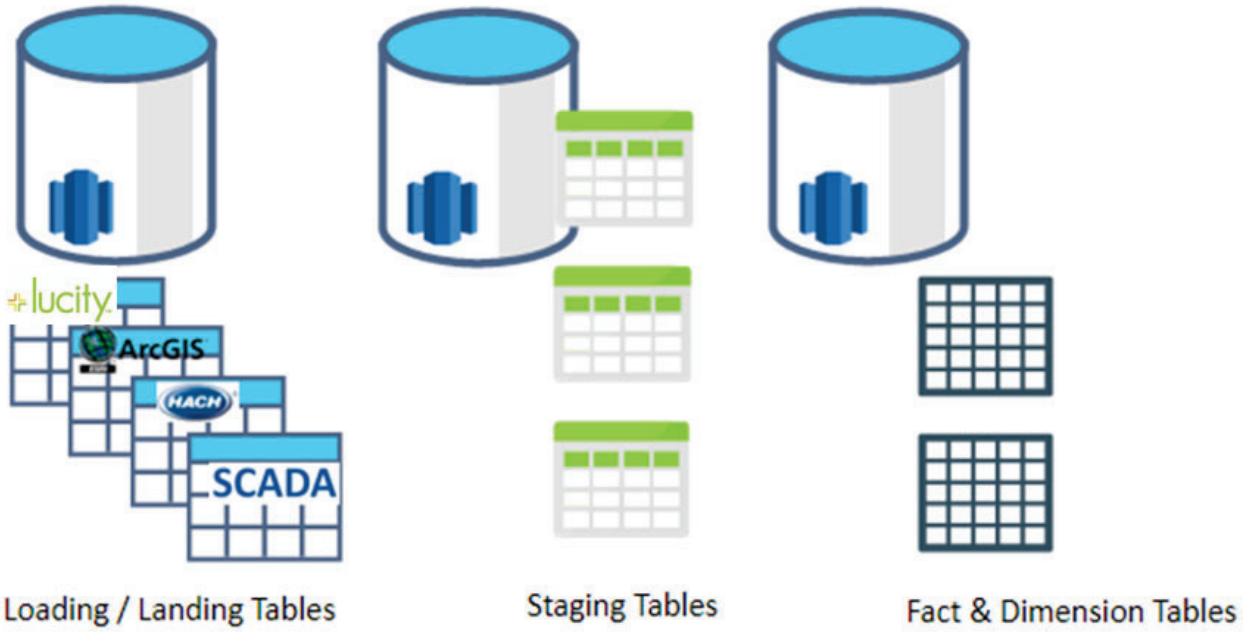


Figure 4-5 Graphical Representation of Build Process

4.4 Scale Data Warehouse or Data Flows to Include Additional Operational Data

This step consists of scaling up the data warehouse or data flows by incrementally adding data sources after the initial launch.

Dataflow
Dataflows can securely access data source systems through an automated process.

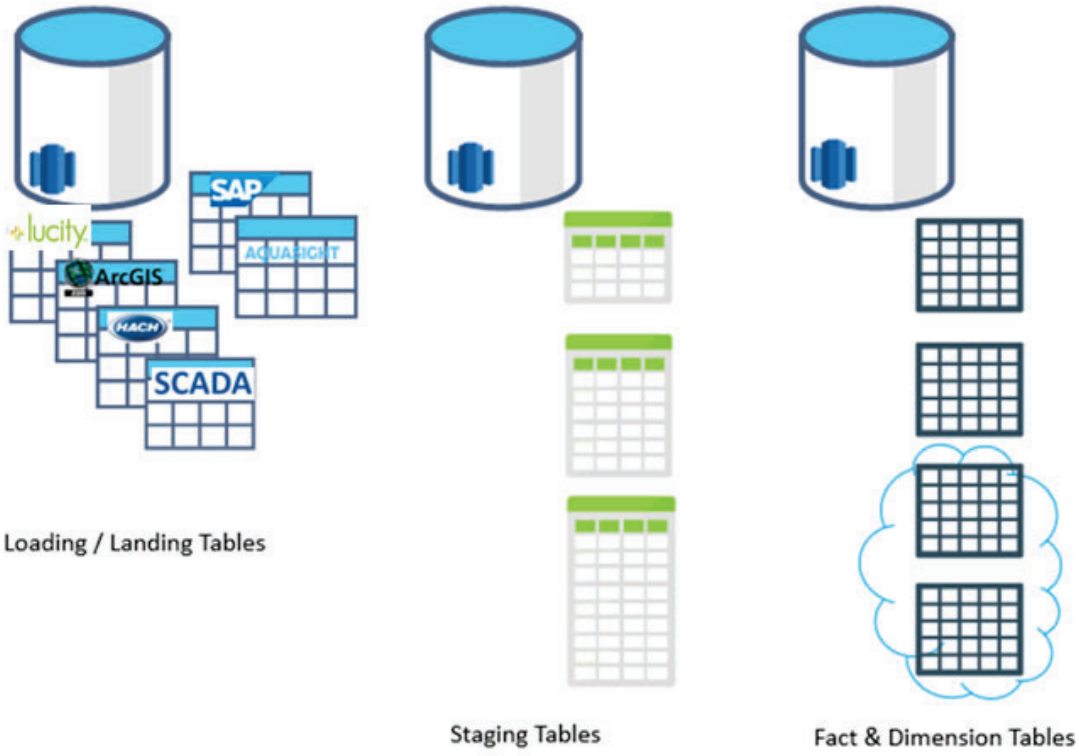


Figure 4-6 Graphical Representation of the Scaling Process

Ultimately, following this program will provide users with an understanding that the decision they are making is based on a reputable source of truth, derived from accurate and timely data.

5.0 Roadmap Development

Building a business intelligence platform involves the contributions and coordination of multiple stakeholders within the City's organization. Ideally, an incremental build of the data warehouse and Business Intelligence is recommended, specifically for the City's priority data sources; Black & Veatch recommends the following roadmap for implementation.

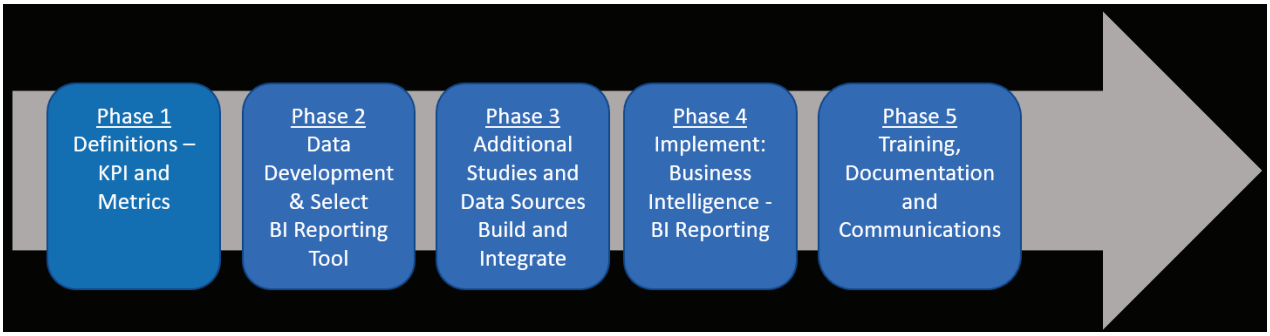


Figure 5-1 Roadmap

5.1 Phase 1 – Definitions Phase – Complete

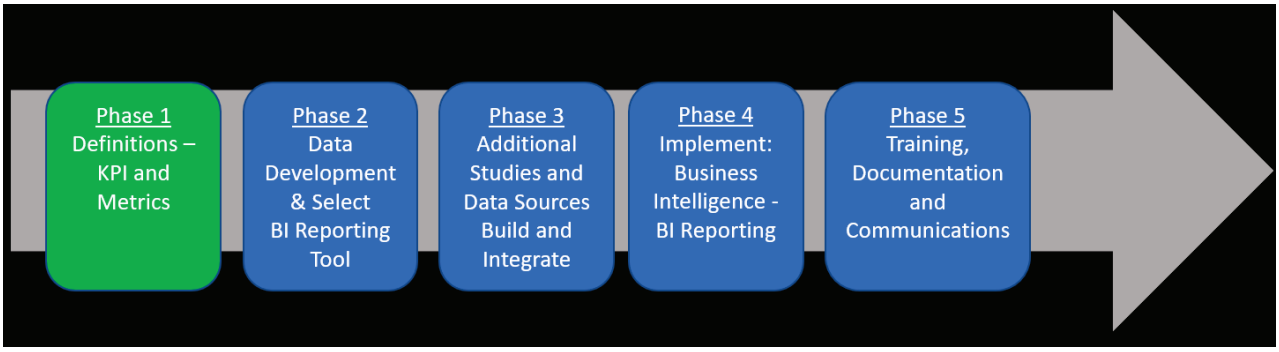


Figure 5-2 Phase 1 Roadmap

This initial phase identifies long-term goals of the City's stormwater program, risks to those goals, data sources which can be used to track the stormwater system performance and health, and project triggers. The deliverable for this phase will be a detailed report documenting a plan to finish the remaining four phases. Further details are described in Section 1.0.

5.2 Phase 2 – Data Development & Select Business Intelligence BI Reporting Tool

Figure 5-3 Phase 2 Roadmap

The second phase includes development of any data identified as needed in Phase 1. The City and Black & Veatch have identified Central Square EAM data source as a logical first step for resolving the KPIs and requirements. The priorities include asset management and financials. Ideally, an incremental build of the data warehouse is recommended, starting with each of these sources.

5.2.1 Connections Details and Data Profiling

A crucial next step is performing detailed profiling of each priority data source. The data catalog provides summary details; however, it is recommended to gather further details. The City is currently gathering detailed data source information from Central Square EAM. There may be sections of each data source that are not necessary to extract, such as system tables, which can remain in the source.

The identified data should then be documented to understand the organization or schema, the characteristics, structure, and data quality. This includes inventorying each source's tables and documenting the following: descriptions of each table, relationships to other tables, indexes, keys, and update frequency/procedures. Further, the columns within the identified tables should be profiled for their data types, field lengths, null values, uniqueness, and quality. A profiling report summarizing these efforts would be excellent documentation for future stewards/owners of the warehouse.

- Identify and securely document the connection and access methodology.
  - Work with data owners to document permissions, restrictions, and data governance.
  - Use Data Catalog for data owner contact information and additional details.
- Develop data profiling report/documentation:
  - Identify which tables for extraction and which tables will remain untouched.
  - For the extraction tables, create summary descriptions, document relationships, indexes, keys, and update frequency/procedures.
  - Profile the columns within the identified tables for their data types, field lengths, null values, uniqueness, and quality.

5.2.2 Develop Dimensional Models

An industry best practice for dimensional modeling is the system of categorizing data into facts and dimensions. Dimensional modeling interrogates a business process to determine the facts, or immutable numeric measurements, and the dimensions, or descriptive context of a business process event. Dimensional models should be designed in collaboration with subject matter experts and data governance representatives. This is a powerful tool for managing and categorizing data. Following this methodology improves query performance, simplifies analysis, facilitates maintenance, ensures data quality, improves scalability, and allows for better security.

- Use the data profiling documentation to determine the facts, or immutable numeric measurements, and the dimensions or descriptive context of data.
  - Create dimensional modeling, categorizing data into facts and dimension tables.
  - Identify the transformation efforts to move data from raw form to the different facts and dimension tables.

5.2.3 Cleansing/Transforming Data

Data cleansing is the process of identifying and correcting data quality issues that were identified during data profiling. This includes removing duplicate data, correcting data errors, handling null values, and standardizing data. Part of this effort will include resolving conflicts between different sources. Data transformation is the process of converting the data into a format that is suitable for loading into the data warehouse. This includes items such as mapping data fields, converting data types, and merging data from multiple sources.

Profiling, cleansing, and transforming raw table data is an essential step in the data warehouse integration process because it helps ensure the quality, consistency, and accuracy of the data before it is loaded into the data warehouse. By identifying and correcting data quality issues before they are loaded into the data warehouse, data profiling helps ensure that the data warehouse is reliable and trustworthy.

5.2.4 Build Out Data Warehouse (Optional)

This section is an optional step of building or expanding a data warehouse detailed in Section 4.0

- Develop Administration, Data Governance, and Data Management Plans.
- Accessing the data sources, replicating copies of the key data sets in loading tables within the warehouse, transforming and categorizing the tables into staging tables, and pulling the staging tables into their separate facts and dimension tables identified in 5.2.2.

5.2.5 Deploy Infrastructure and Replicate Data Sources (Optional)

This section pertains to updating existing data infrastructure, building out new data infrastructure, and replicating data sources for redundancy where necessary.

- Identify and deploy IT infrastructure to replicate, host, and feed data sources to the data flows or data warehouse as needed.

Data Infrastructure
All digital infrastructure used to store, manage and process data.

Best Providers
In House, Snowflake, Redshift…etc.

- Black & Veatch can assist with identifying the best providers (Snowflake, Redshift…etc.).

5.2.6 Select BI Tools to Prepare and Analyze Data to Find and Share Actionable Insights

This step uses BI tools to prepare and analyze data to find and share actionable insights. There are many BI tools available to choose from on the commercial market: Power BI, Tableau, Qlik, etc. The Gartner Research and Advisory Company provides an annual ranking of Business Intelligence software vendors. Currently, Microsoft Power BI ranks as the leader in the ability to execute and completeness in vision[1] (Gartner, n.d.). Black & Veatch has anecdotally noted that in recent years, Microsoft Power BI has become widely adopted across the Water industry, as the program integrates flawlessly within the rest of the Microsoft Office365 suite and is available as a simple add-on to Microsoft's licensing. The Microsoft Power BI software is available in several product offerings:

- Power BI Desktop - A free to use version, intended for personal dashboarding / reporting
- Power BI Pro - Cloud-based Collaboration, Management, Sharing & Distribution
- Power BI Premium - Advanced Features (Machine Learning, Application Lifecycle Management, Standardized PDF Report Generation) The differences between the Free Power BI Desktop edition and a Pro License are depicted in figure 5-6 Power BI Product Differences below.

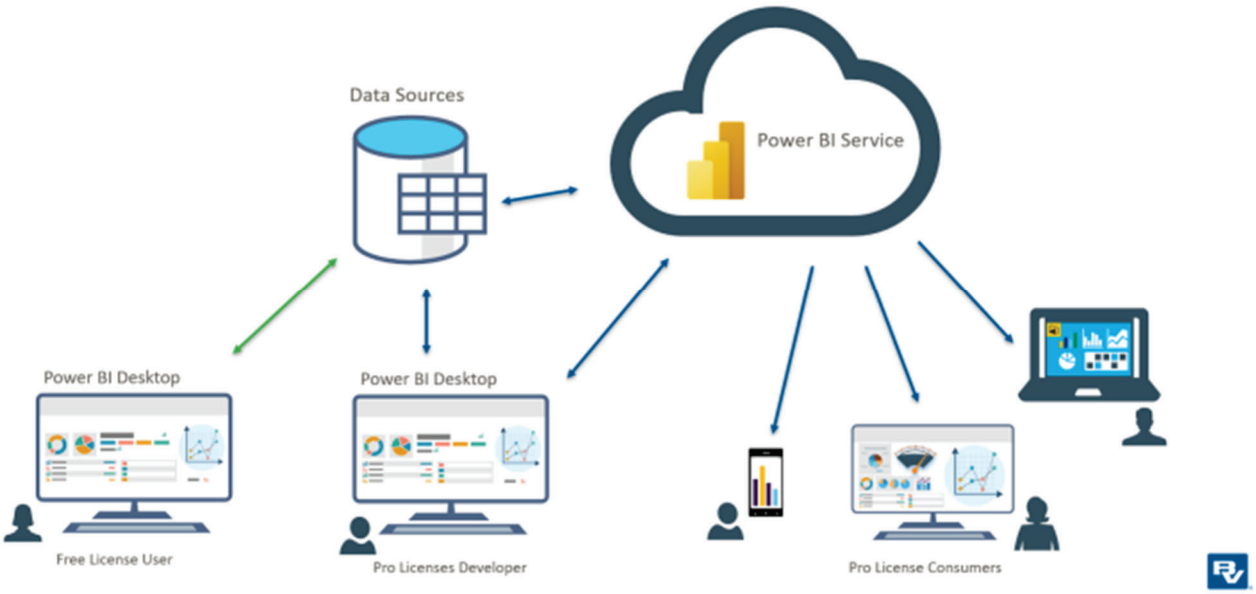


Figure 5-4 Power BI Product Differences

The free desktop edition enables users to connect to over 200+ connectors: CSV files, Excel files, OnPrem SQL Server, AWS, Azure Cloud, etc. This free desktop edition includes the data engineering, modeling, and development of visuals for a dashboard. These reports can continue to access their data sources to pull in new data. The reports and dashboards are saved to the local machine as a Power BI .pbix file, like an Excel file. A free edition user can share the Power BI files (.pbix) with other free edition users; however, each file will need to be saved and accessed from a local machine. A Pro License developer uses the same desktop

[1] (Gartner. [n.d.]. Microsoft Power BI. https://www.gartner.com/reviews/market/analytics-business-intelligence-platforms/vendor/microsoft/product/microsoft-power-bi#reviews)

software for connecting to data, performing data engineering, modeling, and the development of visuals for a dashboard. The added benefit of this license includes the ability to publish content to Microsoft's Power BI service, a cloud-based environment for collaborating and distributing reports and dashboards to other Pro License accounts. The cloud service enables a user to securely access their dashboards via a webpage address, from any device also associated with the user's Office 365 account. Pro Users would be able to collaborate and share content using the service. BI best practices include the definition of a development and distribution strategy for creating new content and publishing new and/or updated reports for end-user data consumption. Typically, this includes working on the .pbix file locally on the desktop edition and publishing a version for quality assurance/quality control (QA/QC). Once the dashboard is finalized after QA/QC, it is deployed for use. This development and distribution strategy is the precursor part of the application lifecycle management.

5.3 Phase 3 – Additional Studies and Data Sources Build and Integrate

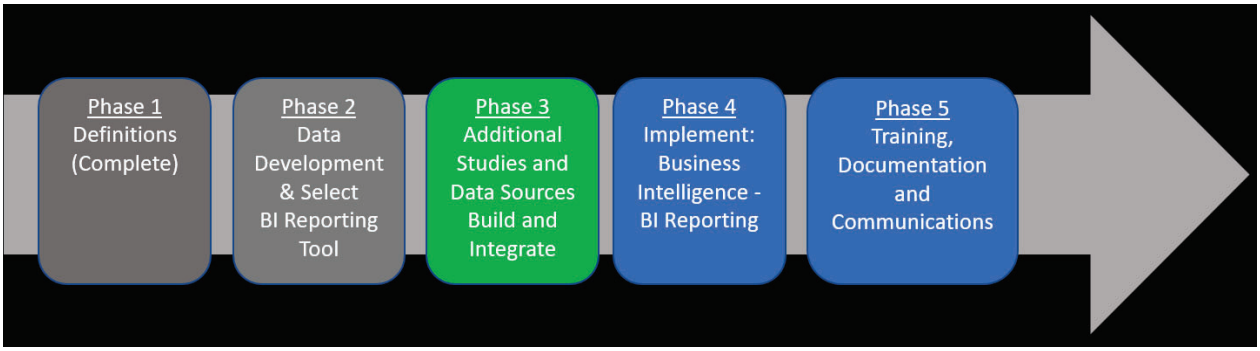


Figure 5-5 Phase 3 Roadmap

Phase 3 includes developing studies identified in Phase 1, then integrating the additional data into the Business Intelligence Platform. An example of a study phase task might be geomorphological assessments of the City's streams to inform stream health metrics.

- The complete list identified in Phase 1 is detailed in Section 3.4.
- Some metrics may require additional data import work, that has not yet been identified, such as government data for water quality compliance and standards.

5.4 Phase 4 – Implement: Business Intelligence - BI Reporting

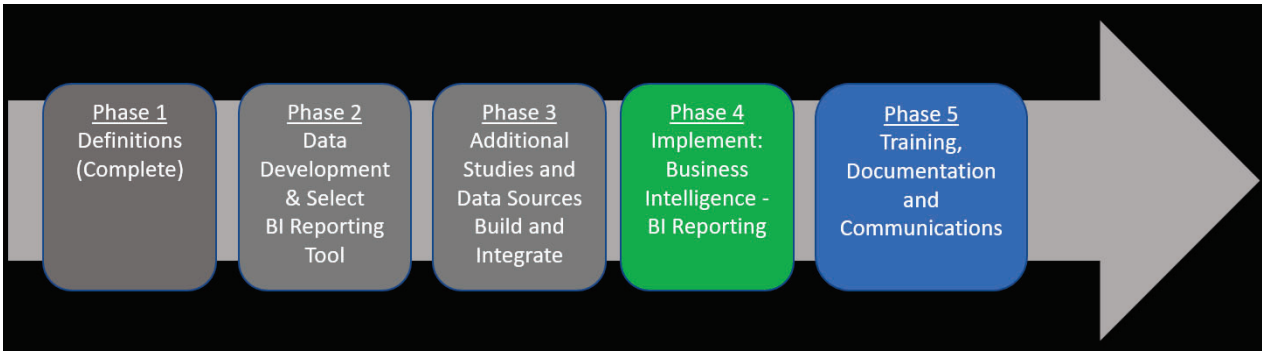


Figure 5-6 Phase 4 Roadmap

This phase relies on the KPI's developed in the Definition Phase to construct and deliver digital dashboards. This task will be highly coordinated with the City's staff to provide at-a-glance dashboards which provide immediate information needed to determine financial overviews, where capital investment is needed, where operations and maintenance can be optimized, and reports which can be used in capital improvement plan documents. The deliverables for this task will be Business Intelligence Dashboards Reporting.

5.4.1 Implement BI Tools Dataflows/ETL

A data sources assessment will be performed which builds out the data catalog and identifies the various data sources. Next steps would be to start planning for the interconnectivity of the different data sources within the Business Intelligence Platform. Priority data sources are identified as coming from Central Square EAM.

5.4.2 Develop Business Intelligence Dashboards

Business Intelligence dashboards will be used to visualize and report the KPIs previously identified. Once the dataflows or data warehouse is running in a production capacity, the City and Black & Veatch will build mockups from previous requirements sessions, and draft dashboards with visuals highlighting those KPI's. Black & Veatch will conduct regular meetings (with associated tasks outlined below) with stakeholders and incorporate their feedback into the solutions following each meeting. During BI Dashboard Development BV will:

- Facilitate Dashboard Requirements Sessions utilizing Mural, an example of which is shown in Figure 5-7, for real time collaboration focused on understanding what will provide maximum positive impact to the City:
    - Identify the **purpose** of the dashboards, including the business problems or questions that the dashboards will be designed to address, as well as the **"user personas"** that will be using the dashboard.
    - Who is going to use the dashboard?
    - What are they trying to achieve and why?
    - How will it fit into their daily work, management, and decision-making?

- What would a successful dashboard mean to the users?
- Discuss conceptual dashboard layouts and functional requirements, including the types of visualizations which will be used, the layout, and look/feel.

- Draft 30% Wireframe Dashboards (Incorporating previous Mural collaboration sessions and KPI Requirements documents)
- Develop 60% Dashboards – including updates from previous meeting
- Finalize 90% Dashboards – with all updates within scope of project

Figure 5-7 Mural Collaboration Example

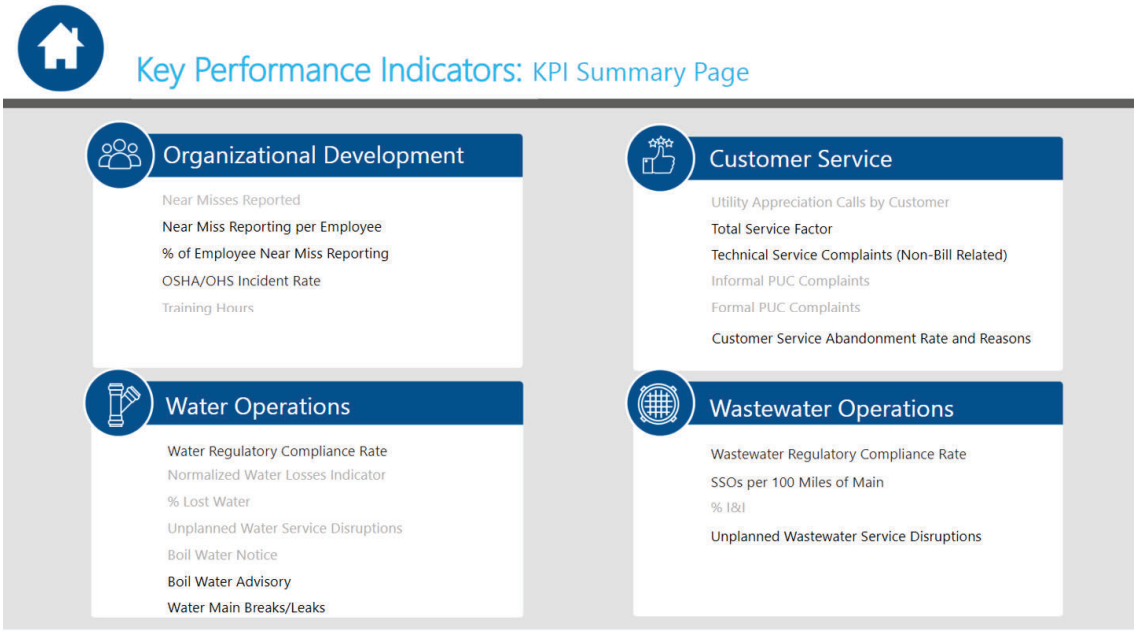


Figure 5-8 KPI Dashboard Landing Page Example

Figure 5-9 Water Regulatory Compliance Rate Example

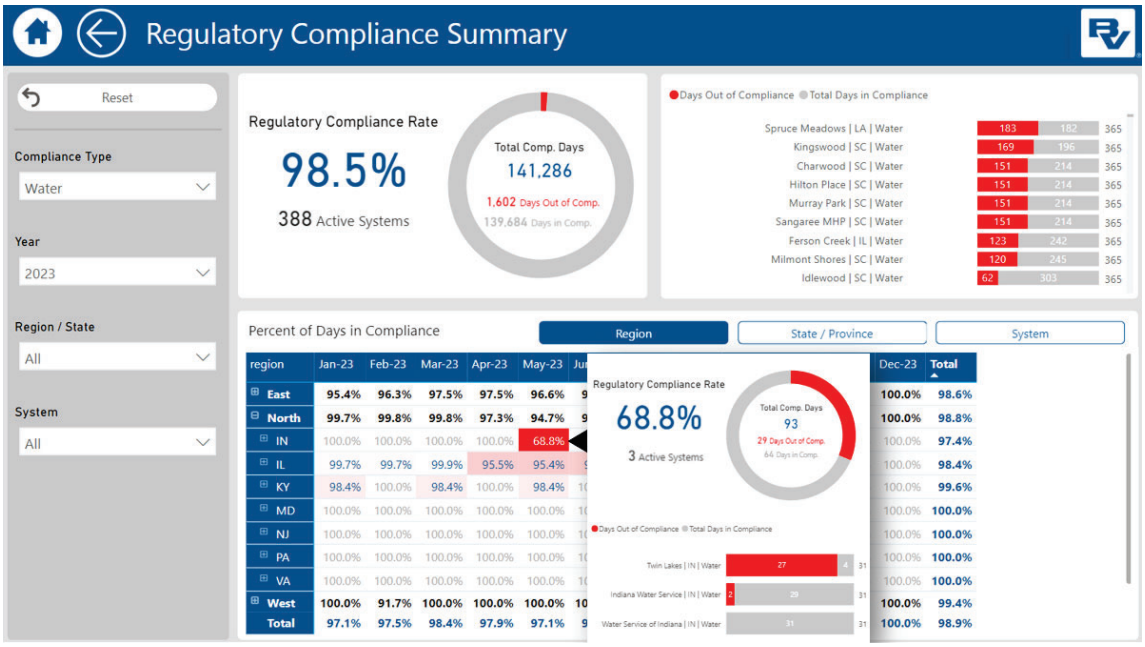


Figure 5-10 Regulatory Compliance Example

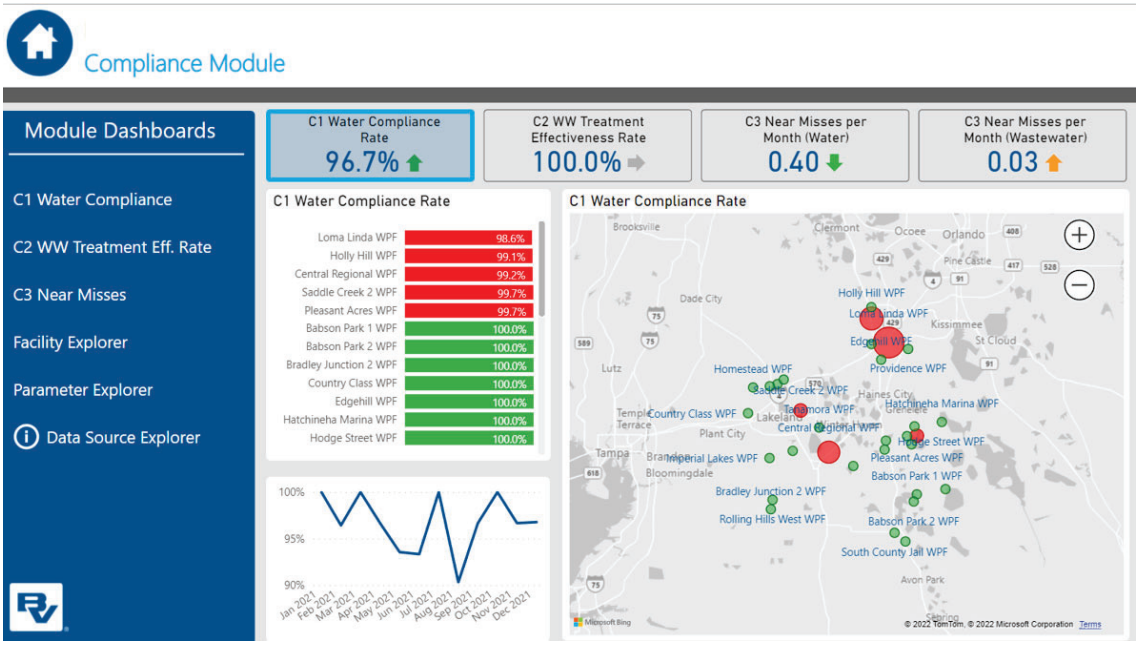


Figure 5-11 Compliance Module Example

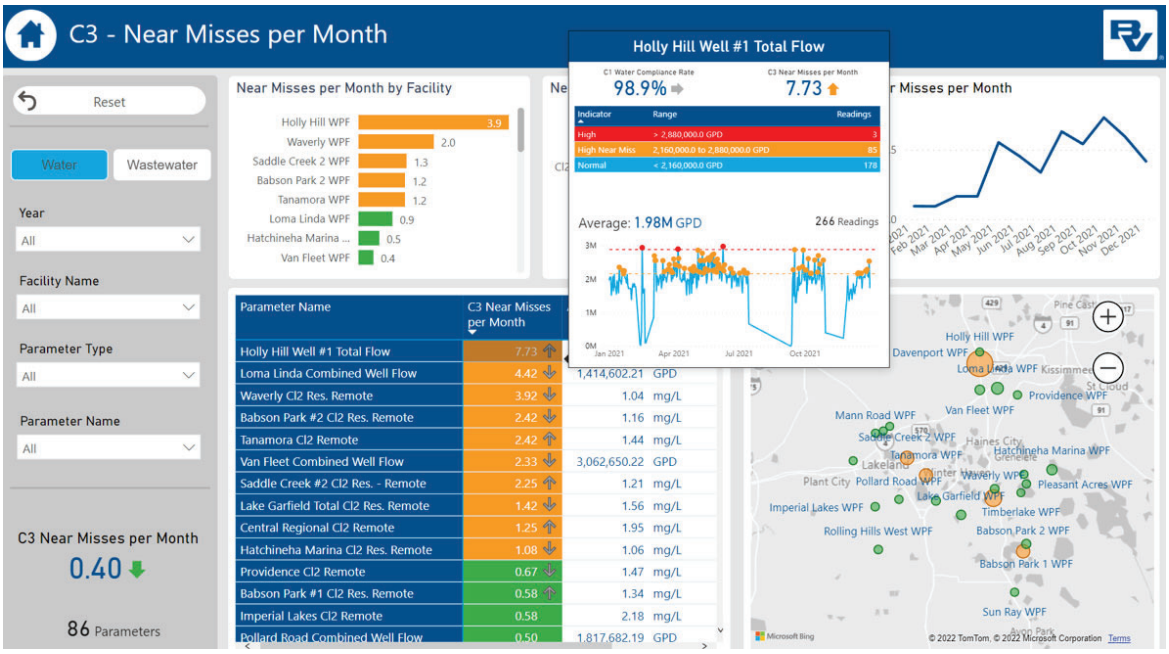


Figure 5-12 Compliance Module Detail Example

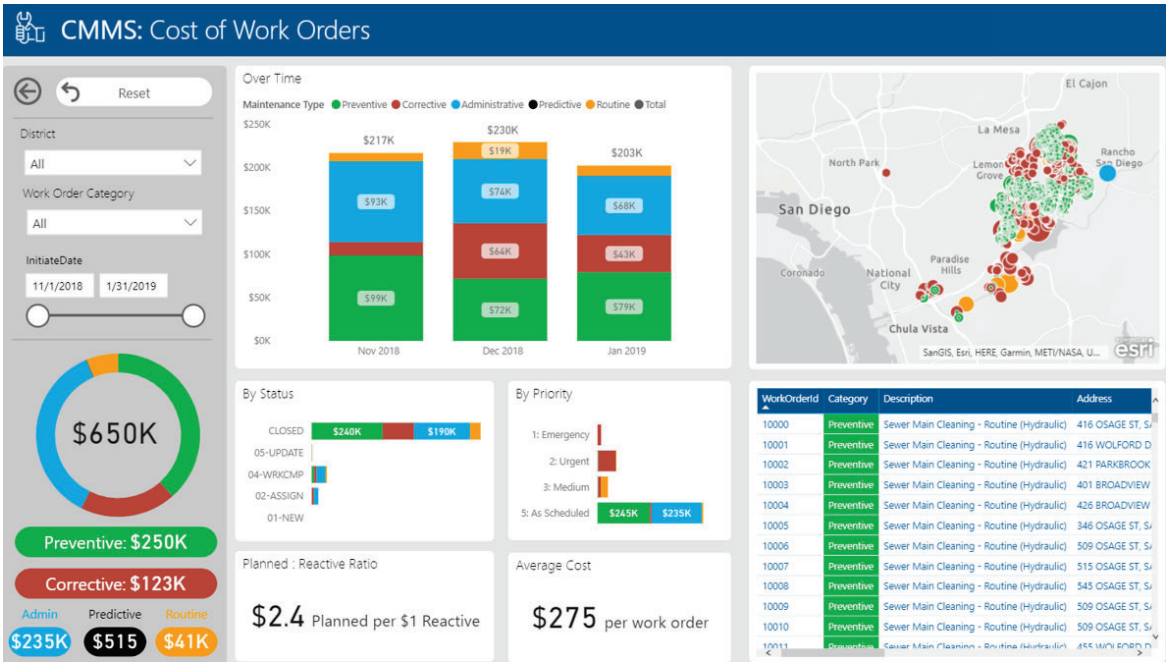


Figure 5-13 CMMS: Cost of Work Order Example

5.4.3 Publish BI Reporting

Black & Veatch will publish all final dashboards based on a promoted or validated dataset. The City will be able to realize the benefits of the Business Intelligence Platform across the organization, such as: deeper analytics & insights, self-serve reporting, recurring regulatory reporting, rapid decision making & actions, increased efficiency, and simplifying the user experience via audience control. Black & Veatch will assist with setting permissions at the audience/user control level as appropriate and applicable. Audience control will allow each user to only see applicable dashboards, increasing efficiency and clarity.

Promoted Dataset
Promotion enables users to highlight content that they think is valuable, worthwhile, and ready for others to use. It encourages the collaborative spread of content within the organization.

Validated Dataset
sample dataset used for evaluation while tuning model.

5.5 Phase 5 – Training, Documentation, and Communications

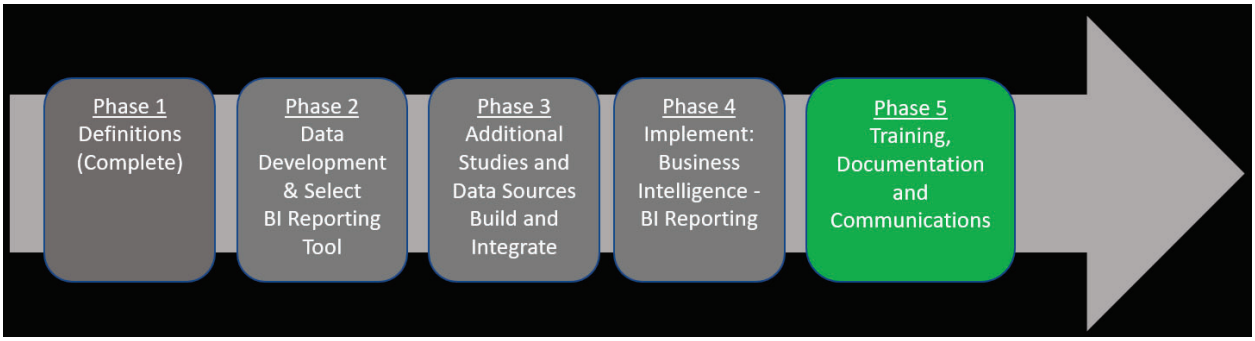


Figure 5-14 Phase 5 Roadmap

This final phase would provide documentation for all data, processes and also in-person or virtual trainings to dashboard users.

- Build all documentation around data sources, data flows, ETL and Power BI reporting.
- Schedule and hold training sessions for all users.

6.0 Early Implementation Scenario with Power BI (Optional)

The advantage of utilizing an Early Implementation Scenario with Power BI is that the City would be able to rapidly develop proof-of-concept dashboards to showcase progress to leadership, which can lead to further support for best practice data warehouse development.

Included in the Microsoft Power BI Service are dataflows, a collection of tables that are created and managed in workspaces in the Microsoft Power BI Service. Dataflows can securely access data source systems through an automated process. Dataflow tables are a set of columns that are used to store data, much like a table within a database. These dataflows can be programmed to securely connect to the City's enterprise data sources, query the correct tables, and replicate the underlying data without a server or virtual machine. Within a dataflow, owners can transform the tables and create data refresh schedules directly from the workspace in which the dataflow was created. These cloud-based entities can be logically grouped into datamarts to address specific business areas/questions (e.g. asset management or water quality) and can be reused across many dashboarding or analytic solutions.

Datamart
Logical Grouping of Data flows.

In this scenario, Power BI dataflows would be connected directly to the priority sources. This will enable the next steps of dataset profiling, initial cleansing of the data, transformation efforts, and building the loading, staging tables, fact, and dimension tables – ostensibly an ad-hoc temporary data warehouse.

The work performed in this optional scenario can be reused later, as dataflows can be translated into new SQL queries to normalize and transform the raw data. Further, the scenario starts the efforts of building a dimensional model for the eventual data warehouse. The Microsoft Power BI Service can be designated as a temporary location for accessing enterprise data, available for new ad hoc reporting and new dashboarding development.

Following development of the ad-hoc data warehouse using Power BI dataflows, Power BI dashboards can be rapidly developed and iterated and provide immediate benefit to the City.

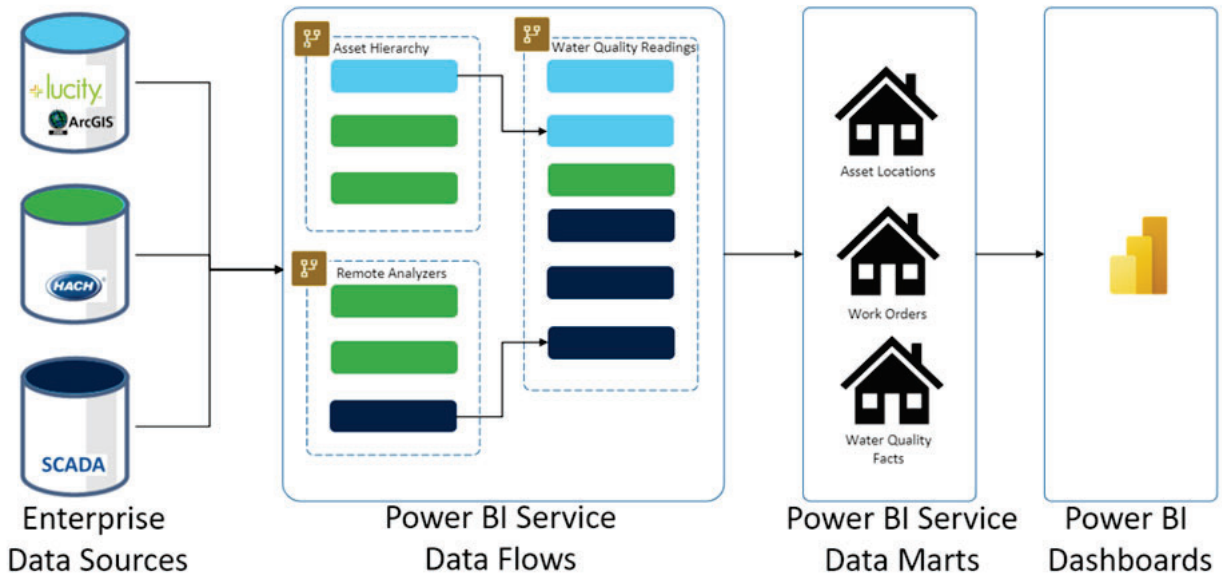
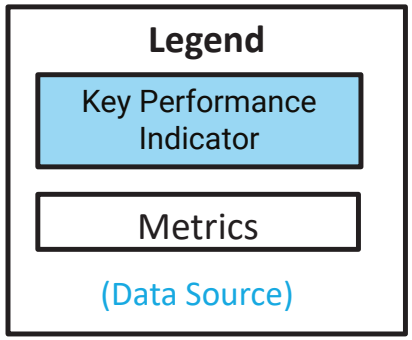


Figure 6-1 Early Implementation Scenario

Appendix A. KPI Flowcharts

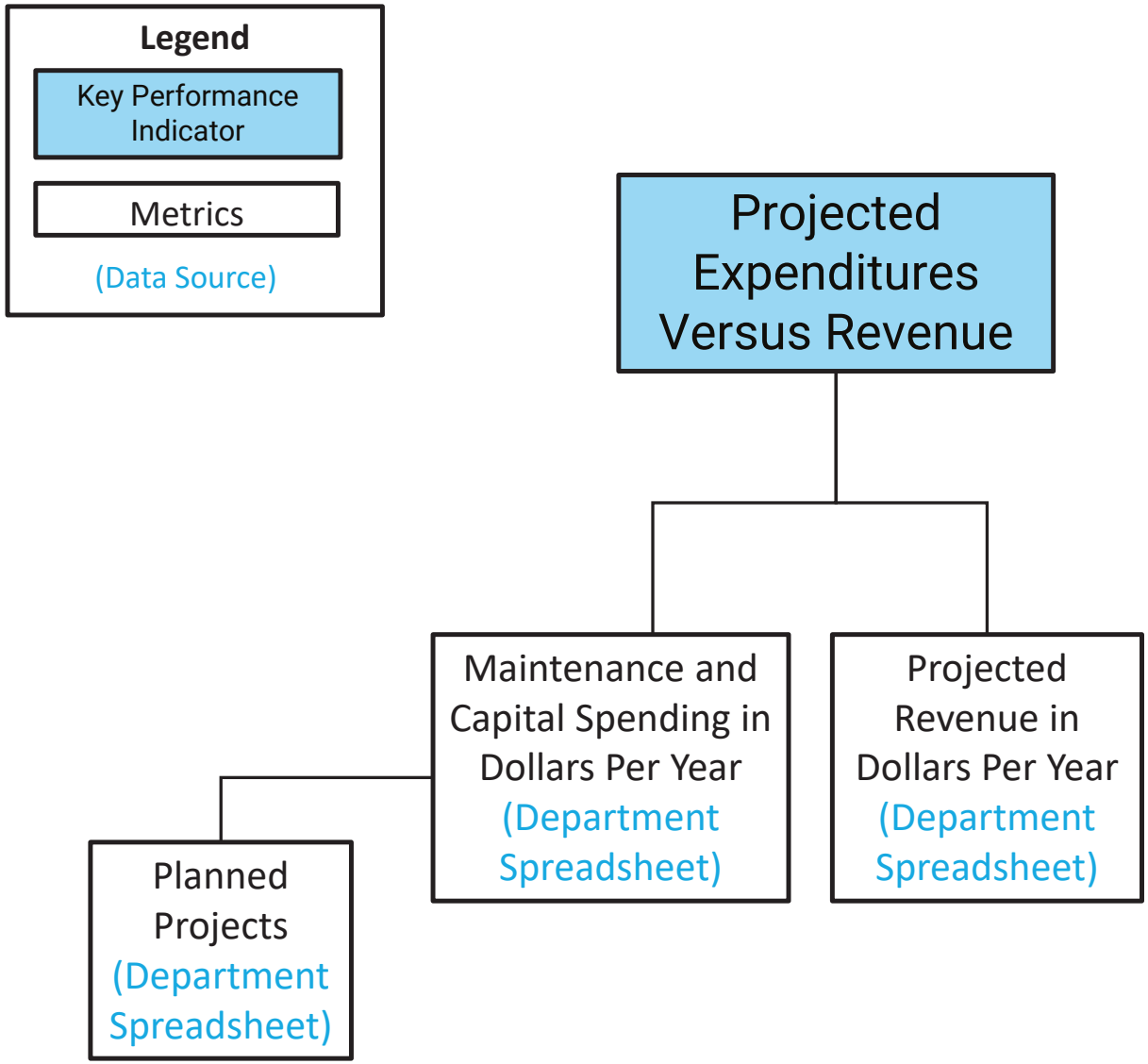


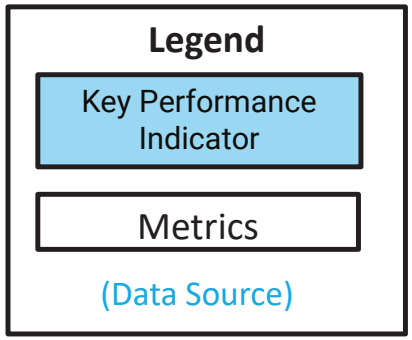
Projected Expenditures Versus Revenue

Definition:
For current and out years, compare project revenue to needs (maintenance and capital)

Measured in:
Dollars

Desired Action(s):
Quantify future needs through 5 years CIP planning
Proactively address any funding gaps


Legend
Key Performance Indicator
Metrics
(Data Source)
Projected Expenditures Versus Revenue
Maintenance and Capital Spending in Dollars Per Year (Department Spreadsheet)
Projected Revenue in Dollars Per Year (Department Spreadsheet)
Planned Projects (Department Spreadsheet)

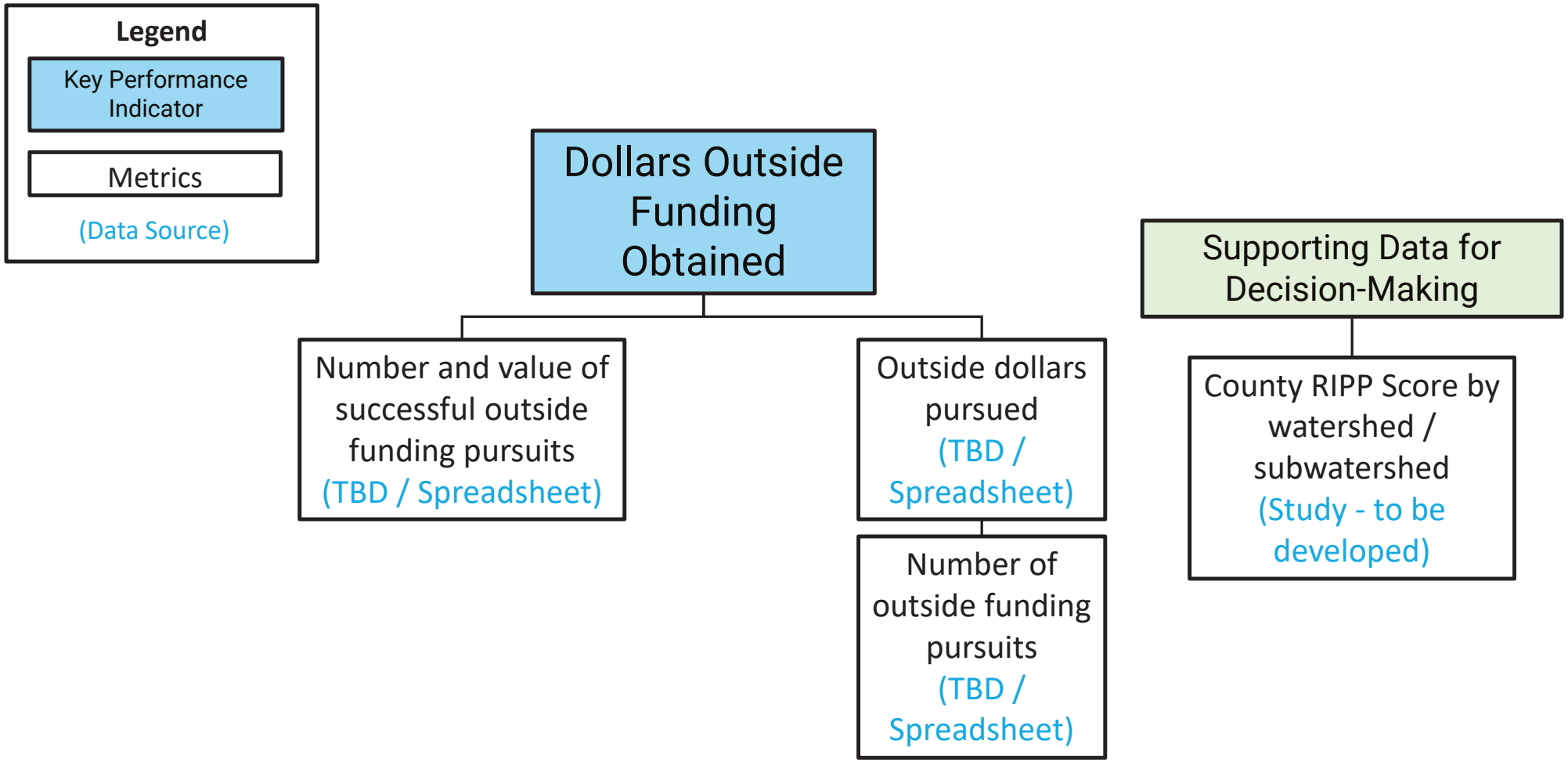


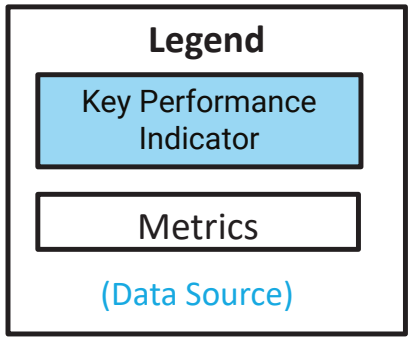
Dollars Outside Funding Obtained

Definition:
For past and future years, measure dollars used for Lenexa projects obtained from outside sources

Measured in:
Dollars

Desired Action(s):
Quantify past successes obtaining outside funding
Pursue outside funding for identified funding gaps


Legend
Key Performance Indicator
Metrics
(Data Source)
Dollars Outside Funding Obtained
Number and value of successful outside funding pursuits (TBD / Spreadsheet)
Outside dollars pursued (TBD / Spreadsheet)
Number of outside funding pursuits (TBD / Spreadsheet)
Supporting Data for Decision-Making
County RIPP Score by watershed / subwatershed (Study - to be developed)

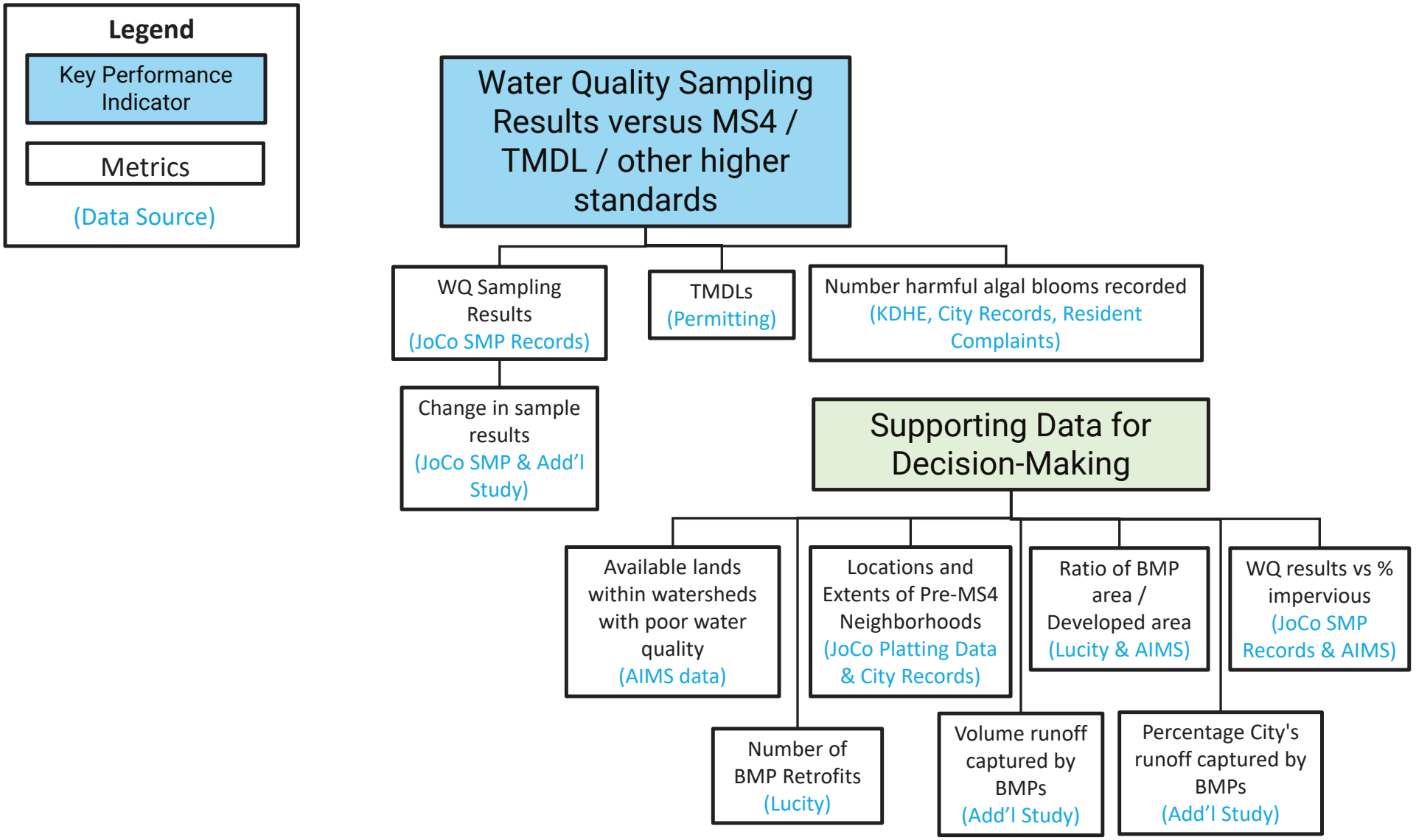


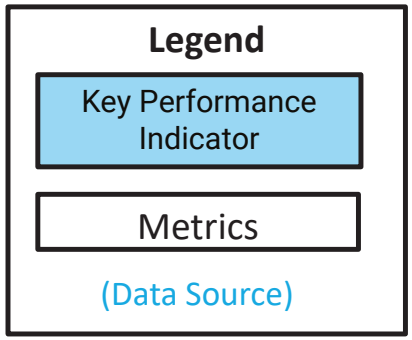
Water Quality Sampling Results versus MS4 / TMDL / other higher standards

Definition:
Report the results of water quality sampling within Lenexa's waterbodies

Measured in:
Pollutant concentrations

Desired Action(s):
Reduce pollutants in the City's waterways
Identify need for additional sampling


Legend
Key Performance Indicator
Metrics
(Data Source)
Water Quality Sampling Results versus MS4 / TMDL / other higher standards
WQ Sampling Results (JoCo SMP Records)
TMDLs (Permitting)
Number harmful algal blooms recorded (KDHE, City Records, Resident Complaints)
Change in sample results (JoCo SMP & Add'l Study)
Supporting Data for Decision-Making
Available lands within watersheds with poor water quality (AIMS data)
Locations and Extents of Pre-MS4 Neighborhoods (JoCo Platting Data & City Records)
Ratio of BMP area / Developed area (Lucity & AIMS)
WQ results vs % impervious (JoCo SMP Records & AIMS)
Number of BMP Retrofits (Lucity)
Volume runoff captured by BMPs (Add'l Study)
Percentage City's runoff captured by BMPs (Add'l Study)



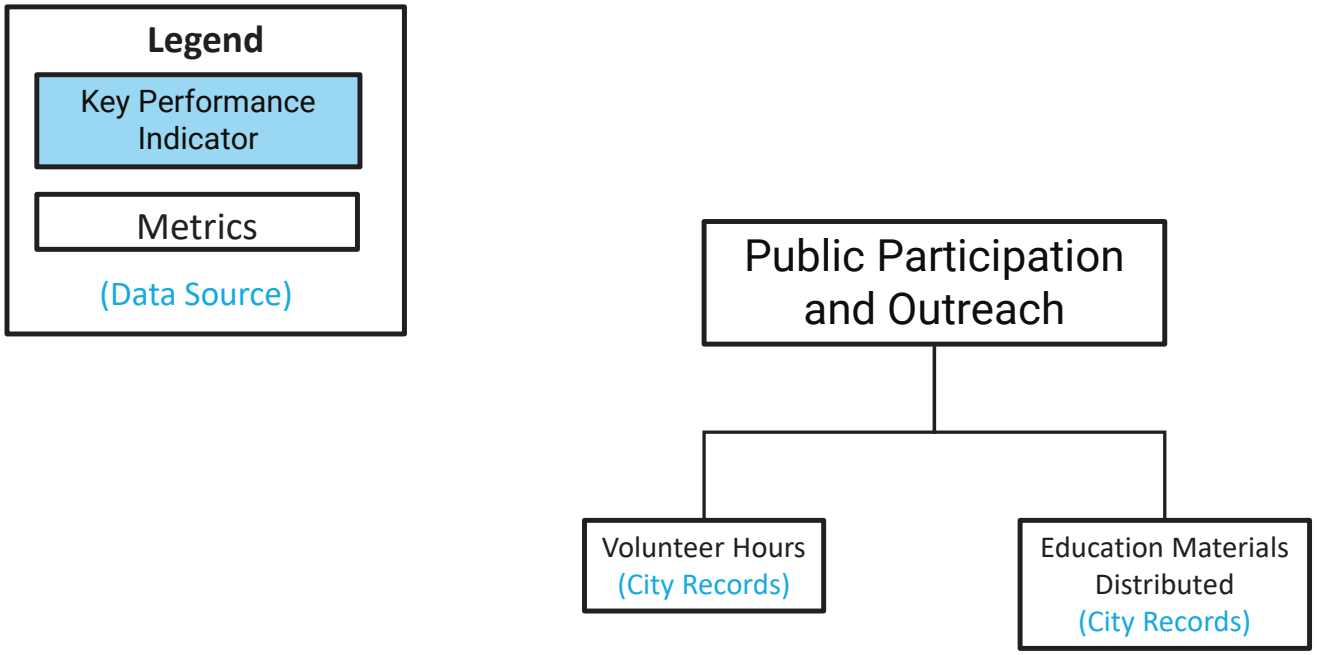
Total Points

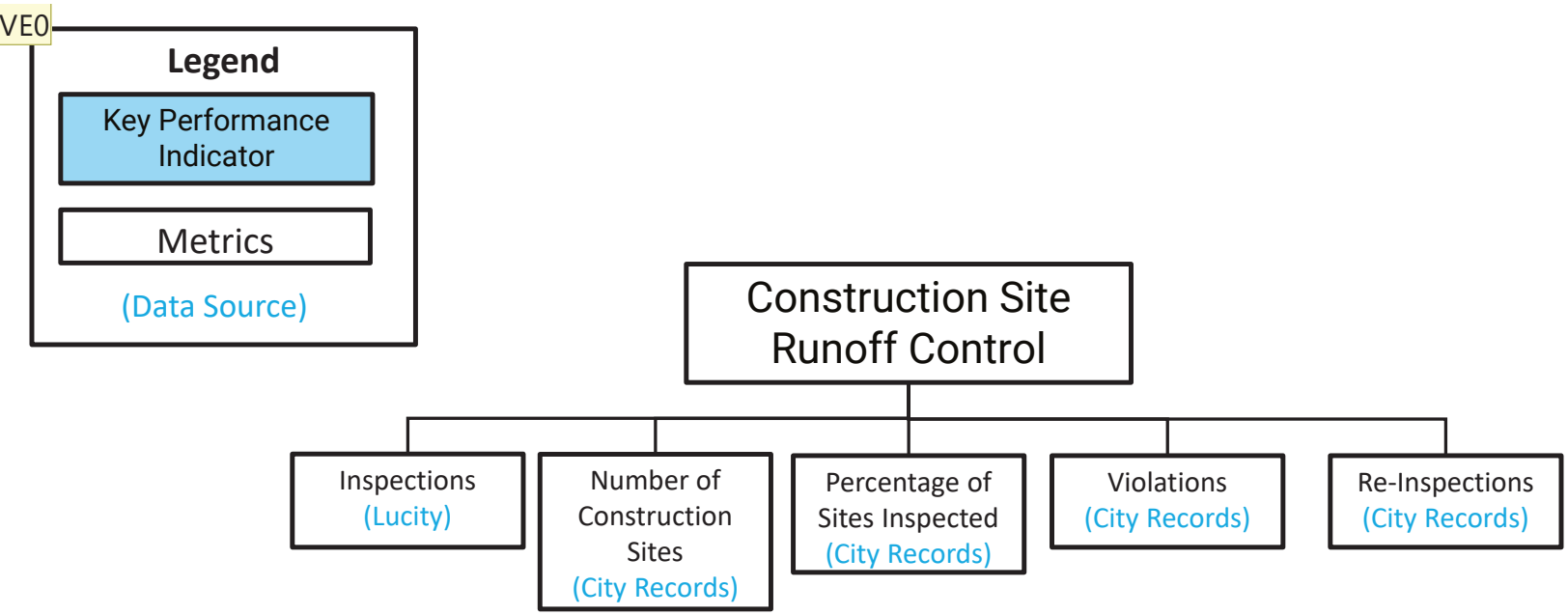
Definition:
Support MS4 compliance by summarizing activities into points required by permit

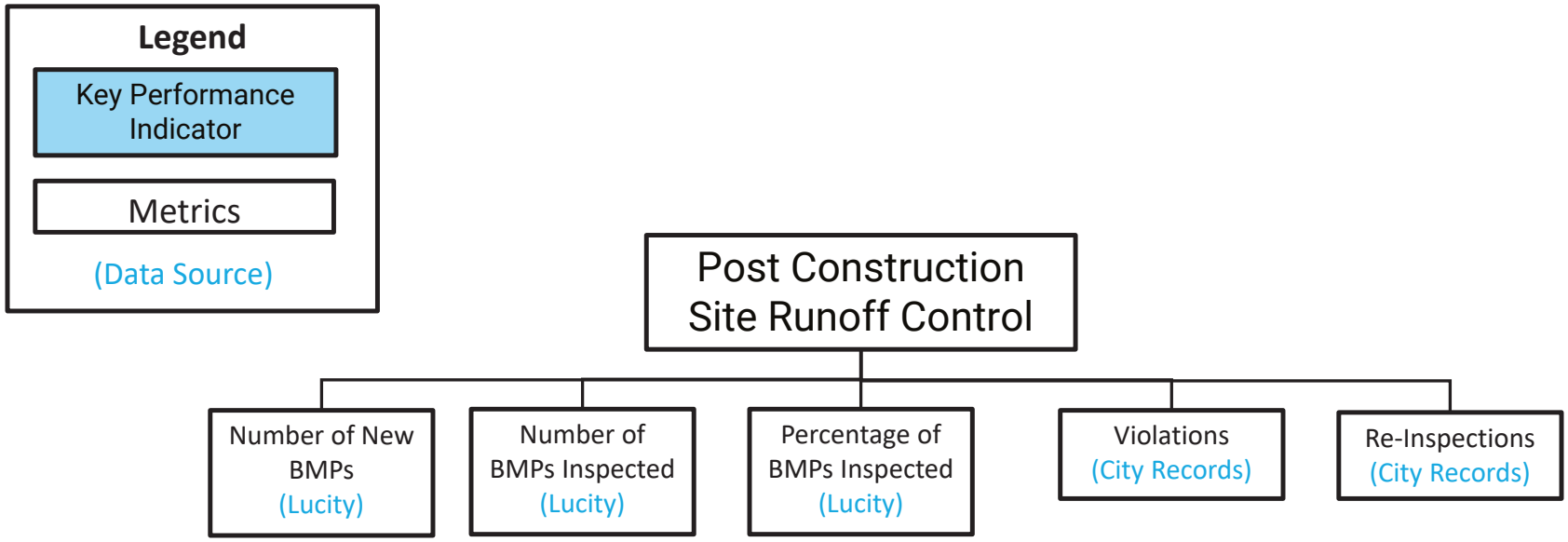
Measured in:
Points

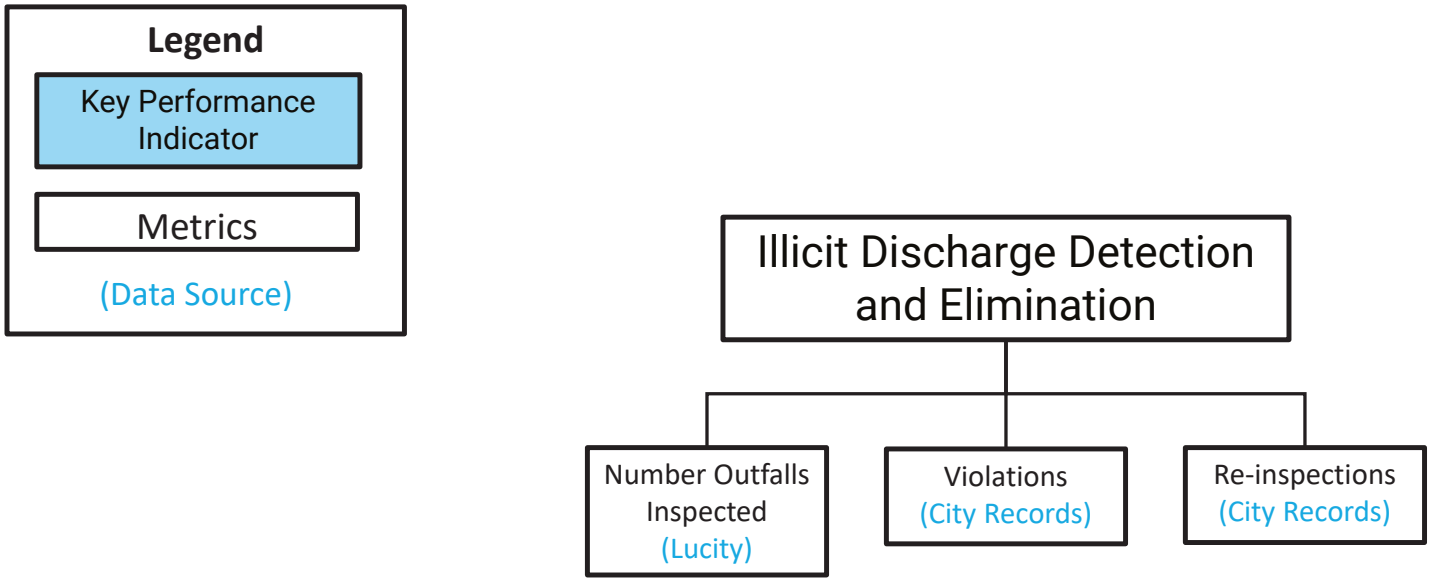
Desired Action(s):
Proactive and streamlined MS4 compliance planning and documentation

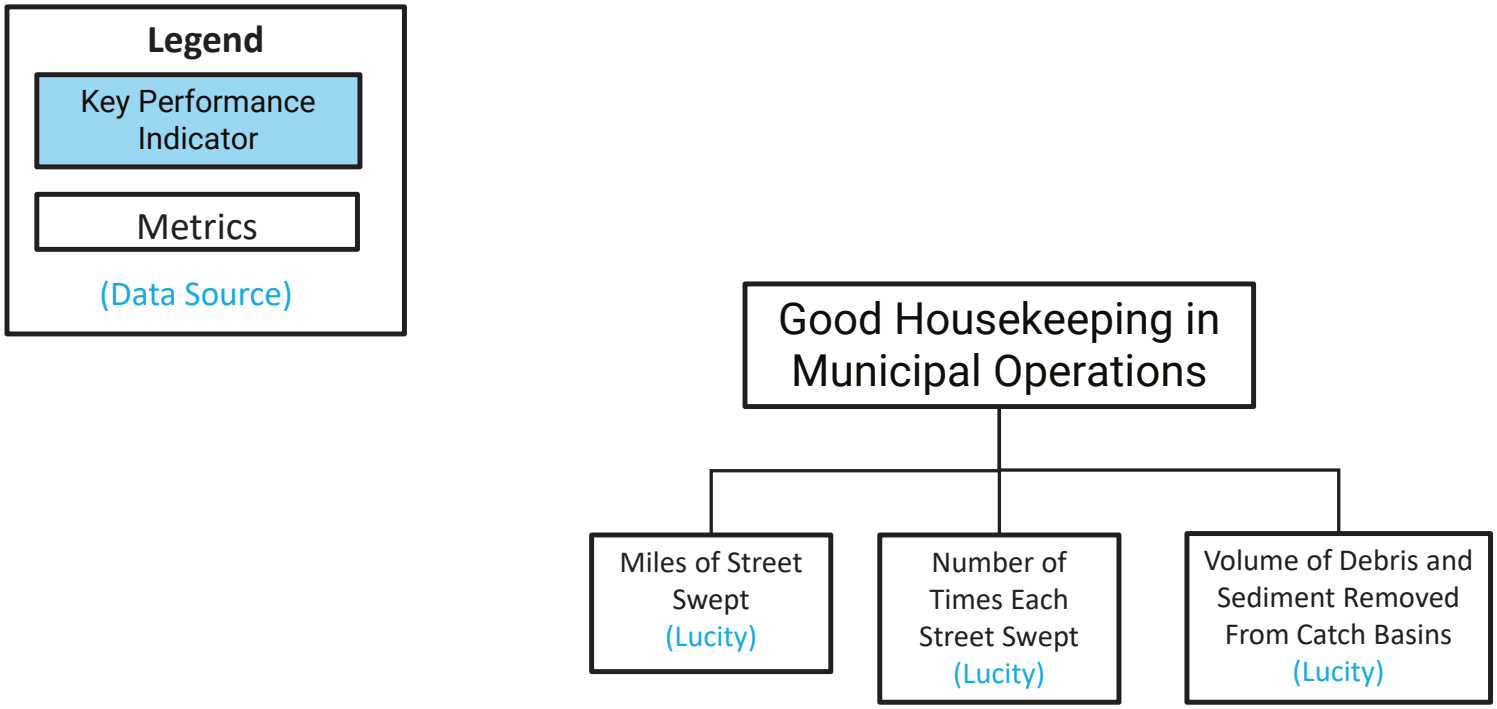
Set triggers to track completed yearly requirements.

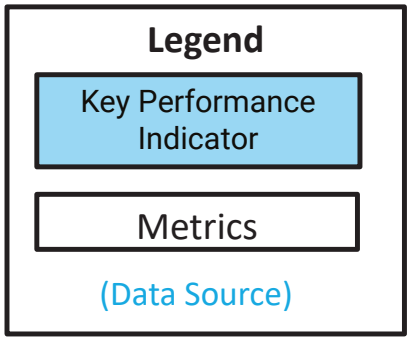

Legend
Key Performance Indicator
Metrics
(Data Source)
Public Participation and Outreach
Volunteer Hours
(City Records)
Education Materials Distributed
(City Records)


VE0
Legend
Key Performance Indicator
Metrics
(Data Source)
Construction Site Runoff Control
Inspections (Lucity)
Number of Construction Sites (City Records)
Percentage of Sites Inspected (City Records)
Violations (City Records)
Re-Inspections (City Records)


Legend
Key Performance Indicator
Metrics
(Data Source)
Post Construction Site Runoff Control
Number of New BMPs (Lucity)
Number of BMPs Inspected (Lucity)
Percentage of BMPs Inspected (Lucity)
Violations (City Records)
Re-Inspections (City Records)


Legend
Key Performance Indicator
Metrics
(Data Source)
Illicit Discharge Detection and Elimination
Number Outfalls Inspected
(Lucity)
Violations
(City Records)
Re-inspections
(City Records)


Legend
Key Performance Indicator
Metrics
(Data Source)
Good Housekeeping in Municipal Operations
Miles of Street Swept
(Lucity)
Number of Times Each Street Swept
(Lucity)
Volume of Debris and Sediment Removed From Catch Basins
(Lucity)

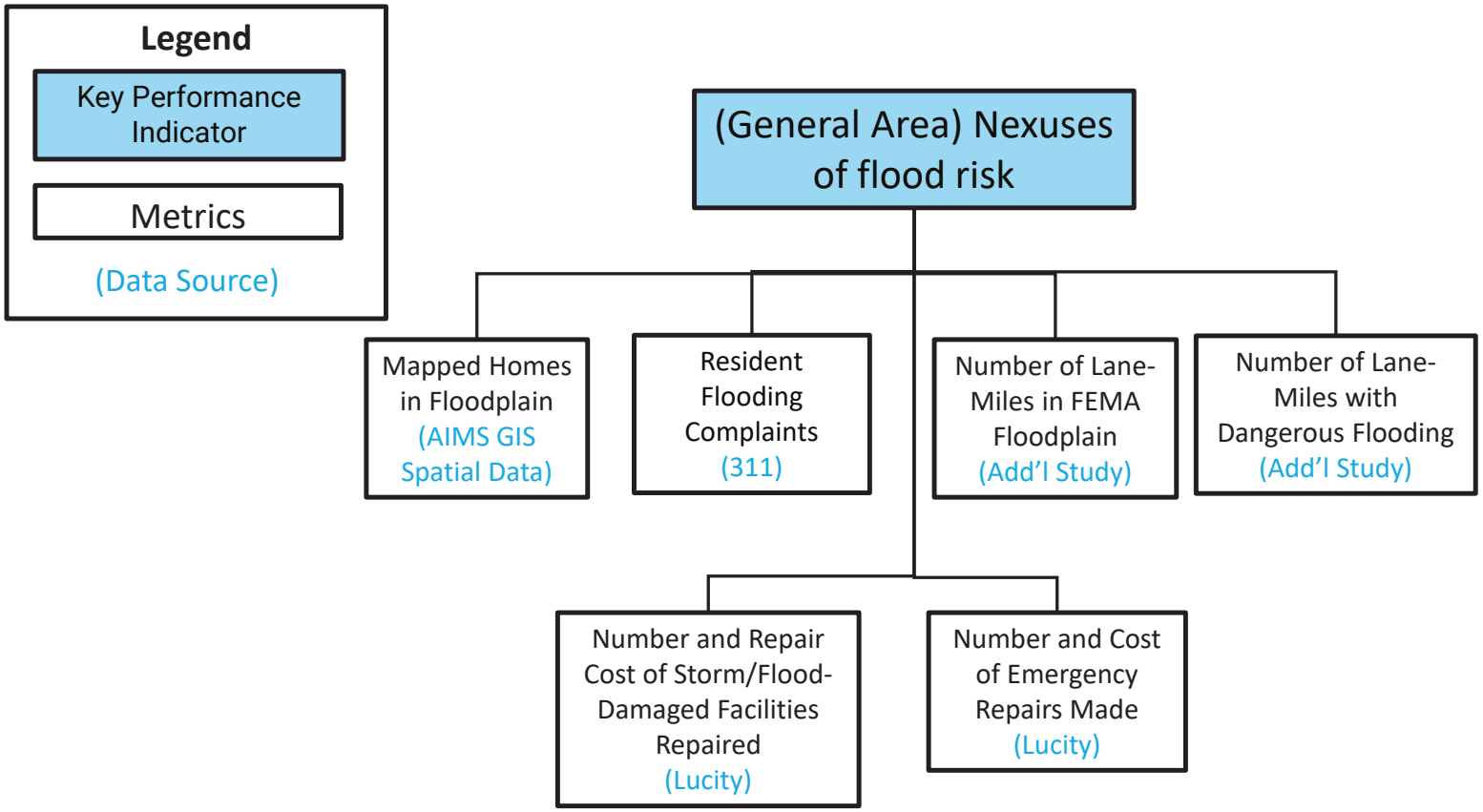


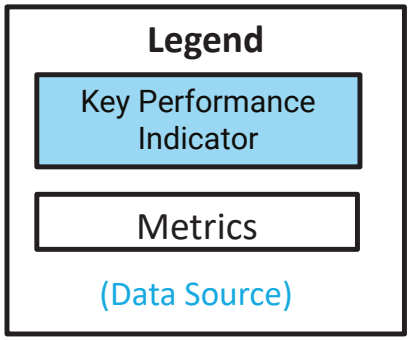
(General Area) Nexuses of flood risk

Definition:
Quantified areas of flood risk

Measured in:
Areas (ArcGIS polygons)

Desired Action(s):
Target improvements to reduce flood risk


Legend
Key Performance Indicator
Metrics
(Data Source)
(General Area) Nexuses of flood risk
Mapped Homes in Floodplain (AIMS GIS Spatial Data)
Resident Flooding Complaints (311)
Number of Lane-Miles in FEMA Floodplain (Add'l Study)
Number of Lane-Miles with Dangerous Flooding (Add'l Study)
Number and Repair Cost of Storm/Flood-Damaged Facilities Repaired (Lucity)
Number and Cost of Emergency Repairs Made (Lucity)

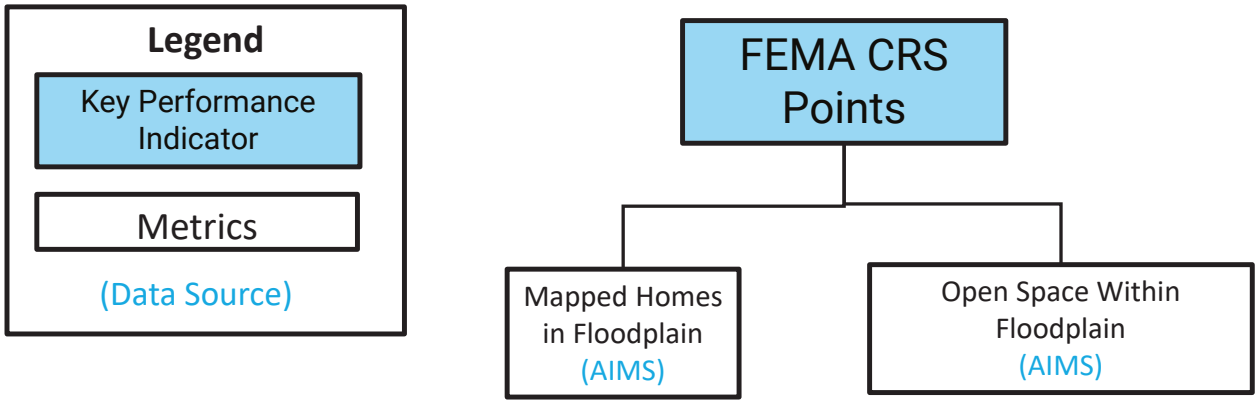


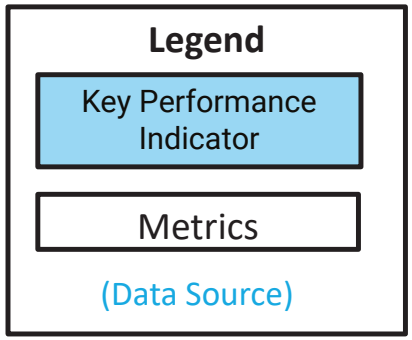
FEMA CRS Points

Definition:
Quantify CRS points by category

Measured in:
Points

Desired Action(s):
Increase CRS activities and points


Legend
Key Performance Indicator
Metrics
(Data Source)
FEMA CRS Points
Mapped Homes in Floodplain
(AIMS)
Open Space Within Floodplain
(AIMS)

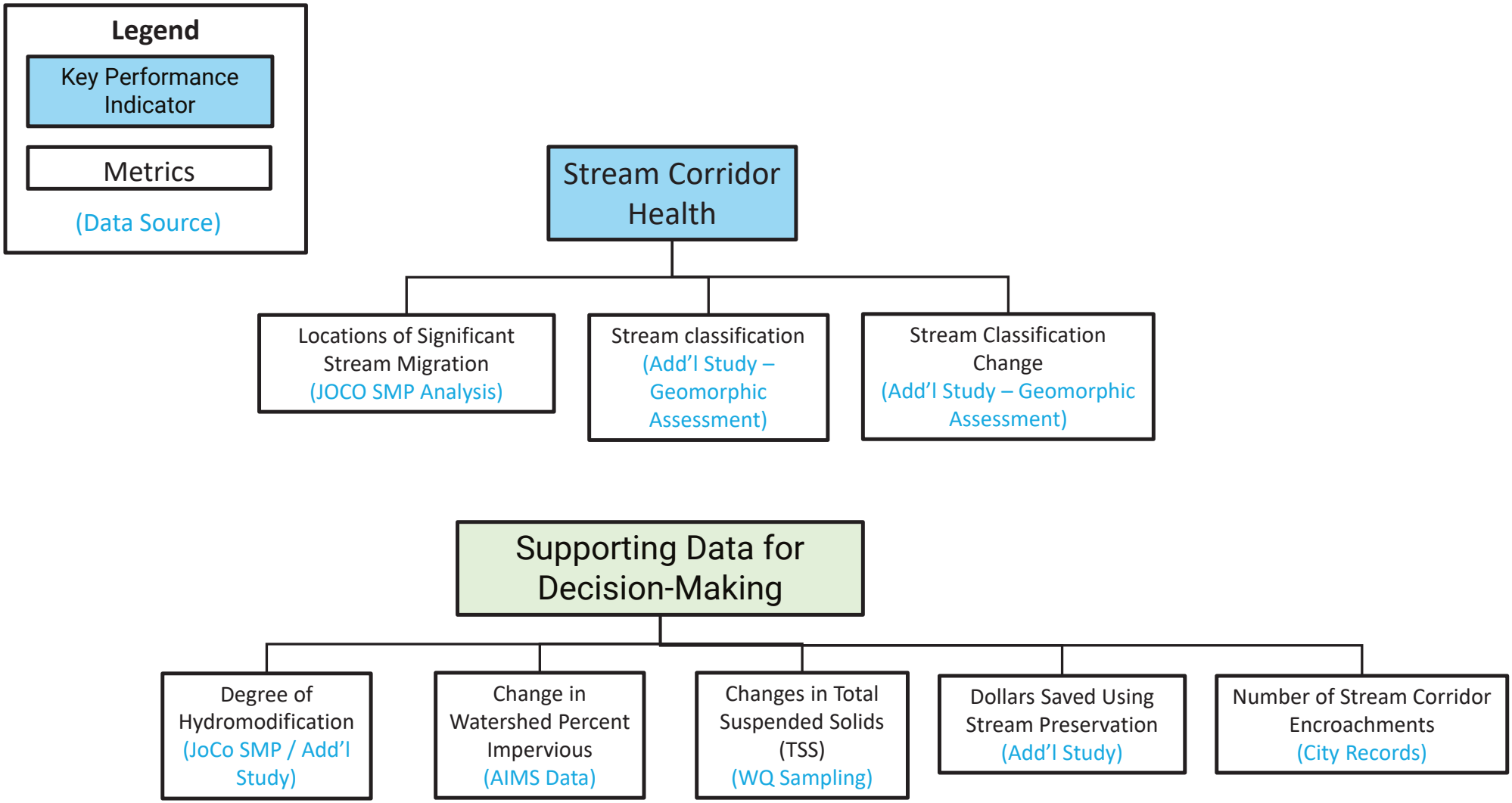


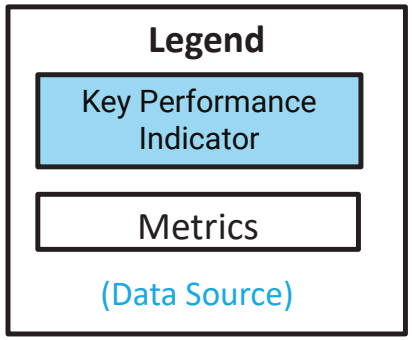
Stream Corridor Health

Definition:
Measurement of stream health

Measured in:
Stream Types

Desired Action(s):
Protect health streams
Improve the health of degraded streams


Legend
Key Performance Indicator
Metrics
(Data Source)
Stream Corridor Health
Locations of Significant Stream Migration
(JOCO SMP Analysis)
Stream classification
(Add'l Study – Geomorphic Assessment)
Stream Classification Change
(Add'l Study – Geomorphic Assessment)
Supporting Data for Decision-Making
Degree of Hydromodification
(JoCo SMP / Add'l Study)
Change in Watershed Percent Impervious
(AIMS Data)
Changes in Total Suspended Solids (TSS)
(WQ Sampling)
Dollars Saved Using Stream Preservation
(Add'l Study)
Number of Stream Corridor Encroachments
(City Records)

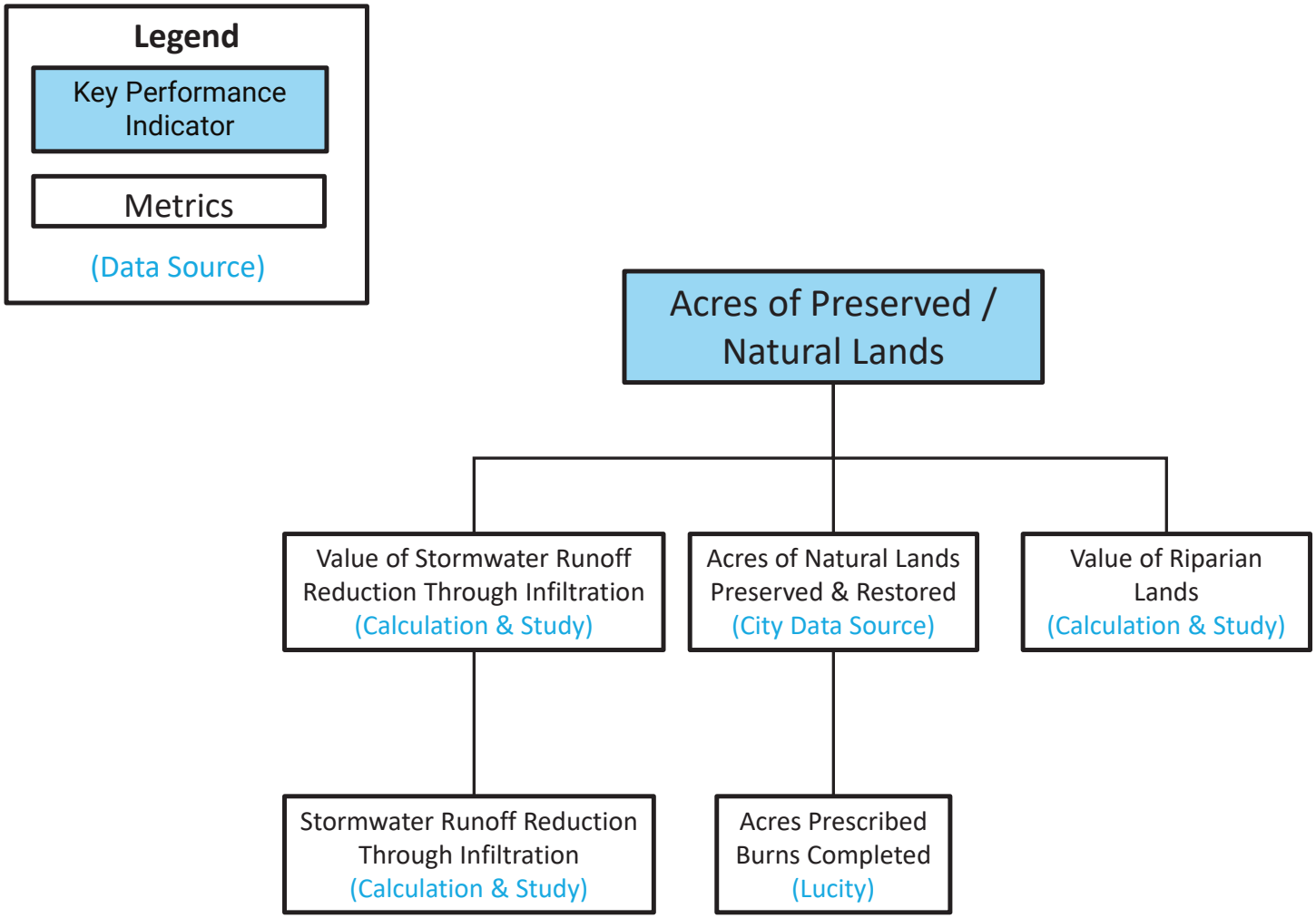


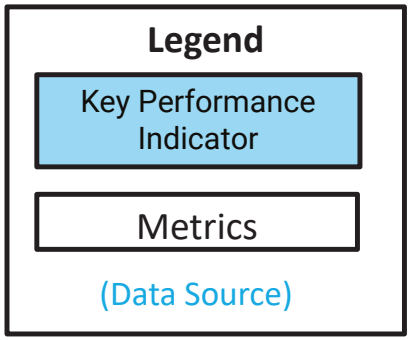
Acres of Preserved / Natural Lands DA0

Definition:
Measurement of natural lands preserved/managed by the City

Measured in:
Acres

Desired Action(s):
Protect native landscapes / continued resident satisfaction associated with native landscapes


Legend
Key Performance Indicator
Metrics
(Data Source)
Acres of Preserved / Natural Lands
Value of Stormwater Runoff Reduction Through Infiltration
(Calculation & Study)
Acres of Natural Lands Preserved & Restored
(City Data Source)
Value of Riparian Lands
(Calculation & Study)
Stormwater Runoff Reduction Through Infiltration
(Calculation & Study)
Acres Prescribed Burns Completed
(Lucity)

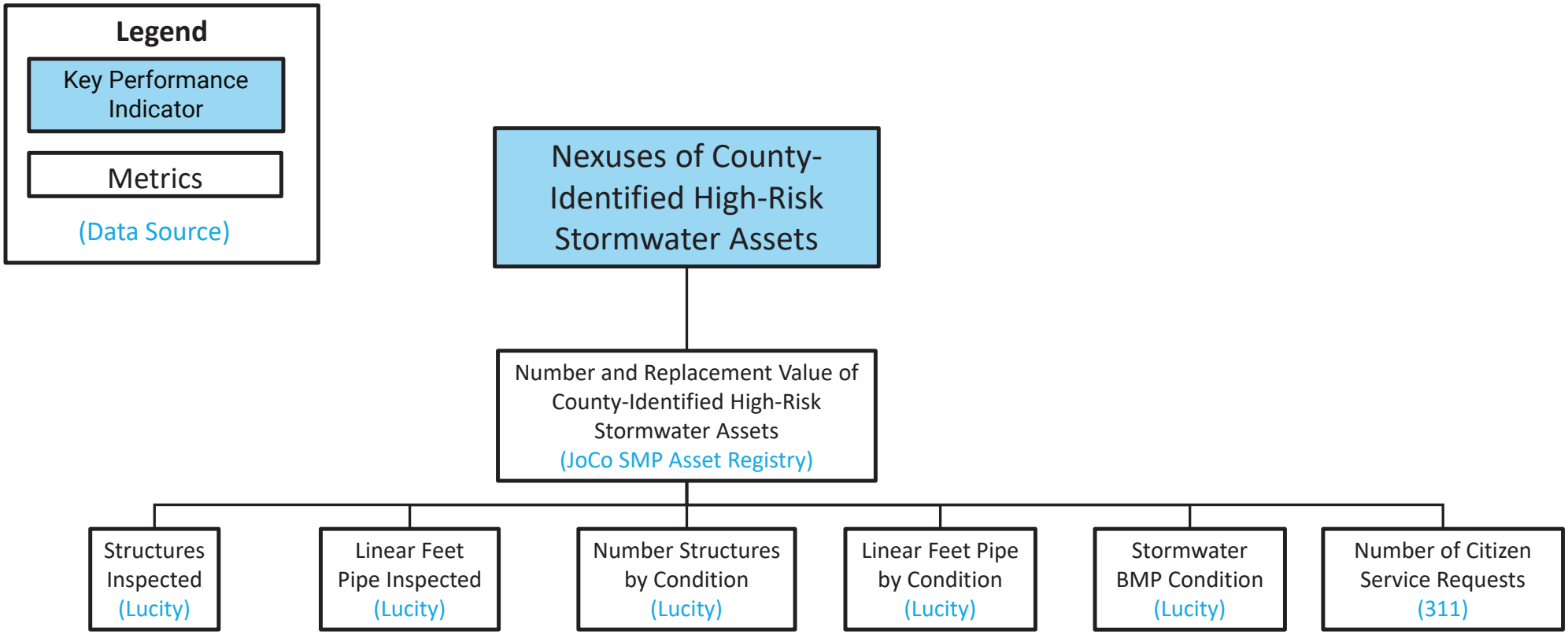


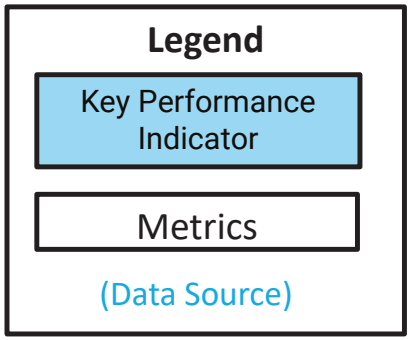
Nexuses of County-Identified High-Risk Stormwater Assets

Definition:
Areas of high risk due to degraded structural integrity of stormwater assets

Measured in:
Risk score (1 through 5)

Desired Action(s):
Invest in replacing high-risk stormwater assets
Develop effective requests for County SMP funding for asset renewal


Legend
Key Performance Indicator
Metrics
(Data Source)
Nexuses of County-Identified High-Risk Stormwater Assets
Number and Replacement Value of County-Identified High-Risk Stormwater Assets
(JoCo SMP Asset Registry)
Structures Inspected
(Lucity)
Linear Feet Pipe Inspected
(Lucity)
Number Structures by Condition
(Lucity)
Linear Feet Pipe by Condition
(Lucity)
Stormwater BMP Condition
(Lucity)
Number of Citizen Service Requests
(311)

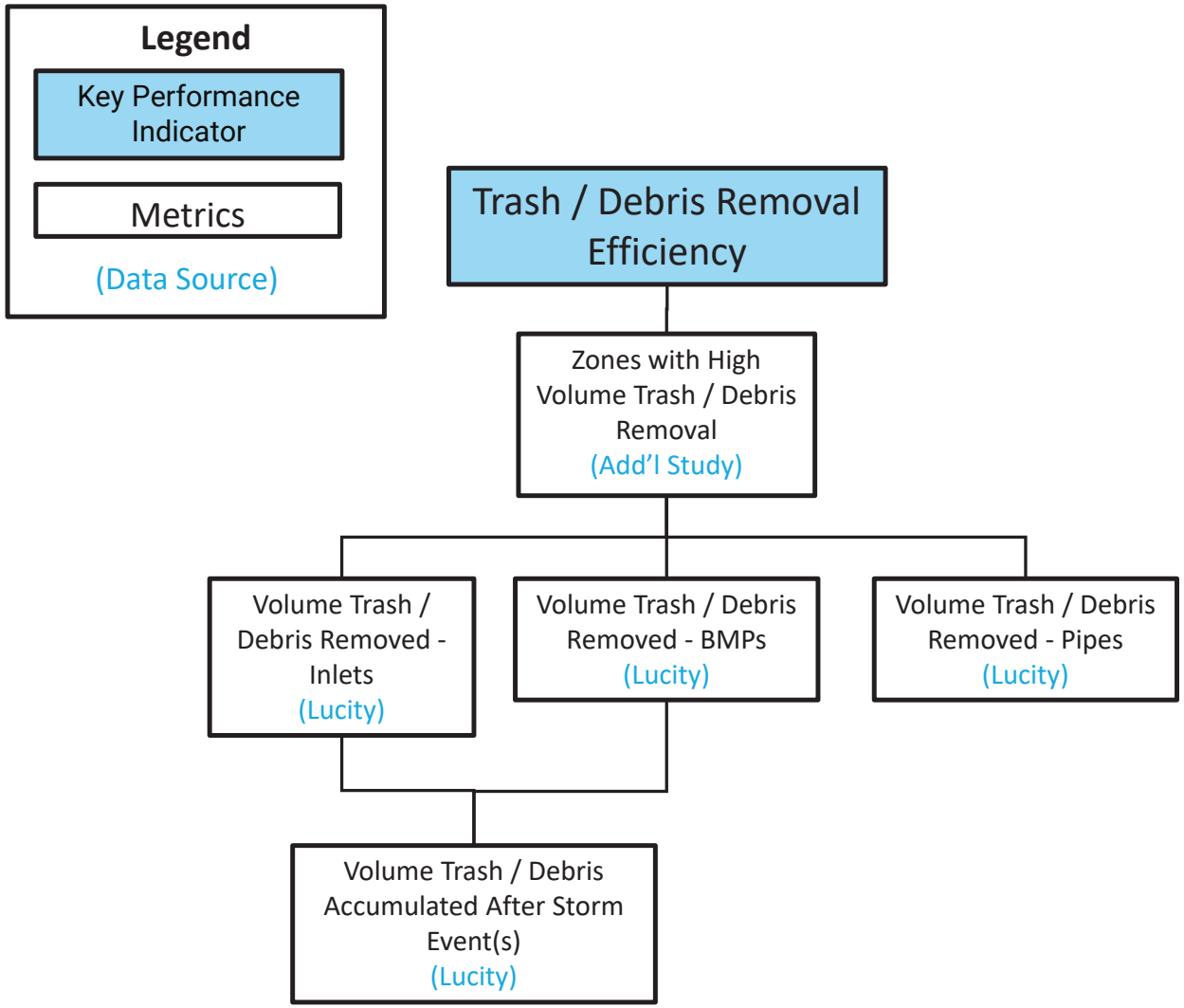


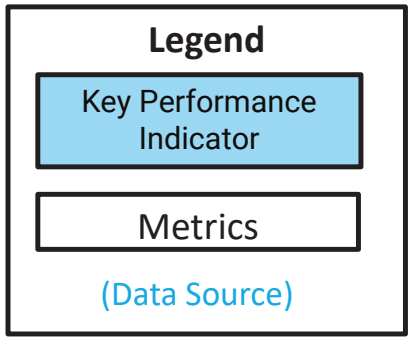
Trash / Debris Removal Efficiency

Definition:
Efficiency in operations to remove trash and debris from the stormwater management system

Measured in:
Dollars per unit volume

Desired Action(s):
Improve overall efficiency relative to stormwater system performance and water quality


Legend
Key Performance Indicator
Metrics
(Data Source)
Trash / Debris Removal Efficiency
Zones with High Volume Trash / Debris Removal
(Add'l Study)
Volume Trash / Debris Removed - Inlets
(Lucity)
Volume Trash / Debris Removed - BMPs
(Lucity)
Volume Trash / Debris Removed - Pipes
(Lucity)
Volume Trash / Debris Accumulated After Storm Event(s)
(Lucity)

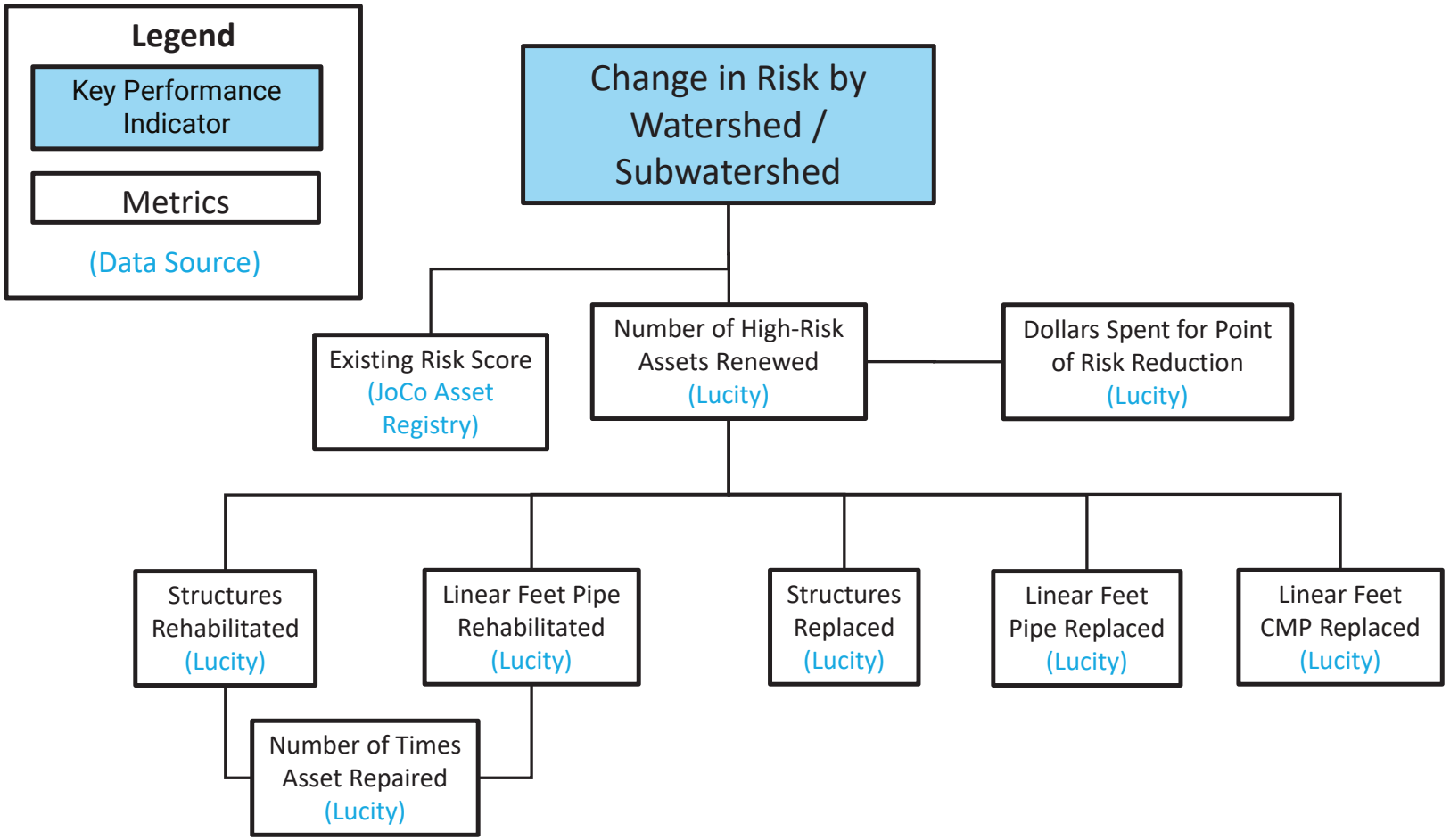


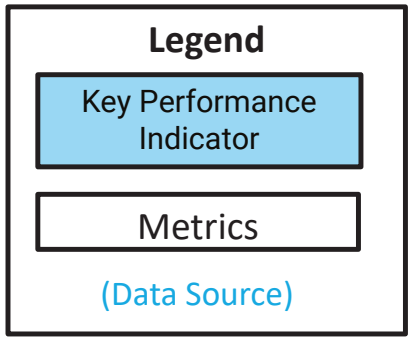
Change in Risk by Watershed / Subwatershed

Definition:
Evaluation of effectiveness of Lenexa investment in asset renewal as gaged by County SMP calculated risk score summarized by watershed and subwatershed

Measured in:
Risk score (1 through 5)

Desired Action(s):
Cost-efficient investment effective to reduce risk


Legend
Key Performance Indicator
Metrics
(Data Source)
Change in Risk by Watershed / Subwatershed
Existing Risk Score (JoCo Asset Registry)
Number of High-Risk Assets Renewed (Lucity)
Dollars Spent for Point of Risk Reduction (Lucity)
Structures Rehabilitated (Lucity)
Linear Feet Pipe Rehabilitated (Lucity)
Structures Replaced (Lucity)
Linear Feet Pipe Replaced (Lucity)
Linear Feet CMP Replaced (Lucity)
Number of Times Asset Repaired (Lucity)

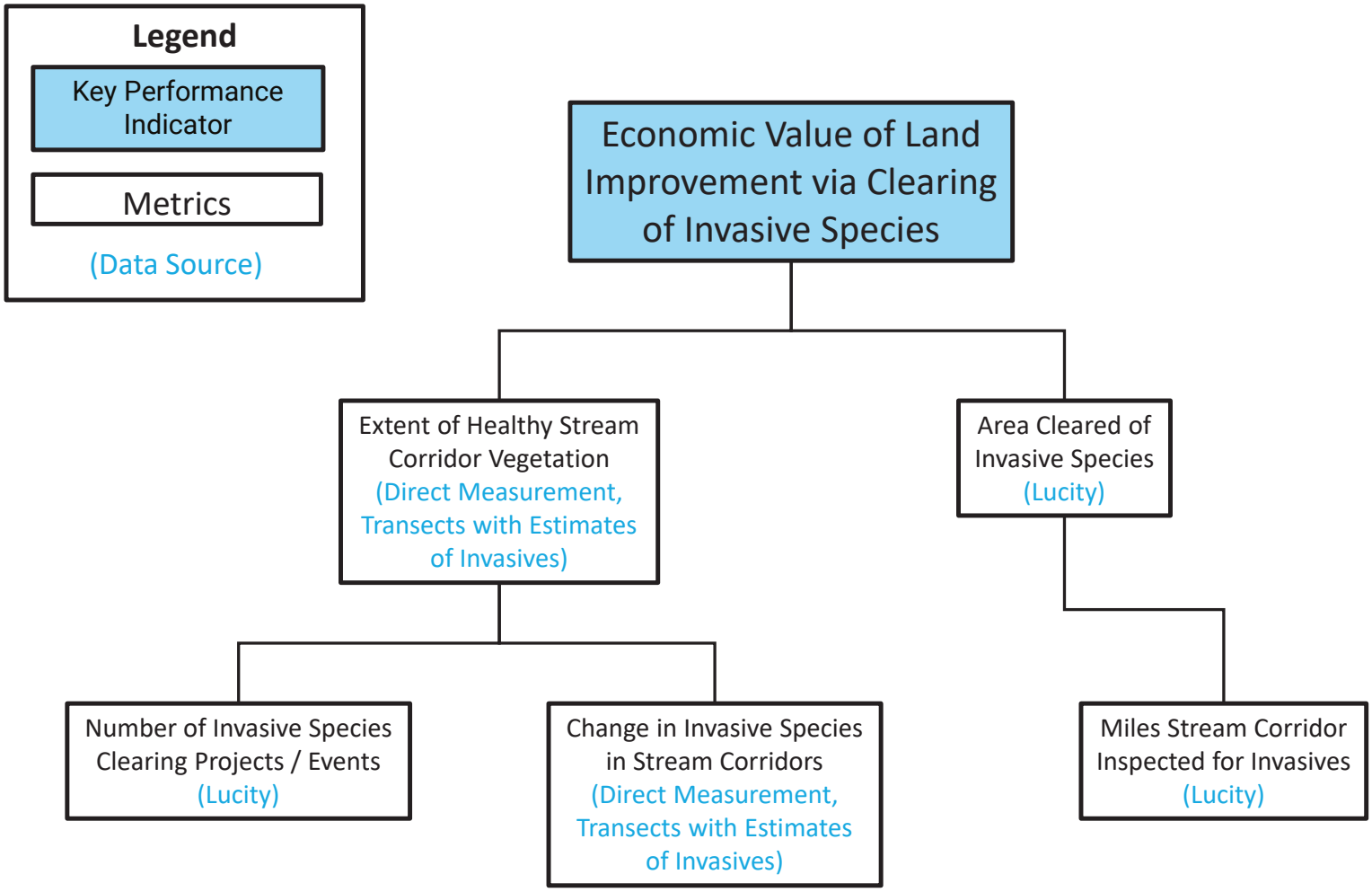


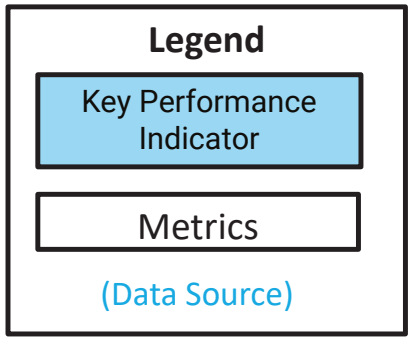
Economic Value of Land Improvement via Clearing of Invasive Species

Definition:
Valuation of efforts to promote healthy lands

Measured in:
Dollars

Desired Action(s):
Continue investment in improvement of high-value natural lands


Legend
Key Performance Indicator
Metrics
(Data Source)
Economic Value of Land Improvement via Clearing of Invasive Species
Extent of Healthy Stream Corridor Vegetation (Direct Measurement, Transects with Estimates of Invasives)
Area Cleared of Invasive Species (Lucity)
Number of Invasive Species Clearing Projects / Events (Lucity)
Change in Invasive Species in Stream Corridors (Direct Measurement, Transects with Estimates of Invasives)
Miles Stream Corridor Inspected for Invasives (Lucity)

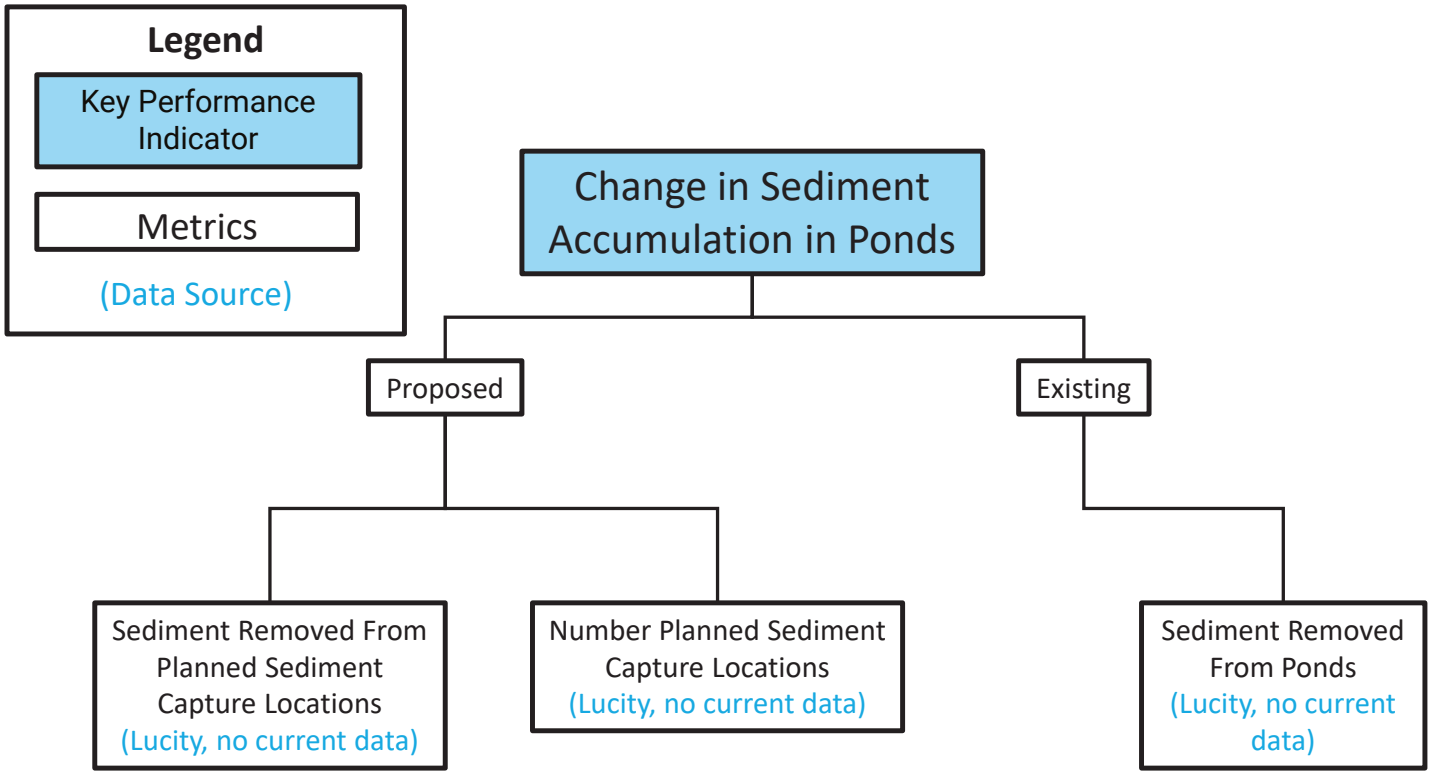


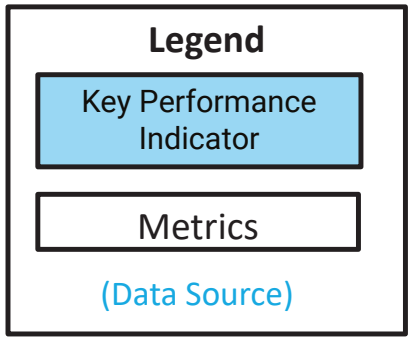
Change in Sediment Accumulation in Ponds

Definition:
Volume of sediment accumulation within City-owned ponds

Measured in:
Volume

Desired Action(s):
Target improvements in lake dredging to locations where they will be most beneficial


Legend
Key Performance Indicator
Metrics
(Data Source)
Change in Sediment Accumulation in Ponds
Proposed
Existing
Sediment Removed From Planned Sediment Capture Locations (Lucity, no current data)
Number Planned Sediment Capture Locations (Lucity, no current data)
Sediment Removed From Ponds (Lucity, no current data)

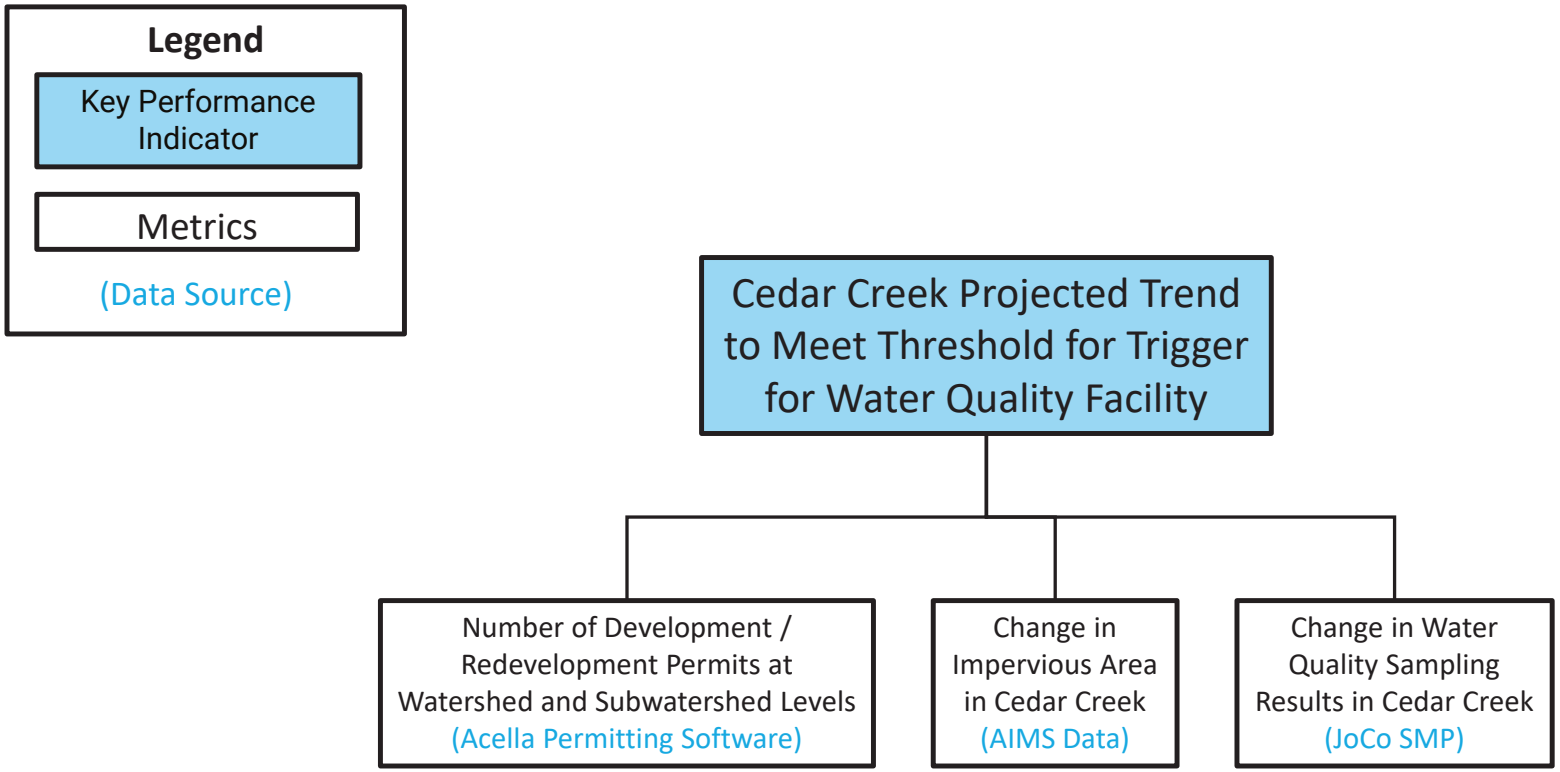


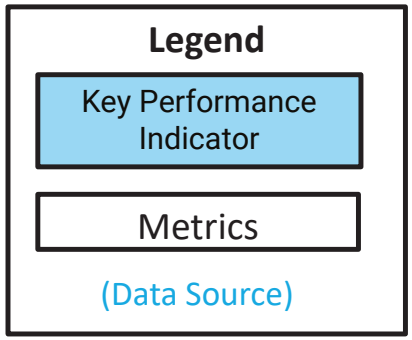
Cedar Creek Projected Trend to Meet Threshold for Trigger for Water Quality Facility

Definition:
Track metrics which indicate the need for a water quality facility in Cedar Creek

Measured in:
Rates of watershed development

Desired Action(s):
Protect water quality in Cedar Creek balanced against anticipated development


Legend
Key Performance Indicator
Metrics
(Data Source)
Cedar Creek Projected Trend to Meet Threshold for Trigger for Water Quality Facility
Number of Development / Redevelopment Permits at Watershed and Subwatershed Levels
(Acella Permitting Software)
Change in Impervious Area in Cedar Creek
(AIMS Data)
Change in Water Quality Sampling Results in Cedar Creek
(JoCo SMP)

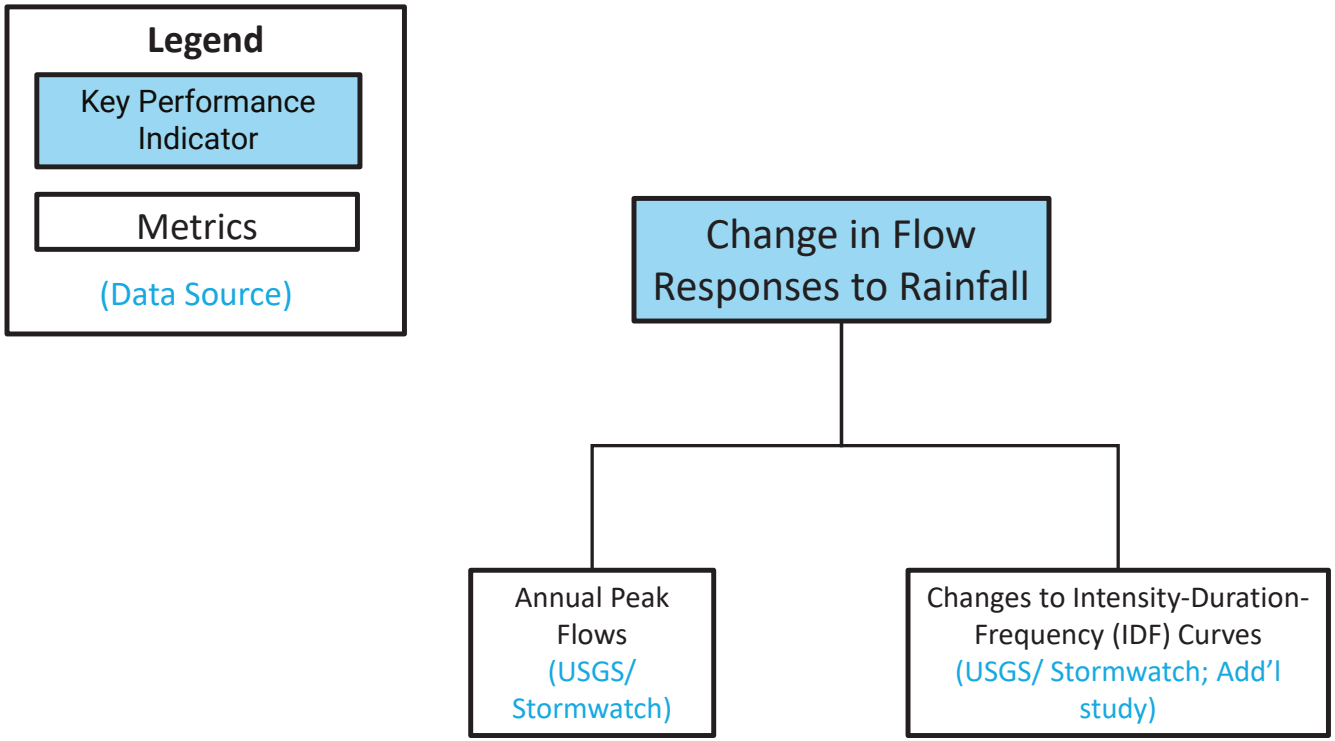


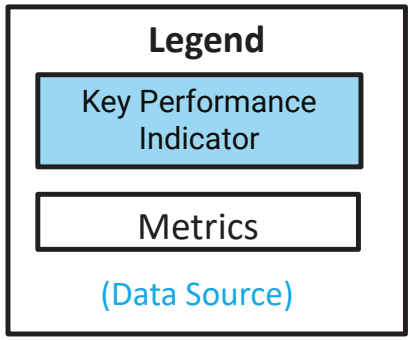
Change in Flow Responses to Rainfall

Definition:
Measurement of impacts due to changing climate conditions

Measured in:
Stream flowrates

Desired Action(s):
Adapt to changing rainfall and flow response patterns


Legend
Key Performance Indicator
Metrics
(Data Source)
Change in Flow Responses to Rainfall
Annual Peak Flows (USGS/ Stormwatch)
Changes to Intensity-Duration-Frequency (IDF) Curves (USGS/ Stormwatch; Add'l study)

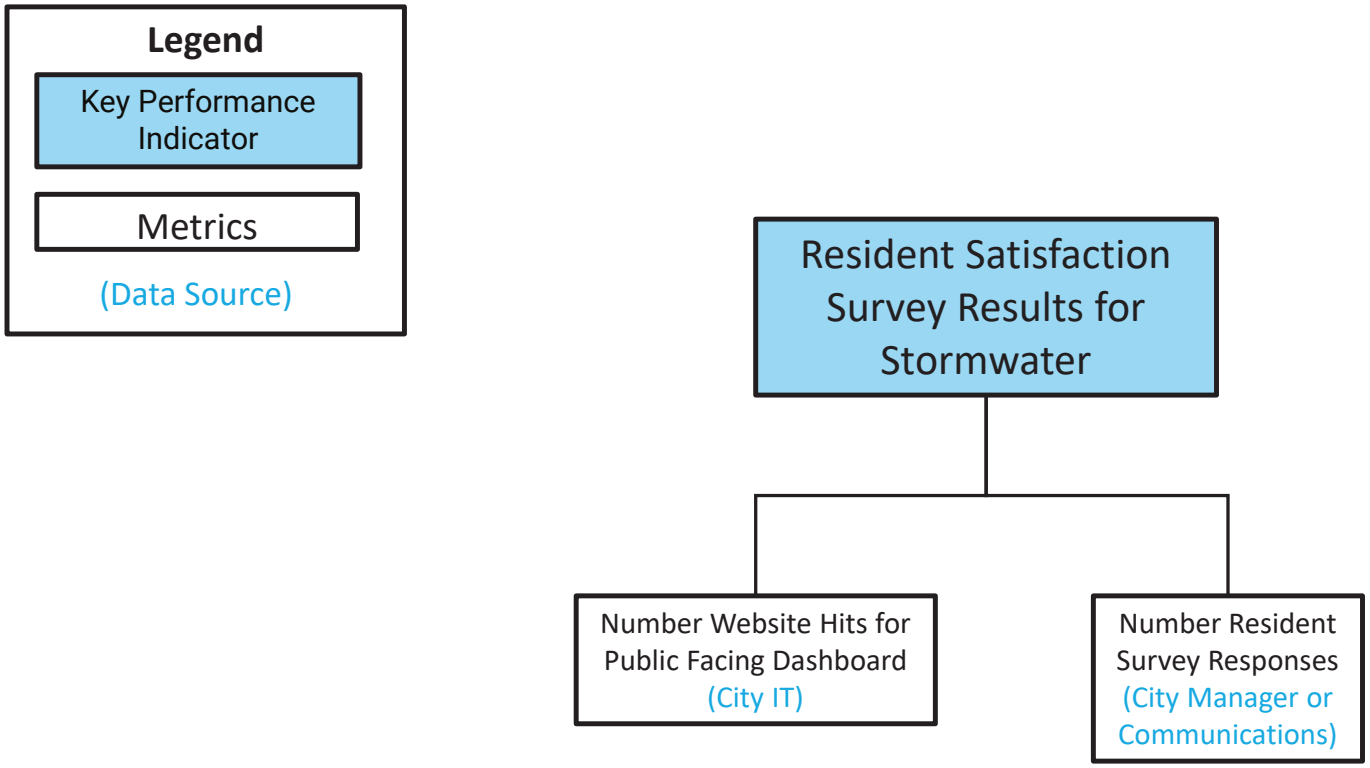


Resident Satisfaction Survey Results for Stormwater

Definition:
Resident satisfaction scores as measured by biennial survey

Measured in:
Satisfaction scores

Desired Action(s):
Address any emerging concerns from residents relative to stormwater


Legend
Key Performance Indicator
Metrics
(Data Source)
Resident Satisfaction Survey Results for Stormwater
Number Website Hits for Public Facing Dashboard (City IT)
Number Resident Survey Responses (City Manager or Communications)

MINUTES OF THE
JANUARY 14, 2025
LENEXA COMMITTEE OF THE WHOLE MEETING
COMMUNITY FORUM, 17101 W 87th STREET PARKWAY
LENEXA, KS 66219

CALL TO ORDER

Mayor Sayers called the meeting to order at 7 PM.

ROLL CALL

Councilmembers Eiterich, Charlton, Nicks, Denny, and Herron were present with Mayor Sayers presiding. Councilmembers Arroyo and Williamson were absent.

Staff present included Beccy Yocham, City Manager; Todd Pelham, Deputy City Manager; Mike Nolan, Assistant City Manager; Scott McCullough, Community Development Director; Sean McLaughlin, City Attorney; Jennifer Martin, City Clerk; and other City staff.

APPROVE MINUTES

Councilmember Denny made a motion to approve the November 12, 2024 Committee of the Whole meeting draft minutes and Councilmember Eiterich seconded the motion. Motion passed unanimously.

DISCUSSION

1. Homeless Shelter Code Amendments

Scott McCullough, Community Development Director, said that the focus of his presentation would be on proposed code amendments for cold weather shelters. He began with a history, explaining how the current code was developed. In 2021, he said, the City established a tiered framework for churches to provide shelters with varying occupancy levels. The framework consists of three tiers:

1. **First Tier**: Up to 10 guests are allowed in shelters accessory to any church, year-round.
2. **Second Tier**: During cold weather months, November 1st through April 1st, churches that meet specific criteria—such as a minimum size of 30,000 square feet, proximity to public transit, adequate staffing, and compliance with building and fire codes—can host up to 30 guests.
3. **Third Tier**: Shelters accommodating over 30 guests require a special use permit.

Mr. McCullough presented a city map reflecting all religious institutions currently eligible for a shelter and said that any amendments made to Code will apply to all

eligible churches. He then showed the zoning use regulations schedule of permitted uses for churches and shelters in the city.

The code aims to balance the needs of unhoused individuals with neighborhood impacts, ensuring compatibility with zoning regulations, according to Mr. McCullough. So far, only one shelter—Project 1020—has been issued a certificate of occupancy, hosting 30 guests at the Shawnee Mission Unitarian Universalist Church (SMUUCh). However, Project 1020 has exceeded its occupancy limit on occasion, raising concerns about safety, compliance, and situational awareness for emergency responders.

Mr. McCullough discussed Project 1020's requests of the City:

- Increase the occupancy limit from 30 to 50 guests, citing their capacity and the growing need.
- Relax staffing requirements during overnight hours to ease operational challenges.

He also talked about other the issues to consider:

- this City Code is to be applied citywide and not only for Project 1020;
- the need to right-size the accessory use to maintain compatibility;
- ensuring maximum occupancy of the shelter remains accessory to the primary use;
- unhoused individuals is a regional issue that others should participate in addressing;
- meeting building and fire codes is necessary;
- importance of complying with the occupancy limit;
- situational awareness for emergency responders; and
- impacts to surrounding uses and neighborhoods.

Mr. McCullough said staff supported increasing the occupancy limit to 50, with adjusted staffing requirements (e.g., 4 staff for 50 guests) and stricter enforcement mechanisms to ensure compliance. He added that staff proposes measures including civil penalties for occupancy violations, the possibility of revoking the shelter's certificate of occupancy for repeated violations, and an administrative appeals process.

Mr. McCullough said staff intends to draft an ordinance addressing these issues, with a public hearing at the February 3rd Planning Commission meeting and further discussion at the February 18th City Council meeting. He noted that the framework would maintain eligibility criteria for shelters, while introducing mechanisms to prevent misuse and maintain safety.

Councilmember Denny expressed support for the proposed approach but raised concerns about its applicability beyond Project 1020, particularly for other churches that may wish to establish shelters. He noted that the old Bonjour school, given its size, can accommodate a larger population, but other churches may not have similar capacity. He questioned whether there should be a proportional scale linking a facility's square footage to the number of people it can accommodate, especially when increasing to 50 individuals.

Mr. McCullough said staff has considered that and there are four or five churches larger than SMUUCh. He acknowledged the concern about facility size and shelter capacity and explained that the approach was designed with zoning compatibility in mind rather than tying capacity directly to square footage. He noted that the occupancy of 50 was chosen as a reasonable limit to align with zoning district requirements and said this approach also simplifies code administration.

Mayor Sayers talked about staff not separating available square footage from accessory use, understanding that some churches might be larger and would not be using a great portion of their square footage for the accessory use.

Instead of basing capacity on available accessory space, Ms. Yocham said the focus is on ensuring compliance with building and fire codes, particularly for overnight use. These regulations dictate factors like exiting requirements, which may limit capacity regardless of a church's physical size. As long as a facility meets these codes, further distinctions based on square footage are unnecessary.

Councilmember Herron asked why the penalties would go through Municipal Court and not the City Council.

Sean McLaughlin, City Attorney, said they would need to go through a neutral party not involved in deciding the land use, which the City Council does. Also, speed would be a factor and appealing to the City Council would inhibit that as well for civil penalties.

Councilmember Herron asked about repeat offenses and Mr. McLaughlin said they could be taken further in court or use other means like revoking or not granting a Certificate of Occupancy.

Ms. Yocham added that the code has not yet been developed, so there is time for the Governing Body to give staff direction to look further into it before the Planning Commission meeting.

Councilmember Herron said he wants the consequences and repercussions to be clear so the shelters can be successful. He thinks that increasing to 50 is reasonable.

Councilmember Charlton asked how much space at SMUUCh is being used for the shelter. Mr. McCullough said 30,000 square feet in a unique building, an old school, occupying two or three classrooms. Barb McEver, Project 1020, said five classrooms are sleeping rooms, two dining rooms, and a supply room.

Councilmember Herron talked about a visit he made to Project 1020 and his experience there, saying the space was well-designed and clean. He said he does not think increasing to 50 guests is going to tax their operations or change how they are doing things currently.

Councilmember Charlton asked what percentage of the overall building does the

operation use and Mr. McCullough said about one-third.

Councilmember Charlton asked about the possibility of selling a portion of the building and then two owners operating a shelter out of both portions, increasing the number of possible guests to 100. Mr. McCullough said there could be many different scenarios that would require more consideration, but that is not the intended goal of this code. The answer to this scenario, Mr. McCullough said, would be that selling a portion of the building could make one or the other portions ineligible for the accessory use due to reduced square footage.

Councilmember Eiterich asked if the code could be written to allow deviations so there is some accommodation and flexibility like in other applications. Mr. McCullough said this is not specific to church spaces, but is a function of the intensity of the use and its impact on the greater community. Setting clear expectations is what staff is striving for, regardless of the different church configurations. Having a clear occupancy limit is the goal, he said, because some of these churches could house more than 50 people. He said the City's approach is not what the church can manage, but what the community can absorb as a use.

Ms. Yocham talked about the religious land use act and being consistent in how that applies not just to religious uses, but to similar uses.

Mr. McLaughlin said that it is important to have objectivity in the Code and to treat all of these fairly without subjective determinations.

Councilmember Eiterich asked if the judge would be responsible for determining the civil penalties. Mr. McLaughlin said that the penalties are still being worked through, but the judge would be enforcing the codified steps.

Councilmember Charlton said he did not realize there would be other churches eligible to have a shelter. He asked how people would know about the hearing at the Planning Commission meeting on February 3rd, saying he felt this was very quick and people might not know to come to the public hearing since there would not be a sign put on the property like is done for rezoning. Mr. McCullough said the standard notification process would be followed and perhaps the Johnson County Post would cover the issue. Ms. Yocham said the standard process for giving notice is through publication and there are no other mechanisms in the code to provide direct notice to neighbors who might be affected by a change in the code.

Ms. McEver thanked the Governing Body for discussing this issue. She provided an update on the shelter statistics for this winter. As of last night, she said they have sheltered 167 different people this winter. She said more people have cars this winter, so they have been requiring them to sleep in their car, but allowing them to eat and shower inside. They try to direct people to other shelters and provide transportation if there is an opening, but they are full too. She said they take people to motels when they can, but that only helps for a few nights. She concluded that they are dedicated to sticking to the maximum occupancy of 50 if that were to be granted.

Councilmember Nicks asked several questions about transport to Project 1020 from surrounding areas. Ms. McEver said there are specific pickup spots throughout the county where they get people who need care. She said a lot of people are in cars this year, but Project 1020 does take people to other places during the day like Waffle House. She added that very few walk away from the shelter, most are taken somewhere.

Councilmember Nicks asked if Ms. McEver knows where guests go when they leave Project 1020. She said they usually do, only because they all talk to each other. It is not required that they tell them where they are going.

Councilmember Nicks asked what the shelter's hours are and Ms. Mcever said the daily shelter hours are 6 PM to 8 AM.

Councilmember Nicks said that turning people away must be hard and he told Ms. McEver she does good work, but he thinks the word is out that these services are provided here and it draws people to Lenexa. He said that the message needs to include the limit of 30 guests and they needs to adhere to that limit so they do not lose their permit. He shared concerns about police calls from winter 2023 that were shared at last year's Governing Body retreat and talked about the need to be able to enforce the current occupancy. He added that since they have not been able to adhere to the current standards, and are asking for a 66% increase in occupancy, he believes that would have unquantifiable effects to the community. He concluded that he would like to have the maximum occupancy remain at 30 with enforcement mechanisms put in place to enforce the code.

Councilmember Eiterich said she saw a security guard on staff at a recent visit and asked how long security has been there. Ms. Mcever said security is on-site from 5 PM to 8 AM and have been there for three 3 years; she said she felt the 39 calls for service last year were too bad for four months.

Councilmember Charlton shared his concerns about expanding shelter capacity from 30 to 50 people and the broader implications for other facilities across the city. He acknowledged the facility's ability to accommodate the increase but emphasized the need for more public engagement before moving forward. He suggested delaying the decision until discussion at a future Governing Body retreat to allow for more due diligence, particularly in considering potential impacts on real estate and other neighborhoods. While recognizing the lack of interest from other churches in offering similar services over the past five years, he cautioned against what he felt was rushing the decision. He shared positive feedback from Holy Trinity, the closest school to the facility, which reported no issues with the shelter's operations, but stressed the importance of engaging with residents that might be affected before implementing any change.

Mayor Sayers commented that Ms. McEver has sought help from other churches but received none. She added if there were genuine interest, it would likely have been seen over the past five years, and that has not happened.

Councilmember Charlton said he reached out to the principal at Holy Trinity and they gave glowing feedback, saying they have not experienced any issues with the facility, and it seems Project 1020 has done a great job mitigating concerns over the years. He added that he was not opposed to this change but felt it may be moving too quickly. He said that other parishes and neighborhoods that could be impacted should another shelter open in their area need to be engaged to ensure their concerns are also considered.

Mc. McEver said that no other churches want to run a shelter but are willing to help Project 1020 at the SMUUCh location. Councilmember Charlton said his concern is that churches in the future could decide to do it and if this code is changed now, it would impact those areas and residents too.

Ms. McEver talked about homeless people already being in this community, whether they are sleeping behind a Quik Trip or safely in this shelter; there is nowhere else for them to go. She told a story about a man who was sent to the shelter by a local hospital with only the clothes on his back, four hours before the shelter opened. She said it is one thing to tell someone over the phone they are at capacity and another thing to tell someone that to their face.

Councilmember Nicks talked about homelessness as a regional issue, saying every county needs to have a shelter and asking what the County is doing to address the issue. He talked about how the County gave some of the funding they had set aside for the Homeless Services Center to help Project 1020, but how the good work is making Lenexa a magnet for homeless people across the area. He said he would support changing the ordinance to add enforcement of the current code, but not an increase in the number of occupants allowed.

Mayor Sayers disagreed with postponing making this decision and talked about the feedback received having been about 50/50 for and against over the last two times this has been discussed. She thinks the Council needs to provide staff with direction on what to propose to the Planning Commission for consideration in February, using the same notification process for the public hearing as would be for any other item.

Ms. Yocham said that both Councilmembers Arroyo and Williamson, who could not be at this meeting, had expressed to her their willingness to move this forward, without sharing any support for or against it.

Councilmember Denny said it appears as if the framework proposed by staff has been somewhat vetted for addressing the regional impacts and it sounds like there are procedural details that need to be worked out. He asked when the revised ordinance would become effective.

Mr. McLaughlin said it would be effective upon publication in the Legal Record on February 25th.

Mayor Sayers added that the Governing Body retreat would occur between the

Planning Commission meeting and the City Council meeting, so there would be time to discuss this there.

Councilmember Denny said he is on board with looking at this more fully, both the occupancy increase and the enforcement, and emphasized the need to be fair and consistent to all.

Councilmember Herron asked Ms. McEver what it would take for other churches that have the capacity and eligibility to step up and operate a shelter in their facilities.

Ms. McEver said she really did not know what it would take, but perhaps if they would visit Project 1020 and see how its run they might see what it takes; however, money is a big part of the equation too.

Councilmember Nicks asked about staff discussions regarding enforcement of the ordinance and if it was considered separate from the occupancy increase.

Mr. McCullough talked about the complexity of the issue, the need to support the homeless shelter while ensuring safety. He said a lot has been learned from challenges over the years, particularly regarding compliance and enforcement of the occupancy limit. While Project 1020 has cooperated with City requirements and invested in building modifications, he noted that its commitment to serving the homeless has created an increased demand. He stressed the importance of establishing a robust enforcement mechanism rather than simply imposing restrictions on the shelter. He also talked about the importance for this structured, tiered approach in enforcement and hopes that other cities would allow homeless shelters as a land use in their codes in the future. He said staff is trying to balance compassion for the shelter's mission with regulatory responsibilities.

Ms. Yocham spoke about the importance of the enforcement and clarified that both the Project 1020 and the church that owns the building would be accountable for compliance. She talked about recent discussions had with Project 1020 and SMUUCh board members, explaining that both parties share responsibility for ensuring adherence to the regulations. She said that if violations occur, penalties would be issued to both entities, with escalating consequences, including potential revocation of their ability to operate a shelter for 12 months. She added that this means Project 1020 could not relocate to another church in Lenexa, and SMUUCh could not host another operator. She said she stands behind this recommendation and enforcement approach to ensure compliance and reinforcing the importance of following the rules.

Mayor Sayers said this would move forward on the schedule proposed, with the Governing Body discussing this at its retreat. The public hearing will take place at the Planning Commission meeting February 3rd and the item would come to the City Council for consideration on February 18th.

Councilmember Denny said that a really good ordinance could serve as a model for other cities.

Councilmember Herron asked if this is discussed when there are meetings with other

cities and said he wants that to occur. Mr. McCullough said yes, it does get discussed and will continue to be.

Councilmember Nicks said the Council and department heads used to meet annually with Olathe and Shawnee to talk about issues like this.

Mayor Sayer said that the Johnson and Wyandotte County mayors meet monthly and have and will continue to talk about this issue.

ADJOURN

Mayor Sayers adjourned the meeting at 8:05 PM.