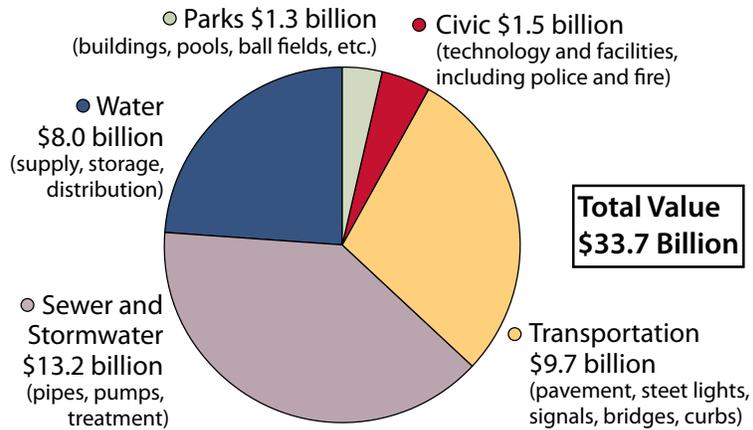


PORTLAND'S INFRASTRUCTURE INVESTMENTS

The City of Portland has invested in infrastructure to support public health and safety, promote trade, accommodate traffic and provide recreation. Portland's infrastructure includes public facilities like City Hall, fire and police stations and other assets you can see, like roads, bridges, sidewalks, parks and natural areas, hydrants and stormwater facilities. It also includes extensive assets that are out of sight: pipes and pumps to transport drinking water, stormwater and wastewater; communications systems, information technology hardware and software. See Figure 1 for the five basic asset groups in the city.

ASSET REPLACEMENT VALUE BY TYPE – 2014

Figure 1



The City has been a diligent steward of its assets for more than a century. Over the years, the City of Portland has invested in its assets as they wear down, become inefficient, or are no longer beneficial to own and operate for other reasons. Historically the City was able to replace assets and provide for growth. However, new challenges have made it hard to keep up.

New health and environmental regulations have required that the City invest in new infrastructure to manage wastewater. Growth of the city's population has meant an ever-increasing number of people using the city's parks and roads. Also, equipment and facilities like fountains and water pipes continue to bear the brunt of wear-and-tear as we continue to use assets that are at the end of their useful lives. All of these factors have created the need for the City of Portland to manage and invest in its assets wisely.

ASSET MANAGEMENT

Effective asset management requires looking at the whole life cycle of infrastructure — from determining the need to maintain, repair or replace existing infrastructure to improving and expanding infrastructure to meet the needs of Portlanders.

Asset management is used by decision-makers to help select actions and investment decisions that provide the best mix of benefits. Asset management is an ongoing process that informs conversations among professional staff, elected officials and the public.

A goal of asset management is to provide desired levels of service in the most cost-effective manner. Bureaus must balance competing demands:

- Maintain, repair and replace existing infrastructure.
- Minimize risk of assets failing.
- Meet regulatory requirements.
- Expand the capacity of systems to fill service gaps and deliver services as Portland grows.

ASSET MANAGEMENT FUNDAMENTALS: LEVELS OF SERVICE, RISK AND FUNDING

Three key factors come into play when managing Portland's infrastructure — levels of service, risk and funding. These factors are interconnected and influence one another in both positive and negative ways.

1 • LEVELS OF SERVICE

Service providers set measurable goals or targets for the services they deliver to the community. These goals, called levels of service, describe what service is provided, how much, and how often.

Each City bureau sets levels of service based on its mission, system needs, regulatory requirements, and customer expectations. Levels of service help guide bureau operations.

As an example, a key level of service for Parks & Recreation is that all households have walkable, half-mile access to a park or natural area. Figure 2 shows areas that meet the park access standard in dark green. Areas in light gray do not meet the park access standard.

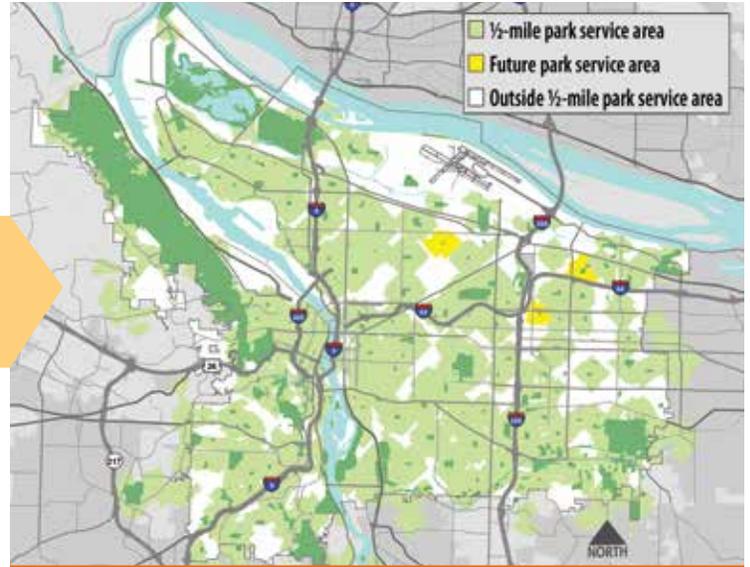
2 • RISK

Risk is a combination of two factors: the consequence of asset failure and the likelihood that the asset will fail. Consequences can be relatively minor, such as a two-hour water shutoff on a residential street, or major, such as a loss of life. The likelihood of failure is tied to industry standards for useful life, or how long assets are supposed to last. Assets that are at the end of their useful lives or that operate in adverse conditions are expected to have higher likelihoods of failure. Figure 3 shows an example of a risk rating system to categorize individual assets. An asset with a high consequence and likelihood of failure would fall into the high or extreme risk category.

In any environment, there are risks of asset failure. Part of asset management, however, is understanding and tracking how assets fail and taking actions to reduce the likelihood of high risk failures. By understanding trade-offs and actively managing risk, Portland's bureaus strive to minimize service interruptions and their effects on the community.

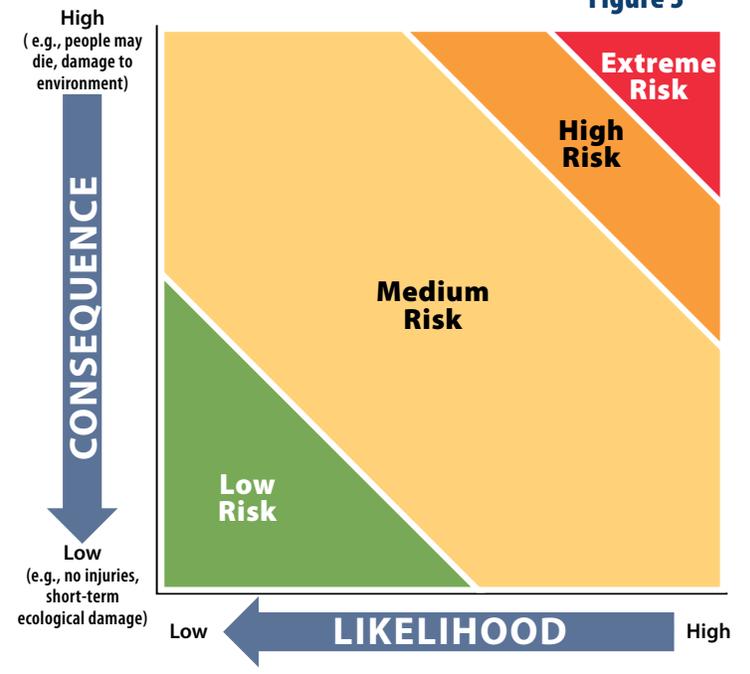
PARK ACCESS MAP

Figure 2



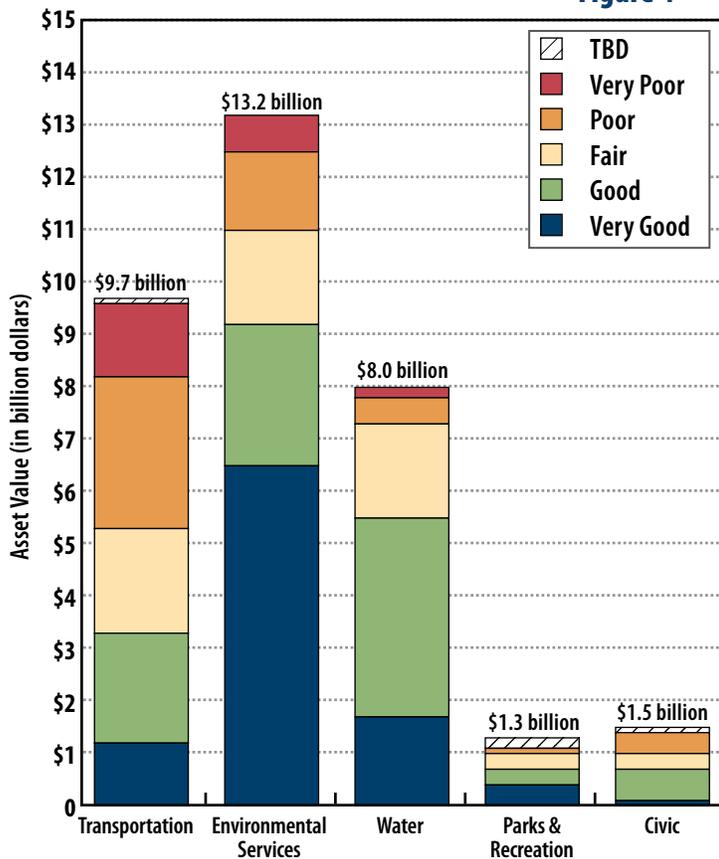
RISK CONSIDERS CONSEQUENCE AND LIKELIHOOD

Figure 3



In 2010, Water Bureau asset managers inspected some of its pipes on bridges. Under the NE Grand Avenue bridge, staff saw a misalignment in the suspended water main. Repairs cost \$200,000—but avoided millions of dollars in potential disruptions to traffic, commerce, emergency response, and in repairs to the I-84 highway below if the pipe had failed.

Figure 4



One way to track risk is to measure asset condition. Figure 4 shows current condition for the City's five asset groups.

Many of Portland's assets are severely stressed from aging and overuse. In 2014, the City's funding gap for repair, replacements and meeting regulatory requirements was estimated at \$248 million a year.



The cost to rebuild a street in poor or very poor condition is about ten times the cost to perform preventive maintenance that will extend the life of the street. Preventive maintenance is only effective, however, if applied before the street has deteriorated to the point of failure. Without preventive maintenance, Portland will face much bigger street rebuilding costs in the future.

3 • FUNDING

Planned investments in equipment and specific operations and maintenance methods can help prevent expensive emergency measures to cope with failed assets. New assets often add to the ongoing operations and maintenance needs. City asset managers have categorized three areas in which investment in assets may be needed:

- **Repair, rehabilitate, replacement** – Assets at the end of their expected lives, assets with worn or obsolete parts, or assets that are too expensive to maintain and may need extensive repairs or replacement.
- **Mandate** – Bureaus are required by law to meet regulations.
- **Capacity** – New or improved assets may help to address inequities or provide services for a growing community.

BUSINESS CASE: A DECISION TOOL

A business case is an economic analysis tool used to evaluate investment decisions. At the project level, a business case compares project alternatives and uses the costs and benefits to help make decisions on the best use of financial resources.

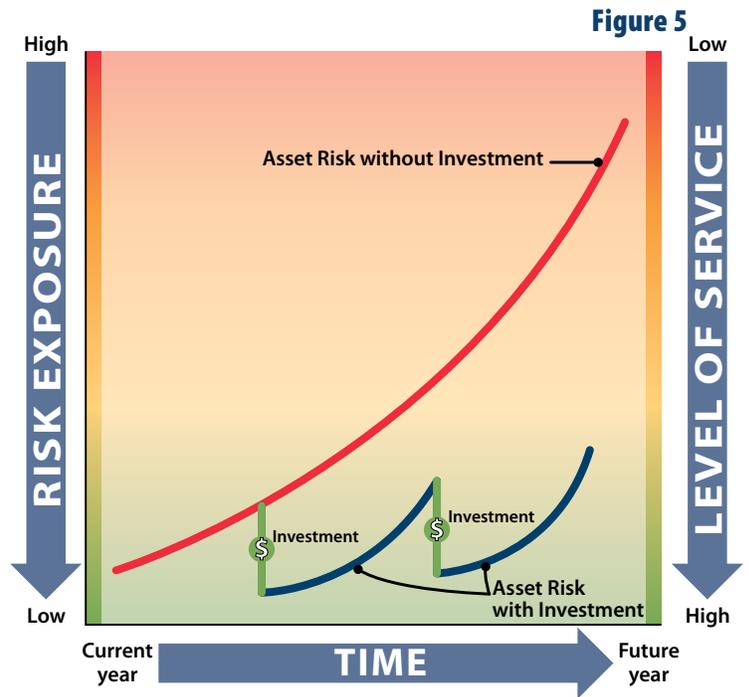
Most bureaus evaluate multiple alternatives for significant asset investment decisions. The bureaus consider life cycle costs (including initial capital costs and costs to maintain and operate) and triple bottom line impacts (economic, social and environmental factors).

THE FUNDING GAP

Portland's asset managers have documented a persistent gap between the need to maintain, repair, and replace assets and the available funding. This under-investment in our city's roads, parks, water, and wastewater systems has required bureaus to consider trade-offs between target levels of service and the levels of tolerable asset risk. In some cases, asset managers have found creative solutions that reduce risk and maintain target service levels, but those opportunities may become more rare if funding levels decrease. Figure 5 shows how Portland's risk exposure increases over time if funding is not available.

Investment levels affect an asset's condition and risk of failing over time. Figure 5 shows two investment trajectories. Lower investment levels, year after year, increase risks and ultimately reduce levels of service. Assets perform less efficiently or are taken out of service (upward sloping line in red). The jagged lower line (in blue) shows the effect of limiting risk of asset failure with two asset interventions (in green). With optimal investments in maintenance and repair, risks may be mitigated over the lifespan of assets. But, all assets will wear out and deteriorate over time.

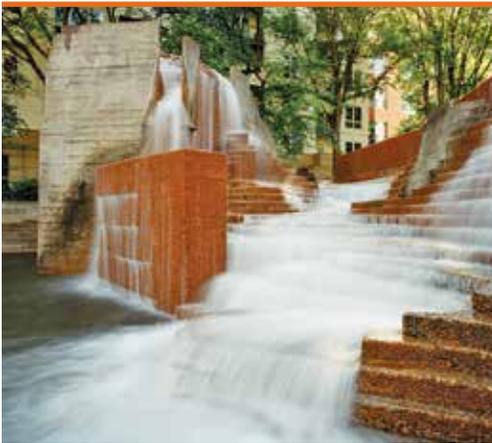
TRADE-OFFS BETWEEN FUNDING AND RISK



SETTING PRIORITIES

Funding, levels of service, and risk are inextricably linked. A persistent funding gap for infrastructure investment needs, as in Portland's case, results in declining levels of service and increased risks. The interplay of these factors and the trade-offs that inevitably result must be considered as policy and investment decisions are made.

Together, Portlanders and the City of Portland face challenging decisions about how to spend limited infrastructure dollars. Some areas lack basic levels of service, and services may cost more in the future if repairs are delayed. Asset management can help to inform funding priorities and enable smart investment choices.



Lovejoy Fountain



Sellwood Pool



Southwest Community Center



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