



# EGD Asset Plan

2012-2021



May 9, 2012



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## 1. Executive Summary

Enbridge Gas Distribution (EGD) is one of North America's oldest investor-owned, regulated natural gas distribution utilities and shares many of the challenges facing some of its North American counterparts – an increased focus on safety and reliability, aging assets, an aging workforce, and the need to cost-effectively meet the demands of customer growth in its franchise area.

In response to these challenges, EGD has been adopting an Asset Management System approach to managing its distribution assets. Through the adoption of this approach, EGD is striving to enhance the value delivered to its customers through enhanced safety, reduced service disruptions, and improved cost effectiveness.

An Asset Plan is an important component of any Asset Management System. It defines and communicates what needs to be done with the organization's core assets over a specified period of time, the rationale behind these activities, and the resources needed for execution.

EGD's Asset Plan is a rolling 10-year plan that establishes the Company's distribution asset spending priorities over the term of the plan in a manner which attempts to address system needs while being mindful of ratepayer impacts.

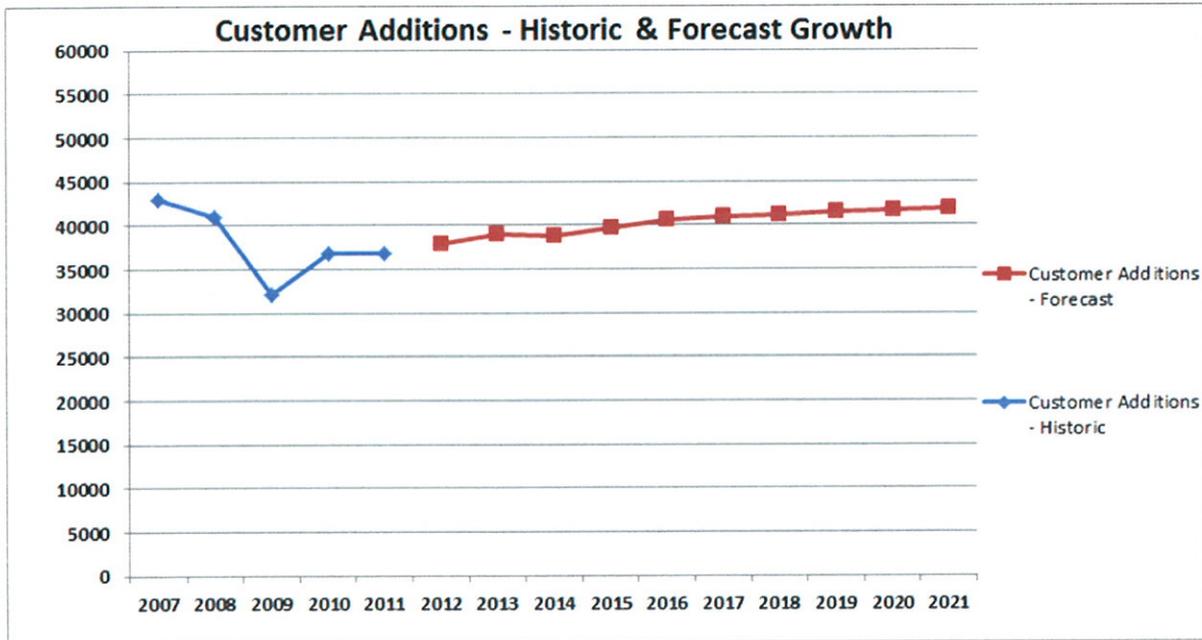
This first iteration of the Asset Plan applies to the 2012-2021 time period. Going forward, the plan will be reviewed and updated on an annual basis. The scope of the plan includes EGD's core gas distribution system assets – Pipelines (Mains and Services), Valves, Fittings, and Measurement & Regulation equipment such as stations.

The Asset Plan includes a set of guiding principles which define EGD's Asset Management Objectives, Policies and Strategies.

Consistent with these guiding principles, the Asset Plan establishes the requirements and estimates the related capital expenditures to support four primary kinds of asset-related investments - Customer Additions, Reinforcements, System Integrity & Reliability, and Relocations.

**Customer Additions:**

EGD has experienced significant customer growth in its franchise area. This growth is forecast to continue in the future, as outlined in the chart below, driving the need to make continued investments in new distribution plant to service these new customers.



2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
42920	41052	32089	36902	36753	37927	38896	38725	39752	40540	41014	41236	41483	41760	41882

Chart 1 - Executive Summary: Customer Additions – Historic & Forecast Growth

**Reinforcements:**

Reinforcements increase the capacity and operating flexibility of the distribution system. Investments required to reinforce the distribution system are primarily driven by Customer Growth and System Integrity & Reliability considerations. As part of the Asset Planning process, network analysis is performed to establish the need and timing for reinforcements within each of the operating areas that make up EGD’s franchise area (Areas 10, 20, 30, 40, 50, 60 and 80). This analysis has determined that a significant increase in reinforcement investment is required over the 10 year horizon of this Asset Plan.

In addition to several routine reinforcements, two major reinforcements of the extra-high pressure grid mains that form the major backbone of the distribution system serving the GTA

and Ottawa areas are required to further support customer growth and address significant system reliability and security of supply issues.

### **System Integrity & Reliability:**

A critical responsibility in managing a gas distribution system is understanding potential threats to the safety and reliability of the system. This can be accomplished through condition monitoring, as well as reference to historical knowledge and industry developments and trends. By understanding these threats and the risks that they can manifest, mitigation programs have been, and continue to be developed and implemented to effectively manage these risks.

In addition, recent events in the natural gas industry, such as the tragic San Bruno explosion in September 2010, the Philadelphia explosion in January 2011, and the Allentown explosion in February 2011, have resulted in increased focus on public safety.

As part of applying an Asset Management System approach, EGD has made a concerted effort to identify, assess and prioritize risks to its distribution system and to continue to develop and implement programs to monitor, repair or replace components of the system as required, as part of this Asset Plan. In cases where risks require further analysis before the extent of mitigation can be determined, targeted risk studies have been identified and also included in this plan. These studies may result in additional programs or projects to address risks in future iterations of the plan.

The following are some of the key initiatives that represent a significant portion of the capital investments for System Integrity and Reliability requirements outlined in the Asset Plan:

- The need to continue to address classes of assets that are near the end of their useful life. Examples include Copper Services, Steel Tubing Services, AMP Fittings, and Mainline Compression Couplings
- The need to continue to conduct studies to improve our understanding of the condition of specific classes of assets where risks have been identified. These studies will help establish the requirements and scope of any related mitigation programs
- A number of initiatives to continue to enhance Records Integrity, including completeness, accuracy, verifiability, timeliness, and accessibility
- In-line inspect targetted XHP pipelines operating over 20% Specified Minimum Yield Strength (SMYS)

- Install additional mainline valves at key locations to enhance EGD's capability to effectively isolate portions of the system to minimize the impact of planned or unplanned service disruptions

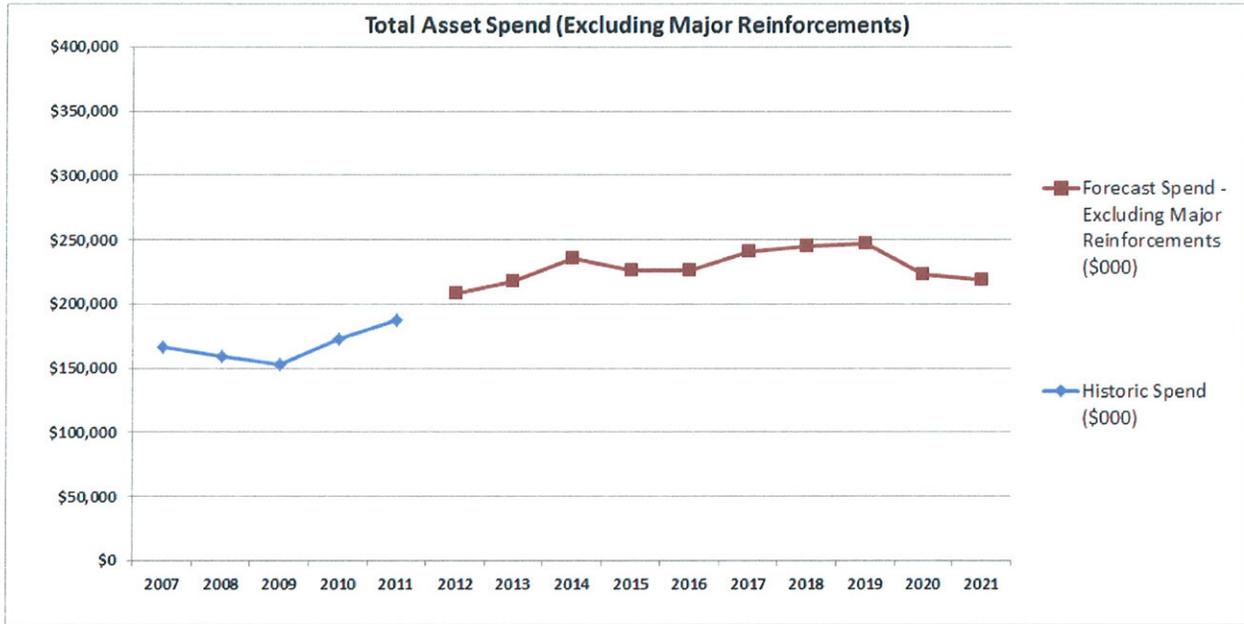
**Relocations:**

Distribution assets generally need to be relocated for reasons such as road-widening and other municipal or third party construction projects.

In forecasting future years' relocations, EGD begins with the historical level of relocation activity and then adds projects or programs identified as incremental to that historical level. Within the 10 year horizon of this Asset Plan, a number of incremental activities, which are already underway or announced, are driving forecast relocation costs above historical levels. These activities include items such as Infrastructure Stimulus Fund activities, major transit projects (TTC Subway expansion, GTAA Rail Link, Rapid Transit – Eglinton LRT, York Region Rapid Transit, and Ottawa LRT), major road expansions (407 Extension) and preparations for the 2016 Pan Am Games.

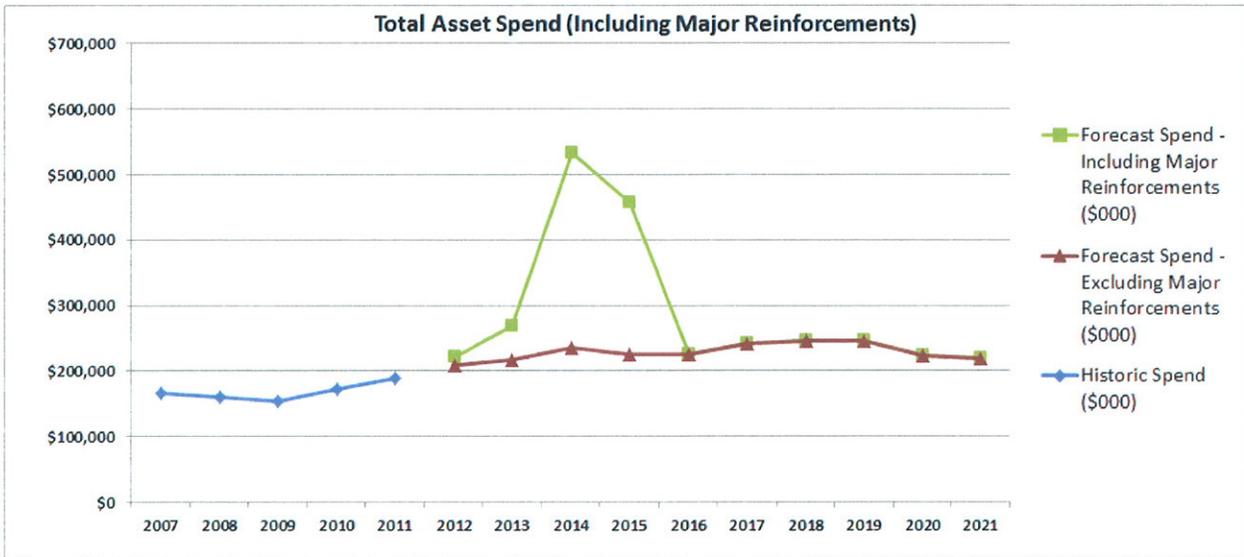
**Forecast Capital Cost of the Asset Plan**

The following two charts summarize the total capital spend profile required to effectively meet the Customer Additions, Reinforcement, System Integrity & Reliability, and Relocation requirements included in this Asset Plan, as compared to the historic spend. The forecast costs are based on 2012 dollars (i.e. inflation and other time-based adjustments have not been applied) and include only the direct capital costs of the projects and initiatives.



2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
\$166,355	\$158,783	\$152,971	\$172,927	\$187,586	\$208,671	\$217,213	\$235,614	\$225,624	\$226,207	\$241,130	\$245,164	\$246,417	\$223,345	\$218,341

Chart 2 - Executive Summary: Historic & Forecast Capital Spend (Excluding Major Reinforcements)



Excluding Major Reinforcements(\$000)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Including Major Reinforcements(\$000)	\$166,355	\$158,783	\$152,971	\$172,927	\$187,586	\$208,671	\$217,213	\$235,614	\$225,624	\$226,207	\$241,130	\$245,164	\$246,417	\$223,345	\$218,341
	\$166,355	\$158,783	\$152,971	\$172,927	\$187,586	\$221,798	\$268,330	\$532,360	\$457,524	\$226,207	\$241,130	\$245,164	\$246,417	\$223,345	\$218,341

Chart 3 - Executive Summary: Historic & Forecast Capital Spend (Including Major Reinforcements)

## 2. Introduction

### 2.1 Background & Context

EGD is one of North America's oldest investor-owned, regulated natural gas distribution utilities and shares many of the challenges facing some of its North American counterparts – an increased focus on safety and reliability, aging assets, an aging workforce, and the need to cost-effectively meet the demands of customer growth in its franchise area. While meeting these challenges, EGD remains committed to the safe, reliable operation of its gas distribution network.

In response to these challenges, EGD has been working over the past several years to build on and enhance its past practices using an Asset Management System approach. Asset Management, as an approach, has been evolving over the past several years in a broad range of asset intensive industries, including utilities. The primary objective of an Asset Management System is to provide management with a systematic approach to making optimal asset related decisions based on trying to achieve an appropriate balance of risks, operational performance and costs. Achieving this balance enhances the value that EGD delivers to its customers through enhanced safety, reduced service disruptions, and improved cost effectiveness.

In working to adopt an Asset Management System approach, EGD has been using an asset management conceptual model developed by the Institute of Asset Management. This model was detailed in the asset management standard called PAS 55, a "Publicly Available Specification" published by the British Standards Institute. EGD took this model and adapted it to its gas distribution business.

Another important reference used by the Company was the Guiding Document on Asset Management released by the Canadian Gas Association in 2009. The CGA defines Asset Management as:

A strategic management system used to optimally manage assets over their life cycle by balancing performance, risk, and expenditures to achieve corporate strategic objectives.

From these reference sources, EGD created a framework that outlines all the major components of a comprehensive Asset Management System. EGD has used this framework to assess its current Asset Management activities to identify gaps and areas for improvement. Addressing these opportunities has become a continuous improvement process. Some areas

where work has already started include system health and performance monitoring, risk assessment and management, asset data, capital management, life cycle cost and value optimization and asset management leadership and accountability. These areas will continue to improve, through the Asset Management process going forward.

A key component of the Asset Management System is Asset Management Strategy and Planning. In addressing this Asset Management System requirement, EGD turned its attention to the development of a 10 year Asset Plan which will guide asset-related investments.

This document provides the first iteration of the plan, which will be reviewed, updated and improved every year going forward, thereby creating a 10-year rolling plan.

## **2.2 Purpose & Objectives of the Asset Plan**

The purpose of an asset plan is to define and communicate what needs to be done with the organization's core assets over a specified period of time, the rationale behind these activities, and the resources needed for execution, consistent with the Company's key priorities. The needs of the assets should be considered over their entire life cycle including creation or acquisition, operation, maintenance and decommissioning.

EGD's Asset Plan establishes the Company's distribution asset spending priorities over a 10-year period (2012-2021) in a manner which attempts to address system needs while being mindful of ratepayer impacts.

More specifically, the objectives of this plan are:

- Align asset-related activities with the Company's key priorities (including safety, reliability, risk management, customer satisfaction, productivity and innovation)
- Provide inputs to the Company's long term planning and budgeting processes
- Provide a basis for substantiating financial requirements
- Meet regulatory requirements
- Serve as a mechanism to communicate EGD's asset management priorities and planned investments with internal and external parties

The target audience of the plan includes EGD's Senior Management, Operational Managers, partners, and external parties such as the OEB and other applicable stakeholders.

## 2.3 Scope of the Asset Plan

The following are the key elements that define the scope of this Asset Plan:

- The planning horizon for the Asset Plan is 10 years, 2012 to 2021.
- Organizationally, the Plan is limited to assets owned and operated by EGD across all regions within its franchise area.
- The Plan applies to core gas distribution assets only. These are physical plant assets that primarily make up the gas distribution system, including Pipelines (Mains & Services), Fittings, Valves, Stations, Meters and other Measurement & Regulation assets.
- The Plan does not include other assets such as Facilities, IT and Fleet.
- For this first iteration of the Asset Plan, Storage assets at EGD's Tecumseh Storage facility have not been included. In the future, EGD expects to include storage assets within the scope of the Asset Plan.
- This first iteration of the Asset Plan is focused on the capital investment requirements to optimally manage EGD's distribution assets. In future iterations, O&M requirements which are currently addressed in our O&M budgets will be addressed in more detail in the Asset Plan.

Based on the scope assumptions above, the Asset Plan will help substantiate a significant portion, but not all of EGD's capital requirements.

The Asset Plan is intended to supplement, but not replace, the evidence to be filed by the Company in support of its budget requirements in rate application filings.

## 2.4 High Level Overview of EGD's Asset Planning Process

Based on industry best-practices and internal expertise, EGD has developed, adapted and employed its own asset planning process. At the high level, this four-step process can be summarized as follows.

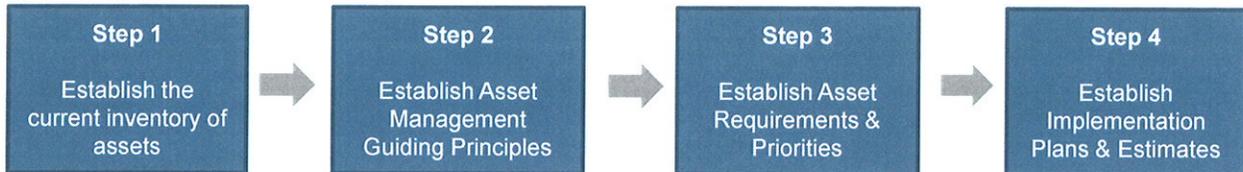


Figure 1 - Asset Planning Process

### Step 1: Establish the Current Inventory of Assets:

The Distribution System is comprised of thousands of discrete components. To analyze and determine the needs of the assets, it is necessary to develop an appropriate classification for those assets, and inventory those assets by class rather than try to deal with discrete components.

- Based on the scope of the Asset Plan, a suitable “Asset taxonomy” has been established. The taxonomy identifies the key assets, and classifies them into a hierarchy
- Using the taxonomy as a reference, an inventory of assets was established. This represents a count of the key assets within the asset hierarchy
- Information on the asset inventory is supported by an explanation of relevant details on each class of asset, such as its age distribution

### Step 2: Establish Asset Management Guiding Principles:

- Guiding Principles provide the basis and rationale for Asset Management decisions
- These principles include Asset Management Objectives, Policies, and Strategies

### Step 3: Establish Asset Requirements & Priorities:

When considering asset requirements and priorities, it is necessary to consider the various types of asset investments that are required to build, operate and maintain the distribution system.

- Considering the various types of asset investments, there are primarily four categories of requirements that determine the overall plan for all the assets within the scope of the Asset Plan:
  - a. Customer Additions
  - b. Relocations
  - c. Reinforcements
  - d. System Integrity & Reliability
- The approach to establishing these requirements and prioritizing them varies by category
- In general, the requirements and priorities are determined based on a variety of sources of information, including asset condition data from operational systems, results of risk assessments, studies, forecasts, tacit knowledge, and historical information.

### Step 4: Establish Implementation Plans & Estimates:

- The implementation plan establishes the scope and timing of asset-related projects, programs and investments that are needed to meet the asset requirements and priorities
- Capital investments needed to support the execution of the implementation plans are estimated by using a variety of approaches as appropriate, including historical expenditures and unit costs where available
- To the extent possible, an attempt has been made to manage potential rate impacts and resource availability by smoothing the expenditure profile and spreading out the costs over a longer term

### **3. Overview of EGD's Distribution Assets**

This section provides an overview of how EGD classifies distribution assets, an inventory count, geographic distribution, and age-related profiles. This information will particularly help set the context for the discussion on System Integrity and Reliability requirements, strategies and plans that are discussed in subsequent sections of this document.

### 3.1 Asset Taxonomy and Inventory

EGD’s distribution assets have been classified into four classes – Pipe, Fittings, Measurement & Regulation Equipment including Stations, and Valves. A further level of categorization has been done based on the sub-type of assets by material type / function. Figure 2 below is a depiction of the asset hierarchy.

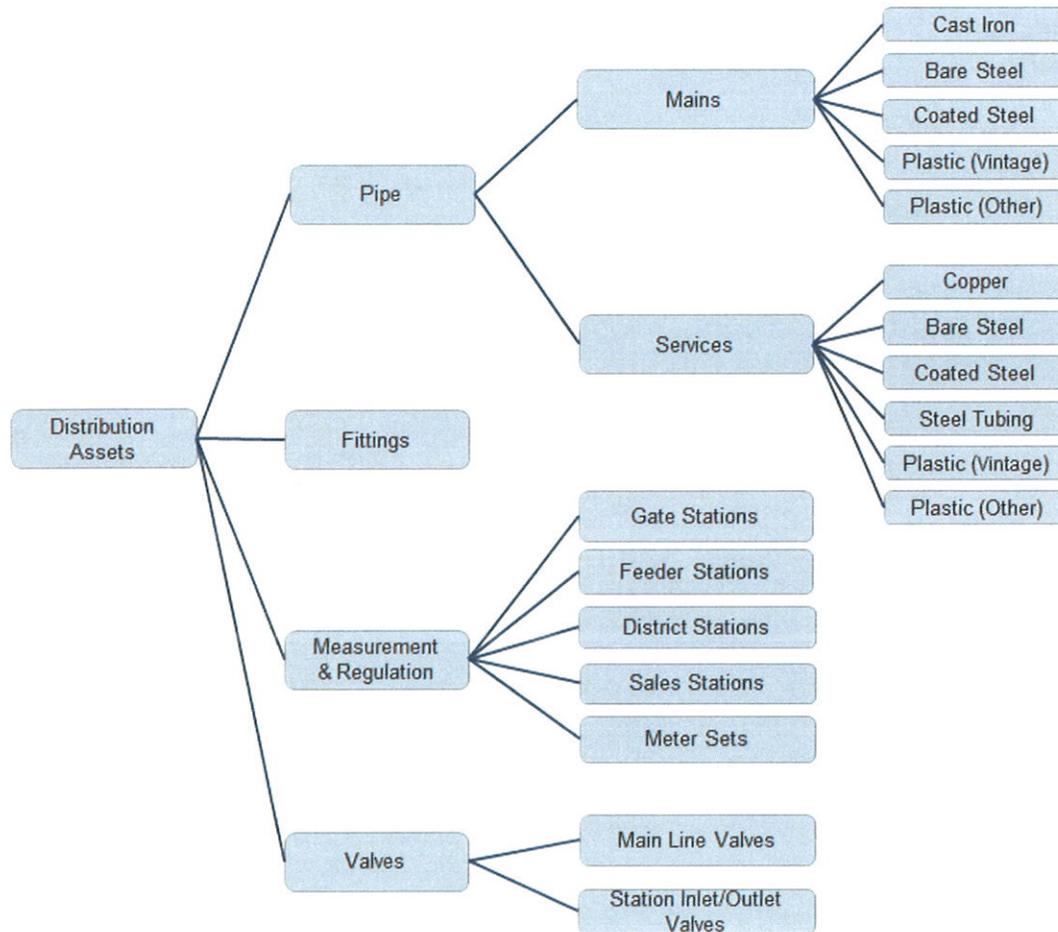


Figure 2 - Asset Taxonomy

Based on the Asset hierarchy above, Table 1 below quantifies the assets, as of March 2012.

Distribution Asset Classes		Quantity
<b>Pipe</b>		
Mains (#kms)		<b>35,181</b>
	Cast Iron	138
	Bare Steel	17
	Coated Steel	12,773
	Plastic - Vintage	3,689
	Plastic - Other	18,559
	Unclassified	5
Service Lines (#)		<b>1,947,325</b>
	Copper	6,754
	Bare Steel	30,714
	Coated Steel	159,744
	Steel Tubing	423
	Plastic - Vintage	284,892
	Plastic - Other	1,463,535
	Unclassified	1,263
<b>Measurement &amp; Regulation</b>		
Gate Stations (#)		<b>47</b>
Feeder Stations (#)		<b>19</b>
District Stations(#)		<b>4,613</b>
Sales Stations (#)		<b>9,391</b>
Customer Meter Sets (#)		<b>2,025,872</b>
<b>Main &amp; Station Valves</b>		
Main Line Valves (#)		<b>19,884</b>
Station Inlet/Outlet Valves (#)		<b>9,273</b>
Unclassified		<b>1,225</b>

Table 1 - Asset Inventory

A common reality faced by the natural gas industry is legacy records where some information about the asset that would be instructive to have is not available. In many cases this is because collection of specific types of data was not part of the records collection standard at the time of installation.

Where adequate information was not available to accurately classify the assets, they have been labeled "Unclassified".

Although fittings are recognized as an important element of EGD's asset inventory, historically these have not been recorded as separate assets, but rather associated with pipe assets. This makes it difficult to determine a precise inventory of these assets.

### 3.2 Geographic Distribution of Assets

EGD’s franchise area is divided into seven administrative areas (Areas 10, 20, 30, 40, 50, 60, 80) as shown below. All of EGD’s distribution assets reside in these areas.

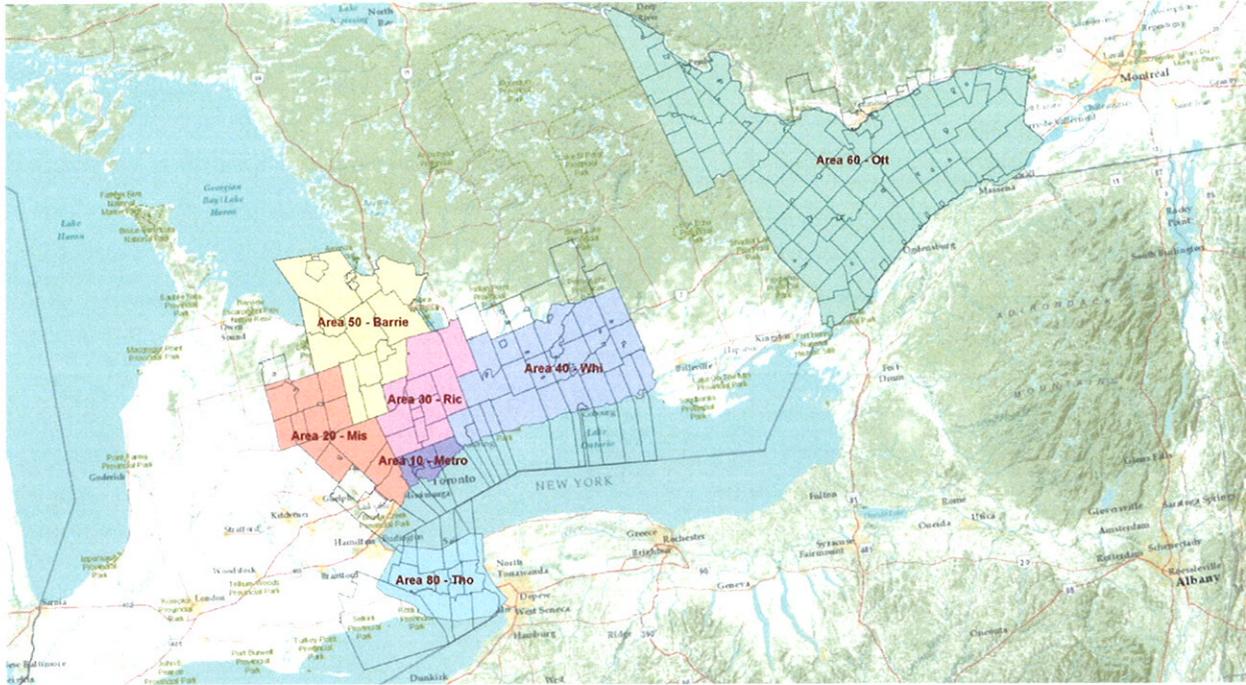


Figure 3 - EGD’s Geographic Organization

Area 10 covers Toronto. Areas 20, 30, 40 and 50 cover the remainder of the Greater Toronto area. Area 60 covers the Ottawa region, and Area 80 covers the Niagara region.

In some cases, asset requirements can vary by area based on historic and future customer growth trends, historic regional practices, geographical conditions such as topography, soil conditions, and other factors.

The asset inventory outlined in Table 1 Asset Inventory is an aggregate of assets by asset class across all areas.

### 3.3 Understanding Assets by Age

EGD, as Ontario’s oldest natural gas utility, has assets of varying age. Understanding the in-service date of the assets is important since materials degrade, and the performance characteristics of the assets can change over time. This understanding can help inform the need, scope and timing of replacement programs.

Histograms of Mains, Services and Main/Station Valves based on age follow.

#### Mains:

EGD’s distribution system has over 35,000 km of mains. Based on when these assets were installed and their material type, there are different generations or distributions of mains as shown in the chart below.

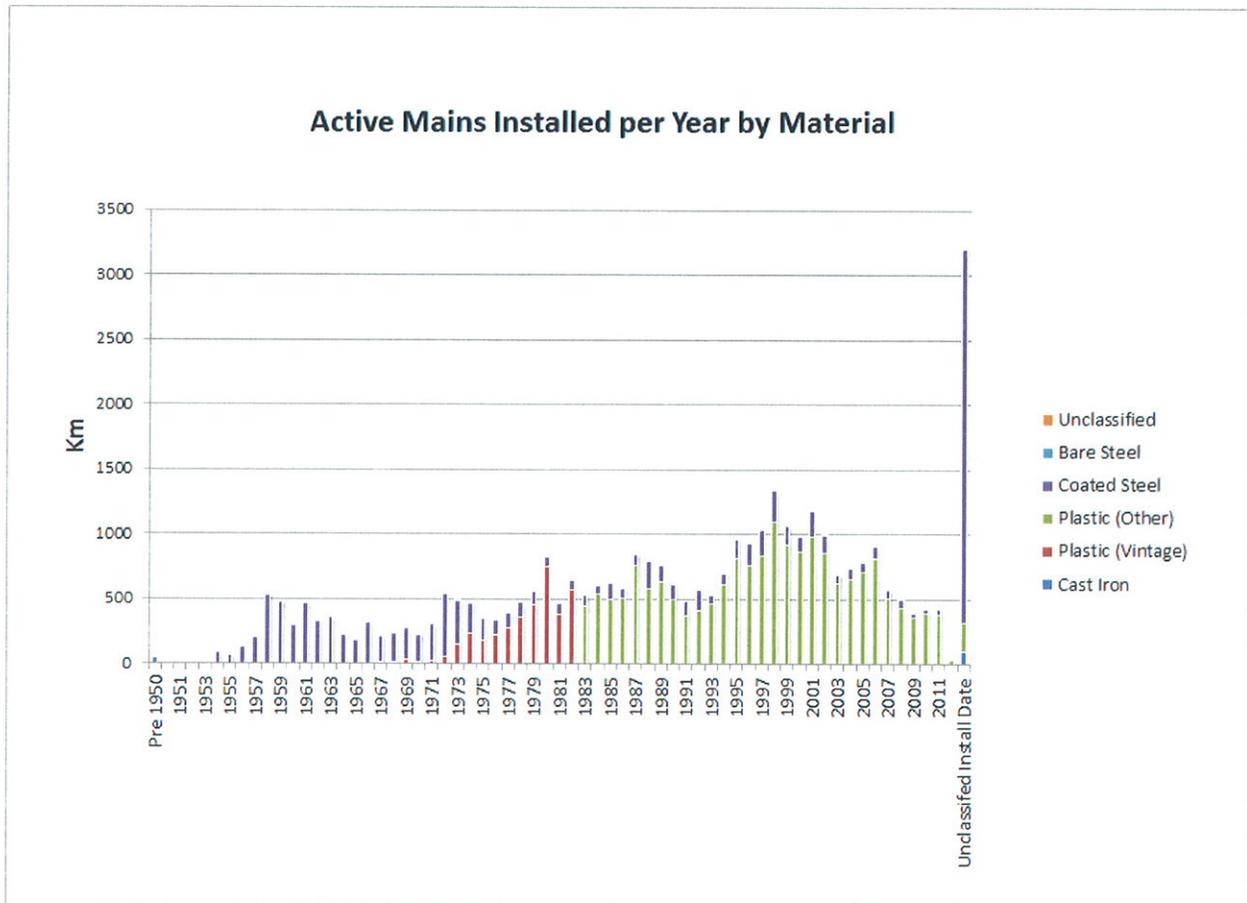


Chart 4 - Active Mains Installed by Year by Material

**Services:**

There are approximately 1.9 million active services across the franchise area. Similar to mains, there are several generations or distributions of services, based on their material type as shown in the chart below.

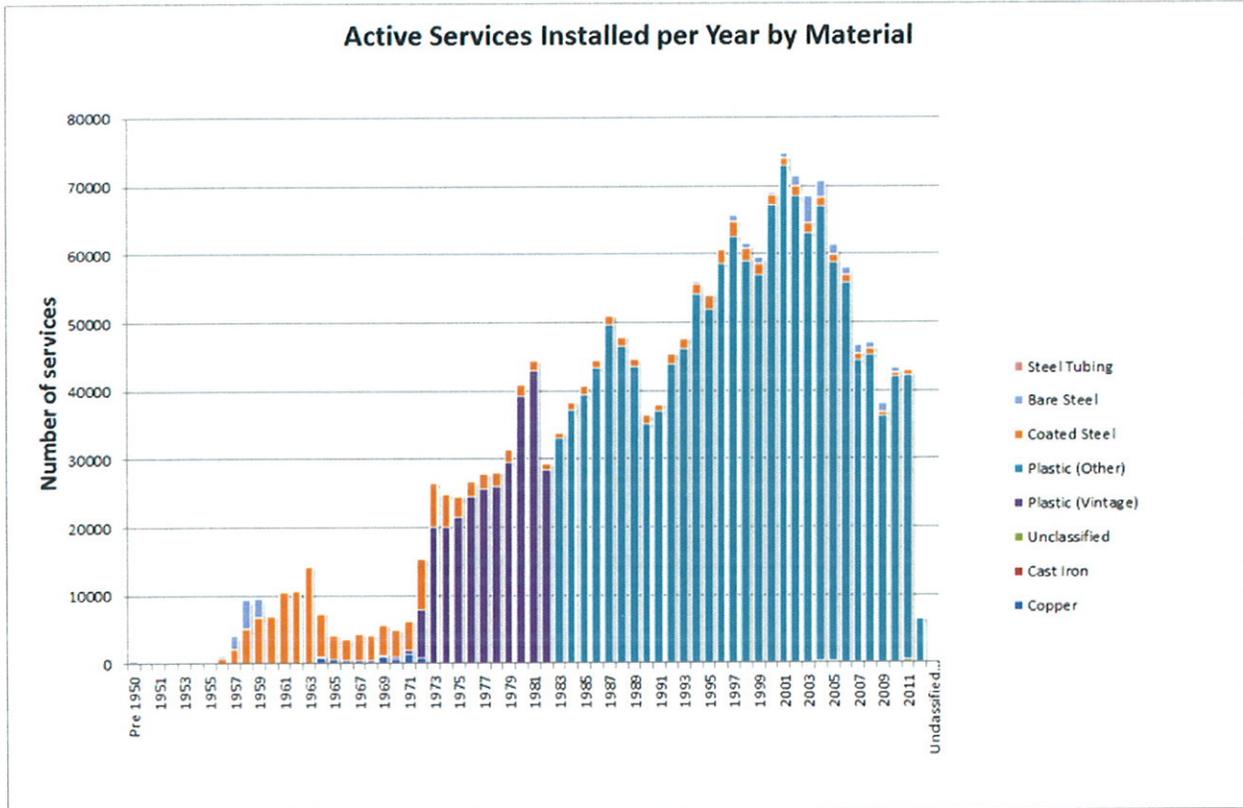


Chart 5 - Active Services Installed by Year by Material

### Main and Station Valves

There are approximately 34,000 active main and station valves across the franchise area. Approximately 95% of these valves are steel, with the remaining 5% being plastic. These valves are located in system pressure regulating facilities, in-line in mains, as well as at customer sales stations. Similar to mains and services, there are several generations or distributions of valves as depicted in the chart below.

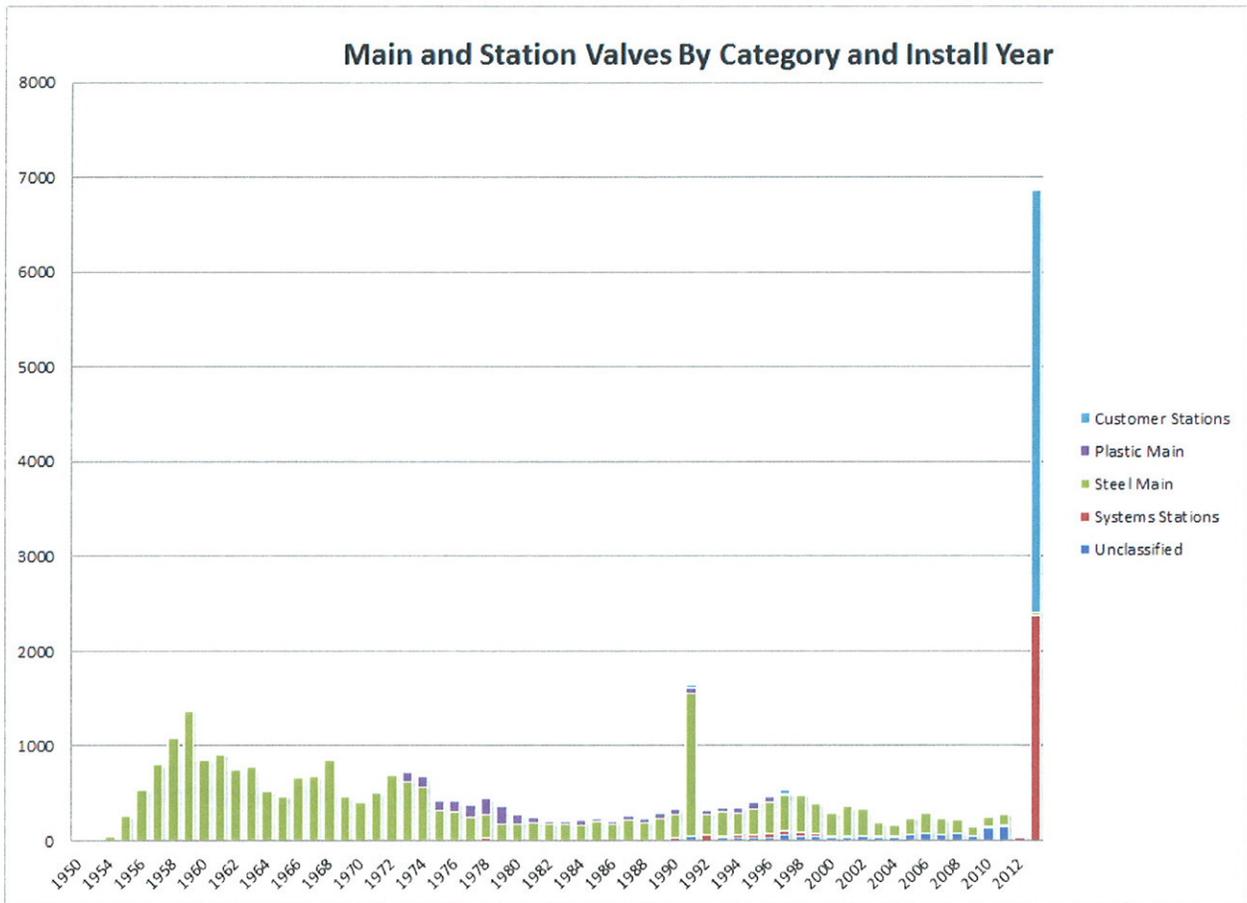


Chart 6 - Main and Station Valves by Category and Install Year

## 4. EGD's Asset Management Principles

As part of EGD's Asset Management System, several guiding principles have been developed. The principles are expressed as Objectives, Policies, and Strategies. These principles have been used to guide the development of the Asset Plan, more specifically with respect to the identification of requirements, their prioritization, and definition of plans to address requirements.

- Asset Management Objectives help align asset investments with the Company's strategic priorities
- Policies define the key considerations that should apply to ensure the effective management of the Company's assets
- Strategies define the high level approach to meet the Asset Management Objectives, consistent with the Asset Management Policies

### 4.1 Asset Management Objectives

The overall purpose of EGD's Asset Management System is to optimize the long term value of its distribution assets by achieving an effective balance of Risk, Operational Performance and Cost.

The specific objectives are:

- Safety : Continue to drive to zero incidents and property damage
- Reliability : Proactively identify and address asset related risks that can result in disruption of gas distribution service to customers
- Growth: Expand the distribution system to meet the growth in EGD's customer base in a sustainable manner
- Cost Effectiveness : Make prudent asset investment decisions while being mindful of rate payer impacts
- Environmental stewardship : Effectively manage the lifecycle of the Company's assets to reduce their environmental impact
- Compliance : Meet all applicable industry and regulatory requirements related to management of assets

## 4.2 Asset Management Policies

Enbridge Gas Distribution is committed to the safe, reliable, cost effective and environmentally responsible provision of gas distribution and services. At the core of this commitment is the effective stewardship of the company's distribution assets. It is through these assets that the company ultimately provides value to all of its stakeholders.

The following are policies that EGD has established to effectively manage its distribution assets:

1. The Company shall use the Asset Manager – System Operator model as the fundamental organizational construct to manage and operate its assets. This model provides a clear separation of accountabilities such that the Asset Manager is primarily responsible for decisions related to asset investments, while the System Operator executes building and operating the assets in the most efficient manner
2. The Company is committed to making all asset-related decisions on the basis of striving to achieve the appropriate balance of Risk, Operational Performance and Cost
3. The Company is committed to the regular assessment of risks associated with its assets, and ensuring that these risks are effectively managed
4. The Company acknowledges that asset information is critical to the effective management of its assets. Therefore, the organization shall ensure that its processes, systems and controls collectively strive to deliver complete, timely, accurate, verifiable and accessible asset information
5. The Company shall have an Asset Plan that is consistent with its key priorities. This plan will be reviewed, revised and ratified on an annual basis
6. The Company is committed to managing every stage in the lifecycle of its assets in compliance with all applicable laws and regulations, industry codes of practice, and internal company policies

### 4.3 Asset Management Strategies

The following table summarizes the high level strategies that have been developed by Management to address the asset requirements included in this Asset Plan.

Type of Investment	Strategies
Customer Additions	<ul style="list-style-type: none"> <li>• The strategy for customer additions is to add all customers in existing and new communities that meet feasibility guidelines</li> </ul>
Reinforcements	<ul style="list-style-type: none"> <li>• Reinforce existing distribution assets to ensure that the system has the capacity to reliably meet current and future customer load demand</li> <li>• Ensure security of supply by enhancing the flexibility of the system to address disruptions in upstream supply or failures with major components of the system</li> </ul>
System Integrity & Reliability	<ul style="list-style-type: none"> <li>• Replace existing assets that are near the end of their useful life</li> <li>• Conduct studies to improve understanding of the condition of specific classes of assets where risks have been identified. Leverage these studies to develop mitigation plans, including risk prioritized replacement, repair or monitoring programs</li> <li>• Comply with all applicable rules and regulations related to system integrity and safety</li> <li>• Enhance the integrity of distribution asset records to reduce operational risk</li> <li>• Enhance our understanding of the condition of our critical assets by expanding the scope of inline inspection programs to include select XHP lines operating over 20% Specified Minimum Yield Strength (SMYS), consistent with current industry best-practices</li> <li>• Enhance the safety and reliability of our critical assets by verifying the Maximum Allowable Operating Pressure (MAOP) of targeted lines</li> <li>• Protect the distribution assets from damages through enhanced monitoring, installation of protective equipment, and the implementation of programs to address specific risks such as sewer laterals</li> </ul>

	<ul style="list-style-type: none"> <li>• Enhance the capability to effectively isolate portions of the system to minimize the impact of planned or unplanned service disruptions</li> <li>• Continue with existing programs already in place to address operational and asset risks and compliance requirements</li> </ul>
Relocations	<ul style="list-style-type: none"> <li>• The need to relocate EGD assets is primarily driven by external parties such as municipal authorities. EGD’s strategy is to meet these relocation requirements in the most cost-effective way while recovering costs allowed by franchise and other agreements</li> </ul>

Table 2 - Asset Management Strategies

## 5. Asset Management Requirements

This section of the Asset Plan defines:

- The known, and anticipated requirements related to our assets
- The approach to fulfill these requirements, consistent with the Company's Asset Management Objectives, Policies and Strategies
- Estimates of the financial investments needed to meet these requirements

### 5.1 Overview of Requirements

The following diagram depicts the four primary types of asset-related capital investments that are required over the term of the asset plan.

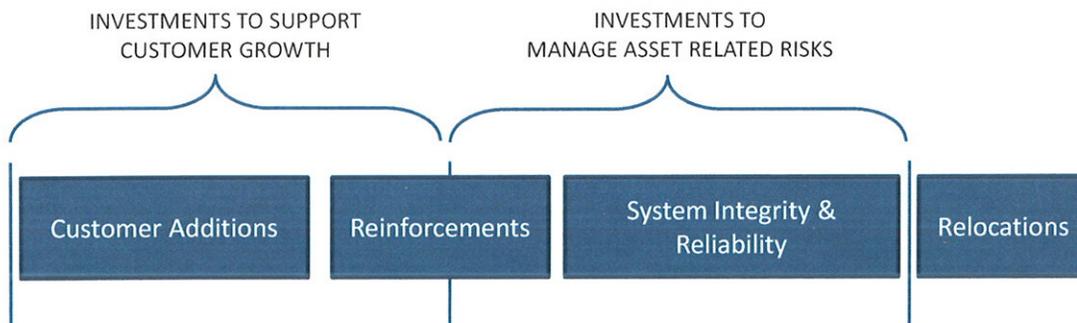


Figure 4 - Types of Asset Related Capital Investments

#### Customer Additions:

EGD is obligated to meet its customer growth demand by attaching customers that meet feasibility guidelines. Each year, there are several thousand Customer Addition projects that accomplish this. Customer Addition projects typically involve installing new segments of mains, installing services, and related meter sets.

In some cases, new Measurement & Regulation equipment such as stations need to be added or existing equipment needs to be upgraded due to increased loads.

**Reinforcements:**

Reinforcements increase the capacity and operating flexibility of the distribution system. They primarily refer to Mains. These projects are driven by Customer Growth and/or System Integrity & Reliability requirements.

**System Integrity & Reliability:**

In order to ensure safety and reliability, assets need to be effectively monitored, and risks need to be addressed in a proactive manner. There are a number of programs currently in place that address known risks. As new risks are identified, existing programs may need to be amended, or new programs may need to be established. Before amending existing programs or establishing new programs, studies are necessary to validate the requirements.

**Relocations:**

Distribution assets generally need to be relocated for reasons such as road-widening and other municipal or third party construction projects. The requirement and timing for these Relocation projects are primarily driven by municipal authorities. EGD recovers a portion of the capital investments for such projects.

## 5.2 Customer Additions

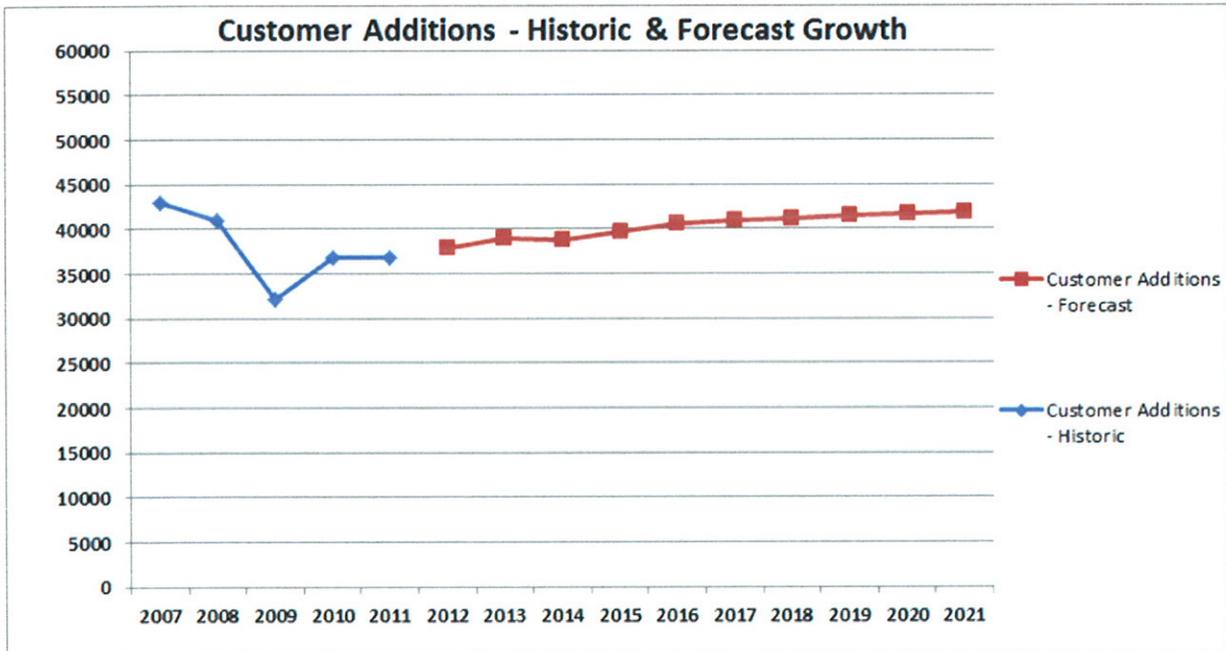
### Requirements

EGD has experienced significant customer growth in its franchise area. This growth is expected to continue in the future.

The customer additions forecast at EGD is developed using a number of information sources:

1. Projections of potential customer growth resulting from current projects in different geographical areas of operation based on information from builders, developers and municipalities
2. Projections for customer growth based on housing start forecasts and other economic factors such as GDP growth, employment, and mortgage rates
3. Projections developed by external consultants specializing in population growth forecasting, as well as municipality long term plans

The following chart depicts the historic customer additions and the forecast for the term of the Asset Plan.



2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
42920	41052	32089	36902	36753	37927	38896	38725	39752	40540	41014	41236	41483	41760	41882

Chart 7 - Customer Additions: Historic & Forecast Growth

The pace of customer growth is expected to continue from 2012 to 2021.

- The majority of these customer additions will be for new residential customers in existing communities
- Toronto (Area 10) will see approx. 10% of the annual customer additions. The Niagara region (Area 80) is expected to see the smallest share of these customer additions – under 3%. The Ottawa region (Area 60) will see approximately 20%. Over 60% of the new customer additions are expected to take place in the GTA, representing Areas 20, 30, 40 and 50. This in turn will inform when and where reinforcements to the system may be required

### Implementation Plan & Estimated Capital Investments

Generally, there are three components of capital investments needed to support the customer additions requirements:

- Installation costs related to Mains, Services and Meters
- Material costs related to Mains, Services and Meters
- Cost related to Measurement & Regulation equipment required to support customer growth

The following chart depicts the historic capital spend on customer additions and the forecast spend for 2012-2021 based on the customer addition forecast numbers.

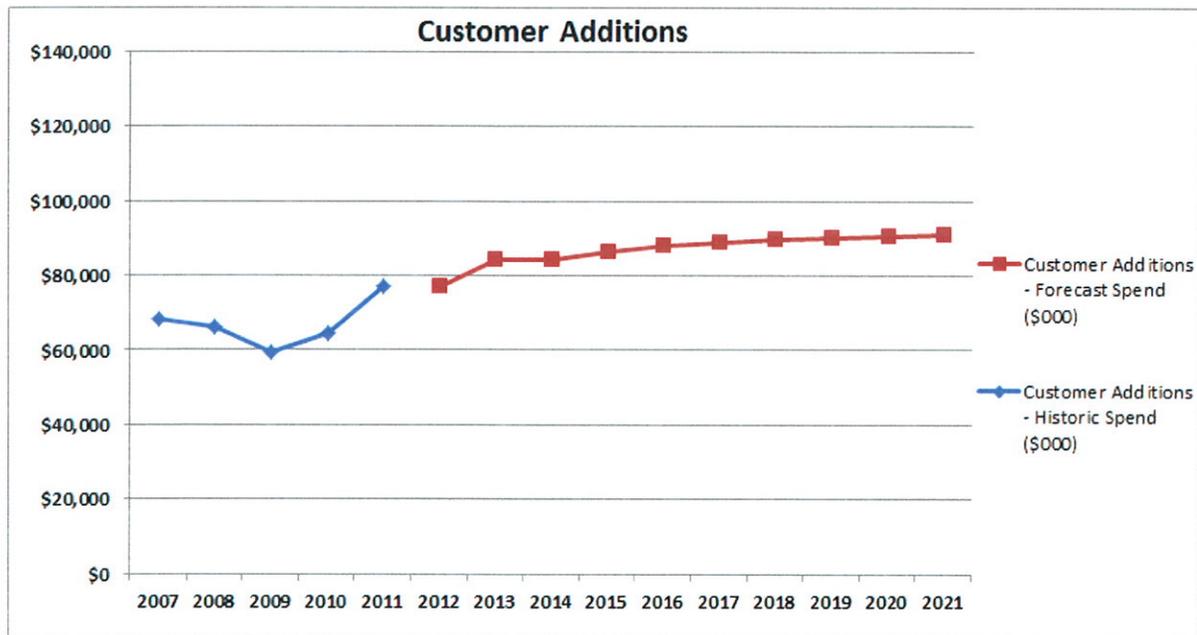


Chart 8 - Customer Additions: Historic & Forecast Capital Spend

## 5.3 Reinforcements

### Requirements

Reinforcement requirements are primarily driven by Customer Growth and System Integrity & Reliability considerations.

As part of the Asset Planning process, network analysis is performed to establish the need and timing for reinforcements within each of the operating areas that make up EGD's franchise area as defined in Section 3.2 - Geographic Distribution of Assets.

#### **Routine Reinforcements:**

Reinforcements to the distribution system are required to ensure that the system can continue to reliably deliver the gas load required by existing and new customers.

The basic objective at EGD for network design is that the system must meet anticipated peak demand at a temperature-dependent design condition. All load additions to the system are modeled based on this design temperature.

To determine the timing of the necessary reinforcements, yearly load additions are modeled by geographical area. Reinforcements are specified based on the system's ability to meet minimum system pressures at key control locations. The ultimate design is based on a minimum of 10 years of customer growth with due consideration given to 20 years of growth, security of supply, and operational flexibility.

This analysis yields the specific reinforcement projects in the following table. In addition, other reinforcements that have not been previously identified will be required from time to time. A provision has been made in the implementation plan to account for these.

The following is a summary of the known requirements by area as of December 2011.

AREA	PROJECT DESCRIPTION
<b>Area 10</b>	4.2 km of HP on Bathurst from Steeles to Sheppard & 3.5 km E on Sheppard to Bayview plus a new HP to IP District Station
	4.0 km of NPS 12" HP from Node 1802294 to 1802241 to 1801503, On Oriole from Roselawn to Kilbarry to Roxborough
	4.5 km of NPS 12" HP from Node 1803252 to 1890057, On Spadina from MacPherson to Lakeshore
	3.5 km of NPS 16" HP Steel Main from New Bayview Station to existing NPS 24" HP Main at Avenue /McPherson
	2.5 km of NPS 16" HP from Node 1803363 to 1900043 from Victoria Park on Dawes to Woodbine & Strathmore
<b>Area 20</b>	Install approximately 2500m of 4" XHP on Mayfield east to Airport Rd
	Install approximately 1000m of NPS 6 ST HP on Hurontario from Steeles to County Court
	Install approx 5 km of NPS 8 XHP from the newly elevated Bondhead line northbound to increase the pressure in Dundalk and Shelburne
	Replace 1181.5m of NPS 4 with NPS 8 on Hurontario, from Steeles to County Court
	Replace 1279.9m NPS 4 with NPS 8 from 1803184 to 1802257
	Install 253.7m NPS 6 connect 21820195 to NPS 24 PineValley line (Mississauga Rd close to CNR)
<b>Area 30</b>	Scarborough Reinforcement - Phase 2 Station Installation
	Install 1200m NPS 12 HP main in new development to avoid construction on Steels and crossing of Rouge
	Install approximately 2000m of XHP NPS 8 ST on Carrville from Bathurst to Yonge
	Install approximately 1400m of NPS 4 ST on Keele from McNaughton to Teston
	Install 7400m of NPS 16 on Woodbine, from Victoria Square to Bloomington
	Install 1050m of NPS 4 on 6th Concession, from Silver Spring Cres to Old Stouffville Sdrd
	Install 200m of NPS 4 on Holburn, from Leslie to Woodbine
	Install 570m of NPS 8 on 16th Ave, from Granton to Spadina
	Install 1200m of NPS 8 on Hwy 7, from stn# 33027 to Woodbine
	Install 2200m of NPS 8 on 19th Ave, from 9th Line to Reesor
	Install 6500m of NPS 16 on Woodbine, from Bloomington to St. Johns Sdrd
Install 6800m of NPS 8 on Glenwoods/Warden, from Woodbine to Bethel Sdrd	

AREA	PROJECT DESCRIPTION
<b>Area 40</b>	Peterborough Reinforcement Phase 1 - Install approximately 1.5 km of NPS 8
	Peterborough Reinforcement Phase 2 - Install approximately 2.4 km of NPS 8 on Preston from the terminus of Phase 1 north to Mount Pleasant at Hwy 7
	Peterborough Reinforcement Phase 3 - Install 1.9 km of NPS 8 ST XHP on HWY 7 from north of Mt Pleasant to Lily Lake
	Kingston Road Reinforcement, install 2.4 km of NPS 4 ST XHP from Lakeridge to Salem with Station
	Approx 8 km NPS 12 XHP, to support OPG and Durham EFW
	Install 300m of NPS 4 ST HP on Whites from south of HWY 401 to Oklahoma Drive, Pickering
	Replace 1.8 km of NPS 12 XHP main with 1.8km of NPS 16 XHP from Oshawa gate to Conlin and Wilson
	NPS 8XHP reinforcement - Kawartha Ethanol Reinforcement - Phase 2 & 3
	Install 2.8 km of NPS 8 ST HP main from ex NPS 8 HP main on at Brock & Kingston, Pickering to Ex.NPS 6 ST HP main at Westney and Kingston Rd in Pickering
<b>Area 50</b>	Alliston Reinforcement, 9 km NPS 8
	Angus Reinforcement
	Alliston Reinforcement Phase 2, 1.5 km NPS 8
	Stayner Second source, NPS 4 XHP with Station
	Alliston Reinforcement Phase 3, 2.8 km NPS 8
	Install 400m of NPS 4 on Hwy 27, from Hwy 9 south, with XHP to HP station Schomberg
	Alliston Reinforcement Phase 4, 3 km NPS 6
<b>Area 60</b>	Approx. 900m OF NPS 8 ST XHP River Crossing @ Woodroofe & Hwy.# 16 towards River Rd
	Mitch Owens Rebuild and install 2 km NPS 4 XHP
	Ottawa Innes Road Replacement - Replace 3.0 km of NPS 8 main with NPS 12, and remove an existing system bottleneck while ensuring a mandated inspection or elimination of high stress pipeline is completed by Dec 2013
	Pressure elevate HP network 6597 feeding Richmond to XHP, approx. 5300m of NPS 4 ST
	Approx. 6700m of NPS 20 ST HP pipe from Greenbank to Rideau Heights
<b>Area 80</b>	Chippawa Creek Road Reinforcement, Replace approx. 400m of NPS 6 ST HP with NPS 12 ST HP

Table 3 - Routine Reinforcements

## Major Reinforcements:

In addition to the routine reinforcements, from time to time major reinforcements of the extra-high pressure grid mains that form the major backbone of the distribution system are required to further support customer growth and address significant system reliability and security of supply issues. These reinforcements are characterized by their size and complexity, and do not arise as frequently as the routine reinforcements.

Analysis of the supply chain and failure risks within the supply chain has indicated the potential for significant customer outages under certain upstream and downstream upset conditions affecting areas of high population densities, including the GTA and the Ottawa region.

This has led to the identification for the need of two major reinforcements in the 10-year planning horizon of this Asset Plan:

- The GTA Project will address these concerns for the Greater Toronto Area
- The Ottawa Reinforcement will address similar concerns for the Ottawa area

While these projects have been included within this Asset Plan, further details will be provided in the Leave-To-Construct applications that will be filed for each of these projects later in 2012.

The following is a summary of the Major Reinforcements.

PROJECT	PROJECT DESCRIPTION
<b>GTA Project</b>	Upgrading the XHP grid system in the Greater Toronto Area to meet load growth, ensure continued reliability and enable access to lower cost natural gas supplies
<b>Ottawa Reinforcement</b>	Ottawa Reinforcement Pre-Engineering
	Approx. 19300m of NPS 24 ST XHP pipe from Richmond Gate Station, North easterly to Greenbank
	Ottawa Reinforcement additional construction costs

Table 4 - Major Reinforcements

## Implementation Plan & Estimated Capital Investments

Based on the reinforcement requirements, an implementation schedule was developed for reinforcement projects over the term of the Asset Plan. An estimate was also developed for the capital spend required for each of the projects. The following is a summary of this schedule.

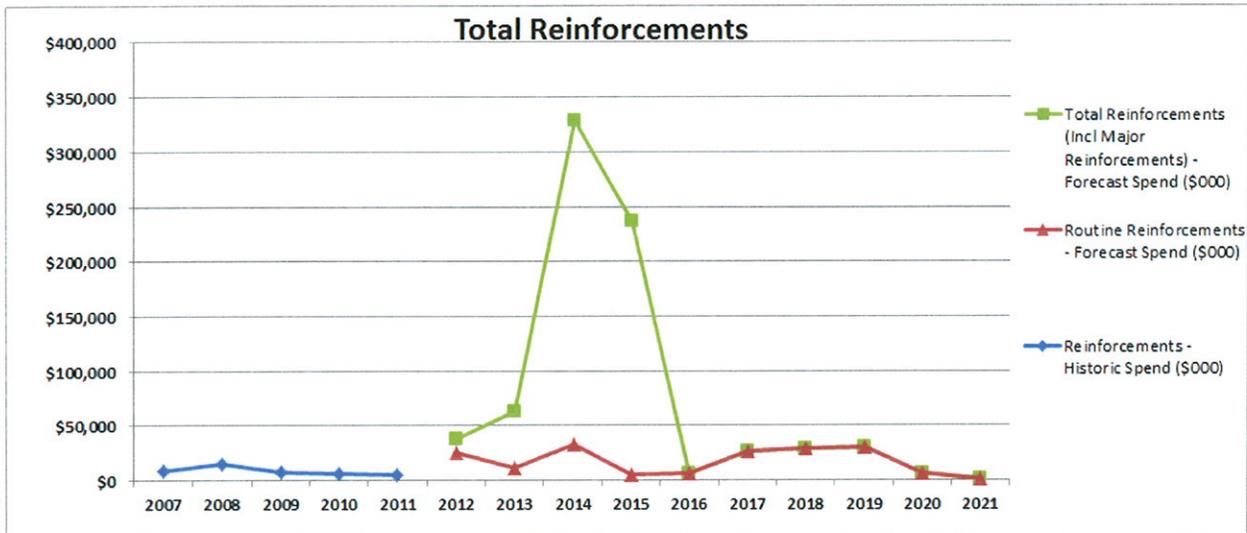
**Routine Reinforcements:**

AREA	PROJECT DESCRIPTION	Dates	Forecast (2012-2021)									Forecast (2012-2021) (\$000)			
			2012	2013	2014	2015	2016	2017	2018	2019	2020		2021		
Area 10	4.2 km of HP on Bathurst from Steeles to Sheppard & 3.5 km E on Sheppard to Bayview plus a new HP to IP District Station	2018							A-10						\$9,000
	4.0 km of NPS 12" HP from Node 1802294 to 1802241 to 1801503, On Oriole from Roselawn to Kilbarry to Roxborough	2018							A-10						\$6,000
	4.5 km of NPS 12" HP from Node 1803252 to 1890057, On Spadina from MacPherson to Lakeshore	2019									A-10				\$7,000
	3.5 km of NPS 16" HP Steel Main from New Bayview Station to existing NPS 24" HP Main at Avenue /McPherson	2017							A-10						\$20,000
	2.5 km of NPS 16" HP from Node 1803363 to 1900043 from Victoria Park on Dawes to Woodbine & Strathmore	2019									A-10				\$5,000
Area 20	Install approximately 2500m of 4" XHP on Mayfield east to Airport Rd	2012	A-20												\$1,000
	Install approximately 1000m of NPS 6 ST HP on Hurontario from Steeles to County Court	2012	A-20												\$750
	Install approx 5 km of NPS 8 XHP from the newly elevated Bondhead line northbound to increase the pressure in Dundalk and Shelburne	2012	A-20												\$1,900
	Replace 1181.5m of NPS 4 with NPS 8 on Hurontario, from Steeles to County Court	2017							A-20						\$1,000
	Replace 1279.9m NPS 4 with NPS 8 from 1803184 to 1802257	2019									A-20				\$1,000
	Install 253.7m NPS 6 connect 21820195 to NPS 24 PineValley line (Mississauga Rd close to CNR)	2020										A-20			\$250
Area 30	Scarborough Reinforcement - Phase 2 Station Installation	2012	A-30												\$751
	Install 1200m NPS 12 HP main in new development to avoid construction on Steeles and crossing of Rouge	2012	A-30												\$1,000
	Install approximately 2000m of XHP NPS 8 ST on Carrville from Bathurst to Yonge	2013		A-30											\$1,900
	Install approximately 1400m of NPS 4 ST on Keele from McNaughton to Teston	2012	A-30												\$560
	Install 7400m of NPS 16 on Woodbine, from Victoria Square to Bloomington	2014			A-30										\$15,000
	Install 1050m of NPS 4 on 6th Concession, from Silver Spring Cres to Old Stouffville Sdrd	2016						A-30							\$400
	Install 200m of NPS 4 on Holburn, from Leslie to Woodbine	2017							A-30						\$600
	Install 570m of NPS 8 on 16th Ave, from Granton to Spadina	2018								A-30					\$600
	Install 1200m of NPS 8 on Hwy 7, from stn# 33027 to Woodbine	2018									A-30				\$800
	Install 2200m of NPS 8 on 19th Ave, from 9th Line to Reesor	2018									A-30				\$1,600
	Install 6500m of NPS 16 on Woodbine, from Bloomington to St. Johns Sdrd	2019										A-30			\$14,000
	Install 6800m of NPS 8 on Glenwoods/Warden, from Woodbine to Bethel Sdrd	2020											A-30		\$5,000

AREA	PROJECT DESCRIPTION	Dates	Forecast (2012-2021)									Forecast (2012-2021) (\$000)										
			2012	2013	2014	2015	2016	2017	2018	2019	2020		2021									
Area 40	Peterborough Reinforcement Phase 1 - Install approximately 1.5 km of NPS 8	2012	A-40																		\$485	
	Peterborough Reinforcement Phase 2 - Install approximately 2.4 km of NPS 8 on Preston from the terminus of Phase 1 north to Mount Pleasant at Hwy 7	2012	A-40																			\$1,900
	Peterborough Reinforcement Phase 3 - Install 1.9 km of NPS 8 ST XHP on HWY 7 from north of Mt Pleasant to Lily Lake	2014			A-40																	\$1,500
	Kingston Road Reinforcement, install 2.4 km of NPS 4 ST XHP from Lakeridge to Salem with Station	2013		A-40																		\$1,000
	Approx 8 km NPS 12 XHP, to support OPG and Durham EFW	2014			A-40																	\$12,000
	Install 300m of NPS 4 ST HP on Whites from south of HWY 401 to Oklahoma Drive, Pickering	2015				A-40																\$200
	Replace 1.8 km of NPS 12 XHP main with 1.8km of NPS 16 XHP from Oshawa gate to Conlin and Wilson	2016					A-40															\$3,500
	NPS 8XHP reinforcement - Kawartha Ethanol Reinforcement - Phase 2 & 3	2012	A-40																			\$2,200
	Install 2.8 km of NPS 8 ST HP main from ex NPS 8 HP main on at Brock & Kingston, Pickering to Ex.NPS 6 ST HP main at Westney and Kingston Rd in Pickering	2017								A-40												\$2,500
Area 50	Alliston Reinforcement, 9 km NPS 8	2012	A-50																		\$4,660	
	Angus Reinforcement	2012	A-50																		\$6,000	
	Alliston Reinforcement Phase 2, 1.5 km NPS 8	2014			A-50																\$1,150	
	Stayner Second source, NPS 4 XHP with Station	2013		A-50																	\$750	
	Alliston Reinforcement Phase 3, 2.8 km NPS 8	2015				A-50															\$1,989	
	Install 400m of NPS 4 on Hwy 27, from Hwy 9 south, with XHP to HP station Schomberg	2017								A-50												\$500
	Alliston Reinforcement Phase 4, 3 km NPS 6	2019														A-50					\$1,917	
Area 60	Approx. 900m OF NPS 8 ST XHP River Crossing @ Woodrooffe & Hwy.# 16 towards River Rd	2012	A-60																		\$1,600	
	Mitch Owens Rebuild and install 2 km NPS 4 XHP	2012	A-60																		\$950	
	Ottawa Innes Road Replacement - Replace 3.0 km of NPS 8 main with NPS 12, and remove an existing system bottleneck while ensuring a mandated inspection or elimination of high stress pipeline is completed by Dec 2013	2013		A-60																		\$6,000
	Pressure elevate HP network 6597 feeding Richmond to XHP, approx. 5300m of NPS 4 ST	2017								A-60											\$200	
	Approx. 6700m of NPS 20 ST HP pipe from Greenbank to Rideau Heights	2018														A-60					\$10,000	
Area 80	Chippawa Creek Road Reinforcement, Replace approx. 400m of NPS 6 ST HP with NPS 12 ST HP	2013		A-80																	\$400	
Contingency for Reinforcements	Contingency to account for additional Reinforcement requirements that might come up within each year	2012-2021																		\$18,250		

Figure 5 - Routine Reinforcements: Implementation Schedule & Cost





	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Routine Reinforcements (\$000)						\$24,756	\$11,550	\$32,400	\$4,939	\$6,650	\$26,300	\$29,500	\$30,417	\$6,750	\$1,500
Total Reinforcements (\$000)	\$8,795	\$14,710	\$8,061	\$7,054	\$4,742	\$37,883	\$62,667	\$329,146	\$236,839	\$6,650	\$26,300	\$29,500	\$30,417	\$6,750	\$1,500

Chart 10 - Total Reinforcements: Historic & Forecast Capital Spend

At this time, the forecast of costs for the GTA project for 2014 and 2015 are still being refined, and the estimates are only available as a range. The chart above assumes the mid-point of the estimated range.

## 5.4 System Integrity & Reliability

### The Need for Integrity Management

A critical responsibility in managing a natural gas distribution system is to understand potential threats to the safety and reliability of the system. Threats to the system can manifest risks (defined as a combination of likelihood and impact), which if not appropriately managed, can lead to serious incidents.

In general, risks associated with gas distribution assets occur when there is a loss of containment of gas from the system. Two basic characteristics of natural gas are that it is lighter than air and when it is released from containment, it will follow the path of least resistance. In most cases, a release of gas will result in the gas escaping to the atmosphere with minor consequences. However, if the gas ignites or if the release of gas follows a path of least resistance to a confined space, increasing the probability of ignition, serious consequences can result. There are several threats to a gas distribution system, such as third party damages, corrosion or degradation, equipment malfunction, etc. which can result in a loss of containment of gas from the system.

In terms of System Integrity, EGD must meet its regulatory obligation to comply with the CSA Z662 Oil and Gas Pipeline Systems standard. EGD will be required to comply with Annex N of the 2011 edition of this standard, Integrity Management Programs and Activities, when the Technical Standards and Safety Authority (TSSA) adopts the standard, likely later this year. At this time, EGD is required to comply with a form of Annex N that is included in the current standard.

The following figure depicts the requirements of Annex N. To ultimately comply with this regulation, EGD must plan, assess, act, measure and improve its management of integrity on a continuous improvement cycle.

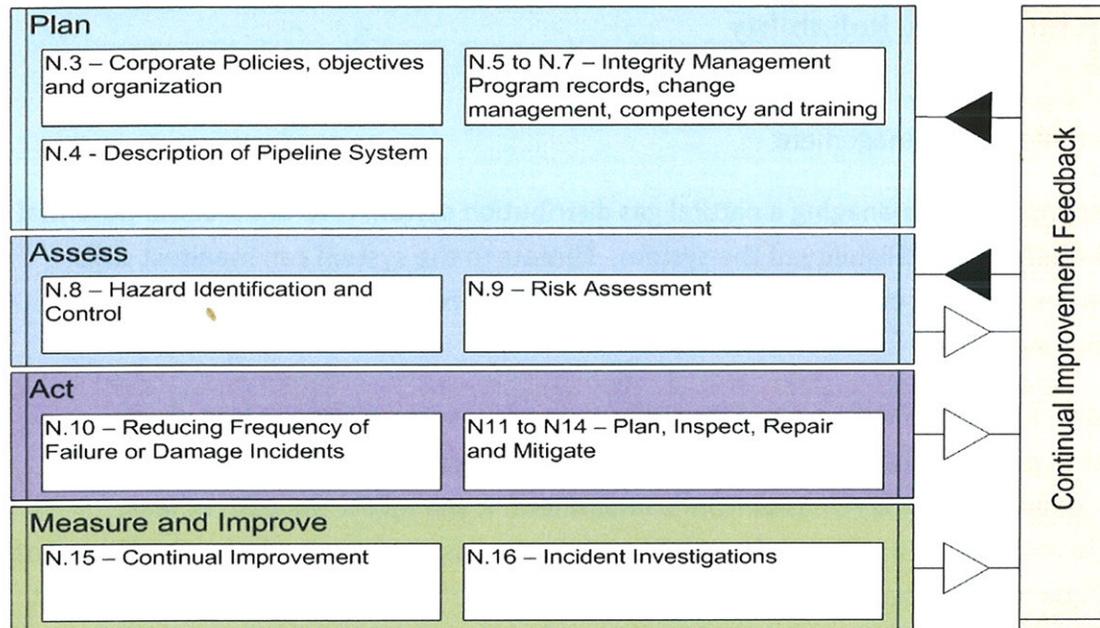


Figure 7 - Elements of CSA Z662 Annex N

In addition, recent events in the natural gas industry, such as the tragic San Bruno explosion in September 2010, the Philadelphia explosion in January 2011, and the Allentown explosion in February 2011, have resulted in increased focus on public safety. Lessons learned from these tragedies are expected to lead to changes in legislation and standards as the industry and regulators seek to minimize the chances of incidents occurring in the future.

### EGD's Evolving Integrity Management Practice

Threats to the gas distribution system have existed from the inception of the industry. EGD has practiced a form of asset management to address integrity issues throughout its history. Integrity Management practices have focused on a wide variety of mitigation programs, including ongoing leak detection and damage prevention programs supported by effective emergency response processes to reactively respond to leaks and damages. In some cases, Integrity Management practices have been directed at proactively addressing specific assets that posed significant risks such as cast iron or bare steel mains and services.

In the case of cast iron, leak and failure rates due to cracking were significantly higher than with newer plastic and steel components. Assessing these risks led to a long term program to replace cast iron on a risk prioritized basis. Similarly, bare steel mains are approaching the end of their useful life due to corrosion failure. Therefore, a replacement program was also initiated

to replace EGD’s bare steel mains. Both the Cast Iron and Bare Steel Main Replacement Programs are due to be completed in 2012.

Learning from these experiences and consistent with an Asset Management System approach, EGD has been working to adopt a broader risk based decision making approach to Integrity Management. This is not only consistent with a best practice industry trend, it is consistent with the evolution of regulations from a traditional “prescriptive” approach to a “goal oriented” or “risk based” approach. Annex N of CSA Z662 is an example of regulation that is evolving in this direction.

A risk based approach can be defined as a comprehensive and defensible process to identify threats, assess the potential risks from those threats, prioritize these risks and specify appropriate asset investments to mitigate likelihoods and impacts to effectively manage the risks.

The following figure is a high level representation of a risk based Integrity Management process.

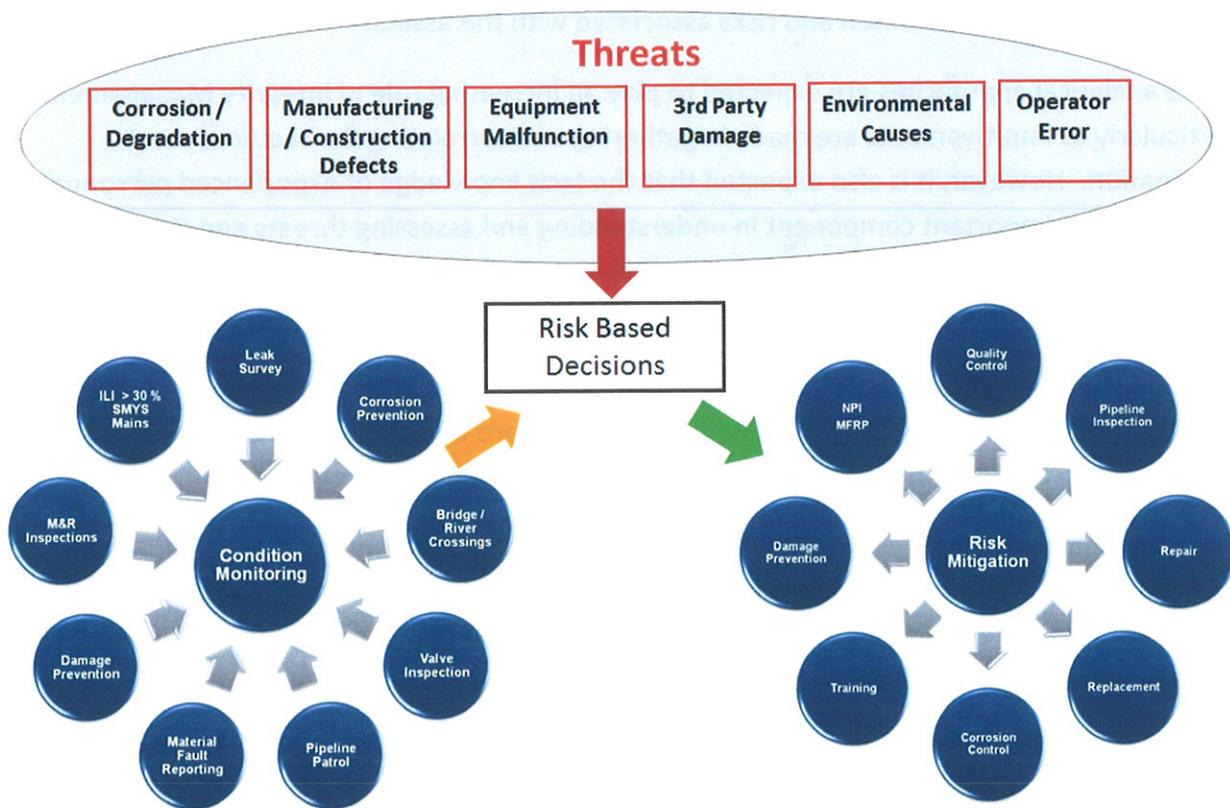


Figure 8 - Threats, Condition Monitoring and Risk Mitigation Programs

Following this risk based approach, EGD has been striving to better understand threats and related risks to the distribution system. One area of focus has been working to gain a better understanding of the condition of different classes of assets that comprise the system based on factors such as the age profile of the assets. As assets age, failure rates are anticipated to increase with the failure profile becoming more acute as the assets approach the end of their useful life. This increasing failure profile is expected to drive an increasing spend profile to maintain and ultimately replace the assets.

EGD has also been striving to improve the condition monitoring of its assets to better understand the factors that contribute to failure rates. For the past five years, since Distribution System Integrity Management Programs have been mandated through the CSA standard and the TSSA, EGD has been working to comprehensively and proactively analyze asset condition and assess which threats contribute to higher failure rates.

In the past, this form of analysis has at times been limited by the availability and completeness of the required asset information, which occurs throughout the industry. EGD continues to seek to improve its capture of asset information, which in turn continues to yield improved understanding of the condition and risks associated with the assets.

These analytical approaches are expected to play an increasing role in Integrity Management, particularly as improvements are made in gathering and correlating the required asset information. However, it is also expected that the tacit knowledge of experienced personnel will remain an important component in understanding and assessing threats and risks, prioritizing these risks and defining the mitigations needed to effectively manage these risks. Industry developments and trends will also continue to play an important role.

In summary, this evolving Integrity Management approach is intended to help ensure that EGD can continue to comply with current and future regulations and that EGD is constantly working to continue to reduce overall asset risks in a cost effective manner over time.

The development of the System Integrity and Reliability Requirements section of this Asset Plan has leveraged this Integrity Management work done to-date. It has also helped to focus these efforts and draw them together into a more formal Integrity Management process which will continue to evolve with subsequent iterations of the Asset Plan.

## Theory Applied

As mentioned above, EGD has been comprehensively and proactively analyzing asset condition and failure incidents.

One trend that has been identified is the increased failure rate of a particular component, corrosion of the copper service riser immediately downstream of an AMP fitting (AMP fitting failure). A graph of the growing trend of AMP fitting failures is shown in the chart below. EGD has a Material Fault Program, under which field workers submit material failures so that the Company can physically evaluate why a component has failed through an analysis performed by EGD's Engineering Materials Evaluation Centre (EMEC). The increased trend of material faults on this asset highlighted an emerging risk. Further analysis through EGD's Work and Asset Management System identified the full scope of the issue. The red bars on the graph show the Material Fault Report submissions for AMP fitting failures. The green bars represent the failure rate as analyzed through EGD's Work and Asset Management systems.

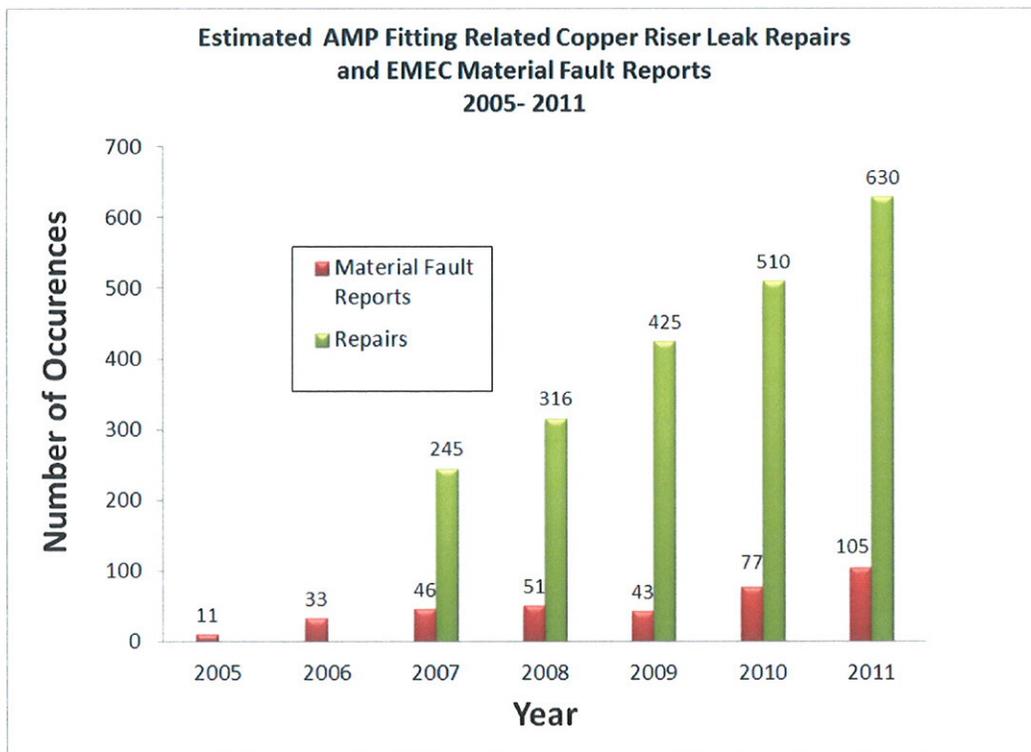


Chart 11 - Failure Analysis

Although EGD cannot predict exact future AMP fitting failure rates, the Company can predict that failures will increase over time.

Therefore, a program to mitigate failures for services that contain AMP fittings will be required going forward. This program will be designed to mitigate the risk of this failure mechanism, and

to the extent that EGD can predict which AMP fittings will fail next, a risk prioritized proactive program should be more cost effective than a reactive program.

EGD is continuing to work to understand how to predict which AMP fitting failures will occur next. In 2012, the Company plans to proactively extract physical samples in order to investigate the failure mechanisms in more detail. The outcome will provide insight into the prioritization of future replacement programs or activities.

The above failure analysis illustrates how EGD is evolving its understanding of its assets, threats to the assets, failures associated with these threats, and recommended mitigation plans.

## Requirements

In applying the above Integrity Management approach, the process EGD undertook to develop the System Integrity and Reliability requirements of the Asset Plan is outlined below.

**Step 1:** System Integrity & Reliability asset risks were identified through three primary approaches:

- Asset condition assessment, by leveraging data gathered from EGD’s operating systems and existing asset condition monitoring programs
- Tacit knowledge, gathered by engaging experienced Operations field staff to identify risks, that EGD has encountered historically
- Relevant industry developments and trends. This includes legislative and regulatory changes that are being implemented or contemplated in the United States in the wake of incidents that have occurred in the recent past as mentioned above.

The risks gathered by using these approaches were catalogued into a Risk Register.

**Step 2:** Risks within the Risk Register were assessed to establish a relative risk ranking.

This was accomplished by defining the risk, the current mitigation programs in place and asking a group of experienced Operational and Engineering personnel to determine the likelihood and impact of potential events based on their knowledge and experience. The following figure depicts the range of likelihood and impact that was used.

	Value	Impact					Likelihood
		Minor	Moderate	Major	Severe	Worst Case	
Daily to monthly	5	P3	P2	P1	P1	P1	
Monthly to yearly	4	P3	P2	P2	P1	P1	
Once in 1 to 10 years	3	P3	P3	P2	P2	P1	
Once in 10 to 100 years	2	P4	P3	P3	P2	P2	
Once in > 100 years	1	P4	P4	P3	P3	P3	
		1	2	3	4	5	

Figure 9 - Risk Prioritization: Likelihood & Impact Chart

The results of this qualitative risk assessment were validated with further analysis of available data.

As a result of this assessment, risks were prioritized into categories with items in the top right corner of the matrix having the greatest relative risk (Priority 1) and items in the bottom left having the least relative risk (Priority 4).

**Step 3:** Programs or other initiatives were defined to address each of the prioritized risks based on the Asset Management objectives, policies and strategies described in Section 4 - EGD's Asset Management Principles.

The outcome of this step was the identification of four different types of integrity initiatives to address the identified risks:

- Continuation of existing System Integrity risk mitigation programs (e.g. Cast Iron Replacement, Failure of M&R Station Components)
- Expansion of scope of existing System Integrity programs (e.g. In-Line Inspection (ILI) Scope and Technology, Damage to Non-Excess Flow Valve (EFV) Services)
- New System Integrity Programs (e.g. Corrosion Downstream of Amp Fittings)
- Studies to determine whether New System Integrity Programs are required (e.g. Field Applied Coatings on Tie-in to Steel)

The figure below provides a high-level summary of the process used to establish System Integrity and Reliability requirements.

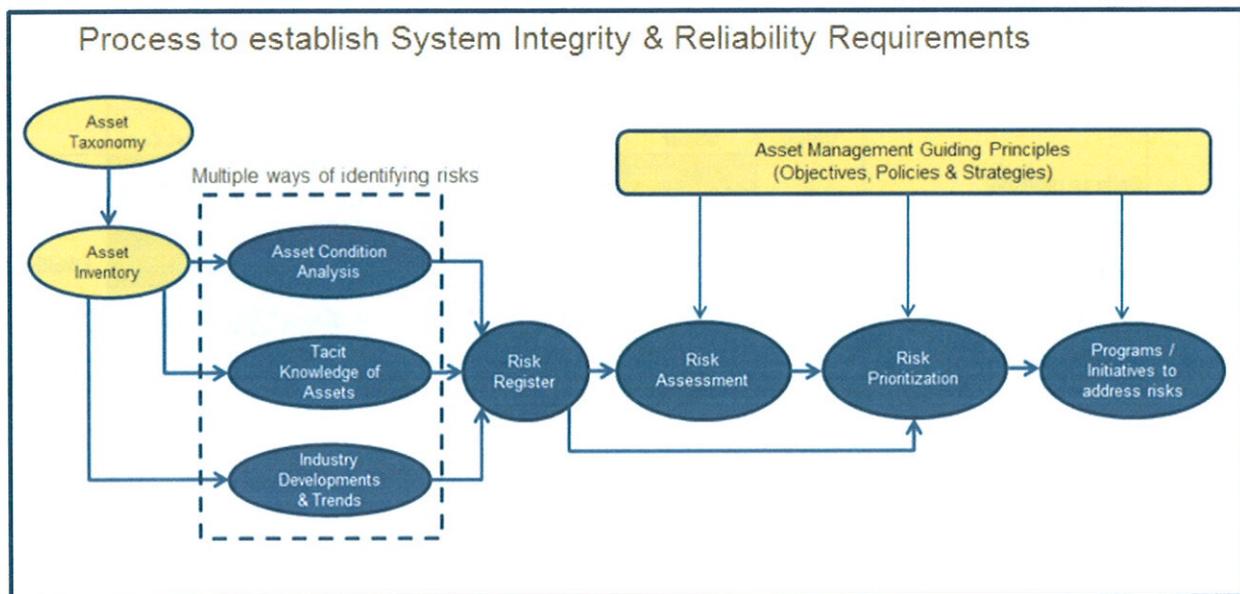


Figure 10 - Process to Establish System Integrity & Reliability Requirements

This is the first time EGD has applied the above process to support the development of a comprehensive, long range asset plan. Therefore, many of the methodologies and tools used to develop portions of the plan are first time efforts. It is expected that these methodologies and tools will be continuously improved over time with resultant improvements in future iterations of the Asset Plan.

**Step 1: The Risk Register**

The following table was developed through Step 1 of the process described above.

ASSET CLASS	RISK	RISK DESCRIPTION
Mains	Cast Iron	Cast iron mains have good corrosion resistance but the material can degrade due to graphitization. Leaks occur at main breaks or may occur at bell joints with the primary threat being ground movement by natural forces or excavation.
	Bare Steel	Bare steel mains may leak due to corrosion and cannot be effectively protected from corrosion in the same manner as coated steel.
	ILI Scope & Technology	The scope of current inspection programs consists of pipelines with operating pressures at or greater than 30% Specified Minimum Yield Strength (SMYS). Defects that are beyond the current scope and identification technology may not get identified.
	Older Coated Steel	Corrosion may occur where the coating is damaged.
	Field Applied Coatings on Tie-In to Steel	For certain field applied coatings on tie-in to steel, the coating may be disbonding from the steel pipe, leaving the area prone to corrosion.
	Plastic Mains (including Services)	Brittle like cracking has been identified by the industry in certain vintage plastic pipes. As a result, leaks may occur at stress points.
	Corrosion of Carrier Pipe in Casings	In situations where the steel carrier pipe touches the casing, cathodic protection may be compromised, possibly accelerating corrosion of the carrier pipe resulting in loss of containment.
	Reliability of Supply	Failure risk within supply chain. Potential for significant customer outages under certain upstream and downstream upset conditions.
	Don River Bridge Crossing	Extra High Pressure 30-inch line on bridge may be damaged in a flood resulting in significant customer outages.
	Corrosion of segment of the 20-inch Lakeshore line	There is a 650m segment of the line that has known coating disbondment leading to a risk of corrosion.
Services	Corrosion on Copper Services	Copper services were installed between the mid 1960's and early 1970's. Due to their age, these services are subject to the risk of leaks due to internal and external corrosion.
	Corrosion of Steel Tubing	Steel tubing is thin wall and can fail due to corrosion more quickly than steel pipe. It has a greater likelihood of release of gas than thicker wall steel pipe.
	Corrosion on Bare Steel Services	Bare steel services may leak due to corrosion and cannot be effectively protected from corrosion in the same manner as coated steel.
	Corrosion on Isolated Steel	Isolated steel pipe may not be cathodically protected from corrosion and therefore may be subject to accelerated corrosion.
	Damage to Non-EFV Services	Significant volume of gas may be released when a service is damaged and the service does not have an Excess Flow Valve (EFV).
M&R Equipment	Failure of Gate Station Components	Failure of gate station components can lead to overpressure and/or loss of containment of high pressure gas or odourant.
	Failure of District Station Components	Failure of district station components can lead to overpressure and/or loss of containment of gas.
	Failure of LP Station Components	Failure of Low Pressure (LP) station components can lead to overpressure and/or loss of containment of gas.
	Failure of Farm Tap Components	Failure of farm tap components can lead to overpressure and/or loss of containment of gas.

ASSET CLASS	RISK	RISK DESCRIPTION
Valves	<b>Failure of Bonnet Bolts on Valves (1.25" to 2")</b>	Valve malfunction due to corrosion of bolts and material brittleness may result in loss of containment of gas.
	<b>Failure of WingLock Valves</b>	Incorrect application of force to operate such valves can cause the internal components of the valve to break which may result in loss of containment of gas.
	<b>Isolation Valves</b>	Due to limited number and/or the technology associated with isolation valves, the company may be constrained when addressing an emergency related to line failure.
	<b>Main Line Valves</b>	Main line valves may be difficult to access or may not operate as required which may result in delay in response to an emergency.
	<b>Load Shed Zones</b>	Due to a limited number and/or the technology associated with isolation valves, the company may be constrained when addressing an emergency related to gas supply disruptions.
Fittings	<b>Corrosion downstream of AMP Fittings</b>	Potential for an underground gas leak to occur downstream of the AMP fitting due to corrosion of the copper risers connected to plastic services.
	<b>Mainline Compression Couplings</b>	Unrestrained compression couplings, when exposed at a point of thrust, can lead to loss of containment.
	<b>Anodeless Risers</b>	Anodeless risers were purchased to avoid the need for cathodic protection. Corrosion may be occurring where the epoxy coating may have been chipped. Exposed plastic pipe can then degrade in sunlight.
	<b>Chicago Fittings</b>	Potential for an above ground gas leak to occur at the Chicago fitting due to age and/or ground movement.
	<b>Compression Outlet Service Tees</b>	Compression outlet on a steel service connection may pull apart due to third party damage or ground movement resulting in loss of containment of gas.
	<b>Jumpers &amp; Service Extensions</b>	Steel jumpers and service extensions are used to connect regulators located outside of a building to piping or meters located inside a building. The jumper or service extension may corrode if the coating is damaged leading to a loss of containment of gas.
	<b>Punch Tee Cap</b>	Punch Tee Cap, including vintage plastic material variety are susceptible to cracking when over-torqued during installation which may result in leaks.
	<b>Expansion Joints</b>	Failure of aging expansion joints, resulting in leaks.
General	<b>Records Integrity</b>	Inaccurate or incomplete records may impact operational decisions and safety.
	<b>Cross Bores</b>	Homeowner/Plumber/City, while attempting to clear a sewer may damage a gas line that at time of installation was inadvertently installed through a sewer lateral, resulting in loss of containment of gas.
	<b>Meter Barriers</b>	A lack of meter barriers in areas where meters may be susceptible to damage from vehicles may result in damage to the meter set, resulting in loss of containment of gas.
	<b>Residential Meter Sets</b>	Changes to requirements around meter exchange government inspections (MXGIs).
	<b>Inside Regulators</b>	Third party damage to a service line may result in an unregulated gas escape inside a customer premise.
	<b>Encased Bridge Crossings</b>	Leaks or pipe support deterioration could develop where visual inspection isn't possible.

Table 5 - Risk Register

### Step 2: Relative Risk Ranking

The result of the risk assessment and prioritization from Step 2 is summarized in the table below:

	Priority 1	Priority 2	Priority 3
Mains	Cast Iron	Older Coated Steel	
	Field Applied Coating on Tie-In to Steel	Corrosion of Carrier Pipe in Casings	
	Corrosion of segment of the 20-inch Lakeshore Line	Inline Inspection Scope and Technology	
	Don River Bridge Crossing	Plastic Mains	
		Bare Steel	
Services		Corrosion on Copper Services	
		Corrosion of Steel Tubing	
		Corrosion on Bare Steel Services	
		Corrosion on Isolated Steel	
		Damage to Non-EFV Services	
M&R Equipment	Failure of Gate Station Components	Failure of Farm Tap Components	
	Failure of District Station Components		
	Failure of LP Station Components		
Valves	Isolation Valves	Failure of Bonnet Bolts on Valves (1.25" to 2")	
	Main Line Valves	Failure of WingLock Valves	
	Load Shed Zones		
Fittings	Corrosion downstream of AMP Fittings	Anodeless Risers	Expansion Joints
	Mainline Compression Couplings	Chicago Fittings	
	Compression Outlet Service Tees	Jumpers & Service Extensions	
		Punch Tee Cap	
General	Records Integrity	Inside Regulators	
	Cross Bores	Encased Bridge Crossings	
	Meter Barriers	Residential Meter Sets	

Table 6 - Risk Prioritization

Assets assessed as Priority 4 risks are considered to simply require monitoring to ensure that their risk level is not increasing.

### Step 3: Programs Defined to Address Risks

As an outcome of Step 3, the following table shows the initiatives that have been established to address the risks contained in the risk register.

ASSET CLASS	RISK	INITIATIVE NAME	INITIATIVE DESCRIPTION
Mains	Cast Iron	Cast Iron Replacement Program	Complete the replacement and abandonment of all cast iron mains by 2012. Some restoration may be required in 2013.
	Bare Steel	Bare Steel Replacement Program	Complete replacement and abandonment of all bare steel mains by 2012.
	ILI Scope & Technology	ILI for pipelines over 20% SMYS	Continue the existing inline inspection (ILI) program, expand the scope to include targeted lines over 20% SMYS and include new technology ILI tools in future ILI runs.
	Older Coated Steel	Coated Steel Program (Mains & Services)	Study to evaluate the effectiveness of different manufacturer applied coatings to protect from corrosion over time in order to determine where upgrades or additional corrosion protection may be required.
	Field Applied Coatings on Tie-In to Steel	Field Applied Coatings Study	Study to understand issues with field applied coatings on tie-in to steel, and how to resolve it.
	Plastic Mains (including Services)	Plastic Mains (Incl Services) Study	Study to understand plastic pipe susceptibility to cracking. Study to be done in conjunction with the Gas Technology Institute (GTI).
	Corrosion of Carrier Pipe in Casings	Casing Study & Program	Study to enhance knowledge of the effectiveness of cathodic protection of the carrier pipe in casing locations.
	Reliability of Supply	Reinforcement Projects	Projects to construct Reinforcement Mains in networks to address capacity or reliability issues.
	Don River Bridge Crossing	Don River Bridge Crossing Replacement	Determine the purpose, need and timing of a replacement solution and implement the solution.
	Corrosion of segment of the 20-inch Lakeshore line	20-Inch Lakeshore Line Replacement	Determine the purpose, need and timing of a replacement solution and implement the solution.
Services	Corrosion on Copper Services	Copper Services Replacement	Complete the current replacement program for copper services.
	Corrosion of Steel Tubing	Steel Tubing Service Replacement	Complete the current replacement program for steel tubing services.
	Corrosion on Bare Steel Services	Bare Steel Services Study	Identify locations of bare steel services not being replaced with the cast iron program in order to develop a proactive replacement program.
	Corrosion on Isolated Steel	Isolated Steel Study	Study to increase knowledge of where isolated steel pipe may occur to enhance corrosion prevention strategies.
	Damage to Non-EFV Services	EFV Program	Study and related pilot to determine how to install EFVs on pre-2006 services. Expand installation of EFVs to additional customers such as multi-family and small commercial customers.

ASSET CLASS	RISK	INITIATIVE NAME	INITIATIVE DESCRIPTION
M&R Equipment	Failure of Gate Station Components	Gate Station Equipment Replacement	Continue with existing gate station maintenance & replacement programs.
	Failure of District Station Components	District Station Equipment Replacement	Continue with existing district station maintenance & replacement programs.
	Failure of LP Station Components	Low Pressure Delivery Meter Set Program	Study to enhance the knowledge of LP station condition and prioritize related upgrades, followed by required upgrade/replacement programs.
	Failure of Farm Tap Components	Farm Tap Study	Study to determine condition of farm taps and to define program requirements if necessary.
Valves	Failure of Bonnet Bolts on Valves (1.25" to 2")	Failure of Bonnet Bolts on Valves Study	Study to determine condition of Bonnet Bolts on Valves and to define program requirements if necessary.
	Failure of WingLock Valves	WingLock Valve Study & Replacement	Study to determine the condition of WingLock valves and to define program requirements if necessary.
	Isolation Valves	Isolation Valve Study & Installation (RCV / ASV)	Study to validate the adequacy of Enbridge Gas Distribution's current main line valve design requirements and any new/retrofit installations required associated with a change in the design requirement (including automatic shutoff and remote (ASV) control valves (RCV) ).
	Main Line Valves		
	Load Shed Zones		
Fittings	Corrosion downstream of AMP Fittings	AMP Fitting Replacement	Study to examine leak rate trends and develop a replacement plan, followed by execution of the replacement plan.
	Mainline Compression Couplings	Targeted Compression Couplings Pressure Containment Sleeve Program	Study to identify targeted compression couplings and to install pressure containment sleeves over these couplings.
	Anodeless Risers	Anodeless Riser Replacement	Study to better understand the nature and extent of corrosion issues associated with anodeless risers, followed by a repair/replacement program as appropriate.
	Chicago Fittings	Chicago Fitting Study	Study to determine if a proactive replacement program would be more effective than reactive repair.
	Compression Outlet Service Tees	Compression Outlet Service Tee Study	Study to identify the most effective risk mitigation and define program requirements if necessary.
	Jumpers & Service Extensions	Jumper and Service Extension Study	Study to increase knowledge regarding steel jumper and service extension condition and determine program requirements if necessary, followed by program execution. This study will be done in conjunction with the Isolated Steel study.
	Punch Tee Cap	Punch Tee Cap Program	Continue to monitor and repair as required leveraging the material fault report program and Construction and Maintenance manual.
	Expansion Joints	Expansion Joint Study	Study to determine the condition of expansion joints.

ASSET CLASS	RISK	INITIATIVE NAME	INITIATIVE DESCRIPTION
General	Records Integrity	Distribution Records Management Program	Set of projects to identify and resolve various records related issues, including clean-up of data, refinement of processes and technology changes.
		Verification of MAOP	Required to mitigate records risks via MAOP verification and resulting in-line inspections requirements.
	Cross Bores	Sewer Safety Program	Inspection and other programs to proactively identify sewer lateral risks, ensure construction practices do not create new risks, increase public awareness, and resolve instances where identified.
	Meter Barriers	Meter Barrier Study & Program	Study followed by program to install meter barriers where field conditions have changed resulting in a meter barrier being required.
	Residential Meter Sets	Residential Meter Sets Study (incl. SMART system)	Study to evaluate the application of new technologies for improved management of residential meters while addressing revised requirements for meter exchanges
	Inside Regulators	Inside Regulator Replacement	Create exterior weak link on inside regulators so that break occurs outside if external force applied to the meter set. Move inside meters outside where possible.
	Encased Bridge Crossings	Encased Bridge Crossings Study	Study to evaluate the condition of bridge crossings.

Table 7 - System Integrity &amp; Reliability Risk Mitigation Initiatives

## Implementation Plan & Estimated Capital Investments

Based on the relative risk ranking, project interdependencies and current work in progress, an implementation schedule was established for the various initiatives that are required to meet the System Integrity & Reliability requirements. The relative risk ranking identified initiatives with varying priorities from 1 to 3 which consists of continuing existing programs, expanding the scope of other existing programs, initiating new programs and conducting studies.

Risks were prioritized based on current asset condition and tacit and industry knowledge information. As more knowledge is gained through studies, certain prioritization may change. Priority 1 initiatives address high impact assets. Priority 2 and 3 initiatives include risk mitigation programs for assets whose combination of likelihood of an event and degree of impact are lower.

Consistent with the risk based approach, Priority 1 and select priority 2 initiatives are identified early in the schedule. Select Priority 2 and Priority 3 initiatives are scheduled later. Within each risk mitigation program, a second level of prioritization is applied to address higher risk assets early in each program.

Some risks identified by the process are currently not well understood. These risks require studies to further analyze and understand risk dynamics and potential mitigation strategies. In the plan, where a risk study is followed by a program, EGD has a high confidence, based on failure data and tacit knowledge, that a risk mitigation program will be required, even though the form of the program may not be fully understood. Where a risk study does not have a program illustrated beyond the study, the level of certainty that a risk mitigation program will be required is lower. The study itself may allow EGD to reduce the assessment of the risk to a lower priority.

To the extent possible, EGD has attempted to smooth the spending on the overall system integrity and reliability programs. For example, many of the programs have been defined as multi-year, long term initiatives. However, it should be noted that, due to aging infrastructure and other factors such as increased Company or industry knowledge, EGD's belief is that asset investments will require increased spending over time. It should also be noted that improved understanding of certain risks may require a higher rate of spend to stay ahead of the failure curve, and reduce risk in a more timely manner.

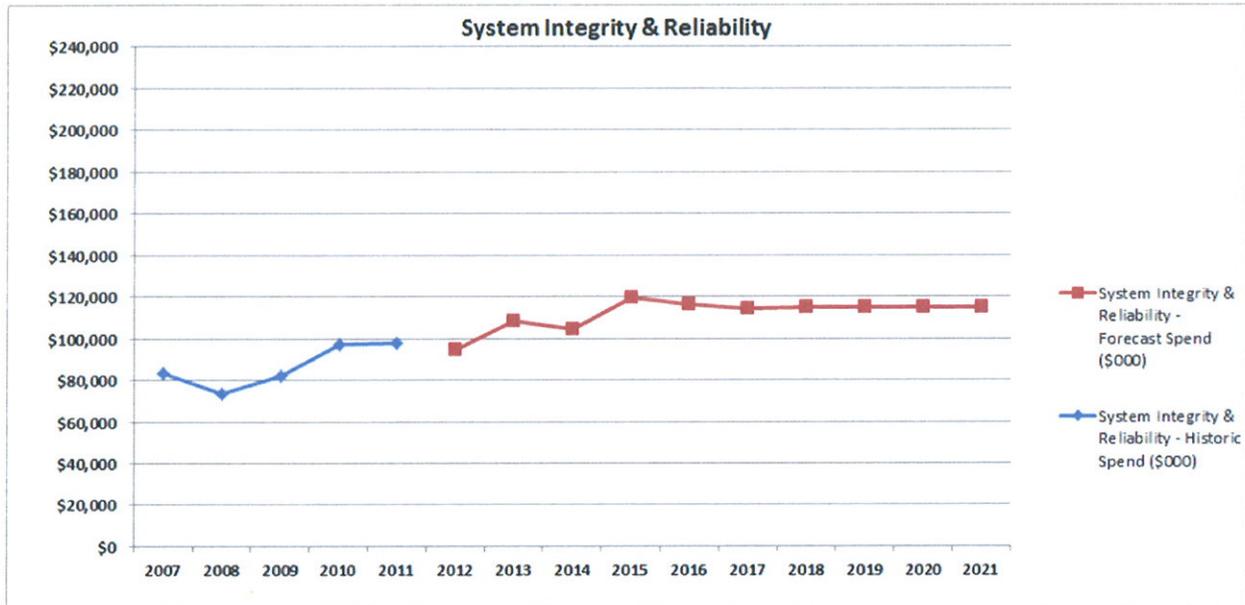
The figure below summarizes the implementation plan for the initiatives, and provides an estimate for the required capital investments over the 2012 to 2021 period.

ASSET CLASS	RISK	INITIATIVE NAME	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Forecast (2012-2021) (\$000)	
Mains	Cast Iron	Cast Iron Replacement Program	Prog										\$26,132	
	Bare Steel	Bare Steel Replacement Program	Prog										\$900	
	ILI Scope & Technology	ILI for pipelines over 20% SMYS	Program										\$82,600	
	Older Coated Steel	Coated Steel Program (Mains & Services)			Study								\$720	
	Field Applied Coatings on Tie-In to Steel	Field Applied Coatings Study	Study										\$720	
	Plastic Mains (including Services)	Plastic Mains (incl Services) Study	Study										\$40	
	Corrosion of Carrier Pipe in Casings	Casing Study & Program	Study		Program								\$4,200	
	Reliability of Supply	Reinforcement Projects												Covered as part of Reinforcements
	Don River Bridge Crossing	Don River Bridge Crossing Replacement		Prog										\$3,500
	Corrosion of segment of the 20-inch Lakeshore line	20-Inch Lakeshore Line Replacement	Prog											\$2,000
Services	Corrosion on Copper Services	Copper Services Replacement	Program											\$15,000
	Corrosion of Steel Tubing	Steel Tubing Service Replacement	Program										\$2,000	
	Corrosion on Bare Steel Services	Bare Steel Services Study			Study								\$200	
	Corrosion on Isolated Steel	Isolated Steel Study	Study										\$200	
	Damage to Non-EFV Services	EFV Program		Study									\$1,500	
M&R Equipment	Failure of Gate Station Components	Gate Station Equipment Replacement	Program										\$50,424	
	Failure of District Station Components	District Station Equipment Replacement	Program										\$25,013	
	Failure of LP Station Components	Low Pressure Delivery Meter Set Program	Program										\$95,380	
	Failure of Farm Tap Components	Farm Tap Study			Study								\$200	

ASSET CLASS	RISK	INITIATIVE NAME	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Forecast (2012-2021) (\$000)
Valves	Failure of Bonnet Bolts on Valves (1.25" to 2")	Failure of Bonnet Bolts on Valves Study					Study						\$200
	Failure of WingLock Valves	WingLock Valve Study & Replacement		Study				Program					\$26,300
	Isolation Valves												
	Main Line Valves	Isolation Valve Study & Installation (RCV / ASV)	Study					Program					\$27,480
	Load Shed Zones												
Fittings	Corrosion downstream of AMP Fittings	AMP Fitting Replacement	Study					Program					\$221,200
	Mainline Compression Couplings	Targeted Compression Couplings Pressure Containment Sleeve Program	Study					Program					\$18,200
	Anodeless Risers	Anodeless Riser Replacement			Study			Program					\$4,320
	Chicago Fittings	Chicago Fitting Study		Study									\$200
	Compression Outlet Service Tees	Compression Outlet Service Tee Study	Study										\$400
	Jumpers & Service Extensions	Jumper and Service Extension Study	Study		Program								\$500
	Punch Tee Cap	Punch Tee Cap Program						Program					Covered through O&M (maintenance cost)
	Expansion Joints	Expansion Joint Study							Study				\$200
General	Records Integrity	Distribution Records Management Program						Program					\$59,023
		Verification of MAOP		Program									\$18,300
	Cross Bores	Sewer Safety Program						Program					\$8,976
	Meter Barriers	Meter Barrier Study & Program						Program					Included as part of Customer Growth related M&R
	Residential Meter Sets	Residential Meter Sets Study (incl. SMART system)			Study								\$200
	Inside Regulators	Inside Regulator Replacement	Prog										\$380
	Encased Bridge Crossings	Encased Bridge Crossings Study				Study							\$200

Figure 11 - System Integrity & Reliability: Implementation Schedule & Cost

The following chart depicts EGD’s historic and forecast capital spend for System Integrity & Reliability.



2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
\$83,467	\$73,223	\$81,905	\$97,096	\$97,763	\$94,583	\$108,041	\$104,143	\$119,271	\$116,324	\$114,427	\$114,779	\$114,579	\$114,573	\$114,554

Chart 12 - System Integrity & Reliability: Historic & Forecast Capital Spend

The forecast spend for System Integrity and Reliability trends up between 2012 and 2015 and then stays relatively flat until 2021.

There are several reasons that contribute to the upward trend in the capital spend from 2012 to 2015 :

- Beyond the existing programs to replace Cast Iron and Bare Steel, the risk assessment has identified the need to address additional classes of assets that are near the end of their useful life. Examples include Copper Services, Steel Tubing Services, AMP Fittings, and Mainline Compression Couplings
- Studies will need to be conducted to improve our understanding of the condition of specific classes of assets where risks have been identified. These studies will help establish the requirements and scope of any related mitigation programs
- Records Integrity, including completeness, accuracy, verifiability, timeliness, and accessibility, was assessed as one of the key risks. EGD has identified a number of initiatives, with significant upfront investments in 2013 and continuing investments in 2014 to 2021 to address this risk. For example, the Company is embarking on utilizing

Geospatial Positioning System (GPS) technology to more accurately identify the location of EGD's distribution assets

- Consistent with industry best-practices, EGD will expand its current in-line inspection program to include targetted XHP pipelines operating over 20% Specified Minimum Yield Strength (SMYS)
- EGD will enhance its capability to effectively isolate portions of the system to minimize the impact of planned or unplanned service disruptions by installing additional mainline valves at key locations

Many of the programs that are needed to mitigate System Integrity & Reliability risks span multiple years. An effort was made to smooth these expenses over the term of the Asset Plan.

## 5.5 Relocations

### Requirements

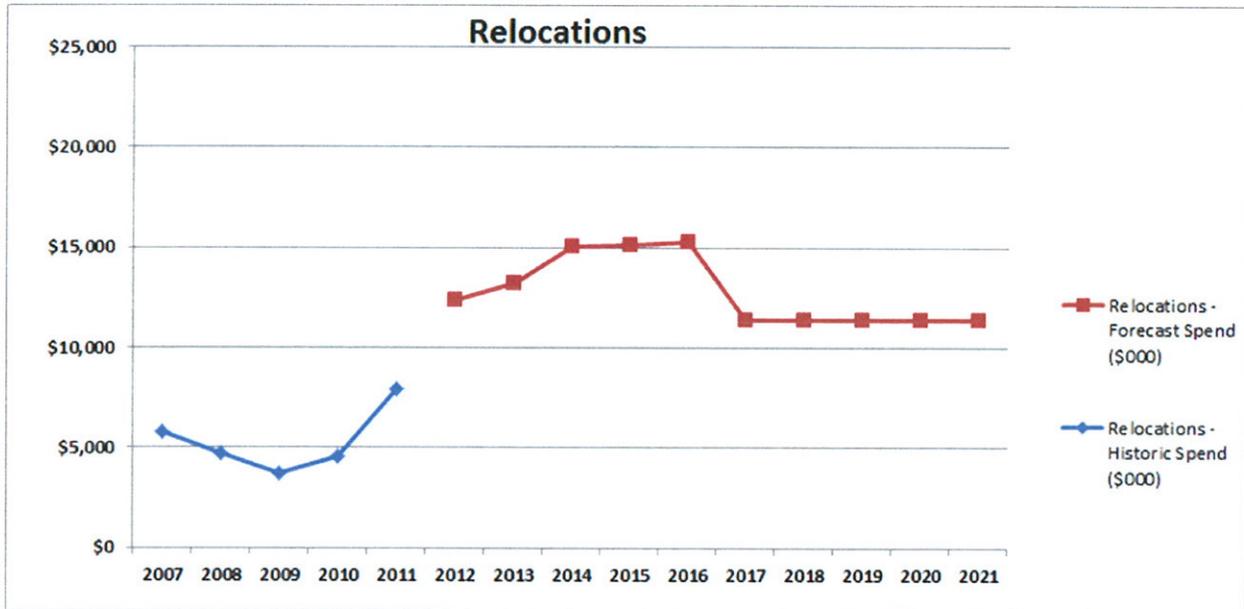
Relocation requirements are generally driven by municipal and other third party works. While some of these relocation requirements are known for the next few years, it is not possible to comprehensively forecast the future relocation requirements over the term of the Asset Plan. Hence, known future projects have to be combined with historic and projected trends to estimate the capital investments needed to support relocation requirements.

Relocation requirements primarily arise from road realignments and expansions, bridge rehabilitation, grade separations or other developments that are initiated by a city, municipality or other third party. In most cases, EGD is able to recover a portion of the relocation costs from the municipality or other party requiring the relocation.

While forecasting relocation requirements and costs, EGD takes into account the normal activity level of relocations and their associated costs. Projects or programs identified as incremental to that normal activity level are then added. Incremental activity could include items such as Infrastructure Stimulus Fund activities, major transit projects (subway expansion, GTAA Rail Link, Rapid Transit – Eglinton LRT, York Region Rapid Transit, Ottawa LRT), major road expansions (407 Extension) and preparation for the 2016 Pan Am Games.

### Implementation Plan & Estimated Capital Investments

The following chart depicts the historic and forecast capital investments, net of the re-billable portion, required for relocations.



2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
\$5,770	\$4,717	\$3,749	\$4,551	\$7,965	\$12,350	\$13,209	\$15,035	\$15,150	\$15,259	\$11,400	\$11,400	\$11,400	\$11,400	\$11,400

Chart 13 - Relocations: Historic & Forecast Capital Spend

The capital spend profile shows an escalation of relocation expenditure over the period of this Asset Plan. In addition to known relocation projects in this time period, EGD expects additional relocations driven by preparations for the Pan Am games, and light rail transit and subway projects that have been planned and already under way in the GTA and Ottawa.

## 6. Financial Summary

The table below summarizes the forecasted capital spend profile to meet the four types of asset related requirements within the scope of the Asset Plan.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Customer Additions (\$000)	\$76,982	\$84,413	\$84,036	\$86,264	\$87,974	\$89,003	\$89,485	\$90,021	\$90,622	\$90,887
Relocations (\$000)	\$12,350	\$13,209	\$15,035	\$15,150	\$15,259	\$11,400	\$11,400	\$11,400	\$11,400	\$11,400
Routine Reinforcements (\$000)	\$24,756	\$11,550	\$32,400	\$4,939	\$6,650	\$26,300	\$29,500	\$30,417	\$6,750	\$1,500
System Integrity & Reliability (\$000)	\$94,583	\$108,041	\$104,143	\$119,271	\$116,324	\$114,427	\$114,779	\$114,579	\$114,573	\$114,554
<b>Total (Excluding Major Reinforcements)</b>	<b>\$208,671</b>	<b>\$217,213</b>	<b>\$235,614</b>	<b>\$225,624</b>	<b>\$226,207</b>	<b>\$241,130</b>	<b>\$245,164</b>	<b>\$246,417</b>	<b>\$223,345</b>	<b>\$218,341</b>
Major Reinforcements (\$000)	\$13,127	\$51,117	\$296,746	\$231,900	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total (Including Major Reinforcements)</b>	<b>\$221,798</b>	<b>\$268,330</b>	<b>\$532,360</b>	<b>\$457,524</b>	<b>\$226,207</b>	<b>\$241,130</b>	<b>\$245,164</b>	<b>\$246,417</b>	<b>\$223,345</b>	<b>\$218,341</b>

Chart 14 - Financial Summary of Asset Spend by Category of Requirements

The following is a general set of assumptions that was used in developing these forecasts:

- For the term 2014-2021, the estimated capital spend is based on 2012 dollars, i.e. inflation and other time-based adjustments have not been applied
- Estimates are based on EGD's asset requirements as of December 2011. Going forward, as part of the annual Asset Planning cycle, these requirements will be reviewed and revised as needed. The capital investment profile is expected to change as the requirements evolve
- Estimates include only the direct capital costs of the projects and initiatives set out in the Asset Plan
- At this time, only a range of estimates is available for the GTA project. The mid-point of this range has been assumed for the purpose of the Asset Plan

The charts below depict the overall spend for the term of the Asset Plan excluding and including major reinforcements.

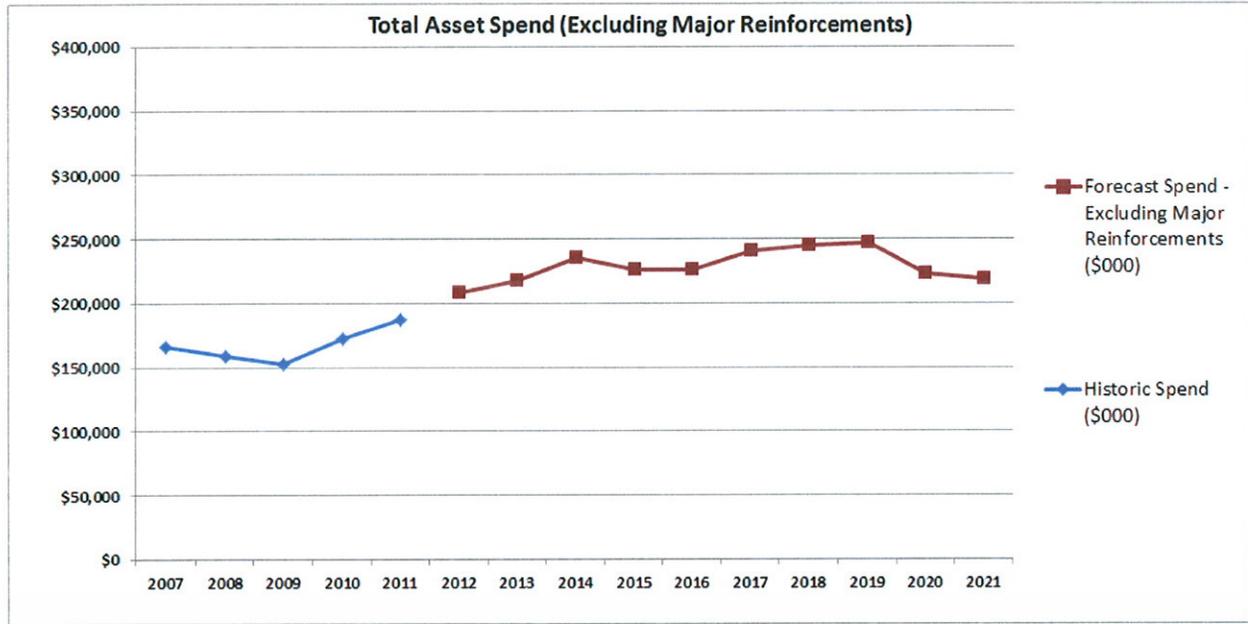
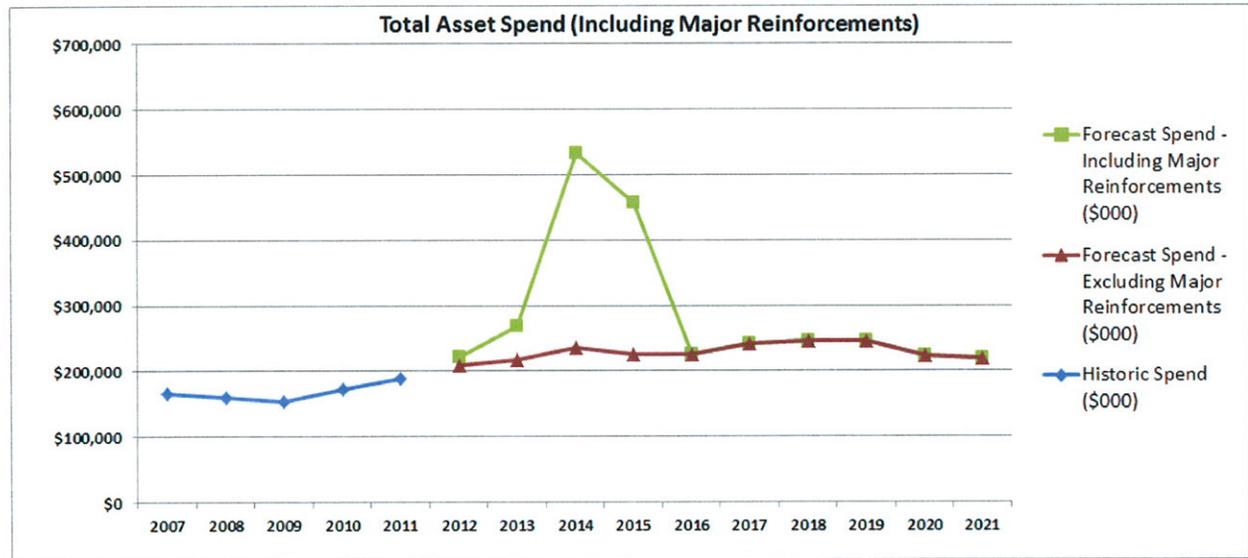


Chart 15 - Financial Summary of Total Asset Capital Spend (Excluding Major Reinforcements)



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Excluding Major Reinforcements(\$000)	\$166,355	\$158,783	\$152,971	\$172,927	\$187,586	\$208,671	\$217,213	\$235,614	\$225,624	\$226,207	\$241,130	\$245,164	\$246,417	\$223,345	\$218,341
Including Major Reinforcements(\$000)	\$166,355	\$158,783	\$152,971	\$172,927	\$187,586	\$221,798	\$268,330	\$532,360	\$457,524	\$226,207	\$241,130	\$245,164	\$246,417	\$223,345	\$218,341

Chart 16 - Financial Summary of Total Asset Capital Spend (Including Major Reinforcements)