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Comprehensive Safety Assessment & Implementation Plan

Columbia Gas Company of Massachusetts Assets

Completed Pursuant to the D.P.U. 20-59 Settlement Agreement

September 1, 2021

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Part I: Introduction & Overview

1. Safety First and Always

Eversource Energy is a mission-driven organization committed to "safety first" and grounded in the voice of the customer. Within the organization, there is an embedded cultural philosophy to strive continually to provide the highest quality, safe and reliable service to customers and strong leadership. Eversource Energy also has a deep appreciation for its employees and the skill and dedication they bring to the mission under wide-ranging and, often, supremely challenging operating conditions. Eversource Energy strongly encourages employees to engage, listen and learn from customers, colleagues, and other industry participants, and to incorporate that learning into everyday work so the customer is served with the highest expertise and dedication in the industry.

Within Gas Operations, there is careful and consistent attention to detail. Gas Operations relies on standardized construction practices, rigorous protocols for training, testing and operator qualifications and comprehensive quality assessment and quality control ("QA/QC") processes, among other strategies, to assure work is performed correctly and safely. In particular, Eversource Energy's QA/QC function introduces a second, intensive level of internal review to assure adherence to applicable standards and compliance requirements. Fundamentally, experts are in charge, meaning that it is not enough to lead, but also Eversource leaders must be experts in the work tasks within their domain. This means that, from top to bottom, a solid mindset is in place, focused intently on getting the job done safely, effectively and at a reasonable cost with minimal environmental impact.

The natural gas business has experienced many changes over the past several years. However, the guiding principle driving all decision-making in the natural gas distribution business is **public safety**. This bedrock principle is a central focus for Eversource Gas Company of Massachusetts d/b/a Eversource Energy ("EGMA" or the "Company") and all of Eversource Energy's natural gas distribution companies today and for the future. At

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Eversource Energy, our shared commitment to “Safety First and Always” is a principle and mindset that is woven into the fabric of every job and every task undertaken -- whether in the field or in the office. Customers deserve to have implicit confidence that the system is safe when gas is their fuel of choice, and this has always been true. Accordingly, safety is the highest priority for Eversource Energy.

On July 2, 2020, Bay State Gas Company d/b/a Columbia Gas of Massachusetts (“Bay State Gas” or “CMA”), and its holding company parent, NiSource Inc. (“NiSource”), EGMA and its holding company parent, Eversource Energy (“Eversource”), the Massachusetts Attorney General’s Office (“AGO”), the Massachusetts Department of Energy Resources (“DOER”), and the Low-Income Weatherization and Fuel Assistance Program Network (“Network”) (collectively, the “Settling Parties”) filed with the Department of Public Utilities (the “Department”) a Joint Motion for Approval of Settlement Agreement (the “Settlement”). The Settlement addressed the acquisition of Bay State Gas by Eversource. As part of the settlement, Eversource committed to undertake the Comprehensive Safety Assessment & Implementation Plan (“Safety Assessment”) to evaluate the safety and condition of the EGMA distribution system thoroughly following the closing of the Transaction, subject to a review of the Safety Assessment by the Department. As set out in the Settlement, the Safety Assessment was designed to accomplish the thorough investigation, evaluation and review of all aspects of CMA’s operations including: gas supply; the Bay State Gas liquefied natural gas (“LNG”) and liquid propane (“LPG”) facilities; gate stations and district regulators; pipeline safety practices, standards and procedures; leak surveys and preventive maintenance; training and operator qualification (“OQ”) practices; engineering and design; construction; leak management; safety management systems; integrity of maps, records and operating data; gas operations tooling and safety equipment; meters; compliance work backlog; and safety culture practices.

As part of the Settlement, EGMA and Eversource agreed that no later than September 1, 2021, EGMA would file with the Department and make publicly available an in-depth and thorough statement of findings, work plans and associated capital budget that resulted from the development and implementation of the Safety Assessment.

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This report satisfies that commitment presenting Eversource's Safety Assessment for EGMA. As noted in D.P.U. 20-59, the Company will file periodic progress reports on the implementation of the Safety Assessment findings, as well as its plans to address any previously unidentified safety-related issues on the EGMA distribution system. These progress reports will be filed at six-month intervals through October 31, 2028, the date of the expiration of the Settlement. The Company proposes to file the first of these reports on March 1, 2022, six months after the initial filing in this matter, and to make periodic six-month filings consistent with the Settlement. The Company further proposes that each report will cover up to the most recent half-year, (six-month) period so that the March 1 progress reports will include information up through the previous year end, and the September 1 progress reports will include information up through the most recent June 30th. In these reports, the Company will continue to provide information gleaned from the ongoing operation of the EGMA system and to report on the implementation of identified improvements.

Additionally, the Safety Assessment encompasses a presentation of the capital budget necessary to implement the changes and improvements identified as necessary and appropriate through the Safety Assessment. Consistent with the Settlement, the annual capital budgets include non-Gas System Enhancement Program ("GSEP") and LNG/LPG capital investment needed to maintain the safe and reliable condition of the EGMA system over the period 2021 through 2028, including a "limited contingency deadband"[1] that accounts for reasonably expected variations from the target budget for the years 2021 through 2026.

2. Addressing Uncertainty and Risk

There are 25 Areas of Focus within this Safety Assessment report. To conduct the thorough assessment contemplated by the D.P.U. 20-59 Settlement Agreement,

1 In future rate reviews, to incorporate capital investment into rate base under Section 2.6 of the Settlement, EGMA will justify any variation exceeding the deadband for the respective expenditure target. If EGMA exceeds the upper boundary of the deadband, it has the burden to prove the necessity of the expenditures exceeding the upper boundary or risk a delay in recovery until the next rate interval. EGMA shall notify the AGO and DOER within 60 days of the end of the calendar year, in the event that the deadband will be exceeded for any reason.

Eversource and the Company leveraged internal and external resources to evaluate all aspects of the Bay State Gas system intensively and to develop a plan of necessary improvements and changes to address the findings. As described herein, certain areas identified under the Safety Assessment require additional investigation. These areas of relative uncertainty are identified throughout the Safety Assessment, most notably in the availability and accuracy of maps and records of the Bay State Gas system. Eversource and EGMA are continuing their investigation of these particular areas, including the review of EGMA's records and mapping, and will make supplemental filings and updates at six-month intervals, as noted above. Importantly, for these areas of uncertainty, Eversource has factored the need for potential expenditures into the capital plan. These areas of uncertainty include challenges related to construction such as permitting and siting, which affect all LDCs in the state, as noted by Dynamic Risk in its Phase II Report, in Section 9.1.10 (pages 55-56). These challenges, along with other identified challenges in the Dynamic Risk Report, include:

(1) Various time constraints imposed by towns/cities and seasons (e.g., work times, winter).

(2) Alignment, coordination and cooperation with town/city priorities, including paving projects or other projects, varying permitting requirements.

(3) Planned events affecting work area, access or both.

(4) Chapter 90 reimbursements for capital project (street paving).

(5) Professional Engineer approvals, where required.

(6) Delayed projects require re-starts, and often, a change in resources.

(7) Police detail availability.

(8) Various requirements that affect project execution (e.g., no more road plates by a stated date); and

(9) Hard and soft surface restoration, and approval of same.

In Eversource's experience, the cost of construction has increased significantly in recent years as localities have strictly enforced, expanded, and/or increased the above-listed requirements and fees. In addition to increasing costs, Dynamic Risk rightly noted that these challenges "...often affect work flow, which in turn, increases risk." (Id. at 55). The projects that Eversource has identified as vitally necessary to reinforce the safety and reliability of the distribution system will need permitting and siting support and moving forward on these projects will be critical in assuring the safe and reliable service to customers as the natural gas industry transitions to a clean energy future. Until these projects are constructed and placed in service, a relative level of risk will exist in the operation of these assets. Eversource is devising temporary workarounds to manage these risks, but ultimately these projects need to be permitted, sited and constructed to eliminate the risk.

3. Overview of the Assets and Acquisition Process

The natural gas distribution assets acquired from CMA were assigned to EGMA, an indirect wholly owned subsidiary of Eversource formed in 2020. EGMA currently serves over 330,000 natural gas customer meters in 66 cities and towns in the greater Springfield area, southeastern Massachusetts, and the Merrimack Valley. As of year-end 2020, the legacy Bay State Gas assets include over 5,000 miles of natural gas distribution main and over 280,000 services. The LNG and LPG assets acquired from CMA were assigned to Hopkinton LNG Corp. These assets include four LNG plants and four LPG plants.

Over 800 former CMA employees were welcomed and successfully onboarded to EGMA and Eversource in 2020. All CMA employees who wanted to continue employment with Eversource were offered jobs.

As approved in D.P.U. 20-59, Eversource purchased the business and assets of Bay State Gas for a purchase price of $1,100 million in cash, subject to certain post-closing adjustments. Some of Bay State Gas' operations relied on its parent company's systems—these systems will remain under the ownership and operation of the parent company and so will have to be and are in the process of being replaced. An important example of this is the Supervisory Control and Data Acquisition (SCADA) system, where the Company is developing a new SCADA system for EGMA to be completed in 2022.

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4. Safety Assessment Methodology and Process

The Safety Assessment required significant organization and project management to complete, given the broad scope of the assessment to be performed. Project responsibilities were divided between four internal groups who supported and managed the Safety Assessment. These groups were established in charter documents for the project and are shown in the table below.

Steering Committee	Support Team	Area of Focus Leads	Resource Team
Integrate Areas of Focus with each other and with other EGB initiatives, address issues Approve budgets, strategies, and final deliverables Review, monitor and track actions progress, metrics, and updates	Set committee meetings and agendas Solicit and compile updates from Leads and on Eversource Gas Business initiatives to send to committee members Conduct committee meetings Keep records & track actions	Perform assessment Develop mitigation plans Draft and finalize report	Identify resource needs based on identified mitigation plans Develop resource plans Review implementation report sections

The process for assigning individuals to particular assessment roles was accomplished through a collaborative process where Leads were nominated or volunteered and then had to agree to perform the assigned assessment or identify an alternate. The Area of Focus Leads included a Lead Manager and Director for each Area of Focus identified in Settlement Appendix 1 of the Settlement.

The Steering Committee functioned as the primary oversight and approval body for the Safety Assessment. The Steering Committee established up front that its decisions would be made by achieving consensus, rather than by a voting structure. To ensure adequate oversight, the Steering Committee met monthly beginning in December 2020. The 28 Areas of Focus identified in Settlement Appendix 1 of the Settlement were divided into two groups of 14, where each meeting was scheduled to alternate between Group 1 and Group 2. Other stakeholders from within the Gas Business and the larger Eversource Energy organization were also included in these meetings to ensure information on this vital process was transparent and disseminated throughout the organization. The

Steering Committee also held additional meetings specifically to cover complex topics and outstanding issues.

The Support Team developed templates and guidance for each Area of Focus Lead to use both in presentations to the Steering Committee and in the final Safety Assessment Report to be submitted to the Department. These templates, including the development of the limited contingency deadband guidance (see below), were approved by the Steering Committee.

The Area of Focus Leads were granted the discretion to develop the methodology that best suited their particular assessment area, subject to approval by the Steering Committee. In addition to presenting to the Steering Committee, Area of Focus Leads were also responsible for presenting respective implementation plans to the Resource Team.

The Resource Team assessed all of the implementation plans from the Area of Focus Leads to determine whether there would be any gaps in resources to complete the plan and develop recommendations to address any identified gaps. Any incremental resource needs or changes to implementation plans were approved by the Steering Committee.

The assessment process resulted in this report with 25 areas of focus, as the effort identified that some of the original 28 areas of focus benefitted from being split into two while others benefitted from being combined.

The limited contingency deadbands are established based on criteria from the Association for the Advancement of Cost Engineering ("AACE") International Recommended Practices 97R-18 (Cost Estimate Classification System - As Applied in Engineering, Procurement, and Construction for the Pipeline Transportation Infrastructure Industries) for natural gas distribution capital projects and Recommended Practice 18R-97 (Cost Estimate Classification System - As Applied in Engineering, Procurement, and Construction for the Process Industries) for the LNG and LPG-related capital projects.

These Recommended Practices each establish five estimate classes with different limited contingency deadbands, based on the maturity level of project definition variables used

to develop the cost estimate; end usage of the cost estimate; and the method used to develop the cost estimate. Given the varying maturity levels of the different projects for the respective Areas of Focus, each Area of Focus has been assigned a single limited contingency deadband to apply across all of the capital investments for that category in 2021-2026. The Area of Focus Leads with personnel from Capital Investments determined the appropriate cost estimate class assignment for their respective Area(s) of Focus. The cost estimate was then reviewed by the Resource Team and Steering Committee and modified only with the Steering Committee's approval.

5. O&M Costs

Although not part of the Settlement Agreement budget presentation, there are many areas wherein additional O&M costs will be incurred to upgrade the operating practices to industry best practices, or Eversource practices. For example, there are areas where CMA performed systematic visual inspections, as opposed to the more thorough inspections that Eversource typically institutes for activities such as regulator maintenance, which involves dissembling the equipment and thoroughly assessing condition and operation. The upgrades in inspection practices will ultimately require additional, incremental staffing, although the costs of these changes is not yet identified and not included in this filing. The purpose of this filing is to present the results of the Comprehensive Safety Assessment & Implementation Plan and to evaluate the capital requirements associated with addressing the safety and reliability gaps and deficiencies identified through the Safety Assessment.

6. Key Findings and Risks

To improve the safety and reliability of the system, numerous aspects of the system and its operations require significant remediation. Details on the gaps, deficiencies, and risks identified during the Safety Assessment are discussed in the subsequent Areas of Focus portions of this Report. This section provides an overall high-level summary of the key findings from the Safety Assessment across all Areas of Focus.

Across several categories, assets were determined to be in poor condition and without either adequate operations and maintenance ("O&M") plans or holistic design and

condition improvement plans. Essentially, in the view of Eversource, these assets declined as a result of sustained under-investment of time, money, and resources. These assets include the LNG and LPG facilities; the gate stations and district regulators; maps, records, and data; telemetering and control to ensure adequate Gas Control oversight; and pipeline system design for safety and reliability. Several of these assets, in particular the LNG and LPG assets, required substantial remediation to be able to safely perform during the 2020/2021 peak winter season. The implementation plans included in the subsequent Areas of Focus portions of this Report for each asset category is designed to bring these assets up to Eversource standards and industry best practices.

Another key finding across various categories is that reliance was placed on meeting minimum code requirements to determine appropriate action, rather than instituting additional safety and risk assessments above and beyond the minimum, but which are recognized to be best practice. Several of the risks identified by Eversource were associated with assets designated as “pre-compliance,” meaning that — due to their age — the assets were not required to meet the same compliance requirements as newer assets. These types of assets were found in the gate stations and district regulators and non-legacy materials areas of focus.

Other related items were associated with slightly different code interpretations, where Eversource typically employs a slightly more conservative approach (as recommended by code) than was used at legacy CMA. This demanded the recategorization of assets into a higher-risk status with new compliance obligations and new mitigations recommended. Eversource also recommends several mitigations that are standard practice for Eversource, but which are beyond code requirements, primarily in the area of additional inspections of generally high-risk assets (e.g., cast-iron pipe during winter; component-level inspection of pressure regulating equipment in gate stations and district regulators; and additional cathodic protection surveys of pipelines operating at over 100 psig, etc.).

Eversource has also devoted substantial time and effort into developing process improvements that drive a culture which puts “Safety First and Always;” continuously improves; and promotes best practices along with a learning culture, across the gas

business. CMA processes were evaluated against Eversource practices and were overall found to be either in the early development stages or able to substantially benefit from integrating into the Eversource program. CMA practices were also—and continue to be—evaluated to identify *new* best practices for the Eversource Energy gas operations, which should be applied to the entire Eversource Gas Business. Several of these processes will undergo general continuous improvement efforts, from which EGMA will continue to benefit. These processes include the following: tooling and equipment, procedures and standards, OQ, training, Pipeline Safety Management System ("PSMS"), Distribution Integrity Management Plan ("DIMP"), gas process safety, contractor onboarding, QA/QC, leak survey and the emergency response program.

Lastly, although previously mentioned, the poor quality of maps, data, and records in particular deserves additional discussion. Ensuring the safety and reliability of the system requires knowledge of the assets contained within that system. The current state of Bay State Gas' records is such that that system knowledge is known to be incomplete and deficient in several areas, with conflicting or non-existent records for various types of assets. The implementation plan to address these issues is provided in Area of Focus #17. However, it is only through the work performed through those implementation plans, which involves individual assessment and verification of the various records, that the true scope of the issues will become known.

7. Targeted Future State

The work plans presented in this Safety Assessment report not only provide a clear lens on the work to be performed, but also establish a vision of the future state of the EGMA distribution system. Once these plans are implemented, EGMA will be a fundamentally different company. EGMA's customers and communities will be served by a safer, more reliable system, with improved redundancy. EGMA will use industry best practices to develop and support a workforce that is better trained, better equipped, and more safety-oriented in the execution of their work tasks and in response to emergencies. Also, the overall condition of EGMA's assets will be significantly improved, with numerous upgrades in design and O&M functionality, which will provide sustained safety and reliability benefits to EGMA customers.

EGMA will also continue to report on the progress of all of the identified implementation plans and any new implementation plans in the progress reports to be filed every six months.

8. Glossary

AACE International: Association for the Advancement of Cost Estimators International. A nonprofit organization that helps to drive projects to be completed on time and on budget, while meeting investment and operational goals.

AGA: American Gas Association. A trade organization representing more than 200 local energy companies committed to the safe and reliable delivery of clean natural gas to more than 71 million customers throughout the nation.

AGT: Algonquin Gas Transmission Company, which is owned by Enbridge, supplies natural gas to the EGMA gas distribution system.

AOC: Abnormal Operating Condition. When the operator identifies a situation that may indicate a malfunction of a component or deviation from normal operations that may indicate a condition exceeding the design limits or result in a hazard to people, property, or the environment.

API: American Petroleum Institute. An organization that represents all of America's oil and natural gas industry. They have developed hundreds of standards for the oil and natural gas industry.

ATM: Atmospheric corrosion inspections. Each pipeline or portion of the pipeline that is exposed to the atmosphere must be inspected for evidence of atmospheric corrosion at least once every three calendar years, not to exceed 39 months (and for service lines at least once every five calendar years, not to exceed 63 months).

AWC: Area Work Center. The subdivisions the company uses to organize operations of its territories.

Bay State Gas: A company founded in 1974 that was based in Westboro, MA. In 1999, it was acquired by NiSource and became part of CMA.

Boil Off Gas System (LNG): LNG is stored at atmospheric pressure and a temperature of approximately -260°F. As LNG begins to boil, turning back into a vapor, the storage tank begins to pressurize. LNG tanks are only designed to handle small amounts of pressure. A compressor is used to pull vapor from the tanks, boost the pressure so that it can be introduced into the local gas distribution system for use. This results in approximately 0.5% loss of product each day.

CAT: Cable Avoidance Tool. An electronic device used to assist in avoiding buried cables and pipes during excavation, reducing the risk of injury to personnel and damage to utilities.

CFR: Code of Federal Regulations.

CGI: Combustible Gas Indicator. A device used to detect flammable gas concentrations.

Chemical Storage System: Chemical storage includes the buildings, tanks or equipment used to store bulk chemicals, hazardous waste, or other non-process related materials requiring special storage.

Class 1: An offshore area or any location that has 10 or fewer buildings intended for human occupancy.

Class 2: Any location that has more than 10 buildings but fewer than 46 buildings intended for human occupancy.

Class 3: Any location that has 46 or more buildings intended for human occupancy or any area where the pipeline is within 100 yards of either a building or small, well-defined outside area occupied by 20 or more people on at least five days per week for 10 weeks in any 12-month period.

Class 4: Any class location unit where buildings with four or more stories above ground are prevalent. The density and building type of the area needs to be considered regarding the new pipeline route. In addition, design factors for steel and plastic piping choice are directly related to class locations.

CMA: Columbia Gas of Massachusetts which was transitioned over to EGMA with the purchase of the Company by Eversource Energy. Previously reported to PHMSA under the Operator ID 01209.

Containment System (LNG): Should the LNG tank fail, containment is used as a secondary barrier to hold any leaked LNG. In most facilities, an earthen ditch is built around the base of the tanks, capable of holding the entire volume of the tank in which it protects.

Controls System (LNG/LPG): The plant controls system includes the plant's distributed control system (DCS) which is the automated computer system that monitors and controls the plant's systems, provides information back to the operators, and helps to ensure safe operation of the plant. This may also include a Safety Instrumented System (SIS) which is a more robust control system specific to process safety functions. It may also include a Hazard Detection and Mitigation System (HDMS), which is separate from the fire alarm systems, that monitors the plant atmosphere for flame and gas detection, along with other hazards such as low oxygen levels or high carbon monoxide levels.

Critical Valves: Valves owned and designated by the Company that are necessary for the safe operation of the system. These valves are strategically located to sectionalize distribution systems and for emergency use. They are inspected annually to ensure operability.

DA: Direct Assessment. An integrity assessment method that utilizes a process to evaluate certain threats (i.e., external corrosion, internal corrosion and stress corrosion cracking) to a covered pipeline segment's integrity. The process includes the gathering and integration of risk factor data, indirect examination or analysis to identify areas of

suspected corrosion, direct examination of the pipeline in these areas, and post assessment evaluation.

DIMP: Distribution Integrity Management Program. The overall program which responds to the requirements of 49 CFR Part 192, Subpart P.

Distribution Line: A pipeline other than a gathering or transmission line. Generally mains, services, and equipment which carry or control the supply of gas from the point of local supply to and including the sales meters.

DOT: Federal Department of Transportation.

ECDA: External Corrosion Direct Assessment. A four-step process that combines preassessment, indirect inspection, direct examination, and post assessment to evaluate the threat of external corrosion to the integrity of a pipeline.

EFV: Excess Flow Valve. A device installed on the service line to limit the flow of gas from the main distribution line in the event of a service line rupture to the extent that the gas flow due to the rupture exceeds the design limits of the valve.

EGMA: Eversource Gas of Massachusetts, reported to PHMSA under the Operator ID 40196 (Distribution, Transmission).

Electrical Distribution System (LNG/LPG): This is equipment that is used in the distribution of electrical power throughout the plant. This includes the motor control centers, distribution panels, cabling, conduits and cable trays.

Electrical Service System (LNG/LPG): The electrical power that feeds the LNG plants. This is supplied by the local utility, standby generators and may include uninterruptable power supplies (UPS).

FEED Studies (LNG/LPG): Front End Engineering and Design studies.

FEMA: Federal Emergency Management Administration.

Fire Protection System (LNG/LPG): This includes detection devices that are triggered by smoke, heat and flames. It also may include suppression systems such as sprinklers, foam, dry chemical, and clean agents.

Flood Zone: Areas designated by EGMA that could be close to a body of water, and under flooding conditions, compromise the gas distribution system. The EGMA flood zone designations for the gas distribution system may or may not follow the Federal Emergency Management Agency (FEMA) designations. The flood condition could be from storms, tidal surges, river flood conditions, etc.

100-year Flood Zone: A flood event that has a 1 in 100 chance (one percent probability) of being equaled or exceeded in any given year. The flood condition could be from storms, tidal surges, river flood conditions, etc.

FR: Flame Resistant. Clothing that includes flame retardant chemicals to stop burning once a heat source is removed.

Gate Station: Location where gas enters EGMA's transmission and distribution systems from a supplier or shipper of natural gas. Also referred to as Point of Delivery (POD).

GIS: Geographic Information System. A system of computer software, hardware, data, and personnel to help manipulate, analyze, and present information that is tied to a geographic location.

GPS: Global Positioning System.

Grade 1 Leak: Any leak judged to be hazardous by personnel; any leak that has ignited; third party damage causing leakage; gas entering or migrating close to buildings; any sustained gas reading of four percent or greater in a substructure; any leak that can be seen/heard/felt/located that can endanger life or property. Immediate actions to protect life and property and continuous actions until conditions are no longer hazardous.

Grade 2 Leak: Any leak that is found to be non hazardous at the time of detection but justifies scheduled repair. Repair within 12 months and surveillance at least every six months until evaluated.

Grade 3 Leak: Any leak not classified as a grade 1 or grade 2 leak. Recheck at next survey or within 12 months (whichever is less) until it's eliminated.

GSEP: Gas System Enhancement Plan. Eversource's annual program to replace aging natural gas pipeline infrastructure in Massachusetts, pursuant to MGL c. 164, Section l45.

GWUT: Guided Wave Ultrasonic Testing. A non destructive examination technique that projects sound waves along pipe walls in order to detect corrosion or other damage.

Hazardous Leak: A leak that represents an existing or probable hazard to persons or property and requires immediate repair or continuous action until the conditions are no longer hazardous. Grade 1 and grade 2 leaks are hazardous whereas grade 3 Leaks are non-hazardous by definition.

HCA: High Consequence Area. Specific locales and areas where a release could have the most significant adverse consequences, as defined by the DOT. Once identified, operators are required to devote additional focus, efforts, and analysis in HCAs to ensure the integrity of pipelines.

High Emitters, Grade 3: Grade 3 leaks identified as environmentally significant, as defined in the code.

I&R: Instrumentation & Regulation Department. An Eversource internal organization responsible for the maintenance and inspection of many critical components of the gas distribution system, including gate and pressure regulation station and large customer meter sets. Also performs monthly tests to ensure gas traveling within distribution system is properly odorized.

ICC: Incident Command Center. A location where the Incident Management Team meets to plan and execute emergency response.

ICS: Incident Command System. A plan that provides guidance for how to organize assets to respond to an incident and processes to manage the response.

Identified Site: Locations where people may occupy an area near a pipeline asset or facility. These are places where people may gather from time to time for a variety of reasons.

ILI: In-Line Inspection. Inspection of equipment or pipe while in service or operating.

IMT: Incident Management Team. A group of trained personnel that responds to a gas emergency.

Instrument Air System (LNG/LPG): Instrument air is used by the facility to actuate a variety of pneumatic devices such as valves. It also provides a means of pressurizing and purging electrical cabinets to keep combustible gasses from entering and to provide cooling. It may also be used for tools and other plant utility uses.

Instrumentation System (LNG/LPG): Instrumentation includes devices such as pressure gauges, thermometers, and flow meters. It also includes electrical digital devices such as pressure and temperature transmitters. These devices are used to send signals back to the plant controls system or may perform local functions to the process.

Landbase: A geographical system used in GIS representing streets, ROW (Right of Ways), edge of pavement, hydrology (wetlands, rivers, lakes, etc.), airports, railroads, land parcels, boundaries (town, district, region, state, etc.).

LDC: Local Distribution Company. A local gas company responsible for distributing gas to its customers. An LDC purchases gas from transmission companies for resale to the consumer. LDC's operate and maintain the underground piping, regulators, and meters that connect to each residential and commercial customer.

Leak: The unintentional escape of gas from containment.

Liquefaction System: Liquefaction is the process where pipeline grade natural gas is treated, refrigerated, and undergoes a phase change to a liquid. This process also changes the density of the methane 600/1 allowing 600 ft3 of methane gas to be stored as a liquid in a space only 1 ft3.

LNG: Liquefied Natural Gas.

LNG / LPG Storage Tanks: Storage tanks are used to contain LNG and LPG. These may be large flat bottom tanks whose contents are stored at about one PSIG pressure, These may also be bullet tanks which are cylindrical vessels, typically mounted horizontally along the ground, with contents stored pressurized up to several hundred PSIG. LNG is stored at a cryogenic temperature (-263°F) while LPG is stored at ambient temperature.

LPG: Liquefied Propane Gas.

Main: A distribution line that serves as a common source of supply for more than one service line.

MAOP: Maximum Allowable Operating Pressure.

MAOP Reconfirmation: Federal code requirement to reconfirm the MAOP for transmission pipeline segments that meet the conditions defined in 49 CFR 192.624.

MCA Identification: An onshore area that is within a potential impact circle containing any one or more of the following and does not meet the definition of an HCA.

- Five (5) or more buildings intended for human occupancy.
- Any portion of the paved surface, including shoulders, of a designated interstate, other freeway, or expressway, as well as any other principal arterial roadway with four (4) or more lanes, as defined in the Federal Highway Administration's Highway Functional Classification Concepts, Criteria and Procedures, Section 3.1.

MCS/MCA: Moderate consequence segments/Moderate consequence areas.

Mega Rule: The DOT Gas Mega Rule provides an expansion of the integrity management requirements for gas transmission pipelines with a greater reliance on risk modeling and the assessment of pipeline risk to prioritize and inform the pipeline operator. Based on lessons learned from the San Bruno incident in 2010. Effective July 1, 2020.

Method 1 HCS Identification: Defined as any one or more of the following.

- A Class Location 3.
- A Class Location 4.
- Any area in a Class 1 or Class 2 location where the potential impact radius is greater than 660 feet and the area within a potential impact circle contains 20 or more buildings intended for human occupancy.
- The area in a Class 1 or Class 2 location where the potential impact circle contains an identified site.

Method 2 HCA Identification: Defined as the area within a potential impact circle containing either one or both of the following.

- 20 or more buildings intended for human occupancy.
- An identified site.

MOC: Management of Change. A systematic approach to organizational changes with the aim of ensuring the continued safety of the distribution system throughout the process.

MOP: Maximum Operating Pressure. The pressure at which the main is operated. MOP is defined as the system set pressure at the regulator. This regulator set pressure is lower than MAOP to allow for slight pressure system fluctuations upward due to ambient conditions so as not to exceed the MAOP.

MPLS: Multiprotocol Label Switching. Data forwarding technology that increases the speed and controls the flow of network traffic.

NGA: Northeast Gas Association. A regional trade association that focuses on education and training, technology research and development, operations, planning, and increasing public awareness of natural gas in the Northeast U.S.

NIMS: National Incident Management System. The FEMA NIMS guides all levels of government, nongovernmental organizations and the private sector to work together to prevent, protect against, mitigate, respond to and recover from incidents.

NRF: National Response Framework. The FEMA NRF is a guide to how the nation responds to all types of disasters and emergencies. It is built on scalable, flexible, and adaptable concepts identified in the National Incident Management System to align key roles and responsibilities.

NSTAR: NSTAR Gas Company in Massachusetts, reported to PHMSA under the Operator ID 2652.

NTSB: National Transportation Safety Board.

O&M: Operation and Maintenance.

OHCA: Outside of High Consequence Area. See HCA “High Consequence Area” definition.

OQ: Operator Qualification. The DOT rules and regulations require those who perform covered tasks on gas facilities be qualified by their knowledge and experience in order to protect life and property.

PE: Professional Engineer. An individual, who has fulfilled education and experience requirements and passed rigorous exams that, under state licensure laws, permits them to offer engineering services directly to the public.

PHMSA: The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration.

Pig: Any of a variety of inspection devices designed to be run while the pipeline remains in service. These devices, or "pigs", measure and record the internal geometry, external or internal corrosion as well as provide information about pipe characteristics such as wall thickness and other pipe defects. Magnetic flux leakage, ultrasonic, calipers, and geometry are examples of smart tools; also referred to as smart pigs.

Piggable Pipeline: A piggable pipeline means that it can accommodate in-line inspection tools without the need for major physical or operation modification, other than the normal operational work required by the process of performing an in-line inspection.

Pin: A saved coordinate point or location within a GIS map.

Pipeline: All parts of those physical facilities through which gas moves in transportation, including pipe, valves, and other appurtenance attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies.

Plant Piping System (LNG/LPG): Plant piping consists of the piping systems and the structural components that support them. These piping systems are used to convey fluids and gases throughout the process systems and facility.

POD: Point of Delivery. Location where gas enters EGMA's transmission and distribution systems from a supplier or shipper of natural gas. Also referred to as a Gate Station.

Potential Impact Circle (PIC): Is a circle with a radius equal to the potential impact radius (PIR).

Potential Impact Radius (PIR): Is the radius in which significant damage to people and property could occur in the event of a pipeline failure. The equation for a PIR is as follows.

$$PIR = 0.69\sqrt{p * d^2}$$

Where:

d = the nominal diameter of the pipeline in inches

p = the pipeline segment's maximum allowable operating pressure (MAOP) in psi

PIR = the radius of a circular area surrounding the failure in feet

NOTE: 0.69 is a factor used for pipelines transporting standard natural gas. Different gasses use different factors based on their heat of combustion.

PPE: Personal Protective Equipment. Equipment worn to minimize exposure to a variety of hazards.

Probabilistic Risk Model: A type of quantitative model that uses system data as an input to calculate risk scores, but also use statistical models to give a probability to risk levels / potential consequences and project the risk into the future.

PSMS & QA: Pipeline Safety Management System & Quality Assurance Department. An Eversource internal organization responsible for ensuring that processes in place at Eversource Gas are being utilized in an effective and efficient manner to prevent control breakdowns by proactively assessing controls.

Qualified: Having proper and valid OQ to perform a specified task.

Qualitative Risk Model: A model based on input from Subject Matter Experts (SMEs) which utilizes the SMEs experience to gauge the relative occurrence and risk level of threats.

Quantitative Risk Model: A model that use historical data (e.g., leak repairs and GIS information) to calculate risk scores based on an established model.

Reliability: A system's ability to safely meet our customers' demands across all standard design conditions, including peak demand, and to withstand and recover from system damage or operational disruption from a given event.

Resiliency: The system's ability to prevent, withstand, adapt to, and quickly recover from a high impact, low-likelihood event.

Roadway Plate: Equipment to open up a pathway for traffic by covering an excavation pit. Safe for both pedestrian use and vehicle use.

RP: Recommended Practice.

SCADA: Supervisory Control and Data Acquisition.

SCBA: Self-Contained Breathing Apparatus.

Sendout System (LNG/LPG): The sendout system is used to withdraw LNG or LPG from the storage tank, boost it in pressure and convey it to the vaporizers for discharge into the local distribution system.

Service Line: A distribution line that transports gas from a common source of supply to an individual customer, to two adjacent or adjoining residential or small commercial customers, or to multiple residential or small commercial customers served through a meter header or manifold. A service line ends at the outlet of the customer meter or at the connection to a customer's piping, whichever is further downstream, or at the connection to customer piping if there is no meter.

SLR: Service Line Record.

SMYS: Specified Minimum Yield Strength.

Squeeze Tool: A tool for stopping the flow of gas inside polyethylene pipe.

Storm Water System (LNG/LPG): Storm water from precipitation is treated in various ways at the facilities. In some locations catch basins, swales, retention basins and other means of collection and treatment are utilized and are important to ensure the protection of neighboring properties and bodies of water.

Stub: Partial service lines installed over the years for areas in preparation for gas service.

Tap Cards: CMA service line record document.

Telemeter: An instrument for measuring a gas system parameter (pressure) and transmitting the result electronically to the SCADA system.

TGP: Tennessee Gas Transmission Company (supplies natural gas to the EGMA gas distribution system).

Threat: An indication of something which is likely to cause damage, harm or loss.

TIMP: Transmission Integrity Management Program. A DOT mandated process for assessing and mitigating pipeline risks in an effort to reduce both the likelihood and consequences of incidents.

Transmission Line: A pipeline, other than a gathering line, that: (1) Transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not down-stream from a distribution center; (2) operates at a hoop stress of 20 percent or more of SMYS; or (3) transports gas within a storage field.

TRC: TRC Companies, Incorporated. A third-party consulting, engineering and construction management firm.

Truck Loading System (LNG/LPG): Truck loading consists of the equipment necessary to either draw liquid from the storage tanks and load it into truck trailers, or to offload truck trailers to the facility's storage tanks. This includes pumps, hoses, loading arms, barriers, and other related infrastructure.

TSA: Transition Services Agreement.

Vaporizer System (LNG/LPG): Vaporizers are used to regasify LNG and LPG by heating the liquid from (-263°F) to pipeline temperature. There are several different technologies used at the LNG facilities to do this, but generally all consist of a heat source, heat exchanger, pumps burners and fans.

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Waste Water Treatment System: Wastewater treatment systems are used to capture and/or treat industrial waste water and sanitary waste. This may include oily water separators, sewer discharge systems and septic systems.

Winter Peak Conditions: The maximum winter system load demand expected. This parameter is used for system design of the gas distribution system.

WMS: Work Management System.

Yankee: Yankee Gas Services Co (Yankee), reported to PHMSA under the Operator ID 24015.

Part II: Areas of Focus

Area of Focus #1: Gas Supply and LNG/LPG Gas Supply Resources

Assessment Methodology:

This Safety Assessment includes Gas Supply, which is a review of Bay State Gas's gas-supply portfolio requirements and system capability to meet customer demand with a focus on the hourly, daily and seasonal periods under all weather conditions (design/normal) to identify any deficiencies or challenges to operate in a safe, reliable, cost-effective, and environmentally conscious manner. It also includes LNG/LPG Gas Supply Resources, which focuses on the viability and efficiency of using the LNG/LPG facilities as a gas supply resource.

Eversource started its review process with a review of the most recently filed Long-Range Integrated Gas Resource and Requirements Plan (the "Plan"), most recently approved by the Department in October 2020.[2] Eversource updated the resource portfolio for known changes and further examined regional balances within the traditional divisions of the service territory in coordination with the other areas of focus related to System Reliability, LNG/LPG Operations, Maintenance and Capital Investment. Eversource found that the portfolio, including recently approved supply resources and incremental supplies outlined in the latest Plan, will be sufficient to meet currently modeled demand in the near-term.[3] However, Eversource has identified the need for future resource development to maintain the portfolio configuration, and to adjust to the changing regional pipeline operations.

[2] The Company's long-range forecast and supply plan was initially filed by CMA and was approved by the Department in D.P.U. 19-135 on October 27, 2020.

[3] The Department recently approved the Company's agreement with Neptune LNG, LLC for the permanent assignment of a firm transportation agreement on Algonquin Gas Transmission, LLC, a firm city-gate peaking agreement with Constellation LNG, LLC, and a firm city-gate peaking agreement with Direct Energy Business Marketing, LLC in D.P.U. 21-09.

EGMA provides local distribution service to over 330,000 customers residing in three separate operating divisions, located in areas of Massachusetts surrounding the major cities of Brockton (including Algonquin "G" Lateral Taunton/S. Attleborough sub-region), Springfield (including TGP Northampton Lateral sub region) and Lawrence. The majority of EGMA's customer base is comprised of residential customers. The remainder of EGMA's customers are traditional small and medium-size commercial and industrial ("C&I") customers, as well as some larger industrial customers. Eversource utilized Department-mandated and accepted practices to assess the portfolio structure and contracting, including a review of all price and non-price factors to ensure a reliable and best-cost supply portfolio to customers including quantitative and qualitative review of price and non-price factors (i.e., reliability, flexibility, diversity, environmental considerations and safety).

Key Findings and Risks:

Eversource has identified areas of concern, which it is actively managing with available options. This report serves as an initial assessment to ensure the continued safe and reliable supply of gas to customers, focusing on the next five years, as Eversource further evaluates the changing energy supply, demand, and policy landscape in the region for the long term. This examination serves as the basis for the assessment of the LNG and LPG facilities, which is also addressed in this Area of Focus as part of the LNG/LPG Facilities Gas Supply Resources assessment.

The initial assessment has identified that the LNG/LPG facilities provide a critical and unique supply resource that has no viable alternative due to their configuration, capabilities, and location. Eversource has provided a preliminary estimate of identified capital investments that will be further refined as results of the Front-End Engineering and Design ("FEED") studies are completed and alternatives subsequently assessed.

Eversource is also in the process of developing number of strategies to lessen the environmental impact of natural gas through potential methane emissions reductions, renewable natural gas projects, NSTAR Gas' networked geothermal pilot, demand response and hydrogen as a supply resource in an ongoing effort with regional stakeholders in the "Future of Gas" proceeding currently before the Department and

discusses how these types of initiatives will impact the supply portfolio. The Company presents this comprehensive and balanced assessment to support sound infrastructure investments to ensure gas customers can be served in a safe and reliable manner with the foresight and flexibility to adjust the supply and capacity portfolio as the evolving customer demand profile permits.

The EGMA and NSTAR service territories have some towns adjacent to each other such as the eastern end of the Worcester Division (NSTAR) and the western end of the Brockton Division (EGMA), portions of the southern Brockton Division (EGMA) are adjacent to parts of the New Bedford Division (NSTAR) and there are there isolated territories for the Lawrence and Springfield Divisions (EGMA) and the Cambridge Division (NSTAR). While the service territories are somewhat fragmented, much of the pipeline capacity passes by the meter stations of each respective company along similar pathways. The industry refers to ability of interstate pipeline capacity to deliver gas to non-primary meters that are along the path of capacity from the receipt, “in the path” which is subordinate only to primary firm capacity to primary meters on each respective contract also known as “Secondary” capacity, it is typically uninterrupted depending on operation conditions of the pipeline. The main Hopkinton LNG facility is also centrally located to all of the service territory and can also provide direct supply support.

Implementation Plans:

The results of the assessment lead Eversource to implement the following actions:

- Replace and refurbish the Lawrence LNG vapor system.
- Maintain Lawrence LPG for now and re-evaluate each year.
- Maintain Northampton LPG indefinitely and assess the potential for other peak shaving energy solutions.
- Retire West Springfield LPG.
- Refurbish Ludlow LNG storage & facility and replace/expand vapor system.
- Refurbish Easton LNG storage & facility and replace/expand vapor system.

- Replace Marshfield LNG vaporizer and storage and potentially expand storage later.
- Maintain Meadowlane LPG for now and re-evaluate each year.
- Continue to study the benefits of expanding Acushnet LNG and other facilities owned by HOPCO to support EGMA systems.
- Continue to study the need for all facilities with an all options approach, including energy options that could help shave peak gas usage on system.

The LNG and LPG Facilities are further discussed in the next Area of Focus.

Area of Focus #2: LNG and LPG Facilities

Assessment Methodology:

This Safety Assessment comprises a review of the EGMA LNG and LPG facilities. Within this Area of Focus, Eversource reviewed the condition of these facilities, their operational and procedural status and condition and the future asset investments necessary to ensure the safe, reliable, efficient operation of the facilities, while modernizing the plant systems and equipment to ensure their maintainability into the future to meet customer demands.

All eight legacy Bay State Gas LNG and LPG facilities are capable of trucking, storing, and vaporizing LNG and LPG for injection into the distribution pipelines that they are connected to. One of the facilities, Ludlow, has the ability to liquefy. Liquefaction is the process in which natural gas is lowered to a temperature of -265°F where it physically changes from a vapor to a liquid, i.e. Liquefied Natural Gas or LNG, and reduces in volume 600 times, making it much more efficient to store. The liquefaction process is typically performed during the summer months when natural gas prices are low and supply is not a concern. When demand for natural gas is high, typically during the winter, prices begin to exceed the cost of the stored LNG product. Stored LNG is then vaporized and transferred into the gas distribution system. Not only does the use of LNG reduce supply constraints, it maintains reasonable market prices for the EGMA customers.

Eversource began its review process by inspecting all of the facilities upon acquisition and identifying key areas that required immediate mitigation or required more in-depth assessment for future improvement. Eversource utilized its operational experience for the HOPCO and Acushnet facilities, along with its lessons learned from the Refurbishment Period undertaken by HOPCO. Eversource then applied this experience in reviewing how best to address critical LNG and LPG safety and reliability issues. The Eversource experience with significant LNG projects has provided invaluable knowledge on the level of effort, strategy, and cost associated with these significant investments.

The following systems, which are further defined in the Glossary, are reviewed at each LNG / LPG facility as part of Eversource's asset and risk management programs aimed

at the systematic review, risk ranking and prioritization of asset and program investments. These same systems have been broadly reviewed and will continue to be assessed in further detail as part of Eversource's ongoing asset and risk management programs, FEED studies and continued condition assessments.

- Boil Off Gas
- Chemical Storage
- Containment
- Controls System
- Electrical Distribution
- Electrical Service
- Fire Protection
- Instrument Air
- Instrumentation
- Liquefaction
- LNG / LPG Storage Tanks
- Plant Piping
- Security
- Sendout System
- Truck Loading
- Storm Water
- Vaporizer
- Waste Water Treatment

Several aspects of the assessment in the operations and maintenance of the facilities were driven by Department communications to CMA before Eversource acquired the assets. The remainder were discovered after the transition, as Eversource began the

Safety Assessment effort and began to operate the facilities on October 9, 2020. Several of these efforts had to be implemented immediately to allow for the safe operation of these facilities in the 2020/2021 winter season. The total scope of items included in the gaps analysis assessments in this area is listed below:

- Compliance requirements, including the results of the self-audits for all four LNG facilities to comply with the requirements of Settlement 5-1-20.[3]
- Training programs and records.
- Operating procedures.
- Maintenance manuals, procedures, and records.
- Employee safety: electrical arc-flash, electrical hazardous area classification, confined spaces, sound studies, fall protection, and lockout/tagout.

Significant Work Performed in 2020 and 2021:

With the acquisition taking place during the shoulder months of the heating season in 2020, Eversource took swift action to identify areas of concern, which required immediate mitigation or action. Other work was prioritized to be addressed at a later date and was actively managed to ensure it did not impact the supply of customers or safety of the facility. This report serves to identify steps taken to address the items identified within the assessment and inform the Department of the significant level of effort that has already taken place to ensure the facilities are safe and reliable.

As found, operating procedures at all the LNG facilities needed to be updated to provide adequate and accurate guidance to the operating staff. Content in procedures was out of date, unclear, and incomplete. It was found that in many circumstances, the operators were relying on uncontrolled notes from other operators or their own personal notes as the “official” operating procedure. The most efficient path to ensure that the operations

[3] Third-party consulting group Sanborn Head was retained initially by CMA to initiate efforts to complete the required assessment as dictated by Settlement 5-1-20. Eversource then continued this effort after the acquisition of the business of former Bay State Gas. The self-audits for all 4 LNG facilities were completed by Sanborn Head on 1/19/2021. This resulted in four reports, one for each LNG facility, and an Audit Summary that was issued to Eversource.

teams would be able to support the 2020/2021 vaporization season was to involve the operators in a complete reauthor of all the operating procedures at all four LNG facilities, which was completed by August 2021. This included field confirming all procedures, including:

- Operations Manuals
- Trucking
- Boil-off Gas
- Vaporization
- Cool down
- Standby by Generator
- Storage Tank

At the Ludlow LNG Plant, revised/new Liquefaction operating procedures needed to be developed in addition to the list above.

All four LNG Facility maintenance manuals were completely rewritten and issued 5/26/21. This effort began under CMA and was completed under Eversource.

Several of the as found conditions were determined to be of such a high risk that they required immediate mitigation. These included the repair, replacement, or purge from service of damaged, non-functional, or unacceptable equipment including tank discharge expansion joints, valves, valve actuators, pressure flange connections, controllers, vaporizer pressure switches and pilot valves, alarm settings, pressure switches, storage tanks, instruments, and pump skids. They also included the design and installation of new plant isolation valves where none previously existed, the design and installation of a local system to control the LNG plant operations that did not rely on the external SCADA system associated with the gas distribution system, the execution of confined space entry plans where non existed, and the training and qualification of operators on the liquefaction and vaporization process (where all operators were found to have passed the qualification due date to perform these operations). The West Springfield LPG facility also had to be retired due to significant issues, including a sinking and leaking main process building, a leaking facility boiler, leaking multi-port valves, an LPG process air receiver without

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documentation or registration, and an incident where the propane vaporizer flashed back explosion and damaged the exhaust stack.

Key Findings and Risks:

The initial assessment has determined that the LNG and LPG facilities require significant capital investment; development of more thorough procedures and standards; the continued training of employees; and implementation of adequate and necessary staffing required to support a significantly larger LNG and LPG organization.

The information from the four self-audits were grouped into 15 actions that globally apply to EGMA LNG compliance, as there are 10 actions required from two additional warning letters. The requirements represent compliance obligations. Mitigations are currently being developed and executed by Eversource.

There are significant gaps in the training program, including in records and ultimately in staffing. Some facilities had out of date and/or incomplete training manuals, with inadequate practical tests. Training records were not always available. Several gaps in staffing were identified, with several facilities inadequately staffed with trained personnel to operate the facilities. Risks related to operating procedures have already been addressed and so were discussed in the previous section.

As found, maintenance procedures were not issued, updated, or maintained at the LNG facilities. In some cases, uncontrolled historical maintenance procedures or check lists remain at the facilities, but there is no evidence that they are still accurate or applicable. Additionally, maintenance records that contain the details of the work performed were not formally retained by CMA, neither locally nor remotely. Several risks related to compliance maintenance scheduling and tracking were also identified. These risks are applicable to all plants.

The findings overwhelmingly indicate facilities with deteriorating conditions, several of which required immediate mitigation, as demonstrated in the previous section. In addition to those and other similar ongoing risks, the assessment identified inadequate weld shop ventilation, unmaintained septic systems, equipment not in adherence with current code, inadequately designed control rooms, environmental and safety risks due to tenant

practices, hazardous waste storage on-site, failed building HVAC system, failed direct-fired vaporizer coils, lack of P&IDs for each facility. Regarding the employee safety initiatives, asbestos-containing areas, arc-flash potentials, confined spaces, fall risk areas, and potential sound exposure areas were identified. Additionally, PPE was identified to be inadequate as it lacked PPE for sound exposure and lockout/tagout procedures were either not present or had not been updated.

Please see Attachment 1, Section 1, for example photos demonstrating some of the findings, particularly those related to poor asset condition.

Implementation Plan:

Eversource is already working to meet the requirements of the compliance agreements, update and create training manuals and materials, qualify all operators to operate their facilities, remedy the maintenance procedures, update P&IDs for each facility, and continue near-term repairs associated with immediate equipment needs. While Eversource utilized its staffing team and experience from the operations of its existing facilities, identified staffing gaps and positions needed, augmented the LNG organization, and is working on filling positions to build a more formal and permanent LNG organization, with improved project management, administrative and engineering support.

Eversource has also provided in the table below a preliminary estimate of identified capital investments that will be further refined as results are gathered from the FEED studies, which are to be completed over the next two years. The FEED studies will consist of conceptual design plans; assessment of existing system conditions through the existing Eversource safety improvement, asset management, and risk management programs; the consideration of Gas Supply needs; and the desire for increased reliability and alternative technologies or methodologies. Because this preliminary assessment is prior to the conceptual-level estimates resulting from the FEED studies, this Area of Focus required a Class 5 deadband.

Table 1: Capital Investment for LNG and LPG

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Lawrence LNG	1.2	14.5	11.0	5.5	2.0	2.0	2.0	2.0
Lawrence LPG	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.3
West Springfield LPG	0.7	-	-	-	-	-	-	-
Northampton LNG	0.02	0.6	0.8	0.6	1.3	1.8	1.8	1.8
Ludlow LNG	2.3	22.0	20.0	9.5	8.5	7.5	7.5	7.5
Meadowlane LPG	0.4	1.5	2.0	3.5	2.5	3.0	3.0	3.0
Marshfield LNG	0.4	5.5	6.5	2.0	2.0	2.0	2.0	2.0
Easton LNG	1.1	15.0	14.0	14.0	6.0	6.0	6.0	6.0
Total ($M)	**6.7**	**59.6**	**54.8**	**35.5**	**22.6**	**22.6**	**22.6**	**22.6**
Total High (+100%)	**13.4**	**119.1**	**109.6**	**70.9**	**45.2**	**45.2**	-	-
Total Low (-50%)	**3.3**	**29.8**	**27.4**	**17.7**	**11.3**	**11.3**	-	-

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Area of Focus #3: Gate Stations and District Regulators

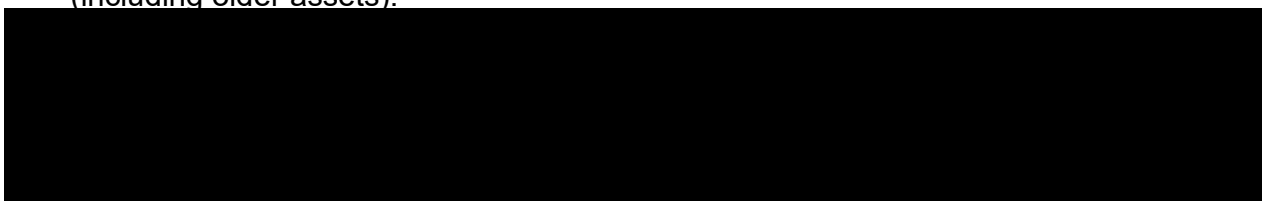
Assessment Methodology:

Eversource assessed the overall risk and condition of all CMA gate stations and district regulators utilizing the same process used to evaluate legacy Eversource facilities. This process, including the criteria used to identify risk, has been in place at Eversource for the past six years. Areas of high risk or high-risk facilities are generally targeted for replacement or capital investment, thereby lowering the risk score.

To ensure this evaluation process was implemented in an unbiased and consistent manner, Eversource employed an independent gas engineering contractor to conduct the review. The review encompassed all 199 district regulators and 16 gate stations. The evaluation consisted of field inspections and desktop reviews of available historical electronic records such as isometric drawings. This review was used to assess the design and condition of each facility and populate the risk registers. A capital plan was developed to reduce the risks identified in the risk registers. The review also included the assessment of a pre-existing CMA plan to provide secondary OPP at some district regulators that met specific criteria.

Key Findings and Risks:

- Lack of a previous overall capital replacement plan that considered risk holistically and across all gate stations and district regulators.
- Lack of a consistent gate station or district regulator standard configuration (including older assets).



- Some gate stations and district regulators have outdated equipment, such as equipment that is no longer produced or supported with replacement parts by the manufacturer. Outdated equipment also refers to equipment that does not comply with current Eversource standards.

- Four district regulators are located in confined space manholes.
- Many older district regulator vaults lack facility separation between the primary pressure control regulator and the over-pressure regulator.
- Many district regulators lack adequate redundancy because there are neither dual runs nor bypasses around individual regulators, making winter maintenance impossible at certain facilities.
- Many district regulators are lacking adequate sense line separation between the monitor and control sense lines (.e., shared sense lines), etc.

- Slam shuts have insufficient setpoint separation, leading to nuisance shutoffs (including during 2020/2021 winter season, nearly leading to outages).
- Many district regulators are equipped with slam shut only devices as the primary means of over-pressure protection ("OPP").

Please see Attachment 1, Section 1, for example photos illustrating some of these findings.

Additional Findings:

The additional findings in this section represent findings that were outside of the scope for this Area of Focus identified in Appendix 1 to the Settlement Agreement, but which were nevertheless relevant to these assets and to the overall safety and reliability of the CMA system.

- A limited preventative maintenance program for gate stations and district regulators.
- Three out of the four Bay State Gas LNG plants, were identified as requiring short term solutions to ensure adequate over pressure protection for the distribution system. Those facilities will receive upgrades prior to the vaporization season, to address this concern. A long term plan will be implemented to standardize and

install more robust over pressure protection system at the LNG facilities. The long-term projects are included in the implementation plan section below.

Implementation Plan:

As a result of the limited preventative maintenance on gate stations and district regulators discussed above, in 2021 Eversource significantly enhanced the preventative maintenance practices of gate station and district regulator equipment to bring the practice in alignment with legacy Eversource practice. These best practices include regular scheduled monthly inspections of gate stations and district regulators, replacing outdated regulator pilots that are no longer supported by the manufacturer, outdated remote pressure control devices are replaced with new the newest version, and in addition to testing for function and lockup during annual regulator maintenance, regulators and pilots are now taken apart and the internal components visually inspected.

District regulators are typically equipped with a control regulator and a monitor regulator. The control regulator is the primary device reducing pressure from the higher upstream pressure to a lower downstream distribution pressure. A monitor regulator is a means of over-pressure protection and is set to a higher pressure than the control regulator. A monitor regulator is a secondary device or backup device to the control regulator, should the control regulator fail or malfunction. As mentioned above in the key findings section, in some instances district regulators are equipped with slam shut only device as the primary means of over-pressure protection without a monitor regulator.

Based on this review, Eversource has developed a capital plan to address the key findings and risks outlined above. This capital plan consists of a short term expedited replacement of slam shut only devices with combination slam shut and monitor devices, and the installation of telemetry at district regulators. A combination slam shut and monitor device is equipped with a monitor regulator as the primary means of over-pressure protection, and an additional slam shut device which acts as a secondary means of protection. Locations with slam shut only devices do not include a monitor regulator, and the setpoint of the slam shut is too close to the primary pressure control regulator. [redacted]

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[redacted] This expedited remediation plan began in 2021.

A long-term capital plan was also developed consisting of partial and complete district regulator replacements, continued telemetry installation, as well as key gate station upgrades and major gate station rebuilds. This plan will reduce risk and replace outdated and ageing equipment.

District regulator capital plans overall will install telemetry for remote monitoring at all low-pressure district regulators by 2023 and replace all top risk assets by 2028 to better align overall asset safety with legacy Eversource. Projects have been designed to address the following risks within this capital plan: regulators at greater than 100% capacity, lack of regulator bypass, and lack of facility separation.

- Telemetry – [redacted]
- Complete Capital Replacement Program - Complete district regulator replacements based on asset risk score. Complete replacements will comply with Legacy Eversource design.
- Partial Replacement Projects – Increase the deployment of risk reduction projects to raise pilot atmospheric reference above ground, add regulator bypasses and valves, add or replace critical valves, address sense line deficiencies, faulty block valves, and strainers will be executed at lower risk facilities that can accommodate partial upgrades.
- Secondary OPP Projects – add second level OPP to station with an inlet pressure of 125 psi or greater, as existing program was found to be appropriate to continue as part of the plan to reduce risk on district regulators.
- Replace slam shut only with Combination Monitor and Slam shuts.

- Regulator Retirement - Developing a plan with System Planning department to identify and retire district regulators through System Reliability and GSEP projects.

As for the gate stations, review of the risk register showed significant improvements can be made if increased remote monitoring and control is added to the stations, also referred to as gas modernization. Gas modernization will make the following improvements and lead to reduced risk scores.

- Fire mitigation will be provided by high temperature shut of switches installed on ESDs. Gas and heat detection will provide awareness to the gas control operators when valves activate.
- ESDs will be added to allow for remote isolation of the station. Valves can be closed on high station outlet pressure. Additional awareness will be provided by run flow indication to ensure the correct run of regulators is isolated in an overpressure event.
- Communication upgrades will be made to ensure a constant signal between gas control and the station.
- Generators will be installed or upgraded to ensure automatic backup power is available at all stations.
- Additional transmitters and door alarms will be installed to provide Gas Control operators additional awareness at the station.
- Station fencing does not meet Eversource standards and is in need of upgrade.

These upgrades will reduce the risk at a given gate station by more than half.

A capital cost estimate for the gate station assets was developed with the goal to deploy gas modernization, upgrade station fencing, and complete major station projects by 2026. Project types will consist of the following:

- Standard Station Upgrade Projects:

  - Gas Modernization: fully implement station upgrades to provide system oversight and control to gas control operators. Ensure station inputs and outputs matches Eversource Standards at the completion of the project.
  - Upgrade fencing to Eversource Standard.
- Major Station Upgrade Projects
  - Address major station deficiencies while completing the goals of Standard Station Projects.
- Major station projects require additional planning and will not start until 2023. These projects will address heating system issues, capacity, and operational issues.

District regulator implementation plans, gate station implementation plans, and the combined investments are provided in the table below. A Class 4 estimate band has been assigned to the capital investments for this Area of Focus based on the following factors:

- Cost estimate based on cost/length factors and factored models
- Uncertainty associated with permitting

Table 2: Gate Station and District Regulator Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
District Regulator Projects								
Telemetry	0.7	2.3	2.4	1.2	1.2	1.3	1.3	1.3
Complete Replacements	-	4.0	4.9	5.9	7.0	9.0	9.3	9.6
Partial Replacements	2.8	1.6	1.4	1.4	1.4	1.8	1.8	1.8
Secondary OPP Projects	-	-	0.1	0.1	-	-	-	-
Replace SPCs slamshut only with combination monitor slamshuts	1.0	0.5	-	-	-	-	-	-
Regulator retirements	0	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Gate Station Projects								

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Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Standard Station Projects	0.3	3.6	3.7	3.8	3.9	4.1	-	-
Major Station Projects	-	-	6.0	6.2	6.4	6.6	-	-
LNG OPP Projects	-	-	2.5	2.5	2.5	-	-	-
Combined								
Total ($M)	**4.7**	**12.2**	**21.1**	**21.3**	**22.5**	**22.8**	**12.5**	**12.8**
Total High (+50%)	**7.0**	**18.3**	**31.7**	**32.0**	**33.8**	**34.2**	**-**	**-**
Total Low (-30%)	**3.3**	**8.5**	**14.8**	**14.9**	**15.8**	**16.0**	**-**	**-**

Area of Focus #4: High-Pressure Pipelines

Assessment Methodology:

The high-pressure pipeline assets include seven pipelines with operating pressures exceeding 100 pounds per square inch gauge ("PSIG"). All seven of these pipelines operate above 200 PSIG.

The Safety Assessment for the high-pressure pipelines is divided into two major assessment areas: traceable, verifiable and complete ("TVC") records review; and a cathodic protection and leak history review. The Safety Assessment also included a general review of CMA programs related to the high-pressure pipelines which were pre-existing at the time of the acquisition. A critical aspect of the TVC records review was to determine whether the systems included any segments which should be classified as transmission.

Key Findings and Risks:

During the acquisition, CMA identified one pipeline with segments classified as transmission (based on the stress in the pipe at operating pressure[4]); however, this assessment found an additional pipeline segment as transmission class. In general, transmission class pipe is higher risk than distribution class pipe. Pipelines operating at high stress levels are more likely to fail by rupture, while pipelines operating at low stress tend to fail by leaking.

Eversource also reviewed the leak data, including leak causes, and found that 165 of 172 leaks were located on service lines and not the mainline. The most common cause of leaks was an issue with threaded connections which caused 48 leaks. Out of the 48 leaks with threaded connection issues, 37 were below-grade and 11 were above-grade. The second most common leak cause was corrosion, which caused 22 leaks, followed by issues with relief equipment involving 21 leaks. A cathodic protection review was conducted on these 165 service leaks to determine if the associated services were

[4] Pipeline segments operating at a stress at or above 20 percent of the Specified Minimum Yield Strength ("SMYS") are classified as transmission.

cathodically protected independent from the main, and therefore part of the 10 Percent Cathodic Protection Program at the time of the leak, or if the services were continuous and cathodically protected with the main. Of the 172 leaks, 76 services were found to be part of the 10 Percent Cathodic Protection Program at the time of the leak; 89 were found to be continuous with the main; and seven were found to be leaks on the main. Six of the seven main leaks were at expansion joints on atmospherically exposed pipe at bridge crossings.

Additional Findings:

Some of the pipeline segments operating above 100 PSIG are electrically continuous and cathodically protected with lower pressure pipes and they possibly have different installation years. In principle, this method of protection is acceptable; however, it does increase the circuit size and complexity. This characteristic will require an additional engineering study to determine if the systems can be electrically isolated into smaller CP systems. The high pressure mains and services will continue to be assessed with particular attention to the different characteristics of the pipe at each test point to determine whether any remediation is required in the future. Any findings associated with this assessment will be provided in future update reports.

Key Metrics:

The key metrics used to evaluate this asset were cathodic protection records and leak history. These will continue to be monitored in future progress reports.

Implementation Plan:

Based on the Safety Assessment, Eversource has determined that it is necessary to replace the 3,600 feet of 16” transmission pipeline on Ravenwood Drive, which is off of the 273 Springfield Line. The pipeline will then be classified as a distribution pipeline based on the percent SMYS of the operating pressure. In addition to removing this section from transmission class status, the Company will remediate the over-pressure protection at the Ludlow LNG Plant, which is currently a single device (relief valve) protecting the pipeline during vaporization. The project to replace the 16” transmission line on Ravenwood Drive will include over-pressure protection compliant with federal

pipeline safety regulations. Eversource has also determined that it is necessary to replace the Con-Ed Line to remove this line from transmission class and reclassify it as distribution. Additionally, the remaining 91 service repairs/replacement for the Springfield 273 Line are scheduled to be completed in 2021.

Also, new safety measures will be implemented to help ensure the high-pressure pipelines continue to be maintained and operated in a safe and reliable manner. For the existing services associated with this asset, a pressure check verification program will be implemented. The new program will begin in 2022 with 1/5 (approximately 180 services) of the services off these seven pipelines being verified each year. All services off these pipelines will be added to the 10 Percent Cathodic Protection Program regardless of whether they are continuous or isolated from the main. This will increase visibility of these important assets and ensures the system is operated safely.

EGMA is currently conducting a 20 percent annual External Corrosion Direct Assessment ("ECDA") / Close Interval Survey ("CIS") on the Monson Palmer ("MP") Line and this schedule will continue. The current program will be expanded to include all the pipelines operating greater than 200 PSIG. The remaining pipelines will be surveyed on a seven-year schedule. The Springfield 273 Line is scheduled to be spread over a three-year period and the Brockton 265 Line is scheduled to be spread over a two-year period. The CIS plan assumes that the surveys may result in additional direct examinations and remediations.

These ongoing programs, and the data resulting from these programs, may result in the identification of new risks which would require remediation and potentially prioritization. The planned capital investments are presented in the table below, respectively. A Class 4 estimate band has been assigned to the 2021-2023 capital investments for this Area of Focus based on the following factors:

- Cost estimate based on cost/length factors and factored models
- Uncertainty associated with permitting
- Prior project delays indicating continued uncertainty

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Table 3 – High Pressure Pipeline Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Ravenwood Replacement	-	5.0	-	-	-	-	-	-
Con-Ed Replacement	1.4	12.3	4.4	-	-	-	-	-
Long-Term Plan 273 Springfield	0.8	-	-	-	-	-	-	-
Total ($M)	**2.2**	**17.3**	**4.4**	**-**	**-**	**-**	**-**	**-**
Total High (+50%)	**3.3**	**26.0**	**6.6**	**-**	**-**	**-**	**-**	**-**
Total Low (-30%)	**1.5**	**12.1**	**3.1**	**-**	**-**	**-**	**-**	**-**

Area of Focus #5: DIMP – Transition and Integration

Assessment Methodology:

The purpose of the DIMP and Transmission Integrity Management Program ("TIMP") is to identify risk within the distribution and transmission systems (respectively), develop and implement measures to reduce risk, and monitor trends to assess the mitigation measures taken. This Safety Assessment focuses on the current effectiveness of the EGMA DIMP program and integration plan to consolidate it with the existing Eversource processes. The TIMP program is discussed in the next Area of Focus.

The DIMP assessment was completed with a combination of leak trend analysis and performing a gap analysis between the legacy Bay State Gas and the current NSTAR Gas DIMP risk models. The leak trend analysis was performed by looking at five different factors: Grade, Pipe Type, Material, Cause, and Town. These factors were used to determine if the existing risk scoring and mitigation plans were sufficiently addressing the risks within the system.

The risk model gap analysis was performed by a combination of both internal comparison and an external report completed by TRC, a third-party consulting, engineering and construction management firm. The analysis focused on how risk scores are calculated and the differences between the Bay State Gas and NSTAR Gas models. Both quantitative and qualitative methods were reviewed as well as existing mitigation plans. The EGMA plan was also reviewed in light of the most recent audit by the Department's Pipeline Safety Division ("Pipeline Division") to identify any additional potential gaps in the program.

Key Findings and Risks:

The key findings from the DIMP Transition and Integration risk assessment were that, while the programs in place at Bay State Gas were compliant with the Pipeline and Hazardous Materials Safety Administration ("PHMSA") pipeline safety regulations, there are benefits from adopting the models currently used at NSTAR Gas.

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For the DIMP risk model, both internal NSTAR Gas and external TRC reviews concluded that the legacy Bay State Gas DIMP model could be improved in both consistency of risk calculations and the level of risk ranking performed. The current model is Excel spreadsheet based, which limits the potential calculations that can be performed and is also vulnerable to small user errors that can affect the model results. A new software-based risk model solution was proposed as a replacement that could more easily integrate data from EGMA systems and perform complex calculations for risk scoring. [redacted]

Key Metrics:

The key metrics for this Safety Assessment involved leak rates across the five identified categories of Grade, Pipe Type, Material, Cause, and Town. These rates were analyzed within the context of DIMP. Existing mitigation plans were reviewed determine if the leak metrics were trending in the right direction or if additional action is needed.

The Pipeline Division's audit of the Bay State Gas DIMP program also provided specific areas for improvement, such as additional threats like water infiltration, that will be included in the updated version of the EGMA DIMP.

Business-case needs for a new software-based risk model were also important for this Safety Assessment. [redacted]

Implementation Plan:

The main capital investment for this Safety Assessment will be the purchase of a new risk modeling software. There will be ongoing subscription costs for the use and support from

the vendor. This will also involve a time investment from the engineering group to be trained on the new tools and facilitate the initial data integration.

Area of Focus #6: TIMP – Transition and Integration

Assessment Methodology:

The purpose of the TIMP is to identify risk within the transmission system, develop and implement measures to reduce risk and monitor trends to assess the mitigation measures taken. This Safety Assessment focuses on the development of a TIMP program that is appropriate for the size and scale of the Bay State Gas transmission assets.

As a part of the acquisition, new transmission class pipeline segments located in High Consequence Areas ("HCA") were acquired, which require the development of a TIMP. Eversource worked with TRC to develop a TIMP that meets the Company's needs and is appropriate for the size and scope of the acquired transmission assets.

Key Findings and Risks:

The key findings from the TIMP Transition and Integration risk assessment were that while the program in place at CMA was compliant with the PHMSA requirements, there are benefits from development of a TIMP that meets Eversource's needs and is appropriate for the size and scope of the acquired transmission assets.

Eversource previously did not have any transmission class pipeline segments located within an HCA. Therefore, a TIMP plan was not necessary. The TIMP plan requires an annual review and integrity assessments of the segments within an HCA once every seven years. Currently, there is one pipeline with two segments located within an HCA. That pipeline is located between Agawam and West Springfield and is called the Con-Ed Line. Two Point of Delivery ("POD") stations have also been identified as having transmission segments located in an HCA: Springfield St, Agawam POD and Oak St, Methuen POD.

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The Ravenwood Dr Line off the Springfield 273 Line meets the requirements of a Moderate Consequences Segment. However, the pipeline cannot accommodate inspection by means of an In Line Inspection ("ILI") tool (i.e., it is not piggable.)[5]

The transmission segments that meet the requirements as defined in C.F.R. Part 192.624 for maximum allowable operating pressure ("MAOP") reconfirmation includes five PODs: Attleboro, Brockton, Canton, East Longmeadow, and Taunton.

The transmission segments that meet the requirements as defined in §192.710 for assessments outside of high consequence areas ("OHCA") includes three PODs: Attleboro, Canton, and North Andover.

Implementation Plan:

The TIMP has been developed with assistance from TRC. This will add additional O&M costs to maintain the transmission assets.

[5] A piggable pipeline means that it can accommodate ILI tools "without the need for major physical or operation modification, other than the normal operational work required by the process of performing the inline inspection" as per PHMSA Final Rule, October 1, 2019, Pipeline Safety: Safety of Gas Transmission Pipelines: MAOP Reconfirmation, Expansion of Assessment Requirements, and Other Related Amendments.

Area of Focus #7: Gas System Enhancement Program

Assessment Methodology:

The GSEP program is a legacy pipe-replacement initiative with the goal of improving public safety and system reliability and reducing lost and unaccounted for gas through a reduction in system leaks. As part of the settlement commitments, a safety assessment was conducted on the CMA GSEP program to determine its effectiveness and target areas for improvement. The Safety Assessment analyzed the CMA GSEP program utilizing a variety of data sources. Primarily, the GSEP project history and leak data were used to determine the effectiveness of the program, including the pace of replacements, and leak trends on priority mains and services. The results of the analysis were used to determine areas of improvement moving forward.

The GSEP project history data was used to review project selection and progress by area work center. This was then compared with the remaining leak-prone pipe inventory to determine if the current pace was adequate for completion within the required timeline.

Leak data was used to supplement the project analysis and provide insight into the effectiveness of project selection. Leaks were reviewed by pipe material type (cast iron, unprotected steel, and wrought iron), grade, asset type (Main vs. Service), geographic location, and cause to determine if replacement projects have been effective in reducing overall system risk. The leak analysis also supports recommendations for targeted replacements that will expedite leak rate reduction.

Key Findings and Risks:

The first key finding of the GSEP analysis is that the program has been effective in reducing the outstanding inventory of leak-prone pipe in the CMA system according to the initial goals. However, some improvements to the replacement timeline, required as per G.L. chapter 164, section 145, are available. The current GSEP plan does complete the work within the contemplated 20-year horizon, but the high concentration of priority pipe in the Springfield area work center does create a risk to executing the plan due to the concentration of work in the later years. Limited workforce availability and restrictions

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to project permits are both potential problems that would result in extending the program beyond the 20-year timeline.

The second key finding shows that leaks on cast-iron main significantly drive both total and hazardous main leak rates. Near-term reallocation of priority pipe replacement targets from unprotected steel to cast iron is expected to drive leak rates down at a faster pace. This will allow EGMA to achieve progress towards the overall goal of leak reduction and achieve the leak rate metric established in accordance with the Settlement.

Additional Findings:

In addition to the quantitative metrics and replacement program details, the issue of infrastructure equity was also reviewed. The data shows that towns with below average median household income tend to have the highest inventories of legacy pipe and older low-pressure systems. Specifically, Springfield and Lawrence fall below 60% of the median household income in Massachusetts and have the 1st and 3rd largest inventories of legacy pipe. Increasing the amount of cast iron replaced in these cities would help to drive down leak rates and emissions and improve the equity across the EGMA territory from an infrastructure and environmental justice standpoint.

Key Metrics :

The key metrics for this Safety Assessment are the total outstanding leak prone inventory and the system-wide leak rates. Currently, the system has 583.2 miles and 34,258 services that are comprised of leak-prone materials. The priority main and service inventory by material is provided in the following table:

Priority Pipe Inventory

Pipe Material	Main	Service
Cast Iron/Wrought Iron	401	
Unprotected Steel	182	34,258
Copper		509
Total	583	34,767

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The overall GSEP plan will ramp up by 10 miles per year from a target of 30 miles in 2021 to 50 miles replaced per year in 2023 and beyond. This schedule will meet the requirement not to exceed a 45 miles per year average for the first four years, as specified in the D.P.U. 20-59 Settlement Agreement.

Leak-rate metrics are divided into main leaks per mile and service leaks per 1,000 services. Currently, the overall main leak rate (excluding outside forces and excavation damage) is 0.24 leaks per mile. The service leak rate is 2.90 leaks per 1,000 services. As part of the Settlement, a service-quality metric was submitted to the Department in 2021 to reduce these by five percent per year going forward resulting in 0.16 leaks per mile and 1.93 leaks per 1,000 services, respectively, by 2028.

Implementation Plan:

Increasing the rate of priority pipe replacement in the Springfield area each year starting in 2022 onward will distribute the replacement load over the remaining years of the program. This will reduce the permit accessibility risk to timely completion of the GSEP and significantly reduce the leak rate within the Company.

Area of Focus #8: Leaks on Non-Legacy Materials

Assessment Methodology:

The Safety Assessment for leaks on Non-Legacy Materials was performed primarily by analyzing leak database records. Non-Legacy Materials are mains and services that are either plastic or protected coated steel. These are also referred to as state of the art and typically have much lower leak rates than older materials such as cast iron, unprotected steel, copper, etc. As part of the annual GSEP reporting, Eversource had identified leak rates on Non-Legacy Materials that were higher than industry averages and, therefore, a Safety Assessment review was needed. The methodology involved looking at state of the art mains and service leak repairs to identify any trends in area, cause, or asset type. The CMA leak database classifies steel as either bare steel or treated (coated) steel, but cathodic protection status is not clear based on the data. Leak repair records on treated steel were compared to cathodic protection inspection records in order to properly identify coated protected steel services vs. coated unprotected services. Lastly, the cathodic protection systems on steel mains were also reviewed for effectiveness and areas that need improvement to properly protect them going forward.

Key Findings and Risks:

The analysis of leaks on Non-Legacy Materials showed a contrast between leaks on mains and services. Plastic and protected steel mains had an overall leak rate that was generally in line with the NSTAR Gas system. While there are some needed improvements to the identification and geographic information system (“GIS”) records for cathodic protection circuits, the overall main leak rate of 0.02 leaks per mile compared to the NSTAR Gas leak rate of 0.02 on Non-Legacy mains in 2020 indicates that the Bay State Gas cathodic protection system on mains is functioning well.

Analysis of service leak data indicates that there are areas for improvement, specifically around steel services. Initially, the cathodically protected steel service leak data showed that the leak rate was abnormally high compared to the rates on NSTAR Gas systems. One of the key findings when investigating this was that it was due primarily to inaccurate identification of which services are cathodically protected. When the cathodic protection

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inspection data was cross-referenced with the leak repair entries, the results showed that modern, compliant (post-1972) cathodically protected steel services have leak rates that are in line with NSTAR Gas. Older services that have been retroactively cathodically protected are at a higher risk of leaking and are driving the high service leak rates. These pre-compliant[6] services combined with unprotected steel services that were incorrectly identified as cathodically protected resulted in an abnormally high leak rate for Non-Legacy services.

Key Metrics:

The key metrics for this Safety Assessment are the leak rates on plastic and protected steel assets. Broken down into mains and services for 2020, the plastic leak rates are 0.03 leaks per mile and 1.19 leaks per 1000 services vs. 0.03 leaks per mile and 0.69 leaks per 1000 services at NSTAR Gas. The latest protected steel leak rates are 0.01 leaks per mile and 2.95 leaks per 1000 services vs 0.01 leaks per mile and 1.21 leaks per 1000 services at NSTAR Gas. See Figure 1 for a table of historical leak rates on Non-Legacy materials.

Figure 1 EGMA Historic Leak Rates on Non-Legacy Materials

EGMA Non-Legacy Leak Rates				
	Main Leaks Per Mile		Service Leaks per 1000	
	Plastic	P Steel	Plastic	P Steel
2015	0.04	0.01	1.74	2.17
2016	0.02	0.01	1.24	2.30
2017	0.03	0.01	1.17	3.83
2018	0.03	0.00	1.32	2.71
2019	0.03	0.00	1.29	2.45
2020	0.02	0.01	1.19	2.95

[6] Prior to 7/31/1971, cathodic protection was not required on newly installed steel services. Any service installed after this date required protection.

Implementation Plan:

The primary recommendation from the Safety Assessment in this Area of Focus is the need to complete targeted, replacements of cathodically protected steel services with high leak rates. A list of approximately 2,130 steel services that have had previous leaks or are fed from a plastic main were identified for replacement. At a rate of 300 services per year, the inventory of 2,130 services will be replaced in seven years. At a cost of approximately $10,000 per service, this results in $3 million in increased spending per year.

The investments for this Area of Focus have been assigned a Class 4 deadband for the following reasons:

- Cost estimates based on cost/length and parametric models
- Uncertainty around kerotest valve population

Table 4:Leaks on Non-Legacy Materials Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Steel Service Relay	-	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Kerotest Valves	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total ($M)	**0.2**	**3.2**	**3.2**	**3.2**	**3.2**	**3.2**	**3.2**	**3.2**
Total High (+50%)	**0.3**	**4.8**	**4.8**	**4.8**	**4.8**	**4.8**	**-**	**-**
Total Low (-30%)	**0.1**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**-**	**-**

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Area of Focus #9: Pipeline Safety Management System

Assessment Methodology:

Eversource utilizes a program-centric approach to the implementation of PSMS. This approach focuses on twelve primary programs as the vehicle for implementing the American Petroleum Institute ("API") Recommended Practice ("RP") 1173 element requirements. Eversource continuously assesses and improves the existing programs.

Key Findings and Risks:

Overall, the Blacksmith Group, a third-party management consultant, identified 31 opportunities for improvement within the EGMA PSMS in 2020. The Pipeline Safety Management & QA team is monitoring these items to completion.

Implementation Plan:

The implementation plan will involve integrating legacy CMA into the Eversource PSMS over the next several years. A formal plan will be developed and outlined after the 4Q 2021 Gap Assessment performed by the Blacksmith Group.

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Area of Focus #10: Gas Process Safety

Assessment Methodology:

Eversource reviewed the existing CMA incident analysis and investigation process in conjunction with OM-090-ADM Analysis of Gas Related Events, and made revisions to OM-090-ADM based on the results of the review. The Company also conducted stakeholder analysis and planning to incorporate TapRoot Training (an incident analysis investigation method) for gas operations staff. Eversource contracted with a third-party vendor to assess understanding and application of process safety concepts in planning, design, and execution of work. Eversource also conducted process-safety training and workforce engagement through Hazard ID, Lessons Learned and Safety Engagement Teams.

Key Findings and Risks:

- Sharing of safety messages in new online format presented challenges initially.
- Safety content like the Directors' Safety Focus and Lessons Learned supported development of safety teams in 2021.
- Hazard ID Submissions allow front line workers to have a voice, share concerns similar to previous CMA CAP (Corrective Action) Program.
- Two events identified for TapRoot Analysis with findings and lessons learned to be shared.
- 96 pending staff to complete TapRoot Training between 2021 and 2022.

Key Metrics:

Taproot Training Attendees	Total	Attended	Pending
EGMA	115	19	96

Hazard ID Submissions	2020	2021	2021 Goal
EGMA	1	24	30

Safety Engagement Team Metrics	Brockton	Lawrence	Springfield
SET Meetings Held	5	6	7
Lessons Learned Shared	4	5	6
Directors' Safety Focus Discussed	5	6	7
Hazard ID Submissions Jan – July	10	7	7
Total Attendees Jan – July 2021	60	74	61

Implementation Plan:

TapRoot Training implementation is ongoing and will require additional O&M expense to complete.

The remainder will be implemented through the normal work and continuous improvement efforts of the PSMS & QA department.

Area of Focus #11: System Reliability and Resiliency

Assessment Methodology:

As of year-end 2020, EGMA provided gas distribution service to over 330,000 active customer meters, located in 66 cities and towns. The service territory covers four distinct operating areas in three Divisions. The largest operating area is the Brockton operating area, where EGMA serves approximately 171,400 customer meters in 45 municipalities, including cities and towns such as Brockton, Attleboro, Taunton, Walpole, Bridgewater, and portions of Abington, Middleborough and Swansea. In the Springfield operating area, the Company serves approximately 98,000 customer meters in 14 municipalities, including cities and towns such as Chicopee, Agawam, West Springfield and the City of Springfield. In the Lawrence operating area, the Company serves approximately 51,700 customer meters in five municipalities including the City of Lawrence, Andover, North Andover, Methuen and a portion of Haverhill. The smallest operating area in terms of geographic area and number of customers is the Northampton area that includes Northampton and the town of Easthampton with approximately 12,700 customer meters.

This System Assessment reviewed the EGMA gas distribution system with the goal of assuring system reliability and resiliency. Resiliency and reliability are often referenced in tandem, but there is a critical difference between the terms and their impact on the design and operation of energy systems. For the purposes of this assessment, **reliability** is a more all-encompassing term, defined as a system's ability to safely meet our customers' demands across all standard design conditions, including peak demand, and to withstand and recover from system damage or operational disruption from a given event**.** On the other hand, **resiliency** is defined as a specific type of reliability: the system's ability to prevent, withstand, adapt to, and quickly recover from a **high impact, low-likelihood event**.

Current system infrastructure, including over 90 individual legacy CMA systems, have been evaluated by the Gas System Planning department utilizing the Synergi Gas Steady State hydraulic modeling software for gas distribution system design and comparing the results to industry capacity design variables as identified in the AGA Design Distribution Capacity Design Principles document. The next step of the review was to gather and

consider other data about each system: leak rates, amounts of leak prone materials, whether or not the system was single fed at the distribution system level, whether or not the system was single fed at the transmission system level, whether or not there were any concerns about any of the district regulators or gate stations supplying the system, the existence of problematic assets on the system, and overall system size. These parameters were used as additional information to help determine possible solutions to system shortcomings identified as part of the review. Finally, as part of this review, each CMA system was considered from a more holistic perspective from the Eversource systems. This included a review of any possible connections between the CMA systems and Eversource systems to eliminate single fed systems utilizing tie-ins that are in proximity to the Eversource distribution systems. The results of this review are included in the Additional Findings section of this Safety Assessment. Also, a review of the telemeter and valve placements on each CMA system was performed to ensure adequate system monitoring and sectioning, respectively.

To address the risks identified by the analysis, Eversource has identified projects that will improve the system's ability to adapt to changing conditions, withstand threats, maintain service under supply constraints, and quickly recover from incidents by increasing both system reliability and resiliency. The identified solutions to meet identified challenges will ensure the continued safe, reliable and continuous service to the EGMAs customers.

Key Findings and Risks:

- 100 percent of the regulator set points were below the system MAOP, and the existing delivery pressure requirements to supply customers are being met under all operating conditions.
- Gate station regulator capacity design issue identified at the Brockton gate station.
- Pressure improvement projects required for several systems operating at below 25 percent of MOP, failing to meet required reliability criterion and indicating a risk of unreliable supply.

- Number of critical valves fail to meet isolation zone criteria of approximately 1,000 or fewer customer meters per zone, providing inadequate sectionalization to reduce size of areas affected by outages and other unsafe events.
- GSEP provides an opportunity to replace lower operating pressure mains with piping capable of higher operating pressure to more efficiently distribute gas, provide additional operational flexibility, and replace low pressure systems with higher pressure systems with additional over-pressure protection. Additional opportunities for low pressure to higher pressure systems also exist.
- Several portions of systems, including low pressure systems which are more vulnerable to water intrusion, are located in 100-year flood zone areas.
- There exist several large low pressure distribution systems with inadequate sectionalization to limit the size of areas affected by outages, over-pressurizations and other unsafe events.
- There exist several higher pressure systems with inadequate distribution-system level redundancy or “looping” to ensure reliable supply and reduce the risk of an outage due to a single failure or incident.

This Safety Assessment identified risks for significant outages, over-pressurization on low pressure systems, and system damage and outages due to flooding.

Additional Findings:

As part of the overall assessment of the CMA system, several locations between the CMA system and the Eversource gas distribution systems that could be connected were noted. These connections could result in improved system support; however they will require additional engineering review.

Implementation Plans:

Below is a list of projects across all operating Divisions including future projects over the next seven years, with a table outlining the capital investments required. These projects will enhance system reliability and are necessary to achieve better reliability and redundancy in the CMA gas distribution systems. These estimates were developed based

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on cost/length models, and several of these project—particularly the larger projects—have significant uncertainty based on permitting and construction difficulties. These criteria support an assignment of a Class 4 cost estimate deadband for these investments.

- Western Massachusetts Reliability project to provide additional redundancy to a system with over 55,000 customers in the Springfield area.
- Sharon Gate to Brockton 265# Line Reliability project to provide additional redundancy to a system with over 66,000 customers in the Brockton area.
- Various pressure projects to support minimum reliability criteria during all conditions, including winter peak conditions.
- Various projects to support the conversion of low pressure systems to higher pressure systems.
- Various projects to support the elimination of single-fed systems and provide increased distribution-system-level redundancy.
- Installation of additional critical valves, conversion of isolation valves to critical valves, and installation of new isolation valves.
- Implementation of the Flood Hardening program, which includes prioritized of low pressure system conversion to higher pressure, additional redundancy and looping, additional critical valves installations, remote operated valves, and relocation of district regulators or extending regulator vent stacks above flood level elevations.

Table 5 – System Reliability and Resiliency Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
LP System Zoning	-	0.8	1.8	0.3	-	-	-	-
Critical Valve Initiative	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Single Fed Systems	-	1.5	3.0	3.0	2.0	1.0	-	-
Flood Hardening Projects	-	1.5	2.0	2.0	-	-	-	-

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Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
General Reliability Projects	6.1	8.4	8.3	8.3	5.4	2.3	2.3	2.4
Western Mass Reliability Project	-	2.0	37.0	1.2	-	-	-	-
Sharon Gate to Brockton 265# Line Reliability Project	-	-	1.5	30.0	30.0	30.0	-	-
Total ($M)	**6.1**	**14.5**	**53.9**	**45.1**	**37.7**	**33.6**	**2.6**	**2.6**
Total High (+50%)	**9.2**	**21.8**	**80.9**	**67.7**	**56.6**	**50.4**	**-**	**-**
Total Low (-30%)	**4.3**	**10.2**	**37.7**	**31.6**	**26.4**	**23.5**	**-**	**-**

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Area of Focus #12: Enhanced Leak Survey & Preventative Maintenance

Assessment Methodology:

The Safety Assessment for Enhanced Leak Survey & Preventative Maintenance was performed by analyzing the current state of the CMA system and exploring how enhanced leak surveys could be used to supplement the current leak survey program. Elevated risk assets, such as single feed systems or high-pressure mains, were reviewed for historical leak data to determine if enhanced leak surveys and patrols are warranted. Other assets such as meter set leaks and leaks on gate station / district regulator station assets were addressed as well.

The use of state-of-the-art leak survey technology was also reviewed as part of the Safety Assessment. As a result of the Merrimack Valley Incident, an advanced leak detection Picarro mobile unit was purchased to conduct surveying on the restored assets. Potential applications for the Picarro mobile unit were reviewed both internally and with staff at Picarro. Applications, training, and potential assets for enhanced surveying were all considered for ongoing use of the unit.

Key Findings and Risks:

The key findings of the Safety Assessment for Enhanced Leak Survey & Preventative Maintenance demonstrated that there are CMA systems that should be included in an enhanced leak survey and patrol program to improve the safety and reliability of the system and that applications for the purchased Picarro unit exist to supplement other gas activities.

In addition to systems that operate above 200 psi, six lower pressure distribution systems that are critical to ensure safe and reliable service to customers were identified for enhanced leak surveys and patrols. These include single fed systems, systems where a loss of service would result in major customer outages and feed lines to LNG facilities.

For advanced leak detection equipment (Picarro), multiple use cases were identified. One important application for the technology is post-construction surveys of new assets. The sensitivity of the leak detection unit would allow any issues with construction to be quickly identified and remedied. This would help to mitigate the tendency of plastic leaks to occur

at the beginning of the asset's lifetime due to installation issues, material failures, or fitting failures. If a plastic asset does not leak within the first few years, the leak rates become primarily driven by excavation damages. Another potential use for the technology is to supplement the risk assessment process for DIMP / GSEP. Picarro emissions data could be used as another input into a software-based risk model. A decision on using advanced leak detection for this application will be made once a new risk model software is adopted.

Additional Findings:

In addition to the findings on leak survey frequency and technology, the high number of outstanding grade 2 leaks was also identified as an area that should be improved. NSTAR Gas has a goal to carry over less than 100 open grade 2 leaks at the end of the year. This target will be implemented for the Bay State Gas assets as well in order to reduce the overall risk of the system. In order to accomplish this in 2021, a backlog of approximately 370 grade 2 leaks will be repaired.

Implementation Plan:

The implementation plans are focused on the rollout of the enhanced leak surveys and patrols. Critical systems will be surveyed and patrolled at increased frequencies. These additional surveys patrols will results in additional O&M expenses.

The Picarro unit is already owned by CMA, but employees will require some additional training for full use of the system. Leak survey technicians and engineers need refresher training to become capable and proficient with data collection and use of the Picarro software to use it effectively.

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Area of Focus #13: Enhanced Quality Control & Contractor Onboarding

Assessment Methodology:

Eversource has implemented the QC program across the EGMA territories. This implementation included communications with work center employees providing the overview of the program followed by classroom presentations of the QC program during the OQ transition. Both internal EGMA crews and contractor crews were onboarded in the field at each area work center. The QC Team has integrated EGMA into all audit activities.

Key Findings and Risks:

CMA utilized a QC program although historic audit data was not available for review prior to the transition. Eversource was able to collect some data on workmanship through focused re-dig and post-audit observations. Detail on this data is provided in Area of Focus #14. Those observations indicate that there are opportunities for a better QC program at EGMA. As a result, Eversource will utilize the established QC process to monitor data for trends in the field and take mitigating actions when necessary. The QC process is a closed feedback loop which collects information during field audit observations. This information is provided as data to the management team who responds when needed with action items that are focused on correcting the observation. The QC Department also communicates with the Policy and Compliance Department when there are inconstancies or issues with the standards or how they are interpreted. There is also regular analysis of the observation data focused on identifying opportunities where training can be enhanced providing a better understanding of expectations of the crews.

Implementation Plan:

Implementation of the QC program is complete and no further investment is required. The staff expansion for QC has been accomplished and the group is now comprised of 24 internal full-time employees (“FTEs”). Also, the group’s organizational structure has been aligned with the associated Operations departments.

REDACTED

Area of Focus #14: Workmanship & QA/QC

Assessment Methodology:

The Eversource Gas QC re-dig and post audits were used to conduct observations of workmanship that occurred prior to the 2020 transition. The Merrimack Valley region was inspected as well as the other area work centers – Brockton and Springfield.

Key Findings and Risks:

The findings are based on activities performed prior to the transition and were measured against the CMA Gas Standards that were active at the time of installation. Many of the findings from the post-audits are risks that can be prioritized and addressed during upcoming inspection intervals.

Key Metrics:

The key metrics are the non-compliant incident rates derived from the observations during the re-dig and post-audits that were performed. These will continue to be tracked in the progress reports.

Implementation Plan:

The QC team will continue to implement the QC process and provide ongoing data and trends allowing the management team to focus their mitigating efforts. Depending on the results of ongoing QC observations and analysis, the Company may consider a prioritized abnormal operating condition ("AOC") mitigation capital investment plan that will allow for the correction of pre-transition AOCs that are anticipated to be discovered during the regular inspection cycles.

Area of Focus #15: Enhanced Operator Qualification

Assessment Methodology:

The overall Safety Assessment methodology was to evaluate existing qualifications and determine how to provide necessary training and testing to obtain qualification in the Eversource OQ program within the requested timeframe. This was a combined effort between the Eversource Gas Training Department and TRC, a third-party consulting group.

Key Findings, Risks, and Progress to Date:

The uninterrupted qualification of employees is critical. Regular reports received from data requests confirmed that qualifications were being maintained prior to the acquisition date.

Understanding the scope of the training that would be necessary could significantly impact the intensity and duration of the training. There were no major differences in Eversource and CMA company standards.

As the acquisition date approached, several different training and testing scenarios were explored, and transition periods of varying lengths were developed. Gas Management committed to an accelerated qualification plan providing the employee access that would ensure successful completion. The plan required the allocation of 100 percent of the Gas Training staff from all three Eversource Gas operating companies (EGMA, NSTAR Gas and Yankee Gas) to complete.

As testing began, the team reviewed the tasks with lower-than-expected pass rates to make adjustments to content delivery or, as happened more frequently, task assignments. Preliminary testing identified tasks that, in some cases, should not have been assigned to certain roles based on the actual duties being performed. Consequently, these tasks were removed from the task assignments.

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The OQ Program has been successfully applied to covered EGMA employees as of April 15, 2021, as follows:

- 500+ employees qualified
- 16,000 tests completed
- Overall 90 percent pass rate
- 14,000 hours of discipline specific face-to-face instruction
- On average, each EGMA employee completed 32 tests
- No COVID-19 transmissions during implementation
- EGMA field employees completed three years of testing in five months

Key Metrics:

Pass rates will continue to be a key metric for the Eversource OQ Program and will continue to be reported in the progress reports.

Implementation Plan:

No implementation plans or capital investments beyond normal Eversource Training Department work are anticipated at this time.

REDACTED

Area of Focus #16: Training & Development Programs

Assessment Methodology:

The Safety Assessment covered the training and development processes, programs, and materials of all facets of the EGMA workforce including front-line workers, Supervisors and Engineers from New Hire to Incumbent status to ensure a qualified workforce now and in the future.

Overall, the training team analyzed CMA's training against the existing training at Eversource. The CMA Training Materials could not be assessed because they were centrally developed by the NiSource Training Development team, were considered proprietary to NiSource and therefore, were not provided as part of the acquisition. Although existing CMA training documents were not available and could not be assessed directly, interviews with EGMA employees were used as primary sources for information on training programs. Core competencies for specified populations were identified and existing Eversource programs were assessed and enhanced to meet training needs. In some instances, the assessment required a thorough review and in others, because there was no existing equivalent program at CMA, the gaps were immediately identifiable.

Key Findings and Risks:

The review identified 38 Front Line Apprentices and Wave hires enrolled in CMA's progression training, none of whom had progressed past the EMA/NSTAR "C-School" level (Basic Level school). These employees were prioritized once the transition training had finished to ensure they could become qualified employees as quickly as possible. There are no ongoing risks associated with this item: the apprentice program has been substantially standardized across EGMA and legacy Eversource.

The training team worked with the EGMA Managers to identify and enroll fifteen new EGMA Operations Supervisors, Engineers and other Company Professionals in the existing Eversource Gas Supervisor Training Program ("GSTP"). The GSTP addresses risks endemic to natural gas distribution and those who work on those assets.

The Safety Assessment revealed that while existing Eversource Training for Instrumentation and Regulation ("I&R") addressed generic safety and gas topics, I&R

employees would benefit from more comprehensive technical training. Eversource leadership and the training team also identified opportunities for improvement in training of engineers through creating a more formalized training program.

Beginning in 2022, EGMA personnel will be incorporated into the enterprise-wide continuing education training offerings.

Key Metrics:

The primary metrics for this Area of Focus will be the number of employees who have completed the various identified training programs. Other safety metrics primarily associated with other Areas of Focus (e.g., post-dig audit findings) are also reviewed on an ongoing basis by the Training Department and other departments to identify gaps that may need to be addressed via training.

Implementation Plan:

The completion of the gap apprentice school to align EGMA new apprentice hires with the legacy Eversource apprentice levels is complete. The remainder of the primary efforts associated with this Area of Focus are ongoing. Expanding the Eversource Gas Supervisor Program and developing and implementing continuing education will be continuing programs performed as normal work for the Eversource Training Department. The development of a comprehensive I&R training curriculum and the development of an engineering learning path will continue, with the goal of establishing formal training for I&R and engineering employees. The remainder of the costs associated with this Safety Assessment is related to providing tools and equipment necessary for the implementation of training and operator qualification. Because these costs are associated with an entirely new curriculum development, it has been assigned a Class 5 deadband.

Table 6: Training and Development Program Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
[redacted]								
Total ($M)	**0.8**	**1.8**	**0.7**	**0.4**	**0.3**	**0.3**	**0.2**	**0.2**
Total High (+100%)	**1.5**	**3.6**	**1.4**	**0.7**	**0.6**	**0.6**	**-**	**-**

REDACTED

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Total Low (-50%)	0.4	0.9	0.3	0.2	0.2	0.2	-	-

REDACTED

Area of Focus #17: Maps, Records, and Data Integrity

Assessment Methodology:

This Safety Assessment is a summary of the collaborative efforts of both TRC and Eversource in reviewing and analyzing the various mapping and data components currently being utilized by EGMA following the acquisition in October 2020. The issues found were categorized into nine areas for the purposes of the assessment:

- Landbase
- Main lines
- Service lines/Customers
- Regulators/Gates
- Paper Sources/Historical Documents
- Corrosion
- Work Management System ("WMS")
- Mapping Leak Data in the GIS
- Additional findings

Eversource has previously invested significant resources into determining the best path forward for all of its gas operations with respect to mapping, records, and work management systems and developing systems for the legacy Eversource companies. Given that the existing CMA systems needed to transition to Eversource systems from CMA's parent company's systems, the decision was made even prior to the purchase that CMA mapping, records, and other data would transition to the Eversource systems. Therefore, the effort in this assessment focused on identifying those gaps, flaws, and risks that would make the transition more difficult and those which would remain after the transition and would need to continue to be remediated moving forward.

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A large part of the assessment also involved, and will continue to involve, quantification of the number of records available across all types. As future reviews continue, the information on the existence of records will also improve.

For the GIS records assessment, Eversource completed the records assessment by starting with information gathering sessions on maps and records with EGMA employees on topics and systems such as the Capital Close Out Process, Corrosion, Damage Prevention, Field operations, GIS mapping standards, Paper Records, WMS, WMSdocs, Leak program, Open Text SLR, CIS, Construction Management, 3-GIS, and the ESRI GIS. Eversource then contracted with a third-party consultant, TRC, to assess the gathered information. Using the insight gathered from the sessions and reports, Eversource, with the help of TRC, conducted a reconciliation pilot for areas in Springfield, Lawrence, and Brockton to identify and / or validate the following relative to existing records:

- Spatial Accuracy
- Data discrepancies
- Data completeness
- Drawing standards concerns
- Landbase accuracy
- Mains and service placement accuracy
- Conflicting data sources
- Legacy conversion issues
- Area work center mapping and records differences
- Records accessibility
- Methods to improve data quality and consolidate sources

Eversource has also contracted with third-party consultants PWC and Critigen to analyze facilities that require preventative maintenance tasks so that they can be maintained and operated using work management systems. This analysis includes the following:

- Identify data flaws, deficiencies, and gaps between systems
- Identify source of record for Locations and Assets

Eversource reviewed the CMA GIS data model to determine feature and attribute gaps.

For the Work Management System, meetings were held with GIS, corrosion, leak survey, and instrumentation & regulation EGMA representatives and data analysis to perform the following and determine location of existing data (GIS, WMS, Paper) for EGMA.

- Established content of existing data and whether the captured data met all the Eversource needs.
- Found additional locations/assets (bonds) captured by CMA that need to be captured by Eversource in future.
- Determined if any additional location/asset data captured by CMA needs to be captured by Eversource in future.
- During meetings review was held of CMA databases to see fields in those databases where data was located, screenshots and field descriptions noted for later conversion to Maximo.
- To determine where and how locations/assets were going to be input into CMA GIS
- Reviewed each data point listed above that is to be maintained in GIS to determine:
    - Does existing CMA GIS have data point;
    - Does CMA GIS data point have all necessary attributes;
    - If no data point, determined how data point can be inserted in GIS and data be converted to it.
- Identified data flaws and deficiencies to create remedial plan
- Data types (locations/assets) that were reviewed:

CP Systems	CP Test Stations	Curb Cocks
Service Points	Sniff locations	Gate Stations

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Valves	Heaters	Odorizers
Pressure Recorders	Rectifiers	Regulators
RTU's	Transducers	ATM Inspection Points

Key Findings:

An overall concern that was discovered during the research was that there is not one system of record for data across all systems at CMA. Users (using local knowledge) are required to access and research multiple sources of information to find all the required information about the attribute or area in question. Reconciling the various data sources will be a complex endeavor requiring a field component to verify information and resolve discrepancies. Mapping and records should be consolidated into the appropriate system (GIS, Docuware, SAP, and Maximo) with the necessary linking keys, interfaces, and reports to keep the data synchronized and accurate.

- During the pilot, Eversource verified the areas of concern that were discovered during the review and system analysis sessions.
- The accuracy and completeness of the landbase does not meet EGMA's current and future business needs, such as collecting main and service locations with GPS.
- Spatial Accuracy Depreciation of the field dimensions/measurements limits the ability to accurately map facilities.
- Main and service lines mapping and placement is not collaborative.
- The GIS was developed and maintained using spatially imprecise mapping techniques and standards (Ex: Landbase, Paper Records, Dimensions).
- The GIS Data Model requires enhancement to support compliance reporting.
- No tracking mechanism to ensure that laptops in the field are using the latest GIS data.
- Springfield and Lawrence Service lines were added to the GIS using Estimated / Approximated blue-lines.

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- Substantial documented service line records issues including 12,000 missing Service / TAP Cards, as found during the 2019 TRC review.
- Not all stubs are mapped in the GIS.
- No interface from the Customer Information System ("CIS") feeding GIS to identify service gaps.
- No interface from WMS to or from GIS.
- No Data Governance program covering services.
- Regulator and Gate stations sensing lines not mapped in the GIS: the Isometric Engineering drawings and GIS representations of the station have not been validated.
- Incomplete backup or scanned copies of paper records.
- Paper or Scanned records not tied / linked to the GIS and there is no way to know if all paper assets have been mapped in the GIS.
- WMS-Asset centric rather than GIS-Asset centric (i.e., there are assets that require inspections maintained in WMS rather than GIS).
- Reliance on disjointed data sources (WMS, GIS, Open Text SLR, Paper, CP, and CIS) and therefore there is "No Single Source of Truth" due to the lack of integration/synchronization between critical systems.
- Cathodic Protection ("CP") preventive maintenance tasks are conducted using WMS and paper records rather than leveraging/integrating GIS into the process.
- Limited long-term data improvement/consolidation strategy (Departmental versus Corporate data).
- Maintain leak data in Maximo and add a complementary object in the GIS.
- There is currently no mobile solution that allows the user to redline the existing mapping records.

Please see Attachment 1 for example photos and screenshots that illustrate some of these findings.

Collectively the findings indicate the following risks:

- Compliance reporting does not reflect the current state of the assets.
- Increased risk for hits/miss marks as not all services, abandoned services, and service stubs are mapped in the GIS.
- Not having all the service lines/customers mapped in the GIS increases the risk for missing a customer impacted by an outage or pressure upgrade project, especially back-lot services lines.
- There is the need to address documented 2019 service line issues.
- Increased risk for an event near a regulator or gate station as no facilities including sensing lines are mapped in the GIS.
- The estimated/blue-line services in Springfield and Lawrence were added without curb valves, excess flow valves (“EFV”), and fittings creating the potential for a user misinterpretation of the mapping/data.
- The capital close-out check list is only utilized for mains and services greater than three inches meaning that there are undocumented service lines issues.
- The weak absolute and limited relative accuracy of the facilities mapped increases the risk for mis-marks.
- Multiple sources of information for the same asset increases the risk of a user using inaccurate or outdated information.
- The mapping of services and mains separately without a consistent effort to consolidate and correct discrepancies mean that potential issues will not be identified until fieldwork and or mark-out is required at the given location.
- The GIS assets and the CP records are not aligned.
- Assets that require preventative maintenance are not synchronized across systems meaning that there is the potential for compliance gaps.

Implementation Plans:

There are several implementation plans required to address the key findings and risks identified in this Area of Focus. These are summarized in high-level way in a table below, followed by a table providing the capital estimates. This area was assigned a Class 5 estimate deadband for the following reasons:

- Cost estimate based primarily on judgment and prior experience.
- The totality of data quality issues is yet to be determined, and can only be determined through the ongoing review and remediation process outlined in the implementation plan.
- High levels of uncertainty regarding quantification of existing records, which can only be determined through the ongoing review and remediation process outlined in the implementation plan.

Task Description	Concerns/Risks	Actions	Target/Outcome
Compare of LP Isometric Drawings to GIS	Isometric Updates not reflected in GIS (Dimensions, Valves)	Compare records and update as needed (Add sensing Lines, Dimensions, Regulators)	LP Pressure Isometric and Gis Mapping Match
Compare of Non-LP Isometric Drawings to GIS	Isometric Updates not reflected in GIS (Dimensions, Valves)	Compare records and update as needed (Add sensing Lines, Dimensions, Regulators)	Non LP Isometric and Gis Mapping Match
Mapping of Leaks in Gis	Accuracy of the Leak data (SOA, DUPS)	Map the Records in GIS to identify duplicate/issues	Improved Analysis of Leaks and causes
Purchase of New Landbase (1' Accuracy)	EGMA landbase lacks accuracy and completeness	1"=80' Landbase for EGMA Service area	Accurate/current Landbase for rebuilding the GIS
Scanning of Brockton (115K) Service Cards	No Backup of paper Records Records not available in the Field ES systems don't support paper records	Complete the Scanning, make records available in the field	Scanned Records loaded into Docuware and made available to the field using Standard Eversource systems/processes Post TSA

Task Description	Concerns/Risks	Actions	Target/Outcome
Review of TRC Services/Pin SVC Card/adjust SVC line (60K Lawrence)	Stubs, active and abandoned services not represented in the GIS Curb valves not mapped in the GIS TRC Blue line services incomplete Open Text SLR has never been compared to GIS	Review Open Txt SLR Records Create Hyper Link in GIS/Add Object if missing Add Missing Curb valves Update Material Type Update Meter Location (inside/outside/Combo)	~Blue line records for missing information ~Access to scanned records ~Curb valves represented ~One to one link between GIS and Open Text SLR ~Links to be used during conversion
Review of TRC Services/Pin SVC Card/adjust SVC line (120K Springfield)	Stubs, active and abandoned services not represented in the GIS Curb valves not mapped in the GIS TRC Blue line services incomplete Open Text SLR has never been compared to GIS	Review Open Txt SLR Records Create Hyper Link in GIS/Add Object if missing Add Missing Curb valves Update Material Type Update Meter Location (inside/outside/Combo)	~Blue line records for missing information ~Access to scanned records ~Curb valves represented ~One to one link between GIS and Open Text SLR ~Links to be used during conversion
Review of TRC Services/Pin SVC Card (145K Brockton)	Some Stubs, and abandoned services represented in the GIS Open Text SLR/Paper Records have never been compared to GIS	Review Open Txt SLR Records Create Hyper Link in GIS/Add Object if missing Add Missing Curb valves (Blue Line Services) Update Material Type Update Meter Location (inside/outside/Combo)	~Blue line records for missing information ~Access to scanned records ~Curb valves mapped ~One to one link between GIS and Open Text SLR ~Links to be used during conversion
Scanning of Historical Records	Not all information was transfer to the Gis During conversion No backup copies	Scan records to be made available/reviewed during rebuild	Scanned Records loaded into Docuware, available for conversion/rebuild
Testing of GPS data Collection	Validate the process for creating anchor points at intersections to better map facilities	Add the GPS Points to Gis and validate the proposed mapping process	Determine the level of detail required to create anchor points that can used during the spatial improvement projects

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Task Description	Concerns/Risks	Actions	Target/Outcome
GIS-Maximo Cleansing (TSA Data Gaps, TBD) Reg Drawings, CP Circuits	TBD, PWC just started the data compare WMS/GIS CP Records are disjointed (Paper,WMS, GIS and Other)	Add Asset and locations (360,000 customers/Addresses) Test Stations (+/- 16,000) Map CP Circuits (TBD) Services with CP Protection (+/- 12,000) Manual Population of PM Assets (Heaters, Sniff Locations, Rectfier etc)	Required to Drive MP's from Maximo

Task Description	Concerns/Risks	Actions	Target/Outcome
GPS Complex Locations-Pre Cleanup Lawrence	Results form the Pilot showed that Gis Dimensions, Tap Card Dimensions conflicted and could not be resolved without field validation	Create anchor points at intersections to facilitate the placement of the Gas facilities in the GIS	~Accurate Anchor points that can be used to spatially improve the data
Redraw/Rebuild of Lawrence GIS Data	-Spatial Accuracy -Missing attribute/inspection data -Customer Location -Conflicting data records -Missing Records -Back lot/corner Services -Services mapped as blue line services	~Rebuild Mains using anchor Points and new landbase -Were feasible add missing attribute data -Validate/Populate customer ID -Add Missing records/notes -Accurately map service lines, stubs, abd services, other -Add Service Test stations -Transfer assets from Temp Maximo to Gis	~Redrawn facilities based on the new landbase/GPS Anchor ~Gis Synchronized with Docuware ~Gis Synchronized with the Customer Service System ~Gis data supporting compliance reporting ~Gis data supporting predictive analytics ~Gis ready to support GPS field data collection ~Gis ready to support Graphic work Design ~Gis ready to support ESRI Utility Network Model ~Gis ready to support Gas OMS ~Gis managing assets/inputs into Maximo (Inspection/Maintenance) ~Meet Safety Assessment/Dynamic Risk/CAP Goals
Field Validation-Post Cleanup of Lawrence GIS Data	-Cleanup/Field validation of conversion	-Complete/field verify open issues	~Reconciliation of outstanding open issues from rebuild
GPS Complex Locations-Pre Cleanup Springfield	Results form the Pilot showed that Gis Dimensions, Tap Card Dimensions conflicted and could not be resolved without field validation	Create anchor points at intersections to facilitate the placement of the Gas facilities in the GIS	~Accurate Anchor points that can be used to spatially improve the data
Redraw/Rebuild of Springfield GIS Data	-Spatial Accuracy -Missing attribute/inspection data -Customer Location -Conflicting data records -Missing Records -Back lot/corner Services -Services mapped as blue line services	~Rebuild Mains using anchor Points and new landbase -Were feasible add missing attribute data -Validate/Populate customer ID -Add Missing records/notes -Accurately map service lines, stubs, abd services, other -Add Service Test stations -Transfer assets from Temp Maximo to Gis	~Redrawn facilities based on the new landbase/GPS Anchor ~Gis Synchronized with Docuware ~Gis Synchronized with the Customer Service System ~Gis data supporting compliance reporting ~Gis data supporting predictive analytics ~Gis ready to support GPS field data collection ~Gis ready to support Graphic work Design ~Gis ready to support ESRI Utility Network Model ~Gis ready to support Gas OMS ~Gis managing assets/inputs into Maximo (Inspection/Maintenance) ~Meet Safety Assessment/Dynamic Risk/CAP Goals
Field Validation-Post Cleanup of Springfield GIS Data	-Cleanup/Field validation of conversion	-Complete/field verify open issues	~Reconciliation of outstanding open issues from rebuild
GPS Complex Locations-Pre Cleanup Brockton	Results form the Pilot showed that Gis Dimensions, Tap Card Dimensions conflicted and could not be resolved without field validation	Create anchor points at intersections to facilitate the placement of the Gas facilities in the GIS	~Accurate Anchor points that can be used to spatially improve the data
Redraw/Rebuild of Brockton GIS Data	-Spatial Accuracy -Missing attribute/inspection data -Customer Location -Conflicting data records -Missing Records -Back lot/corner Services -Services mapped as blue line services	~Rebuild Mains using anchor Points and new landbase -Were feasible add missing attribute data -Validate/Populate customer ID -Add Missing records/notes -Accurately map service lines, stubs, abd services, other -Add Service Test stations -Transfer assets from Temp Maximo to Gis	~Redrawn facilities based on the new landbase/GPS Anchor ~Gis Synchronized with Docuware ~Gis Synchronized with the Customer Service System ~Gis data supporting compliance reporting ~Gis data supporting predictive analytics ~Gis ready to support GPS field data collection ~Gis ready to support Graphic work Design ~Gis ready to support ESRI Utility Network Model ~Gis ready to support Gas OMS ~Gis managing assets/inputs into Maximo (Inspection/Maintenance) ~Meet Safety Assessment/Dynamic Risk/CAP Goals
Field Validation-Post Cleanup of Brockton GIS Data	Results form the Pilot showed that Gis Dimensions, Tap Card Dimensions conflicted and could not be resolved without field validation	Create anchor points at intersections to facilitate the placement of the Gas facilities in the GIS	~Reconciliation of outstanding open issues from conversion

Task Description	Concerns/Risks	Actions	Target/Outcome
Data Governance	Only QAQC on Main/capital work orders	-QAQC all Gis mapping -Implement QAQC Process for mapping Records	~Common Data governance Program across three operating units

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Table 7: Maps, Records and Data Integrity Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Phase 1								
Scanning of Brockton (115K) Service Cards								
Review of TRC Services/Pin SVC Card/adjust SVC line (60K Lawrence)								
Phase 2								
Review of TRC Services/Pin SVC Card/adjust SVC line (60K Lawrence)								
Review of TRC Services/Pin SVC Card/adjust SVC line (120K Springfield)								
Review of TRC Services/Pin SVC Card (145K Brockton)								
Scanning of Historical Records								
On-site Gis resources to help manage capital projects								
Tooling for GPS data Collection								
Phase 3								
GPS Complex Locations-Data Preparation Lawrence								
Redraw/Rebuild of Lawrence GIS Data								
Field Validation-Gathering of Lawrence GIS Data								
GPS Complex Locations-Data Preparation Springfield								
Redraw/Rebuild of Springfield GIS Data								
Field Validation-Gathering of Springfield GIS Data								
GPS Complex Locations-Data Preparation Brockton								
Redraw/Rebuild of Brockton GIS Data								
Field Validation-Gathering of Brockton GIS Data								
Combined								
Total ($M)	**1.6**	**3.3**	**2.6**	**5.7**	**9.0**	**4.0**	**-**	**-**

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Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Total High (+100%)	3.2	6.6	5.2	11.4	18.0	8.0	-	-
Total Low (-50%)	0.8	1.7	1.3	2.9	4.5	2.0	-	-

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Area of Focus #18: Gas Operations Tooling and Safety Equipment

Assessment Methodology:

The Safety Assessment of tooling and safety equipment was conducted with an emphasis on key parameters such as safety, productivity and standardization. The priority was to identify areas in need of improvement and establish uniform consensus on tooling and safety equipment that allows for work to be accomplished in a safer, quicker, and easier manner. In order to achieve this, the committee sought opinions and feedback from employees, reviewed associated tooling and equipment procedures and documentation, and identified those gaps that required remediation. The assessment also reviewed the fleet, including its age, condition, and capabilities.

In addition, an assessment took place to inspect the condition of the tooling and equipment itself to ensure safe operation. Tools and equipment that were identified as requiring replacement, recalibration, or reconditioning have been processed or are in queue for being processed. Training for any new equipment, where required, was conducted on a location-based rollout. Focusing on one area work center location at a time ensured adequate training resources were available to workers.

Key Findings and Risks:

Several safety-related and equipment-related items were identified as needing remediation to allow EGMA field workers to safely perform Eversource procedures or otherwise to promote standardization. Identified items included but were not limited to Kevlar gloves, grip boots, fire suits, nitrogen purge kits, and gauges.

In general, tooling and equipment condition and maintenance schedules were determined to be adequate with the exception of I&R gauges and torque wrenches that had inadequate calibration schedules and some of the Mueller Co. drilling, tapping, and stopping equipment which was in poor condition.

The assessment also identified twelve sets of former CMA trucks which had been outfitted for construction, but which should be converted to maintenance, thereby allowing for smaller maintenance crews and additional operational flexibility in responding to

emergent repairs. The assessment of the entire fleet also resulted in the need for an accelerated replacement schedule relative to the CMA replacement schedule to improve fleet condition, reduce fleet age, and improve the consistency—and therefore safety—of operations.

Implementation Plan:

An important first step in providing new equipment and tooling was to implement a process to provide legacy Eversource stock to EGMA consistent with the Transaction Services Agreement ("TSA") associated with the acquisition. Several items have been purchased or will be purchased in the 2021-2028 timeline, as shown in the table below. Training will continue for any newly purchased equipment. Calibration schedules have also been established.

The tool purchase plans for 2021 through 2028 are provided below. Due to ongoing COVID-related manufacturing and supply chain issues, there is continuing risk of delay. Therefore, some of the items currently designated for 2021 may be pushed into later years. Aside from those uncertainties, these estimates are based on unit costs, and in some instances have already been purchased or have quotes received and have, therefore, been assigned a Class 3 deadband.

Table 8: Gas Operations, Tooling and Safety Equipment Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
CGIs								
Mueller Co. equipment								
SCBAs								
Roadway plates								
CAT tooling								
Plastic pipe couplings								
Squeeze tools								
Nitrogen purge kits								
12" plastic pipe equipment								
Truck equipment								
Fleet								
Remainder (PPE, etc.)								

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Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Total ($M)	15.7	5.9	5.9	5.8	5.9	6.0	6.1	6.2
Total High (+30%)	20.5	7.7	7.7	7.6	7.7	7.8	-	-
Total Low (-20%)	12.6	4.8	4.7	4.6	4.7	4.8	-	-

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Area of Focus #19: Meters

Assessment Methodology:

The team selected to perform the meter assessment was the Metering Asset Family team, which performs risk assessments for the metering assets for the Eversource operating companies. The starting points for the assessment were the items identified in the D.P.U. 20-59 Settlement Agreement, which were then expanded to include other areas based on the team's experience with meter risk assessment at the Eversource operating companies. The team also assessed other risks that became apparent over the course of the assessment.

The former CMA meter assets consists of over 330,000 meters in Massachusetts with a wide variety of components that connect the gas distribution service to the customer. The objective of the meter asset family review is to improve the safety and reliability of the metering assets and gain a consistent approach across Eversource for risk identification and mitigation strategies to meet Eversource's goals of employee and public safety, excellent customer service, system reliability, and continuous improvement of work practices and processes.

Key Findings:

The data for this assessment is limited in terms of quality, completeness, and accessibility to support the assessment to its full potential and does not support a quantitative analysis of meter set assembly risks.

The records or data on the installations, including locations, equipment, over-pressure protection devices, pictures, drawings, and maintenance documents associated with "Single Customer Stations" or "monitor-control" meter sets, which are generally high volume meter sets, is incomplete. In addition, there is no inspection or maintenance program in place to inspect and repair these meter fits periodically.

It was estimated that 4,000 additional inside regulators on state-of-the art services will be identified and require remediation.

Approximately 8,000 elevated pressure services were identified in flood zones.

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Meters that provide significant enhanced safety functionality and additional over-pressure protection for customers on low pressure systems will likely become available in the near-term.

Implementation Plan:

Implementation plans for these assets include developing an inspection program for monitor-control meter sets, rebuilds associated with those inspections, the replacement of problematic C&I meter sets, the development and implementation plan to include vent line protectors on meter regulators in flood zones, the development and implementation plan for safety enhanced smart meter installations on LP systems, continuing the program to replace Trident tape repairs performed without proper qualification, and the relocation of an additional potential population of inside regulators on state of the art services. This Area of Focus was determined to require a Class 5 cost estimate deadband. The reasons for this are as follows:

- Cost estimates for highest cost items are based on judgment and analogy.
- Known data quality issues resulting in high uncertainty for affected replacement populations.
- High uncertainty regarding supplier readiness for safety enhanced meters.

Table 9: Meter Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
[redacted]								

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Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
[redacted]								
Total ($M)	0.3	1.1	1.3	5.0	8.0	8.1	8.4	8.5
Total High (+100%)	0.6	2.2	2.6	10.0	16.0	16.2	-	-
Total Low (-50%)	0.2	0.6	0.7	2.5	4.0	4.1	-	-

Area of Focus # 20: Compliance Work Backlog

Assessment Methodology:

The team identified obligations and commitments with known or suspected backlogs, based on data available during the transition period. The team then reviewed the existing compliance obligations and commitments with respect to dates and prioritizations (e.g., the risk rankings of known AOC's) with relevant stakeholders from the Construction, Planning & Scheduling, Meter Services, Engineering and Project Management departments. Where the Eversource methodology was less stringent than the CMA requirements, those items were flagged for further review. This qualitative review was performed by SMEs within relevant departmentss, including Engineering, Meter Services, and Maintenance to ensure that the Eversource methodology was adequate to manage the risk, using their experience and judgment. Additionally, these items were identified for consideration in the best practices review discussed in Area of Focus #21. More specific information on specific compliance backlog items is provided in the key findings section below.

The scrubbed data was then compared against the known timelines to develop annual plans. Additionally, the team developed estimates for ongoing compliance work necessary to remain current for those items associated with backlogs, in order to develop the annual plans.

Key Findings:

Due to the substantial and ongoing data quality issues associated with the available data sources (see Area of Focus #17), there is a high level of uncertainty for the accuracy of numbers in the workplan, especially as new compliance backlogs may be identified as the work in Area of Focus #17 is completed. As part of continuous improvement efforts, Eversource will continue to review all of its compliance obligations as part of its normal work and through the review identified in the implementation plans section below; therefore, Eversource may identify additional other data quality issues or compliance work backlogs which would be included in future progress reports.

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The primary finding of the assessment of the CMA AOCs is that various types of work in the compliance backlog are over-stated. CMA defined a broad population of items as AOCs with defined timelines to remediate based on a legacy CMA procedure. Eversource uses a different definition of AOC[7]. The individual subitems within the CMA population of AOCs may be defined and/or tracked differently at Eversource. Therefore, after the transition to Eversource procedures, as described in Area of Focus #21, this specific population of compliance items collectively known at CMA as AOCs no longer exists as a specific category for EGMA tracking purposes. The CMA AOC subitems have been split into the Eversource categories below for EGMA:

Eversource Category	**Timeline to remediate as per Eversource procedures**
Inadequate meter protection	Inspection cycle aligned with survey[8]
Plastic exposed	Repair immediately
Outside ATMs	Inspection cycle aligned with survey[9]

In addition to the CMA AOCs, the team determined that there was a backlog population of inactive services which were out of compliance for removal, a backlog population of corrosion repairs requiring remediation, a backlog of meter removals, and a backlog of inside pipe inspections. The team additionally identified a backlog of meter exchanges which is not compliant with code requirements. Please note that meter exchanges support gas measurement and are not associated with pipeline safety.

The team also identified several items where there were concerns about the development of a backlog due to transition issues and / or COVID work restrictions, but analysis determined there was no backlog. Nevertheless, these items are included in the

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7 As noted in WP-EN-001, an abnormal operating condition "means a condition identified by the operator that may indicate a malfunction of a component or deviation from normal operations that may (1) indicate a condition exceeding design limits; or (2) result in a hazard(s) to persons, property, or the environment.

8 As noted in OM-110-ADM, outside meter sets shall be inspected once every three calendar years, with the inspection interval not to exceed 30 months, outside of the Business District and Public Buildings, which are inspected annually, not to exceed 15 months.

9 Ibid.

implementation plans for this Area of Focus. These include weld remediation and end cap remediations, and inside regulator service relays. The team also reviewed the inside regulator program and determined that this program is appropriate to continue and address the risk associated with inside regulators; however, the team expedited the work plan given the team's assessment of resource availability. Additional information on the future of this program is provided in Area of Focus #19. The categorization of some other potential backlogs also changed after the transition to Eversource procedures. For example, CMA procedures defined a 12-month deadline for ATM poor pipe repairs whereas Eversource procedures require that any deficiencies be corrected before the next inspection. The SME evaluation determined that the Eversource procedures were adequate to manage this population. After applying the Eversource procedures to this population, no backlog remained. As another example, CMA procedures classified these leaks as grade 1, 2, or 3 leaks, whereas Eversource procedures generally categorize them as hazardous and therefore requiring immediate repair.[10] The team identified a backlog population of meter set leaks requiring repair.

Implementation Plan:

Overall, an initial implementation plan to become current with compliance work has been developed. The uncertainty associated with these numbers is high due to data quality issues that require ongoing field verification and research to validate. For that reason, the estimate for the units and investment in this workplan has been categorized as Class 5. The Company will continue to assess compliance and any additions will be integrated into this workplan, and provided in the six-month update reports.

The tables below provide the workplan to address both the backlog for items identified above and the requirements to stay current for those items, and the overall capital estimates. The capital estimate includes the Class 5 deadband.

[10] See OM-120.

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Table 10: Compliance Work Backlog Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Corrosion remediation	0.20	0.20	0.21	0.21	0.22	0.22	0.22	0.23
Meter protection	2.8	-	-	-	-	-	-	-
Mandated inactive services	0.3	-	-	-	-	-	-	-
Inside regulator service relays*	2.19	2.25	2.32	-	-	-	-	-
Weld remediation	0.4	-	-	-	-	-	-	-
End cap remediation	0.6	0.8	0.8	-	-	-	-	-
Total ($M)	**6.8**	**3.2**	**3.3**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**
Total High (+100%)	**13.6**	**6.5**	**6.7**	**0.4**	**0.4**	**0.4**	**-**	**-**
Total Low (-50%)	**3.4**	**1.6**	**1.7**	**0.1**	**0.1**	**0.1**	**-**	**-**
*excludes GSEP-eligible services which would be included in GSEP capital investments.								

Estimated Work Plan	2021	2022	2023	2024	2025	2026	2027	2028
Maintenance Department								
Corrosion Repairs	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100
Meter Protection	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Mandated Inactive Services	200	80	80	150	150	190	170	-
								-
Inside Reg Service Relays	1,100	2,800	2,800	-	-	-	-	-
Weld Remediations	11	-	-	-	-	-	-	-
End Cap Remediation	230	300	300	-	-	-	-	-
Meter Services Department								
Meter Exchanges	23,000	23,000	23,000	23,000	23,000	23,000	23,000	23,000
Meter Removals	38	-	-	-	-	-	-	
Outside ATMs	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000
Inside Pipe Inspections	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000

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Area of Focus #21: Procedures and Standards, NTSB Recommendations

Assessment Methodology:

Eversource procedures and standards and CMA's responses to the National Transportation Safety Board ("NTSB") recommendations were reviewed as part of the Safety Assessment. CMA standards were reviewed against the existing legacy Eversource standards and practices, with special attention paid to work design, constructability reviews, Professional Engineer ("PE") certification of designs, live gas procedures and drawings, work execution and close-out. CMA's responses to the NTSB's recommendations were validated to ensure the recommendations were fully addressed. Lastly, the overall Management of Change ("MOC") procedures in place at both CMA and Eversource were assessed for detail, clarity, and scope.

Key Findings and Risks:

The assessment determined that there were no significant compliance gaps in either the CMA or Eversource procedures and standards. Both companies' procedures and standards were similar in scope and requirements. The assessment also determined that the NTSB recommendations were addressed by CMA. Lastly, the Safety Assessment determined that the MOC program in place at CMA at the time of acquisition was not robust and did not cover the scope of changes anticipated by API RP 1173, although the specific recommendation from the NTSB was more narrow in scope. This creates risk during change activities and will be addressed as part of this Safety Assessment.

Implementation Plan:

Based on the findings of this Safety Assessment, the following implementation plans were created:

1. EGMA employees were trained and qualified to the Eversource OQ Written Plan. All EGMA territories transitioned to the Eversource standards and procedures, and this implementation plan was completed on April 19, 2021.
2. A standardized process for designing and certifying pipeline and district regulator/gate station work was created to bring best practices from the CMA process into

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Eversource. This process has been developed and will be rolled out in the fourth quarter of 2021.

3. The Eversource MOC program (OM-011-ADM) will be revised and rolled out to all EGMA employees. The revisions to the program create an MOC procedure that goes above and beyond NTSB recommendations, creates clear, detailed, and prescriptive requirements for addressing changes to the gas business that are not “replacement in kind” changes, with escalating team process and management review and signoff. The process has been developed and will be rolled out in the fourth quarter of 2021.

Area of Focus #22: Dynamic Risk Recommendations

Assessment Methodology:

The Pipeline Safety Management and QA team was assigned the task of reviewing the Dynamic Risk recommendations, current action plans and status from each of the three Dynamic Risk reports.

To address each of the three reports[11] and their corresponding action items, the PSMS and QA Department decided to project manage this initiative into a three-phase methodology as follows**:**

- Phase 1: Identification
- Phase 2: Assessment
- Phase 3: Finalization

Key Findings and Risks:

In total, there were 254 action items between the three Dynamic Risk Assessments. At the time of the acquisition, there were 128 recommendations, opportunities and best practices that were still open and pending completion, while the remaining 126 action items had been closed prior to or at the start of the CMA acquisition.

Implementation Plan:

No future implementation plan is needed.

[11] Although there is only one final Statewide Assessment, Eversource took the approach of looking at the report from two different perspectives (Eversource and CMA) to better understand and project manage what progress had been made on the findings and opportunities for improvement prior to the CMA Acquisition.

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Area of Focus #23: Emergency Response Program

Assessment Methodology:

This review was a comprehensive assessment of CMA's emergency response program and was based upon the emergency response principles of the National Response Framework ("NRF") and National Incident Management System ("NIMS") to determine CMA's ability to provide an organized and efficient response to an emergency event. The Safety Assessment pertaining to the Emergency Response Program was aligned under six categories (Planning, Training & Exercises, NTSB Recommendations, Technology, Critical Infrastructure, and Community Outreach), which were further delineated into 30 sub-tasks, to facilitate a comprehensive review of the emergency preparedness program and development of an integration and improvement plan.

Key Findings and Risks:

At the time of the acquisition, the CMA Emergency Preparedness Program was still in the developmental stages, with few executable plans. Upon review, Eversource determined the following major issues:

- The overall Emergency Response Strategy would have been ineffective to rapidly respond to a large-scale incident
  - Incident Command System ("ICS") Training was generalized and not specific to a Gas local distribution company ("LDC").
  - Emergency Response Plan ("ERP") roles were not known or clearly defined.
  - Key Incident Management Team ("IMT") personnel would have to deploy from Ohio for a large-scale incident.
  - Plans were incomplete and not synchronized across all business functions and locations.
  - The exercise program focused on smaller-scale incidents.
- There were significant shortfalls in their Emergency Preparedness Infrastructure
  - No emergency stock program.

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  - No dedicated Incident Command Center ("ICC").
  - One Mobile Command Center that was not deployable.

- CMA had a robust First Responder training program, but no emphasis on implementation and training with local communities.

Key Metrics:

A key metric associated with this Area of Focus is the percentage of initial individual emergency response training completed across all Eversource Gas employees. This metric will continue to be reported on in the progress reports.

Implementation Plans:

Given the relative immaturity of the CMA emergency response program compared to that of Eversource, the Company's overall strategy was to integrate EGMA into the overall Eversource emergency response program. The Eversource Gas Operations Emergency Response Plan (ERP or the Plan) is the foundation for a comprehensive emergency management program of preparedness, mitigation, response, and recovery actions designed to preserve public safety and welfare through the delivery of safe, efficient, and reliable gas service. On October 9th, 2020, Eversource filed an updated Gas Operations ERP with the Massachusetts Department of Public Utilities to reflect the changes associated with the CMA acquisition. These changes included updated customer and municipality data, and emergency response material stock. Per applicable statutes and regulations, the 2021 Gas Operations ERP annual update has also been filed with the Department.

At the time of the acquisition, a modified ERP strategy was implemented to ensure Eversource's Gas Business Unit's ("GBU") continued ability to execute safe and effective incident response until EGMA employees are fully trained and experienced in the proven Eversource emergency response process. EGMA personnel have been assigned to an IMT position that is paired with an NSTAR Gas and/or Yankee Gas counterpart. During an Emergency Response Plan (ERP) activation, the NSTAR Gas/Yankee Gas employee will serve as the lead member within the position, with the EGMA personnel observing and learning their roles and responsibilities. The purpose of this modified operating

practice is to ensure the GBU maintains its ability to respond effectively, while also providing EGMA personnel with the opportunity to familiarize themselves with emergency response processes and practices. This “Shadowing” concept will continue until the new employee is appropriately trained and gains experience. Appropriate training will be achieved when the new employee has completed all required training and testing and can demonstrate a sufficient level of understanding in both their assigned role and the overall emergency response process.

As of July 13th, 2021, 88 percent of initial individual emergency response training has been completed, and EGMA Emergency Response Training focus has shifted to include Section Training to refine individual skills required within their assigned ERP position.

All exercises follow guidelines from the Homeland Security Exercise Evaluation Program (“HSEEP”), where discussion-based exercises and operations-based exercises are conducted each year. where discussion-based exercises and operations-based exercises are conducted each year. The goal of conducting these exercises is to improve individual and overall organizational performance; improve coordination and communication; test and validate policies, plans, procedures, training, and equipment; identify gaps in resources; exercise ICS principles and protocols; and identify opportunities for improvement within Eversource, as well as with external organizations. Thorough After-Action Reviews are conducted, and an improvement plan is developed following exercises and real-world activations. Performance of various roles are analyzed, and additional training or retraining is recommended based on that analysis. To date, six exercises have been completed or are currently planned for execution later in 2021 and EGMA personnel across all levels of the emergency response were utilized during three Emergency Response Plan real world activations to increase their understanding of the Eversource process and gain critical experience.

Following the acquisition, Eversource prioritized community involvement in the Emergency Response program. As a part of this initiative, dedicated meetings were held with the former CMA communities to introduce the Eversource Emergency Response Team and outline our incident response strategy. Since the initial meeting with Public Safety Officials, Eversource has continued its partnership with the communities by

cooperatively developing a community Critical Facilities list and offering community specific Gas Safety and Emergency Response training to local Fire and Police departments.

The company is also in the process of implementing the ArcGIS Online (AGOL) Mobile Field Application will facilitate emergency response by streamlining data flow, providing field trends analysis and expediting work assignments while increasing coordination between field personnel and the Incident Management Team.

Finally, infrastructure improvements are required to construct a new Gas Incident Command Center to enable a more effective response capability during an incident and conduct centralized planning for complex incidents, and to purchase mobile command centers and upgrade the Emergency Response Trailer received as part of the CMA acquisition to meet Eversource standards.

The table below provides the investments required to support the implementation plans identified above. The capital investment estimates for 2021-2026 were assigned a Class 3 deadband due to the fact that the estimation was developed based on semi-detailed unit costs with assembly level line items.

Table 11: Emergency Response Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
[redacted]								
Total ($M)	**0.77**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
Total High (+30%)	**1.00**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**-**	**-**
Total Low (-20%)	**0.61**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**-**	**-**

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Area of Focus #24: SCADA & Gas Control System Assessment

Assessment Methodology:

The Safety Assessment focused on awareness and control of the gas distribution network. To quantify system awareness, the data available to Gas Control per pressure system was analyzed and assessed based on system complexity. Pressure system complexity is determined by miles of pipe, number of customers, and number of stations feeding into and out of the system. This is quantified as "aggregated risk," and is used as a measure to prioritize work and determine acceptable datapoint density. The review assessed the systems against best practice baselines defined below, with additional definitions provided in the Glossary, referenced from now on through their identifying labels (BP-A, BP-B, BP-C, BP-D):

Best practice baseline

	Required per system
A	Minimum of 2 field monitoring points
B	Remote monitoring of all district regulators
C	Minimum system observability as defined by associated risk factors
D	Minimum system controllability as defined by associated risk factors

Key Findings and Risks:

A substantial amount of data was compiled in the conduct of this Safety Assessment. The main initial risks are highlighted as follows:

This severely inhibits Gas Control's ability to be aware of and accurately identify and manage fluctuations and unexpected changes to system state, including potential loss of containment. This increases the risk of the following:

- Customer outages.

- Inadequate emergency response.

[redacted]

Key Metrics:

Key metrics associated with this Area of Focus are listed below:

- Miles between data points by system.
- Overall miles between data points.
- Additional remote control and/or monitoring required to match best practice by system.
- Overall additional remote control and/or monitoring required to match best practice.

Implementation Plan:

The implementation plan for this Area of Focus has been developed to bring all systems up to the four best practices over the years 2021-2028. [redacted] The ultimate solution may require additional capital to implement. Thus, the cost estimate provided below includes only the additional telemetry and control points associated with achieving the four best practices. A Class 4 cost estimate deadband has been assigned to this Area of Focus for the following reasons:

- Costs based on factored and parametric models.
- Uncertainty due to permitting and land acquisition, with prior known delays on similar projects.
- Complex impacts of related System Reliability and Gate Station and District Regulator projects.

Table 12: SCADA and Gas Control Capital Budget

Capital Budget Forecast ($M)	2021	2022	2023	2024	2025	2026	2027	2028
Telemetry and Control Points	-	13.9	13.9	13.9	13.9	13.9	13.9	13.9
Total ($M)	-	**13.9**	**13.9**	**13.9**	**13.9**	**13.9**	**13.9**	**13.9**
Total High (+50%)	-	**20.9**	**20.9.**	**20.9**	**20.9**	**20.9**	-	-
Total Low (-30%)	-	**9.7**	**9.7**	**9.7**	**9.7**	**9.7**	-	-

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Area of Focus #25: SCADA & Gas Control Field Work Coordination

Assessment Methodology:

This Safety Assessment was performed consistent with the following methodology:

- Assessed legacy CMA processes.
- Identified gaps with respect to legacy Eversource standards and practices.
- Implemented work practices to bring EGMA processes up to standard, including training field personnel on these new practices.
- Daily analysis and review of field work has been implemented, led through the field work coordination team.

These steps are complete.

Key Findings and Risks:

The Safety Assessment found the following overall risks:

- CMA's real time knowledge of the system state was insufficient.
- Work delays resulting in abnormal system conditions ("ASCs") were not actively tracked.
- All emergent situations lacked real time awareness to provide the Gas Controller the knowledge to take appropriate action.

Inadequate real-time knowledge of the system state can lead to inadequately managed and unsafe system states, including potential loss of containment. This increases the risk of the following:

- Customer outages
- Inadequate emergency response

Implementation Plan:

Planned work authorization process including field work coordination ("FWC") has been initiated as of October 2020 in a process that operates under the existing acquisition TSA. Tracking and reporting of ASCs has been initiated. Full integration of FWC with the new

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SCADA system is under development. The SCADA system being developed includes software (Op-Log) to support this integration with Gas Control to promote efficiency and transparency. SCADA system investments fall under the IT SCADA project.