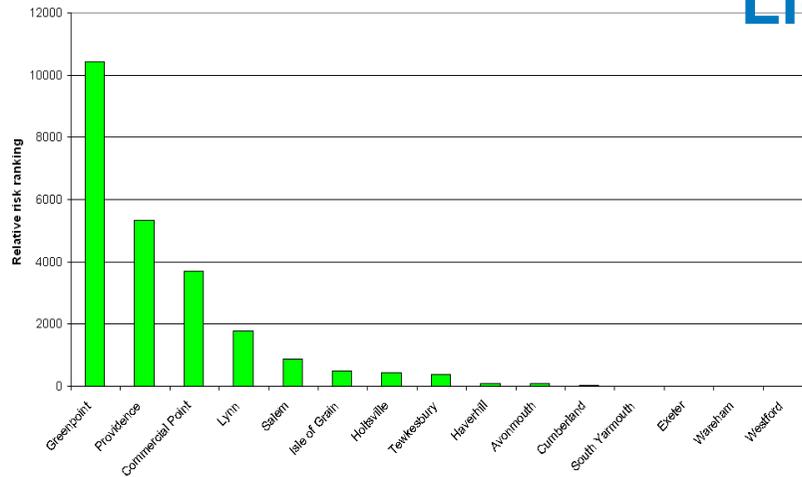


High Pressure Gas Pipelines Decision Support Tool



Comparing Our Major Hazard Assets

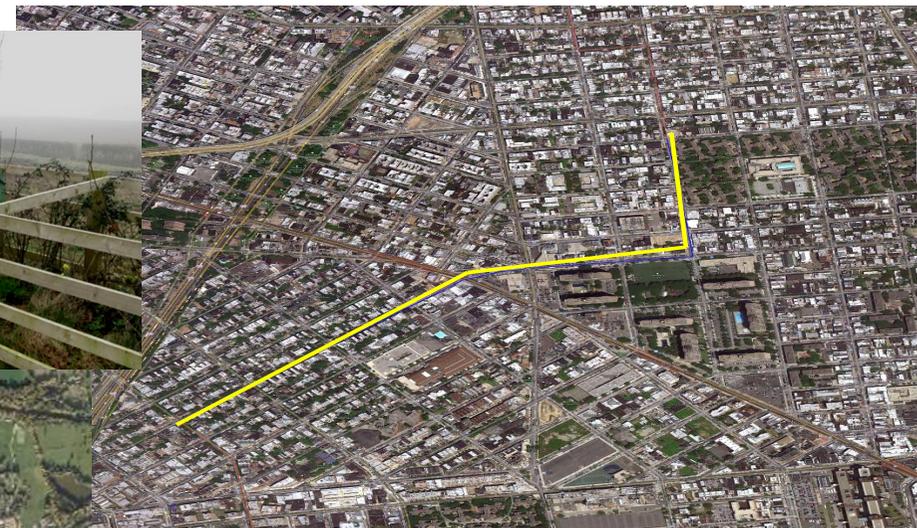
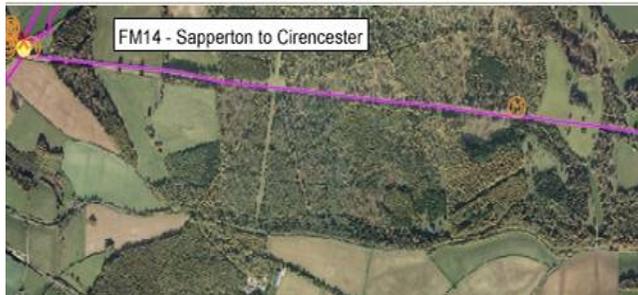
LNG Portfolio - Risk Ranking Results



Liquefied Natural Gas Sites



High Pressure Gas Pipelines



Decision Support Tool Structure

Asses the 5 key threats to a high pressure pipeline

Each threat is assessed separately

External interference



Corrosion



Ground movement



Mechanical

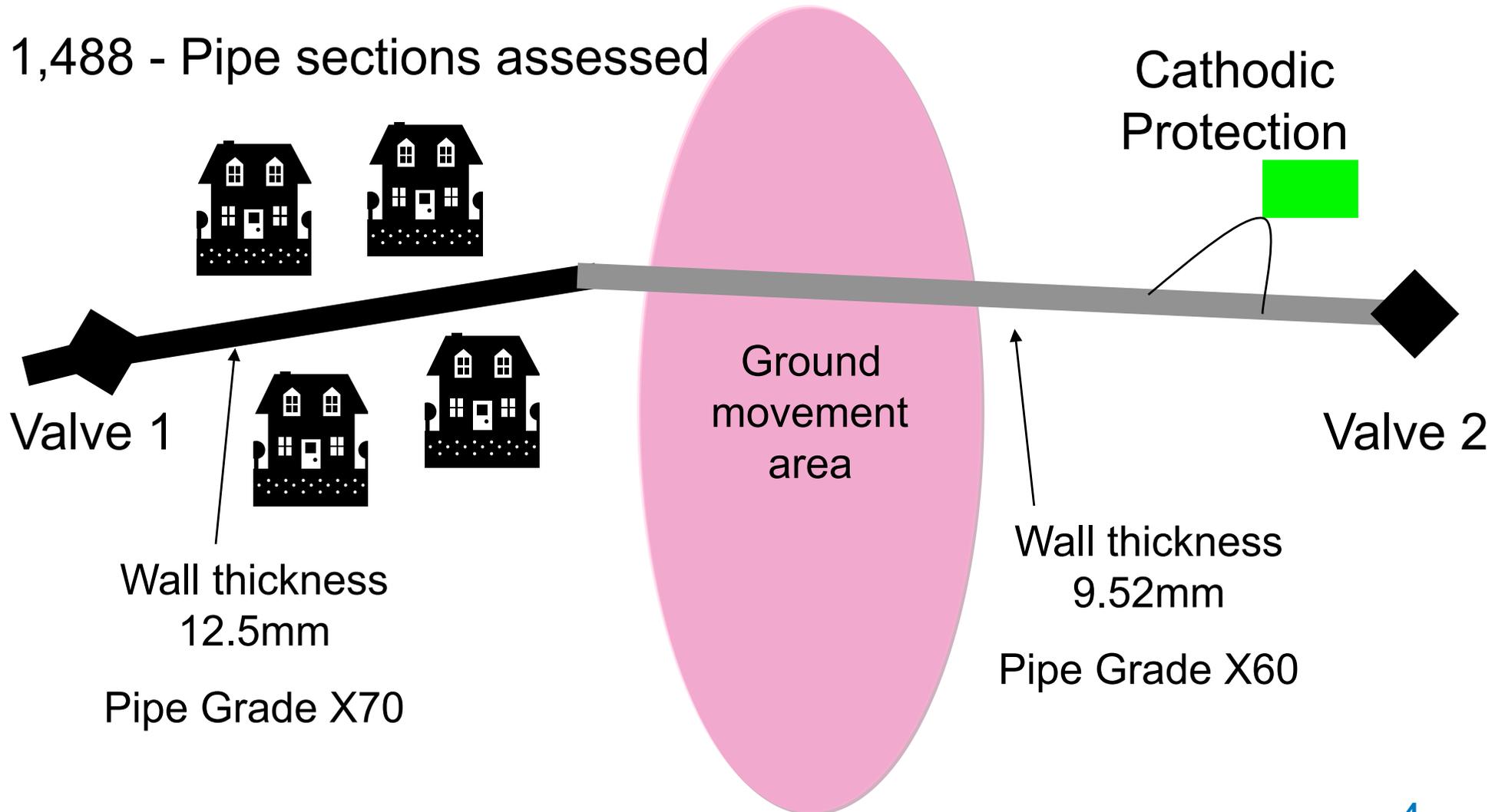


Operational



$$\text{Inherent design factor} \times \text{Consequence factor} \times \text{Control level (after mitigation measures applied)} = \text{Individual threat Score (1 - 100)}$$

Pipeline Sections



Worst case attributes applied to pipeline section

Data Input

Diameter **Wall thickness** Pressure Over-temperature potential
Girth weld quality Fatigue cycles **Sleeves** Slabbing
Corrosion mechanisms Pipeline coating **Pipe type** Mines/Quarries
Non piggable pipeline management **Hydro-test level**
DCVG surveys CIPS survey **Marker posts** Over-pressure potential
Local liaison Surveillance frequency Pipe age
Land sliding susceptibility **Material type** ILI defects
One call system **Ground movement events**

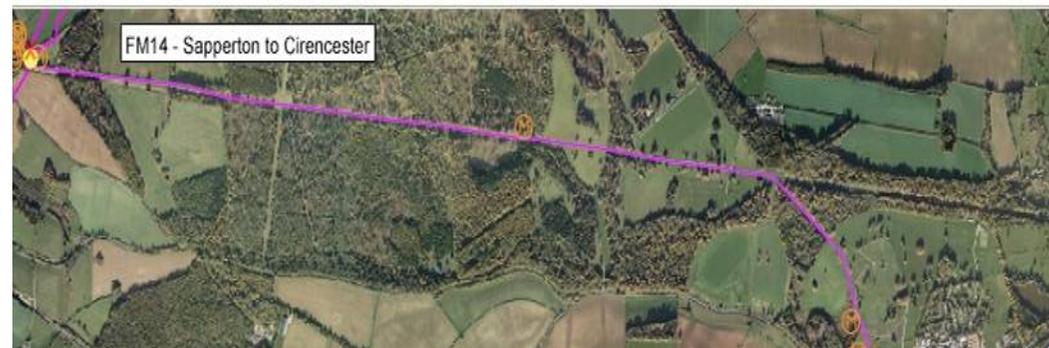
Consequences - Location



City / Town



Suburban



Rural

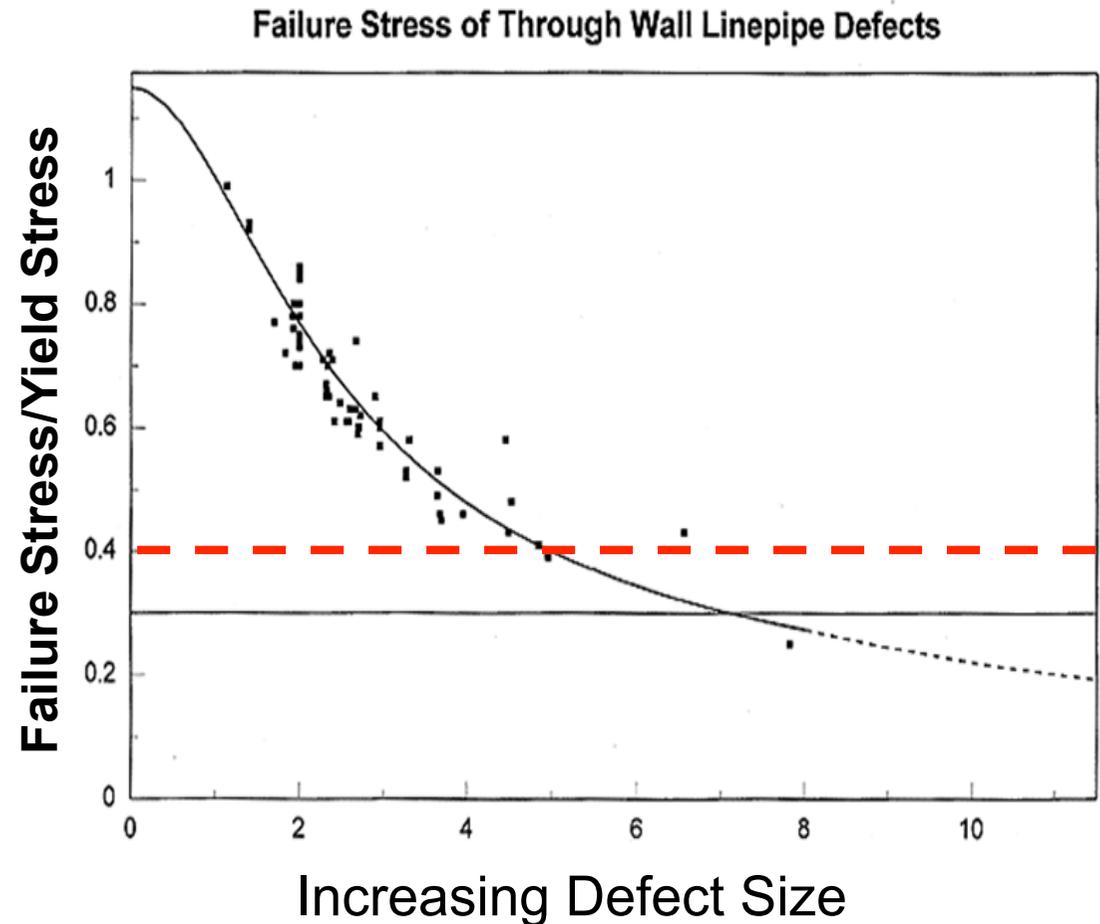
Consequences Of Failure Type



Rupture >30% SMYS



Leak <30% SMYS

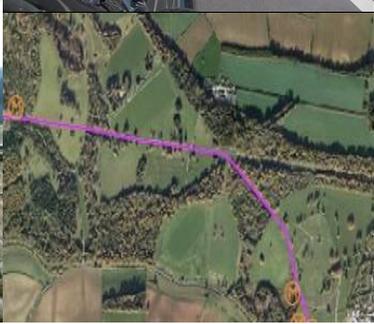


Shannon-Battelle Study ₇

Actions To Manage The Threats



Decision Support Tool

Threat	Inherent design factor	Consequence factor	Control level (after mitigation measures applied)	Overall threat level = Inherent design x consequence factor x Control level
External Interference				45
Corrosion				58
Ground movement				37
Mechanical				35
Operational				17