

Case Study: Pipeline LandWatch Provides Monitoring for Damage Prevention, Risk Reduction

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The goal of transmission companies is to reduce risks and improve the safety of affected communities through an integrity program to ensure construction quality of the pipeline, monitor the longevity of pipeline materials, educate the public, and apply damage prevention systems to avert third-party damage to pipelines (this article focuses on third-party damage prevention). The urban encroachment along pipeline corridors have created a higher probability of third-party damage to pipelines, especially with recent shale developments in and around communities.

Currently, pipeline safety processes consist of several preventive measures such as: 1) pipeline markers, 2) periodic surveillance of pipeline rights of way to identify land disturbances and 3) one-call system, to locate utilities prior to excavation. However, these precautionary programs rely primarily on the promotion of pipeline precautions and local building governance to protect their assets.

Pipeline LandWatch (PLW) is a new monitoring system that uses data sources to identify impending exposure to a pipeline. It is a proven platform that has been used for 15 years to monitor and protect engineered controls of environmentally impacted properties. The monitoring services would notify property owners of planned activities such a utility dig that would expose landfilled materials. PLW is an adaptation of this technology to monitor future land activities that pose a risk to pipelines. Once active, this system continuously monitors, alerts, and notifies operators of potential future threats to their pipeline, giving them a longer time horizon to proactively eliminate these threats.

Innovation & Value

PLW monitors land activities along pipeline corridors — applying information technology to help protect the safety of a pipeline. The program efficiently searches and sifts the “electronic trail” of hundreds of land transactions and land activities to monitor and help prevent third-party risks by providing operators lead time to develop contingency plans and/or communicate pipeline precautions to proper stakeholders. This data subscription service is a “plug-in” to enterprise geographic information systems (GIS), damage prevention, and ROW management systems. It creates, or is configured into existing workflows, to provide a dashboard and alert process that monitors and notifies the operator of potential risks along the ROW. PLW delivers information alerts to an operator for design and construction plans near or crossing their pipelines, providing longer time to initiate preventive and proactive engagements in alignment with their construction and integrity objectives.

Operators currently rely on ROW surveillance and 811 tickets to manage third-party risks — PLW provides the next level of predictive information allowing operators to know what land activities will be occurring in the future. The lead time of planned activities will afford operators the ability to proactively manage the risks by communicating with developers and/or contractors to promote safety and a higher level of operational efficiency. Using PLW for project planning and management can further safeguard the operator from first- and second-party damage as well, keeping all involved contractors and company teams closely coordinated and well informed.



Figure 1 – Pipeline Landwatch provides different layers of monitoring coverage for pipeline operators, alerting them to planned utility, and road permits, new identified buildings, water wells, property transaction and stream gages.

The leading indicators provided by PLW facilitates early communication among stakeholders to better ensure consideration of the potential safety impacts of a proposed land use or property development on the existing pipeline infrastructure. Since most community stakeholders are not pipeline experts, it is important for operators to provide coordination support to help civic organizations to understand how developments or land uses will impact an existing transmission pipeline’s integrity and the safety of the local community. PLW can be the communication bridge between pipelines and city planners who are reviewing developments that include land disturbances, road expansions, utility relocations, and other urban expansion activities. Figure 2 shows different land activities planned along a pipeline’s buffer zone: 1) Apartment complex – higher population density, utilities, and drainage changes, 2) Planned logging – heavy equipment traffic, digging to remove trees, leading indicator of future development, 3) Outdoor Theater Park – change to drainage patterns, periodic gathering of 20 or more individuals.



Figure 2 – PLW can provide different monitoring layers alerting pipelines to the potential threats.

Service Activation

This web-based subscription flags future land activities along a pipeline, and augments existing public awareness and damage prevention programs. The monitoring system is easy to install, since the monitoring service covers a wide swath over the pipeline’s buffer zone, and a general location of the centerline is all that’s needed to start the activation. The system setup requires security authorization to permit user’s access to the web-based system.

The PLW system overlays a coverage outline over the pipe’s protective buffer zone including pipeline, and operational assets. The width of the protective buffer zone is dependent on specific operations, population density and/or sensitive environmental criteria. Information is extracted by PLW from different data sources and provided as layers on a GIS map. The GIS layers are depicted spatially and managed on an intuitive, real-time system dashboard Figure 3 shows PLW’s dashboard with two overlaid layers with property parcels along the pipeline corridor.

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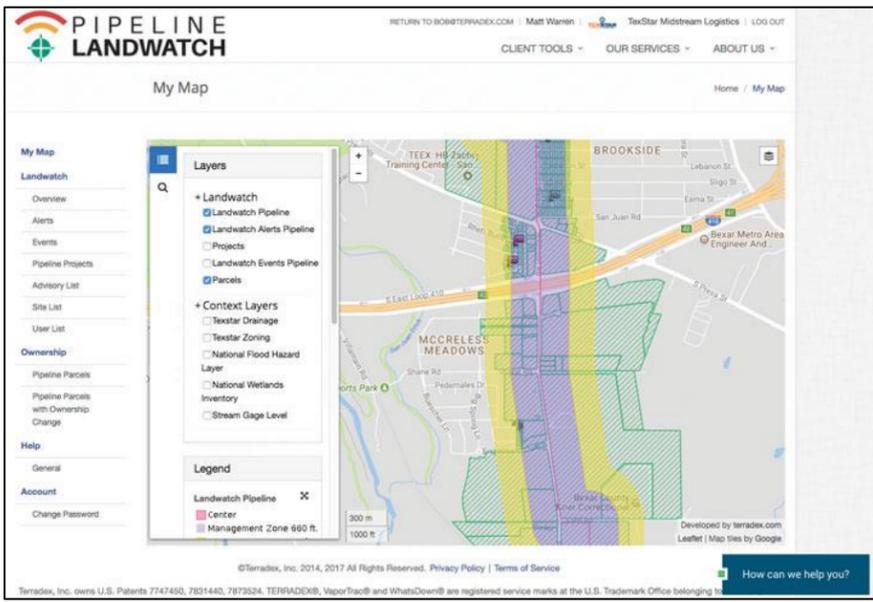


Figure 3 – PLW system dashboard – different layers can apply to pipeline's buffer zone. Figure illustrates property parcels along pipeline corridor.

The user can prioritize information layers. Example layers are new property transactions, zoning changes, building permits, road expansions/realignment, building occupancy, drainage pattern changes. In addition, new monitoring data layers can be developed to fit specific risks identified by a pipeline such as stream levels at water crossings, areal extent of forest fires, earthquake seismic influences near a pipeline.

The monitoring service provided by PLW also allows pipelines to provide automatic public awareness messaging using the same buffer zone coverage to provide advisories to property owners or local and regional stakeholders as shown in Figure 4.

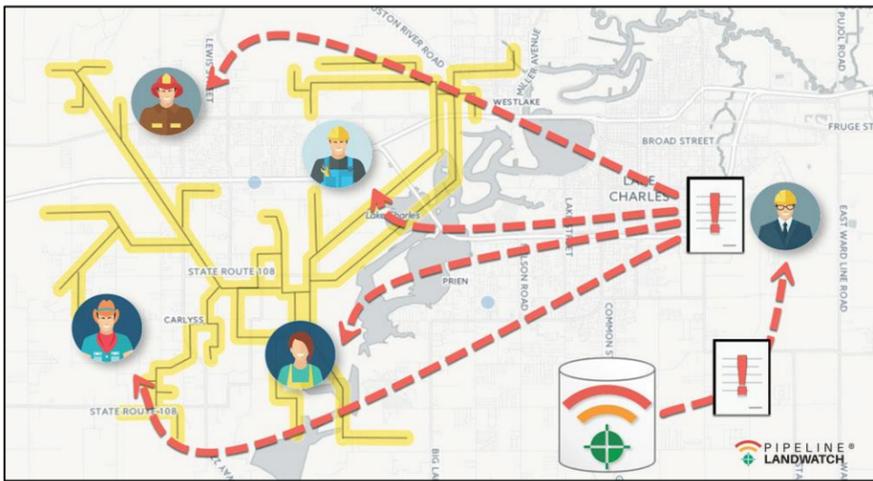


Figure 4 – PLW communication service using different social media forums, through Public Awareness and other channels.

The PLW system uses a variety of social communication media such as phone calls, emails, and texting to send out messaging. The communications can alert new property owners along a pipeline to digging precautions prior to land disturbances. Similarly, PLW provides communications to agriculture property owners prior to seasonal crop management to remind farmers and ranchers to pipeline locations and to utilize 811 call system prior to land activities.

PLW's application begins by understanding the pipeline vulnerability, and application of appropriate monitoring layers to address the potential problem areas. The vulnerability to external interference is dependent broadly on the urbanization, natural setting, sensitive receptors, and existing pipeline controls. The monitoring strategy consists of using selected risk attributes developed with the operator to screen data sources. The monitoring services are limited to the buffer zone area along a pipeline segment(s).

The alert configuration controls how PLW communicates to the operator's organization. These controls also describe how multiple stakeholders along the pipeline could be contacted automatically by the operator through the PLW service to provide reminders, messages and/or pipeline alerts. PLW's communication service allows companies to send messages to specific parties within the pipeline's buffer zone or specific community stakeholders such as first-responders, emergency officials to advise of an emergency training exercise or other operational events or incidents.

GIS is a key component of most pipeline integrity management. Multiple data elements can be served to enterprise GIS systems as a Web Map Service (WMS) or a Web Feature Service (WFS). The Web service augments

infrastructure information with near real-time actionable land activities data. The value is through a simple data service plug-in, that most GIS teams easily accommodate.

Summary

PLW is a subscription data service that can monitor activity on and around pipelines and related facilities. It's designed to augment existing company processes and enterprise systems, offering efficiency to limited manpower resource. This provides leverage to existing IT and data infrastructure.

The value of knowing planned land activities along a pipeline corridor comes in different forms, safety, operational planning, integrity management, and public awareness;

Safety – the PLW alerts allows pipelines to contact stakeholders who are planning land activities and participating early in the project design. Pipelines can provide precautions, and preferred designs.

Operational Planning – lead time of projects can allow operators to forecast anticipated realignment work due to road expansions, new pipe casings due to change in roadway loading, change in operation pressures due to new land development, addition of new valves due to change in topography,

Integrity Management – install a new layer of integrity management to protect against third-party damage. Placement PLW monitoring in the IM plan with operational processes to proactively manage identified future risks along the pipeline.

Public Awareness – become part of the planning process when warranted by a PLW alert, send notices to developers, contractors or planners to improve their knowledge of pipeline locations, precautions and how the pipeline can work with them to improve safety and construction efficiency.

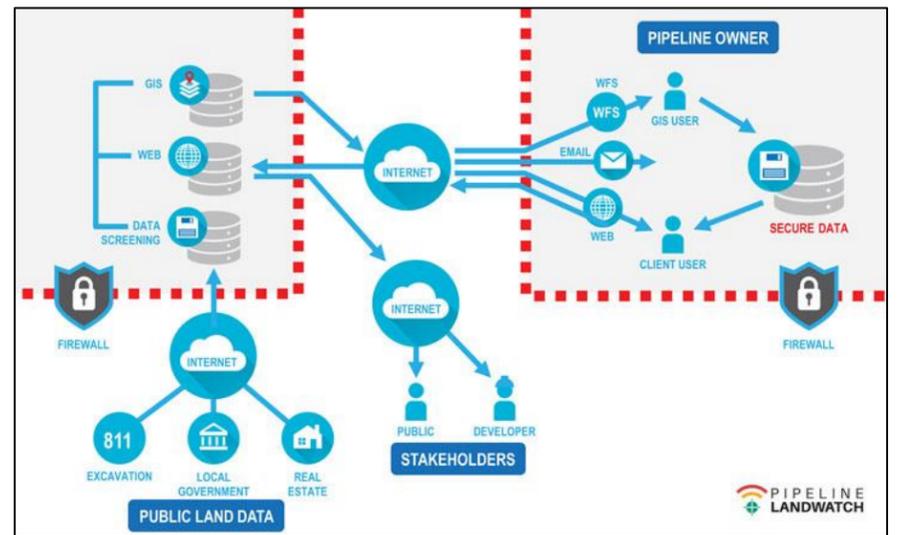


Figure 5 – PLW Data Architecture & Communications and Security Model

PLW can take the pipeline industry to next level of protective surveillance – knowledge of future third-party risks, showing operators proposed land activities along their pipelines allowing them to proactively manage the potential exposure. Place GIS locations of proposed encroachments into the hands of operations and field surveillance teams to plan responses and focus tracking to proactively manage future land disturbances. Reduce reliance on paper-based processes to minimize errors, save money, gain speed and accuracy to monitor and track land disturbances – know where to expect 811 tickets.

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Pipeline Landwatch is a joint venture between [Project Navigator, Ltd.](http://www.projectnavigator.com) and [Terradex, Inc.](http://www.terradox.com)

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