

# Technical Findings & Effectiveness

NIA\_NGT0278 | Predictive Model for Flood Risk Management

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## Background & Objectives

National Gas Transmission (NGT) operates critical infrastructure that is exposed to an increasing risk of flooding driven by climate change. NGT engaged Previsico to test whether Previsico's flood forecasting and real-time sensor monitoring technology could provide NGT with the early warning capability needed to protect its highest-risk assets and inform a broader, scalable resilience strategy across its approximately 600 operational sites.

The project was structured across six work packages:

- WP1: A nationwide flood risk survey to rank NGT's asset portfolio by flood risk exposure and identify priority monitoring sites.
- WP2-5: Deployment of water level sensor hardware and surface water flood forecasting at [REDACTED] with ongoing monitoring and validation throughout the trial period.
- WP6: Documentation of technical findings and standards to support governance, NIA reporting, and future scale-up.

**It should be noted that no flood events occurred at any of the monitored sites during the pilot period.** This report therefore focuses on system performance, operational readiness, and evidence of effectiveness gathered through alternative means, including a controlled sensor threshold test and running the forecasting model against past flood events with known impacts to NGT asset sites.

## WP1: Nationwide Flood Risk Survey

As the first phase of the project, Previsico conducted a nationwide flood risk survey, identifying the flood risk zones applicable to NGT's asset sites by assessing them against national flood risk datasets. This allowed sites to be ranked by flood risk exposure to contribute to the selection of locations for monitoring under WP2-5.

***Full details of the methodology, findings, and outputs are documented in the National Gas – Previsico Risk Zone Check Report, which should be read alongside this document.***

## WP2-5: Flood Monitoring

Previsico deployed flood monitoring systems at the following four pilot sites:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

At each site, on-site sensor hardware was installed and configured, providing real-time local monitoring alongside 48-hour predictive surface water flood forecasting set up to provide alerting capability with insight into the timing and severity of any forecasted flooding.

## Sensor Installations

The sensor installation and commissioning phase demonstrated the ability to successfully deploy devices ready to provide near real-time water level readings and alerts. Previsico and NGT coordinated on the installation of 16 devices at the 4 pilot sites across different regions of the UK:

| Site | Device | Installation date |
|------|--------|-------------------|
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## System Performance & Reliability

The following table presents system performance and reliability results across the pilot period. Performance targets are drawn from a KPI framework proposed by Previsico at the outset of the pilot, which set out suggested benchmarks across a number of measurable indicators as a useful and transparent basis against which to assess and report performance.

## Sensor Uptime & Reliability

Demonstrates hardware reliability and continuous system readiness, ensuring operational visibility even in the absence of flooding.

| KPI                           | Target      | Result | Notes                                                                                                                                       |
|-------------------------------|-------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Sensor datasets accessibility | ≥95% uptime | 99.9%  |                                                                                                                                             |
| Devices fully operational     | ≥95% uptime | 98.1%  | Signal issue at one below-ground device, <span style="background-color: black; color: black;">[REDACTED]</span> 99.9% across other devices. |

## Sensor Accuracy & Data Quality

Ensures confidence in data integrity and the ability to make informed decisions based on real-time, accurate monitoring.

| KPI                                          | Target        | Result | Notes                                                                  |
|----------------------------------------------|---------------|--------|------------------------------------------------------------------------|
| Validated alert rate against rainfall events | ≥95% accuracy | N/M    | Not measured – no valid flood alerts occurred during the pilot period. |
| False reading rate                           | ≤5%           | <2%    |                                                                        |

## Sensor System Integration & Operational Performance

Confirms that the system is working as expected in a real operational setting – not just collecting data, but delivering it quickly, reliably, and in a format National Gas can use. This ensures smooth integration into day-to-day operations and builds trust in the system's performance.

| KPI                          | Target  | Result | Notes                                                  |
|------------------------------|---------|--------|--------------------------------------------------------|
| Data packet delivery success | ≥97.5%  | 99.9%  | Based on 96 expected readings per day for each device. |
| Alert latency                | <5 mins | <3 min |                                                        |
| Platform/dashboard uptime    | ≥99%    | 99.9%  |                                                        |

## Sensor Maintenance & Issue Resolution

Highlights the benefit of a managed service model, with Previsico proactively maintaining system health and minimising disruption.

| KPI                                  | Target       | Result | Notes                                                                                     |
|--------------------------------------|--------------|--------|-------------------------------------------------------------------------------------------|
| Technical issues resolved within SLA | ≥95%         | 100%   |                                                                                           |
| Unscheduled maintenance visits       | ≤1 per annum | 1      | Device reset at [REDACTED] to re-establish communications – carried out by NGT site team. |

## Forecasting System Reliability

This ensures trust in our ability to consistently deliver insights. While not a success metric, it's a prerequisite for evaluating all other KPIs – reliability underpins everything.

| KPI                                             | Target | Result | Notes |
|-------------------------------------------------|--------|--------|-------|
| Platform/dashboard uptime                       | ≥99.9% | 99.9%  |       |
| Forecast data generation & delivery reliability | ≥99.9% | 99.9%  |       |

## Forecast Relevance & Impact

The goal is to support teams in acting earlier and more confidently.

Where appropriate, we will reference Instacast performance – showcasing how hyper-local, real-time forecasting added value in fast-changing weather events.

| KPI               | Target                  | Result | Notes                                                                              |
|-------------------|-------------------------|--------|------------------------------------------------------------------------------------|
| Forecast hit rate | ≤10:1 alert-event ratio | N/M    | No flood alerts or events occurred during the pilot period – zero false positives. |

## System Effectiveness Demonstrations

### Sensor Threshold Exceedance & Alert Triggering

To demonstrate that the sensor monitoring system reliably triggers alerts when water levels exceed configured thresholds, a controlled test was carried out at [REDACTED] AGI. This site was selected because its proximity to the Humber estuary means water levels at one sensor

location in fluctuates predictably with the tide, providing a consistent and observable pattern against which threshold adjustments could be tested.

From 2<sup>nd</sup> Feb 2026, alert thresholds for the selected sensor were temporarily lowered to a level that the tidal water levels were expected to exceed. This resulted in alerts being triggered as the tide rose above the adjusted threshold, confirming that the end-to-end alerting process from sensor reading through to alert delivery functions as intended. Thresholds were restored to their standard operational levels on 2<sup>nd</sup> Mar 2026.

This test provided confirmation that the system will alert reliably when genuine flood conditions exceed configured thresholds, and that threshold levels can be adjusted to reflect site-specific risk profiles as required.

## Historical Event Instacasting – Nether Kellet, Nov 2017

To demonstrate the effectiveness of Previsico's forecasting capability in the absence of live flood alerts during the pilot period, an Instacast exercise was conducted using a known historical flood event at a National Gas asset.

An Instacast runs Previsico's forecasting model using radar rainfall data from a past weather event in place of live data, with outputs that represent what would have been generated with that same rainfall data had the service been active at the time.

The event selected was the severe rainstorm of 22<sup>nd</sup> – 23<sup>rd</sup> November 2017, during which intense rainfall arrived from the Irish Sea coast and caused widespread flooding across the Lancashire area.

Radar rainfall data at 1km resolution (NIMROD) was collected for the 48-hour period from 21<sup>st</sup> November 2017 at 12:00pm, and Previsico's 25m resolution flood model was run across an approximately 25km x 25km area centred on the Nether Kellet Compressor Station. The modelling results confirmed flooding within the asset boundary with water depths ranging between 10cm and 60cm, consistent with the observed flooding reported in the area and validated against Lancashire County Council's post-event flood investigation.

The conclusion of this exercise is that had Previsico's forecasting service been active at Nether Kellet on that date, flood alerts would have been issued to NGT, providing advance warning of the event.

***Full details of the Instacast methodology and results are documented in the accompanying Instacasting Report for National Gas.***

## Conclusions & Lessons Learned

The pilot successfully demonstrated the deployment and operation of an integrated flood monitoring and forecasting system across [REDACTED] NGT asset sites. Across the pilot period, sensor hardware and the forecasting platform performed consistently at or above the proposed benchmark targets, with strong results for uptime, data delivery, alert latency, and issue resolution.

The absence of flood events at any monitored site during the pilot period meant that live alerting could not be assessed directly. However, the controlled threshold test at [REDACTED] confirmed that the end-to-end sensor alerting process functions as intended, and the Nether Kellet

Instacast exercise demonstrated that the forecasting model would have issued alerts for a real historical flood event at an NGT asset, with modelled flood depths of 10–60cm within the asset boundary. Taken together, these exercises provide meaningful evidence of system effectiveness in the absence of live events.

The following lessons are noted for the benefit of a wider future rollout:

- **Pilot scale and the likelihood of live flood events:** this pilot project was designed as a limited-scale proof of concept across four sites over a period of several months and without the expectation of capturing live flood events. As demonstrated by this pilot, the probability of flooding occurring at any specific monitored site within a fixed, short-term window is low. For meaningful evidence of live performance against real events, future deployments should consider both a significantly larger number of monitored sites and an extended monitoring period.
- **Site selection & readiness:** the staggered installation dates across the four sites, with [REDACTED] commissioned in October 2025 and [REDACTED] in December 2025, meant the latter two sites had a shorter monitoring period within the pilot. Earlier confirmation of site selection and readiness would maximise the value of any future deployment. Inclusion of vulnerability as well as susceptibility in selecting sites would increase the likelihood of the solution delivering value for selected sites.
- **Site access and SCO/91 authorisation:** installation work at NGT asset sites requires a Safe Control of Operations (SCO/91) Competent Person authorisation, obtained through a formal application and approval process. This should be factored into project planning for any future deployment, as the authorisation process has an inherent lead time that could affect installation scheduling if not initiated early enough.