WHITE PAPER

Beyond the Model:

A Practical Guide to Flood Risk Reduction for Property Owners, Businesses & Communities

Presented by LCM Solutions

In Partnership with Dutch Water Prevention

Predict | Prevent | Protect®

Prepared for: Property Owners, Businesses, and Municipalities

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Executive Summary

Flood is the world's most frequent and costly natural disaster. It affects properties of every type - commercial, industrial, residential, and public infrastructure - and its financial consequences extend far beyond the physical damage to buildings: business interruption, regulatory compliance obligations, insurance costs, and reputational impact all compound the direct loss. For most property owners and communities, the standard response to flood risk is reactive: file a claim, repair the damage, and wait for the next event.

There is a better approach. And it begins with understanding what current risk assessment tools can and cannot do.

Today's flood risk landscape offers sophisticated modelling tools - the same probabilistic platforms used by major insurers and reinsurers globally. Those tools are valuable for quantifying aggregate exposure. What they cannot do is change it. They tell you how much a flood might cost. They do not stop it from happening.

Dutch Water Prevention (DWP), introduced through LCM Solutions as a curated portfolio partner, closes that gap. DWP provides one of the only flood risk resources currently available in the North American market that moves end-to-end from high-resolution assessment and advanced scenario modelling through to engineering-grade mitigation design, physical implementation, and formal certification. The result is not just a better understanding of flood exposure - it is a measurably reduced one.

LCM Solutions operates as a Third Party Intermediary (TPI): an independent advisory firm that curates and deploys best-in-class risk mitigation partners, drawing on decades of professional experience inside the insurance industry. That institutional knowledge - of what drives flood claim severity, what mitigation measures demonstrably reduce it, and how to structure solutions that are recognized by insurers and regulators alike - is the lens through which every DWP engagement is scoped and delivered.

> **The Core Proposition for Property Owners and Communities**
> Understanding your flood risk is necessary. Reducing it is the point. DWP and LCM provide the complete path: from an objective assessment of your exposure, through a cost-benefit evaluation of mitigation options, to certified physical solutions that protect your property, reduce your Total Cost of Risk, and improve your standing with insurers - before the next event.

1. Flood Risk: The Gap Between Knowing and Acting

Flood is the most pervasive natural hazard affecting North American property - and the one where the gap between risk awareness and risk action is widest. Property owners, businesses, and municipalities typically have access to some form of flood risk information: FEMA flood maps, provincial floodplain designations, historical loss records, or insurer-provided risk scores. What is almost universally absent is a structured path from that information to physical risk reduction.

1.1 What Risk Maps Tell You - and What They Don't

Flood hazard maps - whether produced by FEMA (US), provincial authorities (Canada), or commercial risk modelling firms - are essential starting points. They identify which areas are statistically likely to flood and with what frequency. They inform insurance requirements and, in many jurisdictions, development approvals.

What they do not provide is site-specific intelligence: the precise vulnerability of your building, the condition of your local drainage infrastructure, the compound effect of simultaneous rainfall and storm surge, or the specific measures that would most cost-effectively reduce your exposure. For that, you need an engineering assessment - not a map.

1.2 The Real Cost of Inaction

The tendency to treat flood risk as an insurance problem - something to be transferred rather than managed - carries a predictable cost structure. Direct property damage and repair costs are visible and immediate. But the full impact of a flood event typically includes:

- **Business interruption**: Revenue loss during restoration, often extending for months beyond the physical repair period.
- **Increased insurance costs:** Flood claims directly affect renewal premiums and, increasingly, the availability of coverage. In high-risk zones, insurers are withdrawing or sublimiting flood cover.
- **Regulatory and compliance exposure:** For municipalities and operators of critical infrastructure, flood damage may trigger regulatory obligations, public liability, and reputational consequences that dwarf the physical loss.
- **Cumulative asset degradation:** Repeated flood events - even moderate ones - cause progressive structural damage, mold, and mechanical system deterioration that is often underappreciated until a major event occurs.
- **Community and supply chain disruption:** For municipalities, flood damage to infrastructure creates cascading costs across service delivery, emergency response, and long-term capital planning.

The economic case for proactive flood risk reduction is, in most cases, compelling. The challenge has been the absence of a structured, engineering-validated pathway from risk identification to implemented mitigation. DWP and LCM provide that pathway.

2. LCM Solutions: Independent Risk Expertise, Aligned With Your Interests

LCM Solutions is an independent risk advisory firm operating on a single principle: professionals who understand how risk becomes loss are best positioned to prevent it. LCM's founding team brings decades of experience inside the insurance industry - not as agents or brokers selling products, but as technical specialists who spent their careers managing large complex property programs, claims operations and Third Party Administration (TPA) functions across North America.

2.1 The Third Party Intermediary (TPI) Model

The insurance industry has long relied on Third Party Administrators (TPAs) on the claims side: independent entities that coordinate specialists, manage deployment, enforce standards, and translate complex multi-party activity into accountable outcomes. **LCM applies this same model to the front end of risk - prevention.**

As a Third Party Intermediary (TPI), LCM functions as a centralized coordinating entity that identifies risk categories where the gap between exposure and available mitigation is commercially significant, sources and vets the best technical solutions globally, and manages their deployment in a way that creates measurable, verifiable outcomes. LCM does not sell insurance. It does not sell engineering services. It **provides independent expert coordination - ensuring that the right solution is applied to the right risk**, and that the result is communicated in terms that insurers, regulators, and property owners can act upon.

Why Independence Matters
LCM's professionals are not motivated by insurance commissions, engineering fees, or product sales. Their frame of reference is the Total Cost of Risk (TCR) - the full economic cost of a risk, including insurance premiums, retained losses, mitigation expenditure, and the administrative burden of managing all three. This perspective, developed over decades of working on the cost side of insurance claims, is what distinguishes LCM's advisory approach from that of a vendor or a broker.

2.2 A Curated Portfolio Built on Claims Intelligence

DWP is not the only partner in LCM's risk mitigation portfolio. LCM's model is to systematically identify risk categories where property owners and communities are underserved by existing tools, and then to source and vet the most credible solutions available globally. DWP was selected because flood represents precisely this kind of gap: the risk is large, growing, and inadequately addressed by assessment-only approaches.

Critically, LCM's selection and deployment of DWP is informed by direct knowledge of flood claim outcomes - what causes severity, what reduces it, and which mitigation measures produce results that are recognized and rewarded by insurers. That knowledge is embedded in every DWP engagement LCM introduces.

3. Dutch Water Prevention: Engineering-Led Flood Resilience

DWP is a global flood resilience firm drawing on the Netherlands' unparalleled tradition in water management and engineering. With corporate offices in Houston and Calgary and operational coverage across the Americas, Europe, and Asia-Pacific, DWP brings international depth and engineering rigour to flood risk engagements at any scale.

The Netherlands has spent centuries engineering solutions to exist below sea level, protecting millions of people from the North Sea and major river systems. This is not theoretical knowledge - it is battle-tested engineering applied daily in one of the world's most flood-vulnerable nations. DWP brings that institutional depth to North American properties and communities facing their own flood challenges.

DWP's North American engagement goes well beyond commercial operations. **Dave Swan, DWP's North American Lead**, has worked directly with the National Research Council of Canada (NRC) on flood barrier research and performance evaluation - the NRC being home to one of the world's most advanced flood barrier and flooded infrastructure testing facilities. Dave is also the CSA Committee Chair for the W1020 Flood Resiliency Technical Committee and a contributor to the development of the new CSA guideline TS-227:26, Temporary Flood Barriers - A Selection Guide for Flood Mitigation

Practitioners - a landmark Canadian standard that will shape how municipalities, engineers, and emergency planners evaluate and deploy temporary flood barrier systems across the country.

That research and standards leadership sits on top of two decades of direct, hands-on deployment. Before these capabilities were consolidated under the DWP banner, Dave personally implemented many of the same proven flood mitigation solutions DWP now offers - for approximately twenty years. DWP's credibility is therefore not only technical and academic; it is field-tested, project by project, over two decades, by the same team now delivering it under one accountable brand.

3.1 The Full-Cycle Capability: From Assessment to Certified Protection

The defining characteristic of DWP is that no other flood risk resource in the North American market can complete the full risk improvement cycle that DWP provides:

Assess	Model & Advise	Implement & Certify
Desktop and on-site assessments. High-resolution flood hazard mapping. Historical event analysis. Site-specific vulnerability identification beyond standard floodplain maps.	Compound event and climate scenario modelling. Cost-benefit evaluation of mitigation alternatives. Flood Emergency Response Plans (FERPs). Objective decision-support, not a sales process.	Engineering design and specification of selected solutions. Physical installation by qualified professionals. Formal certification for insurance and regulatory recognition. Ongoing re-certification and lifecycle management.

This end-to-end capability means that a property owner or municipality engaging DWP through LCM is not purchasing a study or a report. They are initiating a process that ends, if they choose, with certified physical protection - and with a documented record of that protection that has direct value with insurers, lenders, regulators, and future buyers.

3.2 FloodAdapt: Seeing What Will Happen, Before It Does

Modeling tools like FloodAdapt (developed by Deltares, a global leader in water science commissioned by the U.S. Department of Homeland Security) provide scenario modelling capabilities that transforms how flood risk is understood and communicated.

FloodAdapt is a physics-based decision-support tool that allows users to simulate and visualize flood scenarios in detail: not just “what is my flood zone,” but “what happens to my building if a Category 3 storm makes landfall 15 kilometres east of here while the river is already at high flow and we have had 150 mm of rain in the prior 48 hours?” These compound events - simultaneous combinations of storm surge, rainfall, and river discharge - produce the most severe and least-predicted losses. FloodAdapt models them physically, not statistically.

For property owners and municipalities, the practical value of FloodAdapt includes:

- Visualizing specific flood scenarios on your actual property or community, with impact maps and damage estimates.
- Evaluating the effect of specific mitigation options - a perimeter barrier, elevated mechanical equipment, improved drainage - before any investment is committed.
- Understanding how your flood exposure changes under climate projections: sea-level rise, increased precipitation intensity, and changing storm patterns.
- Producing decision-support material that can be shared with boards, councils, insurers, lenders, and regulators.

3.3 Certification: Turning Mitigation Into Recognized Value

Physical flood mitigation that is not certified has limited value beyond the physical protection it provides. Insurers cannot formally recognize it. Lenders cannot factor it into valuations. Regulators may not accept it as compliance evidence.

DWP's certification programme addresses this directly. When DWP designs and installs a flood mitigation system, it issues formal certification structured to:

- Support insurance underwriting recognition - providing the evidence base for improved pricing, terms, and capacity.
- Satisfy regulatory and permit requirements for flood protection in applicable jurisdictions.
- Provide lender and investor assurance that flood risk has been physically addressed to engineering standards.
- Establish a documented performance record through ongoing re-certification, confirming that systems continue to meet their design standards over time.

Re-certification is not a formality. It is the mechanism that ensures mitigation investment retains its value - and its recognition - over the long term.

4. What Existing Tools Cannot Provide

It is worth being direct about what the standard flood risk toolkit - government flood maps, commercial cat models, and desktop risk scores - does and does not deliver, so that the value of DWP's full-cycle approach is understood in context.

What Standard Tools Provide

- Broad flood zone classification (100-year, 500-year floodplain)
- Portfolio-level probabilistic loss estimates
- Historical event data and regional hazard mapping
- A basis for insurance pricing and regulatory compliance
- Awareness of exposure - but no path to reducing it

What DWP + LCM Add

- Site-specific engineering assessment at the individual property or facility level
- Compound event modelling (FloodAdapt) capturing simultaneous surge, rain, and river events
- Climate scenario analysis - how your exposure changes over 10, 20, 50 years
- Engineering-grade mitigation design and physical implementation
- Certified protection that changes your risk profile with insurers, lenders, and regulators

The conclusion is not that standard tools are inadequate - they serve their intended purpose. The conclusion is that for property owners and municipalities who want to move from risk awareness to risk reduction, a different class of capability is required. DWP and LCM provide it.

5. Value for Property Owners and Businesses

For commercial and industrial property owners, businesses operating from owned or leased premises, and real estate investors, flood risk represents a specific category of financial exposure that is increasingly difficult to manage through insurance alone. Premiums are rising. Coverage is being sublimited or excluded in high-risk zones. Lenders are factoring climate risk into valuations. The economics of proactive mitigation are shifting decisively in its favour.

5.1 Total Cost of Risk: A Better Framework

The Total Cost of Risk (TCR) framework considers the full economic cost of a risk: not just the insurance premium paid to transfer it, but the retained losses absorbed when claims are below deductibles or excluded, the mitigation costs incurred to reduce it, and the administrative burden of managing all three. For flood-exposed properties, this framework typically reveals that the premium-plus-deductible cost of flood coverage significantly exceeds the annualized cost of well-designed physical mitigation.

A certified flood mitigation programme does not eliminate the need for flood insurance. It changes the economics of the relationship: lower retained losses, better coverage terms, reduced premiums, and a documented risk improvement that is recognized at renewal. That combination - physical protection plus insurance optimization - is the TCR outcome LCM and DWP are structured to deliver.

5.2 Flood Loss Exposure by Property Type

The following table illustrates the typical scale of flood loss exposure across common property types, and the mitigation potential DWP's certified solutions can deliver.

Figures are indicative only; actual exposure and mitigation outcomes depend on site-specific conditions assessed through the DWP engagement process.

Property / Asset Type	Typical Unmitigated Loss Exposure	DWP Mitigation Potential
Commercial / Industrial Building	Flood damage: $250K–$2M+	**Up to 80–90% damage reduction with certified flood-proofing**
Retail / Mixed-Use Property	Flood damage + BI: $100K–$500K	**Up to 75% damage reduction; FERPs reduce BI duration**
Municipal Infrastructure (pump station, lift station)	Replacement cost: $500K–$5M+	**Up to 95% loss prevention with purpose-built barriers**
Critical Facility (hospital, data centre, utility)	Event loss + BI: $1M–$50M+	**Up to 90%+ protection; certified for insurers and regulators**
Residential / Strata Complex	Flood damage: $50K–$500K+	**Up to 70% reduction with perimeter and basement measures**

5.3 Beyond the Building: Business Continuity

For operating businesses, the physical damage to a building is rarely the largest component of flood loss. Business interruption - the revenue and profit lost during restoration, the supply chain disruption caused by a flooded facility, the customer and contractual relationships strained by an extended shutdown - typically exceeds the direct property loss for well-insured businesses with long restoration timelines.

DWP's Flood Emergency Response Plans (FERPs) are a structured tool for reducing business interruption exposure. A FERP defines the specific actions, resources, and responsibilities required to protect a facility before, during, and immediately after a flood event - minimizing the duration of disruption and the severity of damage. When paired with physical mitigation, a tested FERP can materially reduce both the direct loss and the business interruption period.

5.4 Asset Value and Transactional Risk

Flood risk is increasingly material to property transactions. Environmental due diligence processes now routinely include flood exposure assessment, and buyers, lenders, and investors are applying greater scrutiny to climate-related risks in their underwriting and valuation processes.

A property with a documented, certified flood mitigation programme - maintained and re-certified over time - carries a demonstrably different risk profile from one without. That difference translates into financing availability, insurance terms, and transaction value. For property owners planning to hold, refinance, or eventually sell a flood-exposed asset, investing in certified mitigation is not simply an operating cost - it is a form of asset protection.

6. Value for Municipalities and Communities

For municipalities, flood risk sits at the intersection of infrastructure management, emergency preparedness, financial planning, and community resilience. The costs of flood events fall not only on private property owners but on public assets, services, and budgets - and the trend is worsening. Climate-driven changes in precipitation patterns, sea-level rise, and the urbanization of floodplains are increasing both the frequency and severity of flood events across North America.

LCM and DWP offer municipalities a structured, engineering-validated approach to flood risk management that moves beyond emergency response planning to systematic physical risk reduction - at the facility level, the neighbourhood level, and the community level.

6.1 The Municipal Flood Risk Challenge

Municipal flood losses are not limited to the cost of repairing damaged infrastructure. They include:

- Emergency response and recovery costs: Direct expenditures on flood response, temporary services, and infrastructure restoration that often exceed budgeted reserves.
- Service disruption: Flood damage to water and wastewater infrastructure, roads, transit systems, and municipal facilities creates cascading service failures that affect residents and businesses.
- Public liability exposure: In some jurisdictions, municipalities face legal exposure for flood damage to private property where drainage or flood protection infrastructure has failed or is deemed inadequate.
- Capital program pressure: Repeated flood damage accelerates infrastructure lifecycle costs and creates competing demands on already-constrained capital budgets.
- Grant and funding eligibility: Federal and provincial/state disaster mitigation funding programs increasingly require documented risk assessment and engineering-validated mitigation plans as conditions of eligibility.

6.2 A Systematic Approach to Municipal Flood Resilience

DWP’s engagement framework, deployed through LCM, provides municipalities with a disciplined path from risk identification to certified protection across their infrastructure portfolio. The same full-cycle model that applies to commercial properties - assess, model, design, implement, certify - is adapted to the scale and complexity of municipal assets:

- Priority facility assessments: Engineering-grade flood risk assessments for high-consequence municipal assets - wastewater treatment plants, pump stations, emergency services facilities, community centres - identifying specific vulnerabilities and quantifying exposure.

- FloodAdapt community modelling: Scenario modelling at the neighbourhood and community scale, visualizing the impact of compound flood events and evaluating the effectiveness of infrastructure investments before commitment.
- Infrastructure-grade mitigation design: Engineering specifications for flood protection systems designed to municipal infrastructure standards, including perimeter barriers, flood-resistant mechanical and electrical installations, and drainage capacity improvements.
- Grant-ready documentation: Assessment reports, engineering analyses, and cost-benefit documentation structured to support federal and provincial/state disaster mitigation grant applications - improving eligibility and application competitiveness.
- Certification for regulatory compliance: Formal certification of flood protection systems that satisfies applicable regulatory requirements and provides evidence of due diligence in flood risk management.

7. The Predict | Prevent | Protect® Framework

LCM's Predict | Prevent | Protect® framework describes both the company's operating philosophy and the logical sequence through which DWP engagements are structured. For property owners, businesses, and municipalities, this framework maps to a concrete sequence of activities and decisions:

PREDICT	Know exactly what you are facing. Desktop flood assessment using available data: location, elevation, construction, historical records, drainage and floodplain context. In some cases, FloodAdapt compound event modelling - not a zone designation but a physics-based simulation of the events most likely to cause you loss. Climate scenario analysis showing how your exposure evolves over time. A risk profile you can act on.
PREVENT	Make an informed decision about what to do about it. Evaluation of mitigation alternatives - perimeter barriers, flood-proofing, drainage improvements, mechanical equipment elevation, emergency response procedures - with cost-benefit analysis that accounts for avoided losses, insurance savings, and asset value protection. Flood Emergency Response Plans (FERPs) that define exactly how your team responds when a flood event is approaching. Implementation of your selected solution by DWP's qualified engineering team.
PROTECT	Secure the value of your investment. Formal certification of your flood mitigation system, structured for insurance underwriting recognition, regulatory compliance, and lender acceptance. Ongoing re-certification and lifecycle management that maintains your certified protection over time - and maintains its recognition by insurers and regulators at each renewal. A continuously improving risk posture that creates compounding value: lower insurance costs, reduced retained losses, protected asset value, and a documented record of responsible risk stewardship.

8. Engagement Model: A Client-Driven Process

LCM and DWP have designed the engagement model around one principle: clients make decisions based on evidence, not sales pressure. Each phase of the engagement produces a discrete deliverable. The decision to proceed to the next phase rests entirely with the client.

Phase 1: Desktop Flood Assessment
The entry point. A structured desktop review of available data - property location, elevation, building characteristics, historical flood records, local drainage and floodplain mapping - to produce an initial flood risk profile. No site visit required. Output: a risk-graded assessment with recommended next steps and a preliminary cost-benefit framework for mitigation options.

Phase 2: Site Survey and Assessment
Where the desktop assessment indicates significant exposure, the DWP team conducts an on-site assessment. This grounds the desktop model in physical reality: construction details, existing flood protection measures, drainage infrastructure condition, and site-specific vulnerabilities that cannot be captured remotely. Output: an engineering-grade flood risk report with quantified exposure and specific, costed mitigation recommendations.

Phase 3: FloodAdapt Scenario Modelling
For properties and communities where compound event exposure or long-term climate trajectory is material, FloodAdapt modelling can visualize specific scenarios and evaluates adaptation options. Where this is warranted, this phase produces the decision-support material that enables informed investment choices and supports grant applications, board approvals, and regulatory submissions.

Phase 4: Flood Emergency Response Plan (FERP)
A FERP defines the specific actions, resources, and responsibilities for protecting a property or facility before, during, and immediately after a flood event. A tested FERP can materially reduce the severity and duration of flood impacts even where physical mitigation is not yet in place.

Phase 5: Mitigation Design, Implementation, and Certification
Where mitigation is warranted and the client chooses to proceed, DWP designs, specifies, and implements the solution - and issues the formal certification that gives that solution recognized value with insurers, lenders, and regulators.

Phase 6: Re-certification and Lifecycle Management
Certified mitigation systems require periodic re-certification to maintain their recognized value. DWP's re-certification programme keeps documentation current and protection recognized - creating a continuously maintained record of flood resilience that compounds in value over time.

9. Conclusion: From Risk Awareness to Risk Reduction

The question is no longer whether flood risk is material. For a growing proportion of North American properties and communities, it demonstrably is - and it is becoming more so. The question is what to do about it.

The standard toolkit of flood maps, risk scores, and insurance coverage provides a foundation. It does not provide a solution. A flood map does not stop a flood. An insurance policy compensates for a loss after it occurs; it does not prevent it, and in an environment of rising premiums, tightening coverage, and increasing retention requirements, the insurance-only response to flood risk is becoming both less affordable and less complete.

Dutch Water Prevention, deployed through LCM Solutions' TPI framework, provides what the existing toolkit cannot: a structured path from flood risk identification to physical risk reduction, certified to standards that insurers, lenders, and regulators recognize and act upon. For property

owners, businesses, and municipalities that take seriously their obligation to protect their assets, their operations, and the people who depend on them, that path is now available.

Summary: What DWP + LCM Provide That No Other Resource Does

- End-to-end: assessment, compound modelling, engineering design, physical implementation, certification, re-certification
- FloodAdapt by Deltares: physics-based compound event and climate scenario modelling - not a zone, a simulation
- Certification and re-certification: recognized by insurers, lenders, and regulators; not just a report
- FERP development: immediate risk reduction before physical mitigation is installed
- LCM TPI model: insurance-native expertise; Total Cost of Risk perspective; no product sales
- Dutch engineering heritage: centuries of water management expertise applied to North American properties
- Predict | Prevent | Protect®: a disciplined framework from exposure intelligence to certified, lasting protection

Contact

LCM Solutions
Predict | Prevent | Protect®

To discuss a desktop flood assessment or to learn more about DWP's capabilities for your property or community, please contact:

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This white paper represents the combined capabilities of LCM Solutions and Dutch Water Prevention and is subject to update as product and service offerings evolve. Loss mitigation figures are indicative and based on industry data; actual outcomes depend on site-specific conditions and the scope of mitigation implemented.