An Economic Risk Assessment and Site Suitability Framework for the Timber Coulee Sub-watershed



A Project Report

Submitted by

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Executive Summary

Timber Coulee sub-watershed, located within the Coon Creek watershed in Wisconsin's Driftless Area, faces a critical safety gap after the Natural Resources Conservation Service (NRCS) recommended decommissioning all 14 PL-566 earthen flood-control dams. This action resulted from the failure of 3 of the earthen dams during the 2018 floods. Built between 1960 and 1963 with a 50-year design life, this aging infrastructure has served as the region's primary flood-control infrastructure for over six decades. Their removal expands the 100-year floodplain by approximately 249 acres, leaving residents and agricultural landowners significantly exposed to flood risk without proper replacements or planning. This report addresses that gap through two main objectives: an economic risk assessment and a site suitability analysis. Using GIS-based analysis and HEC-RAS-derived flood inundation maps, the economic risk assessment quantifies property and infrastructure exposure across multiple storm return periods. The site suitability analysis employs a weighted multi-criteria GIS framework that uses several physical variables to identify high-priority zones for converting row-crop agriculture to perennial grasses and native prairie strips. This data-driven approach provides county officials with the necessary evidence to secure state and federal grants, ensuring long-term hydrological and economic stability in a post-dam landscape.

1.0 Introduction

Rural communities within Wisconsin's Driftless Area have a long and devastating history of catastrophic flooding. The Driftless Area is a roughly 24,000-square-mile region covering southwestern Wisconsin, southeastern Minnesota, northeastern Iowa, and northwestern Illinois that was bypassed by the glaciers during the Pleistocene Epoch, or the last Ice Age (NRCS 2024). Due to the absence of glaciers, rivers and streams had time to cut deeply into the ancient bedrock, creating V-shaped valleys and steep ridges (NRCS 2024). Once the European settlers cleared the native forests and prairies for agriculture in the 1850s, the deep-rooted vegetation on the steep slopes drastically reduced the soil infiltration, which in turn led to a hydrologic system prone to catastrophic runoff and severe sedimentation in the valley (Grewal et al. 2022). To combat this systemic flooding threat, the federal government and local partners constructed 85 earthen flood control dams across Wisconsin under the Watershed Protection and Flood Prevention Act of 1954 (PL-566) (Daniels et al. 2023). 23 of the earthen dams were built specifically across Coon Creek and the neighboring West Fork Kickapoo watersheds (Abbasian et al. 2026).

Coon Creek watershed is located in the Driftless region that spans across Wisconsin's Vernon, Monroe, and La Crosse counties. 14 earthen dams were constructed throughout the watershed between 1960 and 1963. Designed with a 50-year service life, these structures have served as the region's primary flood-control infrastructure for over six decades (Daniels et al. 2023).

In August 2018, the aging structures were overwhelmed by up to 11 inches of rainfall, causing seven dams to overtop and three to fail. The geotechnical investigations revealed that this was due to internal erosion at the interface between the earthfill embankments and the highly fractured Jordan sandstone abutments (NRCS 2024). A similar possibility is expected for the remaining 11 dams, mainly due to aging and internal erosion. The potential failure of these dams can lead to loss of life, loss of riparian habitat, erosion, sediment accumulation, and damage to croplands, structures, and utilities. In response to the issue, NRCS developed an Environmental Impact Statement, which evaluates various alternatives for flood prevention and flood damage reduction. The preferred alternative is to decommission all 14 dams, which involves leaving the dam in situ and excavating the structure with a 2:1 notch capable of passing a 100-year storm event. To allow precipitation, the inlet riser is removed, the principal spillway is grouted, and the stilling pool is compacted with soil. This approach is said to minimize the potential for dam breaches and resulting damage to property and downstream sedimentation, thereby improving the stream and riparian habitat (NRCS 2024) (Abbasian et al. 2026). This controversial decision removes the existing flood protection, expanding the 100-year floodplain by approximately 249 acres (NRCS 2024). This creates a critical safety gap for current residents, who are left highly exposed to flooding.

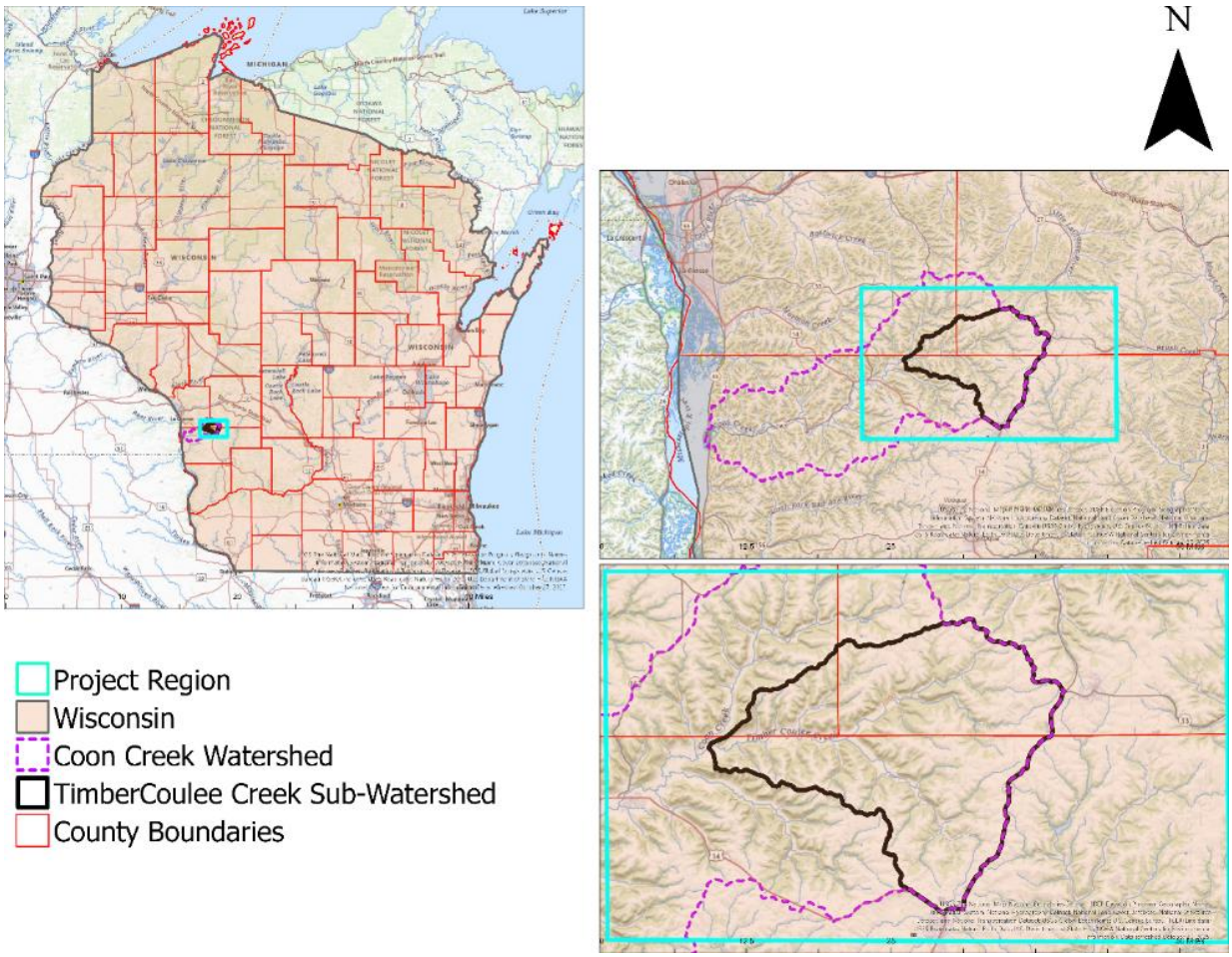


Figure 1: Project Region

The Timber Coulee sub-watershed is a critical drainage area situated within the Coon Creek Watershed in the Driftless Area of southwestern Wisconsin. This sub-watershed is representative of the broader landscape challenges facing the region: steep, dissected terrain with a mix of agricultural row crops, pasture, and forested ridgetops, draining into narrow valleys where residential and agricultural properties are concentrated along stream corridors. The Timber Coulee sub-watershed contains 10 of the 14 dams slated for decommissioning and is therefore directly impacted by the NRCS preferred alternative. The sub-watershed's land-use composition, which includes significant areas of row-crop agriculture on sloping terrain, makes it a particularly stable focus area for evaluating both the economic risks of dam removal and the potential of distributed nature-based flood mitigation strategies.

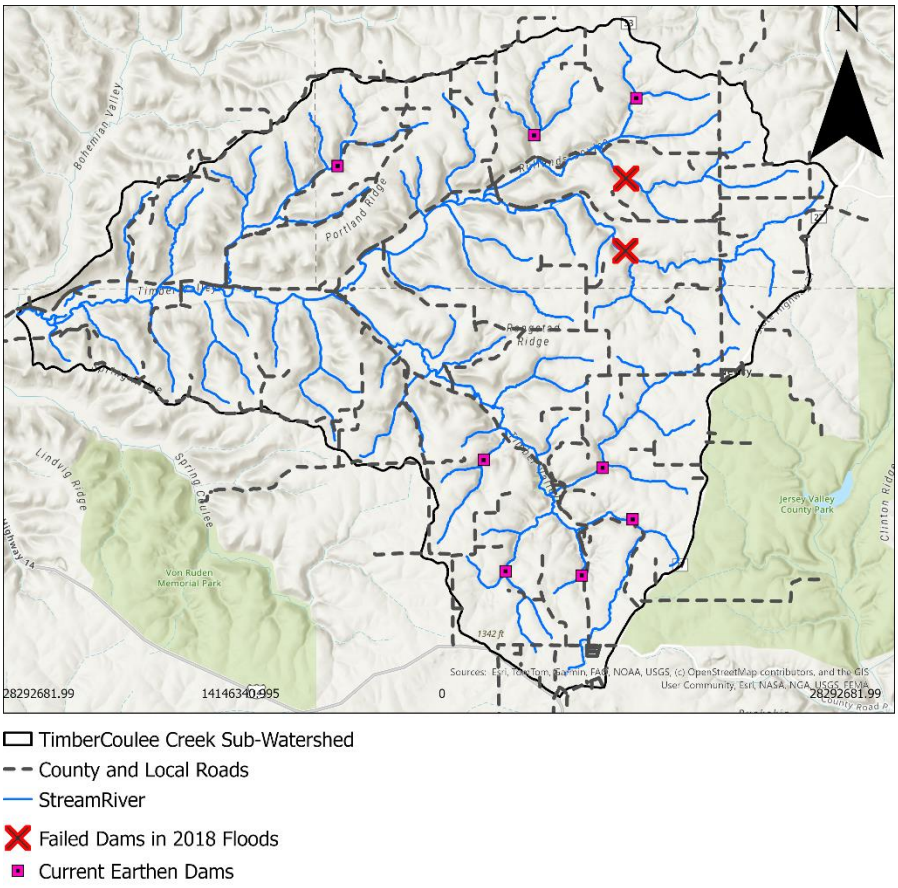


Figure 2: Timber Coulee Sub-watershed

Given the limitations of dam decommissioning, there is a critical need for a good disaster preparedness and mitigation plan that involves all stakeholders. The scope of this project focuses on two primary objectives aimed at bridging the community's safety gap. First, create an economic risk map based on properties and road/bridge networks that could be affected by major storm events resulting from the decommissioning of the dams. Second, identify high-priority zones for distributed Best Management Practices (BMPs) using site suitability analysis. By converting row crops back into deep-rooted perennial pastures or restoring the prairie strips, the project aims to increase soil infiltration, reduce the impacts of stormwater runoff on the natural environment, and ultimately strengthen community resilience.

The decommissioning of dams represents a necessary shift from structural control to a planned distribution of nature-based solutions. With structural solutions no longer federally viable due to submarginal benefit-cost ratios (NRCS 2024), the responsibility of community safety shifts to the land use planners. The economic risk assessment is important because it utilizes the "No Dam" scenario to translate the raw flood discharge to actionable data for the local planners. This risk report can help planners identify residential and agricultural assets and their associated fair market values that are vulnerable to major storm events. This data is essential for updating the hazard mitigation plans and planning for more nature-based solutions to mitigate flood hazards. Additionally, the suitability analysis provides a framework for identifying high-priority zones for BMPs. This analysis identifies optimal zones where land use interventions such as prairie strips

and perennial cover can most effectively improve flood mitigation. This analysis provides a roadmap for planners to protect the long-term viability of agricultural parcels not slated for buyout programs, maintaining community stability while restoring hydrologic functions once held by the earthen dams.

2.0 Methodology

2.1: Economic Risk Analysis

Estimating the economic exposure of properties within the flood hazard zones is a fundamental component of flood risk management and watershed-level planning. The approach involves using Geographic Information Systems (GIS) software, ArcGIS, to intersect parcel data with HECRAS derived flood inundation maps for multiple return period storms (5-year, 50-year, 100-year, and 500-year). The objective is to quantify the "Value at Risk" by aggregating the land and improvement values for all affected parcels within the sub-watershed

To assess property-level exposure, the study uses the Wisconsin Statewide Parcel Map (V11) for the sub- watershed (State 2025). As shown in Table 1, the parcel data uses a property classification system (PropClass) that assigns parcels to major classes. Many parcels carry combination codes (e.g., 1,4,5 or 1,6,5M), suggesting mixed land uses.

Table 1: PropClass provided by Wisconsin's Parcel Data

Number Assigned	PropClass
PropClass 1	Residential
PropClass 2	Commercial
PropClass 3	Manufacturing
PropClass 4	Agricultural
PropClass 5	Undeveloped
PropClass 5M	Agriculture Forest
PropClass 6	Productive Forest Land
PropClass 7	Other

For better clarity of the current parcel data, a critical component of this analysis is the reclassification of property classes into functional, manageable categories. This reclassification is shown in Table 2.

Table 2: Reclassified PropClass

Reclassified Property Class	Description
Developed	Involves the parcel data established under Property classes 1 (Residential), 2 (Commercial), and 3 (Industrial).
Farmstead	Involves parcel data that have different combinations of Property class 7 (other), 6 (Forest), 5 (Undeveloped), 5M (Agricultural Forest), 4 (Agriculture)
Active Agriculture	Involves the parcel data established under Property classes 4 (Agriculture) or 5M (Agriculture Forest), and a combination of the two.
Forest	Involves the parcel data established under the Property classes 6 (Forest)
Natural/Open	Involves the parcel data established under the Property classes 5 (Undeveloped)
Unclassified	Involves parcel data that has no information or has blank/null data.

The use of HEC-RAS to generate flood-inundation maps for multiple-return-period storm events is a standard, well-established approach in flood risk management. HEC-RAS is one of the widely used tools for floodplain mapping. The flood maps for multiple-return-period storm events were created by Professor Eric Booth, a research scientist at the University of Wisconsin-Madison, and his team. These maps were developed for the Natural Resources Conservation Service (NRCS) report as part of the "Coon Creek Final Watershed Plan – Programmatic Environmental Impact Statement" (Plan-EIS) (NRCS 2024). Booth and his team assisted the NRCS by providing flood maps to help understand inundation in the Coon Creek watershed after the 2018 flood disaster across different scenarios.

As NRCS has suggested decommissioning all PL-566 dams in the watershed, this project uses the "Dam Decommissioned" scenario (NRCS 2024). This will help assess the economic losses to the properties resulting from flood inundation during the dam decommissioning scenario for different return-period storm events.

Flood inundation zones for this scenario were developed using peak discharge data acquired from a calibrated hydrologic basin model of the Coon Creek watershed in HEC-HMS. This model was also created by Professor Eric Booth and his team on behalf of the NRCS. The discharge parameters used to map storm-event frequencies were based on a hypothetical precipitation event spanning January 1st to January 4th, 2021, which provided the necessary flow data for the sub-watershed. Incorporating these extreme storm simulations is increasingly critical for accurate local planning. As shifting climate patterns produce more frequent, high-intensity precipitation events across the Driftless Area, the implications of unmitigated runoff and increased inundation zones become more severe. The flood inundation maps were then transferred onto ArcGIS, which will help identify the parcels that fall within the flood hazard zone for each return period. Figure 3 (a-d) shows the flood inundation for different return periods in the Timber Coulee sub-watershed. The economic value of these parcels is captured using the aggregate value of the "Assessed value of Lands" and the "Assessed Value of Improvements" from the parcel data's attribute table (State 2025), which will provide a rough estimate of the economic loss that the properties within the flood zones of the multiple storm events.

Beyond private parcel data, the analysis evaluates the risk to public transportation infrastructure. Bridge replacement costs are estimated using the Wisconsin Department of Transportation (DOT) (Transportation 2026). The valuation to replace a bridge structure follows the formula:

$$Replace\ Structure(\$) = Deck\ area\ (SF) * 1.05 * 220$$

Here, the value 220$ is the unit cost to replace the structure per square foot (SF). A 5% multiplier is added to the formula under the assumption that the new bridge will be slightly larger than the old bridge, hence the '1.05'.

For this study, one bridge located at 'Lars Hill Rd over Timber Coulee Creek' (Ledger 2020) was selected to estimate the average cost of replacing a bridge. The deck area of the bridge was acquired from a document, 'Bureau of Structures Bridge Project Scope Eligibility List', provided by the Wisconsin Department of Transportation.

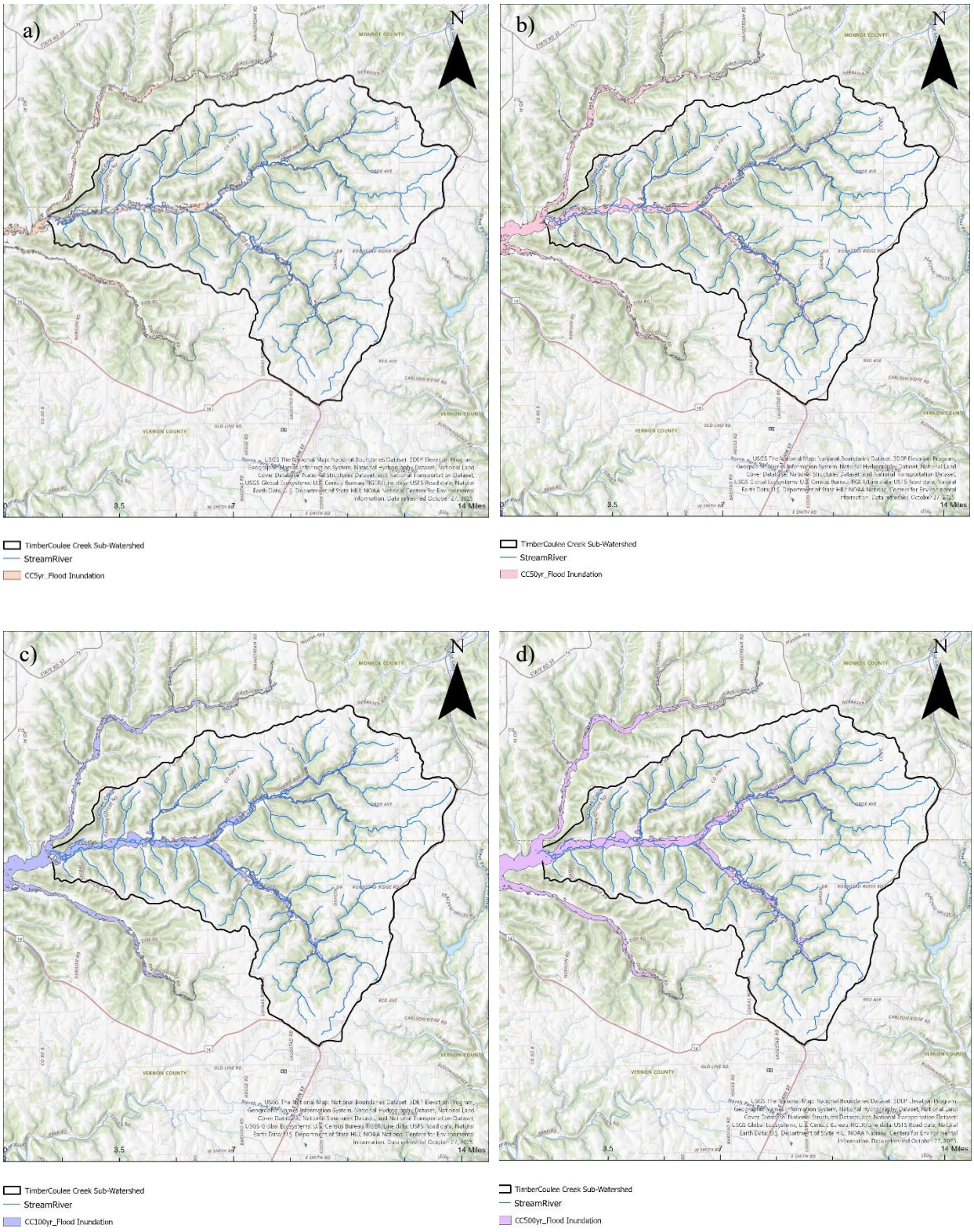


Figure 3: Flood inundation areas for a) 5-Year b) 50-Year c) 100-Year d) 500-Year Storms

2.2: Site Suitability Analysis

The second phase of the methodology identifies high-priority locations for implementing distributed BMPs, specifically focusing on converting row-crop fields into perennial grass and native prairie strips. Agricultural landscapes, particularly those dominated by row-crop production such as corn and soybeans, are significant contributors to nonpoint-source pollution, soil erosion, and altered hydrology that increase flooding (Zimmerman et al. 2019). BMPs are excellent strategies to help reduce soil erosion and improve hydrological regulation, and among these, perennial grass establishment and native prairie buffer strips are widely recognized as effective in-field structural practices that can be strategically placed within the agricultural fields to address these concerns (Asbjornsen et al. 2013) (Yi 2020). This goal uses GIS-based analysis to identify fields suitable for conversion from row crops to BMPs, with a primary focus on reducing flooding impacts on properties within flood hazard zones.

Agricultural BMPs consist of a broad range of vegetative, structural, and operational practices aimed at reducing the environmental impacts of farming and runoff. Vegetative buffer practices, including vegetative filter strips and riparian buffer zones, involve establishing perennial vegetation (usually grasses, shrubs, or trees) adjacent to fields and water bodies to manage soil erosion and surface runoff (Jacobson et al. 2024). Contour strips and prairie strips are in-field structural practices composed of native grasses, alternating with wider strips of cultivated areas, and installed along the contour of the land (Jacobson et al. 2024). This helps provide a resistance to the water movement and significantly reduces field-scale erosion and peak discharge.

To maintain consistency across the HUC-12 watershed scale, all feature layers were projected to 'NAD 1983 HARN WISCONSIN TM (meters)' with a 30-meter resolution and clipped to the sub-watershed boundary. To initiate the Suitability analysis, 4 variables were introduced. Each selected variable was based on its relevance to flood processes.

The four primary variables are defined as follows:

Land cover: This variable identifies the current physical cover and land management. The model specifically targets Row crop agriculture. These areas are prioritized for conversion because they currently lack the year-round root structure provided by perennial vegetation, which is essential for absorbing rainfall and preventing soil erosion. Assessments have highlighted transitions from forest to cropland as a driver of changes in hydrological responses and flood risk patterns (Tola and Shetty 2021). In the study area, since European settlement converted forested areas to intensive agriculture, flooding has increased substantially. Therefore, the suitability model prioritizes agricultural land for analysis.

Slope: Represents the steepness of the terrain. In the Driftless Area, steepness is the primary driver of water velocity. As the slope increases, runoff velocity increases, reducing the time available for the soil to absorb water, which can, in turn, cause downstream flooding. Low slopes tend to favor infiltration, while steep slopes can quickly turn rainfall into high velocity runoff. Selecting a slope of 15 – 35% often marks where surface runoff generation shifts from infiltration to more rapid runoff.

Hydrologic Soil Group (HSG): This is a classification system used by engineers and planners to understand how much runoff a soil will produce. Soils are assigned to one of four groups based on water infiltration when soils receive precipitation from long-duration storms or are thoroughly wet (USDA 2016). The soils in the United States are mainly divided into four groups (A, B, C, D) and three dual classes (A/D, B/D, C/D). Soils A and B have high to moderate infiltration rates, while Soils C and D have slow to very slow infiltration rates (USDA 2016).

Proximity to Roads: This measures the distance from the existing transportation infrastructure. Here, a 100-ft buffer from the road network is established to ensure that the BMPs do not compromise the structural stability of public roads.

Table 3: Factors used for Site Suitability Analysis

Factor	Suitability Criteria	Reason
Slope	15% to 35%	Moderate to steep slopes are where the erosion risk is greatest and where the selected BMPs are most effective
Land Cover	Focusing on row crops	Row crops are the primary causes of erosion and runoff in agricultural landscapes. Conversion to BMPs should provide a marginal reduction in discharge.
Proximity to Roads	>100ft	Prevents interference with the public right of way, and installation of BMPs near roads may be unsuitable.
HSG Soil	D, A/D, B/D, C/D	These soil groups exhibit the lowest natural infiltration and the highest runoff potential. A/D, B/D, and C/D are soils that naturally belong to HSG D (poorly drained), but behave as HSG A, B, and C when artificially drained (tile drainage systems). When the drainage system fails, these soils revert to HSG D, exhibiting low infiltration (USDA 2016).

Table 3 presents the four variables, the suitability criteria, and the reasons for each criterion.

Figure 4 (a-d), shows a visual map of the different variables used for the Site Suitability Analysis. From Figure 4b, a major portion of the land cover in the sub-watershed is row crops (marked in yellow). Additionally, based on the Soil HSG map (Figure 4d), the majority of the sub-watershed consists of soil HSG C, which has slow infiltration rates, leading to a moderately high runoff potential. Based on these two maps, the northeast portion is likely a hotspot for row-crop conversion.

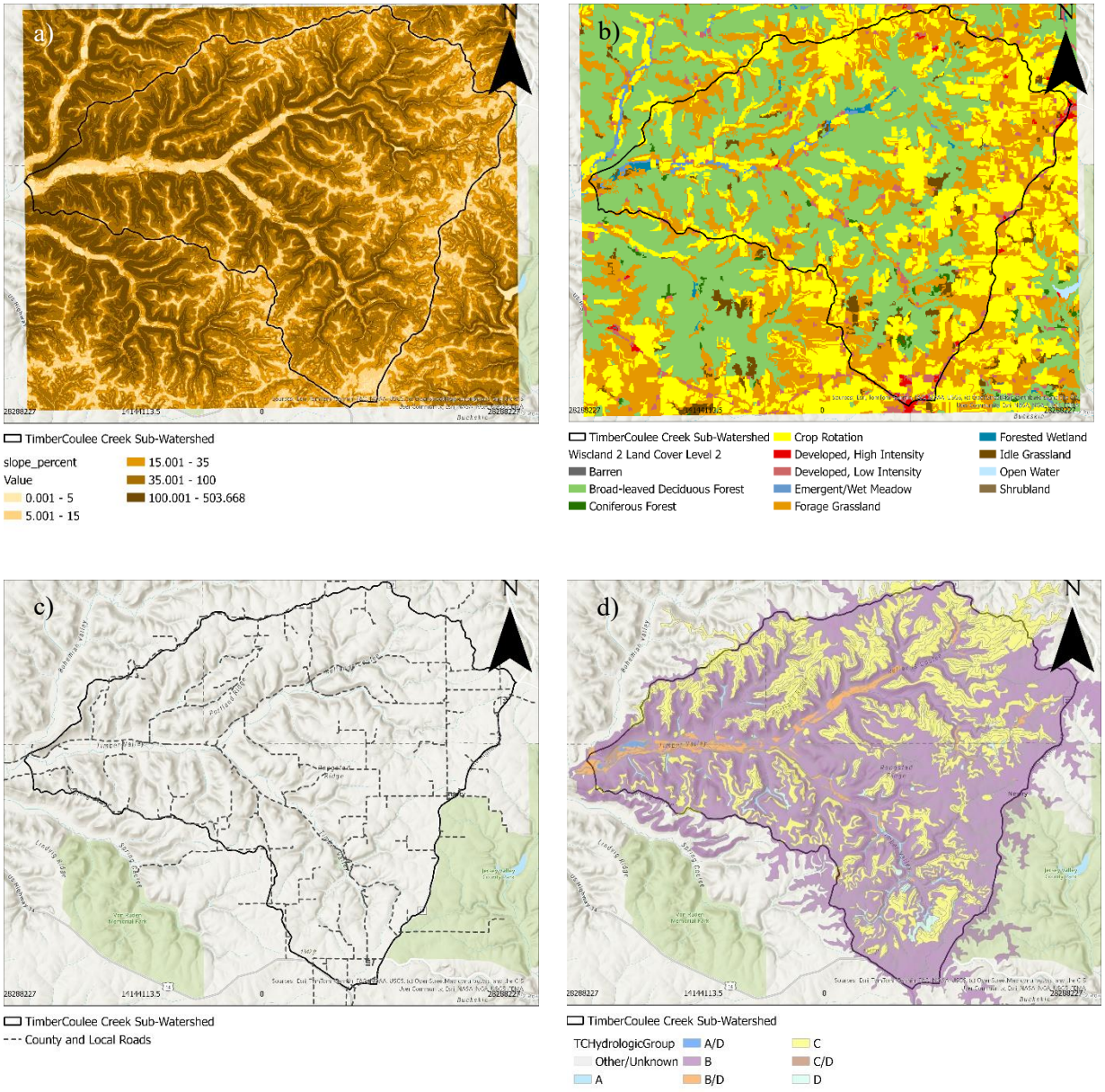


Figure 4: Variables used for Site Suitability Analysis a) Slope, b) Land Cover, c) County and Local Roads, d) Soil HSG

All the variables were then calculated and factored into a ranking system, where rank '1' had the least priority, and rank 5 had the highest priority to combat against flooding. After the reclassification, the physical variables were overlaid using the 'Weighted Analysis Tool' to produce an overall physical suitability map, identifying landscapes that have a higher likelihood of reducing flooding if converted to BMPs. Land Cover was given a 40% weight because this variable has the strongest influence on what land cover needs to be converted. Slope and Soil HSG Raster was given an equal ranking of 25%, and proximity to roads was given a ranking of 10%.

3.0 Results and Discussion

3.1 Economic Analysis

The economic risk analysis illustrates a direct relationship between the storm magnitude and capital risk. The overall economic value of the parcels across Vernon, La Crosse, and Monroe counties for different return-period storm events is provided in Table 4 below. Table 4 demonstrates that even a frequent, low-magnitude event such as the 5-year 24-hour storm can pose a substantial threat to the local economy, with over $15 million in assets currently affected in the inundation zones. As the storm magnitude increases, the number of affected parcels increases from 182 (5Yr 24Hr) to 203 (500Yr 24Hr).

Table 4: Overall Economic Exposure for the 3 counties for multiple storm events

Storm Event	**No. of Affected Parcels**	**Land Value ($)**	**Improvements Value ($)**	**Total Value ($)**
5Yr 24Hr	182	4,695,700	10,709,600	15,405,300
50Yr 24Hr	194	4,104,100	11,091,300	15,907,300
100Yr 24Hr	196	4,842,000	11,298,000	16,140,000
500Yr 24Hr	203	4,945,500	11,796,700	16,742,200

Beyond the property data, the analysis identifies a recurring liability for public infrastructure. Following the DOT's bridge replacement cost methodology, the average cost to replace a structure (Transportation 2025) in Vernon County in General is $367,521.

The economic risk summarized in Section 2.1 is visualized for the four modeled return-period storm events in Figure 5 (a-d). These maps provide local planners and emergency managers with precise geographic visualization, showing exactly which parcels are within the flood inundation boundaries for the "Dam Decommissioned" scenario.

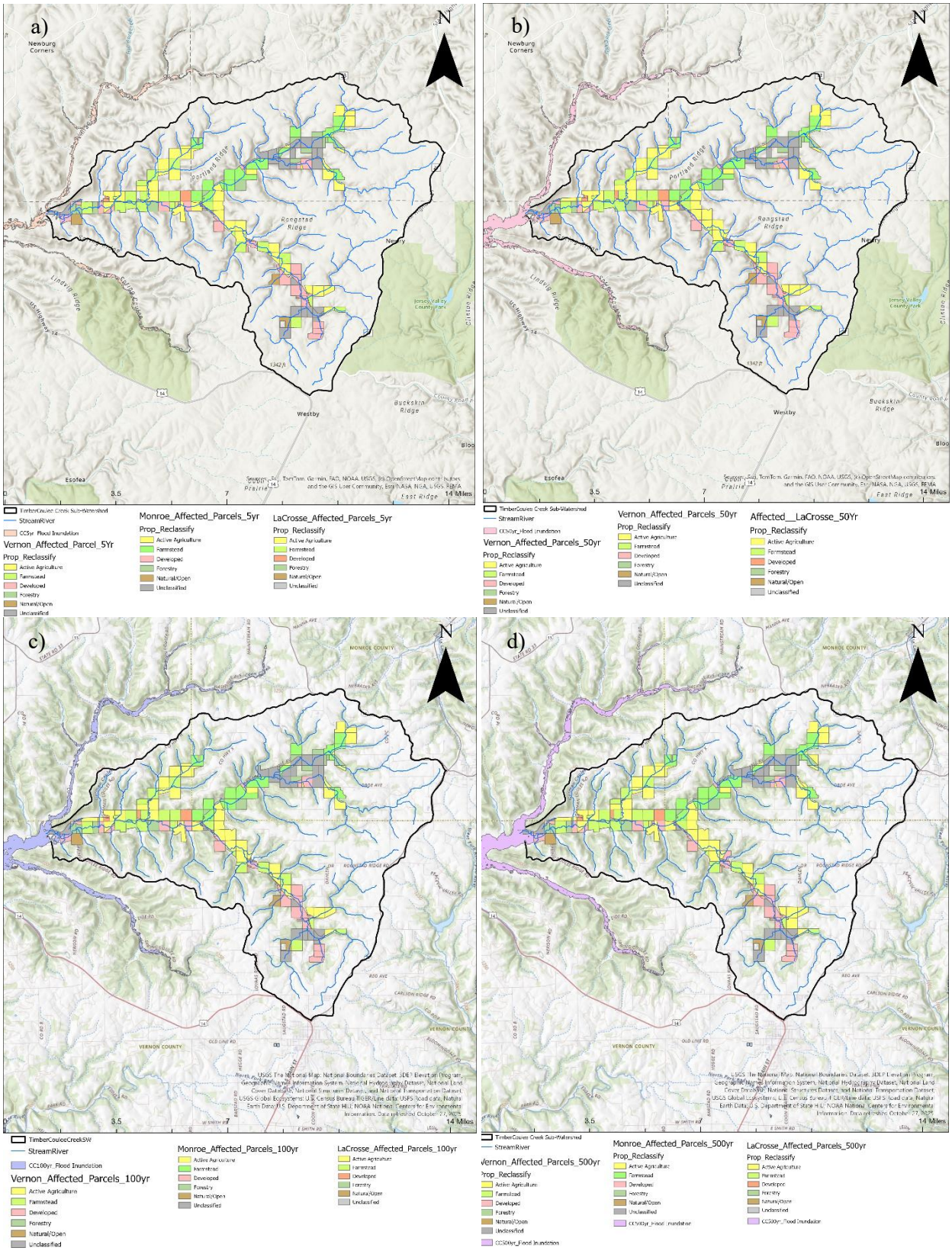


Figure 5: Shows the parcels affected by a) 5-Year b) 50-Year c) 100-Year d)500-Year Storms

3.2 Site Suitability Analysis

After carrying out the Multi-Weighted Analysis, the analysis successfully localized the hotspots for hydrologic mitigation. The resulting map (Figure 6) reveals high-priority sites concentrated around the eastern areas of the sub-watershed. These areas, represented by the 'High' (marked in light green) and the 'highest' (marked in yellow) priority zones, are optimal candidates for conversion from row crops to native prairie strips and perennial grass.

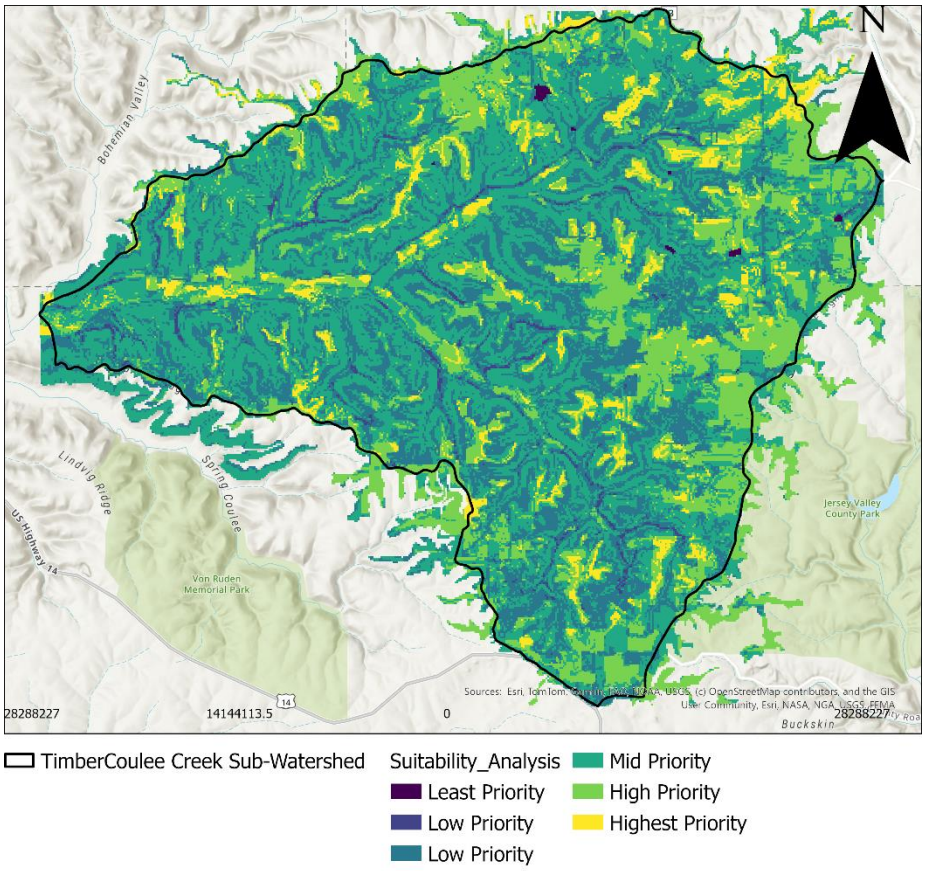


Figure 6: Suitability Analysis Check for BMPs in general.

From the figure, the majority of the high suitability sites have been identified in the uplands (northeastern) areas, which are directly positioned above the parcel data affected by the major storm events. Implementation of BMPs in these zones provides a good protective benefit to the properties within the inundation boundary.

3.3 Discussion

3.3.1 Socio-Emotional Effects

The true impact of flooding in the sub-watershed extends far beyond the assessed property values. Flooding takes a profound mental and emotional toll on residents that persists long after the water recedes (Grewal et al. 2022). Residents have reported lasting anxiety regarding personal safety, particularly during heavy rainfall at night. Repetitive flooding leads to emotional exhaustion and fatigue, where the burden of constant cleanup and recovery becomes unsustainable for some households (Grewal et al. 2022).

Now, while the region benefits from strong volunteerism during the time of crisis, the nature of flooding has fractured community understanding. A significant disconnect exists between valley residents, who frequently flood, and ridgetop residents, who do not. Flood victims often feel misunderstood and isolated, noting that neighbors outside the floodplain have no idea of the impact the floods had made. The Coon Creek watershed has a long agricultural history, with many properties serving as multi-generational homes. Flooding also directly threatens this heritage, causing profound emotional distress when residents are forced to repeatedly rebuild or abandon homes integral to their family history(Grewal et al. 2022).

3.3.2 Data Limitations

While the methodology provides a robust baseline for planning, several data limitations influence the precision of the results. The reclassification of the combination codes into broader categories introduces a degree of simplification. For example, a parcel coded as 1,4,5 may have a different risk profile and economic value composition than a parcel coded as 1,6,5M. Grouping both codes under ‘Developed’ (if residential is dominant) or ‘Farmstead’ (if Agricultural/Forest is dominant) requires more careful judgment.

It is important to note that summing land value and improvement values for all parcels within the flood zone provides an estimate of the total value at risk, that is, the maximum potential economic exposure. This does not necessarily mean the expected damage from a given storm event. Actual damage will depend on the depth, duration, and velocity of inundation, as well as the vulnerability of structures and properties

The suitability analysis is constrained by the availability of datasets for selected variables. Future iterations would benefit from finer-scale data on water table depth and more mapping of impervious surfaces.

3.3.3 Jurisdiction County Lines Issues

A primary barrier to implementing the distributed BMPs identified in Goal 2 is the presence of county lines within the watershed. This jurisdictional boundary creates some issues:

- Ridgeland owners in the uplands often do not see the direct impact of how their land-use decisions (converting row crops to BMPs) could help/affect the residents in the valley below (Grewal et al. 2022).
- In Wisconsin, common cost-share programs often require counties to supply up to 70% of the funding to compel a landowner to adopt a conservation practice (Grewal et al. 2022). If an upstream farmer lives in Monroe County, but the downstream valley being flooded

is in Vernon County, it is politically and economically difficult for Monroe County to justify spending its limited tax dollars to support a farmer whose actions primarily benefit the residents of a neighboring county

- Coordination and communication between the three counties at a watershed level has yet to be fully established (Grewal et al. 2022). Additionally, small municipalities in the Coon Creek watershed often lack the staff, funding, and technical expertise to navigate complex federal grant processes or coordinate cross-border non-structural mitigation plans (Grewal et al. 2022).

While the socio-emotional burdens and jurisdictional hurdles identified in the baseline research remain significant challenges, coordination efforts have evolved by 2026. The rise of Coon Creek Community Watershed Council (CCCWC), which has become a functional bridge between the three counties. By employing a dedicated watershed coordinator and securing multiple grants from the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) and The Nature Conservancy (CCCWC 2025). Further, data limitations are being mitigated by a technical network of 24 real-time flood-monitoring stations established by Monroe County in late 2025. This system provides live-stream-level data through the National Water Prediction Service, enabling watershed-wide transparency in terms of data (County 2026). These advancements show that while the emotional trauma of the 2018 event still persists, the institutional capacity for collective action is now established to mitigate severe flood risks across the sub-watershed.

4.0 Conclusion

The project seeks to provide a framework to address the critical safety gap resulting from the decommissioning of the PL-566 earthen dam network in the Timber Coulee sub-watershed. By bridging the gap between hydraulic engineering and regional land-use planning, the findings offer a path towards restored hydrologic function through nature-based interventions. The methodology helped clarify that, without structural protection, flooding must be managed as a high-frequency, chronic challenge rather than as one reserved for rare, extreme events. To mitigate this challenge, the suitability analysis identifies the northeastern landscapes as primary hotspots where row-crop agriculture on moderate-to-steep slopes with low-infiltration soils offers the most effective opportunity to install BMPs.

The interpretation of this data suggests that, without structural dam control, the 100-year floodplain is no longer the boundary of concern for local safety. Additionally, the effectiveness of nature-based solutions in the hotspots is contingent upon overcoming the “Upstream-Downstream” disconnect. While the real-time monitoring in Monroe County and the establishment of the CCCWC demonstrate a shift towards coordinated action, further policy integration is required to ensure long-term resilience.

While this framework establishes a baseline for economic exposure, future iterations of the methodology can achieve greater precision by refining the economic exposure process. Currently, the methodology calculates the maximum potential exposure at the parcel level. To transition from broad to exact vulnerability, future work could split the parcel data based on the exact area intersected by the inundation zones. Additionally, incorporating a building footprint

would allow planners to isolate the structural improvement values from raw land values, confirming which physical structures fall within the inundation zones.

Beyond the immediate scope of Timber Coulee, this work provides a replicable framework for watersheds across Wisconsin, the broader Driftless area, and any rural-agricultural region transitioning away from aging flood-control infrastructure. Across Wisconsin alone, several PL-566 dams built under the same federal legislation are approaching or have surpassed their design lives. So, the question facing the counties within Coon Creek today will become questions facing many communities tomorrow. Planners can immediately use the data and maps provided in this report to create the watershed mitigation plan, integrating the economic risk figures. For the site suitability analysis, all datasets used are publicly available and regularly updated statewide. On the institutional side, the upstream-downstream disconnect is not unique to Vernon, Monroe, and La Crosse counties; it is an issue faced by most multi-jurisdictional watersheds in Wisconsin and beyond, where the spatial logic of these watersheds does not align with the political boundaries of cost-share programs. This project contributes to an evolving conversation about the role of regional land-use planners in flood risk management. As federal investment shifts from large infrastructure to more locally managed, nature-based solutions, planners must develop skills and understanding across different disciplines such as hydrology, ecological restoration, and more. The methodology presented here demonstrates that spatial planning tools can translate complex data into actionable, area-specific visuals that local governments can use to make necessary decisions. This report serves as a model for how planning practice can lead to community adaptation in an era defined by aging infrastructure, tightening federal budgets, and increasing precipitation events.

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6.0 Appendix: Parcel Reclassification Codes

Code used for the reclassification of Propclass for properties for Vernon COUNTY parcel

```
Prop_Reclassify = Reclassify(!PROPCLASS!)
def reclassify(prop):
    # Convert to string and handle zeros or blank spaces
    val = str(prop).strip() if prop and str(prop).strip() != '0' else ""

    # 1. Handle "Unclassified" first for any blank entries
    if val == "" or val == "None":
        return "Unclassified"

    # 2. Priority: Residential, Commercial, Manufacturing (Codes 1, 2, 3)
    if any(x in val for x in ['1', '2', '3']):
        return "Developed"

    # 3. Priority: Farmstead (Code 7)
    elif '7' in val:
        return "Farmstead"

    # 4. Priority: Productive Farmland (Codes 4 or 5M)
    elif '4' in val or '5M' in val:
        return "Active Agriculture"

    # 5. Priority: Managed Forest (Code 6)
    elif '6' in val:
        return "Forestry"
    # 6. Priority: Natural/Undeveloped (Code 5)
    elif '5' in val:
        return "Natural/Open"
    # Catch-all for anything else
    else:
        return "Unclassified"
```

Code used for the reclassification of HSG for ranking from 0-5

```
Soil_Rank =   Reclassify(!HYDGRPDCD!)

def Reclassify(hsg):
    if hsg is None:
        return 0
    hsg = str(hsg).strip().upper()

    if hsg == 'A':
        return 1
    elif hsg == 'B':
        return 2
    elif hsg == 'C':
        return 4
    # Groups D and dual groups (A/D, B/D, C/D) are high priority
    elif hsg in ['D', 'A/D', 'B/D', 'C/D']:
        return 5
    else:
        return 0
```