Climate Resilience

DEPARTMENT OF TRANSPORTATION

MnDOT estimates $30-33 billion in available funding for the state highway system over the next 20 years. A minimum of $23.5 billion is needed to manage highest risks and meet legal requirements. This folio provides information on potential Climate Resilience investment strategies, funding levels, and outcomes for the estimated $7-9 billion of remaining investment.

1 | WHAT IS CLIMATE RESILIENCE?

As the climate continues to warm, increased extreme weather and other unpredictable events will put additional strain on Minnesota's transportation infrastructure. The Climate Resilience investment category improves state highway infrastructure to withstand these increasingly common extreme events. Without proactive investments to transportation infrastructure, the risk of local or system-wide failures will grow.

This investment category also adapts the state's transportation system to put less stress on the environment by reestablishing native habitats and mitigating impacts from the transportation system.

The Climate Resilience investment category also adapts the state's transportation system to put less stress on the environment by reestablishing native habitats and mitigating impacts from the transportation system. The investment category also includes planting more native and climate appropriate vegetation along roadsides. This helps with stormwater management, provides more shade and also increases the appeal and comfort of walking and bicycling.

GOAL AND OBJECTIVES OF INVESTMENT

The first goal of the investment category is to reduce the vulnerability and increase the reliability of the transportation system by reducing climate-related risks. The second goal is to reduce the impact of the transportation system on the state's natural ecosystem and to support sustainable and healthy communities through transportation investments which promote long term economic, social and environmental wellbeing.

The objectives of the investment category are, to reduce road damage and limit road closures and detours due to extreme weather events; prevent or reduce damage from the transportation system to the natural environment; and better understand system and infrastructure risks from climate change.

TYPES OF IMPROVEMENTS

Climate resilience investments would focus on rebuilding and enhancing the state's transportation infrastructure to be prepared for a changing climate and limit impacts of the highway system on the natural environment. These investments include a flood mitigation program, a climate resilient infrastructure pilot program and a snow fencing program.

Investments that mitigate environmental impacts of the transportation system include a green asset installation program which would range from planting more native plantings and replacing trees cut down during project construction to implementing the climate change mitigation strategy outlined in the Statewide Pedestrian Plan.

HOW DOES MNDOT CURRENTLY SELECT CLIMATE RESILIENCE IMPROVEMENTS?

Climate resilience improvements do happen occasionally and are generally completed as part of regular MnDOT projects to address identified flooding issues. In addition, other state agencies like the Minnesota Pollution Control Agency lead electric vehicle charging station implementation throughout the state. MnDOT is also investing in climate resilience in other ways by electrifying its light duty vehicle fleet and utilizing more renewable sources of energy for its facilities.

The recently passed federal transportation infrastructure bill, Infrastructure Investment and Jobs Act (IIJA) created the PROTECT Program to invest in climate resilience improvements. MnDOT, with local transportation partners, are discussing how this program will be implemented.

2 | WHY IS INVESTING IN CLIMATE RESILIENCE IMPORTANT?

The Climate Resilience investment category will help MnDOT meet two state transportation goals, "to reduce greenhouse gas emissions from the state's transportation sector" and "to accomplish these goals with minimal impact on the environment."

Environmental trends have shown that the state's transportation system has put extreme stress on the natural environment and been a major contributor to the degradation of Minnesota's lakes, stream, forests, grasslands, and the air we breathe. Major concentrations of motor vehicles have been shown to lead to many negative health outcomes for humans who live next to high volume roadways. Additionally, highways and freeways contribute to fragmenting habitat by cutting off natural roaming area for native animal species, higher concentrations of pollutants found in lakes and rivers like high salt concentrations, low density residential living patterns which reduce natural wetlands, forests and grasslands, and are the direct cause of high animal mortality from vehicle hits along rural highways.

If MnDOT does not begin efforts to decarbonize our transportation system, the transportation sector will play an increasingly larger role in the warming of the climate and contribute to increasing extreme weather patterns. Moreover, if MnDOT does not begin efforts to prepare its system for the effects of climate change, the state's transportation system will be increasingly vulnerable to local and systemwide disruptions due to extreme weather and other effects of climate change.

HOW DOES CLIMATE RESILIENCE SUPPORT EQUITABLE OUTCOMES?

Investing in programs which will reduce motor vehicle emissions and expand vegetation on the state right-of-way in urban areas will help ease burdens which disproportionately impact low income and communities of color. Building climate resilience into the state highway system will lead to reducing future inequalities for rural areas which have historically seen more drastic interruptions to daily life from extreme weather events like flooding or slope failures due to more limited network connections.

HOW DOES MNDOT MEASURE PERFORMANCE, CONDITION, OR OUTCOMES?

MnDOT produces an annual sustainability report which tracks greenhouse gas emissions from the transportation sector, electric vehicle adoption and native seeding and planting by MnDOT among other measures.

Performance outcomes for climate resilient infrastructure investments will focus on the number of projects MnDOT completes or infrastructure installed for each investment strategy.

3 | OPTIONS FOR INVESTING OVER THE NEXT 20 YEARS

Green Assets

The **minimum level** MnDOT would invest in green assets is **$41 million**. This would ensure landscaping projects as part of construction projects meet MnDOT targets for native plantings and seeding, 75% of acres seeded with native seeding and 80% of native plants planted in rural areas and 90% in urban areas.

LEVEL 1

Outcomes:
Meet MnDOT native seeding and planting targets

Replace majority of trees removed for construction projects.

LEVEL 2

Outcomes:
Meet MnDOT native seeding and planting targets

300 to 400 miles with improved green assets

LEVEL 3

Outcomes:
Meet MnDOT native seeding and planting targets

475 miles with improved green assets

Flood Mitigation Program

The **minimum level** MnDOT would invest in flood mitigation efforts to address identified existing flooding issues is **$26 million**. This investment level will fund two programmed projects.

LEVEL 1

Outcomes:
10 to 12 reactive flood mitigation projects implemented

LEVEL 2

Outcomes:
20 to 25 reactive flood mitigation projects implemented

$X.X Total cost of investment level

Portion of remaining $4 billion investment for level

Remaining investment available for other priorities

PROTECT Program/Proactive Climate Resilience Improvements

The **minimum level** MnDOT would invest in the PROTECT program is, the amount funded by the federal bill through 2026. This investment would address proactive infrastructure needs related to extreme weather events and limiting impacts of the highway system on the natural environment. Five to 10 projects would be implemented per year at this level.

LEVEL 1

Outcomes:
Implement 10 to 20 projects per year

PROTECT program assumed to continue for 20 years at half the rate

LEVEL 2

Outcomes:
Implement 10 to 20 projects per year

Upgrade 7,600 culverts and 172 large culverts

LEVEL 3

Outcomes:
Implement 10 to 20 projects per year

Upgrade 15,500 culverts and 556 large culverts

Snow Fence Program

The **minimum level** MnDOT would invest in installing snow fences along the state highway network is **$55 million**. This minimum level of investment would continue to install snow fences at a reduced rate leading to 70 miles of snow fences installed and only addressing problem wind trap sites as dictated by pavement needs.

LEVEL 1

Outcomes:
75 miles of new snow fence

Identified wind trap sites would be addessed as pavement projects dictate

LEVEL 2

Outcomes:
125 miles of new snow fence

50% of identified wind trap sites addressed

LEVEL 3

Outcomes:
250 miles of new snow fence

100% of identified wind trap sites addressed

4 | CLIMATE RESILIENCE RISKS

WHAT ARE THE RISKS OF UNDERINVESTING?

As a part of developing performance levels for various programs and strategies, MnDOT also identified the risk to underinvesting in rest areas. Four risks were identified as low to high risk. The risks and their impacts are identified below.

HIGH RISKS

Risk: More frequent service interruptions and road closures
Impact: Compromise the efficiency of the transportation system, and negatively impact access, economic viability and quality of life. Increase costs to maintain and repair infrastructure.

Risk: Local economies and communities could see increased vulnerability due to increases in extreme weather events
Impact: Local communities could experience more frequent and longer economic damages from extreme weather events

Risk: Increased extreme weather events (flash flooding, snow drifts, etc) cause dangerous conditions on roadways
Impact: Unsafe driving conditions resulting in increased crashes

Risk: MnDOT may not maximize the health of Minnesota's people, environment, and economy
Impact: The natural environment degrades, inequities perpetuate, and the economic prospects of communities, businesses and the state diminish

WHAT LEVELS OF INVESTMENT REDUCES THE RISKS' SEVERITY?

As MnDOT provides additional investment in Climate Resilience, the lower the likelihood of the risk occurring. To the right is a table showing how investment effects the likelihood and risk levels.

RISK STATEMENT	SHIFT FROM HIGH TO MEDIUM RISK	SHIFT FROM MEDIUM TO LOW RISK
More frequent service interruptions and road closures	Investment level 2	Investment level 3
Local economies and communities could see increased vulnerability due to increases in extreme weather events	Investment level 2	Investment level 3
Increased extreme weather events (flash flooding, snow drifts, etc) cause dangerous conditions on roadways	Investment level 1	Investment level 3
MnDOT may not maximize the health of Minnesota's people, environment, and economy	Investment level 2	Investment level 3

To find out more details about climate resilience planning and projects, go to:

Climate Resilience Planning
www.dot.state.mn.us/sustainability/climate-resilience.html

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