Item 7 Climate Adaptation and Resilience Guidance

The recommendations provided below will enable proposers to document, in the Environmental Assessment Worksheet (EAW) form, how to make connections between local climate trends and project components. For additional guidance, refer to the Minnesota Environmental Quality Board (EQB) EAW guidance for climate and adaptation and resilience.

7a. Describe the climate variables in the location of the project and how climate change is anticipated to affect that location during the life of the project.

This section addresses the relationship of how climate change may impact the project **location** (at the county level) over the project lifetime. It focuses on evaluating both historical trends and future projections for the following climate variables listed in column 1 of Table 1, and as described by the Minnesota Department of Natural Resources.

There are three necessary parts to address Item 7a:

- Describe **historical climate trends** (1980-present) associated with the climate variables. This data should be entered in the second column of Table 1.
- Describe **future climate projections** (present- lifetime) associated with the climate variables and include this information in the second column of Table 1 as well. Identify the range (ex. mid-century, late-century) that best closely resembles the lifetime of the project.
- Describe how the projected changes in climate could affect the **location** of the project. These changes may introduce either stressors or benefits to the project location. Enter this in column 3.

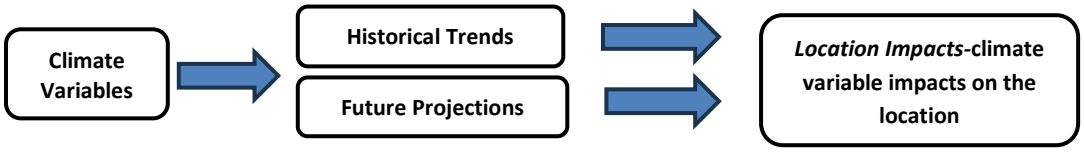
Table 1. Summary of climate variables impact on the project location (*examples shown in italics*).

Climate variables	Trends and projections	Location impact
Average annual temperature increasing		*e.g., Increased air conditioning demands may place stress on the electrical grid and building systems.*
Average precipitation increasing		*e.g., Increased run-off and erosion may affect soil/site stability.*
Cold weather warming (winter warming-Dec., Jan., Feb.)		*e.g., Decreased snow cover may affect vegetation cover that leads to increased soil erosion.*
Heavier, more damaging rains (occurring on an hourly/daily scale)		*e.g., Vegetation changes, stressors, more exposed soils in winter.*
Risk of heat waves increasing (exceeding 90F, 95F, 100F)		*e.g., Construction materials may break down quicker in high heat conditions.*
Risk of drought increasing		*e.g., Limitations on groundwater, surface water for use in dust reduction.*

The following tools are available to assist in determining the historical trends and future projections. More information on these tools can be found in Minnesota EQB EAW guidance for climate adaptation and resilience.

- Minnesota Climate Explorer (DNR)
- MN CliMAT - Climate Mapping and Analysis Tool (University of MN)
- CMRA - Climate Mapping for Resilience and Adaptation (NOAA)

Figure 1. Flow chart of data under 7a.



7b. Describe how the project's proposed activities and design will interact with the identified climate variables. Describe proposed adaptations to address the project effects identified.

This section addresses the relationship of the climate variables and specific aspects of the project itself (project components). This includes identifying any possible risks of long-term impacts and considering how conditions may change through the lifetime of the project.

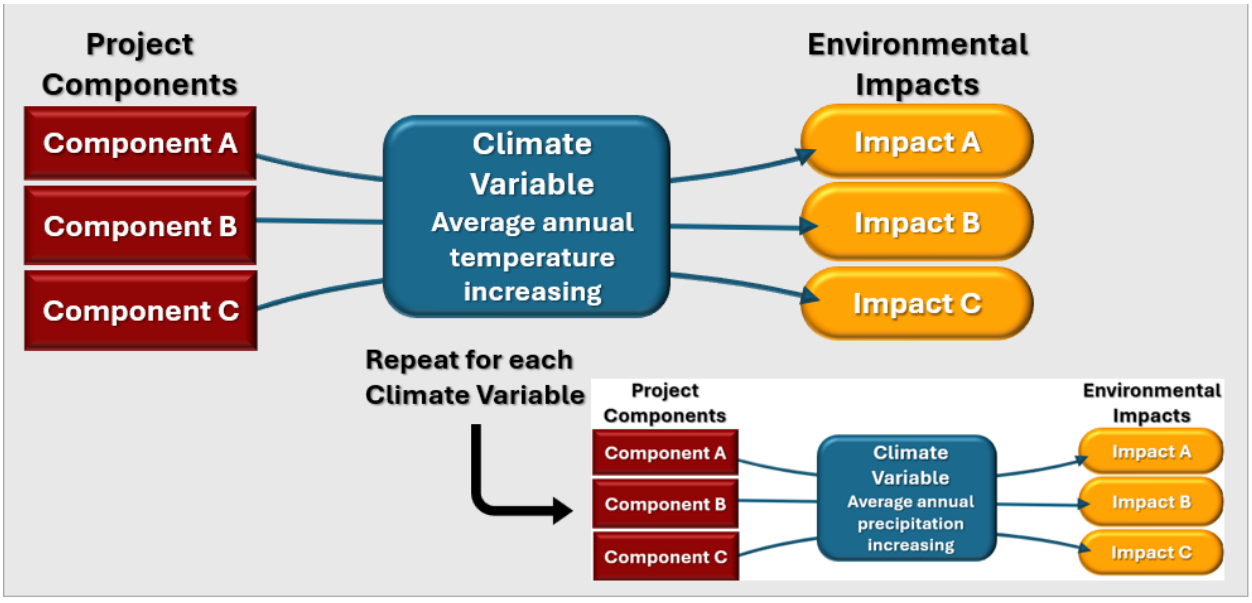
There are three necessary parts to address Item 7b:

- Identify 3 project components, either part of the design or an activity (see generic examples below in Table 2), and list them in column 3 of Table 3. These project components will be **repeated** (see Figure 2.) for the six climate variables listed in Table 1. Project components should be reflective of the project.
- Describe what the potential environmental effects are of the project component related to the climate variables in column 2 (i.e. How will an increase in annual precipitation affect a project that is replacing grasslands with impervious surfaces?).
- Describe proposed adaptation strategies that could be done to minimize these environmental effects. It is not required that the proposed adaptations strategies occur but demonstrates the project proposer has reflected on the possibilities.

Table 2. Generic examples of project components.

Project design (physical layout)	Project processes (activities)
• More, less, or altered buildings	• More, less, or altered hazardous waste
• More, less, or altered impervious surfaces	• More, less, or altered products, by-products, waste
• More, less, or altered habitat/ green space	• More, less, or altered transportation to and from the site

Figure 2: Project component assessment.



Note to Proposer: Once completed, specific to the proposed project, insert Table 3 in the EAW under 7b on EQB's EAW Form. Please note MPCA's suggested table for Item 7b varies from the table provided in the EAW Form. The remaining resource categories (land use, water resources, HazMat, and fish/wildlife/plants/sensitive resources) shall be addressed in their respective item numbers.

Table 3: Interaction of proposed activities with each climate trend and projection listed in 7a (*examples are shown in italics*).

Resource category	Climate variables	Project components	Potential environmental effects • Identify climate change risks & vulnerabilities. • Identify long-term impacts that climate conditions pose to proposed activities.	Adaptation strategies (with applicable timeframe – construction to end of expected lifespan)
Project design	**Average annual temperature increasing**	*Increased impervious surfaces.*	*Environmental impact not foreseen with interaction between impervious surfaces and average temperature increasing.*	*Decrease impervious surfaces where possible.*
		Increased constructed surfaces, such as dark roofing and asphalt.	*Increased heat absorption during the day that is radiated at night, which increases heat island effect and amplifies warming temperatures of climate change.*	*Use of light-colored building materials and surfaces to reduce heat absorption. Regular maintenance and updates to infrastructures, as needed, for life of project.*
		Increased quantity of concrete and building construction materials.	*Infrastructure more vulnerable to damage and deterioration from elevated temperatures.*	*Use of construction materials that are resilient to increasing temperatures for the life of the project.*
	Average annual precipitation increasing	*Repeat project components for each climate trend and projection↓*	*Discuss potential environmental effects with each project component↓*	*List adaptation strategies for each project component↓*
	Cold weather warming			
	Heavier, more damaging rains			
	Risk of heat waves increasing			

Resource category	Climate variables	Project components	Potential environmental effects • Identify climate change risks & vulnerabilities. • Identify long-term impacts that climate conditions pose to proposed activities.	Adaptation strategies (with applicable timeframe – construction to end of expected lifespan)
	Risk of drought increasing			
Land Use	Address in Item 10			
Water Resources	Address in Item 12			
Contamination/ Hazardous Materials/ Wastes	Address in Item 13			
Fish, wildlife, plant communities, and sensitive ecological resources (rare features)	Address in Item 14			

Resource category: land use

In EAW Item 10 Land Use, discuss the compatibility of the project activities with the current land use, proposed land use, and zoning, related to the projected climate changes described in EAW Item 7b.

- **Current and Proposed Land Use:** Describe the existing and proposed human use of the land, representing the economic and cultural activities (e.g., agricultural, residential, industrial, mining, and recreational uses).
- **Planned Land Use:** As determined by Comprehensive Plan, Watershed Plan, and any other applicable plan for land use, water, or resource management by a local, regional, state, or federal agency.
- **Zoning:** As determined by special district overlay such as shoreland or floodplain, and the local zoning designation.

Actions or features to consider that may amplify or interact with how climate change is anticipated to affect land use include reduction or loss in tree cover, increased heat and longer growing seasons, cropland productivity is increased/reduced, prolonged groundwater rise, and prolonged drought.

Definitions

Climate Adaptation: Taking action to prepare for and adjust to both the **current and projected** impacts of climate change. This includes human interventions to assist the adjustment of natural and built systems.

Climate Projection: Predictions of future climate conditions based on mathematical models. Projections consider different scenarios, such as greenhouse gas emissions, land use changes, and other factors.

Climate Resiliency: The capacity of social, economic, and environmental ecosystems to cope with a hazardous events, trends or disturbances resulting from climate change.

Climate Trend: The observed change in climate variables over a specific period, based on historical data and provide insights into how our climate has evolved.

Further reading

For more information related to these topics visit:

- Climate Action Framework | Our Minnesota Climate
- Greenhouse gas emissions in Minnesota 2005-2022 Legislative Report
- Intergovernmental Panel on Climate Change Assessment Report (IPCC 6)
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- National Oceanic and Atmospheric Administration (NOAA) Climate.gov