

ID	Topic	Comment	Response
2A	Overall	<p>The Hazard Mitigation Plan provides valuable guidance to many borough activities by identifying critical hazards and ways that these hazards can be mitigated. The current draft plan is a revision of the 2014 plan. It alters the scope of hazards considered by adding consideration of cryosphere hazards and ground failure hazards and by deleting consideration of volcanic ash as a hazard. I applaud the plan's broad scope and inclusion of multiple jurisdictions. In general, it is very clearly written and covers the scope of issues that it is tasked to address.</p> <p>However, it pays relatively little attention to climate change, so that is the main issue that I address in these comments. These comments address only sections 1-8, I have not reviewed sections 9-11.</p>	<p>Thank you for your comment. Each edition of a mitigation plan is a revision of the previous version. We recognize that a warming climate has increased all hazard risks within the FNSB. A warming climate was considered while drafting each hazard's Probability of Future Events profile (Chapter 5-10).</p>
3A	Overall	<p>4.5 Estimate Losses (no page number; general comment) Please address in the next draft: There is no listing here for the impact of invasive species on the FNSB. I understand that this may be difficult to quantify/qualify prior to the actual introduction of such species, but there are existing mitigation planning strategies that are worth considering at this stage, regardless of the potential invasive species. Invasive species are already a significant issue in other Alaskan communities. For example, the infestation of the spruce beetle in the Kenai peninsula has decimated the spruce tree population; a reality with extreme implications for local economies, wildfire susceptibility, environmental and human health, etc. There are projections for the FNSB that outline which non-native species may be our next invasive candidate. These include plant, animal, and fungal species, each with varying levels of projected local impact.</p>	<p>Thank you for the comment. We will add potential of invasive species to the future hazard impacts of Wildland Fire during the next HMP update.</p>

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3D	Overall	<p>As a general comment, it would be nice to see the borough pursue stronger mitigation planning relationships with some of local Fairbanks and state agencies, organizations, research groups, UA and associated programs, etc., specifically those with experience in identifying and mitigating hazards listed. The depth of insight provided by this mitigation plan draft, and the breadth of available strategies, could be greatly strengthened through such partnerships, and should be pursued actively if this mitigation plan is to effectively serve the borough for the next decade and beyond. Please consider reaching out to more potential partners, for a formal review of this document at the very least.</p>	<p>Thank you for your comment. We did consult with many of the organizations you mentioned to other this plan. We will work to increase our partnerships with subject matter experts during the next update.</p>
3E	Overall	<p>11.2.1 Local Resources (pg. Please consider reaching out to the following groups for a formal review of this plan and/or ongoing mitigation plan support:</p> <ul style="list-style-type: none"> -Fairbanks Climate Action Coalition -Cold Climate Housing Research Center -Alaska Center for Energy and Power -UAF (Snow, Ice, & Permafrost Group, Atmospheric Sciences group, Seismic and Volcanic monitoring group, One Health program, etc.) 	<p>Thank you for identifying additional Subject Matter Experts. for the next plan update.</p>
3F	Overall	<p>11.2.2 State Resources Please consider reaching out to the following groups for a formal review of this plan and/or ongoing mitigation plan support:</p> <ul style="list-style-type: none"> -Alaska Native Tribal Health Consortium -Alaska Department of Fish & Game -Alaska Department of Community and Regional Affairs 	<p>Thank you for identifying potential partners for the next plan update.</p>
4A	Overall	<p>Thank you for this opportunity to comment on the Draft Hazard Mitigation Plan. Overall I find it to be comprehensive, accessible and an impressive compilation from a very wide range of disciplines.</p>	<p>Thank you for your comment.</p>

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4B	Overall	I like Table 4.1, the key table estimating the likelihood of future disaster events, and I agree with the risk levels chosen.	Thank you for your comment
4D	Overall	There are two important discussions that I believe are missing in this plan. The first concerns a new class of risks from the _combination_ of separate increasing, climate change-related risks. These combinations might be simultaneous, e.g., a major flood during an extreme fire season (which sounds paradoxical, but could happen), or sequential (major Loess erosion and road damage during a wet winter, followed by a bad fire season). While such a consideration may not lead to new planning measures, the increasing likelihood of such ‘perfect storms’ should be acknowledged in the Plan.	Thank you for your comment. The next update of the HMP will include a section on combined risks. We acknowledge that the most natural hazards occurrences can make others worse.
4E	Overall	Secondly, the new Goals in Table 11-8, and indeed the rest of the Plan, omit any mention of a food crisis in FNSB caused by an extended interruption in the long supply chain to the Lower 48. The matter was present in the 2014 Plan (Table 11-5, item M-9), but seems to have been dropped in this revision. While some of the potential causes of such a disruption might be considered low risk (war, severe economic disruption, major Anchorage earthquake), the overall likelihood will surely increase as climate change effects become more pronounced; for example, an increasing likelihood of a major disruption to the Anchorage supply route by flood-related road and rail failure.	Thank you for your comment. This plan is limited to addressing natural hazards occurring within the FNSB; it does not address supply chain interruptions. We concur that any of the natural hazards we identified can occur at the same time and/or complicate any other hazard type (natural, technological, deliberate). MH1.5 encourages nonstructural mitigation projects.
4G	Overall	Overall, this is an impressive document and I thank all those who have contributed.	Thank you for your comments.

ID	Topic	Comment	Response
1A	Climate change	<p>Climate change is creating more severe and frequent disasters from flash floods to hail events to wildfires. Wildfires are triggering permafrost thaw. More wildfires degrade more permafrost, the more permafrost is degraded the more they emit greenhouse gas emissions in a vicious feedback loop.</p> <p>Thawing permafrost on hillsides can trigger mudslides. The mitigation goals of this plan are correct to identify areas vulnerable to both wildfire and permafrost thaw - particularly where those areas overlap on hillsides. Homes should not be built in areas seriously vulnerable to either.</p>	<p>Thank you for your comment. We recognize that a warming climate has increased all hazard risks within the FNSB. A warming climate was considered while drafting each hazard's Probability of Future Events profile (Chapter 5-10). Thanks for acknowledging that the goals are correct.</p>
1D	Climate Change	<p>The borough, state of Alaska, and the United States must avoid, minimize, and mitigate greenhouse gas emissions. The borough needs to develop a climate action and adaptation plan and implement the strategies as quickly as possible. All borough plans should be reviewed to identify actions directly or indirectly tied to climate change and then prioritize them for immediate action.</p>	<p>Thank you for your comment. This topic is outside of the scope of this plan as identified by FEMA. It may be addressed in a future planning effort.</p>

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2C	Climate Change	<p>Section 3: Community Profile</p> <p>The section on renewable natural resources (agriculture and forestry) should mention the sensitivity of these sectors to climate change, both in terms of their health and productivity and potential for changes in area managed for these purposes. For example, as climate warms in Alaska and as drought becomes more frequent and intense in America's breadbasket, agriculture might become more prominent in the FNSB economy. There is no discussion of past or potential future changes in the natural resource sector.</p> <p>Impacts of climate change on transportation (airports, railroads, and roads) health care (air quality), and emergency services are likely to be important but are not considered by the current draft plan.</p> <p>I appreciate that the plan discusses installation of renewable energy infrastructure by GVEA as a way to mitigate climate change.</p>	<p>Noted. Infrastructure impacts are discussed in each hazard chapter's Probability of Future Impacts.</p>

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2D	Climate Change	<p>Section 4: Risk assessment and hazard identification Table 4.1, which summarizes hazard event probability, is an excellent start for deciding on priorities for considering changes in potential hazards. This table provides a good rationale for focusing on those risks and hazards that the HMP emphasizes. Although the plan considers future changes in various socio-economic factors, such as population of senior citizens, it does not consider impacts of changing climate, which could be particularly important for considering risks to life and property, health, and infrastructure. Even in discussing risks that are clearly impacted by changing climate (e.g., vulnerability to cryosphere hazard, ground subsidence, severe weather, flood risk or wildfire risk), no mention is made of climate change and the possibility that future risks may be greater than the past risks that are documented in the plan. Instead, these risks are presented as constant (e.g., (1 in 4 chance of flooding during a 30-year mortgage”). Projections of future risks have been made by faculty at the University of Alaska, but these are not included in this general section on risk assessment. These climate impacts are discussed to some degree with respect to profiles of each individual hazard.</p>	<p>These considerations are represented to the extent possible in each hazard chapter's Probability of Future Impacts.</p>

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2E	Climate Change	<p>Section 5: Cryosphere hazard profile</p> <p>This section clearly explains the link between climate change and cryosphere hazards, including discussion of recent climate change. Although this section does talk about likelihood of future climate change, it does not include projections of future changes. It may also under-estimate the impacts of these changes by stating that “Human-induced ground warming typically degrades permafrost much faster than natural degradation caused by warming climate.” This generalization ignores the fact that much more of FNSB is exposed to warming climate than is exposed to warm infrastructure. I would suggest that the spatial extent of changes in cryosphere hazards be addressed more thoroughly.</p>	<p>Thank you for comments. We are working with researchers from the AURA project, referred to in Section 2.7, to better quantify future risk from cryosphere impacts.</p>
2G	Climate Change	<p>Section 7: Flood hazard profile</p> <p>This section does an excellent job of explaining the importance of the Moose Creek Dam in reducing the future risk of flooding in downtown Fairbanks. It also points out that some rural neighborhoods (e.g., Salcha) are not protected by the dam and that low-income areas in South Fairbanks and areas east of Ft. Wainwright remain vulnerable to groundwater flooding. Despite the clear link between climate change and flooding, there is only one sentence about climate change: “UAF is predicting an increase in rainfall, which could impact the City of Fairbanks depending on where the storm hits.” In general, the report correctly reports that overall flood risk has been reduced more strongly flood mitigation projects than it has been increased by climate change.</p>	<p>Thank you for your comments. We will strengthen the section on potential future impacts during the next HMP update</p>

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3B	Climate Change	<p>4.4.1 Population - Social Vulnerability (pg. 78) Please address in the next draft:</p> <p>-In addition to the listed vulnerable social groups, it will be critical to consider the influx of vulnerable groups into the FNSB who have been displaced from neighboring communities due to climate change. This is occurring in other larger Alaskan hub cities, Bethel and Anchorage, for example. The main implications of acute and steady influxes of vulnerable groups into the borough are: affordable housing shortages/potential increases in house-lessness; access difficulty to economic and educational opportunities/potential increases in unemployment rates and educational social stratification; access difficulty to physical and mental health services; strain on local resources availability; etc. Kristalina Georgieva, the World Bank Chief Executive Officer, stated the importance of preempting these eventualities: "We have a small window now, before the effects of climate change deepen, to prepare the ground for this new reality. Steps cities take to cope with the upward trend of arrivals from rural areas and to improve opportunities for education, training and jobs will pay long-term dividends. It's also important to help people make good decisions about whether to stay where they are or move to new locations where they are less vulnerable."</p>	<p>Thank you for your comment. We will work to add additional vulnerable population groups during the next update.</p>

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2B	Climate change, Extreme Weather	<p>Section 2: Introduction</p> <p>Most of the hazards addressed by this plan are strongly influenced by weather and climate. However, there is no mention of climate change in the introduction. Brief discussion of climate change in the introduction would set the stage for assessment of future changes in the risks and consequences of each of the hazards discussed in the HMP (Hazard Mitigation Plan). I appreciate that the planning team includes subject matter experts who are knowledgeable about climate change. They have also cited references that provide information about climate change. It should therefore be feasible to incorporate climate- change information in the proposed HMP planning process. Five-year updates that are specified for the planning process should allow updates on climate impacts as new information becomes available. The AURA project that was initiated in 2020 in collaboration with the University of Alaska provides a model for ways that this new information could be gathered and incorporated into the planning process.</p>	<p>Thank you for your comment. Each edition of a mitigation plan is a revision of the previous version. We recognize that a warming climate has increased all hazard risks within the FNSB. A warming climate was considered while drafting each hazard's Probability of Future Events profile (Chapter 5-10).</p>
1B	Severe weather	<p>It is highly likely that most residential buildings in the FNSB do not have air conditioning and are not easily cooled passively. In the future residents particularly, the elderly will be vulnerable to heat stress and stroke due to rising summer temperatures. This problem will be exacerbated when air quality is hazardous from wildfires. Residents should be warned of this emerging problem and be made aware of the need for at least one cool, clean air room in their homes.</p>	<p>We added consulted with the Alaska Center for Climate Assessment and Policy and included a paragraph in Section 9.4 about high temperature trends in the summer</p>
1F	Severe weather	<p>S-1 Pg. 11-31</p> <p>Incentivize sign-up for Nixle alerts for severe weather alerts and perhaps promote Nixle on tax assessment mailings</p>	<p>This comment is in reference to an action from the previous plan.</p>

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1G	Severe weather	F-4 Pg. 11-38 Identify and prevent loss of stormwater-absorbing wetlands on FNSB lands Perform land trades to acquire and protect wetlands critical to stormwater absorption	This comment is in reference to an action from the previous plan.
1H	Flooding	F-7 Pg. 11-40 Consult with the multi-jurisdictional local green infrastructure group and implement green infrastructure projects to prevent flooding instead of solely focusing on moving stormwater to ditches faster	This comment is in reference to an action from the previous plan.
1I	Flooding	FL7.3 Pg. 11-59 Identify and prevent loss of stormwater-absorbing wetlands on FNSB lands Perform land trades to acquire and protect wetlands critical to stormwater absorption	Thank you for your comment. FL7.3 refers to this in a broader sense in accordance with plan goals.
4C	Flooding	I am satisfied that the main changing factor influencing our community's risk of disaster, i.e., climate change, has been referred to appropriately in various sections - cryosphere (section 5.4), ground failure (8.4), and fire (10.4), though I feel there is insufficient mention (in 7.4) of the likely increase in flood frequency due to increasing precipitation. Thoman & Walsh (2019, "Alaska's changing environment", UAF IARC, page 6) are clear that "annual precipitation has increased in all regions of the state", but this is counter to the statement in section 9.14. Similarly, the specific problem of 'Rain in Winter' events causing slick roads and downed powerlines, which the NSF AURA project has made a priority to study, and the likelihood of an increase in these events, could be added to section 9.5.	Thank you for your comment. Section 9.4.1 shows that the period since 2014 has been wetter than any previous 5-year period in the past 5 years. We will use the NSF AURA research during the next plan update, as noted in Section 2.7.1 of the document.

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2H	Ground Failure	Section 8. Ground failure profile The report correctly points out that ground failure (e.g., landslides) depend on many factors, including those related to geology (e.g., topography and soil type), vegetation, and climate. The report points out that there has been a recent trend toward increased precipitation and that this has been associated with high probability of ground failure and erosion events.	Thank you for your comments.
3C	Ground Failure	8.3 Possible Impacts from Future Events (pg. 156): Please address in the next draft: -In addition to the impacts mentioned, hillside erosion has the potential to significantly threaten individual properties and private investments. Home inspectors serving the FNSB are already seeing the impacts (structural, financial, safety) of hillside erosion, more so in recent years due to climate change effects (namely increased precipitation causing runoff). When compounded, these smaller-scale damages and the associated burdens (economic instability, potential loss of home, etc.) they pose to individuals are substantial.	Thank you for your comment. We are working with the AURA project and other research projects to better quantify the risk from hillside erosion for the next HMP update.
2F	Seismic Event	Section 6: Seismic event profile Excellent section and very thorough. It emphasizes the importance of ground liquefaction in seismic impacts but does not mention the link between permafrost and liquefaction potential.	Thank you for your comment. We will include any published reference on the link between permafrost and liquefaction.
1C	Mitigation Strategy	In addition to generators for electricity to operate refrigerators and freezers (at a minimum), residents should be encouraged to have alternative energy sources like solar panels with a battery storage system.	Objective M8 encourages property owners and the general public about proper interconnection about generators. GVEA published a Generator Safety book. MH1.5 encourage mitigation activities using an all hazard approach
1E	Mitigation Strategy	M-9 Pg. 11-19 See FNSB sustainability plan and COVID-19 economic recovery plan for ideas to improve local food production	This comment is in reference to the previous plan. Obj. M9 addressed ensuring food security during extended events. Changes have been made to FNSB Title 18 since the last planning effort to make small-scale livestock and farming more accessible.
4F	Other	(Minor: I think there is a small typo in the legend of Fig 10-3: should be Bureau, not Borough.)	Thank you. The legend has been corrected