

Comprehensive Plans and Flood Risk

A Resource Guide for Nebraska Communities



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A Resource Guide

Why should comprehensive plans address flooding?

Flooding occurs naturally everywhere. Water, gravity, and topography create conditions along a stream or river that cause flooding. Flooding has become a “problem” because we have built our homes, businesses, and communities in areas that routinely flood. The United States has developed a framework to understand flood risk and manage it in communities. Flooding is an existing condition of many communities, and planners have to understand the ramifications of flood risk when considering long-range planning for growth and development.



Figure 1. Flooding in Lincoln, 1942

Flooding takes the most lives and causes the most property damage each year of all natural hazards. An uninsured family that faces just one foot of water in the basement can have their lives upended by being saddled with a \$30,000 repair cost. The disruption of lives in flooding events can be prevented, but only if communities proactively address the hazard in their land use plans and decisions.

All natural hazards are addressed by a community’s “hazard mitigation plan,” a required document in order to be eligible for a variety of FEMA’s mitigation funding. Flooding, however, is the most studied hazard and one of the most straightforward to understand and predict. Nearly every community in Nebraska that faces flood risk has had a study conducted to predict the characteristics of a 1% annual chance flood (100-year flood). The “Flood Insurance Study” and the associated “Flood Insurance Rate Map” are the best sources of information. The data in these documents mixed with the data in a community’s hazard mitigation plan provide planners with the tools needed

to engage the community in a discussion about growth and development in floodprone areas. Hopefully, the discussion and input would lead to a strong comprehensive plan that increases a community's resilience to flooding.

A comprehensive plan, according to Nebraska Revised Statutes §19-903, should be the guiding document upon which zoning and other regulations are to be based. The statute specifies that "regulations shall be designed [...] to secure safety from flood." In order to do this, the comprehensive plan should consider flood risk and the growth and development of a community.

Data and Factual Base

The foundation of any comprehensive plan should rest on sound data and factual analysis of the context of a community. A factual base to support goals and policies for flood risk is essential and much of the data is available for planners. Community comprehensive plans should analyze the context of flood risk including the local hazard, the people and infrastructure at risk, and the natural areas that provide flood protection. The state statutes require regulations address flood safety, so data on flood risk is essential to be able to address it. A variety of sources of information are available for the following possible components:

- **Delineation of flood hazard:** Flood Insurance Rate Map (available either at [msc.fema.gov](https://www.fema.gov) or dnr.nebraska.gov/fpm). GIS data can be downloaded from the National Flood Hazard Layer (<https://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/national-flood-hazard-layer-nfhl>) for the inclusion of a flood hazard map.
 - This information helps developers and community members understand where exactly the floodplain and flood risk area is. Having this as part of a standalone map as well as on the Future Land Use Map will help

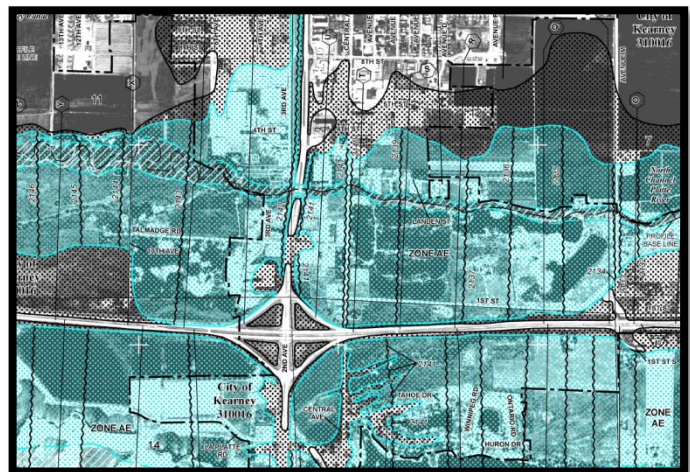


Figure 2. FIRM example near Kearney

the community see better development decisions.

- **History of flooding:** many communities can produce this history just by tapping in to local knowledge, but the Hazard Mitigation Plan and the Flood Insurance Study contain a history of flood events. Additionally, the National Climate Data Center and any streamgauge record (see <http://water.weather.gov/ahps/>) may have additional historical information.
 - Because flooding is a hazard that happens irregularly and with low frequency, a historical reminder that the community is actually at risk is helpful in setting the context that flood risk is real and people should pay attention to it. Many plans already have a historical element, so flooding should just be included in that piece.
- **Area of community located in floodplain:** can be generated by using GIS data. May also have been calculated in the Hazard Mitigation Plan.
 - This information paints a context for the area of the community where special care needs to be taken with every building built.
- **Area of community in existing preserved open space:** information may be in prior comprehensive plan documents and calculated using GIS data.
 - The natural functions of floodplains are important community resources that help protect homes and businesses. A comprehensive plan should inventory these and consider their protection. Wetland areas, open spaces, and riparian areas often act as these natural areas in floodplains and should be protected.
- **Number of current population at risk from flooding:** this number may be in the Hazard Mitigation Plan.
 - Having an understanding of the current population exposed to the risk of flooding can help generate interest in risk reduction activities. The goal of any community should be to put the least people at risk, be it crime or natural hazards, and setting a baseline is important to understand this aspect of a community.
- **Number of critical facilities at risk from flooding:** number calculated in the Hazard Mitigation Plan.
 - Critical facilities are the important places in the community that should be best protected from flooding. In a major flood event, having these facilities remain operational is crucial to the ability of the community to respond.

They may be fire stations, senior living homes, sewage treatment plants, or the only gas station in town. Nebraska statutes require an analysis of public facilities and they should be considered in the context of flood risk.

- **Number and value of public infrastructure at risk from flooding:** some of this may be in the Hazard Mitigation Plan.

- Public infrastructure such as water pipes, sewer pipes, and roads are important to protect from flooding as much as possible. Access to flooded areas is a major concern in a flood event and understanding the miles of road, miles of pipes and conduit, and miles of

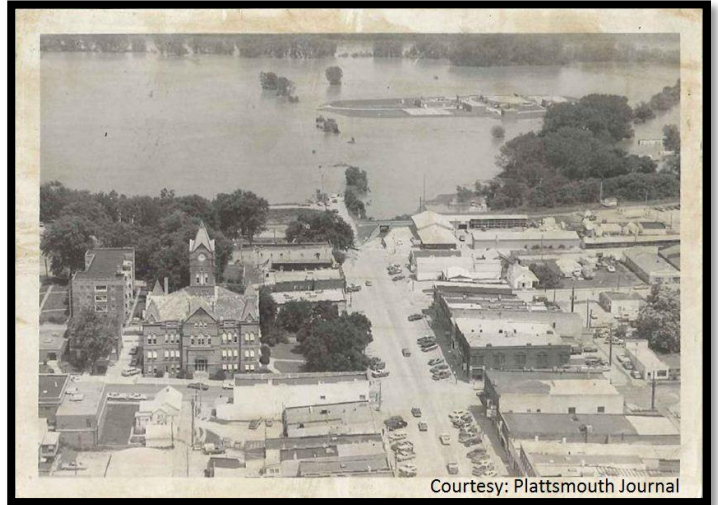


Figure 3. Plattsmouth flooding 1984

electrical infrastructure at

risk will help a community be more resilient when a big flood hits. The community is also saddled with the cost of repairing infrastructure unless there is a presidentially-declared disaster.

- **Number and value of private structures at risk from flooding:** some of this may be in the Hazard Mitigation Plan.
 - Having a number and value of private structures at risk from flooding can help communities understand the economic impacts of a major flood event. This can lead to increased community action to reduce risk.
- **Number of future population at risk from flooding:** number calculated using current population, mixed with the build-out or growth scenario and flood risk GIS data.
 - As communities think about potential growth scenarios, having an idea of the potential population at risk can help guide decisions on each scenario.

Goals

Essential to any long-range community plan process is setting visionary yet realistic goals. Goals developed collaboratively with community members, particularly focused on flood risk reduction, give local governments a priority to address flooding.

Overall, goals in comprehensive plans should focus on protecting the existing areas, buildings, and facilities located in floodplains and prevent future development in floodprone areas. Neighborhoods, commercial districts, or industrial areas that currently lie in the floodplain have significant difficulties in selling property if they're required to pay flood insurance. Most residents or businesses will be concerned about having to pay flood insurance. Communities would be wise to consider any solutions to the problem, but also to be ready to accept the fact that the floodplain and flood risk existed before the homes and businesses.

Ultimately, new developments should be steered away from floodplains. Developers may not consider flood risk in their land acquisition, but comprehensive plans should serve as that guide and be informative on where land is free of future problems. If the land on the urban fringe is already open space with wetlands or other natural



Figure 4. South Sioux City used their floodplain for ballfields that didn't put lives or property at risk

features, there should be a goal to preserve floodplains in those areas. Floodplains can either be an opportunity or a limitation for a community. Those that decide to use floodplains as parks, natural areas, or other conservation areas achieve multiple benefits including reducing future loss of life or property from flooding.

Many communities examine the goals associated with No Adverse Impact development, which outlines goals to ensure no development causes increased flood levels on downstream or upstream development.

Goals to consider:

- **Any goal to reduce loss of life:** flooding accounts for the most number of lives lost every year in the country. Communities have a responsibility of public safety and having a goal that articulates flood risk reduction as a life saving measure lives up to that responsibility. There are different strategies to reduce loss of life than reduce property damage.
- **Any goal to reduce property loss:** because flooding is a natural occurrence, the true effects are property damage. Reducing property loss is one of the primary goals of the National Flood Insurance Program and thus a goal of any community that participates.
- **Any goal to minimize fiscal impacts of natural disasters:** when a community is hit by a natural disaster, a significant portion of the repairs (100% without a Presidential disaster declaration and 25% with a declaration) falls upon that community. Anything the local government can do to reduce the potential financial impacts of a disaster whether to public infrastructure or to private homes and businesses will improve the recovery of the community.
- **Any goal to reduce hazard impact on low-income populations:** natural disasters disproportionately affect the lower-income members of our communities and land use planners should take this into account. Low-income people also have a far more difficult time restoring their lives back to pre-disaster conditions.
- **Any goal to reduce damage to existing residential development:** many comprehensive plans focus on reducing flood risk by guiding development away from floodplains, but many communities already have substantial neighborhoods located in floodprone areas. Comprehensive plans should address the existing neighborhoods in the floodplain.
- **Any goal to reduce damage to existing commercial development:** similarly, comprehensive plans should address the existing commercial districts that may be located in the floodplain.
- **Any goal to reduce damage to existing industrial development:** similarly, comprehensive plans should address existing industrial areas that may be located in the floodplain.
- **Any goal to reduce damage to public property:** any community owns a substantial set of assets in public infrastructure including roads, pipes, and

community facilities. The infrastructure is owned by all taxpayers and repairing it after a disaster requires additional taxpayer expense. Reducing potential damages saves money in the long-term.

- **Any goal to keep critical facilities out of the floodplain:** a critical facility has different definitions, but when considering flooding or other hazards, critical facilities are those that people would rely on during a disaster. These might include major public infrastructure like power plants or wastewater treatment plants or facilities like nursing homes and hospitals or other businesses like the only grocery store or gas station. First responder facilities are crucial pieces of disaster response as well. Local government has a responsibility to ensure these facilities are as safe and resilient as possible in the event of a major flood.
- **Any goal to develop new areas outside of flood risk zones:** ultimately, the safest way for a community to deal with their flood risk is to avoid it in future growth and development. A comprehensive plan process should cover this and help guide development away from substantial flood risk areas.
- **Any goal to preserve flood risk zones in future growth areas for open space or recreation:** any community that has floodplains has the chance to see them as opportunities or limitations. In new growth areas, the floodplains can be seen as opportunities for recreational areas, habitat or conservation areas, or other types of open space. This ensures flooding does not affect homes and businesses. Many Nebraska communities have done this.
- **Any goal to preserve natural floodplain functions in new growth areas:** even better than simply having a park is preserving or restoring wetlands that store floodwaters and reduce the flood heights along the stream or river. These areas provide the natural functions of floodplains.

Actions and Policies

The proposed actions and policies that a comprehensive plan outlines create the opportunity for building off the factual base and realizing goals that the community has helped set. The actions and policies are both visionary and realistic. Planners have a



Figure 5. Flooded house on Grable Street in Beatrice in 1973. Photo courtesy of Bob Feit.



Figure 6. Grable Street after buyouts. Photo by Bob Feit, from 2008.

responsibility to propose items that reflect community goals, but also are responsible in terms of protecting lives and buildings from flood risk.

Actions and policies that reduce flood risk include a wide range from regulatory measures to emergency preparedness to incentives. Every community has differing local capabilities and relationships with other government entities like natural resources districts. Large communities like Omaha and Lincoln may have the resources to acquire and demolish floodprone properties, while smaller communities like Maxwell or DeWitt do not. However, comprehensive plans should consider a wide range of potential state or federal funding options for hazard mitigation that can benefit smaller communities as well.

Generally, actions and policies that could be found in comprehensive plans include:

- General policy direction
- Awareness
- Regulatory
- Incentives
- Control of hazards
- Public facilities and infrastructure

- Disaster recovery
- Emergency preparedness
- Public entity actions

General policy direction

Comprehensive plans can provide an overall policy direction related to natural hazards. These policies show an overall preference of a community toward reducing future risk. Many plans in Nebraska discourage development in flood risk areas. While most communities don't prohibit it, plans that include this help give context to the idea that local governments play a role in guiding development. And development should be guided away from flood risk areas.

Awareness

One of the biggest challenges in natural hazard mitigation is the perception of risk. Many people don't believe that they face any risk from flooding, particularly if they have never experienced or seen it in the past. Communities then are challenged to convince people that floodplain management does help save lives and reduce property damage.

Comprehensive plans can set the direction for communities to better engage their residents and businesses about how to protect their buildings from flooding. Particular policies can call for flood hazard disclosure in real estate transactions, developing warning and response programs, and continuing to participate in the National Flood Insurance Program. These policies put a focus on outreach and awareness of the significant risk that communities face from flooding.

Regulatory

Communities that participate in the National Flood Insurance Program already have regulations in place that manage development in the floodplain. Typically the regulations are found in communities' zoning ordinance. Fundamentally, these regulations say that buildings should be elevated to one foot above the base flood elevation and that residential buildings are prohibited from a designated floodway. These regulations largely protect new and renovated buildings in floodplains to be safe from flooding, but don't do anything to keep new buildings out of flood risk areas.

Communities use a wide array of higher regulatory policies to keep their residents and businesses safer from flooding. Each have multiple other applications and benefits, so the policies should be tailored to every community. A plan could include any of the following policies:

- Restrict all development in particularly floodprone areas, such as floodways. Development such as mobile home parks can also be specifically restricted in certain areas.
- Setback rules – required green space buffer along streams, which could help prevent structures in the higher frequency flooding events.
- Site plan review – requiring any subdivision to be reviewed specifically for flood risk.
- Special study or impact assessment – requiring development in the floodplain to have a special assessment that considers adverse impact on other properties.
- Freeboard requirements – freeboard is the additional feet above the base flood elevation that a building is required to be built to. Nebraska already has a higher-than-minimum standard for all communities, but some can choose to apply higher standards, 2 or 3 feet above the 100-year flood elevation.
- Nonconversion agreements – requiring buildings in the floodplain that have been protected above minimum standards to have a nonconversion agreement ensuring no future building owner removes those protections.
- Impact fees – using higher impact fees to discourage development in floodplains and/or using impact fees in floodplains to reduce the impact that upstream development may have on existing users downstream.
- Open space ratios – requiring subdivisions or individual lots with flood risk to preserve a specific portion of the floodplain as open space with no buildings.

Incentives

Some communities would prefer to not regulate development, but rather incentive it to achieve broader community goals. Incentive solutions can also encourage individuals to be a part of the solution. However, an incentive program relies on individuals knowing about the program and taking advantage of it. A mix of higher regulations and incentives is likely the best way to encourage flood risk reduction in communities. A comprehensive plan could include the following incentive programs:

- Direct local incentive for mitigation –provide direct incentives to homeowners or business owners who retrofit their buildings by elevating, floodproofing, or relocating them.
- Tax abatements for mitigation – provide tax abatements on improvements to property that include risk reduction projects like elevation, floodproofing, or relocation.
- Low-interest loans – provide low interest loans for flood risk reduction projects that homeowners or business owners complete.
- Transfer of development rights – establish a program where developers can purchase the potential development rights of property owners in flood risk areas to build more housing or commercial units in less risky areas.
- Density bonus – provide an incentive for a developer who adds density to a development that preserves flood risk areas for parkland, recreation, or open space.
- Planned unit development – establish a set of flood risk criteria, among others, for a large area development (usually done in phases) that keeps buildings out of the floodplain while allowing for flexible design of individual buildings. Planned unit developments are opportunities to keep large developments consistent with goals in a comprehensive plan.

Control of hazards

Floodplain management focuses largely on reducing loss to life and property for the “big” storms, the 100-year and 500-year events. But, reducing losses from more frequent storms can be an important role of local governments. Typically, this is referred to as stormwater management. Many techniques exist to do this, from retention ponds to subdivision regulations. This guide focuses specifically on stormwater projects and their contribution to reducing flooding, not on stormwater management regulations.

Building dams and levees is not considered in this guide because they don’t reduce overall flood risk, but rather simply transfer it other occupants of a floodplain. A levee pushes water away from a protected area and causes increased flooding downstream. A dam, while having other benefits, simply transfers risk to a localized area and changes the timing of downstream flow. Dams and levees also eliminate natural functions of floodplains and hugely disrupt the ecology of streams and rivers.

The following stormwater management-related policies could be considered by comprehensive plans:

- Comprehensive stormwater management – plans should include overall strategies that reduce the impacts of lower-frequency flooding events. A variety of policy tools exist to do this and are likely very local solutions.
- Maintenance of structures – when communities have implemented stormwater management projects that include building stormwater management facilities like retention ponds or stream channelizations, they should have policies in place to maintain them. Some structures may not be owned by the local government, so the comprehensive plan is a good process to call on all community partners to maintain the structures.

Public facilities and infrastructure

One of the requirements of comprehensive plans in Nebraska is to consider public facilities and infrastructure. While state law doesn't explicitly mandate considering flood risk, citizens and local taxpayers would be best served by having comprehensive plans help reduce risk to public facilities and infrastructure, especially when so



Figure 7. Plattsmouth wastewater treatment plant threatened by Missouri River in 2011

much data is available to understand flood risk. These facilities are often the ones that coordinate responses to flood disasters and thus should be protected to a higher standard. First responders' facilities should never be located in floodplains. Comprehensive plan processes are valuable opportunities to inventory public facilities and understand their flood risk. Data may already be available in a community hazard mitigation plan.

Policies in a plan may include:

- Protecting critical facilities – a policy to ensure new critical facilities are protected above the 100-year or 500-year flood level. The policy might also include retrofits to existing critical facilities that may include elevating the structure, floodproofing, or relocating it altogether. “Critical facilities” are those defined by the community to be critical in the time of a disaster.
- Protecting public facilities – a policy to ensure that any public building is protected from flood risk.
- Capital improvements program – a recommendation that a community’s capital improvements program consider flood risk as part of each public-funded project completed.

Disaster Recovery

In the unfortunate event of a disaster, the recovery period afterward can be a crucial time to make long-term decisions about how a community grows and develops with respect to natural hazards. The recovery period is often the time when people are most willing to undertake risk reduction projects like removing homes from the most floodprone areas or setting aside wetlands for flood storage. Comprehensive plans can suggest policies and actions that help focus a community on long-term risk reduction projects in a post-disaster situation. A local hazard mitigation plan may already have some solutions identified. Policies in a plan may include:

- Moratorium on rebuilding – in a post-disaster context, it is important to have a strategy for rebuilding so that it is done safely, lawfully, and with the best long-term interests of the community. An immediate and temporary moratorium on rebuilding may be effective in a post-disaster situation to ensure rebuilding is done with community goals in mind. A policy should be in place to ensure that the community can do this in the event of a disaster.
- Land use change – a major disaster can be the trigger to make land use changes in a particular area of the community. Policies identified in a comprehensive plan should predict the possible solutions to land use issues in a post-disaster situation. A land use change should also include policies or actions to acquire damaged parcels after a flood event.
- Building design change – changing building codes to be more resistant to natural hazards may be a difficult political proposition, but may be easier after a disaster. A policy could be used to identify changes to a building code post-disaster.

Emergency Preparedness

A community is best served when it is ready for a disaster and can respond accordingly. Preparedness is both a responsibility of the local government and also of individual citizens. Preparedness typically lies within the realm of emergency managers, but there are elements of preparedness that should be in comprehensive plans and generally considered a part of land use planning. Policies in a plan may include:

- Shelters – comprehensive plans could call for storm shelters to be placed in strategic areas throughout the community that help prepare residents who need to take shelter during a severe storm. Shelters should also be identified in the event of displaced residents, like a flood. Comprehensive plans are good places to consider these
- Evacuation – in the event of a flood disaster, evacuation routes are crucial corridors to maintain, otherwise residents may have to be rescued via boat or helicopter. Evacuation routes should be identified and infrastructure planned to be protected to more than a 100-year flood event.

Public Entity Actions

Local governments play an important role in reducing flood risk and a variety of public actions can be taken. Local governments often are the ones that purchase land in the floodplain to remove at-risk structures. Identifying acquisition programs is a powerful tool that comprehensive plans can outline. Municipalities are also the ones that build parks and can purchase floodprone lands before developers do to create recreational areas. Often, comprehensive plans include proposed recreational areas in floodprone areas.

For any additional information, please contact Mitch Paine, Flood Mitigation Planning Coordinator at the Nebraska Department of Natural Resources.

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