2 Localized Flooding

Localized flood problems sometimes do not get the remedial attention they need, partly because they are not the subject of dramatic headlines or stories on the nightly news, and partly because they fall outside the scope of many local flood protection ordinances, which are geared toward the Special Flood Hazard Area (SFHA) depicted on the community's Flood Insurance Rate Map (FIRM). However, as local officials, technical staff, and residents of those areas know, this flooding is a significant—and usually recurring—problem.

The Problem

Localized flooding can result from even minor storms. Runoff overloads the drainageways and flows into the streets and low-lying areas. Sewers back up; yards are inundated. Homes and businesses are flooded, especially basements and the lower part of first floors. Localized flooding poses most of the same problems caused by larger floods, but because it typically has an impact on fewer people and affects small areas, it tends to bring less State or Federal involvement such as funding, technical help, or disaster assistance. As a result, the community and the affected residents or business owners are left to cope with the problems on their own. Finally, flooding of this type tends to recur; small impacts accumulated over time can become major problems.

Safety Hazards

People are at risk even in shallow flooding. It is not unusual for children, especially, to drown after slipping in shallow water or to be swept into a ditch or storm drain. Even adults can be knocked down by just a few inches of moving water.

According to the National Weather Service, almost half of all flood fatalities occur in vehicles. Local storms can quickly fill underpasses and cover bridges, and even two feet of water can float most vehicles, including large ones. If the water is moving,

Village of Gurnee, Illinois

Children, as well as adults, often do not realize the danger of even shallow flood waters.

vehicles can be swept away. Driving at night during a local flood can be especially hazardous.

Emergency workers and other public employees who help in flood response and cleanup risk injury and even death themselves.

Water and electricity can lead to a dangerous situation, no matter how shallow the water. Damp electrical system components pose a shock hazard, as do the extra tools and appliances people use to clean up moist conditions.

Health Concerns

In addition to the obvious risks of drowning and electrocution, there are many less well-known health problems that can be consequences of shallow flooding, particularly if it is recurrent.

- Damp conditions can trigger the growth of mold and mildew in flooded buildings, especially if the weather is warm and atmospheric humidity high. Molds contribute to allergies, asthma, and respiratory infections, especially in children, the elderly, and those with weakened immune systems.
- Snakes and rodents are forced out of their natural habitat by flood waters and move into closer contact with people.
- Gasoline, pesticides, fuel oil, chemicals, and other substances can be brought into the area and into buildings by flood waters. They soak into the soil, building components, and furniture, and can result in long-term health problems.

- Standing water and wet conditions are breeding grounds for mosquitoes, which are not only a nuisance but also can transmit encephalitis and West Nile Virus.
- Any flood experience is a strain on individuals and families. Over time, this stress can lead to anger, conflicts with others, inability to sleep, anxiety, hyperactivity, depression, withdrawal, or lethargy.
- The stress is intensified if there is a sense that the flood water will be back because the problem has not been solved. This can worsen pre-existing medical conditions and contribute to mental health problems.

Property Damage

Even a few inches of water in the basement or ground floor of a building can cause expensive damage. Carpeting, wallboard, insulation, mattresses, and upholstered furniture must be thrown out and replaced. Flooring, studs, and other wooden parts of the building must be thoroughly cleaned and dried. Business records, photographs, and other papers are often destroyed. Many owners find it cheaper to replace flooded furniture, cabinets, contents, machinery, equipment, and inventory than to try to salvage them. Since these areas often flood frequently, the cumulative damage can be significant.

Many property owners outside the SFHA do not have flood insurance. Property and contents damage from flooding is not covered under standard homeowners insurance policies. No amount of money can compensate for ruined keepsakes, photographs, or family heirlooms.

Even under non-flood conditions, there can be some structural damage if the soils have been saturated for a long period or repeatedly over time. Foundations can be gradually undermined, wood can rot, and masonry materials can become weakened.

Disruption

Flood waters can block streets, disrupt traffic patterns, and hinder access to homes and businesses. This can affect the entire community, not just those whose property is flooded. People have to evacuate wet and/or damaged homes, and businesses have to close. Cleanup and repairs take time away from normal routines, interrupting lives and business operations. These difficulties may be serious enough to close a business permanently. All these interruptions, even if short-lived, have ripple effects

Even Minimal Risk Zones Can Be Dangerous

In 1997, a series of intense thunderstorms in **Fort Collins, Colorado**, resulted in flooding throughout the city. The Johnson Mobile Home Park, located in an X Zone, was completely destroyed, and five of its residents died in the flood.

Indiana Department of Natural Resources

Even shallow flooding results in a major cleanup and repair effort. A common approach to cleaning flooded wallboard is to cut and remove the lower 4 feet and replace those sections and the insulation.

Legal Liability for Flood Problems

When individuals receive damage from flooding or erosion they often file lawsuits against governments, claiming that the government has caused the damage, contributed to it, or (in some instances) failed to prevent or provide adequate warnings of the hazard. Such lawsuits are expensive for governments not only because damage awards are growing but also because of attorney and expert witness fees… Courts have often held governmental units liable for inadequately maintaining or operating culverts, bridge crossings, channelization projects, and dams.

Kusler (2004)

throughout a community, its citizens, its commerce, and its economy.

Costs to Local Government

Localized flooding can cause damage to public property, particularly if the flooding recurs periodically. Even though they are intended to withstand some abuse, sidewalks, streets and roads, benches, trash cans, fences, public buildings, signs, and other public property suffer additional wear and tear from flooding and will require repair, replacement, or repainting more frequently than normal.

Another cost of flooding is the diversion of local government staff and resources. Flood fighting, repairs to public buildings, extra trash collections, and cleanup of public property are all expenses that are borne by the public.

Impacts on the Community

In many instances, residents of the flooded areas complain to their local officials, wanting to know why the flooding happens and what is going to be done about it. Such dissatisfaction can even culminate in lawsuits against the local government for damage resulting from, for example, an undersized storm drainage system.

Areas that are flooded repeatedly show signs of deterioration. Buildings age before their time, and streets, sidewalks, and other infrastructure wear out sooner. Maintenance becomes harder to carry out. Property owners can be discouraged if flooding happens more than once or twice and begin to take shortcuts on some repairs, skip them altogether, or even move out and convert the building to a rental property, even if it has not been brought back up to its pre-damage condition. Some owners of repeatedly flooded properties walk away, letting the mortgage holders foreclose and resell or rent out the problem property. These approaches solve the current owner's problem, but just pass the flooding threat on to others.

Repeatedly flooded areas become undesirable places in which to live or work. Property values decline and the community's tax base is diminished.

Shallow stormwater flooding and drainage problems can have a ripple effect throughout the community's economy, social fabric, environment, and quality of life. It is a good idea to step back from the situation, take a broad look at other community concerns or problems, and decide whether localized flooding is contributing to any of them.

- Are property values falling in some areas?
- Has a once-attractive stream become a place to dump garbage?
- Is the economy periodically disrupted?

- Has the fishing declined?
- Have environmental conditions been degraded?
- Are stream banks eroding and threatening homes or bridges?
- Do more storm sewers need repairs?

All these seemingly unrelated issues may well be influencing, or be influenced by, a flooding problem. The advantage is that the solutions to the flood problem can be linked with solutions to other, perhaps more visible or popular, local concerns. They can even influence how well the community can sustain itself into the future.

What Can Be Done

Most of the time, the areas that receive shallow localized flooding are outside the community's regulatory floodplain and thus are not subject to the zoning regulations and building standards that are in place in higher-risk areas. A community may feel that it can do only what the National Flood Insurance Program (NFIP) requires and that it has no regulatory jurisdiction or the power to enforce floodplain management requirements outside the SFHA. However, there are many examples of communities throughout the United States that have taken charge of their localized flooding problems instead of focusing solely on the SFHA and the minimum NFIP criteria. These communities have worked on their own to successfully resolve their localized flooding problems by tailoring solutions to their own needs, resources, and desires. The vital first step is for community officials and residents themselves to realize that they have a problem and that they can resolve it.

Develop a Strategy

An organized approach is always best, and developing a strategy does not need to be a large undertaking. The community's approach to resolving a localized flood problem can be a formal plan, such as a community hazard mitigation plan, or it can be a simple decision to take a couple of visible steps in the right direction. Whatever is decided, the strategy should address the real needs and desires of the community, or at least those of the neighborhoods with flood problems. As detailed in Chapter 3 and Chapter 7, finding out what those concerns are lays the foundation for a plan that can be implemented successfully.

Coordinate with Other Concerns

A remedy for a flooding problem can also be a remedy for some other local concerns, and vice versa. Finding ways to combine solutions to these problems can be the key to simultaneously improving life in the community and alleviating flooding.

- Does the community/neighborhood need a park? A low-lying area converted to public space could fulfill that purpose and also provide needed storage for stormwater to alleviate flooding of nearby homes or businesses.
- Does the community/neighborhood need after-school activities for young people? Cleaning accumulated debris out of a stream channel and "adopting"

it can minimize flooding and provide an educational experience for middle and high school students.

- Have residents or businesses in certain neighborhoods been asking for sidewalks? Combining the installation of this infrastructure with drainage works can make pedestrians safer and can also direct stormwater to a more appropriate location.
- Has the downtown area been declining? If it is flood-prone, a project to mitigate the flooding could support revitalization efforts, and vice versa.

Orland Hills Solves its Flood Problems

Village of Orland Hills

Figure 2-1

Village of Orland Hills

Figure 2-2

The Village of Orland Hills, Illinois, had a varied and widespread flooding and drainage problem that affected buildings, yards, and streets throughout town. Heavy rains caused water problems several times each year.

The Village has a FIRM, but the mapped SFHA is relatively small and 82 percent is preserved as open space. The chronic flooding situations faced by Orland Hills residents were caused by local drainage problems. Regulating floodplain development and other traditional flood control approaches would not help.

Accordingly, the Village created a Committee that prepared a Flood Protection Plan in 1995. It reviewed problems with maintenance of open ditches and detention basins. Many of the problems were preventable.

> *In some areas, weeds and brush have been allowed to grow. Rocks placed as rip rap on the banks have been moved to the channel bottom, apparently by children. Figure 2-1 shows where the rip rap has been moved to plug a detention basin inlet.*
>
> *The worst problem in the channel is the condition of some of the culverts. As shown in the profiles, the culverts are so small that they act as dams even when clear. Over time, debris collects in them, rip rap is moved to block them, and they suffer from wear and tear. The pipes under 93rd Avenue have apparently separated, resulting in a hole in the overlying fill. Figure 2-2 shows this culvert and the barricade that has been placed over the hole.*

Flood Protection Plan, Village of Orland Hills, 1995, pp. 2-6–2-7.

Village of Orland Hills

Figure 2-3

Village of Orland Hills

Figure 2-4

The Plan identified storm sewer backup and yard drainage as major causes of the continuing problems. The Plan also noted that many of the problems were caused by the owners themselves:

> *Over the years, this drainage system has been disrupted. Many property owners are not aware of the need to keep their easements and swales open. They installed sheds, planters, railroad ties, or swimming pools in the easements. They built fences right on their lot lines to enclose the largest part of their properties. Figure 2-3 shows this process in one of the newest areas of Orland Hills. The low swale in the middle of the picture is being encroached upon by the new fences.*
>
> *Early homes in Orland Hills, especially homes on crawlspaces, were built at the original ground level. Later home builders, especially for tri-levels, added fill around the lots. This provided positive drainage from the lot, protected the lower areas from drainage problems, and improved the appearance of the site.*
>
> *Now when it rains, the runoff goes downhill to the lowest point: the older buildings that did not backfill or raise their lots. Directing downspouts and sump pump discharge pipes toward the property line aggravates the problem. Often the first property developed becomes the recipient of runoff as later builders fill in their lots. An example of this is seen in Figure 2-4.*

The *Flood Protection Plan* recommended a range of activities that have since been implemented:

- Tougher enforcement of easement restrictions;
- Passage and enforcement of a stream-dumping ordinance;
- Initiating a formal drainage maintenance program that inspects all ditches and storm sewers several times each year and after every heavy rain;
- Small scale projects to correct local problems, including televising storm sewers and rehabilitating broken ones;
- Site visits to determine the causes of local flooding problems and to advise property owners about what they can do; and
- A public information program that includes articles in the Village newsletter, annual letters to residents in problems areas, cable TV "crawlers," and an annual public information campaign theme, such as "Don't forget your drainage."

Since these efforts were started, Village staff report that the number of flooding complaints has decreased dramatically. They noted that some easement and dumping violations were reported by neighbors, a sign that the public information activities were paying off.

In 1996, Orland Hills joined the NFIP Community Rating System (CRS). Village officials found CRS materials helpful in designing their program and the annual reporting requirements helpful reminders to keep their programs going. They note that there are more advantages to the CRS than the direct financial reward to the policyholders. Orland Hills is currently a CRS Class 5, one of the best in the nation, even though there are only 22 flood insurance policies in the Village.

Solving Localized Flooding—Value Added

- Property and neighborhoods are preserved and often improved.
- The lives of residents and emergency personnel are protected. Fewer floods mean fewer opportunities for injuries and accidents to occur.
- The health of community residents is safeguarded; unhealthy and stressful situations are minimized.
- The economic viability of the community is maintained.
  - Disruption and economic losses from flooding are reduced or eliminated.
  - Business interruptions and permanent closures are minimized.
  - Public (local) costs of flood response and recovery are reduced or eliminated.
  - Property values and the local tax base are preserved.
- Legal liability is minimized.
- Credit for certain activities can be obtained under the CRS, resulting in lower insurance premiums for all flood insurance policyholders in the community. Even policyholders outside the SFHA receive a 5 to 10 percent reduction in their premiums.
- Making progress, and especially participating in the CRS, provides both an incentive for more organized and permanent local floodplain management, stormwater drainage, public awareness, and other activities.

Pick an Activity and Do It

Start with an action item listed in the plan or strategy that is easy, or inexpensive, or can be added on an existing activity. An early success will give people a sense of accomplishment and encourage moving on to the more difficult or complicated tasks. After that, priorities will have to be set by the community based on identification of the most visible problems and the resources that are available, as well as other factors. The area analysis process described in Chapter 7 offers some ideas of the factors to be considered in setting priorities.

Any initiative will fall into one of the three general categories of approaches listed below. These are based on the scale of the area and number of people affected, going from broad to narrow. The rest of this guide is organized according to this scheme.

- Organize **community-wide activities** (Part II of this guide) to make a broad impact and/or obtain wider support. This includes local planning and bolstering the capabilities of community staff (Chapter 3); and assessing regulations, mapping, building standards, zoning, and other techniques that apply to the whole community, even if there are different provisions for certain areas (Chapter 4). Public awareness and education campaigns (Chapter 5) and flood warning systems and emergency services (Chapter 6) also are best handled at the community level.
- Tackle each **neighborhood problem area** individually (Part III). In many cases, several homes and/or businesses suffer flood problems for the same reason, whether it's their location in a low-lying area or an inadequate storm drain or culvert. The local government will probably be the entity to carry out neighborhood-level projects or programs, but involving residents as much as possible is essential. The area analysis recommended in Chapter 7 encompasses this idea. Neighborhood associations or even ad hoc groups of property owners can be a big help in spreading the word, developing ideas, and garnering citizen support for changes such as drainage improvements (Chapter 8) and even redevelopment (Chapter 9).
- Deal with **individual buildings**. The flood risk to some flood-prone structures cannot be mitigated through a community-wide or neighborhood-level approach. These buildings need special attention to make them resistant

to flooding. Another reason to work on a single-building basis is that convincing one property owner to take protective measures for his or her property may well induce others in the area to follow. Often people are hesitant because they don't know what the finished product will look like or because they are unfamiliar with the problem or the techniques that can solve it. An individual success can induce others to take action and lead to a bigger project, if needed.

Part IV explains the best techniques to use on individual structures, namely, retrofitting (changing a building or part of it to make it more resistant to flood waters) in Chapter 10, and flood insurance, discussed in Chapter 11.

Join or Advance in the Community Rating System

Under the NFIP Community Rating System (CRS), a community receives a classification based upon credit points that are awarded for conducting activities to reduce flood losses, such as better mapping, stronger regulations, public information campaigns, flood damage reduction projects, and/or flood warning and preparedness programs. The credit points earn reductions in flood insurance premium payments for all NFIP policyholders in the community, even those outside the floodplain.

The CRS has made the Village think more proactively about stormwater management, instead of just waiting for the next big rain.

— Gary Salavitch, Village of Hoffman Estates, Illinois

But participating in the CRS is not just about saving people money. Belonging to the CRS provides an incentive not only to start new flood mitigation activities, but also to keep them going. A CRS community must recertify each year that it is continuing the activities for which it receives credit. The recertification is a simple procedure, but it serves to keep local attention focused on the importance of these ongoing activities. Further, in the process of applying for the CRS, a community receives help on and feedback about parts of its flood reduction program, which improves staff expertise and generates new ideas. Some communities say that the CRS has changed the way their programs work, even without budget increases.

Because there are 10 levels (classes) in the CRS, even communities that already participate can benefit from undertaking additional flood-related activities. They will receive greater premium discounts and can take advantage of the expert assistance, information, and contact with other communities.

Where to Get Help

- The Community Rating System Web site is http://training.fema.gov/emiweb/CRS/.
- The Web site of the Association of State Floodplain Managers (ASFPM) is http://www.floods.org.
- Information on the NFIP can be viewed at http://www.fema.gov/nfip/.
- Examples of how localities have solved flood problems can be found easily on the Web. Search for "mitigation success" or go to http://www.floods.org/Publications/mitsuccstories/mssiii1.htm.

Additional resources are listed in Appendixes A and B.

The Community Rating System

The CRS rewards communities for what they are doing to reduce flood losses and also provides an incentive for new flood protection activities. The reward is a reduction in flood insurance premium rates. A community's efforts are rated and identified by a CRS classification, with an accompanying discount on the annual premiums for policyholders in the community (see table below).

Application. To apply, a community submits worksheet pages from the CRS Application that show what it is doing and that its activities earn at least 500 points. After the activities are verified through a field visit, The Federal Emergency Management Agency (FEMA) sets the credit to be granted and notifies the community, the State, and insurance companies of the rating.

Recertification. Each year the community must recertify that it is continuing to perform the activities that are being credited by the CRS, and submit documentation in the form of copies of projects conducted during the year, progress reports, and similar items.

Community Responsibilities. A community in the CRS must:

- Designate a CRS Coordinator;
- Cooperate with the verification of its credited activities;
- Continue to implement its activities, and certify each year that it is doing so, with appropriate documentation;
- Advise FEMA of modifications to its activities;
- Address any identified repetitive loss issues;
- Maintain elevation certificates, other permit records, and old FIRMs forever; and
- Maintain other records of its activities until the next verification visit.

CRS Activities. The CRS credits a range of local (and State) activities that operate to reduce flood losses, promote flood insurance purchase, and facilitate accurate insurance rating. The four main categories and 18 creditable activities are listed in the box below.

Information. Technical assistance is available for communities applying for and participating in the CRS. No fees are charged for application, publications, or participation. The *CRS Application,* the *CRS Coordinator's Manual,* and all other CRS publications are free and can be obtained by calling 317-848-2898 or e-mailing NFIPCRS@iso.com, or downloaded from http://training.fema.gov/emiweb/CRS/.

Credit Points	CRS Class	Credit		
		SFHA*	Non-SFHA*	A99/AR Zones
4,500+	1	45%	10%	10%
4,000 - 4,499	2	40%	10%	10%
3,500 - 3,999	3	35%	10%	10%
3,000 - 3,499	4	30%	10%	10%
2,500 - 2,999	5	25%	10%	10%
2,000 - 2,499	6	20%	10%	10%
1,500 - 1,999	7	15%	5%	5%
1,000 - 1,499	8	10%	5%	5%
500 - 999	9	5%	5%	5%
0 - 499	10	0	0	0%

CRS Classifications

* SFHA: the floodplain shown on the community's FIRM.

CRS Activities

300 Public Information Activities
- 310 Elevation Certificates
- 320 Map Information Service
- 330 Outreach Projects
- 340 Hazard Disclosure
- 350 Flood Protection Information
- 360 Flood Protection Assistance

400 Mapping and Regulatory Activities
- 410 Additional Flood Data
- 420 Open Space Preservation
- 430 Higher Regulatory Standards
- 440 Flood Data Maintenance
- 450 Stormwater Management

500 Flood Damage Reduction Activities
- 510 Floodplain Management Planning
- 520 Acquisition and Relocation
- 530 Flood Protection
- 540 Drainage System Maintenance

600 Flood Preparedness Activities
- 610 Flood Warning Program
- 620 Levee Safety
- 630 Dam Safety

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