Floodplain Management Plan

2017 Update

Prepared for the Flood Liaison Committee

By

Robinson Engineering, Ltd.

November 2017

Original Plan By

French & Associates, Ltd.

March 1, 1994

Updated

June 1, 2000

August 2005

November 2010

Floodplain Management Plan

2017 Update

Village of South Holland, Illinois

Contents

Chapter 1. Introduction

This document is an update of the original *Floodplain Management Plan* that was prepared in 1994 and updated in 2000, 2005 and 2010. This document was prepared because:

- Most plans get major updates every five to ten years.
- Many of the problems that are covered in the original *Plan* and the updates have been addressed.
- Other action items do not account for the recent activities of the South Suburban Mayors and Managers Association, Metropolitan Water Reclamation District of Greater Chicago (MWRDGC), and State and Federal agencies.

Much of the basic information and many of the recommendations presented in the 1994 *Plan* are still valid. Therefore, rather than prepare a completely new document, this *Update* incorporates more recent information and pertinent recommendations from the old text.

1. Background

The Village of South Holland, Illinois, has a history of extensive flooding that has affected over 2,000 buildings. The community was most recently flooded in 1981, 1982, 1985, 1989, 1990, 1993, 1996, 1997, 2008 and 2013, and has several properties that have received repetitive flood insurance claims.

Since the Thornton Quarry Reservoir went on line, the Flood Insurance Rate Map for the Village has been revised, reducing the number of buildings in the Special Flood Hazard Area from 2,000 to 45.

However, residents and businesses will remain exposed to floods greater than the Thornton Quarry Reservoir's 100-year flood design level (as happened in 2008) and to local drainage and sewer backup problems (as happened in 2016). There are additional ways to protect these properties from flood damage. These include floodproofing, flood insurance, flood warning, emergency preparedness, and various types of regulations for new development.

Because of the Village's history and exposure to flood hazard, the Village is updating the comprehensive floodplain management plan. This plan will guide Village flood activities for the next five to ten years. It will ensure that the Village implements activities that are most effective and appropriate for its situation.

2. Planning Approach

Simply stated, a plan is the product of a rational thinking process that reviews alternatives and selects and designs the ones that will work best for the community. It is the opposite of making quick decisions based on inadequate information. Plans are vital to ensuring that public funds are well spent.

This plan was prepared using a standard planning process that had three key ingredients:

2.1. Technical expertise: The process involved input from engineers, code enforcement and public relations staff, emergency managers, floodplain managers, and others knowledgeable about the various types of flood protection measures. The lead technical input, for the original plan was provided by French & Associates.

The activities that have been reviewed and recommended have proven to be effective in preventing or reducing flood damage. The plan notes where many of the recommendations have been implemented in South Holland and other south suburban communities.

2.2. Resident involvement: Many of the activities, particularly floodproofing and emergency preparedness plans, require the cooperation of the floodplain residents to be effective. Because residents are important to the solution, they were involved in the planning of the solution.

Resident involvement was provided through the Village's Flood Liaison Committee. The Committee is composed of floodplain residents and Village staff from offices involved in flood related activities. After the 1994 *Plan* was adopted, the Flood Liaison Committee continued to meet regularly, monitoring plan implementation and drafting annual reports. Updates were prepared in 2000, 2005 and 2010.

While the membership changed over the years, there have always been resident participants. The current Committee members are:

F.A.C --- Brian Smith
Chairman --- Louis Schultz
Member --- Deloris Bogan
Member --- Rosemarie DeWitt
Member — Simon Koopmans

Village Engineer --- Patricia Barker
Advisor --- Frank Knittle

Trustee --- Prince Reed
Secretary --- Roberta Rinkema

Meeting of the Flood Liaison Committee

2.3. Comprehensive review: Together, French & Associates and the Committee reviewed existing studies, reports, and other materials related to the Village's flood problem and activities that can reduce the impact of flooding. This was accomplished through a series of planning meetings that were held during April through September 1993. The updates took several months of meetings in 2000, 2005 and 2010. The reports and studies reviewed are listed at the end of each chapter.

Chapter 2 reviews the three causes of flood damage in South Holland: overbank flooding, local drainage problems, and sewer backup. It also looks at a special flood problem known as repetitive losses, flooding of a property that has resulted in at least two flood insurance claim payments in less than ten years. After this review of the problems faced by the Village, floodplain management goals were set and included in Chapter 3.

The committee's work and the subsequent plan document explored five general categories of floodplain management activities:

- Flood control: levees, reservoirs, channel improvements, etc. (Chapter 4)
- Regulations: zoning, floodplain, stormwater, and other ordinances (Chapter 5)
- Emergency services: warning, sandbagging, evacuation, etc. (Chapter 6)
- Property protection: relocation, floodproofing, insurance, etc. (Chapter 7)
- Public information: outreach projects, technical assistance, etc. (Chapter 8)

After the alternatives were reviewed, the Committee drafted an "action plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The action plan is included as Chapter 9 of this floodplain management plan.

3. Public Input and Coordination

This update was prepared during the months of March 2017 – November 2017. Information on the planning process was publicized via a news release, in an article in *South Holland Today*, and on the Village's website.

2010 Flood Awareness Week public meeting

During the planning and updating processes, contacts were made with the following agencies to determine how their programs affect or could support the Village's floodplain management efforts.

Federal agencies
- Federal Emergency Management Agency Region V
- National Weather Service
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, Natural Resources Conservation Service

State agencies
- Illinois Department of Natural Resources
- Illinois Emergency Management Agency
- Illinois Environmental Protection Agency

Regional agencies
- Metropolitan Water Reclamation District of Greater Chicago (MWRDGC)
- Chicago Metropolitan Agency for Planning (CMAP)
- Chicago Southland
- South Suburban Mayors and Managers Association (SSMMA)
- Will-South Cook Soil and Water Conservation District
- Calumet Union Drainage District No 1
- Center for Neighborhood Technology (CNT)

Neighboring communities
- Village of Dolton
- Village of Thornton
- Village of Lansing
- Village of Phoenix
- City of Harvey
- City of Calumet City
- Cook County Department of Department of Planning and Development
- Cook County Forest Preserve District
- Cook County Homeland Security and Emergency Management

Private organizations
- South Holland Business Association
- South Suburban College
- American Red Cross
- Homebuilders Association of Greater Chicago

When this 2017 Update was drafted, it was sent to the agencies and communities listed above with a request for their comments.

Input from Village residents was also encouraged. A public meeting was advertised and conducted by Village staff in the affected floodplain to educate the public on the manual update and to gather information from Village residents regarding their flooding concerns and flood-prevention ideas. A draft version of the Floodplain Manual Plan Update was posted on the Village website along with a fillable comment section that could be submitted electronically to Village staff.

The Committee revised the document based on comments received from the listed agencies and organizations and the public and recommends this version to the Village Board of Trustees. These comments were reviewed and the 2017 Update revised accordingly.

4. The Community Rating System

The Federal Emergency Management Agency's National Flood Insurance Program (NFIP) administers the Community Rating System (CRS). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. This program can have a major influence on the design and implementation of floodplain management activities, so a brief summary is provided here.

A community receives a CRS classification based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs.

There are ten CRS classes: Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a Class 10 community.

Figure 1-1: Community Rating System Premium Reductions

Class	Points	Premium Reduction In Floodplain	Premium Reduction Outside Floodplain
1	4,500+	45%	10%
2	4,000–4,499	40%	10%
3	3,500–3,999	35%	10%
4	3,000–3,499	30%	10%
5	2,500–2,999	25%	10%
6	2,000–2,499	20%	10%
7	1,500–1,999	15%	5%
8	1,000–1,499	10%	5%
9	500– 999	5%	5%
10	0 – 499	0	0

Since 2002, South Holland has been a Class 5 CRS community. There are only three communities east of the Mississippi River that are better than a Class 5 and only ten in the country. Other south suburban CRS communities include:

- Calumet City: Class 6
- Country Club Hills: Class 8
- Flossmoor: Class 7
- Lansing: Class 7
- Orland Hills: Class 5
- Tinley Park: Class 7

The CRS provides an incentive not just to start new mitigation programs, but to keep them going. There are two requirements that encourage a community to implement floodplain management activities.

First, the Village receives CRS credit for the Floodplain Management Plan. To retain that credit, the Village must submit an evaluation report on progress toward implementing this Plan to FEMA on a yearly basis. That report must be made available to the media and to the public.

Second, the Village must annually recertify to FEMA that it is continuing to implement its CRS credited activities. Failure to maintain the same level of involvement in flood protection can result in a loss of CRS credit points and a resulting increase in flood insurance rates to residents.

It is expected that this undesirable impact of loss of CRS credit for failure to report on the Plan's progress or for failure to implement flood loss reduction projects will be a strong encouragement for the Village to continue implementing this Plan in dry years when there is less interest in flooding.

In addition to the direct financial reward for participating in the Community Rating System, there are many other reasons to participate in the CRS. As FEMA staff often say, "if you are only interested in saving premium dollars, you're in the CRS for the wrong reason." The other benefits that are more difficult to measure in dollars include:

1. The activities credited by the CRS provide direct benefits to residents, including:

   - Enhanced public safety;
   - A reduction in damage to property and public infrastructure;
   - Avoidance of economic disruption and losses;
   - Reduction of human suffering; and
   - Protection of the environment.

2. A community's flood programs will be better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, will be conducted on a sounder, more equitable basis.

3. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.

4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.

5. The public information activities will build a knowledgeable constituency interested in supporting and improving flood protection measures.

6. A community would have an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new developments would be taken into account by the governing board when considering such actions.

7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found through the FEMA website: https://www.fema.gov/national-flood-insurance-program-community-rating-system.

Chapter 2. Problem Description

2.1 Overbank Flooding

South Holland is subject to overbank flooding from three sources as shown in Figures 2-1 and 2-4. The Little Calumet River (Little Cal) flows through the center of the Village, from east to west. The Little Cal drains northeastern Illinois and northwestern Indiana via several tributaries. At South Holland, the river's watershed is over 200 square miles. A small tributary, Thorn Ditch, drains the central part of South Holland. Its overbank flooding is caused by backwater from the Little Cal.

Thorn Creek flows from the south and joins the Little Cal on the southeast side of town. Thorn Creek collects water from Deer, North, and Butterfield Creeks and Lansing Ditch. The Thorn Creek basin drains over 100 square miles, accounting for over half of the water that enters the Little Calumet at South Holland.

The third stream is the Calumet Union Drainage Ditch, a man-made ditch that drains 18 square miles of the Markham and Harvey areas to the west. It joins the Little Cal in the west part of the Village.

Most of the Village's overbank flood problem is in the Little Calumet River's floodplain. Because the area is so flat, the flooding of one stream is accompanied by flooding on the other two. Therefore, while there are three sources of overbank flooding, the problem will be treated as one floodplain.

2.2 Flooding History

Flooding has occurred along South Holland's streams since the last glacier left Illinois. Early settlers avoided building too close to the rivers. As late as the 1940's, large areas of the south suburbs remained vacant, primarily because it was too marshy to build on. These areas were used by the rivers to carry and hold excess rain runoff and snow melt.

Beginning in the late 1940's, this scene changed as the Chicago area's population expanded to the south. Urban development put pressure on the vacant land along the rivers. The floodplains were built up during the 1950's and 1960's, primarily with single family housing. It was not until the 1970's that local governments passed floodplain management regulations to require the elevation of new buildings in the floodplain. Since then, floodplain development has slowed down, but developers did fill certain floodprone areas for new homes or commercial properties.

In the 1920's, the Calumet-Sag Channel was completed and the Little Cal received an additional outlet. Instead of flowing into the Grand Calumet and Lake Michigan, most of its water now flows west through the Cal-Sag to the Des Plaines River. There are locks on both the Cal-Sag and the Grand Calumet to control low flows.

At the eastern end, Burns Ditch was connected to Lake Michigan in the 1920's. During high flows, the Indiana portion of the Little Cal drains west. These two diversions mark the northwest and eastern limits of the Little Cal's watershed in Figure 2-1.

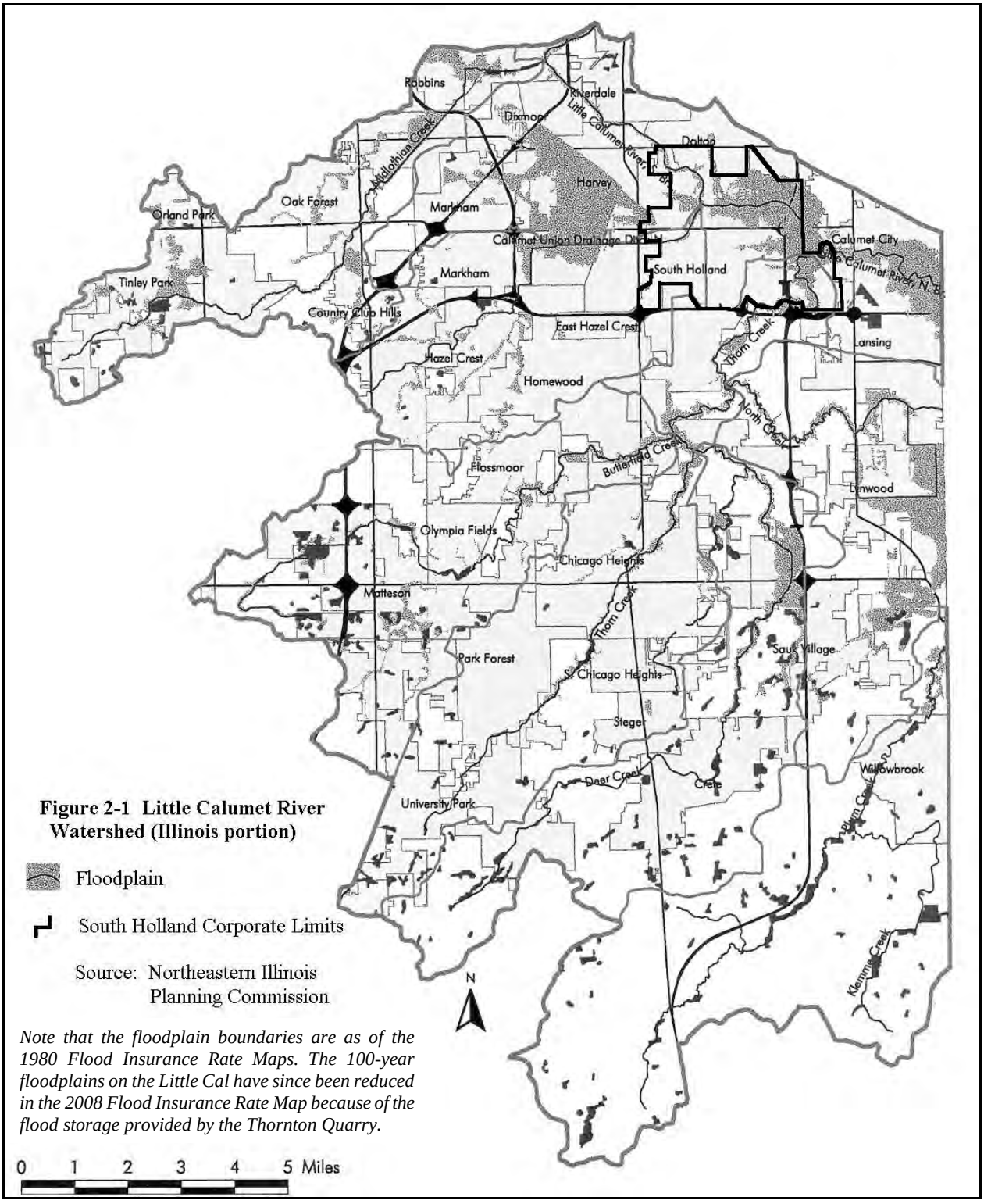


Figure 2-1 Little Calumet River Watershed (Illinois portion)

Note that the floodplain boundaries are as of the 1980 Flood Insurance Rate Maps. The 100-year floodplains on the Little Cal have since been reduced in the 2008 Flood Insurance Rate Map because of the flood storage provided by the Thornton Quarry.

With post-war growth to the south of Chicago, farmlands were replaced with roofs, parking lots, streets, gutters, storm sewers, and more ditches. With this urban development, a greater volume of rainwater ran off the land and into the rivers and the runoff occurred at a faster pace. As with floodplain regulations, it was not until the 1970's that communities began stormwater management regulations that require developments to restrict their runoff.

In short, while the rivers of the Little Calumet basin flooded in the past, the problem has gotten worse since the 1940's. Until 1981, the worst flood on record for all three streams was in July 1957. Heavy summer storms caused widespread flooding in northeastern Illinois. The subsequent flood on the nearby Kankakee River was estimated at being a 750-year flood.

The 1957 flood was exceeded in 1981 by another flood caused by summer storms. While there was not as much rain as in 1957, the 1981 flood caused much more damage because there was more development. Because so many homes and businesses were affected, the June 1981 flood resulted in a Presidential Disaster Declaration for the area. Another Presidential declaration followed the December 1982 flood.

South Holland's worst flood on record occurred in late November 1990. Heavy local storms caused the Little Cal and its tributaries to rise almost half a foot higher than the 1981 record. Other floods are noted on Figure 2-2.

To reduce flooding in the Chicago suburbs, the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) instituted a major flood planning effort in the 1970's. The culmination of that effort in the South Suburbs came in 2015, when the Thornton Composite Reservoir became operational. The Thornton Quarry Reservoir has already successfully reduced flooding in South Holland and is described in Chapter 4.

2.3 Flood Data

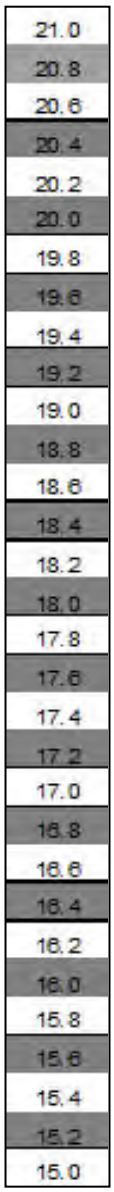
2.3.1 Flood Heights: Flood heights have been recorded since 1947 on a river gage that is currently located at the Cottage Grove Avenue bridge over the Little Calumet. Recorded flood heights can be shown in stage or in elevation. Stage is measured in feet above an arbitrary starting point that was set when the gage was first installed. Elevations are in feet above sea level, using the National Geodetic Vertical Datum of 1929 (NGVD).

"Flood stage" is the elevation at which the river leaves its banks. In 2008, the National Weather Service set 15 feet as the "action stage" and 16.5 feet as the "flood stage" at Cottage Grove. The Weather Services defines "action stage" as the level "where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity". Yards and parks are flooded when the river reaches a stage of 15 feet or an elevation of approximately 590 feet above sea level. Buildings are affected at approximately stage 18.0 or 593 feet above sea level.

The history of flooding prior to the Thornton Transitional Reservoir becoming operational is shown graphically in Figure 2-2. This figure also shows the relation between historic flooding and the post-Thornton Quarry Reservoir 10-, 50- and 100-year floods. For example, the June 2, 1989, flood crested at a stage of 18.6 which is the same as 593.6 feet above sea level, just below the newly rated 100-year flood level.

With the 2008 FEMA Flood Insurance Rate Map, the 100-year flood at Cottage Grove would reach an elevation of 593.7 feet above sea level. The 500-year flood is predicted to crest at an elevation of 596.6, 2.9 feet higher than the 100-year flood. As the river flows from east to west, flood elevations are higher in the east and lower in the west.

Figure 2-2 River Stages: Little Calumet River at Cottage Grove Avenue



Stage	Elevation	Event
	-- 596.0	Red Flood Response Level
	-- 595.5	11/27/90
	-- 595.2	6/14/81 and 9/14/2008
	-- 595.1	7/14/57
	-- 595.0	7/20/96 − Orange Flood Response Level
	-- 594.6	12/3/82
	-- 594.4	10/11/54
	-- 594.2	4/6/47
	-- 594.1	2/21/97
	-- 594.0	Water reaches buildings on Drexel − Yellow Flood Response Level
	− 593.7	12/25/65 and 12/31/72, 100-year Flood (2008 DFIRM)
	-- 593.6	6/2/89 and 4/18/13
	-- 593.3	5/13/2002
	-- 593.2	10/10/54, 590.1 5/29/96
	-- 593.0	Thorn Creek begins to cover 170th Street
	-- 592.9	3/5/79 and 2/24/85, Water covers Riverview and Drexel
	-- 592.7	12/27/65
	− 592.5	50-year Flood (2008 DFIRM)
	-- 592.0	Flood warning issued
	-- 591.5	National Weather Service's "flood stage"
	-- 590.9	10-year Flood (2008 DFIRM)
	-- 590.0	Water enters Veterans Park, National Weather Service's "action stage"

Note: Elevations are in the National Geodetic Vertical Datum of 1929 (NGVD), to be consistent with past records and the National Weather Service gage. The 2008 Flood Insurance Study and Flood Insurance Rate Map use the North American Vertical Datum of 1988 (NAVD). In NAVD, the 100-year flood is 593.4 at Cottage Grove Avenue, but that converts to 593.74 NGVD.

2.3.2 Areas Affected: The Village experiences different levels of flooding. Unlike other hazards, it can be predicted where a flood will go. Five color-coded flood response levels are used. The levels and the impact of a flood at each level are shown in Figure 2-3, below.

The relation between the levels and past floods are shown in Figure 2-2. The red level is roughly one-half foot higher than the highest flood in recent memory, the flood of November 1990, which crested at an elevation of 595.5 feet. The Village has prepared flood stage forecast maps that show the different areas covered by different flood levels. Maps of each level are available in the Flood Assistance Coordinator's office and are shown in Figure 2-4.

Figure 2-3 Flood Response Levels

	Yellow	Orange	Red	Purple	Black
Stage	19.0	20.0	21.0	23.0	25.0
Elevation	594.0	595.0	596.0	598.0	600.0
Frequency (2000 FIS) *	10-year	1996	1990	100-year	
Frequency (2008 FIS) *	100-year			500-year	
Number of homes affected **	21	83	284	1,925	4,514
Other structures affected **	11	21	30	120	239
Critical facilities affected **	0	1	3	14	38
Streets to be closed **	32	57	84	170	193

* The flood response levels do not change when new studies produce new 100-year flood levels.

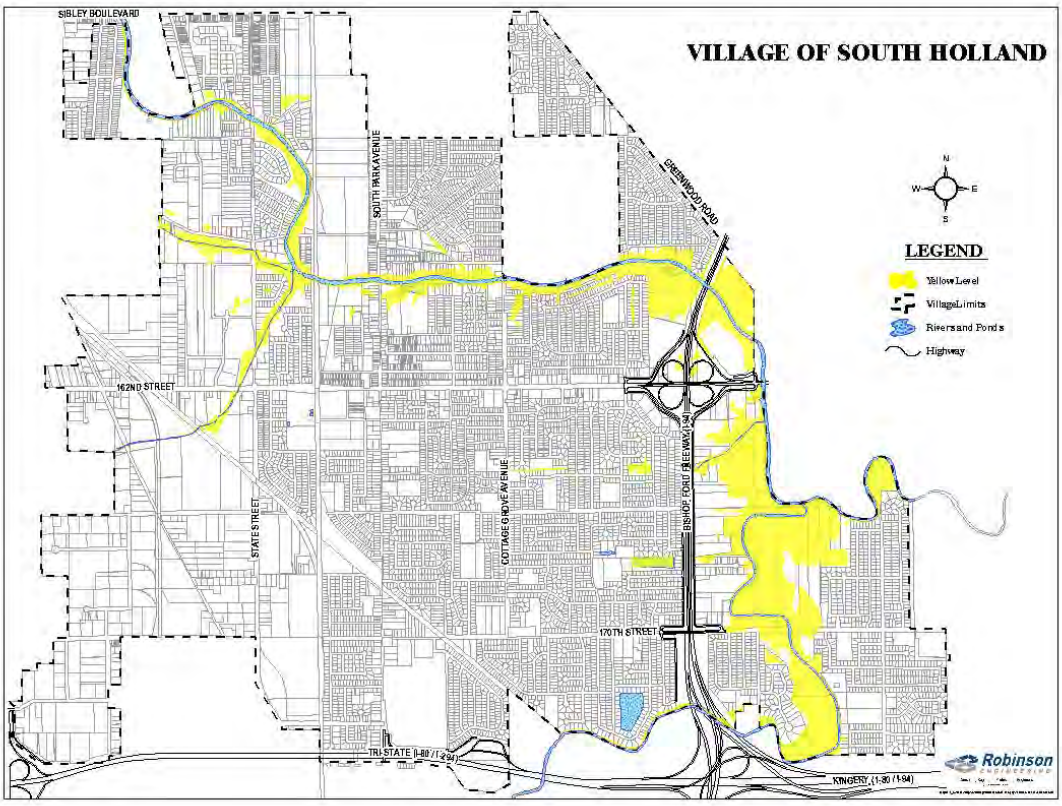
It should be noted that these levels are based on the elevation of flooding at the Cottage Grove gage. The Little Calumet River gage at Cottage Grove is used by the U.S. Geological Survey for recording river levels and by the National Weather Service for reporting predicted flood levels (which is discussed in Chapter 5).

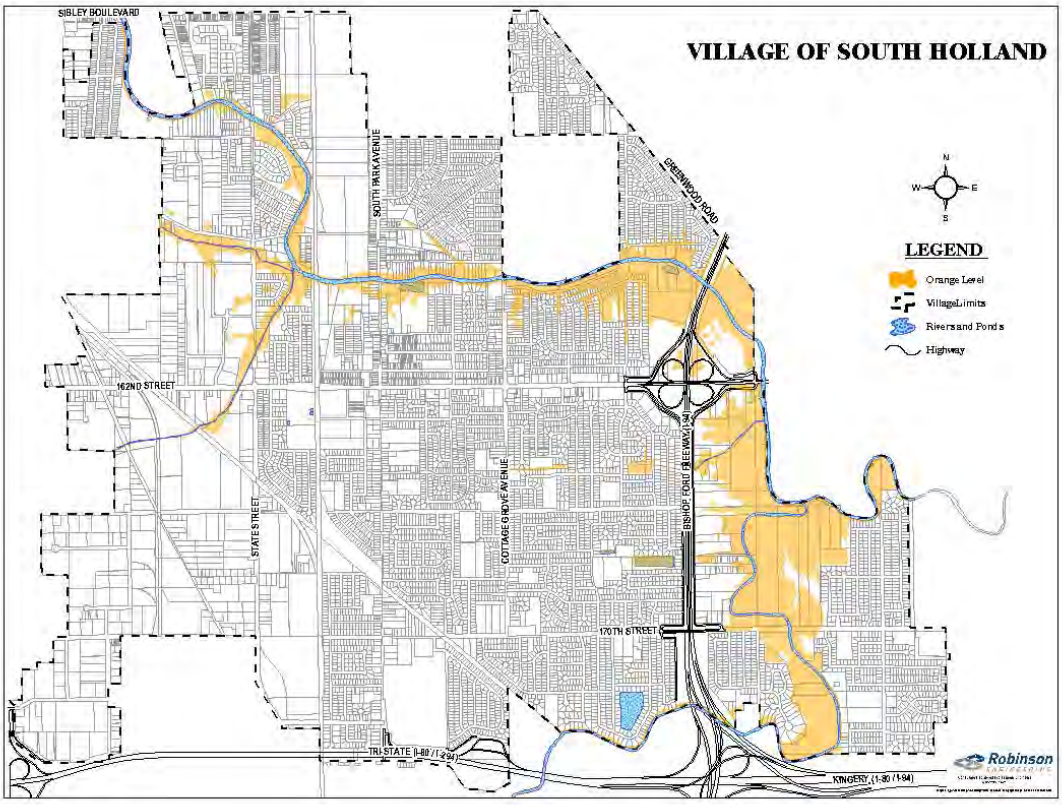
The area affected by the 100- year flood has been mapped on the 2008 Cook County Digital Flood Insurance Rate Map, effective August 19, 2008. The 2008 100-year floodplain falls between the area flooded by flood stage 18 and 19. The fact that the September 14, 2008 flood exceeded the 100-year flood level (and occurred after the Thornton Transitional Reservoir began operation) means that the Village should still pay attention to all possible hazards.

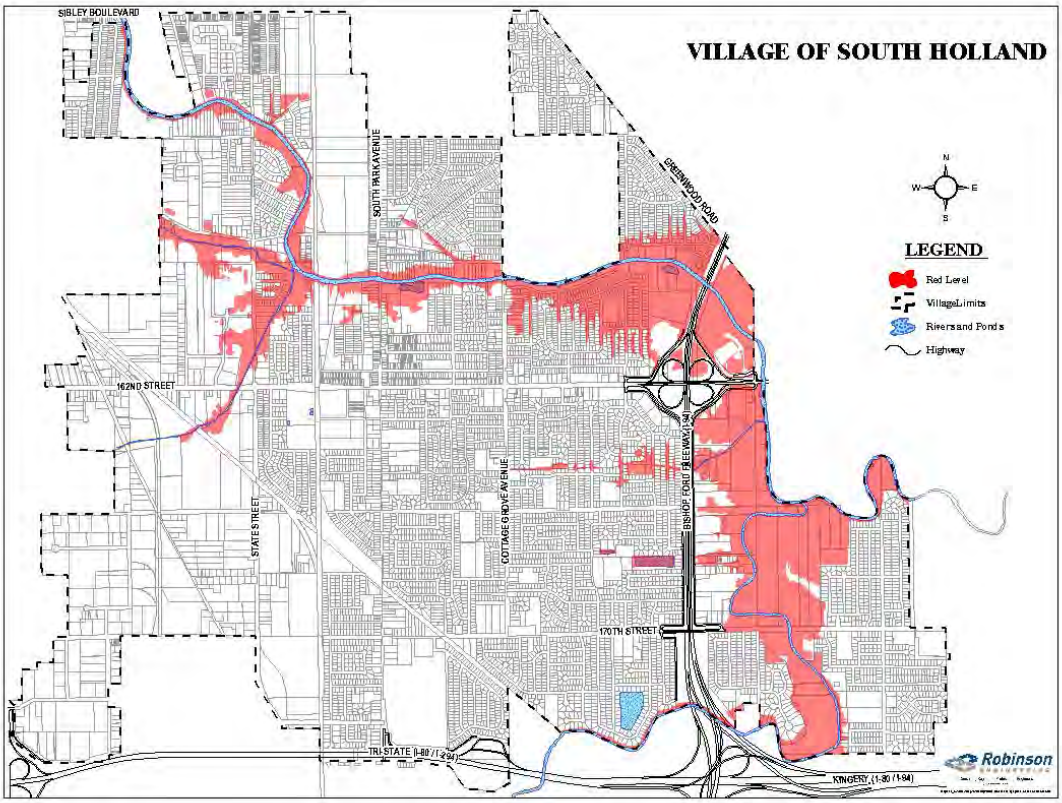
2.3.3 Velocities: Floods move slowly in this flat area. According to the South Holland Flood Insurance Study, the highest average floodway velocity during the 100-year flood is 2.5 feet per second. At most locations on the three streams, the 100-year velocities are less than two feet per second. On the Cal Union Ditch, velocities are less than one foot per second.

Velocity as a hazard is related to flood depth. For example, the common rule of thumb is that an adult can walk through a flooded area one foot deep and running at three feet per second or three feet deep moving at one foot per second. Most buildings can withstand velocities of up to five or six feet per second without structural damage. Therefore, the velocity hazard in South Holland is relatively low.

Figure 2-4 Yellow, Orange, Red, Purple, and Black Level Floodplains






VILLAGE OF SOUTH HOLLAND
SIBLEY BOULEVARD
SOUTH PARK AVENUE
GREENWOOD ROAD
162ND STREET
STATE STREET
COTTAGE GROVE AVENUE
BISHOP FORD FREEWAY (I-94)
170TH STREET
TRI-STATE (I-80 / I-294)
KINGERY (I-80 / I-94)
N
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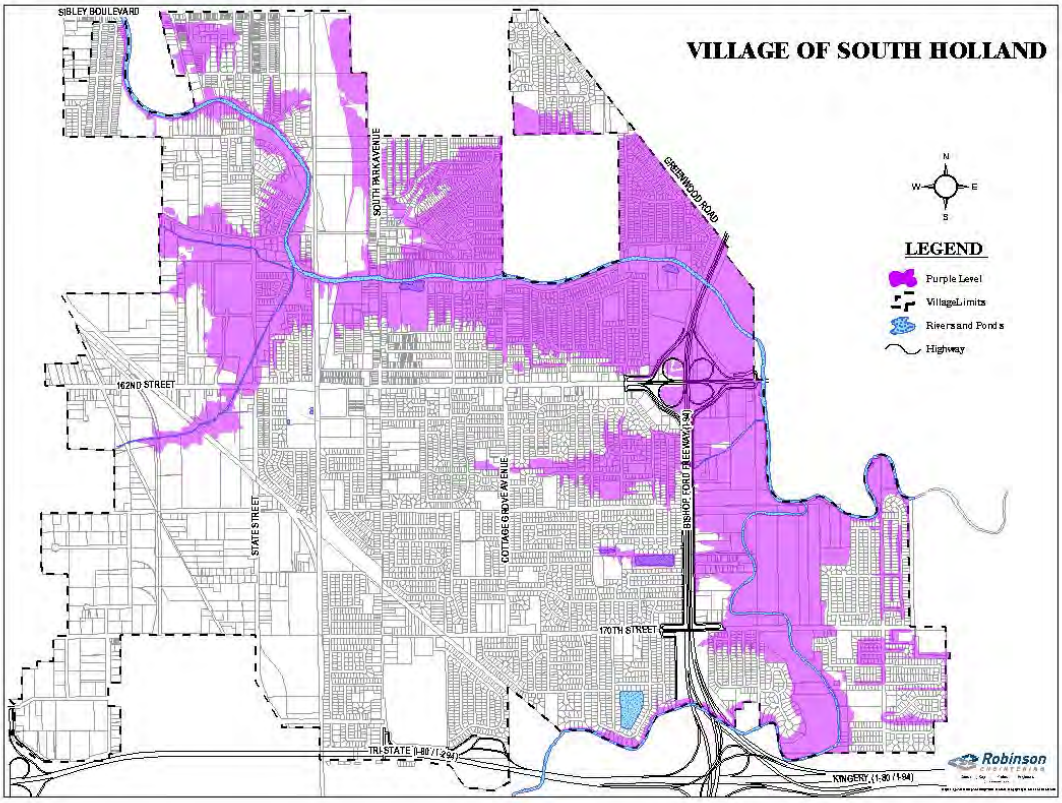
LEGEND
Red Level
VillageLimits
Riversand Ponds
Highway
Robinson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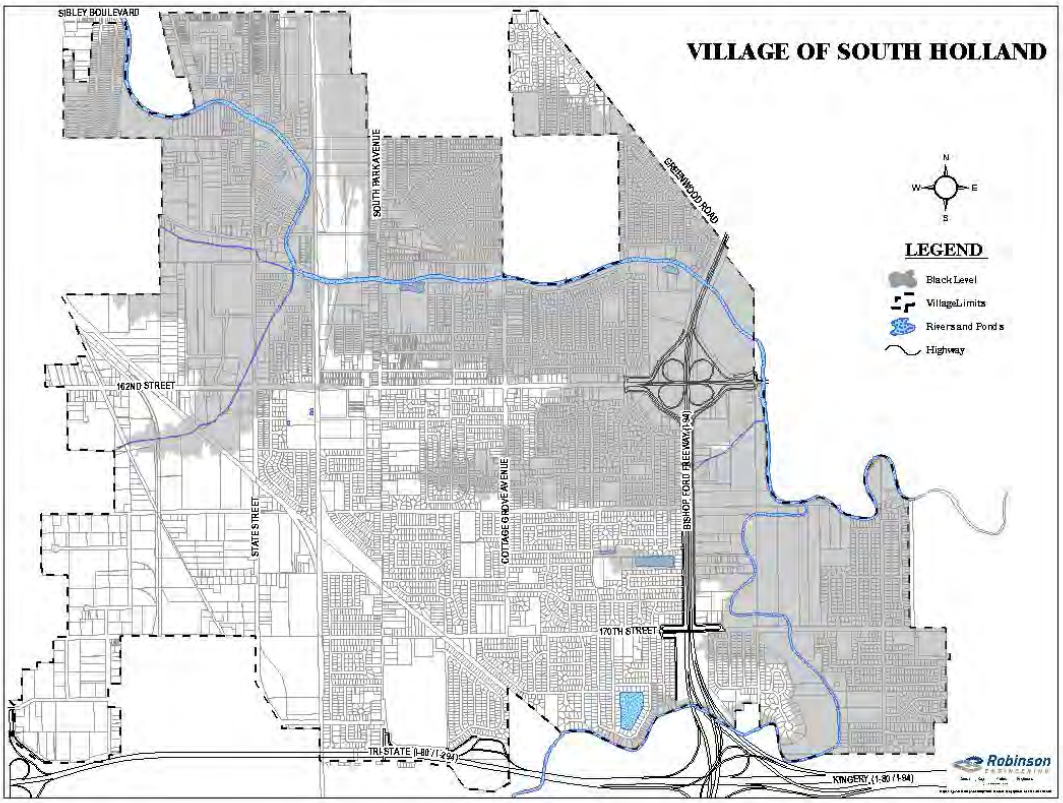
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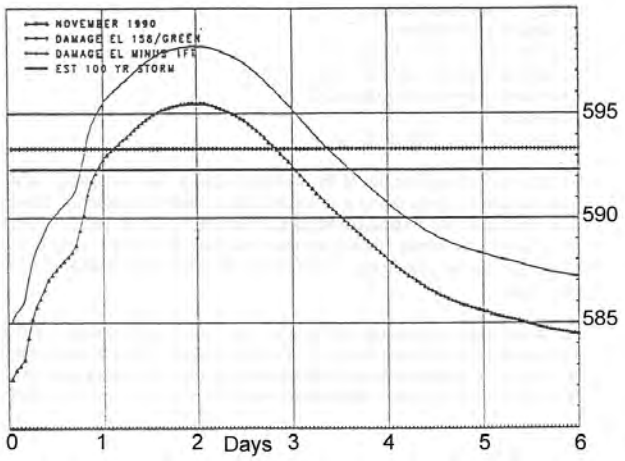
Block Level
Village Limits
Rivers and Ponds
Highway
Robinson

2.3.4 Rate of Rise and Duration:
Because of the urbanized watershed, stormwater runs off quickly. Figure 2-5 is a hydrograph of the 1990 flood. It shows that the 1990 storm caused overbank flooding to reach buildings in less than 24 hours. The river kept rising for another 24 hours.

Because of the flat terrain, it takes a while for the waters to recede. After the Little Cal crested in 1990, it took 24 hours to stop flooding houses and 2-3 more days to get back in its banks. In other words, the river was out of its banks for a total of five days and in buildings for two of those days.

Figure 2-5 Little Calumet River Hydrograph
Source: Dolton-South Holland Flood Study, Appendix 1, Robinson Engineering Ltd., 1992



2.4 Impact of Flooding

2.4.1 Building Damage: Dependable damage data on historic flooding is hard to obtain. The 1990 flood affected an estimated 400-500 buildings. In 1996 a count of buildings in the mapped 100-year floodplain was enabled with the new Geographic Information System. It was found that there were approximately 2,000 properties in the 100-year floodplain, according to the 1980 FIRM. A count following the issuance of the 2008 DFIRM found 45 houses and no commercial structures in the mapped 100-year floodplain.

After a review of flood loss estimates in the area and adjusting for inflation, it is estimated that it costs $28,000 to repair a home with an unfinished basement that was flooded with one foot of water over the first floor. This figure accounts for debris removal, cleaning, repairing the floors, replacing walls, insulation, wooden doors, electrical services, furnace, washer, dryer, and contents. It assumes no damage to the foundation, the garage or landscaping.

Extrapolating on this figure, a 100-year flood would cause $1,260,000 in damage to the 45 residential buildings. There would also be damage to utilities and public facilities, such as streets and parks, and loss of business due to flooded streets.

Critical Facilities: “Critical facilities” are those properties that, if flooded, would result in severe consequences to public health and safety. The Village’s Flood Warning and Response Plan identifies no critical facilities in the post-2008 Special Flood Hazard Area. However, there are 33 such facilities in the different flood levels, up to Level Black. These are listed in Figure 2-6. This list is subject to updating as property uses change.

Some facilities are critical because of the need to safeguard their occupants. It is relatively easy to evacuate schools with several hours flood warning time. However, it is a major decision to evacuate a nursing home because the move can be perilous to the residents. Other facilities, such as gas stations (even vacant ones) may contain hazardous materials that would increase the health and safety danger to the community if it was flooded.

Figure 2-6 Floodprone Critical Facilities		
Flood Level	**Facility**	**Address**
Orange	Eisenhower School	16001 Minerva Avenue
Red	Love's Travel Stop	1533 East 162nd Street
Red	Arden Courts	2045 East 170th Street
Red	Christ Our Savior Catholic School	900 East 154th Street
Red	Family Life Child Development Center	15924 South Park Avenue
Red	Madison School	15656 Orchid Drive
Red	Manor Care Health Services	2145 East 170th Street
Red	Paarlberg's Inc	1840 East l72nd Street
Red	Phoenix Court Residence	17312 Clyde Avenue
Red	South Suburban College	15800 State Street
Red	Windmill Nursing Pavilion	16000 Wabash Avenue
Black	Accurate Dispersions Bldg #1	192 West 155th Street
Black	Accurate Dispersions Bldg #2	189 West 155th Street
Black	Accurate Dispersions Bldg #3	15530 LaSalle Street
Black	Accurate Dispersions Bldg #4	15600 LaSalle Street
Black	American Piping Products, Inc.	15801 Van Drunen Road
Black	BP Products North America, Inc.	951 East 162nd Street
Black	Calderone Roofing	15815 Van Drunen Road
Black	Calvary Academy	16300 State Street
Black	Calvary Academy Day Care	16360 State Street
Black	Calvin Christian School	528 East 161st Place
Black	E.C.H.O. School	350 West 154th Street
Black	First Step Day Care	15045 State Street
Black	Gas Depot	15 East Sibley Blvd.
Black	Gurtler Industries, Inc.	15475 LaSalle Street
Black	Holland Terrace	15175 State Street
Black	Marathon	1144 East 162nd Street
Black	Martin Produce	160 West 154th Street
Black	Midwest Transit Equipment, Inc.	16725 Van Dam Road
Black	Protestant Reformed Christian School	16511 South Park Avenue
Black	South Holland Gas Mini Mart, Inc.	16200 State Street
Black	South Holland Marathon	151 West Sibley Blvd.
Black	Zion Buds of Promise Christian Academy & Day Care	14875 Wallace Avenue
	Aim National Lease	16055 Van Drunen Road
	Greenwood School	16801 Greenwood Avenue
	Happy Days Child Care Center	831 East 162nd Street
	Grease Monkey	720 East 162nd Street
	Tibstra House	271 East 161st Street

Another type of critical facility are streets and bridges. There are two railroad and eight road bridges across the Little Cal and Thorn Creek, all of which would be under water during the red flood response level flood. In 1990, the Bishop Ford Expressway (Interstate 94) was flooded and had to be closed temporarily. Streets are flooded at many locations, often before the bridges themselves are under water. A count of streets that will be closed at each of the five colored flood response levels is included in Figure 2-3.

While these locations are critical to traffic flows, early warning can result in barricades and traffic control that minimize the actual danger to people and property. On the other hand, blocked streets can prevent access to properties by emergency vehicles, increasing the threat to flooded and isolated properties. The 1975 Little Calumet Plan put a dollar figure on the cost of traffic disruption. Based on the driver's lost work time and vehicle operating costs and updated for inflation, it is estimated that each vehicle detoured costs $40.00 per hour.

2.4.3 Indirect Impacts: Floods cause other problems that aren't so easy to identify or measure. They disrupt businesses which must be closed when they are flooded, they lose their inventories, people can't get to them or the employees are busy protecting or cleaning up their flooded homes. Several South Holland businesses closed temporarily after the floods. After the 1990 flood, one of them closed for good, primarily because of the cost of flooding to the building and inventory.

Besides the lost income, there are costs to fight the floods, find temporary housing, and clean up. Repetitively flooded areas tend to deteriorate over time and property values go down.

Three general types of health problems accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the stormwater runoff picked up, including dirt, oil, and farm and industrial chemicals. In the 1990 flood, one nearby community found PCBs after the waters receded.

The second health problem comes after the water is gone. Stagnant pools become mosquito breeding grounds and wet, uncleaned, areas of a building breed mold and mildew. A house that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.

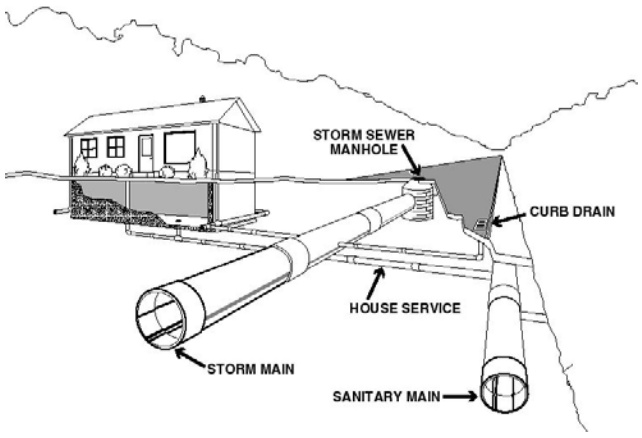
The third problem is the long term psychological impact of having been through a flood, seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flooded home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated health and mental health problems.

2.5 Sewer Backup

2.5.1 Causes: Too much stormwater can overload a sewer. With no place to go, sewers back up and flow out of the lowest opening in the sewer line. Figure 2-7 shows that sanitary sewers back up into basements and storm sewers back up into streets.

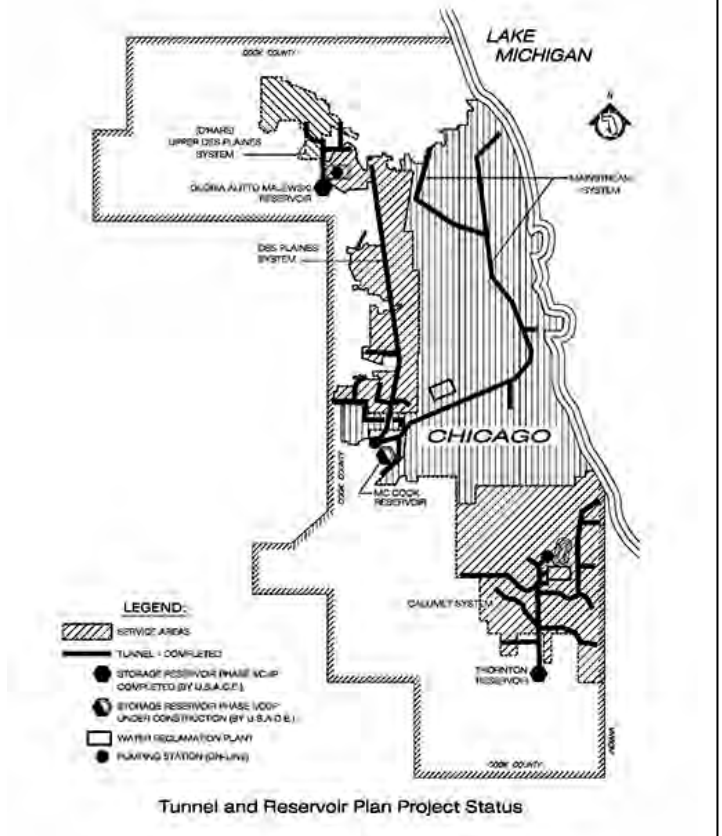
Most of South Holland is served by separate storm and sanitary sewers, as shown in Figure 2-7. Storm sewers are supposed to take stormwater. Too much stormwater backing up into the streets is a nuisance, but not a major problem. Sanitary sewers are not supposed to take stormwater. Increased flows in sanitary sewers increase the cost of treatment. Overloaded sanitary sewers backing up into basements are a major problem in property damage and health hazards.

Figure 2-7 Storm and Sanitary Sewer Schematic



Stormwater enters sanitary sewers through cracks in the pipes or manholes, deteriorating pipes and joints, breaks in nearby storm sewers, cross connections to storm sewers, and direct connections to downspouts, sump pumps, and driveway drains. "Infiltration" is groundwater entering the sewers through cracks. "Inflow" is stormwater directly entering the sanitary sewers from other sources. Infiltration and inflow ("I/I") results in flooded basements in those areas served by separate sewers.

Figure 2-8 Tunnel and Reservoir Plan Map



The older parts of South Holland are served by combined storm and sanitary sewers. Stormwater is supposed to enter the combined sewers but these systems can be overloaded also. Now that the Thornton Composite Reservoir portion of the Tunnel and Reservoir Plan (TARP) project is complete, the combined sewers should be better equipped to handle wet weather flows. The high flows are now stored in the Thornton Composite Reservoir and stormwater that has been diverted to this location is pumped to the Calumet Water Reclamation Plant for treatment.

2.5.2 Areas Affected: Sewer backups can occur during very localized storms in any part of the Village. While many basements were flooded during the November 1990 storm and flood, many have flooded at other times. Two separate storm events on July 29 and August 20 of 2016 resulted in over 100 properties experiencing flooding due to sewer backups. Although there have not been any major sewer improvement projects in the last 20 years, the Village has attempted to mitigate sewer backups through the flood protection rebate program. Through this program, the Village has funded projects that included the installation of overhead sewers or backup valves in Village homes.

2.5.3 Impact: Backed up sewers cause two types of damage. By getting items wet with dirty water, it can effectively destroy many basement contents. Finished basements, with carpeting and furniture, are especially susceptible to damage. Even in unfinished basements, water damages washing machines, dryers, furnaces, water heaters, etc.

The second type of damage comes from the sewage in the water. Backed up sewers create a significant health problem, even in empty basements. Clean up must be careful and thorough to ensure there are no lingering hazards. The health, mental health, and noneconomic impacts are similar to those described for overbank flooding in Section 2.4.3.

2.6 Local Drainage and Ponding

2.6.1 Causes: Stormwater flows downhill to the ditches and rivers. This is difficult to do in very flat areas. Rain runoff flows to the nearest depression and collects until it can evaporate or soak into the ground. Heavy rains or saturated grounds overload this drainage pattern and the water sits for hours or days. This is called “ponding” and is a common problem in flat Illinois.

Another source of local drainage problems is backed up storm sewers. Storm sewers are installed to drain streets and ponding areas. When they are blocked or overloaded by heavy rains, the drainage system is plugged. Again, stormwater sits for hours or days, waiting for the sewers to clear. Both of these types of drainage problems occur throughout the Village. They are not limited to the floodplain.

2.6.2 Areas Affected: As with sewer backups, ponding can occur during very localized storms in any part of the Village.

2.6.3 Impact: Many consider flooded streets and yards as nuisance flooding. Generally, the water does not reach or damage a building. In some cases, yard ponding will cause or aggravate basement flooding. Street ponding is usually not severe enough to close a street to traffic, at least not to emergency vehicles.

2.7 Flood Insurance Claims and Repetitive Losses

2.7.1 Flood Insurance Claims: The National Flood Insurance Program (NFIP) provided the Liaison Committee with a list of insurance claims for the period 1978-2016. During that time, FEMA has paid 482 claims for a total of $2,319,000. The amount of claim payments ranged from $20 to $52,000. The average payment was $4,800.

The number of claims and average payments for the major floods are shown in Figure 2-9. Note that the height of the floods did not differ much. However, the average payment for the floods with a stage of 20 or higher went up. This reflects the rising cost of flood damage over the years. The increase in the number of claims for these floods is also significant. It reflects the increased amount of flood insurance coverage, which is likely due in part to the Village's public information efforts, since the floodplain boundary did not change from 1980 to 2008.

Figure 2-9 Flood Insurance Claim Payments

Flood	Flood Stage	Claims Paid	Average Payment
June 1981	20.2	16	$2,812
December 1982	19.6	14	$4,096
July 1983		11	$3,268
November 1990	20.5	38	$5,304
July 1996	20.0	49	$4,452
July 2003		48	$3,337
October 2006		15	$3,665
January 2008		13	$4,687
September 2008	20.2	159	$6,465
April 2013	18.4	14	$5,850

2.7.2. Repetitive Losses: A "repetitive loss property" is one which has received two flood insurance claim payments for at least $1,000 each over any ten-year period since 1978. These properties are important to the National Flood Insurance Program (NFIP) because almost $12.5 billion have been paid to repetitive loss properties. Currently, repetitive loss properties are approximately 1% of all policies, but they account for about 25-30% of all NFIP claims.

South Holland has 17 repetitive loss properties. The number of repetitive loss properties has decreased from 40 to 17 since the last Plan update.

The 17 properties have been grouped into 15 repetitive loss areas, which are listed in Figure 2-10. The addresses of the repetitive loss properties cannot be made public due to the Privacy Act. However, there is a need to plot the areas around the repetitive loss properties, including those properties that are similarly situated, but for whatever reason have not made it to FEMA's list (e.g., no flood insurance policy at the time of the first flood).

Figure 2-10 Repetitive Loss Areas

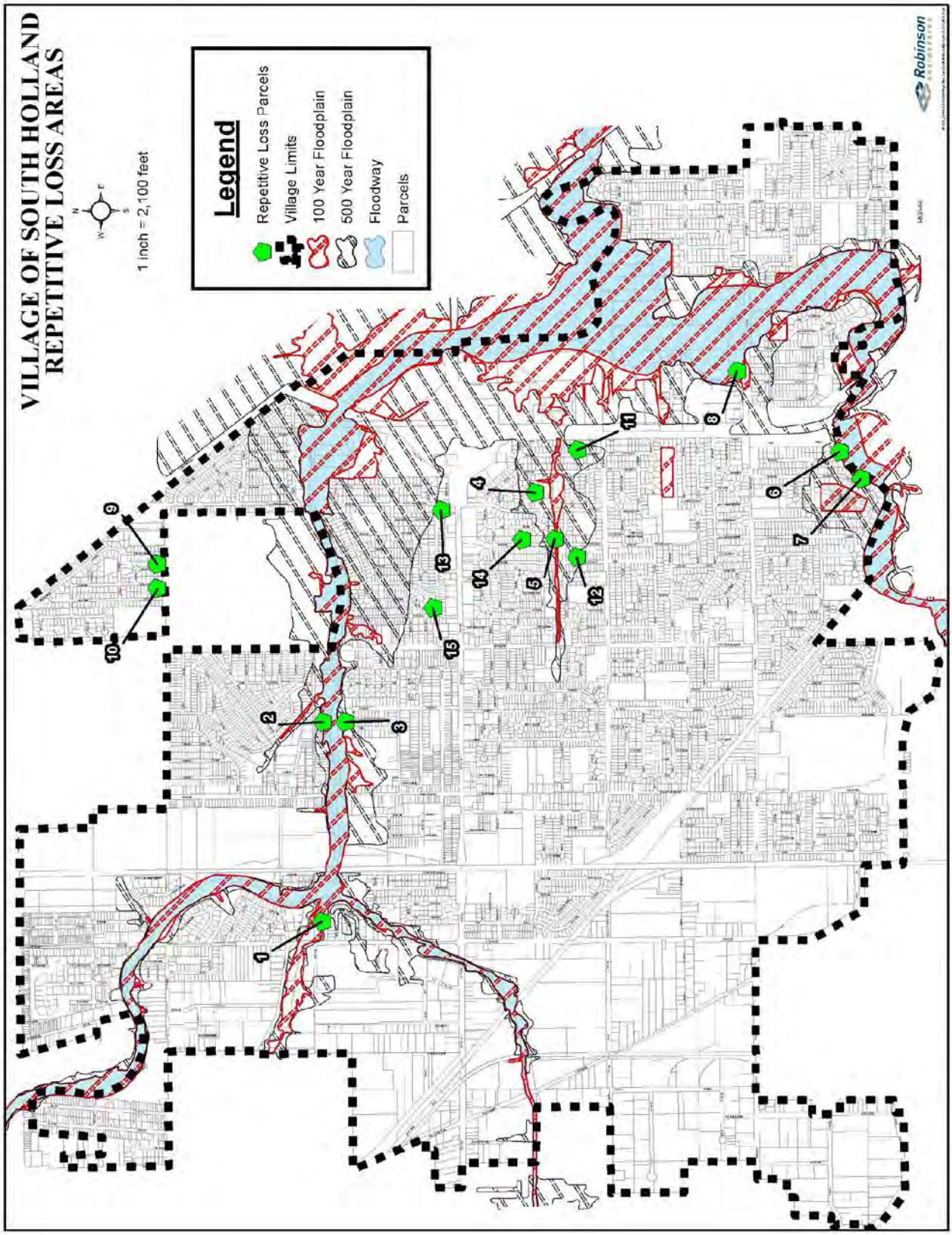


Figure 2-11 includes the 17 FEMA repetitive loss properties, neighboring properties that have had claims (but do not meet the threshold required for a repetitive loss property designation), and other nearby properties with similar flooding conditions.

In all, there are 84 properties in South Holland's 15 repetitive loss areas. 5 of the 15 areas have only one property, as the building is particularly low or otherwise exposed to flooding that does not reach its neighbors.

Figure 2-11 Repetitive Loss Areas

Map #	Cause of repetitive flooding	Number of Properties			
		FEMA List	Other Claims	Neigh-boring	Total
1	Overbank from Little Calumet River	1			1
2	Overbank from Little Calumet River	1	8	8	17
3	Overbank from Little Calumet River	1	2	4	7
4	Local drainage/overbank from Thorn Ditch	3	2	5	10
5	Local drainage/overbank from Thorn Ditch	1	8	1	10
6	Overbank from Thorn Creek	1	1	2	4
7	Overbank from Thorn Creek	1		7	8
8	Overbank from Thorn Creek	1		1	2
9	Local drainage/sewer backup	1			1
10	Local drainage/sewer backup	1			1
11	Local drainage/overbank from Thorn Ditch	1		5	6
12	Local drainage/overbank from Thorn Ditch	1	5	6	12
13	Local drainage/sewer backup	1	2		3
14	Local drainage/sewer backup	1			1
15	Local drainage/sewer backup	1			1
	Total Unmitigated Properties	17	28	39	84

Table 2-12 summarizes the repetitive loss data by source of flooding.

Figure 2-12 Repetitive Flooding Sources

Flooding Source	Areas	Properties
Overbank from Little Calumet River	3	22
Overbank from Thorn Creek	3	11
Local drainage/overbank from Thorn Ditch	6	32
Local drainage/sewer backup (outside floodplain)	5	2
Total (unmitigated)	17	67

The Department of Planning, Development and Code Enforcement has the complete list of addresses, which cannot be included in this plan because of the Privacy Act. A requirement of participating in the Community Rating System is that all 84 properties be sent a notice each year that advises the occupant of the repetitive flood hazard and provides ideas on how the property can be protected.

2.7.3. Repetitive Loss Mitigation: It should be noted that the Village has worked diligently to mitigate the damage caused by repetitive flooding. The major projects have been the Thornton

Transitional Reservoir, which has reduced flooding on Thorn Creek and the Little Calumet River (covered in Chapter 4) and the Flood Assistance Program and rebate which focuses on reducing shallow drainage and sewer backup problems (covered in Chapter 7). This *Floodplain Management Plan* is, in effect, a repetitive loss mitigation plan.

2.8 Conclusions and Planning Considerations

Chapter 2 summarizes South Holland's three types of flood problems. The summary is based on available information. While some of the data regarding ponding may be incomplete, the information does show some patterns that are important to the design of a floodplain management plan. The key considerations are:

a. South Holland is subject to several different types of surface and sewer flooding problems during and after storms. These problems result in property damage, economic disruption, and health and mental health repercussions. A comprehensive floodplain management program should address all three types of problems.

b. While flooding affects areas throughout the Village, those closest to the Little Calumet River and its two tributaries are subject to the deepest flooding. Therefore, a flood protection program should put those properties shown in the Yellow flood response level floodplain in Figure 2-4 as a high priority.

c. While it is not as damaging to property, sewer backup flooding is more frequent and presents just as great a health hazard. Therefore, a flood protection program should put sewer backup protection as a high priority.

d. The severity of the next flood cannot be predicted. Therefore, to provide a sufficient level of protection and to be consistent with other programs, the Village should prepare a plan based on protecting property to the 100-year flood level. Critical facilities should be protected to the 500-year flood level, which equates to the purple level of flooding.

e. South Holland's floods have a short and long-term impact on physical health and mental health. A flood protection program should address these concerns in addition to protecting buildings, streets, and public facilities.

f. Flooding in South Holland should not be a life-threatening situation. However, people have died during floods in neighboring communities due to carelessness. A flood protection program should include an information or education element to prepare people for the threat to life.

g. A flood protection program should include measures to protect new construction from increased damage expected from future flooding.

h. Repetitive flooding is a problem for both the Village and the National Flood Insurance Program. This *Floodplain Management Plan* should be considered as the official repetitive loss plan needed for Community Rating System recognition.

2.9 References

- Dolton-South Holland Flood Study, Robinson Engineering, Ltd. 1992.
- Flood insurance claims records, Federal Emergency Management Agency, 2016.
- Flood Insurance Rate Map, Cook County, Illinois, Federal Emergency Management Agency, 2008.
- Flood Insurance Study, Cook County, Illinois, Federal Emergency Management Agency, 2008.
- Floodwater Management Plan and Environmental Assessment, Little Calumet River, Little Calumet River Steering Committee, 1975.
- Our Community and Flooding, Resource Coordination Policy Committee, 1991, updated, October 1998.
- Repetitive flood insurance claims records, Federal Emergency Management Agency, 2016.
- Sanitary Sewer Update, South Holland Public Works Department, undated.
- Tunnel and Reservoir Plan, Metropolitan Water Reclamation District of Greater Chicago, 2017.
- Village of South Holland Flood Warning and Response Plan, Village of South Holland, 2017.

Chapter 3. Goals

Goals are needed for this planning effort to guide the review of the possible floodplain management measures. This Plan needs to ensure that the recommended actions are appropriate for the Village of South Holland. Goals need to reflect community priorities and be consistent with other plans for the Village.

3.1. 1996 Goals

The original 1994 *Floodplain Management Plan* did not have a goals statement. This shortcoming was corrected in 1996 when the Village Board adopted six original goals for the plan:

> Whereas, the Village of South Holland has been conducting floodplain management planning since March 1993 and adopted its *Floodplain Management Plan* on May 2, 1994; and
>
> Whereas, during this process our planning goals were implicitly understood by those participating in the process; and
>
> Whereas, it is advisable that the Village's Floodplain Management Planning Goals be explicitly stated to ensure that all participants are in agreement;
>
> Now, therefore, be it resolved by the President and Board of Trustees of the Village of South Holland, that the Village's Floodplain Management Planning Goals shall be as follows:
>
> 1. It is the Village's ultimate goal to reduce and prevent flood losses from overbank flooding, sewer backup and local drainage and ponding.
> 2. The most effective long-range solution to our overbank flooding problem is conversion of the Thornton Quarry to be a flood control reservoir. However, there is no assurance as to when and if it will be built.
> 3. Therefore, it is the Village's goal to pursue all other feasible means to reduce the damage from overbank flooding. The Village's plan to reach this goal is spelled out in our *Floodplain Management Plan*, May 2, 1994, as amended.
> 4. Many of the activities spelled out in the *Floodplain Management Plan* require the cooperation of individual property owners. Therefore, it is the Village's goal to provide them with technical assistance for self-help activities, assist them with rebates to help finance the activities, and to involve them in the planning process through representation on the Liaison Committee.
> 5. It must be noted that the Village has other goals, such as economic development, that may run counter to these floodplain management goals. The Board of Trustees is the ultimate decider as to which goals shall take precedence.
> 6. Floodplain management planning is a continuing process. The Village's Flood Liaison Committee will continue to meet on a regular basis and review floodplain management activities, assess their effectiveness, and recommend to the Board and Village staff. Improvements to those activities and revisions to the *Plan*.

3.2. 2000 Goals

In 2000, the 1996 goals were replaced by five more specific goals:

1. The threat of major flooding from the Little Calumet River and its tributaries should be reduced by construction of the Thornton Quarry Reservoir.

2. The Village should assist floodprone property owners to protect themselves from minor flood problems, such as local drainage and sewer backup.

3. All Village residents should be aware of the flood hazards they face throughout the community, what the Village is doing about them, and how they can support the Village's efforts to prevent and reduce flood losses.

4. The Village should provide residents with information, early flood warning, technical assistance and, where appropriate, financial assistance so they can be better prepared for all types of flood hazards.

5. The Village should use all of its regulatory authority, powers of persuasion, development programs, and drainage system maintenance efforts to prevent flood, drainage and sewer problems from getting worse.

3.3. 2005 Goals

In 2005, the Flood Liaison Committee determined that the Goals 2000 were still relevant, but the first goal has become outdated because the reservoir had been completed. Accordingly, Goal 1 was replaced by:

1. Floodplain development regulations, flood insurance rules, emergency response planning, and related activities should be based on the actual flood hazard, so official maps should be revised as soon as possible to reflect the flood protection provided by the Thornton Transitional Reservoir.

3.4. 2010 Goals

In 2010, the Flood Liaison Committee adopted the following revised goals statement:

1. Floodplain development regulations, flood insurance rules, emergency response planning, and related activities should be based on the actual flood hazard, so official maps should be revised as soon as possible to reflect the flood protection provided by the Thornton Transitional Reservoir.

2. The Village should assist flood prone property owners to protect themselves from minor flood problems, such as local drainage and sewer backup.

3. All Village residents should be aware of the flood hazards they face throughout the community, what the Village is doing about them, and how they can support the Village's efforts to prevent and reduce flood losses.

4. The Village should provide residents with information, early flood warning, technical assistance and, where appropriate, financial assistance so they can be better prepared for all types of flood hazards.

5. The Village should use all of its regulatory authority, powers of persuasion, development programs, and drainage system maintenance efforts to prevent flood, drainage and sewer problems from getting worse.

6. The Village should remain in the National Flood Insurance Program and improve its class in the Community Rating System.

3.5. 2017 Goals

In 2017, the Flood Liaison Committee determined that the 2010 Goals were still relevant. The first goal, to update the official maps to reflect the flood protection provided by the now complete Thornton Transitional Reservoir, has been achieved, so that goal has been eliminated. Based on review comments provided by MWRDGC during their review of the draft plan, a new goal related to potential grant funding, was created. The 2017 goals are as follows:

1. The Village should look for potential funding opportunities through the FEMA and IEPA grant programs.

2. The Village should continue to assist flood prone property owners to protect themselves from minor flood problems, such as local drainage and sewer backup.

3. All Village residents should be aware of the flood hazards they face throughout the community, what the Village is doing about them, and how they can support the Village's efforts to prevent and reduce flood losses.

4. The Village should provide residents with information, early flood warning, technical assistance and, where appropriate, financial assistance so they can be better prepared for all types of flood hazards.

5. The Village should use all of its regulatory authority, powers of persuasion, development programs, and drainage system maintenance efforts to prevent flood, drainage and sewer problems from getting worse.

6. The Village should remain in the National Flood Insurance Program and work to improve its class in the Community Rating System.

Chapter 4. Flood Control

As noted by their name, flood control measures control floodwaters and keep them from reaching damageable property. They are also called "structural" measures because they involve construction of man-made structures to affect surface water flows. There are seven general categories of flood control projects which were reviewed by the Flood Liaison Committee:

4.1 Levees and floodwalls
4.2 Reservoirs
4.3 Diversions
4.4 Channel improvements
4.5 Sewer improvements
4.6 Control gates
4.7 Runoff controls

There have been several flood control studies on the Little Calumet River system and on South Holland's sewer problems. They include the 1975 Little Calumet River Floodwater Management Plan, by the Little Calumet River Steering Committee, Dolton-South Holland Flood Study, by Robinson Engineering, Ltd. in 1992, Village of South Holland Sewer System Evaluation Report, by Robinson Engineering, Ltd. in 1987 and updated in 1992 and Little Calumet Detailed Watershed Plan (DWP), by MWRDGC in 2010. Most parts of the 1975 Little Calumet plan and the 1987 sewer system report have been or are being implemented.

This section reviews the seven flood control alternatives and what these studies have concluded about the feasibility of their use in South Holland.

4.1 Levees and Floodwalls

4.1.1 General: Probably the most common flood control measure is to erect a barrier of earth (levee) or concrete (floodwall) between the river and the property to be protected. Levees and walls must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Levees and floodwalls are appropriate for protecting existing development without disrupting it. Where a levee or floodwall protects more than one property, it should be publicly owned. Levees required a lot of room to fit between the river and the area to be protected. If space is a constraint, more expensive floodwalls are used. Both must be set back out of the floodway so they will not push floodwater onto other properties.

Large floods can overtop levees or floodwalls and inundate properties thought to be protected. If a levee or floodwall fails, the sudden rush of flood water can endanger lives and may cause greater damage than having no flood barrier at all. They can be barriers to access and views, too. There are continued operation and maintenance costs to ensure the pumps work and that the levees do not slump or develop holes from animals or roots.

Larger levees or floodwalls usually cost so much that they cannot be built without state or federal aid. Flood control agencies require that the benefits of a major project exceed the cost. This allows them to protect the major concentrations of flooded property in urban areas. However,

where development is scattered or aligned in narrow strips along the river, the cost often exceeds the benefits of protecting a smaller number of properties.

4.1.2 Use in the Area: The 1975 Little Cal plan reviewed the feasibility of levees and floodwalls. It was concluded that they would only be cost effective in Indiana where there was more room between the channel and the buildings. The U.S. Army Corps of Engineers has subsequently completed construction of approximately 25 miles of levees and floodwalls along the Little Cal to protect Gary, Griffith, Hammond, Highland and Munster. Other projects were recommended for protecting the Illinois portion (see discussion in 4.2 Reservoirs and 4.4 Channel Improvements).

In the late 1980's neighboring Lansing and Calumet City constructed small levees on the Little Cal to protect their floodplains. They were successful during subsequent floods, although there were reports of some water splashing over the tops in 1990. In 2016 Lansing invested in extensive floodwall repairs and earthen berm restoration along 1.5 miles of their existing system.

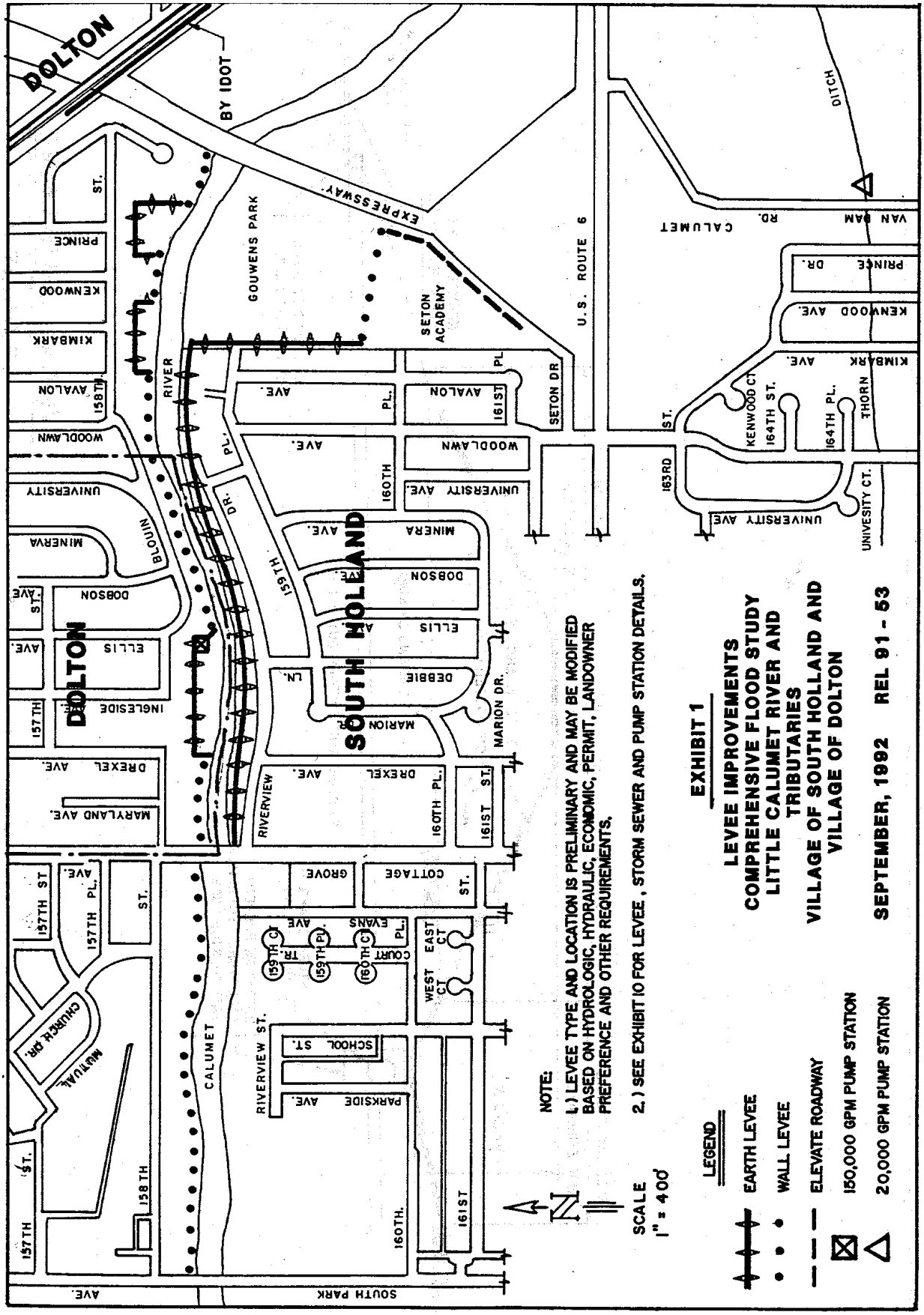
The Illinois Department of Transportation, Division of Water Resources, was planning to assist Dolton with raising an abandoned railroad embankment. The result would act as a levee and protect 80 homes across the Little Calumet River from South Holland. However, this project is not expected to be pursued. As with the Calumet City and Lansing levees, this one would not provide 100-year flood protection.

4.1.3 1992 Levee Proposal: The 1992 Robinson study looked at three levels of levee protection: 500-year, 100-year and 50-year. The most cost effective would be a less than 100-year earthen levee to protect the Riverview Drive residents in South Holland. At its ends, it would be tied to elevated roadways at Cottage Grove and the Calumet Expressway frontage road. Levees and floodwalls (where there is no room for a levee) would protect South Holland and Dolton residents on the north side of the river. The proposed alignment is shown in Figure 4-1.

The proposed levee would protect the areas hardest hit by the 1990 flood from a recurrence of a flood of that level. As seen in Figure 4-1, the plans account for internal drainage and backflow under the levee through the storm sewers. However, the proposal had the following concerns noted by Robinson:

- Many property owners would need to provide easements.
- Lack of room would mandate slow progress and possible removal of porches, decks, etc.
- Some of the natural scenic areas along the river would be altered.
- Permits would be required from many agencies.
- Residents may falsely believe that they are protected from any flood and would not continue to take needed flood protection precautions.
- It would not provide 100-year protection nor would its construction result in a change to the Flood Insurance Rate Map. Flood insurance would still be required as a condition of a loan and floodplain regulations would still be in effect in the protected area.
- The reduction in flood damage could affect the benefit-cost calculations needed to justify the Thornton Transitional Reservoir (see Section 4.2.3). For this reason, it was opposed by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC).

Figure 4-1 Proposed Levee and Floodwall



Source: Dolton-South Holland Flood Study, Robinson Engineering, Ltd., 1992

The cost of this proposal and related pump stations and backflow gates was estimated to be $5.3 million. There would also be continued maintenance expenses. The benefits derived from the project would be negated when the Thornton Transitional Reservoir was built (see Section 4.2.3). It was calculated that if the Reservoir was built before 2012, then the levee would cost more than it would be worth when only direct economic costs are counted.

4.2 Reservoirs

4.2.1 General: Reservoirs control flooding by holding high flows behind dams or in basins. After the flood peaks, water is let out slowly at a rate that the river can handle. The lake created may provide recreational or water supply benefits and dry basins can double as parks or other open space uses.

Reservoirs are appropriate for protecting existing development without disrupting it. They are most efficient in deeper valleys where there is more room to store water or on smaller rivers where there is less water to store. They are often infeasible in flat areas because so much land is needed.

As with levees and floodwalls, reservoirs usually cost so much that they cannot be built without state or federal aid. There are also continued operation and maintenance costs. Higher dams become safety hazards if poorly maintained or when upstream flood flows exceed design capacity.

4.2.2 Use in the Area: Reservoirs were the most popular recommendation in the 1975 Little Calumet plan. All four of the reservoirs proposed by the plan have been built. One of them, the Edward C. Howell structure in Markham, was completed in 1987. It reduces the flood flows into the Calumet Union Drainage Ditch. It cost $5.6 million.

4.2.3 Thornton Transitional Reservoir: One way to save money on a reservoir is to obtain a storage basin that has already been dug. The Thornton Quarry was proposed for purchase in the 1975 Little Calumet plan. Due to its proximity to Thorn Creek, just upstream of South Holland, it would provide a ready-made storage reservoir. It was the most expensive part of the Little Cal plan with an estimated acquisition and construction cost of over $77 million.

The quarry was subsequently proposed as a storage basin to support the MWRDGC's Deep Tunnel in the U.S. Army Corps of Engineers' Chicago Underflow Plan. The project combined the Little Cal plan's surface flood protection program with the Deep Tunnel sewer system program.

This project was built in several stages by the MWRDGC with funding support from the Corps and the US Natural Resources Conservation Service. The first stage included construction of the Thorn Creek overflow and conveyance system to direct floodwater to the West Lobe of Thornton Quarry. This transitional reservoir came online in 2003 and provides storage of up to 3.1 billion gallons of floodwater. Following a storm event, the reservoir is drained through an 8-foot diameter tunnel for pumping to the Calumet Water Reclamation Plant for treatment and eventual discharge to the Little Calumet River.

Figure 4-2 Thornton Transitional Reservoir

High flows from Thorn Creek flow through a diversion inlet structure, drop 230 feet down a 24-foot diameter shaft, and flow through an 8,000-foot long, 22-foot diameter diversion tunnel into the west lobe reservoir.

The intake structure, normal flow on Thorn Creek

The intake structure, high flow on Thorn Creek

The west lobe of the Thornton Quarry, home of the Transitional Reservoir

The west lobe, half full of floodwater in 2003

Photos courtesy of MWRDGC

The Thornton Transitional Reservoir provides overbank flood relief for 9 communities and has captured 36 BG of flood water during 56 fill events. The Corps of Engineers estimated that the Thornton Transitional Reservoir would reduce $135,000 average annual damage to $300.

The second stage of this project included the construction of the Thornton Composite Reservoir, a permanent 7.9 billion gallon reservoir, located in the North Lobe of the Thornton Quarry. This reservoir was completed in the fall of 2015 and is estimated to provide $40 million per year in benefits to 556,000 people in 14 communities. In its first year of operation, it captured more than 4.5 BG of polluted water.

4.3 Diversions

4.3.1 General: A diversion is simply a new channel that sends water to a different location. Where a stream runs near a large body of water, such as a lake, the ocean, or a larger river, a diversion of high flows to that body can be a cost-effective flood control measure. Diversions can be surface channels, overflow weirs, or tunnels.

Diversions are limited by topography; they won't work everywhere. The receiving body has to be relatively close to the river and the land in between should be low and vacant. Otherwise, the cost can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is required.

4.3.2 Use in the Area: The South Suburbs' flatness and numerous ditches make diversions feasible in the watershed. The 1975 Little Calumet plan included two diversion channels to connect ditches to the Cal-Sag channel. However, the projects were replaced by larger storm sewer projects.

4.3.3 1992 Diversion Tunnel Proposal: The 1992 Robinson study looked at a diversion tunnel as an alternative to the levee discussed in Section 4.1.3. Two options were proposed. They would run from the northeast of the Calumet Expressway - 159th Street interchange north to the North Branch of the Little Calumet. The North Branch channel is ten times larger than the South Branch which flows through South Holland so it would be able to absorb the diverted flows. The project would be 12,000 feet long and carry 5,000 cubic feet per second.

The first option would utilize the relatively open area along the Calumet Expressway/Bishop Ford to provide a 4,000-foot surface channel. An 8,000-foot tunnel would be needed to complete the diversion under railroad tracks and other development. The second option would be a 12,000-foot tunnel to minimize disruption to the neighborhoods and make for easier maintenance. In both cases, the tunnels would be 75 feet deep and 25 feet in diameter. Siphons would negate the need for pumps, except to dewater the tunnel for maintenance.

The proposed diversion tunnel had several advantages over the levee:

- There would be less disruption during and after construction.
- It is not prone to catastrophic failure. If it is overloaded, the Little Cal would just continue to rise gradually.
- It would provide protection to Dolton, Calumet City, and Lansing as well as South Holland.

– It would still provide a reserve capacity for high flows after the Thornton Transitional Reservoir is on line.

The major disadvantage of the diversion tunnel was the cost. In 1992, Option 1 was estimated at $19,570,000 and option 2 at $22,060,000. South Holland's share would be $10 million provided the other three communities contributed $10 million. As with the levee proposal, the benefits would exceed the costs only if the Thornton Transitional Reservoir was not operational until 2012.

A second disadvantage of the tunnel proposal was the need for permits from many agencies. This would require a study of the effects of diverting floodwaters to another area, which would increase the cost and, possibly, the complexity of the project.

A third disadvantage was the impact of this project on the Thornton Transitional Reservoir project. The flood damage reduction benefits could have affected the economic justification for the Quarry, reducing the chances that it would be funded. An outside source of funding would be the same as the Thornton Transitional Reservoir's funding sources. The project would, in effect, be competing with another Village flood control priority. For this reason, it was opposed by the Metropolitan Water Reclamation District of Greater Chicago.

4.4 Channel Improvements

4.4.1 General: A channel can be made wider, deeper, straighter, or smoother so it will carry more water and/or carry it downstream faster. Some smaller channels can be lined with concrete or even put in underground pipes. Channel improvements are appropriate for smaller streams and ditches in developed areas, particularly if there is no room for a levee.

"Channel maintenance" is an ongoing program to clean out blockages caused by overgrowth or debris. This work is usually done by a community's public works crew. Communities also pass ordinances prohibiting dumping and making riverfront owners responsible for maintaining their areas.

Dredging is one form of channel maintenance. It is usually cost prohibitive because the dredged material must be air dried and disposed in an approved area somewhere and the river will usually fill back in with sediment in a few years. Dredging is usually conducted only to maintain a navigation channel.

Channel improvements and their continual maintenance can be expensive. They can damage or destroy wildlife habitats and create new erosion problems. Straightening a stream is only temporary because it tries to eliminate meanders and other features that nature will continually work to recreate. Sending water faster downstream may aggravate a flood problem downstream.

4.4.2 Use in the Area: Channel improvements have been implemented on the Little Calumet system since the 1930's. Projects have included dredging various sections of the Little Cal, widening its receiving stream, the Calumet-Sag Channel, and clearing debris by an "army" of volunteers on "clean up day," May 8, 1971. While helpful, the benefits from these projects were relatively short-lived as debris and sediment returned to the channel over the years.

The 1975 Little Calumet plan proposed two channel improvement projects. The first involved two miles of the Calumet Union Drainage ditch, 1.75 miles of channel improvements and 0.25 miles of concrete lining. This project was completed in 1988 at a cost of $4.4 million, most of it borne by the Natural Resources Conservation Service.

The other project was a proposal to clear debris and snags and dredge 4.5 miles of the Little Calumet River in Lansing and Calumet City. It would have cost up to $2 million in state funds. However, after many years of attempting to obtain rights of way from adjacent property owners, the project was dropped. It was designed primarily for environmental and aesthetic improvements and did not have flood control benefits.

The 1986 "Final Project Planning Report" stated "The permitted action will have only a minimal effect (in general, less than 0.3 feet) on lowering flood elevations in the Little Calumet River. The largest reductions in flood elevations were simulated to occur in floods of a two-year recurrence interval or less. Larger floods showed a smaller reduction in flood elevations." (Page VI-6). After many years of attempting to obtain rights of way from adjacent property owners, the project was dropped.

4.4.3 Corps' Clearing and Snagging: The U.S. Army Corps of Engineers' Chicago District looked into interim solutions that would help alleviate flood losses until the Thornton Transitional Reservoir became operational. It proposed a "clearing and snagging" project on the Little Calumet River between Thorn Creek and the northwest Village limits. The project was to remove sediment that collected under bridges and debris that collected in the channel and along the banks.

During the planning process, it was found that the sediment contained materials that would have to be hauled to a special landfill. This increased the project's costs so that they outweighed the benefits. Because of this, the Corps had to stop its involvement in the project.

4.4.4 Stream Maintenance: Unlike the one-time only channel improvement projects, this is a routine, periodic activity to prevent debris and overgrowth from clogging the stream. Individual state permits are not needed provided the maintenance work remains small enough to stay within parameters set by a regional state permit. Stream maintenance has its greatest impact during smaller storms that may go out of bank due to obstructions.

As a participant in the Little Calumet plan, South Holland signed a stream preservation agreement with the Illinois Department of Transportation, Division of Water Resources in 1984. Under the agreement the Village inspects and maintains the channels to reduce flooding and enhance the appearance of the streams. In 2003, this work was turned over to the Department of Natural Resources' Office of Water Resources. Once each year, Village and DNR staff conducted a joint stream preservation maintenance inspection of the Little Calumet River, Thorn Creek, and the Calumet Union Drainage Ditch.

In 2008, MWRDGC began a stream maintenance program that has superseded DNR's. The Village does inspections twice a year and in response to inquiries. If a problem is found, it's reported to MWRDGC which does its own inspection. The Village gets any needed permissions to go on private property. MWRDGC works on the three main stem streams and three ditches.

4.4.5 Cal Union Channel Improvements.

During the late 1990's, the Village constructed a major channel improvement project along the Cal Union Drainage Ditch. By funding a small piece each year, the Village could rework the channel banks for over a third of a mile from State Street to the confluence with the Little Calumet River. Extensive rip rap (large rocks, properly placed) and appropriate ground cover reduce or eliminate channel erosion problems, increase the channel's carrying capacity, and protect neighboring properties from bank erosion.

4.5 Sewer Improvements

4.5.1 General: As discussed in Section 2.5, many South Holland buildings suffer from sewer backup. There are four basic ways to correct this:

1. Make the sewers large enough to handle the excess flows,
2. Provide safe storage for overflows,
3. Seal the leaks that let stormwater into the sanitary system, and
4. Prevent overloaded sewers from backing up into basements.

Each of these approaches has been investigated and each has its own shortcomings. The common problem with all four approaches is the expense. There are 68 miles of sewers under South Holland. To dig them up and replace them with larger pipes would be a tremendous cost. Further, MWRDGC must treat all the water and cannot handle the increased flows that larger pipes would bring.

Storing the excess flows and sealing the leaks are also very expensive alternatives. They are discussed in the next section. The fourth approach, preventing backflow into basements, has been implemented by many property owners through backflow check valves, overhead sewers, and floor drain standpipes. This approach is discussed in more detail in Chapter 4. Property Protection.

4.5.2 ICAP: The Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) is responsible for treating sanitary sewage. It is naturally greatly concerned with infiltration and inflow ("I/I"). MWRDGC has required its communities to participate in an I/I Corrective Action Program, known as "ICAP." A limit of 150 gallons per capita per day was set for the sanitary sewer lines. Anything over that is considered excessive I/I. South Holland's flows were estimated to be ten times that amount.

Accordingly, South Holland began inspecting its sewers for problems. With 68 miles of sanitary sewer, the work proceeded one section of town at a time. The work included televising sewer mains, using dye to check for downspout connections, and even digging up the lines to see what the problems were. The initial findings were reported in 1987 in Village of South Holland Sewer System Evaluation Report, by Robinson Engineering.

The report was updated in 1990. Robinson's surveys found that it was possible to reduce the sewer flows to 611 gallons per capita per day by correcting selected I/I problems. The total cost was estimated to be $4,943,000. Approximately 20% would be borne by property owners and

the remaining cost would be shared by the Illinois Environmental Protection Agency and the Village. This project did not include any work on the combined sewers.

By 1992, over 1,500 manholes and numerous sewer main lines had been repaired. Most of the downspout, sump pump and driveway drains had been disconnected by the owners. Additional sewer main work is proposed each year to incrementally reduce the excess flows. However, the 1990 plan included only those projects that were cost effective in reducing I/I. It was projected to lower the flow to 611 gallons per capita per day, short of the MWRDGC's goal of 150. Additional work would cost more than the resulting dollar benefit."

A dependable source of income for this work was initiated by the Village when it added a sewer user charge to its water bills. The results have already been seen. Village staff noticed that there were fewer calls and complaints from residents after the 1992 work. MWRD enacted an I/I Program for communities in 2015, mandating annual reports, evaluation of sanitary sewers, prioritization of repairs, and documentation of work by 2019. The Village of South Holland is complying with this mandate. In 2016 sonar testing was used to evaluate sanitary sewers 18" and larger throughout the Village. This information is the basis for prioritizing repairs on the system.

4.6 Control Gates

4.6.1 General: Many smaller ditches and pipes can have gates or valves installed to keep water from backing up. Some are operated manually but others, such as "flap gates," can be automatic. This prevents a larger river above flood stage from backing floodwater into tributaries or sewer lines. Gates and valves are appropriate for smaller channels and at storm sewer outfall pipes.

Unless there is a pump system installed, the ditch or pipe will not be able to drain. Local rains could then cause upstream flooding. Debris can sometimes get caught in gates and valves, preventing them from closing, thereby making them useless. This can be prevented with proper monitoring and maintenance.

4.6.2 Use in the Area: Automatic duck bill gates were installed for four outfalls into the Little Calumet River along Riverview Drive. A fifth was installed on Thorn Ditch at Van Dam Road or Prince Drive on either side of the Calumet Expressway (Figure 4-3). Thorn Ditch backwater flooding could be prevented by controlling flows at the pipes under the road.

Figure 4-3: Outfall to the Little Cal River

As recommended in the 1994 *Floodplain Management Plan*, the Village Engineer submitted a request to the Department of Natural Resources for funding of the Thorn Ditch backwater valve. After an on-site investigation, IDNR found that there are several other sources of flooding into the area. A backwater valve on Thorn Ditch would not keep the area dry during a flood on Thorn Creek. The project has proved to be cost-prohibitive and was not pursued.

4.7 Runoff Controls

4.7.1 General: The runoff of rain water can be slowed down on the ground by vegetation, terraces, contour plowing, no-till farm practices, and other measures. Delaying surface water on its way to the channel increases infiltration into the soil and controls the loss of topsoil from erosion. These measures are appropriate for steeper slopes, especially in agricultural watersheds.

Runoff controls must be implemented by owners of property far from the flood problem, usually at their expense. They must be done on many properties over a wide area to have an impact.

4.7.2 Use in the Area: The Little Calumet plan has a "land protection program" element which has resulted in most of the watershed's communities having enacted erosion and sediment control ordinances. These ordinances regulate soil loss from construction projects to minimize sedimentation in channels and reservoirs. Erosion and sediment control and stormwater management regulations are discussed in Chapter 5, Regulations.

The state's soil and water conservation districts have an ongoing program to encourage farmers to preserve their topsoil using conservation tillage methods, such as no-till planting and other erosion control practices. The Will-South Cook Soil and Water Conservation District estimated that 60% - 70% of the agricultural land in the Little Calumet watershed has some form of conservation tillage or erosion control practice used. Other than the District's and the development regulations, there is no special runoff control program for the 200 square miles of the Little Calumet watershed.

4.8 Conclusions and Recommendations

4.8.1 Conclusions:

a. After 30 years of planning, searching for funding, and design work, the Thornton Transitional Reservoir came on line in 2003. It provides a great deal of flood protection and resulted in a revised Flood Insurance Rate Map for south Cook County. It does not stop flooding, as the events of September 2008 showed. However, that flood that would have flooded a larger area than the 1990 level had it not been for the Reservoir.

b. Other large scale flood control projects, particularly the levee and the diversion tunnel, proved too expensive and were not pursued.

c. Some small-scale flood control projects, such as clearing and snagging and flap gates on storm sewers, are relatively inexpensive and they provide protection from smaller, more frequent flooding.

d. The stream maintenance program provides benefits in both the appearance and the low flow carrying capacity of the channels.

e. The Village's programs to reduce overloading of the sanitary sewers (ICAP and I/I) have proceeded well and produced certain benefits. However, 2016 heavy rains resulted in sewer backups into basements, again putting emphasis on the importance of a comprehensive I/I Program.

f. Other approaches to flood control, such as runoff controls, require a great deal of intergovernmental cooperation with other communities throughout the watershed.

4.8.2 Recommendations:

a. The Department of Public Works has updated its approach to stream cleanup to work with current MWRDGC policies that address stream maintenance. Where appropriate, this has included working with volunteer resident groups.

b. The Village should continue to explore alternative property protection measures as discussed in Chapter 7 which are more useful for localized, smaller scale flooding.

4.9 References

– CRS Credit for Drainage System Maintenance, National Flood Insurance Program/Community Rating System, 2006.

– Dolton Levee Project, IDOT-Division of Water Resources, 1992.

– Dolton-South Holland Flood Study, Robinson Engineering, Ltd. 1992.

– "Drainage System Maintenance SOP," Village of South Holland, 1994.

– Floodwater Management Plan and Environmental Assessment, Little Calumet River, Little Calumet River Steering Committee, 1975.

– Little Calumet River Detailed Watershed Plan (DWP), MWRDGC, 2010.

– "Memorandum of Cooperation and Understanding Regarding Stream Preservation on the Little Calumet River Watershed" between the Village of South Holland and the Illinois Department of Transportation, Division of Water Resources, 1984.

– Our Community and Flooding, Resource Coordination Policy Committee, 1991. Updated, October 1998.

– Sanitary Sewer Update, South Holland Public Works Department, undated.

– South Basin System Analysis, MWRDGC, 1991.

– Streambank Protection Guidelines, U.S. Army Corps of Engineers, 1983.

– Tunnel and Reservoir Plan, 2017. Retrieved from https://www.mwrd.org/irj/portal/anonymous/tarp

– Village of South Holland Sewer System Evaluation Report, by Robinson Engineering, Ltd., 1987 and subsequent supplements.

Chapter 5. Regulations

While Chapters 4 and 7 are oriented toward dealing with the existing flood problem, this chapter focuses on planning efforts undertaken by the Village that are based on the goal of minimizing the effects of future storm events. These planning, zoning and regulatory efforts are designed to keep the existing flood problem from getting worse by ensuring that future development does not increase potential flood damage and by maintaining the river system's capacity to carry floodwaters away.

5.1 Planning and Zoning

5.1.1 General: Advance planning can match the land use with the land hazard, typically by reserving flood hazard areas for open space, parking lots, backyards, or similar low-damage activities. A land use plan proposes appropriate uses for areas within the Village and provides valuable information regarding the land use goals of the Village. However, it is only a plan, and plans generally have no real authority.

Plans are usually implemented by two local measures, zoning ordinances and capital improvement programs. A zoning ordinance regulates development by dividing the community into zoning districts and setting development criteria for each district. Appropriate zoning districts for a floodplain include public use, conservation, agriculture, and low density residential development. Public use and conservation generally require public ownership of the land to avoid the legal challenge that the restrictions are so severe they amount to a "taking" of the land.

A community's capital improvement program identifies where major public expenditures will be made over the next 5-20 years. These expenditures may include the acquisition of land for public uses, such as parkland, and extension of roads and utilities. If the long range plan calls for preserving the floodplain as open space, then the capital improvement program should support the plan by acquiring flood prone areas for parks and by not improving or extending roads into the floodplain.

Acquiring open space in the floodplain has two benefits: it prevents potentially hazardous developments and it provides attractive sites for open space and parks. While this can be an expensive endeavor, there are sources of financial assistance available for park acquisition and/or development. Many communities have been successful in getting owners to donate land for tax purposes or to ensure it is kept open for future generations to enjoy.

As an alternative to public ownership, an easement can be purchased. With an easement, the owner can develop and use his or her private property but is financially compensated to not build on the floodprone part or the part set aside in the easement. In some cases, the owner can develop the area for low hazard uses or to transfer the right to develop other flood-free parcels (known as "TDR" or transfer of development rights).

Easements do not always have to be purchased. Flood flow, drainage, or maintenance easements can be required of developers as a condition of approval of the development. These are usually linear parcels along property lines or streams. Maintenance easements can also be negotiated with riverside property owners in return for a community channel maintenance program.

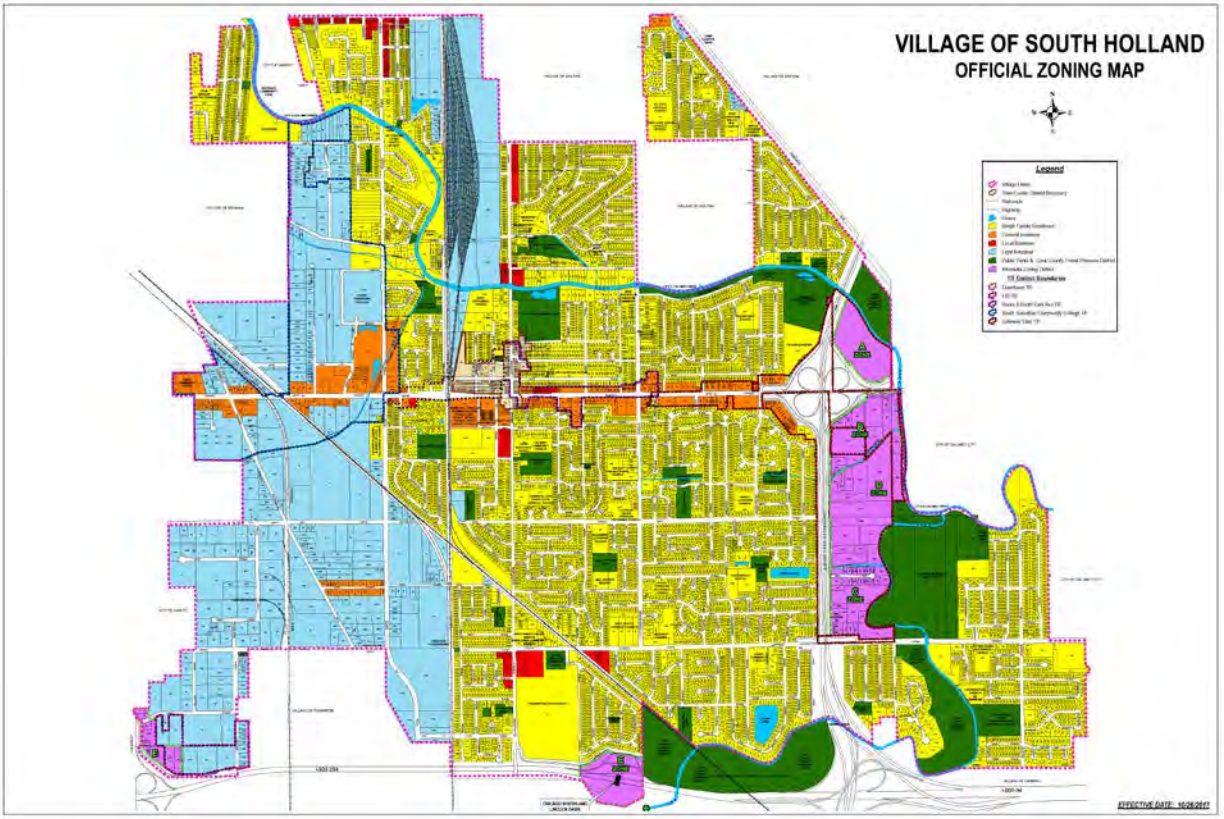
5.1.2 South Holland's Planning and Zoning: The "Comprehensive Plan for the Village of South Holland" was prepared in 1989, and a 2018 update is pending. It notes that the Village

> "is basically built-up and has limited vacant land available for development... The Land-Use Plan attempts to reinforce and strengthen the established land-use pattern in the community."

The land use plan's map shows a variety of uses in the floodplains, including residential, commercial, industrial, institutional, and parks and open space.

The Village's Zoning Ordinance was first adopted in 1956 and has been amended periodically since then. The zoning map generally matches the land use plan's map. The current zoning map is shown below. The major land use designations are yellow − single-family residential, light blue − light industrial, orange – general business, and green − public parks or forest preserves. Figure 5-1 shows that several parks are located within the floodplains, but there is a substantial amount of floodplain zoned as single-family residential and light industrial.

Figure 5-1. Zoning Map



Because so much of the Village is already developed, it is difficult to plan or zone for major changes to the existing development pattern. The impact of the land use plan and the zoning ordinance is primarily on vacant areas. The largest vacant area of floodplain is located along the Little Calumet River and Thorn Creek, to the east of the Bishop Ford Expressway. This area is zoned into four basic zones, A, B, C and D, consisting of 175 acres and named the Interstate Zoning District (purple shading), which allows for larger lot developments and more flexible designs that can avoid flood prone areas.

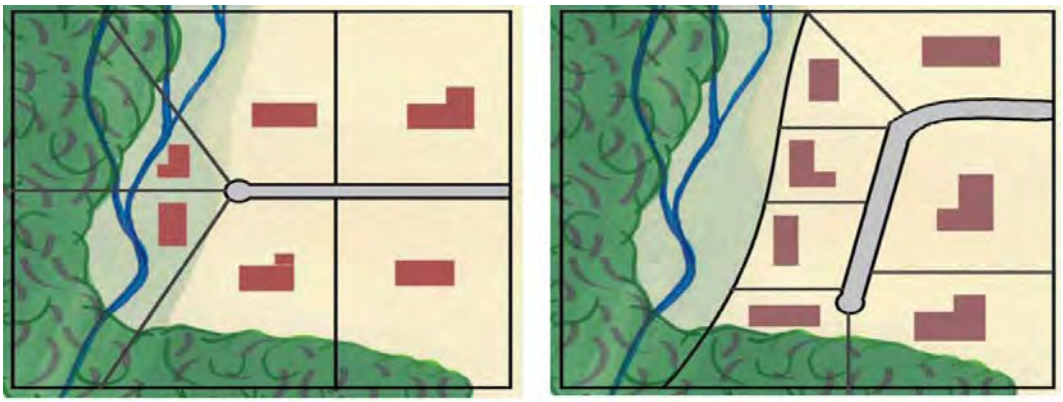
South Holland does not have a formal capital improvements program. The last parkland expansion was the acquisition of Gouwens Park in 1987. This floodplain park has since been developed to incorporate stormwater and floodplain storage features. There have been no recent acquisitions of lands in the Special Flood Hazard Area.

5.2 Floodplain Regulations

5.2.1 General: Subdivision ordinances and building codes come into effect after the plans and zoning ordinances have identified where various land uses are appropriate. If the zoning for a site allows buildings, these regulations ensure that the buildings will not be subject to flood damage and that the development will not aggravate the existing flood problem.

Subdivision regulations govern the development of large vacant areas that the developer intends to subdivide into individual lots. They set the construction and location standards for the infrastructure provided by the developer, including the roads, sidewalks, utility lines, storm sewers and drainageways. The storm sewer and drainageway standards are discussed in the next section on stormwater management.

Figure 5-2. Alternative Subdivision Approach



In the standard zoning approach (left), the developer considers six equally-sized lots without regard for the flood hazard. Two properties are subject to flooding and the natural stream is disrupted. An alternative, flexible, PUD approach is shown on the right. The floodplain is dedicated as public open space. There are seven smaller lots, but those abutting the floodplain have the advantage of a larger open area. Four lots have riverfront views instead of two. These amenities compensate for the smaller lot sizes, so the parcels are valued the same. The developer makes the same or more income, the future residents are safer, and the natural area is preserved.

Subdivision regulations often require that every lot have a buildable area that is located entirely above the flood level. A preferred approach is to keep proposed buildings completely out of the floodplain, as shown in Figure 5-2.

Where buildings are allowed in a floodplain, the building code should provide flood protection standards. These standards should include criteria to ensure that the foundation will withstand flood forces and that all damageable portions of the building are located above or protected from floodwaters.

Most floodprone communities participate in the National Flood Insurance Program (NFIP) which is administered by the Federal Emergency Management Agency (FEMA). As a condition of making federally supported flood insurance available for their residents, communities agree to regulate new construction within the 100-year floodplain. To minimize confusion, the 100-year floodplain is called the "base floodplain" and the elevation of the 100-year flood is known as the "base flood elevation" or "BFE."

The 100-year floodplain is shown as the "Special Flood Hazard Area" on the Flood Insurance Rate Map (FIRM) provided by FEMA. In non-coastal areas, the 100-year floodplain is designated as the "A" Zone. The area outside the A Zone is labeled the "X" Zone. The designation as an X Zone does not mean that the area is not subject to local drainage problems or overbank flooding from streams or ditches smaller than the FEMA mapping criteria.

The major requirements of the NFIP in a riverine situation are shown in Figure 5-3. Communities are encouraged to enact more restrictive regulatory standards, especially where warranted by the flood hazard. The most common restrictive standard is to require freeboard. "Freeboard" means an extra margin of safety added to the BFE to account for waves, debris, miscalculations, lack of data, and floods higher than the base flood.

Other more restrictive regulatory requirements include:

- Using more accurate or more restrictive techniques to calculate the BFE or to delineate the floodway;
- Specifying foundation protection standards;
- Counting improvements cumulatively to determine when a substantial improvement occurs;
- Using a threshold lower than 50% to determine when a substantial improvement occurs;
- Setting higher protection standards for critical facilities;
- Preserving the floodplain's flood storage capacity by prohibiting fill or requiring that an equal volume of fill be removed to compensate for the loss of storage; and
- Requiring buildings in X Zones to be elevated above the street or local drainageways.

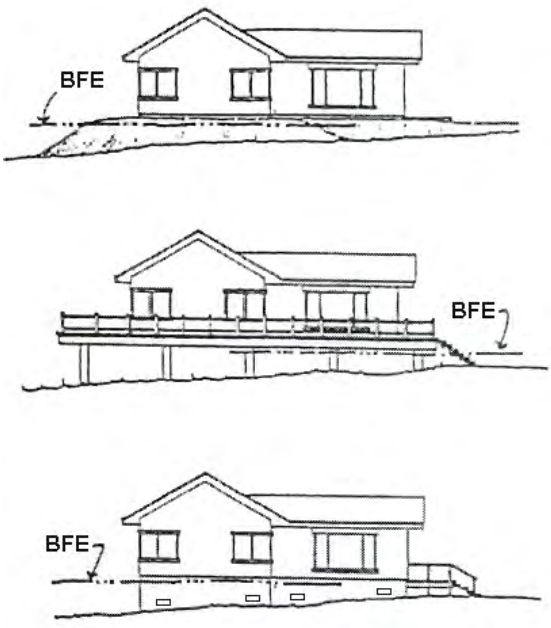
More restrictive state regulations take precedence over the minimum NFIP criteria. FEMA uses Illinois' floodway mapping standard and defers to the Illinois Department of Natural Resources' floodway regulations. In Northeastern Illinois, all new buildings and substantial improvements must be protected to a level of one foot above the BFE.

Figure 5-3 NFIP Floodplain Regulatory Requirements

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). As a condition of making flood insurance available for their residents, communities that participate in the NFIP agree to regulate new construction in the area subject to inundation by the 100-year (base) flood. State laws set additional requirements. Here are the basic requirements:

1. The regulatory floodplain is the floodplain mapped on the 2008 Cook County Digital Flood Insurance Rate Map.
2. All development in the regulatory floodplain must have a permit from the community. "Development" is defined as any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of materials.
3. Only "appropriate uses" are allowed in the floodway. The floodway is the channel of a river or other watercourse and the adjacent land areas that are needed to convey the base flood. Appropriate uses include flood control structures, recreational facilities, detached garages and accessory structures, floodproofing activities, and other minor alterations. They do not include buildings, building additions, fences, or storage of materials. Such larger projects in the floodway require a permit from the State DNR in addition to the Village permit. The result of this requirement is that vacant floodways will essentially remain as open space, free of insurable buildings or other obstructions.
4. New buildings may be built in the floodplain, but they must be protected from damage by the base flood. The lowest floor of residential buildings must be elevated to above the base flood elevation (BFE). Nonresidential buildings must be either elevated or floodproofed.
5. A "substantially improved" building is treated as a new building. The regulations define "substantial improvement" as any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. This requirement also applies to buildings that are substantially damaged.

Communities are encouraged to enact more restrictive regulations that better reflect local flooding conditions and better meet local needs.



5.2.2 South Holland's Regulations: In 1996, the Flood Liaison Committee recommended that the Village's subdivision ordinance be amended to require all new subdivisions to have the streets and building sites elevated above the base flood elevation. This amendment was subsequently approved by the Board of Trustees. The Village has adopted the 2018 edition of the International Building and Residential Codes.

South Holland's floodplain regulations are in Article II of Chapter 14 of the Village's code. This ordinance is taken from a 1990 model recommended by FEMA, the state, and the Northeastern Illinois Planning Commission. The ordinance has the following sections that exceed the minimum requirements specified in Figure 5-3:

- Section 14-22 defines “flood protection elevation” as one foot above the BFE. Section 14-29(3) and 14-29(4) require new buildings to be elevated or floodproofed to the flood protection elevation. This is equivalent to one foot of freeboard.
- Section 14-25(4) requires that a detailed flood study using future land use conditions in the watershed be conducted by developers in floodplains where there is no BFE.
- Sections 14-26(2)b and 14-27(2)b require compensatory storage in the flood fringe and floodway. In the fringe (the floodplain area outside the floodway) filling must be compensated at a rate of 1.5 times the volume of storage lost.
- Section 14-27 allows only “appropriate uses” in the floodway. Appropriate uses do not include buildings, building additions, fences, or storage of materials. There is a list of approved appropriate uses which includes flood control structures, recreational facilities, detached garages and accessory structures, floodproofing activities, and other minor alterations. The result of this state-mandated regulation is that vacant floodways will essentially remain as open space, free of insurable buildings.
- Section 14-29(3)b states that improvements will be figured cumulatively beginning April 1, 1990. This will close a loophole and prevent owners from making many small improvements to avoid the requirement to bring older buildings up to flood protection standards.
- Section 14-29(4)d states that nonconforming structures in the floodway may not be enlarged. If they are damaged beyond 50% of their pre-damage value, they must be brought into compliance, i.e., removed from the floodway.

From code excerpts listed above, it is evident that South Holland’s ordinance includes more restrictive criteria than that which is required by the NFIP. The intent is to better respond to the local flood hazard where flood storage is so important, and to comply with state law. The ordinance is limited to the base floodplain. There were no requirements for elevating or protecting X Zone buildings from local drainage problems until 1996 when the Liaison Committee recommended a grading plan be required for every new building or addition. The Board of Trustees adopted the recommendation.

Administration of the floodplain management ordinance is dependent on accurate elevation data for each construction site. T he Department of Planning, Development and Code Enforcement has transferred the flood elevations to a more accurate base map with one-foot contour intervals. This map also reflects the latest map amendments issued by FEMA after areas have been filled or found to be higher than the BFE.

To transfer the flood elevation to a site, a surveyor must start from a known elevation point. This job is easier and the flood elevation is more accurate if there is an elevation reference mark close to the site. The Village Engineer helps to maintain the elevation reference marks and replaces them if they have been moved or altered.

If a project will be in the floodway, the applicant must also apply for a permit from the Illinois Department of Natural Resources, Office of Water Resources. This lengthens the permit review time and requires the applicant to submit plans and gain approval from two different agencies.

The NFIP, state, and Village ordinance requirements total more than 100 pages of technical floodplain management requirements. It is possible for the permit office to make errors or not be aware of all the details. The state has a program to visit communities and help ensure that local

procedures meet all the mandated requirements so the Village does not jeopardize its participation in the NFIP.

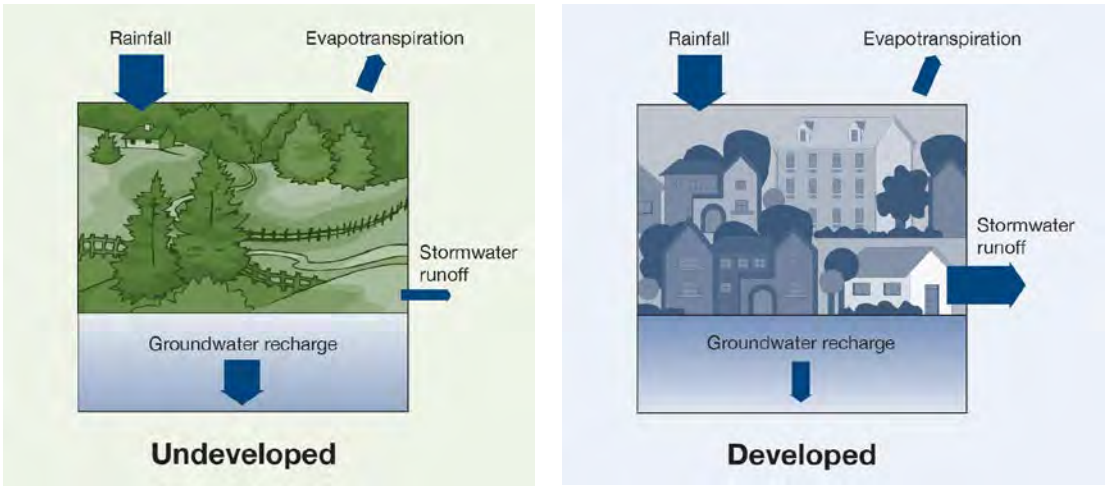
5.2.3 MWRDGC Regulations: In 2007, the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) began developing a countywide stormwater management regulatory ordinance to be known as the Cook County Watershed Management Ordinance (WMO). The primary goal of the ordinance is to establish uniform, minimum, countywide stormwater management regulations for Cook County. It covers drainage and detention, floodplain management, wetland protection, stream habitat and riparian environment protection, soil erosion and sediment control, and water quality. The WMO went into effect on May 1, 2014 and was adopted by the Village of South Holland on April 21, 2014 to be in compliance.

5.3 Stormwater Management

5.3.1 General: Floodplain regulations address development in the direct path of flooding. However, flooding can also be increased by development that occurs outside of the floodplain. When an area is urbanized, converted from farms, forests and fields to buildings and streets, the ground surface becomes more impervious. As a result, more stormwater runs off the land instead of soaking into the ground.

At the same time, developers build gutters, sewers, and ditches to move surface water as fast as possible downhill to the river channels. Not only does this aggravate downstream flooding, it often overloads the community's drainage system. The alternative, stormwater management, requires developers to incorporate detention facilities to ensure that the post-development runoff rate is no greater than the runoff rate generated in the pre-development condition.

Figure 5-4 Change in Stormwater Runoff due to Urban Development



Stormwater management requirements for detention are generally found in ordinances governing subdivisions and larger new developments. Many developments utilize wet or dry basins as landscaping amenities. Larger detention basins are more effective than smaller basins which drain relatively quickly. In some cases, advance community planning identifies the most effective location for a basin and requires developers to contribute funds in lieu of constructing on-site detention.

There are four general problems with the usual approach to stormwater management:

1. If not properly planned, small on-site basins may aggravate the problem rather than alleviate it. Depending on the location in the watershed, flooding can be increased when small basins release their detained water too quickly.

2. Most communities leave maintenance of the detention facilities up to the property owner. Often the owner, such as a homeowner's association, does not understand the need for continued maintenance or is not interested in paying the associated costs. As a result, the maintenance required to keep the facility in good working order does not consistently occur.

3. In urban areas, stormwater runoff is not clean. The water passes over streets, chemically-sprayed fields, and industrial areas and picks up many kinds of pollutants. Storm sewers, ditches, and traditional detention basins simply channel these pollutants to the rivers and creeks.

4. Under natural conditions, most stormwater soaks into the ground. Rivers are continually replenished with groundwater and flow throughout the year (see Figure 5-4). Holding back high flows and then releasing them over the next few days results in erosion of natural streambanks and low or no flows for the remainder of time. This does not bode well for habitat or water quality. A low impact development approach can alleviate this issue (see Figure 5-5).

Figure 5-5 Low Impact Development Techniques

Under the low impact development approach, stormwater is held on the site where it falls. It is allowed to soak into the ground in order to replicate the natural conditions that produce continuing flowing streams with better quality water.

Source: Puget Sound Action Team

5.3.2 South Holland's Stormwater Management: South Holland's subdivision ordinance sets construction standards for storm sewers and the use of streets for local drainage. However, it does not have any requirements for detention of stormwater runoff.

In 2008, the Village adopted Chapter 14, Article III, "Stormwater Conveyance Systems." This has both water quantity and quality provisions. It applies to "building, grading or other land development permits required for land disturbance activities of 1.0 acre or more." Applications must include both a storm water management concept plan and a maintenance agreement. It adopts the provisions of the *Illinois Urban Manual*, which is generally seen as the current best management practice.

The Environmental Protection Agency is requiring communities of South Holland's size to improve the quality of their stormwater runoff through the National Pollutant Discharge Elimination System (NPDES). The Village has been mandated to enact regulations requiring developments to incorporate additional measures to "treat" runoff, such as grass filter strips. These provisions are included in the Cook County Watershed Management Ordinance set forth by the Metropolitan Water Reclamation District of Greater Chicago and adopted by the Village April 21, 2014.

The value of an improved stormwater management ordinance is relative to the amount of area that is still subject to development in the Village. Because most of the Village is already developed, there will be few opportunities to require new stormwater management structures. However, every little bit helps.

5.4 Debris, Erosion and Sediment Control

5.4.1 General: Floodplain regulations control major development projects in floodplains. However, debris can accumulate or be accidentally or intentionally dumped into the channels, obstructing even low flows. Stream dumping regulations are one approach to preventing intentional placement of trash or debris in watercourses.

Another occurrence that obstructs channels is sedimentation.As rain hits the ground, especially where there is bare dirt, (farm fields and construction sites), soil is picked up and washed downstream. Sediment tends to settle where the river slows down and will gradually fill in the channel.

Catch basins can be installed downstream of construction sites to slow runoff so sediment will be dropped on-site before it gets to the river. There are a variety of erosion and sediment control measures that can be taken; the main goal is to implement these measures, particularly on construction sites.

5.4.2 South Holland's Program: The Village's Code had an effective stream dumping regulation that has been copied for use as a national model by the NFIP. It was inadvertently repealed when the 2008 stormwater management ordinance was adopted. It has since been readopted at Section 14-64 under Chapter 14.

Division 2 of Chapter 14's Article III was adopted in 2008 as part of the stormwater management regulations. It is an effective erosion and sediment control regulation based on a proven state model.

5.5 Conclusions and Recommendations

5.5.1 Conclusions:

a. The Village's floodplain regulations exceed the minimum federal and state requirements. Additional ordinance and code amendments would encourage retrofitting buildings to protect them from flooding and better protect new buildings outside of the floodplain.

b. The Village adopted the MWRDGC WMO on April 21, 2014 and is therefore in compliance with the current regulations.

c. The Village's regulations on stream dumping and erosion and sediment control are acceptable, although the requirements and procedures could use more publicity.

5.5.2 Recommendations:

a. The Village Plan Commission should incorporate floodplain concerns in the all revisions to the comprehensive plan and the zoning ordinance.

b. The Village Plan Commission should draft amendments to the subdivision ordinance to require that the floodplain portions of new developments be dedicated to parks, open space or maintenance easements.

c. Village staff should examine the benefits of low impact development and similar techniques that will improve water quality when the next stormwater management regulation revisions are prepared.

d. The Village Code Enforcement Office should continue to enforce the standards of its floodplain, stormwater, debris, and erosion and sedimentation control regulations.

5.6 References

– Comprehensive Plan for the Village of South Holland, Trkla, Pettigrew, Allen & Payne, Inc, 1989, 2018 update pending.

– Cook County Stormwater Management Plan, Metropolitan Water Reclamation District of Greater Chicago, 2015.

– CRS Credit for Higher Regulatory Standards, National Flood Insurance Program/Community Rating System, 2006.

– CRS Credit for Stormwater Management, National Flood Insurance Program/Community Rating System, 2006.

– Floodplain Management: Local Floodplain Administrator's Manual, Illinois Department of Natural Resources Office of Water Resources, 2006.

– Openings in Foundation Walls And Walls of Enclosures, Federal Insurance Administration, Technical Bulletin 1, 2008.

– South Holland Municipal Code, Chapter 14: "Planning and Development", 2016.

– Technical Guidance Manual for the Implementation of the Watershed Management Ordinance, Metropolitan Water Reclamation District of Greater Chicago, 2015.

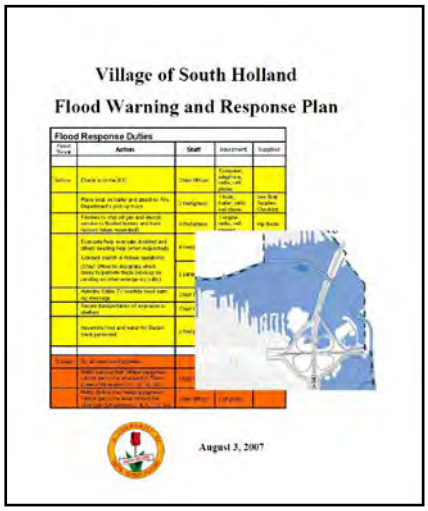
– "Village of South Holland Zoning Ordinance", 1995.

Chapter 6. Emergency Services

Most communities appoint an emergency manager or emergency services coordinator. This person is usually part time, although many communities make it an extra duty for a full-time member of the fire or police department. In times of emergency this person reports directly to the Village President and coordinates the activities of the various Village departments and cooperating organizations, such as the Red Cross and school district.

South Holland's approach is to have a different incident commander for each type of disaster. During floods, the Director of Planning and Development is in charge. The Emergency Services and Disaster Agency (ESDA) Coordinator is primarily concerned with organizing the volunteers who support the Village's emergency response efforts.

Emergency services activities that occur before and during a flood are covered in the "Flood Warning and Response Plan" which was prepared and adopted in 2007. This plan is reviewed by the Village on an annual basis. This chapter reviews the emergency services activities that relate to flooding and identifies how the Village's "Flood Warning and Response Plan" addresses these activities. There are five basic parts to a flood emergency plan:


Village of South Holland

Flood Warning and Response Plan

Flood Response Duties

August 3, 2007

6.1 Flood threat recognition

6.2 Flood warning

6.3 Village flood response activities

6.4 Critical facilities' response activities

6.5 Post-Flood Mitigation

6.1 Flood Threat Recognition

6.1.1 General: The first step in responding to a flood is knowing that a flood is eminent. A flood threat recognition system provides an early warning to the emergency managers. A good system will predict the time and height of the flood crest. This can be done by measuring rainfall, snow conditions, soil moisture, and stream flows upstream of the community and then calculating the impact on the community. On large rivers, the measuring and calculating is done by the National Weather Service. Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio.

On smaller rivers, it is up to the communities to develop their own system. This is done by installing rain and river gages in key locations and then using computer models to translate the gage data into a flood threat prediction. Many western and mountainous communities have developed these systems in response to the great threat to life from flash floods. The systems installed in the mountains usually rely on remote gages that transmit data via radio to a central computer station. The cost of the hardware can be several hundred thousand dollars. Where speed is not so vital to protect lives (i.e., outside of mountainous flash flood areas), very successful programs have been established using human gage readers who telephone in the data every 15 or 30 minutes during a storm.

The most important element of either system is that the community is given early notification regarding the impending flood. The more data and the more lead time that can be provided, the better the community can respond. If the system inaccurately predicts the severity of the flood and the potential threat to the community, great amounts of energy and resources can be wasted responding to a threat that didn't exist. A false warning provides an added hazard of the "cry wolf syndrome" and comes with the risk that people may not take the next warning seriously.

On the other hand, a system that under-predicts the hazard can be even worse. The under-estimated flood will catch the community and its residents unprepared. Much damage will occur, especially to vehicles, contents, and other moveable items, that could have been moved out of harm's way.

6.1.2 Use in the Area: In the Chicago area, the National Weather Service's flood threat recognition system provides crest and timing predictions only on the Des Plaines, Fox and Kankakee Rivers. There is a remote reporting gage on the Little Calumet River at Cottage Grove Ave which the Weather Service uses for tracking and predicting flood crests.

Local flood threat recognition systems are rare in the Midwest. Because of the slow rise of floodwaters and the low threat to life, most communities do not feel the need for a system that provides detailed early flood data. The National Weather Service has a program to help communities develop local flood warning systems. This program was used by Glenview, Deerfield and Northbrook to establish a coordinated flood threat recognition system using rain and river gages.

6.1.3 South Holland's System: The Village is advised of a pending flood threat in two ways. First, if it is raining and conditions look like the rivers could rise, staff will check the status of the Cottage Grove gage on the Weather Service's website. This is a public site and a link to it is provided on the Village's website's (www.southholland.org) flood protection page. Figure 6-2 gives an example of the information that is provided. Staff will also receive automated notifications as the river levels continue to rise.

Figure 6-1 NOAA Weather Wire Statement

Flood Statement

NATIONAL WEATHER SERVICE CHICAGO IL
810 AM CST MON FEB 14 2005

FOR THE LITTLE CALUMET RIVER...INCLUDING MUNSTER AND SOUTH HOLLAND...
MINOR FLOODING IS FORECAST.

WITH RAINFALL AMOUNTS RANGING FROM ONE HALF OF AN INCH, TO NEAR ONE INCH ACROSS THE AREA SINCE SUNDAY...QUICK RISES ON THE LITTLE CALUMET RIVER ARE EXPECTED THIS AFTERNOON AND EVENING.

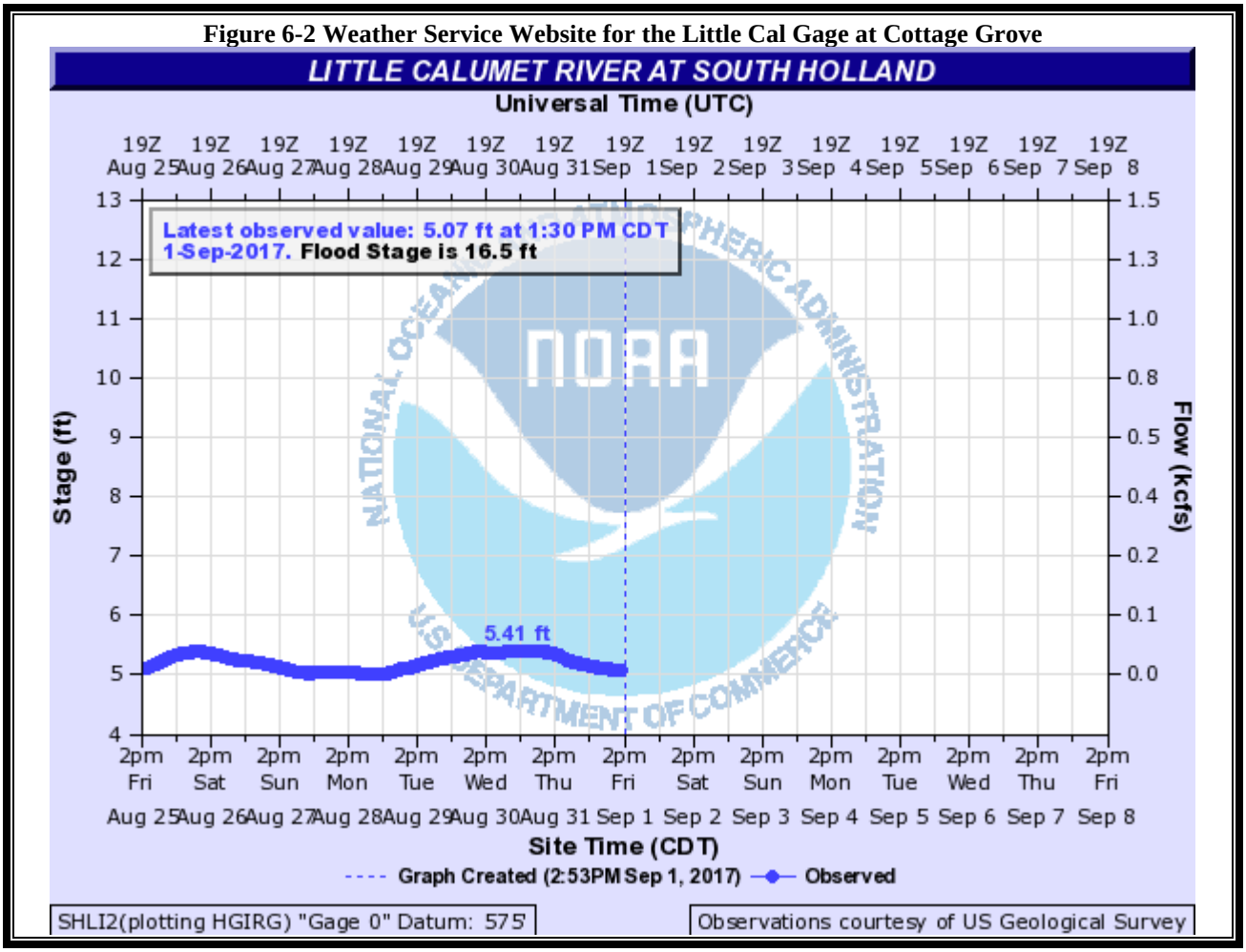
ON THE LITTLE CALUMET RIVER AT SOUTH HOLLAND, THE LATEST STAGE IS 10.5 FEET AT 7 AM MONDAY. FLOOD STAGE IS 13.0 FEET. MINOR FLOODING IS FORECAST, WITH A CREST OF 14.5 FEET EXPECTED THIS EVENING, WHICH IS 1.5 FEET ABOVE FLOOD STAGE. WATER LEVELS ARE EXPECTED TO RISE ABOVE THE FLOOD STAGE OF 13.0 FEET THIS AFTERNOON. AT 15.0 FEET, WATER ENTERS VETERANS PARK.

THE FOLLOWING RIVER FORECASTS ARE BASED ON OBSERVED PRECIPITATION AND FORECAST PRECIPITATION FOR THE NEXT 24 HOURS:

FLD OBSERVED		FORECAST 7AM				
LOCATION	STG	STG	DAY TIME	TUE	WED	THU
LITTLE CALUMET RIVER						
MUNSTER	12	9.6	MON 7 AM	12.3	9.9	8.0
SOUTH HOLLAND	13	10.5	MON 7 AM	12.8	10.7	9.2

When the Little Calumet River is expected to rise, the Weather Service will issue a flood crest stage and time prediction (how high and when) for the Cottage Grove Ave gage similar to the Weather Wire statement in Figure 6-1. Sometimes a flood crest prediction can be made up to two days in advance. That prediction will also be posted on the gage's website.

Figure 6-2 Weather Service Website for the Little Cal Gage at Cottage Grove



The second way the Village is advised of a flood threat is through the NOAA Weather Radio. This system issues all National Weather Service storm and flood watches and warnings. A Weather Radio is at the Dispatch Center managed by E-Com for area municipalities.

If the Weather Service issues a watch or a warning related to heavy storms or river flooding, then E-Com's dispatcher will call the Village's ICC Director (see next section) and advise him/her of the notice. The ICC Director will check the website and relate the predicted flood stage to the color coded flood level. If the website is not operational or not updated to reflect current conditions, the ICC Director will call the Weather Service's office.

The current system has generally worked in the past, especially since the slow rising flood waters allow for corrections in the predictions. Village staff has found a significant improvement in the accuracy of these predictions since 1993. They have proven correct to within an accuracy of less than one-half foot during flood threats in 2008 and 2013. This has greatly helped the Village respond appropriately.

6.2 Flood Warning

6.2.1 General: Once the community is aware of the impending flood, the next step is to advise other agencies, the general public and critical facilities that a flood is on the way. The earlier and the more accurate the warning message, the more people can implement protection measures.

There are a variety of ways to disseminate a flood warning. The best approach is to have multiple or redundant systems so if people do not hear one warning, they are likely to still get the message from another part of the system. Figure 6-3 lists the more common warning methods and their scores under the Community Rating System, which is a measure of dependability and utility. This section also awards points for the information provided in the flood warning messages, routing plans for door-to-door and/or mobile public-address warnings, and information provided online (on Village's website). The maximum allowable score for this section of the CRS is 75 points.

These methods of disseminating a warning, be it for floods, tornadoes, or severe storms, are in widespread use throughout the south suburban area.

Figure 6-3 CRS Credit Points for Warning Dissemination Methods

15, door-to-door contact or mobile public address systems

10, outdoor voice-sound system or fixed siren system;

15, telephone system that reaches all floodplain residents;

10, using the Emergency Alert System;

10, cable television override system;

15, other forms of public notification such as geocoded alert products or social media coordination

10, tone alert radios or NOAA Weather Radios are used for public announcements.

Source: *CRS Coordinator's Manual*

Most flood warning dissemination programs have two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.

Warning: a flood, tornado, etc. has started or has been observed in the area. A "warning" is also issued based on the river gage predictions.

The Weather Service often issues a "flash flood watch" for urban areas, a notice that the amount of rain expected will cause ponding and other flooding on small streams and ditches where much of the watershed has been urbanized.

A complete warning system should have a public information component. Many people are not able to relate a warning to their situation and many others don't know what to do when a flood threatens. Some communities have provided residents with the elevation of the lowest water entry point so they can tell if the predicted flood crest will get into their homes. Many public information programs include information on what warnings mean and what steps and safety precautions should be taken when one is issued.

6.2.2 South Holland's System: The Village issues flood watches and warnings when the rivers reached predetermined stages. The stages for the Little Calumet River at Cottage Grove Ave are shown in Figure 2-2 on page 2-4. The following methods are used:

- Village's emergency cable TV interrupt displays a message on the screen of any television set that is connected to cable and is turned on. The majority of homes in the Village are connected to the cable system.

- Announcements via police and fire department vehicle public address systems. Sometimes, the police or fire staff will knock on doors to be sure that people have heard the message.
- Code Red System (Reverse 911) via land lines and cellular phone systems.
- Signs are displayed near bridges (Figure 6-4).
- Residents can go to the Village's website and link to the Weather Service's gage (see Figure 6-2).

Figure 6-4 Flood Warning Sign

Village public information materials advise residents about how warnings are publicized. They also include safety precautions to take during a flood. These are discussed in Chapter 8.

Given the slow rise of flooding in South Holland, the current system is adequate to get the word out to people.

6.3 Village Flood Response Activities

6.3.1 General: The first priority after the flood threat is recognized is to alert others through the flood warning system. The second priority is to respond with actions that can prevent or reduce damage or injury. These actions can be taken by community staff or by others in concert with an overall flood response plan.

A flood response plan is the best way to ensure that all bases are covered and that the response is appropriate to the expected flood threat. The starting point for such a plan is a flood stage forecast map. This map shows what the areas that will be inundated at various flood levels and the facilities that will be affected.

The flood response plan identifies the actions to be taken and which agency or office is responsible. Examples include:

- activating the emergency operations center (emergency manager);
- sandbagging certain areas (public works department);
- closing streets or bridges (police department);
- shutting off power to threatened areas (utility company);
- dismissing school (school district);
- ordering an evacuation (mayor);
- opening evacuation shelters (churches or the Red Cross), and
- arranging for extra dumpsters for the clean up (garbage haulers).

The Village is a member of the South Suburban Building Officials Association (SSBOA). If the need arises, the SSBOA will make extra building inspectors available after a flood event. In addition, they will provide extra personnel and office equipment (e.g. telephones, copiers, fax machines, computers) to expedite the distribution of aid and resources.

Flood response plans are developed carefully in coordination with the agencies or offices that are given various responsibilities. Drills and exercises should be conducted between floods to ensure that the key participants understand their duties.

The plan should be updated annually to keep telephone numbers and contact names current and to make sure that supplies and equipment that will be needed are still available. They should be revised after floods and training exercises to take advantage of lessons learned and changing conditions. The result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner possible.

6.3.2 South Holland's System: If the Weather Service issues a watch or a warning related to heavy storms that will flood streets and affect the entire community, then the outlined procedures are followed. If the watch or warning is related to river flooding, then the Flood Warning and Response Plan is followed.

The Flood Warning and Response Plan is based on a series of flood stage forecast maps. Five flood response levels are used. The levels and the impact of a flood at each level are shown in Figure 6-5. The relation between the levels and past floods are shown in Figure 2-2. The red level is roughly one half foot higher than the highest flood in recent memory, the flood of November 1990, which crested at an elevation of 595.5 feet. The maps of the yellow and red flood response levels are shown in Figure 2-4.

Figure 6-5 Flood Response Levels

	Yellow	Orange	Red	Purple	Black
Stage	19.0	20.0	21.0	23.0	25.0
Elevation	594.0	595.0	596.0	598.0	600.0
Number of homes affected	21	83	284	1,925	4,514
Other structures affected	11	21	30	120	239
Critical facilities affected	0	1	3	14	38
Streets to be closed	32	57	84	170	193

For each flood response level, the Flood Warning and Response Plan lists specific flood response duties for the following Village offices. The duties for the Incident Command Center are in Figure 6-6.

- Incident Command Center
- Mayor/Village Administrator
- Fire Department
- Police Department
- Planning, Development and Code Enforcement
- Public Works
- ESDA Crews
- Health Department
- Public Information Officer
- Parks Department

Having flood response experiences almost every year has refined the procedures and given the staff valuable training for small floods. After each occurrence, a Post-Flood Evaluation Report is prepared with recommendations for improvements. For example, after the September 2008 flood, the evaluation noted that the number of streets affected by an orange level flood is not as high as the plan reported and that the Village Engineer should double check the figures. These reports have improved the Village's flood response capabilities.

Figure 6-6 Flood Response Duties for the Incident Command Center				
Flood Threat	**Action**	**Staff**	**Equipment**	**Supplies**
Any	Check gage on website to verify predicted flood level, monitor electronic updates	Director		
	Notify Fire Chief, FAC, Receptionist			
	Advise Mayor, Administrator, PIO of the predicted level			
Yellow	Check gage on the website to verify the predicted flood level	Director		
	Notify Mayor, Administrator, Fire Chief, FAC, Police, Public Works, ESDA, Public Information Officer, Health Department, Red Cross	Director and Receptionist		
	Open ICC	See ICC procedures	See ICC equipment list	See ICC supply list
	Use Code Red System to send a flood warning to all affected properties	Director	N/A	N/A
	Monitor reports, record activities	Receptionist		
	Advise Cook County EMA of status every 4 hours. Ask how neighboring communities are doing	Director		
	Check with power, gas, telephone companies on their services and needs	Director		
	Identify if and when utility services are turned off to certain areas	Director		
	Remind Village personnel to keep track of expenses and hours worked	Receptionist		
Orange	Do all lower level activities			
	Use Code Red System to send a flood warning to all affected properties	Director	N/A	N/A
	Advise Love's Travel Stop of impending flood	Receptionist		
Red	Do all lower level activities			
	Use Code Red to send a flood warning to all affected properties	Director	N/A	N/A
Purple	Do all lower level activities			
	Use Code Red to send a flood warning to all affected properties	Director	N/A	N/A
Black	Do all lower level activities			
	Use Code Red to send a flood warning to all affected properties	Director	N/A	N/A

6.4 Critical Facilities

6.4.1 General: Critical facilities are those buildings or locations that are vital to the flood response effort or that would create secondary disasters if flooded. Examples of the former are emergency operations centers, hospitals, public works garages, and suppliers of needed materials. Examples of the latter include hazardous materials facilities, water works, and nursing homes.

Attention to critical facilities is a vital part of a flood response plan. If a facility is flooded, it may draw many workers and resources away from protecting the rest of the community. If a facility is prepared, it will be better able to support the community's efforts.

Most critical facilities have full-time professional managers or staff who are responsible for the facility during a disaster. These people often have their own emergency response plans. State law requires hospitals, nursing homes, and other public health facilities to develop such plans. Many facilities would benefit from early flood warning, flood response planning, and coordination with community flood response efforts.

6.4.2 South Holland's System: The critical facilities identified in the Village's "Flood Warning and Response System" are listed in Figure 2-6. The Incident Command Center has contact names and telephone numbers for these facilities. The Flood Warning and Response Plan identifies responsibilities for contacting those affected by different flood levels.

While there was no damage to any critical facilities during the 2008 flood, most of the facilities do not have their own response plans. The Village could help them develop appropriate flood response plans.

6.5 Post-Flood Mitigation

6.5.1 General: The days and weeks following a flood offer a unique opportunity for flood hazard mitigation, i.e., for taking steps that will reduce the community's vulnerability to damage from the next flood. Once the immediate response efforts and damage assessments are completed, the Village should prepare a post-flood plan for reconstruction and redevelopment of the flooded area. There are four reasons why this timing can be so productive:

1. A flood will bring federal, state, and regional people from various agencies and fields together to focus their attention on the Village and its flood problems.

2. The residents and elected officials will be more interested and more willing to spend time on the Village's flood problems and to try new solutions.

3. If the damage was severe enough, it may be relatively easy to clear out a destroyed area and start anew.

4. If the damage was severe enough to warrant a major disaster declaration, there will be several different sources of money available to buy or rebuild properties so that they will be protected from future flood damage.

6.5.2 South Holland's Program: The 1994 *Floodplain Management Plan* dedicated an entire chapter to this subject, which reviewed the state and federal disaster declaration/disaster assistance timetable. The *Plan* had three recommendations:

a. The Village should appoint a flood hazard mitigation coordinator as soon as possible. The flood assistance coordinator would be an appropriate person for this position.

b. The hazard mitigation coordinator should attend training provided by IEMA and/or FEMA and become familiar with post-flood procedures, clean up and repairs, reconstruction regulations, public information activities, and sources of financial assistance.

c. The hazard mitigation coordinator should develop a post-flood hazard mitigation plan to provide the Village with an aggressive recovery, reconstruction regulation, and public information program to minimize the difficulties during recovery and maximize the opportunities and assistance for mitigation, including funding support for floodproofing or elevating buildings, acquiring flooded properties, and relocating residents.

The Village did make this appointment and the Flood Assistance Coordinator, along with the Village's floodplain management consultant, drafted the *Post-Flood Mitigation Procedures*. The procedures were adopted by the Flood Liaison Committee in 1997. It covers all the issues listed in the 1994 *Plan's* recommendations under the following headings:

- Emergency response (responsibilities, damage assessments, etc.)
- Post-emergency activities
- Building condition survey
- Mitigation approach (reconstruction moratorium, redevelopment planning, etc.)
- Reconstruction regulations (permits, emergency repairs, inspections, estimating substantial damage, contractor quality control, etc.)
- Public information (the mitigation message, media to use, etc.)
- Post-flood mitigation plan (interim guidance, coordination with disaster assistance, etc.)

The procedure paper has been used as a model in other suburbs and other states.

6.6 Conclusions and Recommendations

6.6.1 Conclusions:

a. South Holland previously had an "ad hoc" flood threat recognition system that has been improved substantially since 1993.

b. South Holland has successfully responded to recent floods and has prepared for future floods with the 2007 Flood Warning and Response Plan. After the September 2008 flood, an after-action report was prepared with recommendations on how to improve the Plan.

c. The Village has data on flood prone critical facilities. Some, if not all, of the critical facilities in South Holland's floodplain do not have flood response plans that are coordinated with the Village's flood response efforts.

d. The Village has a useful set of procedures for post-flood mitigation.

6.6.2 Recommendations:

a. The Village should implement the recommendations from the critique of the Flood Warning and Response Plan following the September 2008 flood.

b. The Village should conduct an exercise of the Flood Warning and Response Plan biannually. An evaluation report should be prepared after each exercise and after each flood.

c. The Village should continue to update its list of floodprone critical facilities.

d. The Village should continue its outreach efforts to critical facilities to help them develop flood response plans that are coordinated with and support the Village's plan. This effort should start with those facilities in the orange and red flood levels.

e. Village staff should review, critique, and update the 2007 *Guide to Flood Protection*. This work should use the expected CRS credit criteria as guidelines. The procedures should then be incorporated into the Flood Warning and Response Plan.

6.7 References

- Community Handbook on Flood Warning and Preparedness Programs, H. James Owen, for the U.S. Army Corps of Engineers, 1981.
- CRS Credit for Flood Warning Programs, National Flood Insurance Program/Community Rating System, 2006.
- Flood Warning and Response Plan, Village of South Holland, 2007.
- Floodplain Management: Local Floodplain Administrator's Manual, Illinois Department of Natural Resources, Office of Water Resources, 2006.
- Guidelines on Community Local Flood Warning and Response Systems, Federal Interagency Advisory Committee on Water Data, 1985.
- Post-Flood Mitigation Procedures, Village of South Holland, 1997.

Chapter 7. Property Protection

Property protection measures are those steps taken to protect individual properties, rather than neighborhoods or larger areas of the Village. Most property protection measures modify the land or the building so floodwaters will inflict little or no damage. Property protection measures may be the only feasible flood protection approach in less densely developed areas where a formal flood control project is not feasible. They are also appropriate as interim measures pending construction of a flood control project.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance are provided by a local, state, or federal agency. There are eight categories of property protection measures that were reviewed by the Flood Liaison Committee:

7.1 Relocation
7.2 Acquisition
7.3 Elevation
7.4 Floodwalls
7.5 Dry Floodproofing
7.6 Wet Floodproofing
7.7 Sewer Backup Protection
7.8 Flood Insurance

Most of these measures have been implemented in the south suburban area. As part of its review of property protection, the Flood Liaison Committee visited several sites, including two in South Holland.

The Committee also investigated ways to assist property owners who could use more information or financial assistance in implementing their own protection measures. Provisions regarding information and technical assistance are covered in Chapter 8, Public Information. Financial assistance is addressed in Section 7.9.

7.1 Relocation

7.1.1 General: The surest and safest way to protect a building from flooding is to move it to high ground. There are many house movers in the Chicago area and any type of building can be moved. However, the cost increases for heavier (e.g., masonry) buildings and for large or irregularly shaped buildings.

Flood Hazard:

- Relocation protects a building from any type of flood hazard.
- Relocation is more justified in areas subject to ice jams, flash flooding, deep waters or other severe flood hazard.

Building Types:

- Smaller, wood frame buildings.

- Buildings on crawlspaces or basements where it is easier to place jacking and moving equipment underneath.
- Large lots with portions outside the floodplain or where the owner has a new flood-free lot available.

Cost: The cost could exceed to over $90,000 depending on the type, weight and size of the house, whether it must be cut and moved in parts, and the cost of a new lot.

Problems:

- Expensive for the individual property owner, although there are some government loans or grants available.
- If a large area is affected, the community loses property tax and utility income.

7.1.2 Use in the Area: Many buildings have been moved in the Chicago area. However, there is little documentation of moving a house to get it out of the floodplain. There have been floodplain relocation projects in downstate Illinois and in other states.

7.2 Acquisition

7.2.1 General: Acquisition has all the advantages of relocation. The major difference is that the building is undertaken by a government agency and the land is converted to public use. Acquisition and demolition are done more often for larger, slab, or masonry buildings that are too expensive to move and for dilapidated structures that are not worth protecting.

There have also been cases of acquisition and relocation, whereby the purchasing agency sells the building for salvage and the new owner relocates the structure rather than demolish it. Sometimes arrangements are made to allow the previous owner to purchase the building back at the salvage value. The owner then gets to keep the house and use the rest of the money made from the sale to pay for the new lot and moving expenses.

Flood Hazard:

- Acquisition works in any type of flood hazard.
- Acquisition is more justified in areas subject to ice jams, flash flooding, deep waters or other severe flood hazard.

Building Types:

- Appropriate for any type of building.
- Areas where the community wants to clear or redevelop because of building conditions.
- Areas where parks are needed and areas that are adjacent to existing parks.

Cost:

$142,000	median sale price of a single family home
8,400	appraisals, abstracts, title opinions, and other fees
13,500	relocation benefits
,000	demolition
$180,900	

Problems:

- Many people don't want to leave their property, often because they prefer a waterfront location.
- A "checkerboard" acquisition pattern leaves holes that break up the neighborhood (see Figure 7-1).
- The properties acquired by the community become an added maintenance cost to the taxpayer.
- If a large area is affected, the community loses property tax and utility income.

Figure 7-1 Acquisition Pattern

This aerial photo shows the checkerboard pattern in the buyout area along the Little Calumet River in Calumet City.

7.2.2 Use in the Area: There are several excellent examples of acquisition in the Chicago area. One of the largest in the country was implemented between Addison and Elmhurst in the early 1970's. Over 150 acres were purchased and 75 families were relocated out of the Salt Creek floodplain. The area was redeveloped by the Forest Preserve District and part of the land was used to build a levee to protect properties not purchased.

In the 1980's, one of the more commonly used programs was FEMA's Section 1362, which funded acquisition of substantially or repeatedly damaged buildings that were insured under the National Flood Insurance Program. Section 1362 was used to purchase homes in Calumet City. This resulted in the checkerboard pattern where only a few lots here and there were acquired and cleared (Figure 7-1).

Section 1362 has been replaced by other funding programs, especially since the 1993 Mississippi River flood. The Village applied for funding following the 1996 flood to acquire a repetitive flooded commercial structure. However, state rules allowed only funding of residences, so the project was not approved.

In 2015, the Village of Glenwood was selected for funding through FEMA's Flood Mitigation Assistance Program for acquisition and demolition of nine homes in the Thorn Creek floodplain.

MWRDGC has a Flood-Prone Property Acquisition Program, which involves partnerships with local communities to acquire flood-damaged and flood-prone homes within the floodplain on a voluntary basis. MWRDGC is currently working with several communities to acquire flood-prone homes, which will be removed from the floodplain and preserved as open space. Communities are selected for this acquisition program through an annual application process.

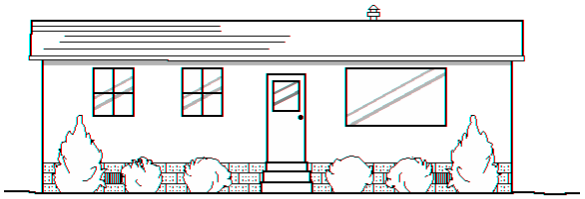
7.3 Elevation

7.3.1 General: Short of removing it from the floodplain, the best way to protect a house from surface flooding is to raise it above the flood level. Floods flow under the building, causing no damage. This protection technique is required by law for new buildings located in floodplains and is commonly practiced in flood-prone locations throughout the country.

House moving contractors know the techniques to elevate a building. The building is jacked up and set on cribbing while a new foundation is built underneath. The foundation walls are raised to the flood protection level and the house is lowered back down. Utility lines are extended and reconnected, steps are built, and, sometimes, the perimeter is backfilled or landscaped to mask the change.

If the flood protection level is low, the result is similar to a house on a two or three-foot crawl-space (see Figure 7-2). If the house is raised two feet, the front door would be three steps higher than before. If the house is raised eight feet, the lower area can be wet floodproofed for use as a garage and for storage of items not subject to flood damage.

Figure 7-2 Elevated House



A variation on elevating the entire building is filling in a basement, which "relocates' the lowest floor to a level 8 – 9 feet higher. This occurred when a South Holland home in the floodplain had a fire that caused substantial damage. The owner built a second story and moved everything out of the basement. The basement was filled in. The first floor was already above the regulatory flood elevation, so the house was compliant with the floodplain management regulations and the owner pays lower flood insurance premiums.

Flood Hazard:

- Elevation is appropriate for slower moving surface and subsurface water.
- Buildings can be elevated to flood protection levels up to eight feet.
- Elevation is appropriate where there is no time for human intervention.

Building Types:

- Lighter, wood frame buildings on crawl spaces or basements are the easiest to elevate because jacks can readily be placed under them.
- Masonry buildings on crawlspaces can be readily elevated but the cost is increased because of the weight and the care needed to keep the brick or stone from cracking or falling off.
- Buildings on slab can be elevated, slab and all, but the number of knowledgeable contractors is limited.

Cost: Crawlspace: $28,000 - $56,000. Slab with brick walls: $56,000 - $112,000. Costs do not include design or permit fees. Projects managed by the property owner have cost as little as $5,000.

Problems:

- Many owners object to the change in appearance. If no one else in the neighborhood has elevated their building, they are concerned that they will stand out and the project will affect area property values.
- New lower stories created by raising buildings eight feet are sometimes reoccupied with contents and materials susceptible to flood damage.

7.3.2 Use in the Area: There have been several homes elevated in the floodplains of Salt Creek and the Kankakee and Des Plaines Rivers. These have been raised from two feet to eight feet. In some cases, separate and attached garages were left at grade. Most of these were financed by the property owners. A well-landscaped example is on 158th Street just east of Greenwood Road.

7.4 Barriers

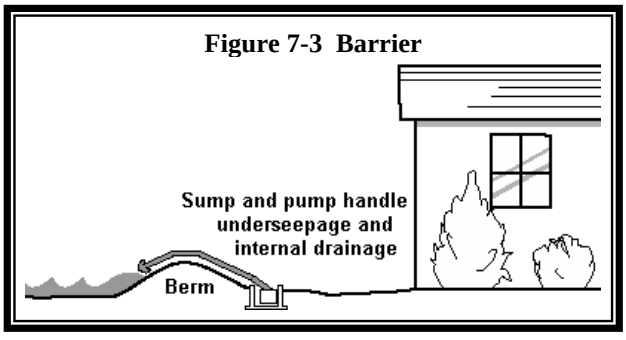
7.4.1 General: Barriers keep floodwaters from reaching a building. They can be made of earth or concrete. Large earth barriers are called levees. The term "berm" is used in this report and is the more common approach in shallow flooding areas. Berms are made by regrading or filling an area (see Figure 7-3). Barriers can either surround the building ("ring levee") or connect to high ground.

The strength of levees comes from their mass; therefore, they need a lot of room. The standard design is three horizontal feet for each vertical foot (3:1 slope). Providing a foot width at the top results in a need for six to seven feet of ground for each foot in height.

Concrete floodwalls are used where there is not enough room for a berm or levee. They should be built with internal reinforcing bars for strength and to resist cracking and settling over time. They must be properly anchored to withstand lateral hydrostatic pressure and care must be taken to ensure they are watertight.

All three approaches need to handle leaks, seepage of water under the barrier, and rainwater that falls inside the levee or floodwall perimeter. Therefore, they need a sump and/or drain tile to collect the internal ground and surface water (Figure 7-3). A pump and pipe is also needed to pump the internal drainage over the barrier.

Figure 7-3 Barrier



By keeping water away from the building walls, the problems of seepage and hydrostatic pressure are reduced. Basements and the lower floors of split levels can also be protected by construction of low walls around stairwells.

Flood Hazard:

- Levees and floodwalls can be built up six feet high, but are more common, less obtrusive, and safer where the flood protection level is three feet or less.
- Levees and berms are susceptible to erosion in areas with high velocities.
- Some barriers have openings for driveways and sidewalks. Closing these openings is dependent on human intervention.
- Care must be taken to set a barrier back on the property so that drainage problems are not diverted to neighboring properties.

Building Types:

- Any type of building can be protected, although buildings with basements will be more susceptible to underseepage.
- Floodwalls are more appropriate on small lots where there is less room.

Cost: The cost can range from practically nothing, when the homeowner regrades the yard or builds a berm with local fill, to $12,000 for a concrete floodwall three feet high with drain tiles and sump pump. One wall around a patio in South Holland cost $3,000 to protect to less than the 100-year flood level.

Problems:

- Levees and berms are susceptible to erosion from rain and floodwaters if not properly sloped and provided with ground cover.
- Levees, berms, and floodwalls can settle over time, lowering their protection levels. Concrete walls can crack, weaken, and lose their watertight seal.
- Barriers are not allowed in floodways or other areas where the obstructions would divert floodwater to other properties.

7.4.2 Use in the Area: There are several examples of barriers in the area. There is a small berm on 164th Street in Calumet City between a home and a park on the Little Calumet River. A good part of the berm appears to be on park land. A small concrete floodwall protects a house on Burnham Avenue in Calumet City, just north of the Little Calumet River (Figure 7-4).

A more sizeable ring levee protects two houses on 158th Street just east of South Holland. The Liaison Committee visited this site on a field trip. The levee is six feet in the back and three feet in the front. It has successfully kept out floodwaters since it was built after the 1981 flood of the Little Calumet River.

Figure 7-4 Local Barriers

This Calumet City home is surrounded by a floodwall, but the garage door must be sandbagged during a flood. The wall doubles as a planter box to reduce the visual impact of a flood protection structure.

This floodwall was installed by a South Holland home-owner on the Calumet Union Drainage Ditch. It has kept floodwaters out of the house multiple times since it was built in 1991.

There are interesting different approaches to floodwalls that protect below grade garage entrances in Oak Forest. The Committee visited examples that use a wooden barrier and that require the vehicle to drive over a raised area in the front yard or a raised sidewalk.

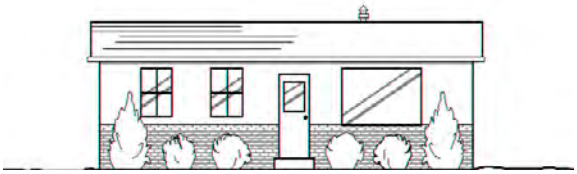
7.5 Dry Floodproofing

7.5.1 General: This term covers several approaches to sealing up a building to ensure that floodwaters cannot get inside it. All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, sewer lines, and vents, are closed, either permanently, with removable shields, or with sandbags. Many dry floodproofed buildings cannot be told apart from those that have not been modified.

Dry floodproofing is only appropriate for buildings on sound slab foundations that are subject to less than three feet of water. Because there is a joint between the slab and the foundation wall, the foundation cannot be considered watertight. A subsurface drainage system with a sump pump is needed in areas where flood waters are up for several hours.

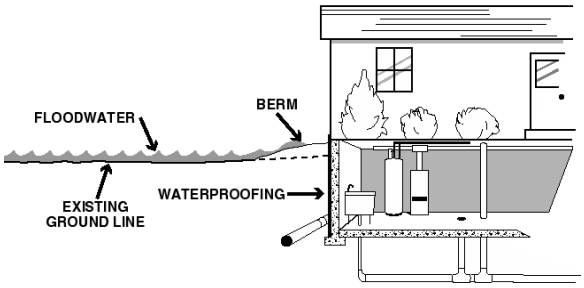
The degree of floodproofing can vary from simply applying a waterproofing compound on the walls and sandbagging the doorways to a more secure method. The more secure method involves coating the lower three feet of the outside walls with waterproofing compounds and plastic sheeting. This coating is covered with a layer of brick facing to protect the waterproofing and to minimize any disruption to the appearance. If not already installed, a drain tile with a sump and sump pump is needed at the base of the walls to handle underseepage.

Figure 7-5 Dry Floodproofed House



Small brick-faced floodwalls are built around the doorways to allow access into the house during flooding. The drain tile sump and a sump pump are located inside the wall. The walls have watertight doors that stay closed, requiring human intervention to open them.

This approach assumes that the slabs are not broken or cracked. To ensure that they are watertight and sound, an engineering analysis is needed. The end result is a watertight house that will keep water out even when there is no one home.Houses with basements or other floors below grade can be protected with a backfill approach. A waterproofing compound is applied to the walls and fill is placed against the side of the house. A subsurface drain tile and one or two sump pumps are a must. Water must seep through the fill to reach the house. The drains and pumps can keep up with the seepage.**Figure 7-6 Backfill Floodproofing**



By backfilling above the flood protection level, a house with a basement can be protected from shallow flooding. The basement walls need to be waterproofed and a drain tile and sump pump is needed to keep water pressure from building up. This approach was used to protect the South Holland home to the right.

The secret is to not let surface water touch the house. This will greatly increase the amount of water against the basement walls, resulting in much greater hydrostatic pressure. Sump pumps cannot keep up with surface water. An example of this backfill or waterproofing berm approach is in Figure 7-6.

Flood Hazard:

- Dry floodproofing without a backfilled berm is appropriate where the flood protection level is less than three feet deep. Most building walls and floors are not strong enough to withstand the hydrostatic pressure from more than three feet of water.
- The three feet depth guideline assumes there is little velocity.

Building Types:

- Dry floodproofing is only appropriate for buildings with slab on grade foundations. It is very difficult to waterproof a crawl space to protect it from underseepage.
- Dry floodproofing without backfill is not recommended for houses with floors below grade, such as basements and garden apartments, because the hydrostatic pressure can collapse the walls or buckle the floor.
- Where there is not enough space on the lot for a berm or levee, dry floodproofing may be the only alternative. This technique is not as desirable as keeping floodwaters from reaching the building.

Cost: An owner can install a dry floodproofing approach for very little money. The cost ranges from $100 for the waterproofing compound/sandbag approach to $22,000 for the more secure/attractive approach described. The project in Figure 7-6 cost approximately $10,000.

Problems:

- Closing openings is dependent on adequate warning and the presence of someone who knows what to do.
- Many commercial waterproofing compounds are made to protect wood from rain and will not withstand the pressures of standing water. Some deteriorate over time.
- It is very tempting for the owner to try to keep the flood out if floodwaters get deeper than 2-3 feet. This can result in collapsed walls, buckled floors, and danger to the occupants.

7.5.2 Use in the Area: There is one well-documented case in Calumet City of an owner who applied a little over $100 worth of plastic and waterproofing compound to the lower levels of brick on his slab house (Figure 7-7).

There are probably many other cases of dry floodproofing that we are unaware of because they don't always show. One measure that does show is glass bricking the basement windows. However, this approach is not recommended because of the loads placed on the basement walls. The backfill approach is preferred because pumps keep the seepage water from building up the hydrostatic pressure.

The backfill approach has been used by one of the Flood Liaison Committee members. The owner built a waterproofing berm combined with landscaping, timbers, and concrete that protects his house with a below grade floor. This site was visited by the committee members on the field trip (Figure 7-6).

Figure 7-7 Dry Floodproofed House in Calumet City

This project kept water out during the 1982 flood and proved that it was one of the most cost effective floodproofing projects ever made. While the waterproofing compound left a black strip over the lower rows of brick, it was hidden by planting and landscaping in the front and side yards.

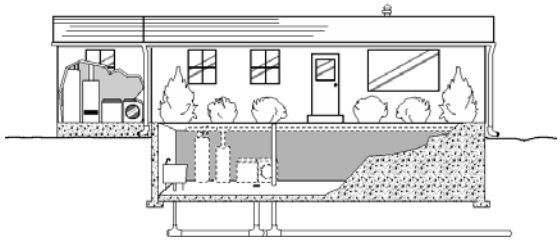
7.6 Wet Floodproofing

7.6.1 General: Outside floodwaters against a basement put the equivalent pressure of seven feet of water on the wall and floor. Most walls and floors are not built to withstand hydrostatic pressure of more than three feet of water. As a result, sometimes waterproofed basement walls and floors are cracked, buckled, or broken by the pressure of floodwater.

One way to deal with this is to plug the sanitary sewer openings, such as the floor drain, and let the surface water in. Everything subject to water damage must be moved up or out of the building. This is called wet floodproofing. Wet floodproofing approaches range from moving a few valuable items to rebuilding the floodable area.

In the latter case, structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher level. In Figure 7-8, these items are relocated to a new room addition. Another approach is to raise these items on platforms where the flooding is not deep.

Figure 7-8 Wet Floodproofed House



Wet floodproofing is not feasible for one story houses because the flooded areas are the living areas. However, many people wet floodproof their basements, garages, and accessory buildings simply by relocating all hard to move valuables, such as heavy furniture and electrical outlets. Light or moveable items, such as lawn furniture and bicycles can be moved after the flood warning is issued.

Wet flood proofing has one advantage over the other approaches: no matter how little is done, flood damage will be reduced. Thousands of dollars in damage can be prevented by simply moving furniture and electrical appliances out of the flood-prone area.

Flood Hazard: Wet floodproofing will work wherever there is an area above the flood protection level to which things can be relocated or temporarily stored.

Building Types:

- Buildings with basements.
- Garages, sheds, commercial and industrial facilities, and buildings with contents that are either water resistant or easily moved.

Cost: One hour of the owner's time will accomplish some wet floodproofing by moving valuables out of the floodable area. The out of pocket cost can range to $3,000 for relocating the furnace, water heater, etc., to as high as $22,000 to rebuild a floodable area with water-resistant materials and to relocate all utilities. This cost can be minimized if the work is done as part of building improvements or during reconstruction after a flood.

Problems:

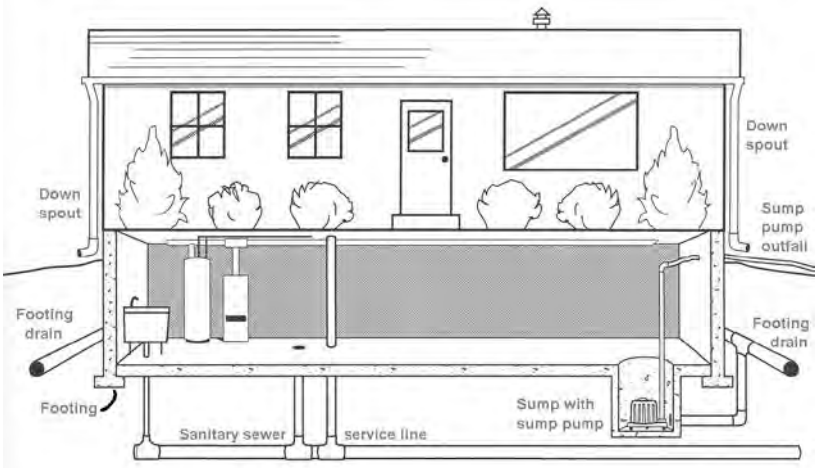
- Owners are reluctant to "abandon" large areas of their buildings.
- Moving contents is dependent on adequate warning and the presence of someone who knows what to do.
- Flooding an area where there is electricity or hazardous materials creates a safety hazard.
- There will still be a need for clean up, with its accompanying health problems.

7.6.2 Use in the Area: As with dry floodproofing, it is very hard to tell if a house has been wet floodproofed. There have been a few Chicago area cases documented. A Wood Dale resident elevated his house and wet floodproofed the attached garage so it didn't have to be elevated. An Oak Forest homeowner wet floodproofed the lower level of his bi-level house rather than suffer any more flood damage.

7.7 Sewer Backup Protection

7.7.1 General: Figure 7-9 shows the sewer arrangements for a typical house in South Holland. The sanitary sewer service line drains toilet waste, laundry tubs and the basement floor drain to the sanitary sewer main in the street. Clean storm and ground water is handled by downspouts and footing drains. This water is directed either to a storm sewer service line (pictured) or to a sump where a pump sends it out onto the ground away from the house.

Figure 7-9 Typical House Sewer Arrangement



Often basement flooding is caused by these two sewer systems being interconnected. Some houses have the downspouts, footing drain tile, and/or the sump pump connected to the sanitary sewer service. During a heavy rain, excessive amounts of stormwater enters the sanitary sewers, causing backups in the owner's house and overloading the mains, contributing to backups in other houses. Correcting these problems are part of the Village's ICAP programs which is discussed in Section 4.5.2. To date, most of the downspout, sump pump and other improper cross-connections have been disconnected.

Sewer backups can also be caused by events not related to storms or flooding. Individual service lines can be plugged by grease, waste, tree roots, breaks in the pipe or saturated ground. The Village's mains can also be plugged by the same causes as well as vandalism or illegal placement of items in manholes. These problems can be fixed by the owner or the Village, depending on where the stoppage occurs. Proper maintenance, such as pouring tree root killer down the toilet every year, can prevent most of these problems.

This section focuses on property protection measures that deal with sanitary sewer backup which occurs when the sewer main is overloaded and backs up through the sanitary service line into the house. There are four common approaches addressed in this section: floor drain plug, floor drain standpipe, overhead sewer, and backup valve. These all work for the same flood hazard and building type (buildings with basements or below grade floors), so those headings are not repeated in this section.

7.7.2 Floor Drain Plug: The simplest way to stop sewer backup is to plug the opening where it first occurs. This is at the floor drain, the sanitary sewer system's lowest opening in the house. Commercial plugs are available which are placed in the floor drain below the grate. Bolts on metal end pieces are tightened, causing a rubber gasket to expand and seal the plug in the pipe.

A plug stops water from flowing in either direction. Therefore, if the laundry tub overflows or other spillage occurs, it will stay in the basement unless the plug is removed. Conversely, the plug can be left out and put in place during heavy rains.

Figure 7-10 Floor Drain Float Plug

One variation on the plug is one with a float. This plug allows water to drain out of the basement (see Figure 7-10, left side). When the sewer backs up, the float rises and plugs the drain (see Figure 7-10, right side). A float plug does not need to be removed and replaced in order for the floor drain to work.

Cost: The great advantage of a plug is its low cost and ease of installation. A standard floor drain plug can be purchased at most local hardware stores for approximately $5. A float plug costs $10 - $15.

Problems:

- A plug left in the floor drain may contribute to a wet basement if spillage cannot drain out.
- A small amount of debris can jam a float plug open, preventing it from sealing.
- A floor drain plug does not stop backup from coming out of the next lower opening, such as a laundry tub or toilet in the basement.
- A plug does not tell you if there is a problem occurring in your sewer service line. If the plug is not tight enough, pressure can eject it.
- In older houses, the sewer lines under the basement floor may be clay tile. A build up of pressure can break them. In newer houses, the sewer line under the floor is cast iron, making breakage unlikely.

7.7.3 Standpipe: A standpipe is an inexpensive alternative to a floor drain plug. A "donut" with metal end pieces and a rubber gasket in the middle is placed in the floor drain. A length of pipe is placed in the "donut hole." Bolts are tightened and the metal end pieces squeeze the gasket to make a tight seal on both the floor drain and the length of pipe.

Figure 7-11 Standpipe

When the sewer backs up, the water stays in the pipe (see Figure 7-11). Unlike a pipe, water pressure will not blow a properly installed standpipe out of the floor drain. The system works unless the backup is so deep that it goes over the top of the pipe.

One advantage of the standpipe over the floor drain plug is that the overflow acts as a safety valve. A flooded basement equalizes water pressure on the walls and floor, minimizing the chance of a cracked floor from broken pipes underneath.

However, because water pressure is dependent on the "head" or height of water in the pipes, a standpipe does not reduce the pressure in the pipes. The water pressure in the pipes is the same with a standpipe or a plug. Therefore, standpipes and plugs are only recommended for buildings where the sewer line underneath the floor is cast iron pipe.

Cost: A standpipe is almost as inexpensive as a floor drain plug. The "donut" can be purchased for $20 - $30. The pipe can be cut to any length and will cost less than $10.

Problems:

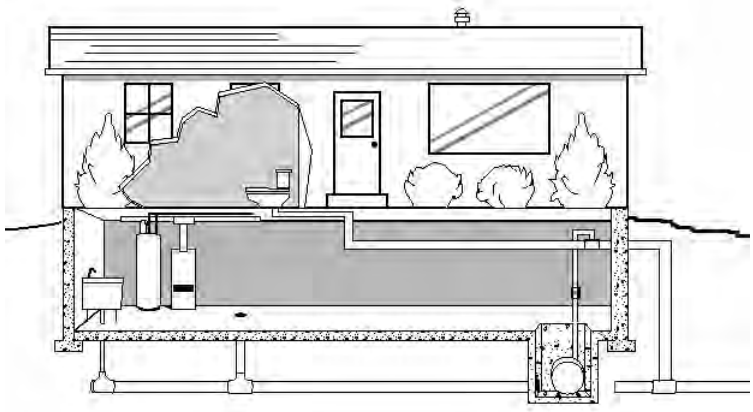
- A standpipe left in the floor drain may contribute to a wet basement if spillage cannot drain out.
- A standpipe only protects up to its height, normally three feet. Deeper flooding will flow over the top.
- A standpipe does not stop backup from coming out of the next lower opening, such as a laundry tub or toilet in the basement.
- In older houses, the sewer lines under the basement floor may be clay tile. A build up of pressure can break them. In newer houses, the sewer line under the floor is cast iron, making breakage unlikely.

7.7.4 Overhead Sewer: An overhead sewer acts like a standpipe but without the problems. A sump is installed under the basement floor to intercept sewage flowing from basement fixtures and the basement floor drain. An ejector pump in the sump pumps sewage up, preferably above ground level. Plumbing fixtures on the first floor are not affected. They continue to drain by gravity to the sewer service line.

It is unlikely that the sewers will backup above ground level. If water does go higher, a check valve in the pipe from the ejector pump keeps it in the pipes. Backed up sewage is contained in the sewer pipes so there is no worry about overflowing laundry tubs or basement toilets.

Another advantage is that one does not have to be home during the storm because an overhead sewer

Figure 7-12 Overhead Sewer



is a permanent alteration to the plumbing. The only concern is when power is lost, the ejector pump won't work. This only limits the use of the facilities in the basement that need the pump. Upstairs plumbing still works.

Cost: While more dependable than a standpipe, an overhead sewer is more expensive, typically costing $5,500 to $17,000 for a plumbing contractor to reconstruct the pipes in the basement and install the ejector pump.

Problems:

- The ejector pump requires maintenance and electricity to work properly.
- The basement is disrupted during construction. The contractor may have to run the overhead pipes through one or more basement rooms, although often they can be camouflaged.
- In older houses, the sewer lines under the basement floor may be clay tile. A build up of pressure can break them. Sometimes this can be accounted for by running the overhead line through the basement wall. In newer houses, the sewer line under the floor is PVC, making breakage unlikely.

7.7.5 Backup Valve: A backup valve stops the water in the sewer pipes. Older versions of this approach were located in the basement and relied on gravity to close the valve. If debris caught in the flapper, the valve did not close tight. Because of its unreliability, valves were discouraged and even prohibited in some communities.

The "balanced valve" has corrected these design shortcomings. A system of counterweights keeps it open all the time so debris won't catch and clog it. When the sewer backs up, instead of relying on gravity, floats force the valve closed. It is usually installed in a manhole in the yard so there is less disruption during construction and no concerns over breaking the pipes under the basement floor.

As with overhead sewers, a valve is fully automatic. It can even work when there is surface flooding. The installation is outdoors, so there is minimal disruption of the basement during construction. The owner can still use the sanitary sewers during flooding as long as there is power to run the ejector pump which ejects wastewater when the valve is closed.

Cost: Area companies can install an outside backup valve at a cost from $5,500 to $12,000.

Problems:

- The ejector pump and the valve require maintenance.

7.7.6 Use in the Area: Because plugs and standpipes can be purchased anywhere and because they are installed indoors, there is no way to tell how many are in use in South Holland or the south suburbs. However, many residents are familiar with standpipes and many use them.

Overhead sewer installation and backup valves require a knowledgeable plumber and a building permit. The Village's rebate program (see Section 7.9.5) has funded 135 overhead sewer installations and 56 backup valves.

7.8 Insurance

Insurance helps the owner finance repairs and replacements after a flood, and insurance has the advantage that a property is covered as long as the policy is in force. The owner does not have to be home for this approach to work. Most homeowner's insurance policies do not cover a property for flood damage. However, there are two ways an owner can insure a house.

7.8.1. National Flood Insurance: The Village of South Holland participates in the National Flood Insurance Program (NFIP). Local insurance agents can sell a separate insurance policy under rules and rates set by the Federal Insurance Administration. Any agent can sell a policy and all agents must charge the same rates. Rates do not change after claims; they are set on a national basis.

Separate coverage can be obtained for the building's structure and for its contents. The structure generally includes everything that stays with a house when it is sold, including the furnace, cabinets, built-in appliances, and wall to wall carpeting. There is no coverage for money, valuable papers, and items outside the house, such as the driveway and landscaping.

A National Flood Insurance policy covers damage to contents in a basement only under special circumstances. Structural coverage only covers the structural parts of basement walls and floor (not finishings like paint, wallpaper, or paneling) and selected items such as the furnace, water heater, washer, sump pump, etc. The lower level of a split level is considered a basement.

Flood Hazard:

- Flood insurance covers a building subject to a "general condition of surface water flooding." Coverage is appropriate regardless of the velocities, duration, warning time, etc.
- The NFIP does not insure buildings for subsurface flooding, including seepage and sewer backup.

Building Types: Any walled and roofed structure can be covered by a flood insurance policy. Detached garages and accessory buildings are covered under the policy for the lot's main building.

Cost: The cost of a flood insurance policy for a home built before August 1980 varies and is dependent on the amount of coverage to be provided and the location and type of house. In South Holland, preferred risk policies are available for properties located outside the 100-year floodplain (as shown on the Flood Insurance Rate Map). The annual premiums for these policies are typically substantially lower than the premiums for homes that are in the floodplain. Premiums typically include a deductible for the structure and a separate deductible for the contents of the structure. Higher deductibles are available to reduce the cost of the premium.

Use in the Area: In 1999, the Village had over 1,100 policies, ranking it fourth in the state. With the new Flood Insurance Rate Map, the floodplain where lenders must require a flood insurance policy is much smaller. As of March 2010, there were 392 policies in force for a total of $71,537,900 in coverage. As of January 2017, there were 121 policies in force for a total of $30,307,800 in coverage

Participation in the Community Rating System provides South Holland residents a 25% reduction in their premium rates (see Section 1.4).

7.8.2. Basement backup insurance: Several insurance companies have sump pump failure or sewer backup coverage that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra. Most exclude damage from surface flooding that would be covered by National Flood Insurance.

Flood Hazard:

- Subsurface flows from sump pump failure.
- Sewer backup.

Building Types: Any building with a basement or floor below grade would benefit, especially buildings in combined sewer areas.

Cost: Varies per individual property for a rider on the homeowner's insurance premium.

Problems: Each company has its own deductibles and exclusions. Some may cancel the coverage or increase the premium if the policy holder collects on a claim.

7.9 Financial Assistance

7.9.1 Federal Grants: Congress has created a variety of funding sources to help floodprone property owners reduce their exposure to flood damage. Because the Village participated in the 2014 Cook County Hazard Mitigation Plan, they are now eligible to apply for FEMA grants, such as the Flood Mitigation Assistance and Pre-Disaster Mitigation grants. More information on the following programs can be found on the noted websites and in Figure 7-13.

- Hazard Mitigation Grant Program (HMGP) − a grant made available after a Presidential disaster declaration (https://www.fema.gov/hazard-mitigation-grant-program)
- Flood Mitigation Assistance (FMA) − a grant that a community can apply for each year (https://www.fema.gov/flood-mitigation-assistance-grant-program)
- Pre-Disaster Mitigation (PDM) − a nationally competitive grant that a community can apply for each year (https://www.fema.gov/pre-disaster-mitigation-grant-program)
- Repetitive Flood Claims (RFC) − a grant that FEMA administers for certain repetitive loss properties where there is no local government sponsor (https://www.fema.gov/media-library-data/20130726-1621-20490-8359/rfc_08_guidance_final_10_30_07.pdf)
- Severe Repetitive Loss (SRL) − a grant that is reserved for "Severe" repetitive loss properties, i.e., those with their flood insurance policies administered by FEMA's Special Direct Facility rather than a private insurance company (https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf)

- Increased Cost of Compliance (ICC) − an extra flood insurance claim payment that can be provided if an insured building was flooded and then declared substantially damaged by the local permit office. (https://www.fema.gov/increased-cost-compliance-coverage)
- Small Business Administration (SBA) − low interest loans that can fund repairs and mitigation projects for residential and nonresidential buildings following a disaster declaration (https://www.disasterassistance.gov/get-assistance/forms-of-assistance/4479/0/D05)

Most of the FEMA grants provide 75% of the cost of a project. The owner is expected to fund the other 25%, although in some cases the state or local government may contribute to the non-FEMA share. ICC pays 100% (up to $30,000) of the cost of bringing the damaged building up to the local ordinance's flood protection standards.

Each program has a different Congressional authorization and slightly different rules. These are summarized in Figure 7-13. States and communities set their own priorities for the use of the grant funds, but they are strongly encouraged to address their repetitive flood problems. In no case can a FEMA grant be used on a project without the voluntary agreement of the owner.

7.9.2 State Programs: The Illinois Department of Natural Resources, Office of Water Resources, has had a mitigation assistance program that has been used to acquire buildings located in floodways. There are no formal rules and regulations on this program. It is possible that if floodproofing were shown to be cost effective, the program might be used to protect floodway properties instead of buying them.

Figure 7-13 Federal Funding Sources

Types of Projects Funded	HMGP	FMA	PDM	RFC	SRL	ICC	SBA
Acquisition of the entire property by a gov't agency	✓	✓	✓	✓	✓		
Relocation of the building to a flood free site	✓	✓	✓	✓	✓	✓	
Demolition of the structure	✓	✓	✓	✓	✓	✓	✓
Elevation of the structure above flood levels	✓	✓	✓	✓	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓				✓
Local drainage and small flood control projects	✓	✓	✓	✓			
Dry floodproofing (nonresidential buildings only)	✓	✓	✓	✓		✓	✓
Percent paid by Federal program	75%	75%	75%	100%	75%	0	0
Application notes	1, 2	1	1		1	3	2, 4

Application notes:
1. Requires a grant application from the local government
2. Only available after a Federal disaster declaration
3. Requires the building to have a flood insurance policy and to have been flooded to such an extent that the local government declares it to be substantially damaged
4. This is a low interest loan that must be paid back

7.9.3 Use in the Area: Calumet City and several Will and DuPage County communities have used FEMA grants. In 1983 and 1986, FEMA purchased 15 properties along the Little Calumet River (see Figure 7-1).

The Illinois Department of Transportation, Division of Water Resources' mitigation assistance program has been used mostly on the Illinois River. A few properties in Wood Dale, Addison, Elmhurst, Oak Brook, and Plainfield have been purchased.

After the 1996 Chicago suburban flood, more funds were made available. State priorities limited the use of the funds to acquisition of residential buildings. Only one building in South Holland appeared to be appropriate for the program, but it was a commercial property and could not compete with residences that fell higher on the State's priority list.

7.9.4 Community Funding Arrangements: Most of the Federal and state programs have their own requirements as to how the money is used to protect a property. However, communities have more discretion in how they use their own funds. This section reviews alternative arrangements for how local funds could be administered.

Community Built Project: As with public works projects, the Village could design and manage the construction project and pay the contractors directly. This approach can add a great deal of overhead cost when there are many little projects on different properties. This approach has been used in Prince George's County, Maryland, where floodwall and dry floodproofing projects cost in the neighborhood of $30,000.

This arrangement is the most expensive one. The Village must do all the preparations, plans, and administrative work. Because of direct government involvement, the project may be more expensive due to prevailing wage laws and the desire for architect or engineering plans. However, this is the only feasible approach for acquisition.

100% Grants: This approach is used by many local community development or housing improvement agencies for their rehab programs. Under a contract between the property owner and the contractor, the local agency does not have to meet Federal requirements for public projects. It does not pay prevailing wages and it avoids direct liability for the work. On the other hand, the community is able to help the owner through the complicated process of writing plans, selecting a qualified contractor, and inspecting the work.

Cost Sharing: Cost sharing has two benefits. First, it makes the Community's funds go farther. Second, it gives the property owner a stake in the project. It is generally understood that by having an investment in floodproofing, the owner will have an incentive to make sure that it is properly maintained. The owner's share should be large enough to be a meaningful investment but not so large that the owner cannot afford to floodproof.

The community development and housing improvement agencies' funding arrangements accommodate cost sharing. The owner's share is put in the same escrow account before the contract is signed. If the owner's share is very large, as with multi-family building projects, a letter of credit is obtained from a bank. The owner has an approved loan, but does not have to borrow all of the principal before it is needed.

Soft Match: A variation on the cost share is a "soft match" by the owner. Instead of a cash contribution, the owner would donate labor or something else to the project. If a floodwall protects several homes, the owner of the property might donate the land and the fill dirt.

Another example would be an owner who cannot afford to pay his or her share of elevating a house in cash up front. Instead, after the house is elevated, the owner builds the stairs and does the landscaping over the next few months. Under this example, the owner contributes 15% - 20% of the total project cost. The community is assured that the flood protection parts of the project are done properly while it is up to the owner to make the property look good.

Loans: Low interest loans look attractive to a funding agency. Eventually, the funds will be repaid so they can be loaned out to floodproof other properties. Loans also avoid the challenge that the community is "giving" money to improve private property.

The problem with floodproofing loans is that not many people have taken advantage of them. They were tried in the 1980's by the states of Michigan and Illinois in pre-flood situations and there were few takers. A study of the Illinois' 2% loan program concluded that in spite of the low usage, low interest loans did help people and can be an appropriate source of financial assistance given the community's and property owners' resources.

Rebate: In the 1980's, the City of Des Plaines and the Village of Mount Prospect had very successful cost-sharing programs. They provided a "rebate" of 20% of the project cost or $1,000 (whichever was less) after property owners install floodproofing measures. Most of the measures have been related to sewer backup and flooded basements, so few rebates have been as high as $1,000.

Financial Advisor: A community paid counselor could help floodprone property owners learn about and apply for financial assistance from one or more of the numerous possible Federal, local, or private sources. For a relatively small investment (equal to the cost of elevating two houses), the Village could fund such a person for a year. That work could result in hundreds of thousands of dollars in outside funds going to help South Holland's floodplain residents.

7.9.5 Use in the Area: The 1994 *Plan* recommended, and the Village created, a Flood Assistance Program. Village funds were budgeted each year to provide 25% rebates toward the cost of an approved retrofitting project. In 2014, the Village introduced the Sewer Back Up Prevention Pilot Program, which provides 50% rebates to homeowners that elect to install overhead sewers, backflow devices or lift stations. These projects minimize the potential for sewer backups during a heavy rain event and to date 108 projects have been funded. Administered by the Flood Assistance Coordinator (who is also a financial advisor), these rebate programs have been quite a success. The program is summarized in Figure 7-16.

The rebates have promoted a variety of projects, most of them related to basement flooding and sewer backup (see Figure 7-15).

Figure 7-15 Rebate Projects

Project	Number
Drain tile system	323
Foundation crack repairs	689
Overhead sewers	135
Back up sumps	42
Sewer back up valves	56
Dewatering systems	14
Mud jacking	5
Other floodproofing	57
Total	1,321

As the numbers show, the rebate program has proven to be very successful. It has received state and national awards and has been written up in national publications.

Figure 7-14 Rebate Financing

Year	Number Of Projects	Value Of Projects	Rebate (Village's Share)
1995	70	$206,304	$49,826
1996	67	143,280	35,820
1997	84	182,341	45,585
1998	74	123,629	30,907
1999	55	74,170	18,543
2000	58	80,471	20,118
2001	50	73,739	18,435
2002	33	29,197	7,299
2003	67	67,862	16,967
2004	70	116,084	29,021
2005	43	81,123	29,281
2006	51	90,753	22,688
2007	54	132,247	33,062
2008	92	218,136	54,534
2009	73	145,204	36,301
2010	46	87,544	21,886
2011	37	74,038	18,510
2012	14	34,194	8,548
2013	66	190,464	74,616
2014	45	112,893	28,223
2015	18	38,534	9,634
2016	59	99,654	24,913
2017	95	110,974	27,743
Total	1321	$2,512,835	$662,460

Figure 7-16 Rebate Program Details

Objective: To promote and encourage flood awareness to residents of the Village of South Holland, so that proper steps may be taken to prevent future problems within the home, while providing financial assistance to encourage flood control projects to be completed.

Flood Assistance Rebate Details: This program is designed to offer residents a 25% rebate on flood control projects, with a maximum rebate of $2500.00 per home.

Flood Assistance Qualifying Projects:

- → Repair of foundation cracks
- → Waterproofing of foundation walls
- → Installation of drain tiles
- → Diversion of downspouts
- → Construction of flood walls
- → Removal of sump pump and downspout connectors from sanitary sewers
- → Elevation of landscaping for improved drainage
- → Additional projects may qualify

Flood Assistance Rebate Requirements:

- → All projects must be pre-approved by the Village
- → Property must be owner occupied
- → An application must be completed prior to approval
- → Two bid proposals are required

Sewer Back Up Prevention Rebate Details: This program is designed to offer residents a 50% rebate on flood control projects that prevent sewer backups, with a maximum rebate of $5000.00 per home.

Sewer Backup Prevention Qualifying Projects:

- → Installation of overhead sewers
- → Installation of backflow devices and lift stations

Sewer Backup Prevention Rebate Requirements:

- → Sump pump and downspout connections must be separate from the sanitary sewer
- → All projects must be pre-approved by the Village
- → Property must be owner occupied
- → An application must be completed prior to approval
- → Two bid proposals are required

Residents who desire to apply for the Flood Rebate Program are encouraged to call for details.
If you have any questions regarding this program, please call us at 708-210-2915.

− http://www.southholland.org

7.10 Conclusions and Recommendations

7.10.1 Conclusions:

a. There are a variety of flood protection measures that can be implemented to protect individual buildings from surface flooding and sewer backup.

b. Many of the measures can be installed by the owner or by a contractor at relatively little cost to the owner. The most effective sewer backup protection measures cost $9,000 to $17,000 per building. Surface flooding protection measures can cost in excess of $100,000, but many buildings with basements can be retrofitted to protect them from shallow flooding for less than $10,000.

c. There are a variety of ways the Village can assist property owners implement protection measures, ranging from providing information and technical assistance to cost sharing to fully funding the design and construction.

d. Many types of projects can be funded at a low cost, so a relatively small amount of financial assistance could help protect many properties.

e. The Village's rebate program has proven quite successful, leading to over 1,300 surface and sewer flooding protection projects. It has also bred goodwill and helped to improve relations between residents and Village staff.

7.10.2 Recommendations:

The Village should continue its Flood Assistance Program to help floodprone property owners take steps to reduce flood damage. The program should continue to be administered by a Village staff person and would have three parts: general information, site-specific information and financial assistance.

a. Staff: The Flood Assistance Coordinator (FAC) position should continue. The position is currently staffed. If the position should become vacant at some point in the future, a potential candidate would need to meet the following qualifications and be able to complete the following duties:

    1) Qualifications: The person hired for the FAC should have a working knowledge of building construction, be able to work with people, and be able to learn the details of floodproofing and government financial assistance programs.

    2) Duties: The FAC should be responsible for:

        – Administering the activities recommended by this plan,

        – Attending training on floodproofing, financial assistance and post-flood mitigation programs,

        – Collecting, reading and becoming familiar with appropriate references on these topics,

– Reporting on the progress of the Flood Assistance Program and implementation of this plan to the Flood Liaison Committee, and

– All other flood-related issues, including stream maintenance.

3) Budget: The Village should provide an adequate budget to pay the FAC's salary, expenses, and training. Because there are few training programs or communities with similar programs, the budget should include funds for travel to other communities and conferences in other parts of the country.

4) Technical Support: The Village should provide the FAC with engineering and technical support on floodproofing and government programs.

a. Financial Assistance: The FAC should be responsible for administering the financial assistance aspects of the Flood Assistance Program.

1) Financial Assistance Advice: The FAC should research and become familiar with outside sources of financial assistance, including disaster assistance programs. He or she should follow developments in federal and state programs to capitalize on any new opportunities and pilot programs.

2) Flood Assistance Fund: The FAC should administer the Village's Flood Assistance Fund. The current criteria, as listed in Figure 7-12, should continue to be followed.

a) Publicity: The Village should publicize the rebate and loan programs well before they begin so that all residents have an equal chance of applying.

a) Amount: Rebates should be made available to cover 25% of the cost of a flood protection project in an amount not to exceed $2,500.

3) Project costs: The amount of a rebate or loan should be based on the total "out of pocket" cost of the project, i.e., the cost of the contractor and/or supplies. There should be no "soft matches" or basing the cost of the project on the property owner's labor or donated materials.

7.11 References

– Analysis of the 1991 and 1992 Floodproofing Open Houses, Illinois Association for Floodplain and Stormwater Management, 1993.

– Answers to Questions About the National Flood Insurance Program, Federal Emergency Management Agency, 1991, updated 2011.

– CRS Credit for Outreach Projects, National Flood Insurance Program/ Community Rating System, 2006.

– Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings (Third Edition), Federal Emergency Management Agency, 2012.

– Flood Proofing Techniques, Programs and References, U.S. Army Corps of Engineers National Flood Proofing Committee, 1991, updated 2000.

- Flood Proofing: How to Evaluate Your Options, U.S. Army Corps of Engineers, 1993.
- Floodplain Management: Local Floodplain Administrator's Manual, Illinois Department of Natural Resources, Office of Water Resources, 2006.
- Floodproof Retrofitting: Homeowner Self-Protective Behavior, Shirley Bradway Laska, University of Colorado, 1991.
- Guide to Flood Protection, Village of South Holland, 2007.
- Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding, FEMA-312, Third Edition, 2014.
- How to Conduct a Floodproofing Open Houses, Illinois Association for Floodplain and Stormwater Management, 1993.
- Local Flood Proofing Programs, U.S. Army Corps of Engineers, 2005.
- Repetitive Flood Claims (RFC) Program Guidance, Federal Emergency Management Agency, 2007.
- Retrofitting Flood-Prone Residential Structures, Federal Emergency Management Agency, 1986, updated 2007.
- Sanitary Sewer Update, South Holland Public Works Department, undated.
- Sewer Back Up Prevention Pilot Program, Village of South Holland, 2016.

Chapter 8. Public Information

A successful floodplain management program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take steps to protect themselves and others.

Information can bring about voluntary flood protection activities at little or no cost to the Village. Property owners mitigated their flooding problems long before there were government funded programs. A study of northeastern Illinois public information efforts found that people favorably responded to and acted on information (see Figure 8-1). In fact, 60% of Illinois respondents who had retrofitted their homes, did so without outside financial assistance.

Figure 8-1.
Information Brings Results

Dr. Shirley Laska of the University of New Orleans has studied various programs that encourage floodprone homeowner "self-protective behavior." In her book she notes

"The research reported herein demonstrates considerable interest among and effort by flooded homeowners to retrofit their homes to protect them from future flood damage. Several measures were undertaken by those who retrofitted. Moreover, they spent their own money – often considerable sums – to implement the measures….

"Having some source of retrofitting information appeared to encourage retrofitting, and the measures implemented by flooded homeowners who did consult an information source were evaluated by those owners as more protective than the measures implemented by homeowners who did not rely on a source [of information]."

Floodproof Retrofitting – Homeowner Self-Protective Behavior, University of Colorado, 1991, pages 221 and 223.

The typical approach to delivering information regarding flood hazards and protection options involves two levels of activity. The first is to broadcast a short and simple version of the message to every property owner that is potentially affected. The second level provides more detailed information to those individuals who have expressed interest and would like learn more.

This chapter starts with activities that are designed to reach out to the community. The goal is to advise and make the public aware of the potential flood hazards that exist in the Village, and to inform them on some of the steps that can be taken to alleviate these hazards. It then covers additional sources of information for those members of the public that want to learn more. It ends with the Village's overall public information strategy.

8.1 Outreach Projects

8.1.1 General: Outreach projects are the first step in the process of orienting people to the hazards they face. They are designed to encourage people to seek out more information and to take steps to protect themselves and their properties.

Research has proven that outreach projects work. However, only having an awareness of the hazard is not enough; people need to be told what they can do to alleviate or reduce the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions.

An outreach project can be a notice that is mailed or otherwise distributed to floodprone property owners or it can be an article on the Village website, in a newsletter or a newspaper that will reach floodprone properties. Other approaches, such as cable television shows, notices in public buildings, or booths at shopping centers, help but are not as effective as notices specifically directed to the owners of properties that should be protected.

Examples of other approaches include:

- Presentations at meetings of neighborhood, civic or business groups,
- Displays in public buildings or shopping malls,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river and wetlands) and their relation to floods,
- Videos for cable TV or to loan to organizations or individuals,
- Brochures available in public buildings and at festivals,
- School programs, activities, and handouts, and
- Special meetings, such as floodproofing open houses.

8.1.2 Use in the Area: Each year the Village has implemented:

- Most editions of the Village's bi-monthly *South Holland Today* have had a section on flood protection.
- Each year, the mayor sends a special six-page letter on flood protection to all floodplain residents.
- Booths or displays have been featured at various festivals, such as during the South Holland Business Association's "Appreciation Days", or at the Farmers Market.
- In 1996, the Public Relations Office prepared a ½ hour video on the Village's flood hazards, the Thornton Transitional Reservoir project and technical and financial assistance available to help residents. In 2003, the Village helped South Suburban College prepare a short video "Keeping Your Home out of Deep Trouble." Both videos have been aired regularly on public access cable TV.
- For several years, South Holland and neighboring communities Calumet City and Lansing coordinated Spring Flood Awareness Week activities. These included breakfast meetings with local businesses and open houses for the general public.

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Figure 8-2 Outreach Projects

Flood insurance – a wise investment

For those residents living near the Little Calumet River, Thorn Creek, or one of the ditches in the Village, flood insurance is highly recommended. Even if the last storm or flood missed you or you have done some flood proofing, the next flood could be worse. Most homeowners' insurance policies do not cover a property for flood damage.

The Village of South Holland participates in the National Flood Insurance Program. Local insurance agents can sell a flood insurance policy under rules and rates set by the federal government. Any agent can sell a policy and all agents must charge the same rates.

Now is a good time to purchase flood insurance in South Holland. Due to South Holland's CRS rating (5), homeowners realize a 25 percent discount from standard flood insurance premiums.

Any house can be covered by a flood insurance policy. Detached garages and accessory buildings are covered under the policy for the lot's main building. Separate coverage can be

The cost varies from nothing up to about $75 for a rider on your homeowner's insurance premium. However, there is a 30 day waiting period once homeowner has applied for flood insurance.

Floodproofing your home

Floodproofing a house means altering it so floodwaters will not cause damage. Different floodproofing techniques are appropriate for different types of buildings. Use the following as a guideline:

♦ If you have a basement, split level, or other floor below ground level, get a free copy of *Guide to Basement Flooding* from the Village Hall. There are lots of ways to protect your basement or lower floor from seepage and sewer backup.

♦ If your house is on a slab foundation, investigate a low floodwall, berm, or "dry floodproofing" (i.e., making the walls watertight and closing all the openings when a flood comes).

South Holland Today article

Flood protection display for festivals

– The first Open House was held in South Holland in 2001. It had a good turnout, but over the years, attendance declined. Therefore, in the last few years, the Mayor's Coffee was used to have staff talk about flood issues and the rebate program. In 2008, the Coffee was combined with the "roll out" of the new Flood Insurance Rate Map and over 100 people came. In September 2016 over 100 residents attended a Mayors Coffee dedicated to the August 29 and August 20, 2016 rain events in the Village.

Figure 8-3 Flood Awareness Week & Mayor's Coffee

2003 Flood Awareness Week Business Breakfast

2016 Mayor's Coffee

8.2 Real Estate Disclosure

Many times after a flood, people say they would have taken steps to protect themselves if only they had known they had purchased a property in the floodplain. Three regulations, one federal and two state, require that potential buyers of a parcel be told of their exposure to a hazard.

8.2.1 Flood Disaster Protection Act: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building that the property is in a floodplain as shown on the Flood Insurance Rate Map (the A Zone).

Flood insurance is required for buildings located within the A Zone if the mortgage or loan is federally insured. However, there is no legal requirement as to how far in advance of closing the disclosure must occur. Sometimes, local officials are called on the day of closing by a distressed home buyer. Often, the bank's information is provided after the loan applicant is already committed to purchasing the property.

Figure 8-4

8.2.2 Illinois Residential Real Property Disclosure Act: This law requires a seller to tell a potential buyer if the seller is aware of any flooding or basement leakage problem, if the property is located in a floodplain, or if the seller has flood insurance.

This State law is not wholly reliable because the seller must be aware of a problem and willing to state it on the disclosure form. Due to the sporadic occurrence of flood events, a property owner may legitimately not be aware of potential flooding problems when a property is being sold.

Practices by local real estate boards can overcome the deficiencies of these laws and advise newcomers about the hazard earlier. They may also encourage disclosure of past flooding or sewer problems, regardless of whether the property is in a mapped floodplain.

8.2.3 Subdivision plats: *Illinois Compiled Statutes,* Chapter 55, Section 5/3-5029 requires that all subdivision plats must show whether any part of the subdivision is in the 100-year floodplain.

8.2.4 Use in the Area: The three laws described above are in effect in South Holland, but may not have much of an impact. These approaches would be more effective if real estate agents checked the Flood Insurance Rate Map and informed house hunters if a property is in the floodplain. Accordingly, Village staff met with real estate offices and reviewed this issue. Due to the large number of suburbs that they serve, it was concluded that such a program in only one town would not work − it should be addressed at the county level.

8.3 Technical Information

After an outreach project or real estate disclosure makes a person aware that a property is subject to flooding, that person should look further into the hazard and ways to mitigate its effects. The community can help by providing technical information and assistance. The community library and local web sites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources.

8.3.1 Library: Books and pamphlets on hazard mitigation can be given to libraries, many of them obtained free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.

8.3.2 Use in the Area: Pursuant to the 1994 *Plan*, Village staff worked with the South Holland Public Library to collect and catalog relevant references. This has received Community Rating System (CRS) credit.

8.3.3 Handbook: The references that are available from Federal agencies are intended to be useful nationwide. Therefore, they cover many topics that are not appropriate to South Holland, such as how to deal with coastal storms and alluvial fan flooding. Some are too technical for most property owners and some may recommend measures that are contrary to state or local floodplain regulations.

Research has shown that a publication tailored to local conditions, especially one that is written for the reader's situation, is more effective than a general reference. The reader can identify with the situation and may have personally seen some of the examples. As a result, readers of such localized books are more likely to implement a property protection project.

8.3.4 Use in the Area: In 1996, the Village published two handbooks, one for surface flooding and one for basements. *Guide to Flood Protection* and *Guide to Protection from Basement Flooding* were displayed at the municipal building and made available to residents, on display in the Municipal Building for the taking, and included in the new residents package.

In 2007, the two booklets were combined into the *Guide to Flood Protection*. This publication is available to property owners and is available at the Village Hall.

8.3.5 Website: Today, websites are the most popular research tools. They provide quick access to a wealth of public and private sites and sources of information. Through links to other web sites, there is almost no limit to the amount of up to date information that can be accessed by the user.

The Village has made an extensive amount of flood related information accessible to the community through it's website. Information related to flood protection and safety, floodproofing, the Village rebate program, flood insurance, and links to real time flood gage data are just a few of the items included on the website. Also included and available for public viewing is a copy of the current Floodplain Management Plan. Between September 1, 2015 and August 30, 2017, there were 2,892 hits to the various Flood Assistance links and articles.

In addition to on-line floodplain maps, websites can link to information for homeowners on how to retrofit for floods and a "FEMA for Kids" site (www.fema.gov/kids/). This website teaches children how to protect their home and what to have in a family disaster kit.

8.3.6 Use in the Area: The Village now has a special section in its website for flood assistance. In addition to providing all the information supplied in the outreach projects and the *Guide to Flood Protection*, the site leads the user through a step-by-step approach to protecting property (See Figure 8-5). It also has links to more information from other sources, including the real time National Weather Service gage readings on the Little Cal and Thorn Creek (see Figure 6-2).

Figure 8-5 Village Website

8.4 Site Specific Information

The most intensive form of public information is providing assistance to individuals that directly affect their situation. This section reviews the more common activities.

8.4.1 Map Reading: Many benefits stem from providing flood information to inquirers. Communities can easily provide map information from FEMA's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies. They may also assist residents in submitting requests for map amendments and revisions when they are needed to show that a building is outside the mapped floodplain.

Communities often supplement what is shown on the FIRM with maps that complement and clarify the FIRM and information on additional hazards, flooding outside mapped areas and zoning. When map information is provided, community staff can explain insurance, property

protection measures and mitigation options. They should also remind inquirers that being outside the mapped floodplain is no guarantee that a property will never get wet.

8.4.2 Use in the Area: Village staff respond to requests for Flood Insurance Rate Map information. The more difficult determinations are referred to the Flood Assistance Coordinator. This activity receives CRS credit.

8.4.3 Technical Assistance: Technical assistance provides one-on-one counseling with individual property owners. Technical assistance can be given in the form of telephone conversations, complementary critiques of the owner's plans or ideas, and visits to the building. A more intensive effort is a written "flood audit" which provides the owner with a written description of the flood hazard at the site and specific recommendations on how to protect the building.

8.4.4 Use in the Area: The Flood Assistance Coordinator gives advice over the phone and provides on site consultation for concerned property owners. This service is publicized in *South Holland Today* and receives CRS credit.

8.5 Public Information Program Strategy

A public information program strategy is a document that receives CRS credit. It is a review of local conditions, local public information needs, and a recommended action plan of activities. A strategy consists of the following parts, which are incorporated into this plan. The local flood hazard – discussed in Chapter 2 of this plan.

- The property protection measures appropriate for a specific hazard – in Chapter 7.
- Flood safety measures appropriate for the local situation – discussed in Figure 8-6.
- The public information activities currently being implemented within the community including those by non-government agencies – discussed in sections 8.1 – 8.4.
- Goals for the community's public information program – covered in Chapter 3.
- The outreach projects that will be done each year to reach the goals – in the Chapter 9 action plan.
- The process that will be followed to monitor and evaluate the projects – in the Chapter 9 action plan.

Figure 8-6 Flood Safety

- Do not walk through flowing water. Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. Use a pole or stick to ensure that the ground is still there before you go through an area where the water is not flowing.
- Do not drive through a flooded area. More people drown in their cars than anywhere else. Don't drive around road barriers; the road or bridge may be washed out.
- Stay away from power lines and electrical wires. The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines to the Police by calling 911.
- Look out for animals that have been flooded out of their homes and who may seek shelter in yours. Use a pole or stick to poke and turn things over and scare away small animals.

- Look before you step. After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.
- Be alert for gas leaks. Use a flashlight to inspect for damage. Don't smoke or use candles, lanterns, or open flames unless you know the gas has been turned off and the area has been ventilated. If you suspect a gas leak, call Nicor at 888/642-6748 (toll free).
- Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly -- cook with charcoal outdoors.
- Clean everything that got wet. Flood waters have picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food, flooded cosmetics, and medicine can be health hazards. When in doubt, throw them out.
- Take good care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster has on you and your family may last a long time.

Adapted from *Guide for Flood Protection*

At its May 9, 2004, plan review meeting, the Flood Liaison Committee conducted a public information strategy exercise. The members identified and ranked what they viewed as the best methods to disseminate flood-related messages and what the messages should include.

The Recommendations in Section 8.6.2 are based on this exercise, past successful activities, CRS credited activities and topics, and the review by the Flood Liaison Committee during the 2017 *Plan* update. These action items form the Villages' Public Information Program Strategy, which receives CRS credit.

8.6 Conclusions and Recommendations

8.6.1 Conclusions:

a. There are a variety of ways to inform residents about flood protection measures that can be implemented to protect their lives and properties. The Village is already implementing many of these measures, relying heavily on the Village website, newsletter articles, displays at public events, direct mailings, and videos.

b. Except for a minor disclosure requirement for new subdivision plats, potential buyers or renters of floodplain property are not advised of the flood hazard unless there is a mortgage through a federally regulated lender.

c. Technical information is provided to South Holland residents via the public library, a homeowner's guidebook, and the Village's website.

d. The Flood Assistance Coordinator and other Village staff provide site specific information to inquirers, including map information and technical assistance.

e. The Village has publicized the FAC's availability to provide technical assistance and to review plans. Many residents have taken advantage of this service and the FAC has made numerous site visits and consultations.

8.6.2 Recommendations:

a. The Village should ensure that the following ongoing public information activities are implemented each year:

1. The flood protection library
2. Articles on flood protection in *South Holland Today*
3. Displays at various festivals and public activities
4. Distribution of the mayor's annual letter on flood protection to floodplain residents
5. Prepare short messages and inserts for utility bills
6. Playing flood-related videos on flood protection and the Village's flood activities on cable TV
7. Provide materials for the New Residents' Package given to all newcomers to the Village
8. Providing flood map information to inquirers
9. Providing advice on flood protection and retrofitting
10. Providing advice on selecting and dealing with contractors

b. The Village should update, expand, and/or initiate the following public information activities:

1. Increase the information and links on the Village's web site
2. Critique the materials provided to the schools each year and revise them as needed
3. Review and update the *Guide to Flood Protection*
4. Prepare a standard talk with PowerPoint slides for presentations at neighborhood meetings, civic groups, and similar forums

c. The Village should work with neighboring communities to develop and implement joint public information activities that benefit everyone in the region, including:

1. Conduct a Flood Awareness Week that coordinates Village efforts with the efforts of neighboring communities and state and federal agencies that are sponsoring awareness weeks.
2. Educate insurance agents on flood insurance
3. Conduct floodproofing open houses
4. Educate contractors and home improvement stores' staff on property protection measures, construction regulations, and Village services

d. The Village should ensure that the activities pursued under this public information program strategy convey the following messages:

1. The types of flooding that can occur in the Village
2. A map of the area covered by the Flood Insurance Rate Map
3. What various government agencies are doing about flooding
4. Flood safety precautions, especially "Turn Around Don't Drown"
5. Flood insurance and what an insurance policy covers
6. Floodproofing and other property protection measures
7. Why sewers backup and sewer backup protection measures
8. The natural and beneficial functions of the Village's floodplains and open spaces
9. Flood warning procedures
10. Floodplain development permit requirements.
11. The substantial improvement/damage requirements.
12. Rules on dumping in channels and channel maintenance procedures

8.7 References

- Coordinator's Manual, National Flood Insurance Program Community Rating System, 2017.
- CRS Credit for Outreach Projects, National Flood Insurance Program Community Rating System, 2006.
- Floodproof Retrofitting: Homeowner Self-Protective Behavior, Shirley Bradway Laska, University of Colorado, 1991.
- Guide to Flood Protection, Village of South Holland, 2007.
- Stormwater Management Public Information Resource Guide, South Suburban Mayors and Managers Association, 1999.
- Village of South Holland website (2017). Retrieved from: www.southholland.org

Chapter 9. Action Plan

The culmination of this *Floodplain Management Plan* is the series of action items presented in this chapter. This chapter assigns recommended projects and deadlines to the appropriate offices.

9.1 Village Board of Trustees

9.1.1 Continue to explore and fund the Flood Assistance Program and Flood Assistance staff positions to help protect properties from smaller, more frequent floods, drainage issues, and sewer backup problems.

Deadline: Ongoing

Funding: $50,000 should be budgeted each year for the rebate programs and unspent funds should be carried over to the following year.

9.2 Flood Liaison Committee

9.2.1 Continue to follow flood programs and provide information and recommendations to the Village Board, staff and residents. Meet on a quarterly basis to monitor the implementation of this *Plan* and prepare a written progress report to the Village Board at least annually. Include a specific evaluation of the public information program strategy (Section 9.5).

Deadline: Ongoing

Funding: Staff time

9.2.2 Continue to work with the South Suburban Mayors and Managers Association and other regional groups to encourage coordination and cooperation on:

1. Remapping the Little Calumet watershed's floodplains,
2. Flood warning and response,
3. Channel maintenance,
4. Public information activities, especially during a flood awareness week,
5. Adoption of the SSMMA model stormwater and flood damage prevention ordinance, and
6. Participation in the Community Rating System.

Deadline: Ongoing

Funding: Staff time

9.3 Flood Assistance Coordinator

9.3.1 Continue to attend training and collect references on floodplain management, code enforcement procedures, State and Federal requirements, development regulations, floodproofing, financial assistance and post-flood mitigation programs. Pursue potential funding opportunities through the FEMA and IEPA grant programs. Follow all flood-related developments and report progress to the Flood Liaison Committee.

Funding: Staff time

9.3.2 Assist residents in obtaining financial assistance through the Flood Assistance Program's rebates.

Deadline: Ongoing

Funding: Staff time

9.3.3 Monitor other communities' efforts to develop flood response plans for critical facilities. Once their lessons have been learned, work with two local critical facilities to help them develop flood response plans for the appropriate flood hazard.

Deadline: Make initial contacts within 3 months of reviewing the other communities' efforts.

Funding: Staff time

9.4 Flood Assistance Coordinator/Director of Communications (Public Information Program Strategy)

9.4.1 Ensure that the following ongoing public information activities are implemented each year:

1. The flood protection library
2. Articles on flood protection in *South Holland Today*
3. Displays at various festivals and public activities
4. Distribution of the mayor's annual letter on flood protection to floodplain residents.
5. Playing flood-related videos on flood protection and the Village's flood activities on cable TV
6. Providing flood map information to inquirers
7. Providing advice on flood protection and retrofitting
8. Providing advice on selecting and dealing with contractors

Deadline: Ongoing

Funding: Staff time. The annual mayor's letter goes to approximately 45 floodplain residents households at a cost of $120.00, which is included in the Communication Department's annual budget.

9.4.2 Update, expand, and/or initiate the following public information activities:

1. Increase the information and links on the Village's web site
2. Critique the materials provided to the schools each year and revise them as needed
3. Review and update the *Guide to Flood Protection*
4. Prepare short messages and inserts for utility bills.
5. Provide materials for the New Residents' Package given to all newcomers to the Village.
6. Prepare a standard talk with PowerPoint slides for presentations at neighborhood meetings, civic groups, and similar forums.

Deadline: Report progress at each annual Flood Liaison Committee status review meeting.

Funding: Staff time

9.4.3 Work with neighboring communities to develop and implement joint public information activities that benefit everyone in the region, including:

1. Conduct a Flood Awareness Week that coordinates Village efforts with the efforts of neighboring communities and state and federal agencies that are sponsoring awareness weeks.
2. Train insurance agents on flood insurance
3. Conduct floodproofing open houses
4. Educate contractors and home improvement stores' staff on property protection measures, construction regulations, and Village services

Deadline: Hold a coordination meeting with neighboring communities in January of each year.

Funding: Staff time

9.4.4 Ensure that the activities pursued under this public information program strategy (Sections 9.4.1 – 9.4.3) convey the following messages:

1. The types of flooding that can occur in the Village
2. A map of the area covered by the Flood Insurance Rate Map
3. What various government agencies are doing about flooding
4. Flood safety precautions, especially "turn around don't drown."
5. Flood insurance and what an insurance policy covers
6. Floodproofing and other property protection measures
7. Why sewers backup and sewer backup protection measures
8. The natural and beneficial functions of the Village's floodplains and open spaces
9. Flood warning procedures
10. Floodplain development permit requirements.
11. The substantial improvement/damage requirements.
12. Rules on dumping in channels and channel maintenance procedures

Deadline: Provide copies of each project to the Liaison Committee meetings

Funding: Staff and Committee time

9.5 Emergency Response Committee

9.5.1 Critique the "Flood Warning and Response Plan" after each time that it is implemented and update and revise the document as needed.

Deadline: Prepare a written critique within 30 days of a flood that warrants implementation of the system.

Funding: Staff time

9.6 Department of Public Works

9.6.1 Implement the Drainage Maintenance SOP.

Deadline: Ongoing. Respond to problems identified by the Flood Assistance Coordinator's inspections and citizen calls within seven days.

Funding: Staff time and equipment