

# CHAPTER SEVEN

## Gig Harbor Basin

### 7.1 BASIN CHARACTERISTICS

The Gig Harbor Basin is located on a peninsula extending southward into South Puget Sound. The western boundary is by Carr Inlet and Henderson Passage, the east by Tacoma Narrows, and on the south by Hale Passage. Several drainage divides are located close to the Pierce/Kitsap county line form the northern boundary of the Basin. The remainder of the Basin lies within unincorporated Pierce County, except for a small area at the northern edge of the Basin that lies within Kitsap County and the City of Gig Harbor.

The Gig Harbor Basin is 42.4 square-miles. The City of Gig Harbor is the main commercial center and the only incorporated city. Much of the peninsula consists of rolling, rather flat-topped hills and ridges. Steep bluffs drop to the waters of Puget Sound on all three sides of the peninsula.

The Basin is drained by a number of fairly small streams. The catchments of the streams vary in aerial extent, from a few acres to approximately 6.5 square miles. Crescent, Wollochet, Artondale, and McCormick Creeks drain the largest catchments. Most of the land close to the tops of the bluffs drains to small, unnamed, ephemeral creeks. The larger creeks are perennial.

The climate of the Gig Harbor Basin is mild. It receives between 40 and 55 inches of precipitation annually, almost all as rain.

#### 7.1.1 Gig Harbor Basin

##### ***Goodnough Creek***

Goodnough Creek is sometimes referred to as Gooch Creek. The main stem of Goodnough Creek is about one-mile long and it drains an area of about 2.0 square miles (1318 acres). Its gradient is moderate to steep. The headwaters of the creek are in the Canterwood Golf Course and Country Club, a large residential and golf course development to the east of Highway 16. The creek flows westward under Highway 16, Goodnough Drive and State Route 302 before discharging to Henderson Bay just south of Purdy. It has one small tributary known as Wilderness Creek that flows south from 144th Street NW and joins the main stem near Canterwood Drive. The stream supports coho and chum salmon in the 450 feet of unimpeded channel downstream of State Route 302. Cutthroat trout are also present.

##### ***McCormick Creek***

The north fork of McCormick Creek rises in a wetland area just east of Highway 16, passes under the highway, flows in a northwesterly direction, and discharges to Henderson Bay. The creek divides within the Highway 16 right-of-way. The northern branch of the creek drains an area near the Canterwood Golf Course and Country Club. The southern branch, which originates in a series of wetlands alongside Bujacich Drive, extends toward the Washington Correction Center for Women. McCormick Creek drains

a catchment with an area of about two and one half square miles (1506 acres). McCormick Creek supports chum and coho salmon, steelhead and cutthroat trout. Chinook salmon strays have been noted.

### ***Nelyaly Creek***

Nelyaly Creek, sometimes referred to as Lay Creek, drains a catchment northeast of Lay Inlet with an area of 1.5 square miles (986 acres). The creek crosses under 92nd Street and empties to an arm of Lay Inlet. Its gradient is moderate. Volunteers have planted coho and chum for a number of years with a reported high rate of hatching and returns.

### ***Rosedale Creek***

Rosedale Creek drains a valley north of Rosedale with an area of 0.6 square miles (329 acres). It flows generally south, then turns west, crosses under Rosedale Street, and empties into a tidal inlet near Rosedale. The main stem of the creek is about 0.75 miles long and its gradient is moderate. The creek supports coho and chum salmon and cutthroat trout in the reach below Holy Family School. Chinook salmon have been raised in a pond upstream of the school, but the success of adult returns is unknown.

### ***Mark Dickson Creek***

Mark Dickson Creek is sometimes referred to as Ray Nash Creek. Mark Dickson Creek drains a valley north of Arletta with an area of 2.2 square miles (1,421 acres). The main stem is about one mile long. It flows northward and empties into small tidal inlet south of Raft Island. Mark Dickson Creek has a shallow to moderate gradient and is joined near its mouth by a tributary from the east known as Sylvia Lake or Meyer Creek. This tributary drains a Basin that includes Sylvia Lake, an artificial water body created by an approximately 15-foot high earthen dam. The lowest reaches of the main stem and the tributary support coho and chum salmon. Cutthroat trout are probably present.

### ***Warren Creek***

Warren Creek drains a valley west of Warren with an area of 0.9 square miles. It has a moderate gradient and drains to Hale Passage opposite the western extremity of Fox Island. Coho salmon and cutthroat trout are present in the lowest reach of the creek downstream of Warren Drive.

### ***Muri Creek***

Muri Creek drains a small watershed and flows to Hale Passage about 0.75 miles east of the Fox Island Bridge. Cutthroat trout are reported to be present in the lower reaches of the creek.

### ***Artondale Creek***

Artondale Creek drains a watershed with an area of 3.2 square miles (2,049 acres). The main stem of the creek originates in the ridge lands east of Rosedale. The upper reaches of the main stem have a moderate to steep gradient and flow south to a large wetland area at an elevation of about 50 feet. From the wetlands, the creek turns east, flowing through the Gig Harbor Golf and Country Club and under Artondale Drive and Wollochet Drive to Wollochet Bay. The lower reaches of the creek have a moderate to shallow gradient. A major tributary joins the main stem from the east just downstream of the wetlands. The tributary, sometimes referred to as the East Branch of Artondale Creek, begins at Maloney Lake. The lake has a surface elevation of 248 feet. The East Branch flows through a wetland at about an elevation of 70 feet. Coho and chum salmon and cutthroat trout are reported to be present in Artondale Creek.

### **Wollochet Creek**

Wollochet Creek empties into the northern extremity of Wollochet Bay. Just above its crossing East Bay Drive NW and a few hundred feet upstream of Wollochet Bay, the creek divides into two. The main stem is known to some as Bitter Creek. The east tributary is called Garr Creek. The main stem flows southward from its headwaters near Rosedale Street NW, passing under Hunt Street NW. Just upstream of its confluence with Garr Creek, it crosses under Wollochet Drive NW. The gradient of the main stem is generally moderate but there are several wetland reaches. Garr Creek has several branches. The southerly branches have low to moderate gradients and drain wetlands and a small valley near Midway. The longer northerly branches have moderate to steep slopes and drain the valleys and ridges that extend northward to Highway 16. The Wollochet Creek complex drains an area of 2.6 square miles (1,672 acres) and reportedly supports coho salmon, chum salmon and cutthroat trout.

### **Murphy Creek**

Murphy Creek drains to Wollochet Bay near Picnic Point. A single 100-foot long reach of Murphy Creek was surveyed upstream of the culvert under East Bay Drive. The riparian corridor was in fair to good condition. Fish habitat was in fair to poor condition. Upstream of reach surveyed there was no surface flow in August 2000. The East Bay Drive culvert is a barrier to fish passage because of the slope, slope break and the pipe turn underground.

### **Sullivan Gulch Creek**

A creek drains Sullivan Gulch flowing south and then west under East Bay Drive NW to Wollochet Bay. The creek, referred to here as Sullivan Gulch Creek, drains an area of 2 square miles (1282 acres) and has a moderate gradient and no major tributaries. Coho and chum salmon use the most downstream few hundred feet of stream. Cutthroat trout are present in the lower half of the stream.

### **Doc Weathers Creek**

Doc Weathers Creek is a small stream that enters the Tacoma Narrows approximately 0.25 miles south of the Highway 16 bridge. It originates in a wetland east of the Tacoma Narrows Airport and flows about 3,000 feet to the shoreline. Its most downstream reach is located within a Pierce County park. The stream does not currently support salmonids.

### **Donkey Creek**

Donkey Creek, sometimes referred to as North Creek, drains a catchment with an area of 1.9 square miles (1,200 acres) close to the city of Gig Harbor. Its headwaters are just west of Highway 16. The creek passes under the highway, flows southeast generally paralleling Burnham Road, and empties into the bay at Gig Harbor. The creek passes through a long culvert near its outlet. Much of the stream has a moderate gradient but the upper reaches near the Highway 16 are steep. An unnamed tributary enters from the west close to the creek mouth. A volunteer group has been raising and releasing approximately one million chum salmon annually since the late 1970s.

### **Crescent Creek**

Crescent Creek flows south from its headwaters at Crescent Lake, paralleling Crescent Valley Road and crossing under it three times before discharging to the bay at Gig Harbor. The water surface elevation at Crescent Lake is about 165 feet. Crescent Creek has a moderate to shallow gradient for most of its length. It receives water from several small springs and one major tributary, Salmonberry Creek, which enters Crescent Lake just north of its outlet to Crescent Creek. The Crescent Creek catchment has an area of about 6.5 square miles (4180 acres). The creek supports coho and chum salmon and steelhead. It supported a run of native Chinook salmon until the late 1940s. Today, the Chinook that enter the creek are likely the result of annual plantings.

## 7.2 LAND USE IN THE GIG HARBOR BASIN

Land use affects surface water hydrology by altering the landscape from its natural condition and changing water drainage, storage, and evaporation characteristics. The effect of various land uses on surface water hydrology is taken into consideration by estimating effective impervious surface within the Basin. In order to conduct a detailed analysis of the current and projected future effective impervious surface within each subbasin, the Basin was divided into more specific land use categories. To assess the hydrologic characteristics of a Basin and to determine the potential for water quality/quantity problems requires an accurate understanding of a Basin's existing and proposed land uses.

### 7.2.1 Existing Land Use

Table 7-1 summarizes land use types under current conditions in the Gig Harbor Basin. The predominant land use in the Basin is low-density residential use and this will continue to be so in the future. Urban land uses, including residential, commercial, industrial, institutional and transportation uses, currently occupy 60% of the land surface.

Existing Land Use	Area (acres)	Percent of Basin
High density residential	409	1.5%
Low Density residential	11,056	41.0%
Commercial/Industrial	953	3.3%
Institutional	499	2.0%
Agriculture	534	2.0%
Forest	2,402	9.0%
Fishery/Mineral Extraction	53	0.2%
Open Space	876	3.0%
Transportation Utility/Infrastructure	3,232	12.0%
Vacant lands	7,118	26.0%
<b>Total</b>	<b>27,132</b>	<b>100%</b>

### 7.2.2 Future Land Use

The *Pierce County Comprehensive Plan* was developed and adopted in 1994 in response to the requirements of the Washington State "Growth Management Act" (GMA). The Plan, codified as *Title 19A, Pierce County Code*, indicates a general intention to allow development to the Basin boundary with residential densities ranging from one unit per 10 acres to six units per acre. The *Pierce County Zoning Ordinance* is codified in *Title 18A, Pierce County Code*. In the future, urban uses will occupy 81% of the land surface.

The "Growth Management Act" provides goals and guidelines for development of growth management plans addressing urban growth. This Act mandates consistency between county comprehensive plans and

plans of all municipalities in the county. The *Pierce County Comprehensive Plan* provides county-wide policies in cooperation with all cities and towns in the County. These 11 policies are: affordable housing; agricultural lands; economic development; education; historic, archaeological and cultural preservation; natural resources; open space and protection of environmentally sensitive lands; determining site locations for public capital facilities of a county-wide or state-wide nature; transportation facilities and strategies; urban growth areas; and amendments and transition.

The “Growth Management Act” includes the following goals for development:

- **Urban Growth**—Encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner.
- **Reduce Sprawl**—Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development

Pierce County has an additional goal of containing urban sprawl by designating an urban/rural boundary, and focusing infrastructure development in proposed employment centers and near cities and towns where a full range of urban services is available.

### 7.3 FLOOD CHARACTERISTICS

Most storm water runoff in the Gig Harbor Basin is routed to streams that flow to Puget Sound. Natural drainage patterns remain largely unaltered, although many culverts have been built to carry stream flow under roads and driveways. Curbs, gutters and underground storm drains exist only in the more densely developed areas.

Storm water runoff in older rural communities and suburban neighborhoods is typically routed to roadside ditches and then on to natural streams. Many streams flow through fairly narrow canyons where streamside properties are generally located a considerable distance above the water level.

Where the flood plain is broader, wetlands often exist and are a deterrent to development. As a result of these physical circumstances and careful urban planning, few homes or businesses appear to be located within floodplains.

There are no records of damaging flooding in the Gig Harbor Basin. All reported flooding is relatively minor and probably results from temporary blockages of culverts rather than serious drainage deficiencies. However, because urban development in the Basin is expected to continue, with a concomitant increase in storm water runoff, flooding could occur in the future. Watercourse flow characteristics for the Basin are illustrated in *Table 7-2*.

**TABLE 7-2  
GIG HARBOR BASIN WATERCOURSE FLOW CHARACTERISTICS**

Watercourse	Drainage Area (miles)	Measured Discharge (cfs)	Modeled Peak Flows (cfs)			Modeled Flow Location
			2-year	25-year	100-Year	
Goodnough Creek	2.0	2.4	86	185	218	@ Purdy Dr.
McCormick Creek	2.5	0.5 - 39.0	69	195	250	@ Woodhill Dr.
Nelyaly Creek	1.5	1.1	21	74	110	@ 82nd Ave.
Rosedale Creek	0.6	3.7	9	28	40	@ Rosedale St.
Mark Dickson Creek	2.2	7.1	N/A	N/A	N/A	N/A
Warren Creek	0.9	*0.6	30	91	129	Warren Dr. @ 92nd Ave.
Murri Creek	0.75	N/A	N/A	N/A	N/A	N/A
Artondale Creek	3.2	0.8 - 72.0	50	162	238	@ Artondale Dr.
Wollochet Creek	2.6	*7.0	71	139	163	@ East bay Dr.
Murphy Creek		N/A	N/A	N/A	N/A	N/A
Sullivan Gulch Creek	2.0	1.0	82	205	285	@ East Bay Dr.
Doc Weathers Creek		*0.3				
Donkey Creek	1.9	3.9	54	153	216	@ Harborview Dr.
Crescent Creek	6.5	1.4 - 60.40	131	377	539	@ 96th Ave.
* Estimated						

### 7.3.2 Causes of Flooding

Most storm water runoff in the Gig Harbor Basin is routed to streams that flow to Puget Sound. Natural drainage patterns remain largely unaltered, although many culverts have been built to carry stream flow under roads and driveways.

Curbs, gutters, and underground storm drains exist only in the more densely developed areas. Storm water runoff in older rural communities and suburban neighborhoods is typically routed to roadside ditches and then into natural streams. Many streams flow through fairly narrow canyons where streamside properties are generally located a considerable distance above the water level. Where the flood plain is broader, wetlands often exist, and are a deterrent to development.

Several methods were used to identify historical flooding problems in the Gig Harbor Basin. Local residents were invited to two public meetings and asked to complete a questionnaire on flooding and other problems and to locate known flooding problems on a map. The questionnaire was also mailed to approximately 380 streamside property owners with a request that it be completed and returned. Forty-seven questionnaires were returned.

Records of past problems and complaints were also obtained from Pierce County's files. The County records any incident of flooding reported by its own staff or citizens and has done so for the last ten years. The files contained 135 reports of water-related problems in the Gig Harbor Basin. One hundred of the

reports related to flooding or drainage problems in the Gig Harbor Basin. The remaining 35 reports addressed water quality, erosion, safety, and maintenance problems.

Earlier storm drainage studies of the Gig Harbor area were also examined to determine whether they contained records of historical flooding. The earlier storm drainage studies are the countywide storm drainage master plan prepared by James M. Montgomery Consulting Engineers in 1991, and an analysis of storm drainage in the Wollochet Creek Watershed by Economic and Engineering Services, Inc., conducted in 1995. No records of historical flooding were found in these reports.

Almost all of the flooding problems that occur under existing conditions are localized and relatively minor. Problems reported were as follows:

- ***Flooding that caused serious damage.*** It occurred when a hillside above several homes was logged and no measures were taken to control storm runoff from the denuded slope. The problem was corrected by the installation of a detention Basin.
- ***Crescent Creek overflows on to Crescent Valley Road.*** Several individuals noted water at times. But, in general, the existing system appears to have sufficient capacity to carry storm water away from structures at the current level of urban development.
- ***Debris Accumulation.*** Most of the reported problems are probably the result of debris accumulating in culverts and ditches. These probably could be solved by improved maintenance.
- ***Drainage System Deficiencies.*** A few problems may be the result of deficiencies in the engineered drainage system in some residential subdivisions.

## 7.4 FLOOD HAZARD IMPACTS

Flooding within the Clover Creek Basins can have numerous impacts on the on the way of life within this Basin, and Pierce County in general.

Under this section, we will assess the vulnerability of the Basins, improved property, critical facilities, and assess the impact a flooding on the Basin's population and economy.

### 7.4.1 Public Safety and Health

There have been historical occurrences of flooding within the Gig Harbor Basin. However, in comparison to flood events and total damages within other Basins within the County, these losses and associated damages are a small percentage of the overall damages within the County.

Since the early 1960's, there have been no reports fatalities immediately caused by flooding within this Basin. Since the land uses within this Basin are predominantly residential or vacant lands, the potential impact flooding can have on public health and safety within this Basin would focus on potential damage to private property and life safety issues dealing with the use of potentially impacted infrastructure.

Potential impacts could be reduced via informing the public of the potential for flood damages within the Basin, and refining or establishing procedures for early warning within the Basin. There currently is no “real-time” flood threat recognition capability within this Basin. However, it should be noted that Pierce County has been able to successfully avoid significant damages within this Basin by its field monitoring protocol and physical presence within the Basin during events that could cause flooding based on its flood threat recognition capability in the larger watersheds within the County.

Pierce County has experienced substantial growth recently and is expected to support more growth over the next 20 years. From a 1980 population of 485,667, Pierce County grew by 21% to 586,203 in 1990, and then by another 21% to an estimated 707,745 in 2000. The County population is expected to increase another 20%, to 850,483, by 2020.

Population growth in Pierce County has historically spread from city centers outward to rural areas. U.S. Census Bureau figures indicate that in 1920, 23% of Pierce County’s population lived in unincorporated areas. By 1990, census data indicated that 57% of the County’s population lived in unincorporated areas. During the 1980s, 84% of population growth occurred in unincorporated areas. Incorporation and annexation has shifted some of the County’s population from unincorporated areas to new cities (Pierce County 1997).

The estimated 2000 population in the Gig Harbor Basin is about 42,800 and represents about 6% of the total County population of 707,745. The population in the Gig Harbor Basin is projected to increase by about 13,200 to 56,000 over the next 20 years.

## 7.4.2 Critical Facilities

Using the parameters to define “Critical Facilities” discussed in [Chapter One](#) of this risk assessment, Pierce County Water Programs, coordinating with Pierce County Emergency Management, has identified that there are no critical facilities that could be impacted by flooding within the Gig Harbor Basin. The basis for this determination is: physical location within a mapped or known floodplain, known history of flooding, and the lack flood protection to the facility.

## 7.4.3 Structures Impacted

*Table 7-3* shows an estimate of the number of structures on parcels in the floodplain. These estimates were generated using Planimetric data available for this Basin.

To identify the potential dollar/loss exposure for the Basing, assessed values for improvements to each of the parcels shown to have structures within the 100-year floodplain were accumulated by subbasin. This value is representative of the exposure. To truly gauge vulnerability, the depth of flooding would need to be identified to apply FEMA’s depth/damage functions to this exposure. This detail of information was not available at the time of the preparation of this assessment. However, total exposure values can be a good gauge of potential flood impact for planning purposes and for identifying potential project benefits when prioritizing mitigation actions

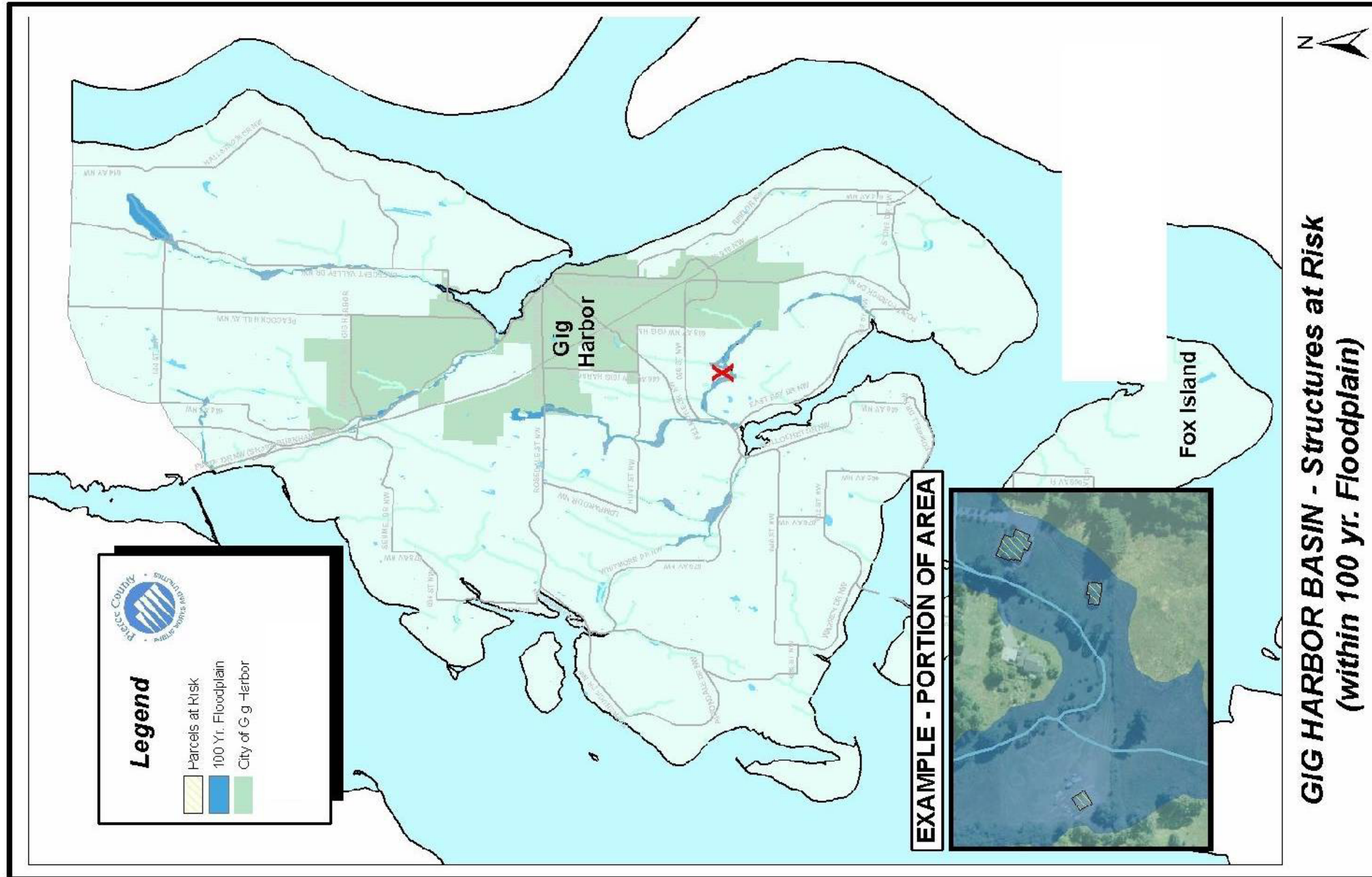


Figure 7-1  
Floodplain extent and location  
Gig Harbor Basin



Structure Type				
Commercial	Dwelling	Other	Total	Market Improvement Value
26	317	4	<b>347</b>	\$99,700,600

#### 7.4.4 Repetitive Loss Areas

Utilizing the FEMA definition of “Repetitive Loss” defined under the Community Rating System, there is one identified repetitive loss property within this Basin. The corresponding repetitive loss area for this Basin extends along Sunrise Beach Drive, starting at the 9500 block through the 9700 block (see *Figure 7-2*).

Pierce County estimates that this repetitive loss area includes up to 18 properties along this reach. All of these properties have been targeted by Pierce County Water Programs for annual public outreach projects that provide valuable property protection information to these property owners.

The causes of repetitive flooding for this area typical coastal flooding associated with coastal storm surge from the Puget Sound. This area has been mapped by FEMA as an unnumbered “A” zone. However, Pierce County has adopted this area as a Coastal “A” Zone under *Title 18E, Pierce County Code*.

Pierce County has established a regulatory “Base Flood Elevation” (BFE) for this area that takes into account coastal storm surge applications. This BFE is 13.5 feet, based on the *National Geodetic Vertical Datum of 1929* (NGVD1929). The mean ground elevation for this area is approximately 5 feet, NGVD1929.

#### 7.4.5 Insurance Analysis

Flood insurance statistics can help identify vulnerability by regionally isolating areas where claim activity is high and a high rate of flood insurance is in force. *Table 7-4* summarizes vital insurance statistics that can be used to help identify vulnerability within the Gig Harbor Basin. The locations of these policies are identified in *Figure 1-2*.

Number of flood insurance policies in force within the Basin (as of May 1, 2007)	72
Number of Policies within a mapped floodplain (FIRM)	6
Number of Policies outside of a mapped floodplain	66
Number of Claims filed within the Basin	22
Number of claims filed for losses outside the 100-year floodplain	22
Estimated number of insurable, primary Structures in mapped floodplains	343
Estimated % of at risk structures with flood insurance coverage	1.75%
% of current flood insurance coverage outside of a mapped floodplain	91.6%

Based on a review of this data, the following observations can be made:

- Based on the approximate number of primary, insurable structures in the floodplain and the insurance coverage in force within the floodplain, insurance coverage as a form of mitigation appears to be well below the national average. According to a study being conducted for the NFIP by the Rand Corporation, nationwide about 49% of single-family homes in special flood hazard areas (SFHAs) are covered by flood insurance.
- With 94.7% of the current policies in force located outside of a mapped floodplain, there appears to be some flooding issues within this Basin not addressed via the existing mapping. These could be drainage related flood issues that the Pierce County “Basin Planning Program” seeks out, that typically are not captured through standardized floodplain mapping techniques.
- With the existence of repetitive loss areas within this Basin, and the low percentage of insurance coverage, flood insurance promotion could be an effective means of mitigation within the Basin.
- All of the historical claims filed within this Basin have been outside of a mapped floodplain. This once again, suggests that there are flooding issues within this Basin not addressed through flood hazard mapping.



