

COMPREHENSIVE PLAN



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January, 1968

Mr. Jack Wylie, Chairman
Board of County Commissioners
Courthouse
Mount Vernon, Washington

Dear Mr. Wylie:

Enclosed is the text of the proposed Skagit County Comprehensive Plan. This text, the "Analysis of Population in Skagit County, the Skagit County Economic Base, October 1964, "Parks and Recreation, A Plan for Skagit County" and the large wall map entitled "Comprehensive Plan, Land Use, Transportation, Community Facilities, for Skagit County" comprises the Comprehensive Plan of Skagit County.

The objectives listed in this Plan have been submitted to, discussed, and reviewed by the Skagit County Planning Commission during the last two years.

We wish to acknowledge the cooperation of the various local, county, state and federal officials in supplying data for this Plan.

We are very grateful for the complete cooperation that has been given to us throughout this entire planning program by Chairman Arnell Johnson and each of the members of the Skagit County Planning Commission.

We also wish to acknowledge the cooperation of Lanche Crow and Marian Servoss of the County School Superintendent's office, and the superintendents of the various school districts in Skagit County, in submitting detailed data regarding existing and needed school buildings and facilities.

It is hoped that this Plan will serve as a guide and a point of reference in the development of Skagit County during the coming years.

Very truly yours,

Wayne Kite

Wayne Kite, Director
Skagit County Planning Department

FLOOD PROTECTION

“ ___Rivers were here long before man, and for untold ages, every stream has periodically exercised its right to expand when carrying more than normal flow. Man’s error has not been the neglect of flood control measures but his refusal to recognize the right of the rivers to their floodway___.”



Skagit River Valley - Flood Basin

The flood plain includes the entire floor of the Skagit River Valley, the deltas of the Samish and Skagit Rivers, and reclaimed tidelands adjoining the Skagit, Samish and Stillaguamish basins. The flood plain comprises 90,000 acres, including 68,000 acres of fertile farm land downstream, and west of Sedro-Woolley. A large portion of the farmland west of Sedro-Woolley is protected from small floods by levees, but would be flooded by large floods that overtop or breach the levees.

Cities and communities in the Skagit River Basin include Mount Vernon, Sedro-Woolley, Burlington, Concrete, La Conner, Clear Lake, Lyman, Marblemount, Hamilton, Rockport, Conway and Van Horn.

The central business district of the City of Mount Vernon is within the flood plain, but is protected by levees from all but major floods. The City of Sedro-Woolley is situated on a terrain which slopes upward from the river, and only minor flooding has occurred within the city limits in recent times. The City of Burlington has been inundated by major floods, but high levees west and south of the city have restrained the relatively mild floods of recent years. The communities of Concrete, Marblemount, Rockport, Lyman and Van Horn are

on high ground and are therefore not subject to flooding. La Conner has not been flooded in recent years because of protection afforded by levees north of the city and along the Skagit River. Many of the smaller communities on the flood plain are subject to flooding. Allen, Bow, Blanchard and Edison in the Samish River Basin are also subject to flooding, should the Skagit River floods overflow the low divide between the two basins in the vicinity of Sedro-Woolley.

Our Tendency to Forget

As the Skagit Valley has experienced only very minor flooding since 1959, there is a tendency among some valley residents to disregard the flood problem. The much large flood of 1951 is even less well remembered. The flood of 1921, which had more than twice the peak discharge of 1959, is practically forgotten. However, recent disastrous floods in other parts of the nation clearly illustrate that a long flood-free period is no assurance of future immunity to flooding. In view of the lack of recent flood experience, there has been an increase in occupancy of the flood plain.

The Flooding Process

Skagit River floods result from storms which, moving in from the Pacific Ocean, have their rainfall intensified as the air currents are forced upward over the Cascade Mountains. Temperatures accompanying the storms are often high enough to melt part of the snowpack. If, in addition, the ground is saturated from previous rains, rapid runoff takes place. Swollen creeks and streams quickly fill the main river channel to capacity. As the increasing flow proceeds downstream, the flatter grades cause a reduction in velocity and the river spreads out onto the flood plain.

When the river overflows its banks, a sheet of water quickly spreads across the flood plain. The water is generally shallow at the beginning and some inundated roads remain passable. However, water may stand several feet deep in old river channels and other depressions. As the flow increases toward the peak of the flood, water extends to the outer limits of the flood plain and rises to greater elevations. The normal river banks may disappear from sight, submerged beneath a mile-wide expanse of water. Vehicles being driven along drowned roads are endangered as the force of flowing water may be enough to carry cars and trucks off the pavement into ditches and fields. Homes in the flood plain may be inundated, furniture water-

logged, basements filled with silt and debris. With greater depth and the force of flowing water, buildings may be moved off their foundations or undermined. As the water moves toward Skagit, Padilla and Samish Bays, it may be blocked by a road fill with inadequate culvert openings. When this happens, the water rises until it spills over the roadway, creating a falls on the downstream side which may completely wash out the road. Where bridges have inadequate clearances above high water, debris such as logs, brush, and small structures may be trapped at piers or on girders and accumulate until the bridge opening is virtually blocked. This causes an additional rise in the water surface and may result in collapse of the bridge.

History of Flooding 1896-1967

The two most recent floods of the Skagit River occurred on 30 April and 24 November 1959 and wore a little over 90,000 cubic feet per second at Sedro-Woolley. This is less than half the magnitude of several floods which have occurred in the last hundred years.

Flood Dates	Discharge near Concrete <u>1/</u> (cubic feet per second)	Discharge near Sedro-Woolley <u>1/</u> (cubic feet per second)	Estimated Damages in flood plain west of Sedro-Woolley <u>2/</u>
16 Nov 1896	-	185,000	\$11,900,000
19 Nov 1897	-	190,000	11,980,000
16 Nov 1906	-	180,000	11,810,000
30 Nov 1909	-	220,000	14,060,000
30 Dec 1917	-	195,000	12,067,000
12-13 Dec 1921	-	210,000	13,273,000
27 Feb 1932	147,000	-	10,609,000
13 Nov 1932	116,000	-	6,600,000
22 Dec 1933	101,000	-	2,350,000
25 Jan 1935	131,000	-	9,050,000
27 Nov 1949	-	140,000	6,870,000
10 Feb 1951	-	150,000	11,360,000
30 Apr 1959	90,700	92,000	500,000
24 Nov 1959	89,300	91,000	390,000

1/ These are actual discharges. Ross Dam storage was partially effective in 1949 and 1951 and fully effective after 1953.

2/ Damages are at 1963 prices and development, and based on full use of Ross Dam flood control storage for all flows.

The 1909 flood was the largest since reliable records were started in 1896. Greater floods can, and probably will, occur at rare intervals. If all of the flood-producing conditions should take place at the same time, the unlikely would become the possible. For example, if the river should be running high, with the soil saturated and a deep, wet snowpack over the basin, and if a series of storms should follow each

other in from the Pacific Ocean, precipitation and snowmelt could cause a flood much larger than the 1909 highwater.

Flood Control Projects - Man's Effort to Keep the Water Away From the People

An examination of existing levees indicates that all areas behind the levees do not have the same degree of flood protection. With sand bagging of low areas and minor flood fighting, some areas may be flooded when Skagit River flows reach 90,000 cubic feet per second, while others would be safe until a flow of about 140,000 cubic feet per second is reached. Floods of these magnitudes are expected to recur at frequencies of 3 and 14 years, respectively. The capacity is based on the assumption of failure when the flood level is one foot below the average of low elevation in the levee system. Average annual flood damages in the flood plain are estimated to exceed \$2,216,000 a year at 1963 prices. Damage to farmland and crops, farm buildings and equipment, commercial buildings, roads and railroads, dikes, and transmission lines are included in the estimate. The dams in Skagit County are primarily "power dams" - not flood control dams - and consequently the dams offer only a relatively small degree of protection.

The only dependable flood storage in the basin effective in reducing flood flows is at Ross Dam in the Upper Skagit River. Since 1953, the flood storage in Ross Dam has been used effectively to reduce all flood flows in the lower basin. For example, a recurrence of the 1909 flood that was equal to 220,000 cubic feet per second at Sedro-Woolley would be reduced to approximately 200,000 cubic feet per second by this storage. In other words, Ross Dam would affect less than 10 percent of the river flow at Sedro-Woolley.

Unwise Encroachment on River's Expansion Area

In recent years there has been a trend toward unwise urban expansion and industrial development into the flood plain agricultural areas. As this trend toward higher land use continues, the flood damage potential will be greatly increased. We must recognize that flood plains are among the most attractive sites for human occupancy and activity. Throughout all human history, civilizations have risen and flourished in river valleys. Almost all major American cities are situated on riverbanks, and much of our best farmland lies on the floors of alluvial valleys. People desire access to riverbank areas for the enjoyment of outdoor recreational activities. Industries need access for transportation and water supply.

Any development of the flood plain should be tempered by the fact that the flood plain can only be borrowed. Basically, the unprotected flood plain belongs to the river, which, in accordance with physical law, may demand its return at any time. The flood plain may be thought of as a gigantic drain which may carry enormous quantities of water from the hills and mountains to the sea. Between storms, when the river is fed by underground seepage and streamflow is confined to a low-water channel, the flood plain is temporarily available for the uses of man. During periods of heavy, continuous rainfall, the capacity of the low-water channel is exceeded and the river calls upon its flood plain to carry the load. This is just as normal during the rainy season as low flow is during dry weather.

Under these conditions, what can be done to obtain the most beneficial use of the present day flood plain with the least damage? The first consideration is to give the river working room. Nothing should be done to obstruct the low-water channel, as this will cause the river to overflow its banks unnecessarily. Everything

possible should be done to permit water which has overflowed onto the flood plain to run off as quickly as possible. For example, highway fills across the flood plain should have sufficient culvert openings to pass flood flows without causing the water to back up excessively.

Working Room for the River

Lack of working room for a river often is found where levees have been built by piecemeal, haphazard, "do-it-yourself" methods. Levees built on the edges of river banks to conserve land, confine the river to a narrow channel and the flow can no longer spread out across the flood plain. Such confinement results in higher water surface elevations and increased flow velocities which cause erosion. When levees are needed, a uniform, overall system should be planned, including a flow study to establish the distance required between levees on each side of the river to contain high flows. Similarly, highway and railroad bridges should be high enough to pass both flood waters and floating debris.

Elevating of Structures - Floodproofing

Another consideration for living successfully with a river is to carry out floodproofing measures, that is, adapting buildings to withstand several feet of water with a minimum of damage. One simple but

effective method is to build or raise structures several feet above the ground. This would require a few extra steps, but the ground floor could be used for parking or for certain kinds of storage. Other waterproofing measures include closing basement windows permanently - for example, with glass brick; using treated timbers in the lower portions of structures; applying waterproof cement on floor coverings; avoiding the use of carpeting, upholstery and veneer as much as possible.

Emergency measures such as moving furnishings above floor level when flooding is imminent also reduce flood damage. Such measures, however, are contingent upon the receipt of a warning or forecast in time to take the necessary action. In the past, responsibility for this service has not been clearly defined, but Civil Defense centers now coordinate information supplied by the U. S. Weather Bureau, river gages, law enforcement and count engineering unites, and arrange for broadcasting flood and evacuation warnings by commercial radio and television stations.

National Trend - Zoning, Man's Effort to Keep the People Away From the Water

In the absence of adequate and effective flood control, the most effective means of preventing flood damage is zoning. The zoning of cities and counties to separate residential, commercial, and industrial areas is commonplace. The zoning of floodplains, including regulations restricting flood plain usage, is increasingly becoming common practice and is just as desirable and as legally sound. The objective of such zoning is to reserve the flood plain for those uses which are best suited to it and the least subject to damage from highwater. The part of the flood plain subject to inundation every few years could be zoned for agriculture, including buildings necessary for farm operation. Public and commercial activities which can recover quickly from inundation could be allowed in some areas provided protection is provided. Other desirable uses include parks, playfields, parking lots, and drive-in theaters. A useful method for determining the limits of this zone would be to use the highwater mark on one of the larger recorded floods.

At this point, attention should be called to the fact that the zoning of private and other non-federal lands in the flood plain is the responsibility of counties and cities under the authority granted by State law. Land use planning was authorized by the Washington State Legislature in a 1959 act.

Other Tools of Government to Supplement Zoning

To supplement zoning laws, other means are available to provide some control over use of the flood plain. Subdivision ordinances determine the conditions under which tracts may be divided into lots for sale or building developments. Such ordinances should incorporate flood maps and water surface profiles, and require that flood elevations be above a selected flood height and that buildings and land fills be constructed so as to insure that no restriction will be made in the floodway capacity.

Federal and State Influence - in lieu of local acceptance of responsibility

Federal loan agencies, such as the Federal Housing Agency, Veterans Administration, Farmers Home Loan Administration, Urban Renewal Administration, the Economic Development Administration, and others exert an influence on development of the flood plain by withholding approval of loans for improvements in locations known to be subject to flooding.

Other federal and state agencies such as the U. S. Army Corps of Engineers and the State Department of Water Resources (statewide jurisdiction over flood control) provide valuable services and technical aid to local areas and exert a great deal of

influence on developments of the flood plain through the provision of their various technical services and through the enforcement of the various flood control regulations, permits, etc.

These agencies also exert influence indirectly such as through state and federal recommendations to funding institutions regarding proposed projects or the flood plain (commercial, industrial, residential, etc.) and the withholding of funds from local jurisdictions which fail to recognize local flood problems and develop flood plain regulations. The increasing federal and state concern, over actual and potential flood damages and losses, which are continuing to rise despite greatly increased expenditures for flood control improvements, has accelerated the national trend toward flood plain zoning by local jurisdictions.

Experience has shown that there is no substitute for a comprehensive zoning ordinance to prevent the disastrous mistakes which occur when the inexperienced or unformed seek to develop the flood plain. The present high rate of population growth and resulting increase in building and subdividing can affect all areas suitable for residential construction purposes. This is particularly true on the edges of the larger metropolitan communities, and, with improved transportation, soon will apply to the more remote localities. Early settlers in

western Washington valleys knew that they and their families would be living there for years to come and had the good judgment to build their homes on the highest available part of their holdings. As a result, flood damage along many streams has been confined primarily to crops.

The danger is that promoters of new housing sites, shopping centers, and motels may lack a long-range viewpoint and unintentionally saddle future owners with flood susceptible, depreciated and hazardous property.

Local Responsibility

The responsibility for flood plain zoning lies with county or municipal planning commissions. The task of the mapping the county, determining its present uses, and arriving at a fair and reasonable recommendation for the best future use of all areas, is a difficult one and should be undertaken by only these agencies or groups which are well qualified to perform the work.

Those interested in doing additional reading on the subject of flood plain zoning may wish to examine a list of books and other publications available upon request from the County Planning Department.