

Chapter NR 116

WISCONSIN'S FLOOD PLAIN MANAGEMENT PROGRAM

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History: Chapter RD 16 as it existed on August 31, 1970 was repealed and a new chapter numbered NR 116 was created, Register, August, 1970, No. 176, effective September 1, 1970.

NR 116.01 Introduction. (1) The Wisconsin legislature in enacting chapter 614, laws of 1965, recognized that flood plain zoning is a necessary tool to protect human life, health and to minimize property damages and economic losses. Counties, cities, and villages are required by section 87.30, Wis. Stats., to adopt reasonable and effective flood plain zoning ordinances within their respective jurisdictions where serious flood damage may occur.

History: Cr. Register, August, 1970, No. 176, eff. 9-1-70.

NR 116.02 Definitions. (1) **CHANNEL.** A natural or artificial water-course with definite bed and banks to confine and conduct the normal flow of water.

(2) **DEPARTMENT.** State of Wisconsin department of natural resources, division of environmental protection.

(3) **ENCROACHMENT LINES.** Limits of obstruction to flood flows. These lines are on both sides of and generally parallel to the stream. The lines are established by assuming that the area landward (outside) of the encroachment lines will be ultimately developed in such a way that it will not be available to convey flood flows.

(4) **EQUAL DEGREE OF ENCROACHMENT.** Established by considering the effect of encroachment on the hydraulic efficiency of the flood plain along both sides of a stream for a significant reach. Hydraulic efficiency depends on such factors as the relative orientation of the channel, natural and man-made characteristics of the flood plain, relative ground level on both sides of the stream, the type of vegetation on both sides of the stream and the resistance of such vegetation to flood flows.

(5) **FLOOD.** A temporary rise in stream flow or stage that results in inundation of the areas adjacent to the channel.

(6) **FLOOD FREQUENCY.** A means of expressing the probability of flood occurrences as determined from a statistical analysis of representative stream flow records. It is customary to estimate the frequency with which specific flood stages or discharges may be equalled or exceeded, rather than the frequency of an exact stage or discharge. Such estimates by strict definition are designated "exceedence frequency", but in practice the term "frequency" is used. The frequency of a particular stage of discharge is usually expressed as occurring

once in a specified number of years. Also see: Recurrence interval.

(7) **FLOOD PLAIN.** The land adjacent to a body of water which has been or may be hereafter covered by flood water including but not limited to the regional flood.

(8) **FLOOD PLAIN MANAGEMENT.** The full range of public policy and action for insuring wise use of flood plains. It includes everything from the collection and dissemination of flood control information to actual acquisition of flood plain lands; and the enactment and administration of codes, ordinances, and statutes for flood plain land use.

(9) **FLOOD PROFILE.** A graph showing the relationship of the water surface elevation of a flood event to a location that generally is expressed as a distance upstream from a designated point on a stream or river.

(10) **FLOOD PROOFING.** A combination of structural provisions, changes, or adjustments to properties and structures subject to flooding primarily for the reduction or elimination of flood damages to properties, water and sanitary facilities, structures and contents of buildings in a flood hazard area.

(11) **FLOODWAY.** The channel of a stream and those portions of the flood plain adjoining the channel that are required to carry and discharge the flood water or flood flows of any river or stream including but not limited to flood flows associated with the regional flood.

(12) **FREEBOARD.** A factor of safety usually expressed in feet above a design flood level for flood protective or control works. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions such as wave action, bridge opening and floodway obstructions, and the hydrological effects of urbanization of the watershed.

(13) **MAXIMUM PROBABLE FLOOD.** The most severe flood with respect to flood peak that may be expected from a combination of the most critical meteorological and hydrological conditions that are reasonably to be expected on the drainage basin.

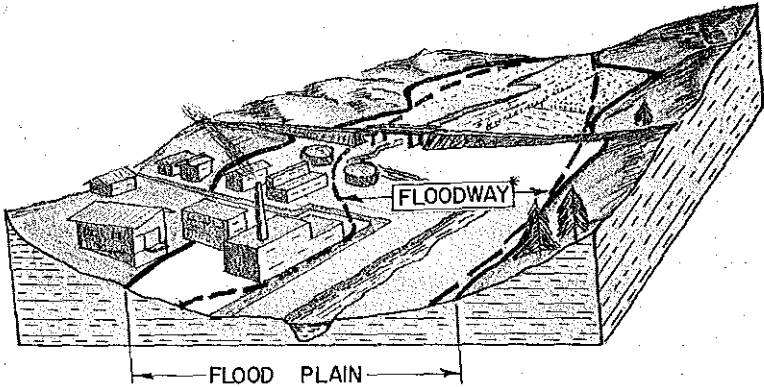
(14) **REACH.** The longitudinal segments of a stream or river influenced by natural or man-made obstruction.

(15) **RECURRENCE INTERVAL.** The average interval of time, based on a statistical analysis of actual or representative stream flow records, which can be expected to elapse between floods equal to or greater than a specified stage or discharge. Recurrence interval is generally expressed in years. Also see: Flood frequency.

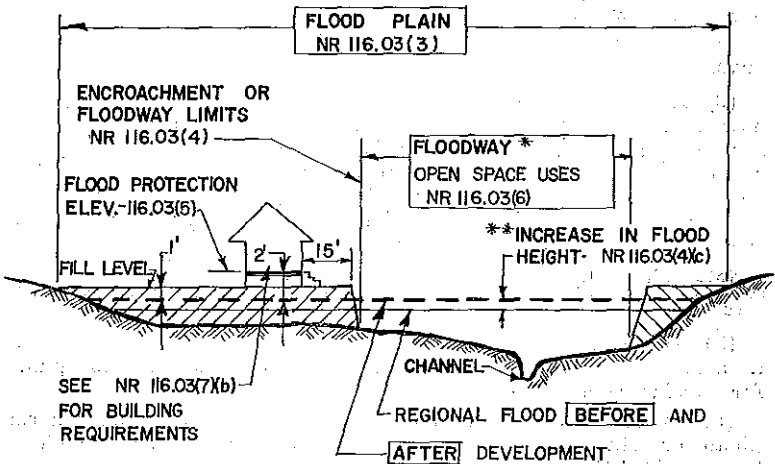
(16) **REGIONAL FLOOD.** A flood determined by the department to be representative of large floods known to have generally occurred in Wisconsin and which may be expected to occur on a particular stream because of like physical characteristics. The regional flood generally has an average frequency of the 100 year recurrence interval flood.

(17) **RURAL AREAS.** All areas that are not included in urban area, such as agricultural, forest and undeveloped lands.

(18) **STANDARD PROJECT FLOOD.** A hypothetical flood, estimated by the corps of engineers, representing the critical flood runoff volume



*That portion of the flood plain required to carry and discharge flood waters. The limits of the floodway are smooth lines that exclude areas associated with stagnant flood waters, intensive urban development and other areas not effective in conveying flood waters.



**Increases in flood heights result from filling and development on the flood plain.

VALLEY CROSS SECTIONS

Figure 1

and peak discharge that may be expected from the most severe combination of meteorological and hydrologic conditions that are considered reasonably characteristic of the geographical region involved, excluding extremely rare combinations.

(19) URBAN AREAS. For the purpose of flood plain management, urban areas shall be construed to include the following:

(a) The area within the present corporate limits plus the adjoining area that is or could be under the statutory extraterritorial zoning jurisdiction of any city, village or town;

(b) Any group of seasonal or permanent buildings which have a population density not characteristic of rural areas.

History: Cr. Register, August, 1970, No. 176, eff. 9-1-70.

NR 116.03 General criteria for flood plain regulations. (1) **OBJECTIVES.** The objectives of these criteria are to provide a uniform basis for the preparation and implementation of sound flood plain regulations for Wisconsin rivers and streams to:

- (a) Protect human life and health;
- (b) Minimize expenditures of public monies for costly flood control projects;
- (c) Minimize rescue and relief efforts, generally undertaken at the expense of the general public;
- (d) Minimize business interruptions;
- (e) Minimize damage to public facilities on the flood plains such as water mains, sewer lines, streets and bridges;
- (f) Help maintain a stable tax base by the preservation or enhancement of property values for future flood plain development. In addition, development of future flood blight areas on flood plains will be minimized and property values and the tax base adjacent to the flood plains will be preserved;
- (g) To discourage the victimization of unwary land and home buyers.

(2) **REGIONAL FLOOD DETERMINATION.** The method of flood frequency determinations for the regional flood generally will be based on the log-Pearson type III distribution (with the log normal as a special case) as described in the federal water resources council bulletin 15, "A Uniform Technique for Determining Flood Frequency", December 1967. In special instances the department may use or authorize the use of other acceptable hydrologic methods or techniques.

Note: The bulletin referred to above is available from Water Resources Council, 1025 Vermont Avenue, N. W., Suite 900, Washington, D. C. 20005

(3) **FLOOD PLAIN DELINEATION.** (a) The regional flood shall serve as a basis for delineation of the minimum limits of the flood plains for regulatory purposes;

(b) In absence of regional flood data, experienced flood maps, aerial photos or detailed soil maps may initially serve as a basis for delineation provided that:

1. The affected flood plains are generally undeveloped;
2. The associated text of the zoning ordinance provides for a special exception procedure similar to section NR 116.05 (3) (c) to ascertain the effects of proposed construction upon flood flows and the flood protection elevation.
3. The local unit of government has initiated a program to ultimately obtain regional flood data in problem areas.

(c) Where technical information is available to ascertain the magnitude of floods larger than the regional flood (such as the standard project flood or the maximum probable flood), the flood plain limits of these large floods shall be reflected on the official zoning district maps for public information purposes;

(d) Accepted engineering principles and other techniques shall govern the delineation of the flood plain limits on the official zoning

district map. Where a conflict exists between the flood plain limits illustrated on the map and actual field conditions, the elevations from the flood profile shall be the governing factor in locating the regulatory flood plain limits.

(4) FLOODWAY DELINEATION. (a) The delineation of the floodway shall be based on the channel of the river or stream and those portions of the adjoining flood plains which are reasonably required to carry and discharge the regional flood without any measurable increases in flood heights;

(b) The determination of the floodway limits shall be based on hydraulic and engineering studies;

(c) In areas having appreciable urban development on the flood plain, the floodway may be based on encroachment lines generally following the riverward limits of development provided that:

1. Encroachments on the floodway of any river or stream generally should not cause an appreciable increase in stage of the regional flood. Increased flood depths up to 0.5 foot in any one reach or for the cumulative effect of several reaches of a river or stream are generally acceptable. The department may authorize increases greater than 0.5 foot where:

a. The area affected by the increases is in open space use;

b. Local comprehensive plans and land use controls will assure the continuation of such open space use;

c. The increases do not affect adjoining communities; and

d. Appropriate legal arrangements have been made with the affected local unit of government and riparian land owners. If the increase in flood stage will materially increase the flood damage potential or affect adjoining communities, the department may require that such increase be less than 0.5 foot.

2. Floodway encroachments shall be:

a. Based on a uniform degree of encroachment for a significant reach on both sides of a river or stream;

b. Based on hydraulic and engineering studies; and

c. Compatible with local land use plans.

(5) FLOOD PROTECTION ELEVATIONS. (a) The flood protection elevations shall correspond to a point not less than 2 feet above the water surface profile associated with the regional flood plus any increases in flood heights attributable to encroachments on the floodway established under section NR 116.03 (4)(c).

(b) The flood protection elevation shall be clearly lettered at identifiable positions on the official zoning district map consistent with the water surface profile of the regional flood, or the profile shall be attached to and made part of the official zoning district map.

(6) AREAS WITHIN THE FLOODWAY OR BETWEEN LEVEES. (a) *Permitted uses*. 1. Open space uses having a relatively low flood damage potential such as those associated with agriculture, recreation, parking, storage yards, certain sand and gravel operations;

2. Certain structures accessory to permitted open space uses if the structures:

a. Are not designed for human habitation;

b. Have a low flood damage potential;

c. Are to be constructed and placed on the building site so as to offer the minimum obstruction to the flow of flood waters;

I. Whenever possible, structures will be constructed with the longitudinal axis parallel to the direction of flow of flood waters; and

II. So far as practicable, structures will be placed so their longitudinal axes are approximately on the same line as those of adjoining structures.

d. Will be firmly anchored to prevent the structure or building from floating away and thus threatening to further restrict bridge openings and other restricted sections of the stream or river; and

e. Service facilities such as electrical and heating equipment will be at or above the flood protection elevation for the particular area.

3. Channel uses permitted by the department pursuant to c. 30, Wis. Stats.

(b) *Prohibited uses.* 1. Any fill, deposit, obstruction, excavation, storage of materials, or structure which acting alone or in combination with existing or future similar works will adversely affect the efficiency of the capacity of the floodway or adversely affect existing drainage courses or facilities.

2. Structures that are:

a. Designed for human habitation;

b. Associated with high flood damage potential; and

c. Not connected with permitted open space uses.

3. Storage of materials that are buoyant, flammable, explosive or injurious to human, animal or plant life; and

4. Uses that are not in harmony with and may be detrimental to the uses permitted in the adjoining district.

(7) FLOOD PLAIN AREAS LANDWARD OR OUTSIDE OF THE FLOODWAY.

(a) *General.* 1. All flood plain developments shall be compatible with a local comprehensive plan. In the absence of a formal plan, development shall be compatible with the uses permitted in the adjoining district;

2. Flood plain developments shall not adversely affect the efficiency of or unduly restrict the capacity of the channels or floodways of any tributaries to the main stream, drainage ditches, or any other drainage facilities or systems;

3. Flood plain developments shall not materially affect the storage capacity of the flood plains, based on an equal degree of encroachment, particularly in flood areas upstream from urban areas.

(b) *Urban residential areas.* 1. The finished surface of the first floor or basement floor of any building or structure to be erected, constructed, reconstructed, altered or moved on the flood plain shall be placed on fill at or above the flood protection elevation;

2. Fill elevation shall not be less than one foot/above the regional flood elevation plus any increase in elevation due to floodway encroachment as described in section NR 116.03(4) (c) and the fill shall extend at such elevation at least 15 feet beyond the limits of any structure or building erected thereon. Where existing streets are at elevations which make compliance with this provision impractical, the department may authorize use of other flood proofing measures or methods to the flood protection elevation in accordance with section NR 116.03(8).

(c) *Rural seasonal or permanent residences.* 1. The finished surface of the first floor and any floor or a basement of a building or structure used for human habitation or associated with a high flood

damage potential to be erected, constructed, reconstructed, altered or moved on the flood plain shall be at or above the flood protection elevation.

(d) *Commercial areas.* Commercial areas generally are to be constructed on fill with no first floor or basement floor below the flood protection elevation. Certain yards, parking lots and other auxiliary land uses may be at lower elevations. However, no such area in general use by the public shall be inundated to a depth greater than 2 feet or subjected to flood velocities greater than 4 feet per second upon the occurrence of the regional flood.

(e) *Manufacturing and industrial areas.* Protection methods utilizing fill, levees, floodwalls and flood proofing measures for buildings, structures and appurtenant works are to be provided to the flood protection elevation. Interference with normal plant operations is to be minimized, especially for streams having protracted flood durations. A lesser degree of protection may be permissible for storage yards, parking lots and other auxiliary uses compatible with these criteria.

(f) *Public utilities, streets, and bridges.* 1. When failure or interruption of public facilities would result in danger to the public health or safety or where such facilities are essential to the orderly functioning of the area, protection to the flood protection elevation is to be provided;

2. Where failure or interruption of service would not endanger life or health, a lesser degree of protection may be provided for minor or auxiliary roads or utilities;

3. Public utilities, roads and bridges on the flood plain should be designed to minimize increases in flood elevations and should be compatible with the local comprehensive flood plain development plan.

(g) *Storage of materials.* Any storage of materials that are buoyant, flammable, explosive, or in times of flooding, could be injurious to human, animal or plant life, shall be at or above flood protection elevations.

8. **FLOOD PROOFING MEASURES.** When these criteria or variances in local ordinances permit flood proofing measures they shall be designed for flood velocities, depths, forces and other factors associated with the regional flood. A plan or document certified by a registered professional engineer or architect that the flood proofing measures are adequately designed shall be submitted to the local unit of government prior to any authorization. Some flood proofing measures are:

(a) Anchorage of structures to foundations.

(b) Installation of watertight doors, bulkheads and shutters.

(c) Reinforcement of walls to resist water pressures.

(d) Use of paints, membranes or mortars to reduce seepage of water through walls.

(e) Addition of mass or weight to structures to resist flotation.

(f) Installation of pumps to lower water levels in structures.

(g) Construction of water supply and waste treatment systems to prevent the entrance of flood waters.

(h) Pumping facilities for subsurface drainage systems for buildings to relieve external foundation wall and basement flood pressures.

(i) Cutoff valves on sewer lines or the elimination of gravity flow basement drains.

(j) Placing of essential utilities above flood protection elevations.

(9) FLOOD PROTECTIVE OR CONTROL WORKS FOR URBAN AREAS. (a) *Levees or floodwalls.*

1. Floodway encroachments described in section NR 116.03 (4) ~~(6)~~ generally shall be applicable to levees or floodwalls.

2. The minimum height and design of any levee or floodwall shall be based on the flood profile of the regional flood confined between the levees or floodwalls, plus 3 feet of freeboard or the standard project flood confined between the levees or floodwalls, whichever provides the greater protection from floods;

3. Increases in flood stages resulting from any levee or floodwall in excess of the allowable increases due to floodway encroachments as described in section NR 116.03 (4) ~~(c)~~ shall be contained within the upstream extent of any levee or floodwall.

4. Floodplain developments landward of any levee or floodwall shall provide for interior drainage and designated ponding areas associated with any levee or floodwall;

5. The criteria for flood plain areas landward of or outside the floodway in section NR 116.03 ~~(7)~~ shall apply for flood plain development until such time as the levees and floodwalls are constructed and operative.

(b) *Agricultural levees.* 1. Agricultural levees shall be designed so that the levees will overtop upon the occurrence of the 15-year recurrence interval flood.

2. Increase in flood heights in the area upstream from agricultural levees shall not exceed 0.5 foot for the 15-year recurrence interval flood based on an assumption of an equal degree of encroachment on both sides of a river or stream provided the consent of the affected property owners is obtained.

(c) *Reservoirs and channel improvements.* Flood protection elevations or flood plain and floodway limits based on any proposed reservoir or channel improvements shall not be effective until the reservoir or channel improvements are constructed and operative.

(11) MODIFICATIONS OR ADDITIONS TO EXISTING STRUCTURES. (a) *Areas within floodway or between levees.* No modifications or additions to any structure that are not in compliance with permitted floodway uses are permitted unless such modifications will decrease the flood damage potential of the structure or its degree of obstruction to flood flows.

(b) *Areas landward or outside of floodway.* 1. Any modifications or additions to any structure generally shall be in compliance with the general criteria for flood plain regulations.

2. Where compliance with applicable criteria results in undue hardship, the following shall apply:

a. Any modifications or additions to any structure for human habitation or with a high flood damage potential shall be protected to the flood protection elevation by flood proofing measures, in section NR 116.03 (8).

b. Modifications or additions to other structures may be permitted at elevations lower than the flood protection elevation if such modifications or additions will not be subjected to high flood depths

or flood velocities and will not require the installation of public facilities.

3. Any modifications involving the internal use of an existing building not in compliance with these criteria may be permitted if such use will not endanger human lives, increase the flood damage potential by the occurrence of the regional flood, or require the installation of public facilities below the flood protection elevation.

3. Any modifications or additions to existing structures also shall comply with the statutory provisions for nonconforming uses.

(12) **THE REMOVAL OF DESIGNATED FLOOD PLAIN LIMITS.** The flood plain designation on zoning district maps shall not be removed from any area unless it can be shown that the area is filled above the flood protection elevation and is contiguous to other lands lying outside the flood plain.

(13) **CERTIFICATION OF COMPLIANCE.** No vacant land in the flood plain shall be occupied or used and no building hereafter erected, altered or moved shall be occupied until the applicant submits to the local zoning administrator or building inspector a certification by a registered professional engineer or land surveyor that the finished fill and building floor elevations and other flood plain regulatory factors were accomplished in compliance with appropriate flood plain zoning provisions and other flood plain regulations.

(14) **PUBLIC INFORMATION** (a) Flood limits should be marked on the ground. Markers should also be set to show the depth of inundation at appropriate locations within the flood plain.

(b) All available information in the form of maps, engineering data and regulations should be freely and widely distributed.

(c) All legal descriptions of property transferred in the flood plain should include information relative to the zoning classification.

History: Cr. Register, August, 1970, No. 176, eff. 9-1-70.

NR 116.04 Department duties (1) The establishment and upgrading of standards for local floodplain zoning ordinances and the review and evaluation of the administration and enforcement of local ordinances.

(2) Where counties, cities and villages fail to comply with section 87.30, Wis. Stats., or Wis. Adm. Code section NR 116.05 herein, or where local ordinances have not been administered or enforced consistent with flood plain management criteria herein, the department shall recommend to the natural resources board the adoption and enforcement of an ordinance in accordance with the procedure in section 87.30, Wis. Stats.

(3) The department shall issue a certificate of approval to a unit of government upon a finding that the adopted flood plain zoning ordinance meets the provisions of sections NR 116.03 and NR 116.05.

(4) The review of proposed, preliminary, final or enacted ordinances by the department will include the following:

(a) Determination if the most accurate maps were utilized in delineating the flood plains;

(b) Determination of the adequacy of the text of any ordinance;

(c) Determination of the compatibility of ordinances from adjoining communities on the same streams or rivers;

(d) Determination of the compatibility of flood plain ordinances with county shoreland regulations, existing zoning and any land use plan.

(5) The department with assistance from appropriate federal and state agencies will, upon request, assist local units of government or regional planning commissions in evaluating flood hazards and flood plain delineation and relating these factors to flood plain zoning and enforcement practices. The primary contribution of the state and federal agencies toward this program will be to provide technical guidance and computer facilities for the necessary hydrologic, hydraulic and engineering studies. Local contributions to this program shall include, among other things, the necessary topographic and other base maps and field surveys.

(6) The department will coordinate flood plain management with programs of other state or federal agencies or institutions to assure that public works on the flood plains will not violate flood plain management criteria and local flood plain zoning ordinances.

History: Cr. Register, August, 1970, No. 176, eff. 9-1-70.

NR 116.05 Regulations applicable to cities, villages and counties.

(1) **ADOPTION OF FLOOD PLAIN ZONING ORDINANCES** (a) Counties, cities and villages shall adopt and continue to administer and enforce reasonable and effective flood plain zoning ordinances that meet or exceed the criteria in section NR 116.03 for all flood plains within their respective jurisdictions where serious damage may occur.

(b) Where necessary to assure the effectiveness of flood plain zoning ordinances, criteria in section NR 116.03 shall be included in subdivision regulations, building and sanitary codes and flood insurance.

(c) Where the department finds that one or more of the following regulations or programs will accomplish the objectives and provisions of section NR 116.03, these regulations or programs may be substituted in lieu of zoning ordinances:

1. Acquisition by easement or purchase of flood plain areas for open-space uses described in section NR 116.03 (7).

2. Flood warning system.

3. Building codes.

4. Subdivision regulations.

5. Sanitary codes.

(d) Local units of government shall adopt or amend flood plain zoning ordinances to reflect adequate flood data within 6 months from the time such data are available. Local units of government shall also within 6 months incorporate any upgrading of flood plain management criteria or hydrologic data based on legal precedents and improved technical information and methods.

(2) **AMENDMENTS.** Any amendment to flood plain regulations shall be approved by the department before it becomes effective.

(3) **APPEALS, VARIANCES, EXCEPTIONS.** (a) Local decisions on flood plain zoning appeals, variances, special exceptions (conditional uses) shall not be contrary to the provisions of this code or other state regulations.

(b) Local units of government shall give mailed notice to the appropriate district and main office of the department of any public hearing on an application for a variance or special exception (con-

ditional use). Such notice shall specify the time, place and subject matter of the public hearing.

(c) The local units of government may require the applicant to submit a map plan and/or legal description which accurately locates or describes the proposal with respect to the flood plain districts and provides all pertinent information such as the nature of the proposal, fill limits and elevations and building floor elevations. The local unit of government may transmit this information to the department for a determination of flood protection levels and the evaluation of the effects upon flood heights, velocities and flood plain storage areas. The department may request additional information such as valley cross sections or other survey information to make its determination.

(d) The determination of these effects shall be based on the assumption that the flood plain or floodway encroachment resulting from any proposed fill, obstruction or structures will extend for a significant reach of the stream, together with any probable encroachment equal in degree on the opposite side of the stream.

(e) The department shall advise the local unit of government of its findings within 30 days of receiving notice of an application for a variance or special exception (conditional use) or 30 days after receiving all requested engineering information. Failure of the department to respond within 30 days may be construed to mean it has no comment.

(f) A copy of all decisions granting a variance or special exception (conditional use) relating to the flood plain or floodway areas, shall be mailed within 10 days to the district and main office of the department.

(4) LOCAL ENFORCEMENT PROCEDURES. Flood plain zoning ordinances enacted under section 87.30, Wis. Stats., shall provide for the following, except that where a zoning administrator, planning agency and board of adjustment or appeals have already been appointed to administer a zoning ordinance adopted under sections 59.97, 59.971 or 62.23 (7), Wis. Stats., these officials shall also administer the flood plain zoning ordinance. (a) The appointment of an administrator and such additional staff as the work load may require;

(b) The establishment of a planning agency and a board of appeals or adjustment, as required by law;

(c) A system of permits for all new construction, reconstruction, structural alterations or moving of buildings and structures including sanitary waste disposal and water supply facilities. A duplicate copy of all applications shall be filed in the office of the administrator;

(d) Regular inspection of permitted work in progress, to ensure conformity of the finished structures with the terms of the ordinance;

(e) Procedures for appeals, variances, special exceptions (conditional uses) in accordance with a variance procedure relating to the use, change of use or alteration of nonconforming lands and structures in section NR 116.05 (3). There shall be a complete public record of all proceedings before the board of appeals or adjustment and planning agency;

(f) Mapped zoning districts and the automatic recording, on an official copy of such map, of all district boundary changes;

(g) The firm prosecution of any and all violations of flood plain zoning regulations for which there is adequate evidence, unless such violations are voluntarily corrected in accordance with section 87.30 (2), Wis. Stats.

History: Cr. Register, August, 1970, No. 176, eff. 9-1-70.

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