DCD Data Related to Milwaukee River Interim Study Overlay District

Interim Study Links to Study Plan and Map:
http://www.mkedcd.org/planning/zoning/IS/MilwaukeeRiver/index.html

Background Data:

Soils

Soil type identifies characteristics like erosion and angle of repose, which is the natural stable slope of any given soil type. Soil type impacts bluff stability.

- USDA Natural Resources Conservation Service (NRCS) Web Soil Survey identifies the river corridor as an Unmapped Area (UA). If a specific soil type was identified, the angle of repose, erosion rates, and other information could be identified. http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

- An Aug. 8, 2008 email from Robert Monnat, Mandel Group, states: Our geotechnical engineer, Terracon, reviewed the soils and suggested that we consider using a 1 or 1.5 "angle of repose" for excavation. This means that for every foot we excavate for a basement level, they suggest that we offset from the bluffline by 1 to 1.5 feet. Our maximum excavation is in the range of 12 feet, suggesting a setback based on soil/bluff stability of 12-18 feet.

Bluff Stability & Recession Rates

Bluff stability is affected by a number of factors, including soil type, water, slope, vegetative cover, weather and humans. Bluff recession rates are the rate at which bluffs recede away from the water's edge. Bluff recession rates are difficult to determine and it is done through a time-intensive process. Other bluff recession rates were sought to establish an approximate bluff recession rate for the Milwaukee River corridor.

- USGS - Bluff Erosion in North Fish Creek WI (bluff erosion rates): North Fish Creek bluffs eroded at a rate of approximately 2 feet per year. http://pubs.usgs.gov/sir/2004/5272/#N1035D

- Illinois Department of Natural Resources: IL bluffs eroding approximately 0.7 – 1.0 feet per year from 1872-1987. A 1994 study indicated a range of erosion from 0.3-2.5 feet per year. http://dnr.state.il.us/owr/cmp/pdfs/4%20-%20Erosion%20-%202009_01_1.pdf

- SEWRPC – Identifies causes of bluff failure: groundwater seepage, vegetative cover, precipitation, etc. http://www.sewrpc.org/publications/mr/mr-156_lake_park_bluff_stability.pdf

- This article questions whether bank erosion causes sedimentation and if sedimentation is truly a bad thing for the environment. http://www.glc.org/basin/pubs/keeping/pdf/keepingv1n2.pdf

Related SEWRPC Documents

- Primary Environmental Corridors (PEC) Overview: http://www.co.washington.wi.us/uploads/docs/PLN_SEWRPC_EnvironmentalCorridorsPresentation.pdf

Official PEC Definitions:
http://www.sewrpc.org/regionallandinfo/metadata/delineation_environmental_corridors.pdf

SEWRPC defining environmental corridors:
Polygons are established around areas like rivers over 50 feet wide, shoreland is 75 feet on both sides of river, steep slopes or very steep slopes (12-19% or 20%+), wetlands, and floodlands each get polygons; the polygons are rated, then connected (using criteria) to form corridors. Based upon the resulting size of corridors, they are designated primary or secondary. *Primary* corridors contain concentrations of significant natural resources and are at least 400 acres and 2 miles long, and 200 feet wide. *Secondary* corridors have smaller concentrations of significant natural resources and are at least 100 acres and 1 mile long. The resulting polygons through the Milwaukee River area may then be 75 feet beyond the river and may or may not include steep slope, wetland or floodland polygons. SEWRPC does not use the "top of bluff" concept to delineate polygons or corridors. (Technical Report, "Refining the Delineation of Environmental Corridors in SE WI", 1981, by Rubin & Emmerich.) SEWRPC uses tree drip lines to determine the edge of the PEC.

- SEWRPC Comprehensive Planning Fact Sheet

This document recommends preservation of PEC to maintain both the ecological balance and natural beauty of the region.
http://www.sewrpc.org/smartgrowth/pdfs/sewrpc_comprehensive_planning_fact_sheet_environmental_corridors.pdf

- SEWRPC Regional Land Use Plan for SE WI 2035

The land use plan calls for the preservation of environmental corridors. Benefits of PEC include "recharge and discharge of groundwater, maintenance of surface and groundwater quality, attenuation of flood flows and stages, maintenance of base flows of streams and water courses, reduction of soil erosion, abatement of air and noise pollution, provision of wildlife habitat, protection of plant and animal diversity, protection of rare and endangered species, maintenance of scenic beauty and provision of opportunities for recreational, educational, and scientific pursuits."

The plan also identifies land uses that are compatible for development (Table 27 Chapter 4) within the PEC provided development does not jeopardize the integrity of the PEC.

The plan recommends local comprehensive plans to preserve PEC. (NOTE: The Land Use Plan does not state any buffering requirement for the PEC.)

The plan takes care to state it does not encourage development specified in Table 27 within environmentally significant areas. Rather, the limited development specified in Table 27 is an accommodation that seeks to balance landowner interests in development with natural resource base preservation objectives.
http://www.sewrpc.org/publications/pr/pr-048_regional_land_use_plan_for_se_wi_2035.pdf
<Table27.pdf>

City of Milwaukee – Comprehensive Plan – Northeast Area Plan

The Northeast Area Plan is one of fourteen plans created by the City of Milwaukee Department of City Development to comply with the State of Wisconsin's Smart Growth Law. The Northeast Area Plan deems the Milwaukee River area as a catalytic project and recommends that design guidelines are established to help protect the PEC.
http://www.mkedcd.org/planning/plans/Northeast/plan/NESplan.pdf

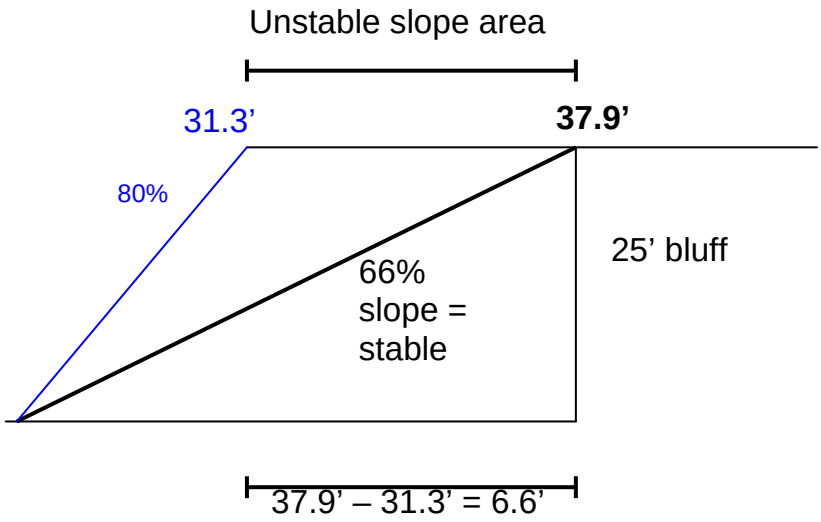
NR 115 – Wisconsin's Shoreland Management Program

- NR 115 recommends a 75 foot buffer from the ordinary high-water mark (OHWM) to the nearest part of building or structure. NR 115 does not contain any guidance about setbacks along bluffs. Milwaukee County is completely incorporated, so Chapter NR 115, Wis. Admin. Code, does not apply.
  http://www.legis.state.wi.us/rsb/code/nr/nr115.pdf

Slopes

Slope measurements were calculated for 10 areas along the corridor and the average bluff slope was 63%, which is very steep. The greatest slope measured was 80%. The average bluff height was 25'.

Slope = rise / run
Stable slope is 1:1 or 1:1.5 (66%) according to the geotechnical engineer
An 80% slope going up 25' has a 31.3' run.
A 66% slope going up 25' has a 37.9' run.
The difference between the two slopes is the unstable area. This area should not have construction to minimize the risk of bluff instability.



Setback: 6.6' + (0.25 annual erosion x 50 years) = 19.1'

DCD then considered a building with a 50-year life span and a 0.25 foot erosion rate. This results in a 19.1 foot setback if bluff stability is the only concern. (NOTE: Engineering techniques make it possible to build on bluffs.)

- This document provides a list of all WI counties and their policies towards bluffs. It contains sample ordinances. http://dnr.wi.gov/org/water/wm/dsfm/shore/documents/Wt54200/Chapter15.pdf

- Steep Slope Ordinance, Highland Park IL: 40 foot setback from steep slopes www.cityhpil.com/pdf/ordinances/article19.pdf

- City of Seattle Steep Slope: 15 foot setback from steep slopes

Draft slope illustrations <MRGOD Sections0808.pdf >

Buffers

It is important to note the difference between setbacks which use top of slope, ordinary high-water mark (OHWM), and a setback from PEC. No scientific research indicated setbacks from environmental corridors; instead they indicated setbacks typically from OHWM. WI DNR defines OHWM as where the regular action of water against the bank leaves a distinct mark. It is not typically mapped or surveyed. http://dnr.wi.gov/org/water/wm/dsfm/shore/ohwm.htm

- Effectiveness of Shoreland Zoning Standards to Meet Statutory Objectives: A Literature Review with Policy Implications: WI DNR, 1997. This document discusses the impact of sediment on habitat and spawning, along with stream temperatures, vegetation and more. It discusses a 35-foot buffer, noting that it will help water quality and habitat, which are interdependent. It contains a literature review with 35 to 100-200 feet wide buffers. It discusses natural beauty.

http://www.dnr.state.wi.us/org/water/wm/dsfm/shore/documents/WT50597.pdf

- Design Recommendations for Riparian Corridors and Vegetated Buffer Strips: US Army Engineer R&D Center, April 2000. This document provides tables of buffers for a variety of topics: buffers for water quality (5-30m); buffers for fish (30m); etc. It discusses the three zone buffer system.

http://el.erdc.usace.army.mil/elpubs/pdf/sr24.pdf

- The Architecture of Urban Stream Buffers: From Watershed Protection Techniques. This article lists the benefits of buffers. It cites a 1993 study (Heraty) of urban stream buffers, which range from 20 to 200 feet on each side of the stream, according to a survey of 36 buffer programs. They cite buffers at least 100 feet from streamside edge, and a three zone buffer system. This article cites buffer that change under certain conditions, steep slopes for example. It also discusses a system of density bonuses based on loss of site due to buffers.

http://www.cwp.org/Resource_Library/Center_Docs/PWP/ELC_PWP39.pdf

- Riparian Buffer Zones: Functions and Recommended Widths: Yale School of Forestry, April 2005. This article discusses buffers for erosion control, water quality (5-30m), aquatic habitat and terrestrial habitat. It examines factors affecting slopes. It looks at variable width, fixed width and three zone buffers, along with a literature review of buffer widths.

http://www.eightmileriver.org/resources/digital_library/appendicies/09c3_Riparian%20Buffer%20Science_YALE.pdf

- This document lists WI counties' shoreland protections and provides sample ordinances.
  http://www.dnr.state.wi.us/org/water/wm/dsfm/shore/documents/Wt54200/Chapter4.pdf

- Riparian Setbacks: Technical Information for Decision Makers, Chagrin River Watershed Partners, 2006: This document discusses the benefits of buffers, buffers for erosion control, water quality, ecosystem protection, etc. It outlines the cost effects of buffers on local governments, property owners, and property values. It contains model ordinances.
  http://www.crwp.org/pdf_files/riparian_setback_paper_jan_2006.pdf

- Riparian Buffers Fact Sheet from Delaware Riverkeepers

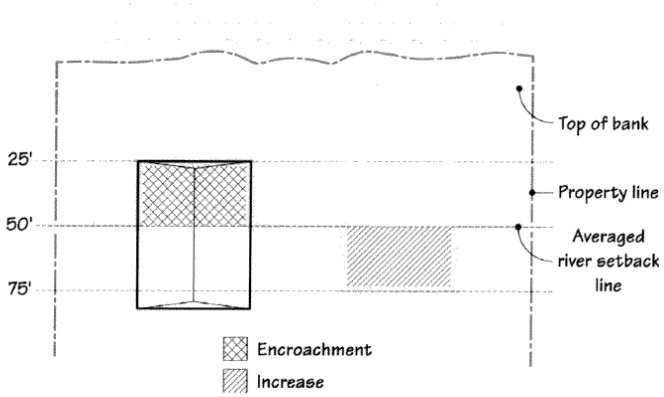
This document identifies benefits of buffers as documented in scientific articles. It also cites documents regarding buffer widths to protect a variety of plant and animal species, as well as minimizing runoff pollutants. It provides plant selection criteria for establishing buffer vegetation.
http://www.caciwc.org/library/Riparian%20buffer%20Fact%20Sheet%20CFE%202-2-05.pdf

- The Wisconsin Buffer Initiative: A Report to the Natural Resources Board of the WI Department of Natural Resources by University of Wisconsin-Madison College of Agricultural and Life Sciences. December 2005
  This document cites peer reviewed scientific articles relating to the design and location of riparian buffers, particularly with an adaptive management approach.
  http://www.nelson.wisc.edu/people/nowak/wbi/reports/nrbFinalReport.pdf

- Great Lakes Restoration Initiative Plan – July 2009
  http://www.epa.gov/glnpo/glri/glmyrapo.pdf
  This document begins to outline the importance of waterway restoration as it relates to the Great Lakes, particularly area deemed Areas of Concern (AOC) by the EPA. NOTE: The Great Lakes documents have been updated since this document and an array of documents are available at:
  http://www.epa.gov/glnpo/glri/

- Eighty map measurements were taken along the east and west banks of the Milwaukee River corridor to measure the distance from approximately the OHWM to the MRWG-proposed setback line 50 feet beyond the PEC. The 80 measurements averaged to 308.75 feet. This is a setback number that can be compared to the setback of other cities.

Encroachment into the Setback



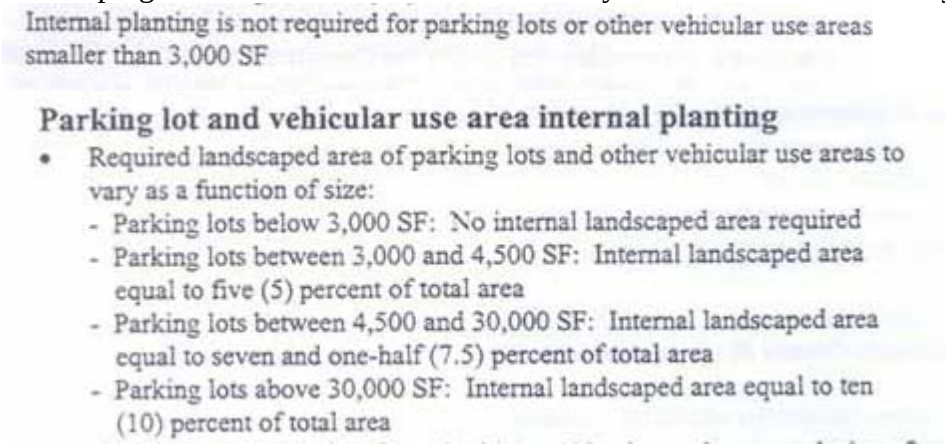
Encroachment into the setback. Development that is not river-dependent or river-related may encroach into the river setback as long as the setback is increased by an amount of square footage equal to the encroachment. At no point can development that is not river-dependent or river-related encroach closer than 25 feet from top of bank unless approved through a Greenway Goal Exception. See Figure 475-4.

- Portland, Oregon allows encroachment into the setback, provided the same amount of square footage is returned to the natural area and a minimum setback distance is maintained.

- Wisconsin shoreland setbacks for many counties are documented here, including ideas for setback averaging. Wisconsin Department of Natural Resources.
  http://www.dnr.wi.gov/org/water/wm/dsfm/shore/documents/Wt54200/Chapter4.pdf

Parking Lot Landscape Standards

- Guide to the City of Chicago Landscape Ordinance
  This document provides a stepped approach to parking lot landscaping, where larger parking lots require greater interior landscaped areas and smaller parking lots require lesser interior landscaped areas. Chicago requires extensive landscaping for all parking lots. These guidelines directly influenced parking lot landscaping for the Milwaukee River Greenway Site Plan Review Overlay Zone.



Internal planting is not required for parking lots or other vehicular use areas smaller than 3,000 SF

Parking lot and vehicular use area internal planting

- Required landscaped area of parking lots and other vehicular use areas to vary as a function of size:
  - Parking lots below 3,000 SF: No internal landscaped area required
  - Parking lots between 3,000 and 4,500 SF: Internal landscaped area equal to five (5) percent of total area
  - Parking lots between 4,500 and 30,000 SF: Internal landscaped area equal to seven and one-half (7.5) percent of total area
  - Parking lots above 30,000 SF: Internal landscaped area equal to ten (10) percent of total area

  http://www.cityofchicago.org/content/dam/city/depts/streets/supp_info/LandscapeManual.pdf

- City of Milwaukee – Forestry
  The City Forester, David Sivyer, recommends that parking lot trees have a minimum of 700 cubic feet of root area available to increase tree health and survival rate. The minimum width of a parking lot island was determined by using the area of approximately one parking stall, 9' wide x 20' long x 3' deep, or 540 cubic feet, which is insufficient to ensure high quality tree success. By increasing one side to 12', the result is 12' wide x 20' long x 3' deep results in 720 cubic feet available for a tree, which offers better rooting conditions for the tree.

Native trees are encouraged, but not required at this time, as parking lot trees, to allow for more options and to consider site-specific characteristics when choosing tree species.

- Urban Tree Conservation: a White Paper on Local Ordinance Approaches
  Tree conservation ordinances often include parking lot issues, such as canopy requirements or percentage of parking lot devoted to landscaping. Oroville CA uses the tree canopy requirement of 50% coverage within 10 years of installation. Lewisville TX has a range of percentages from 5 to 10 percent for landscaping of parking lots over 25,000 square feet.
  http://www.aces.edu/ucf/documents/TreeConservationWhitePaper.pdf

Bird-Friendly Design

- New York City Audubon – Bird-Safe Building Guidelines May 2007
  A 55-page guide to bird safe building practices. Bird-building collisions tend to occur near glass, so guidelines for glass include: the use of reduced reflectivity glass, techniques which modify the appearance of glass by mixing textures, colors or opacity. This influenced the building materials for the City of Milwaukee MRGSPROZ
  http://www.nycaudubon.org/home/BirdSafeBuildingGuidelines.pdf

Natural Beauty

Natural beauty is a term frequently used in state and regional planning documents.

- Wisconsin has a Council on Natural Beauty http://www.legis.state.wi.us/acts89-93/69Act138.pdf
- Counties in WI may have Natural Beauty Councils; e.g. Fond du Lac http://www.fdlco.wi.gov/Index.aspx?page=929
- Precedent cases exist regarding natural beauty – WI Division of Hearings and Appeals Gehling & Schwab in Oconto County WI
- St Croix River ordinance cites natural beauty http://www.co.saint-croix.wi.us/Ordinances/Ch%2017%20SUBCHAPTER%20III%20Shoreland.pdf

Easements

Easements are in place relating to the 1994 removal of the North Avenue dam. The easements go approximately to the middle of the bluff on these properties, which are located both north and south of North Avenue.

Tree Root Protection

One common way of estimating tree root protection is allowing for 1'-1.5' per 1" of diameter at breast height (dbh). Based on observation in the Milwaukee River corridor, the majority of tree diameter at chest height appears to be 6-8" with a

few reaching 12-15". If dbh is 15" the tree protection area would be 22.5'.
http://www.treelink.org/docs/critical_root_zone.pdf

Threatened or Endangered Species

The Milwaukee River Work Group has identified areas where the threatened species, Butler's Garter Snake (snake) and Forked Aster (flower), are present. SEWRPC reports indicate others have observed the presence of striped shiner (fish – endangered), greater redhorse (fish – threatened). SEWRPC did not observe the fish first hand. DNR has indicated Butler's Garter Snake is present in the corridor in a 1994 North Ave Dam Feasibility Study.
<scanned SEWRPC, DNR documents>

Fish and Fish Buffers

The State of the Milwaukee River Basin, WI DNR – August 2001. This document indicates non-native species of fish, like rainbow trout, coho and Chinook salmon, migrate from Lake Michigan to the Milwaukee River for spawning.

This report also examines the Milwaukee River South Watershed, and table 4 on page 12 lists zero miles of streams listed as outstanding or exceptional resource waters in the south watershed; it also states 41.5 miles of streams on impaired waters list; it lists general threats to stream water quality as runoff and erosion.
http://dnr.wi.gov/org/gmu/milw/milwaukee_801.pdf

Case Studies:

Shorewood

http://www.villageofshorewood.org/vertical/Sites/%7B5230848F-4209-4497-9E80-89EC90BA64AE%7D/uploads/%7BF19B51f0-843f-4a47-835b-3637d604bd82%7d.pdf

Plan summary in Appendix. <Summary-Shorewood.doc>

Chicago – Chicago River

http://www.cityofchicago.org/city/webportal/portalContentItemAction.do?BV_SessionID=@@@@@1086969339.1220992004@@@@@&BV_EngineID=cccdadefdmieiffcefecelldffhdfho.0&contentOID=536904039&contenTypeName=COC_EDITORIAL&topChannelName=Dept&blockName=Planning+And+Development%2FCommunity+Plans%2FI+Want+To&context=dept&channelId=0&programId=0&entityName=Planning+And+Development&deptMainCategoryOID=-536886455

NOTE: The Chicago link often fails. Google: Chicago Planning and select the City's website, choose community plans, choose Chicago River Design Guidelines

Plan summary in Appendix. <Summary-CHI River.doc>

Portland OR – Willamette River

http://www.portlandonline.com/shared/cfm/image.cfm?id=53351

Background info used by Portland:
http://www.portlandonline.com/shared/cfm/image.cfm?id=58869

Plan summary in Appendix. <Summary – Portland Overlay.doc>

St Paul

http://www.stpaul.gov/web/citycode/lc068.html#sec68.402

Table comparing plan summaries

<TableSummaryGuidelinesDCDver.doc>
Table comparing Portland, Chicago, Shorewood, St. Paul in Appendix.

Useful Illustrations:

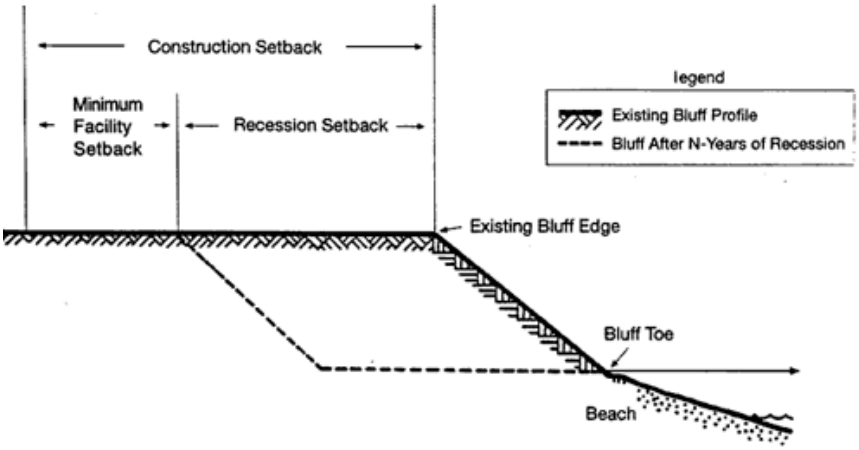


Illustration from: http://www.seagrant.wisc.edu/CoastalHazards/Default.aspx?tabid=873

The illustration above shows that construction setbacks should consider bluff recession rates. NOTE: DCD used a 50-year life-span of a building and applied that to bluff recession rates.

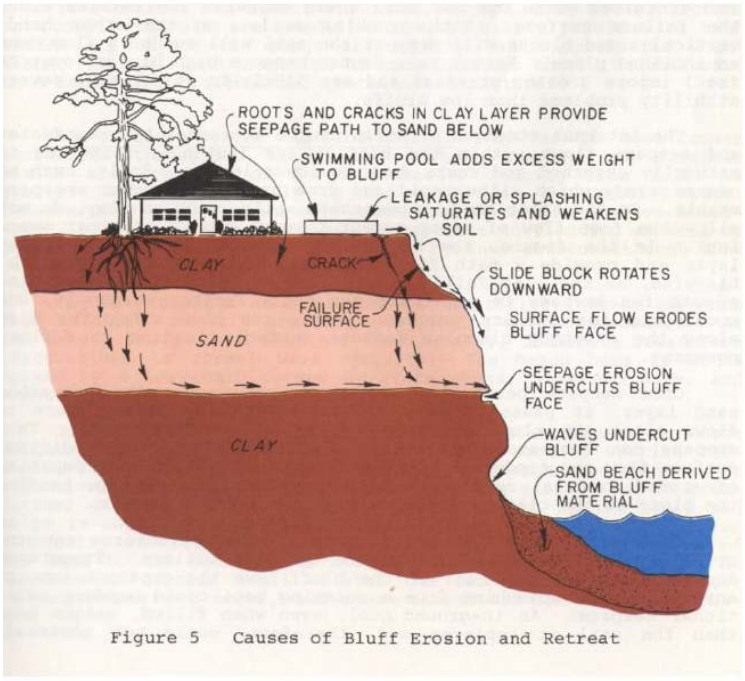


Illustration from:
http://images.google.com/imgres?imgurl=http://www.tpub.com/content/coastalhydraulicslaboratoryfact/sect54owners/sect54owners0015im.jpg&imgrefurl=http://www.tpub.com/content/coastalhydraulicslaboratoryfact/sect54owners/sect54owners0015.htm&usg=__WbvcD6RvmzjUdw_FByPzRAVJlrs=&h=1188&w=918&sz=67&hl=en&start=1&tbnid=LqCmdAC7NNy9sM:&tbnh=150&tbnw=116&prev=/images%3Fq%3Dbluff%2Berosion%2Binstability%26gbv%3D2%26hl%3Den%26sa%3DG

The illustration above shows how water (surface and groundwater) moves through a bluff adding to instability.

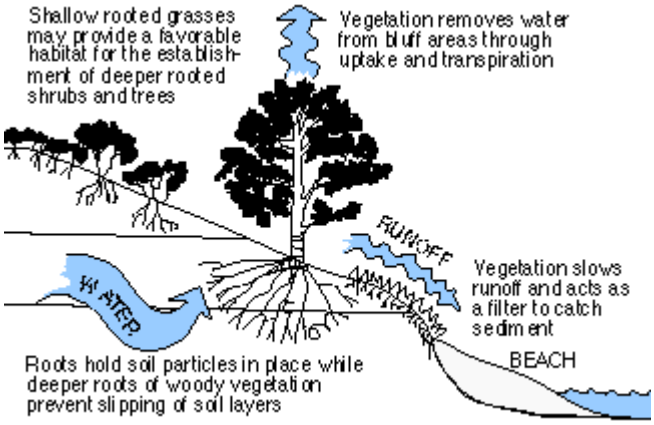


Illustration from:
http://images.google.com/imgres?imgurl=http://www.extension.umn.edu/distribution/naturalresources/images/6946f10.gif&imgrefurl=http://www.extension.umn.edu/distribution/naturalresources/components/DD6946g.html&usg=__iFIw6J3ejFotZsvuNUlYvxh6ruQ=&h=208&w=388&sz=4&hl=en&start=26&tbnid=q8UUCVDRv3NRbM:&tbnh=66&tbnw=123&prev=/images%3Fq%3Dbluff%2Berosion%2Binstability%26gbv%3D2%26ndsp%3D20%26hl%3Den%26sa%3DN%26start%3D20

The illustration above shows how vegetation can positively impact bluff stability.

Appendix

Table 27

GUIDELINES FOR DEVELOPMENT CONSIDERED COMPATIBLE WITH ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS

Component Natural Resource and Related Features within Environmental Corridors[a]	Permitted Development																
	Transportation and Utility Facilities (see General Development Guidelines below)				Recreational Facilities (see General Development Guidelines below)											Rural Density Residential Development (see General Development Guidelines below)	Other Development (See General Development Guidelines below)
	Streets and Highways	Utility Lines and Related Facilities	Engineered Stormwater Management Facilities	Engineered Flood Control Facilities[b]	Trails[c]	Picnic Areas	Family Camping[d]	Swimming Beaches	Boat Access	Ski Hills	Golf	Playfields	Hard-Surface Courts	Parking	Buildings		
Lakes, Rivers, and Streams	--[e]	--[f,g]	--	--[h]	--[i]	--	--	X	X	--	--	--	--	--	--	--	--
Shoreland	X	X	X	X	X	X	--	X	X	--	X	--	--	X	X[j]	--	--
Floodplain	--[k]	X	X	X	X	X	--	X	X	--	X	X	--	X	X[l]	--	--
Wetland[m]	--[k]	X	--	--	X[n]	--	--	--	X	--	--[o]	--	--	--	--	--	--
Wet Soils	X	X	X	X	X	--	--	X	X	--	X	--	--	X	--	--	--
Woodland	X	X	X[p]	--	X	X	X	--	X	X	X	X	X	X	X[q]	X	X
Wildlife Habitat	X	X	X	--	X	X	X	--	X	X	X	X	X	X	X	X	X
Steep Slope	X	X	--	--	--[r]	--	--	--	--	X[s]	X	--	--	--	--	--	--
Prairie	--	--[g]	--	--	--[r]	--	--	--	--	--	--	--	--	--	--	--	--
Park	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	--	--
Historic Site	--	--[g]	--	--	--[r]	--	--	--	--	--	--	--	--	X	--	--	--
Scenic Viewpoint	X	X	--	--	X	X	X	--	X	X	X	--	--	X	X	X	X
Natural Area or Critical Species Habitat Site	--	--	--	--	--[q]	--	--	--	--	--	--	--	--	--	--	--	--

NOTE: An "X" indicates that facility development is permitted within the specified natural resource feature. In those portions of the environmental corridors having more than one of the listed natural resource features, the natural resource feature with the most restrictive development limitation should take precedence.

APPLICABILITY

These guidelines indicate the types of development that can be accommodated within primary and secondary environmental corridors and isolated natural resource areas while maintaining the basic integrity of those areas. Throughout this table, the term "environmental corridors" refers to primary and secondary environmental corridors and isolated natural resource areas.

Under the regional plan:

- As regionally significant resource areas, primary environmental corridors should be preserved in essentially natural, open use—in accordance with the guidelines in this table.
- Secondary environmental corridors and isolated natural resource areas warrant consideration for preservation in essentially natural open use, as determined in county and local plans and in a manner consistent with State and Federal regulations. County and local units of government may choose to apply the guidelines in this table to secondary environmental corridors and isolated natural resource areas.

GENERAL DEVELOPMENT GUIDELINES

- Transportation and Utility Facilities: All transportation and utility facilities proposed to be located within the important natural resources should be evaluated on a case-by-case basis to consider alternative locations for such facilities. If it is determined that such facilities should be located within natural resources, development activities should be sensitive to, and minimize disturbance of, these resources, and, to the extent possible following construction, such resources should be restored to preconstruction conditions.

  The above table presents development guidelines for major transportation and utility facilities. These guidelines may be extended to other similar facilities not specifically listed in the table.

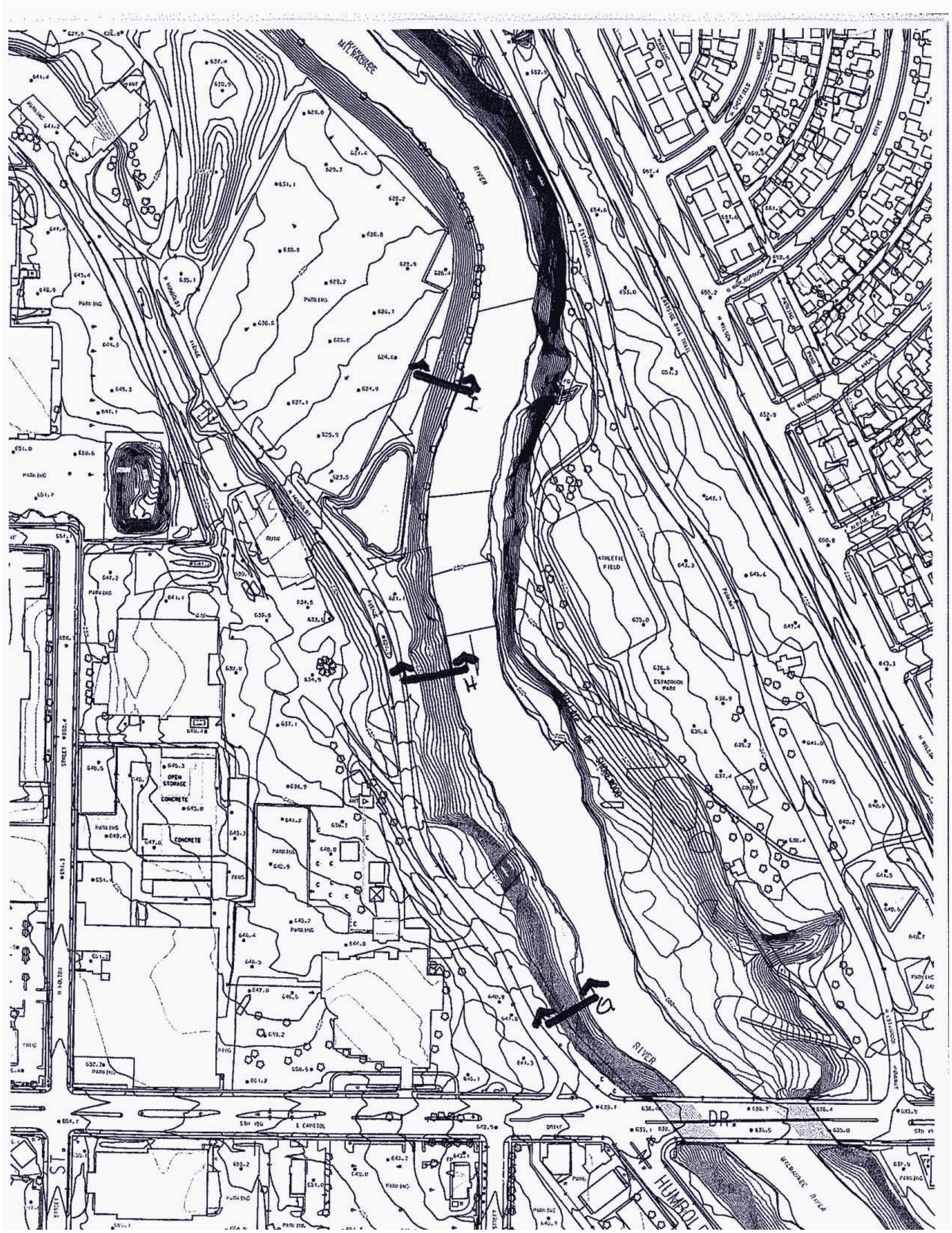
- Recreational Facilities: In general, no more than 20 percent of the total environmental corridor area should be developed for recreational facilities. Furthermore, no more than 20 percent of the environmental corridor area consisting of upland wildlife habitat and woodlands should be developed for recreational facilities. It is recognized, however, that in certain cases these percentages may be exceeded in efforts to accommodate needed public recreational and game and fish management facilities within appropriate natural settings. In all cases however, the proposed recreational development should not threaten the integrity of the remaining corridor lands nor destroy particularly significant resource elements in that corridor. Each such proposal should be reviewed on a site-by-site basis.

  The above table presents development guidelines for major recreational facilities. These guidelines may be extended to other similar facilities not specifically listed in the table.

Milwaukee River Greenway Overlay District
River Slope Sections

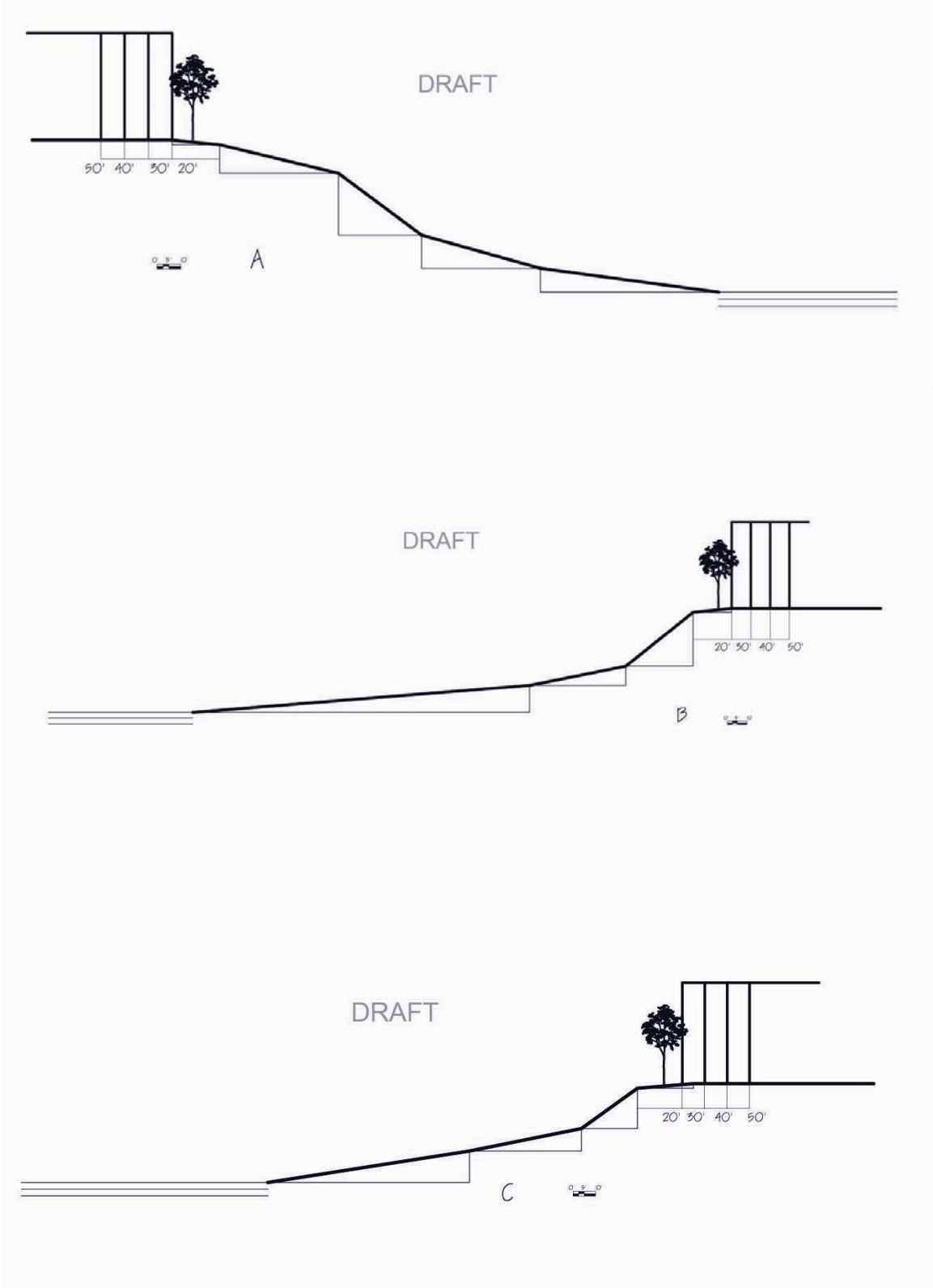
July 21, 2008


RIVER
E. LOCUST
GORDON
PARK
RIVERSIDE
MILWAUKEE
COUNTY
TENNIS COURTS
ATHLETIC FIELDS
PARKING
OPEN STORAGE



Letters by the section lines on contour maps above correspond to the sections illustrated below.

All sections below depict a 45’ tall building with a 35’ tall tree.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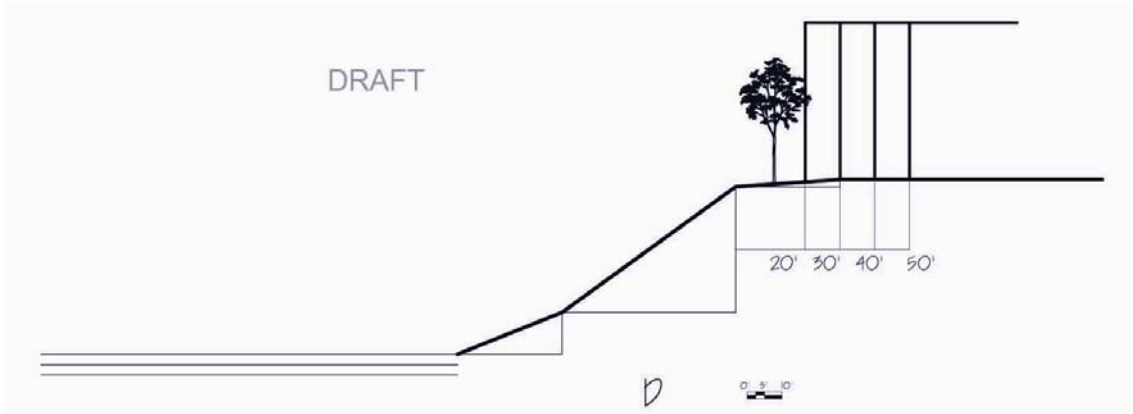
50' 40' 30' 20'
A
DRAFT
20' 30' 40' 50'
B
DRAFT
20' 30' 40' 50'
C


DRAFT
20' 30' 40' 50'
D


DRAFT
20' 30' 40' 50'
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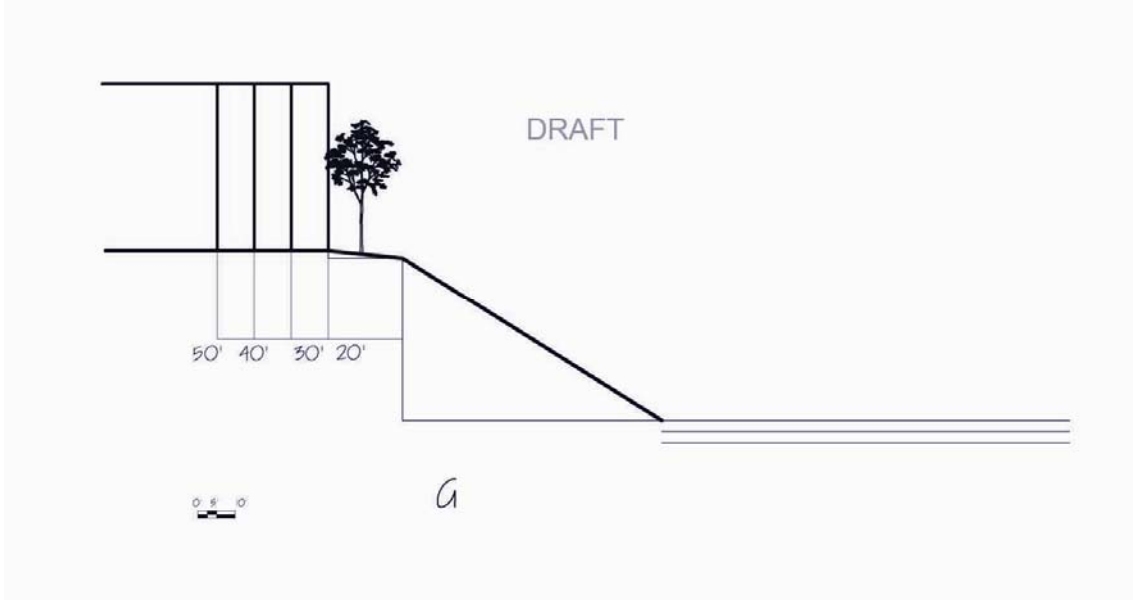
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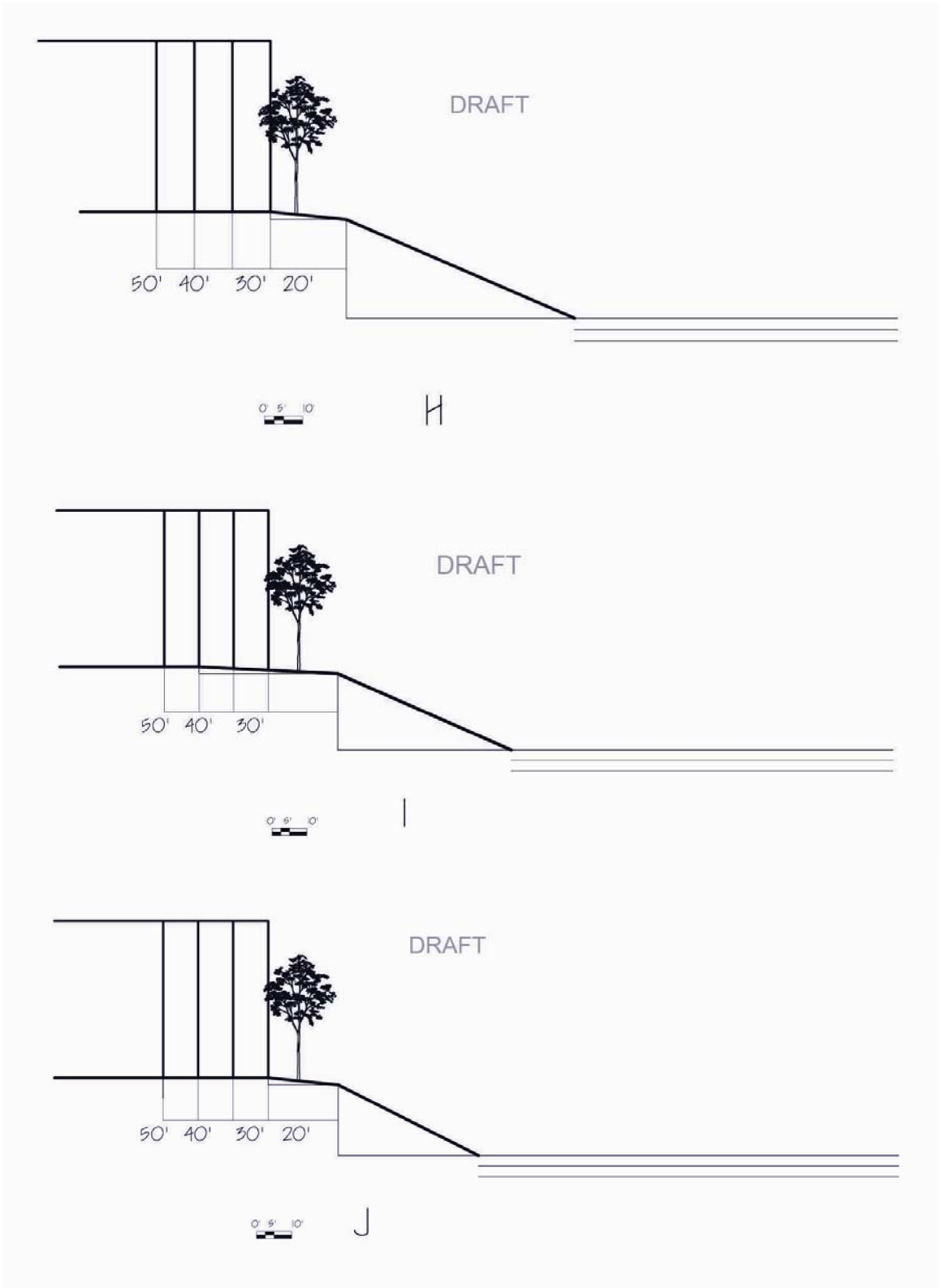
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Table 3. Herpetiles expected to occur[1] in the Milwaukee River Corridor, North Avenue dam feasibility study area.

Species	Full pool	Mud-flats Draw-down	Wooded Riparian
AMPHIBIANS			
Eastern American toad	X	X	X
Western chorus frog	X	X	X
Green frog	X	X	
Northern leopard frog	X	X	
REPTILES			
Common snapping turtle	X	X	
Painted turtle	X	X	
Butler's garter snake		X	X
Eastern garter snake		X	X

1. Adapted from: Vogt, R.C. 1981. Natural History of Amphibians and Reptiles of Wisconsin. Milwaukee Public Museum. Milwaukee, WI 205 pp.

DNR Dam Study 1994

Table 69 (continued)

Map 33 Reference Number	Site Name	County	Location	Species of Concern[a]	Ownership
94	Cambridge Avenue Woods	Milwaukee	T7N, R22E Section 9	Aster furcatus (T)	Milwaukee County
95	Brynwood Country Club Woods	Milwaukee	T8N, R21E Section 15	Lithospermum latifolium (R)	Private
96	Fox Point Clay Bluffs	Milwaukee	T8N, R22E Sections 9, 16, 21, 28	Tofieldia glutinosa (T) Trillium nivale (T)	Private
97	Stauss Woods	Ozaukee	T9N, R21E Section 33	Lithospermum latifolium (R)	Private
98	Pecard Sedge Meadow	Ozaukee	T9N, R22E Section 19	Gentiana alba (T)	Private
99	Eastbrook Road Woods	Ozaukee	T9N, R22E Section 19	Aster furcatus (T)	Private
100	Cedarburg Woods—West	Ozaukee	T10N, R21E Section 22	Hydrastis canadensis (R)	Private
101	Cedar-Sauk Upland Woods	Ozaukee	T11N, R21E Section 33	Lithospermum latifolium (R)	Private
102	Sauk Creek Nature Preserve	Ozaukee	T11N, R22E Section 29	Aster furcatus (T)	Ozaukee County
103	Jackson Woods	Washington	T10N, R20E Section 20	Lithospermum latifolium (R)	Private
104	St. Anthony Maple Woods	Washington	T11N, R18E Section 10	Lithospermum latifolium (R)	Private
105	Doll Woods	Washington	T11N, R18E Section 16	Lithospermum latifolium (R)	Private
106	Riesch Woods	Washington	T11N, R19E Section 6	Lithospermum latifolium (R)	Private
107	Silver Lake Swamp	Washington	T11N, R19E Section 34	Cypripedium reginae (R)	Private
108	Cameron Property	Washington	T11N, R20E Section 8	Cypripedium parviflorum (R)	Private
109	Fechters Woods	Washington	T11N, R20E Section 36	Hydrastis canadensis (R)	Private
110	High School Woods	Washington	T11N, R19E Section 24	Panax quinquefolius (R)	City of West Bend
111	Paradise Springs Brook	Waukesha	T5N, R17E Section 16	Carex crawei (R) Solidago ohioensis (R)	Department of Natural Resources

[a] *"E" refers to species designated as endangered in Wisconsin*
"T" refers to species designated as threatened in Wisconsin
"R" refers to species designated as special concern or watch species in Wisconsin

[b] *The Margis Wildlife Area has been identified as both a Critical Plant Species Habitat site and a Critical Bird Species Habitat site.*

[c] *The Caledonia Site South Critical Plant Species Habitat site is located entirely within the Caledonia Sanitary Sewer Right-of-Way site.*

Source: SEWRPC.

SEWRPC HABITAT PROTECTION PLAN, rpt no. 42 A.

Table 101 (continued)

Watershed	Map 53 Reference Number	Stream Reach	Stream-Miles	Rank[a]	Assessment Score	Description and Comments
Milwaukee River (continued)	58	Milwaukee River downstream from STH 57 to CTH C	4.5	AQ-2 (RSH)	13	Critical fish species present, including the striped shiner; Biotic Index Rating[c] of Good
	59	North Branch, Milwaukee River	8.5	AQ-2 (RSH)	14	Good overall fish population and diversity, including critical fish species; Biotic Index Rating[b] of Good to Excellent
	60	Pigeon Creek	2.4	AQ-2 (RSH)	17	Good overall fish population and diversity, including critical fish species; critical plant species adjacent to and within the channel
	61	Wallace Creek	8.6	AQ-2 (RSH)	14	Good overall fish population and diversity, including critical fish species
	--	Total stream-miles and stream reaches	57.1	9	--	--
	62	Cedar Creek downstream from Little Cedar Creek inflow to CTH M	9.8	AQ-3	5	Good fish population and diversity; bisects Jackson Swamp, an identified Natural Area
	63	Cedar Creek downstream from CTH M to STH 60	9.5	AQ-3	12	Good fish population and diversity; good mussel species assemblage
	64	North Branch, Cedar Creek	7.3	AQ-3 (RSH)	10	Critical fish species; bisects an identified Natural Area, Reinartz Cedar Swamp
	65	Friedens Creek	3.2	AQ-3 (RSH)	9	Biotic Index Rating[c] of Very Good
	66	Kewaskum Creek	4.7	AQ-3	8	Good fish population and diversity
	67	Milwaukee River downstream from Woodford Drive to STH 33	13.6	AQ-3 (RSH)	10	Critical fish species present
	68	Milwaukee River downstream from CTH C to Mequon Road	13.4	AQ-3 (RSH)	11	Good fish population and diversity and mussel species richness
	69	Milwaukee River downstream from Mequon Road to Brown Deer Road	3.8	AQ-3 (RSH)	8	Biotic Index Rating[c] of Good; critical fish species present
	70	Milwaukee River downstream from Brown Deer Road to Port Washington Road	8.1	AQ-3 (RSH)	8	Critical fish species present
	71	Milwaukee River downstream from Port Washington Road to North Avenue	3.8	AQ-3 (RSH)	7	Critical fish species present
	72	Milwaukee River downstream from North Avenue to Walnut Street	0.9	AQ-3 (RSH)	5	Critical fish species present
	73	Quaas Creek	4.9	AQ-3 (RSH)	12	Good fish population and diversity
	74	Silver Creek	5.9	AQ-3 (RSH)	7	Critical fish species present; Biotic Index Rating[c] of Good
	75	Stony Creek	3.1	AQ-3 (RSH)	10	Critical fish species present; Class II trout stream
	--	Total stream-miles and stream reaches	92.0	14	--	--

This approximately 11.8-acre plant community area is part of the Milwaukee River floodplain wetland complex and consists of fresh (wet) meadow; second growth, Southern wet to wet-mesic lowland hardwoods; and scattered stands of shrub-carr (willow thicket). Disturbances to the plant community area include dumping, clearing of vegetation, establishment of footpaths, filling, selective cutting of trees, water level changes due to the dam removal at Caesar Park, and siltation and sedimentation due to stormwater runoff from adjacent lands. While no Federal- or State-designated Special Concern, Threatened, or Endangered species were observed during the field inspection, Striped shiner (Luxilus chrysocephalus), a State-designated Endangered fish species, and Greater redhorse (Moxostoma valenciennesi), a State-designatted threatened fish species have been documented from this stream reach.

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[1] Alien or non-native plant species
[2] Growing along the wetland edge
[3] Dominant plant species

SEWRPC Cesar Pk & Locust St

Plan Summary of:

Village of Shorewood Zoning / Setbacks
Milwaukee River area
October 2006

Source: Internet,
http://www.villageofshorewood.org/vertical/Sites/%7B5230848F-4209-4497-9E80-89EC90BA64AE%7D/uploads/%7BF19B51F0-843F-4A47-835B-3637D604BD82%7D.PDF

Engineering

- Requires engineer certification for any grading or construction that may adversely impact slope stability; increase runoff of water on bluff surface; create or add to an erosion problem; or adversely affect the structural integrity of any adjacent or adjoining structures or lots.

Setbacks

- Setbacks should be the greater of:
    - 20 feet from the bluffline, or
    - 75 feet from the ordinary high water mark, or
    - Such a distance as to not adversely impact the bluff stability; sufficient distance to prevent injury or damage to property; sufficient distance to provide for natural runoff of surface water…

- Conditional use within setback area for:
    - Filling, excavating, grading changes
    - Removal of vegetation
    - Temporary access uses;
    - Construction of any building or structures

Bluffline Definition

- Top of the bluff is where the slope riverward is 12% or more for a distance of not less than 25 or not more than 50 feet.

Shoreline Cutting

- Tree cutting within setback area is prohibited without a conditional use permit. If there is no bluffline, then area 75 feet inward from ordinary high water mark.
    - Cutting of dead, dying trees or shrubbery is subject to Village approval.
    - Natural shrubbery is to be preserved when practical.
    - Removal requires a conditional use application for permit to provide tree inventory, species listing, proposed cutting and vegetation

removal plan, and proposed maintenance, landscaping and replanting plan.

Planned Development District

- No lots in the district may be divided or subdivided unless the property is rezoned Planned Development District.

- Site plans should maintain or enhance a green, wooded appearance from the Milwaukee River with lower building heights nearer to the river and taller building heights away from the river and nearer the Oak Leaf Trail.

- Parking shall be predominantly underground or within a structure.

- At minimum, 20% of buildable area shall be maintained as landscaped green space.

- Permitted use: multi-family dwellings, with at least two floors. No single family or two-family dwellings allowed.

- Lot width minimum: 40 feet; lot area minimum 4500 square feet

- Setbacks:

    - Street: minimum 15 feet
    - River or bluffline: per ordinance
    - Oakleaf Trail minimum: 5 feet
    - Property line minimum: 15 feet

- Different building heights will apply depending on the distance the building will be located from the river or bluffline setback.
    - Maximum shall be 60 feet, not to exceed 4 stories in the buildable area between the setback line and a line that runs parallel to and 70 feet from the setback line.
    - Maximum shall be 84 feet, not to exceed 6 stories in the buildable area not included in the paragraph immediately above.
    - Minimum of 2 stories.

Plan Summary of:

Chicago River Corridor
Design Guidelines and Standards
April 2005

Source: Internet,
http://egov.cityofchicago.org/city/webportal/portalContentItemAction.do?BV_SessionID=@@@@@1486109764.1215457308@@@@@&BV_EngineID=ccccadeeihelggicefecelldffhdfhk.0&contentOID=536904039&contenTypeName=COC_EDITORIAL&topChannelName=Dept&blockName=Planning+And+Development%2FCommunity+Plans%2FI+Want+To&context=dept&channelId=0&programId=0&entityName=Planning+And+Development&deptMainCategoryOID=-536886455

(If this link does not work, Google: Chicago Planning, then go to Community Plans, and choose Chicago River Plan and Design Guidelines)

I. Introduction

- Plan Goals (5)
  - Create a connected greenway along the river, with continuous multi-use paths along at least one side of the river.
  - Increase public access to the river through the creation of overlooks and public parks.
  - Restore and protect landscaping and natural habitats along the river, particularly fish habitat.
  - Develop the river as a recreational amenity, attracting tourists and enhancing Chicago's image as a desirable place to live, work and visit.
  - Encourage economic development compatible with the river as an environmental and recreational amenity.

- Design Guidelines and Standards address development options along the river, including but not restricted to architectural treatments, building construction, parking, fencing, lighting, landscaping, and riverbank treatments. (Specific information relating to riverbank treatments, permit requirements, site furnishings, elements, construction materials and specifications may be found in appendices.)

- Chicago zoning processes all new development within 100' of waterways (except single family homes, 2-flats and 3-flats) as planned developments. New developments are to provide a 30' setback from the river.

- The plan acknowledges federal and state level authorities may have additional requirements.

- The plan defines and maps areas of the Chicago River subject to these design guidelines and standards.

- Definitions are provided for: setbacks and riverfront development zones, including riverbank zones, urban greenway zones, and development zones.

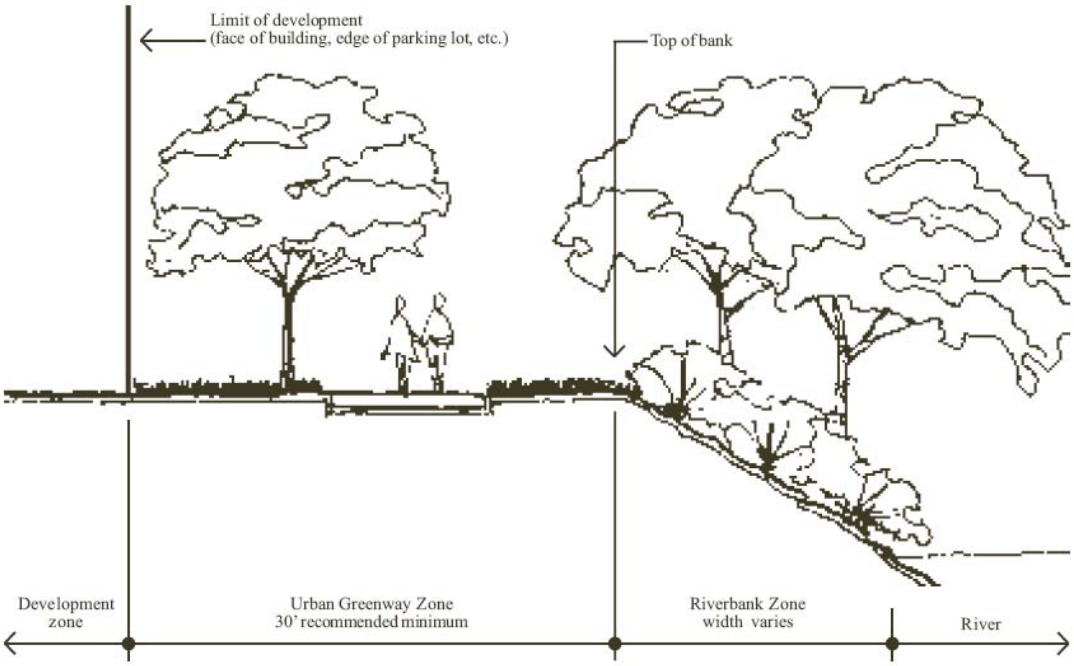


Figure 1.2 Typical riverbank section

II. Setbacks

Setback Minimum

- New development must be set back a minimum of 30 feet from the top of the bank of the Chicago River. The Bubbly Creek requires a setback of 60 feet.

- Exclusions to setbacks include: existing structures or homes, new single family or 2-, 3-flats, and river dependent uses.

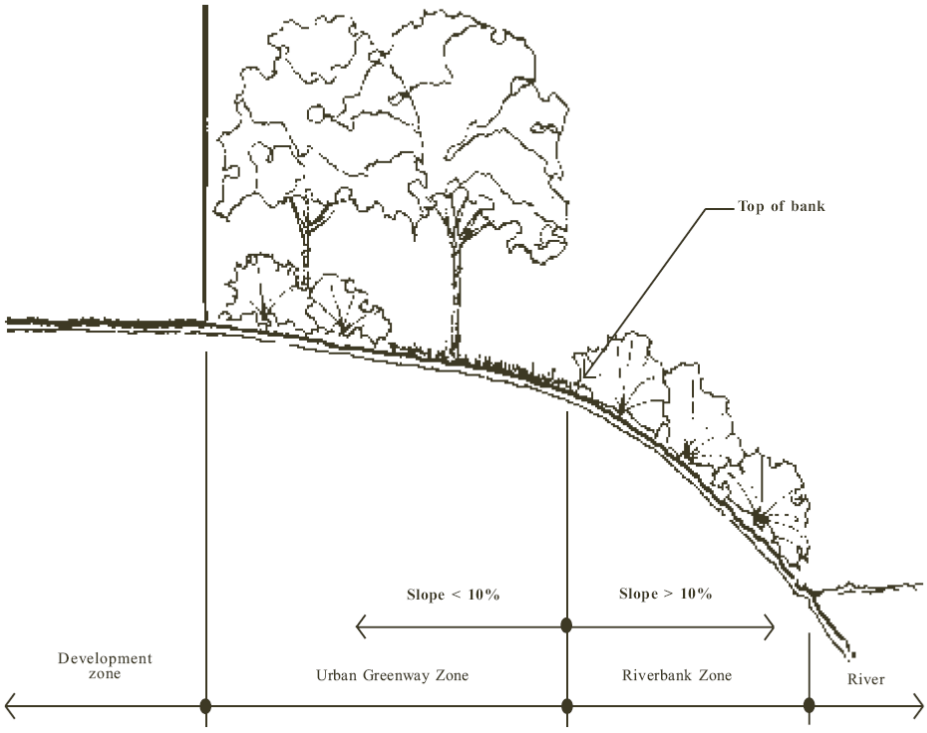
Allowed or Not Allowed

- Improvements or structures allowed in setback areas include:
  - Paved or unpaved walkways,
  - Projections from buildings (awnings, balconies, etc),
  - Arbors and trellises,
  - Fences and walls not exceeding 6' in height,
  - Lights, benches, drinking fountains, and other riverwalk amenities,
  - Wheelchair lifts and ramps,

- Improvements or structures not allowed in setback areas include:
  - Buildings or structures of any kind (except as noted),
  - Vehicular use areas (parking lots, drives, etc),
  - Overhead utilities,
  - Private yards, terraces or decks

- Definition of top of bank – the point at the top of the slope where the slope becomes less than 10 percent. When there is a terrace or "bench" in the slope, the top of bank is the point furthest from the water's edge where the slope becomes less than 10 percent.

Figure 2.1 Characteristics of sloped banks



Bonuses

- Chicago zoning code provides floor area bonuses for riverside projects in downtown zoning districts that provide a river setback space exceeding the 30 foot minimum.

- Chicago zoning code provides floor area bonuses for water features built within the public riverwalk setback area.

Variances

- Variances for less than 30 feet may be permitted to address constrained sites; small, irregularly shaped sites; and to allow flexibility for optimal site plans.
    - Maximum depth variance: Structures and private yards may encroach into the 30 foot setback a maximum of 10 feet, so the minimum setback is never less than 20 feet.

    - Maximum length variance: Encroachments into the setback may occur provided the encroachment occurs along a maximum of 1/3 the length of the site's river frontage measured in linear feet, so that the required setback never occurs along less than 2/3 of the site's river frontage.

Mitigation for Variances

- Additional open space must be provided elsewhere on the site to mitigate for loss of riveredge open space due to encroachment.

    - Encroachments resulting in setback less than 30 feet from top of bank, additional land free of structures, which is not defined or developed as private yard, should be provided adjacent to the river setback and urban greenway zone to compensate for the loss of open space.

    - Additional amount of open space for mitigation of variances: additional land should be provided adjacent / contiguous with the setback zone at a rate of 2.5 times the land or open space lost to encroachment.

    - Proportion of additional open space for mitigation of variances: additional open space must have proportions of no more than 2 feet of depth per one foot of frontage along the river setback line to avoid excessively long or deep and narrow parcels of land that could be relatively or completely unusable and have little or no public benefit.

- A picture on page 12 explains the setback variance mitigation.

III. Riverbank Zone

Riverbank zone is the area between the river's edge and the top of bank. Where there is a vertical bulkhead or engineered vertical structure, there is no riverbank zone.

Riverbank Buffer

- The riverbank buffer should be managed as a natural area, using native riparian vegetation, which is specified by species later.

- Care should be taken to preserve the natural slope to the extent possible by selective thinning and pruning of weedy and dead vegetation.

- The riverbank buffer should extend from the water's edge to the edge of the riverwalk path or a minimum of the first 20 feet of the urban greenway zone, whichever is less. The multi-use trail or its shoulder shall not be located less than 5 feet from the top of bank.

- Structures and fixtures allowed within the riverbank buffer are limited to those required by river dependent uses. These include trail ramps, steps, and fishing platforms.

- Soil erosion and sediment control plans are required for any construction along waterway. Existing native plantings should be preserved. Existing grading should be preserved to the extent possible.

- Install a tree protection fence at the top of the bank during construction.

- If river-dependent use is permitted, the multi-use trail should be accommodated if possible. It is acceptable, if for safety, security and circulation reasons, the multi-use trail must be landward on the site of a river-dependent use. River-dependent uses must follow landscape requirements for portions of the river frontage not in active use.

- Seawall specifications are provided.

IV. Urban Greenway Zone

Urban greenway is the area between the top of the bank and the setback line.

Multi-use Trail

- This area is intended to be developed as a passive linear park with a multi-use trail.

- Water-oriented recreational use may require facilities in the urban greenway zone. These may include access to launches, lighting, railings, bicycle racks, etc. (Water-oriented recreational use may also require access in the riverbank zone.) However, parking for water-oriented recreational facilities should not be in either greenway or riverbank zones.

- The continuous multi-use trail is to follow design guidelines that separate uses (walking, running, bicycling, etc).

- Minimum trail width is 8 feet, while recommended width is 10 feet.

- Under-bridge connections should be built where space beneath the bridge deck permits. Responsibility may be City or developer, or shared, as determined during planned development review process.

- Nature trails are a separate use from the multi-use trail.

- Access points to the multi-use trail and river are important, especially in areas where there is no public access along, or adjacent to, the river, and where street rights-of-way stop at the river. Overlooks may be developed, particularly where streets end at the river.

- The greenway zone should be heavily landscaped, with guidelines provided. Public art is encouraged.

- Where the multi-use trail cannot be built on land within greenway zone, and where detours around on land side would be so long or indirect as to discourage use of the trail or effectively interrupt it, construction of a cantilevered walkway around the building or bridge should be considered.

- If the multi-use trail cannot be built on land or cantilevered, construction of a floating walkway should be considered.

V. Development Zone

The development zone is the area adjacent to the river corridor that does not fall within the urban greenway / setback zone, or the riverbank zone, and that may be developed or redeveloped as permitted by zoning.

Buildings

- The river elevation of buildings should be treated architecturally as one of its principal facades.

- Materials on the river façade should be of the same quality as material on other facades.
- New structures should be oriented to the river, so the greenway and riverbank zones are not perceived as only the area behind the building or structure. Entrances and windows will generate activity on the river side.

- Massing of structures must be sensitive to the river and greenway zone, so that the river and greenway zone are not overwhelmed by tall and dense structures and buildings built to the setback line.

- Adaptive re-use or renovation of existing buildings should be oriented to the river, so the greenway and riverbank zones are not perceived as only the area behind the building or structure. Entrances and windows will generate activity on the river side.

- Parking lots and vehicular use areas should be attractively landscaped, following Chicago landscape ordinance.

- Outdoor storage areas should be screened, with screen height not to exceed 8 feet.

- Light fixtures are recommended for development zone, with fixture height less than 20 feet and maximum height of 30 feet. Light shields should minimize shine into adjacent residential or institutional areas.

Chicago zoning code:

http://www.amlegal.com/nxt/gateway.dll/Illinois/chicagozoning/chicagozoningordinanceandlanduseordinanc?f=templates$fn=default.htm$3.0$vid=amlegal:chicagozoning_il

Chicago zoning code provides building height limits depending on zoning and use along the Chicago River. River developments are handled as planned developments. If a building is mixed-use, the more restrictive use building height limits are applied. (So Chicago does not have any single guideline or limit for building heights along the Chicago River.)

Additional Definitions:

Floor Area Bonus: the right to build a larger building in return for providing a public amenity. The Chicago Zoning Ordinance provides floor area bonuses for additional river setback area in the downtown zoning districts.

River Dependent Uses: those uses or activities that can be carried out only on, in, or adjacent to a waterway because the use requires access to the waterway and which, therefore, cannot be located inland, including:
• Bulk material operations that ship or receive materials by barge
• Marinas
• Recreational and commercial boating facilities
• Waterfront dock and port facilities
• Navigation aids, basins, and channels
• Bridge abutments
• Recreational parks and open spaces
• Other uses that require waterborne transportation or the river as a source of water

Plan Summary of:

Portland OR Greenway Overlay Zone
33.440.030

(Willamette River Greenway)

Source: Internet,
http://www.portlandonline.com/shared/cfm/image.cfm?id=53351

I. Introduction

- Greenway Overlay Zones (5)
  - River Natural – protects, conserves, and enhances land of scenic quality or of significant importance as wildlife habitat.
  - River Recreational – encourages river-dependent and river-related recreational uses which provide a variety of types of public access to and along the river, and which enhance the river's natural and scenic qualities.
  - River General - allows for uses and development which are consistent with the base zoning, which allows for public use and enjoyment of the waterfront, and which enhances the river's natural and scenic qualities.
  - River Industrial – encourages and promotes the development of river-dependent and river-related industries.
  - River Water Quality – protects the functional values of water quality resources by limiting or mitigating the impact of development in the setback.

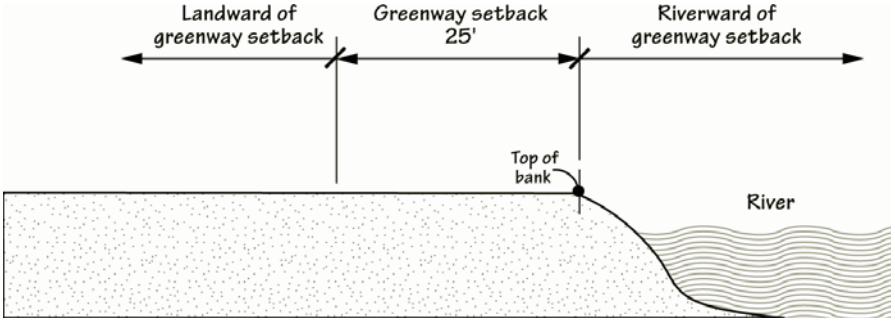
- Acknowledges state and federal authorities may require approval of development.

II. Use Restrictions

- Greenway zones do not restrict primary uses allowed in the base zones by right, with limitations, or as conditional use. Exceptions are: River Recreational, River Industrial, and River Water Quality zones.
  - River recreational zones are limited to recreational uses that are river-dependent or river-related.
  - River Industrial zone allows river-dependent and river-related uses on sites that front the river. Primary uses that are not river-dependent or river-related may be approved through the greenway review. There are no special use restrictions on sites that do not have river frontage.

- River Natural and River General zones have no special use restrictions.
- River Water Quality zone has use restrictions only within the greenway setback. Primary uses that are river-dependent or river-related are allowed. Primary uses that are not river-dependent or river-related are subject to greenway review. Existing uses that change to non-river-dependent or non-river-related use are subject to greenway review.

III. Setbacks



- River-dependent or river-related developments in the greenway setback may have different requirements, which are noted in this document.

Setback Minimum

- The greenway setback extends 25 feet back from the top of the bank, except in the River Water Quality overlay zone.

- The River Water Quality overlay zone greenway setback extends 50 feet landward from top of the bank for sites with less than 25% slope, or to a point 200 feet landward for sites with 25% or greater slope.

- The greenway setback is 50 feet around the delineated edge of wetlands in the River Water Quality overlay zone in addition to the setback from the top of the bank.

Setbacks for River Water Quality Zone

Slope Landward of Top of Bank	Width of Vegetated Corridor [1]
< 25%	50 feet
> 25% for 150 feet or more	[2] 200 feet

[1] To establish the width of the vegetated corridor, slope is measured in 25-foot increments landward of top of bank until slope is less than 25%
[2] Vegetated corridors in excess of 50 feet apply on steep slopes only in the *uphill* direction from the protected water feature.

- Development landward of the greenway setback does not have to be river-dependent or river-related. All are subject to greenway review unless exempt.

- River-dependent or river-related uses may develop within the greenway setback, if approved through greenway review, unless exempt.

- Development riverward of the greenway setback may be approved through greenway review for river-dependent or river-related uses. If a use is not river-dependent or river-related and wants to be riverward of the greenway, they must get a review and a Greenway Goal Exception to locate in the setback.

Floor Area Ratio

- Maximum FAR is 2 to 1 for the first 200 feet inland measured from the ordinary high water line, with exceptions: already subject to a more restrictive FAR; site located in Central City plan district where plan district FAR applies; use is industrial in IH or IG base zone.

Landscaping

- Establishes landscaping standards for the greenway and riverward. Landscaping must be provided to conserve or re-establish vegetative cover within or riverward of the greenway setback. Landscaping is not required where it would significantly interfere with a river-dependent or river-related use or development, or where it would pose a safety hazard per Fire Marshal.

    - Minimum of 1 tree for every 20 feet of river frontage.
    - Minimum of 1 shrub for every 2 feet of river frontage (with conditions).
    - Unpaved surfaces must have living ground cover.
    - Plantings are to be in and riverward of the greenway setback.
    - Plantings must comply with native plant requirement of Willamette Greenway Plan.

- Public recreation trails and public access and viewpoint areas should be established.

IV. View Corridors

- View corridors provide visual access and connections to the river for neighborhoods and business districts who might otherwise be visually cut-off from the river. View corridors are generally extensions of existing public rights-of-way through to the river. View corridors are one tool used to

V. Greenway Review

- The purpose of greenway review is to ensure that:

    - Development will not have a detrimental impact on the use and functioning of the river and abutting lands;
    - Development will conserve, enhance and maintain the scenic qualities and natural habitat of lands along the river;
    - Development will conserve the water surface of the river by limiting structures and fills riverward of the greenway setback;
    - Practicable alternative development options are considered, including outside the River Water Quality zone setback; and
    - Mitigation and enhancement activities are considered for development within the River Water Quality zone.

The following are subject to greenway review, unless exempted:

- New development,
- Exterior alterations to development, including removal of trees and shrubs and the application of herbicides,
- A change of use or development within or riverward of the greenway setback, where use is no longer river-dependent or river-related,
- Changes to land and structures in the water,
- Dedication or extension of rights-of-way and any new development or improvements within rights of way within River Natural zone or riverward of the greenway setback;
- Non river-dependent or river-related primary uses in the River Industrial Zone or in the River Water Quality Zone.

Exemptions from Greenway Review

- Buildings or structures complying with setbacks in River Industrial zone,
- River-dependent development in the River Water Quality zone,
- Alterations landward of the greenway setback not in or within 50 feet of River natural zone,
- Interior changes,
- Excavations and fills involving less than 50 cubic yards,
- Greenway trail changes that meet standards,
- Placement of up to 4 single piles, or equivalent, for each 100 feet of shoreline for existing river-dependent or river-related use,

- Signs,
- Removal of vegetation identified as nuisance plants on Portland Plant List.

Supplemental Application Requirements

- Additional information required for Greenway review applications:
    - Existing conditions site plan showing topography, top of bank and setback area, distribution outline of shrubs and groundcovers, with list of species, trees, streams, drainage patterns, existing improvements, utilities and structures, areas of known contamination, stormwater management facilities,

    - Development proposal site plan including grading (with 2 different contour intervals depending on slope), proposed improvements, areas where existing topography and vegetation will be undisturbed,

    - Construction management site plan identifying areas of disturbance including equipment, location of site access and egress, staging and stockpiling areas, erosion control measures, and tree preservation plan

There are different requirements for the River Quality overlay zone.
The Greenway goal exception process is identified.

Table Summary of Guidelines for Portland, Chicago, Shorewood, St. Paul
Revised: Friday, July 25, 2008
Version: 1.0

	Portland	Chicago	Shorewood	St Paul
Top of bank definition	Undefined in Willamette River Greenway Plan; updated River Plan May 2008 defines top of bank as: location of a major change of elevation (major change = 10 degrees or more *equals 17.6% slope*) OR 2 feet above ordinary high water mark; clarification of definition will arrive from Portland planners after July 28	Point at top of slope where slope becomes less than 10 percent. When there is a terrace or "bench" in the slope, the top of bank is the point furthest from the water's edge where the slope becomes less than 10 percent.	Slope riverward 12% or more for not more than 50 feet or less than 25 feet	Section 68.402 Slope riverward 12% or more for not more than 50 feet or less than 25 feet
Setback(s)	Typically non river-dependent or river-related is 25' from top of bank; in river water quality zone setback is 50-200 feet from top of bank depending on slope	30 feet from top of bluff Measured horizontally from top of bank	Greater of 20 feet from bluffline OR 75 feet from ordinary high water mark	General: 75' from ordinary high water mark for lots w/o sewer; 50' for lots w/ sewer; no commercial or industrial devt on slopes > 12%; no residential devt on slopes > 18%; bluff devt is 40' landward of all blufflines
Additional Setback(s)	Wetlands (in the River Water Quality overlay zone) have 50 feet setback around the delineated edge of wetland in addition to the setback from top of bank.			

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Building heights	Determined by base zoning, not overlay	Vary depending on use; each development is treated as planned development. (All new development within 100' of waterway is processed as planned development.)	Max 60' not to exceed 4 stories within 70' of setback line; Max 84' not to exceed 6 stories in buildable area not specified above; Min 2 stories	RC3 Urban Open District limits to 40' height; 45'in river town; 35' rural area; 25'conservation area
Variances	Greenway review process may allow variances	Variances for irregular or small parcels; encroach max of 10' into setback; encroachment cannot exceed 1/3 length of river frontage; additional open space required for encroachment	Conditional use process	May be granted, must meet standards of safety, etc
Miscellaneous	FAR limited to 2:1 for first 200' from river	Bonus developers (FAR) for setbacks > 30'; building design must address the river façade; public art encouraged within greenway	Min. of 20% of buildable area to be kept as green space	Minimize cutting, grading, filling in setbacks
Landscaping	Min 1 tree per 20' river frontage; Min 1 shrub per 2 feet river frontage; unpaved areas must have living ground cover; plantings to be in & riverward of setback; native plantings (per list); removal of nuisance plants (per list) is ok	Selective thinning and pruning of weedy and dead vegetation; Riverbank buffer zone uses native riparian and prairie vegetation; Recommended plant list; 1 tree per 25' river frontage	Tree cutting within setback prohibited w/o conditional use permit; natives will replace any natives removed during construction;	Clear cutting prohibited, except for roads, utils, etc; natural vegetation will be restored after construction; no wetland or bluffline veg removed unless for structures

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Stormwater	Site plan must contain stormwater management facilities	New developments are required to direct stormwater discharge into river and attain 80% of total suspended solids removal, preferably through above ground stormwater BMPs that include rain gardens, bioswales, infiltration areas, green roofs, and permeable pavements. Bubbly Creek - manage stormwater on-site; BMPs like vegetated bioswales, infiltration strips and level spreaders; avoid linear swales; P42-45 has more info	Not mentioned	Retain sediment on site; stormwater may be directed to wetlands if free of silt, debris, chemicals, etc; development near 12%+ slopes shall not increase runoff onto slopes to damage veg 68.404(c)
	Portland	**Chicago**	**Shorewood**	**St Paul**

Sources:

- **Portland - Willamette River Greenway**

Source: Internet, http://www.portlandonline.com/shared/cfm/image.cfm?id=53351

- **Chicago River Corridor Design Guidelines & Standards**

Source: Internet, http://egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/2005riverguidelines_a.pdf

- **Village of Shorewood Zoning / Setbacks**

Source: Internet, http://www.villageofshorewood.org/vertical/Sites/%7B5230848F-4209-4497-9E80-89EC90BA64AE%7D/uploads/%7BF19B51F0-843F-4A47-835B-3637D604BD82%7D.PDF

- **St Paul 68.400**

Source: Internet, http://www.stpaul.gov/web/CityCode/lc068.html#sec68.402. http://www.municode.com/Resources/gateway.asp?pid=10061&sid=23

SEWRPC defining environmental corridors:
Polygons are established around areas like rivers over 50 feet wide, shoreland is 75 feet on both sides of river, steep slopes or very steep slopes (12-19% or 20%+), wetlands, and floodlands each get polygons; the polygons are rated, then connected (using criteria) to form corridors. Based upon the resulting size of corridors, they are designated primary or secondary. *Primary* corridors contain concentrations of significant natural resources and are at least 400 acres and 2 miles long, and 200 feet wide. *Secondary* corridors have smaller concentrations of significant natural resources and are at least 100 acres and 1 mile long. The resulting polygons through the Milwaukee River area may then be 75 feet beyond the river and may or may not include steep slope, wetland or floodland polygons. SEWRPC does not use the "top of bluff" concept to delineate polygons or corridors. (Technical Report, "Refining the Delineation of Environmental Corridors in SE WI", 1981, by Rubin & Emmerich.)

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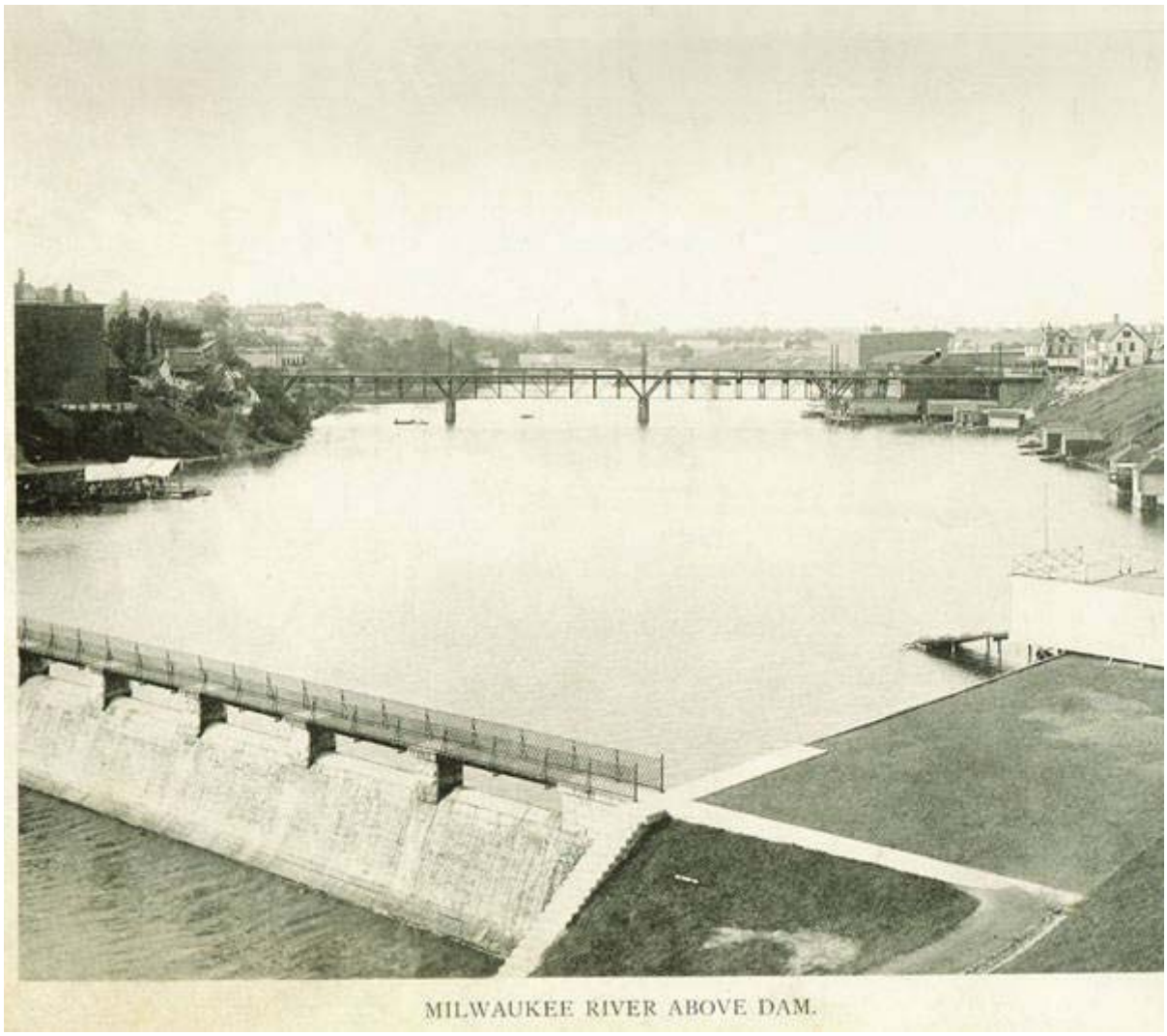

MILWAUKEE RIVER ABOVE DAM.

1895 Milwaukee River North Ave. Dam
UWM Libraries
http://collections.lib.uwm.edu/cdm4/item_viewer.php?CISOROOT=%2Fmkenh&CISOPTR=345&DMSCALE=100&DMWIDTH=600&DMHEIGHT=600&DMMODE=viewer&DMFULL=0&DMX=20&DMY=0&DMTEXT=%2520river&DMTHUMB=1&REC=3&DMROTATE=0&x=118&y=120

1907 and 1915
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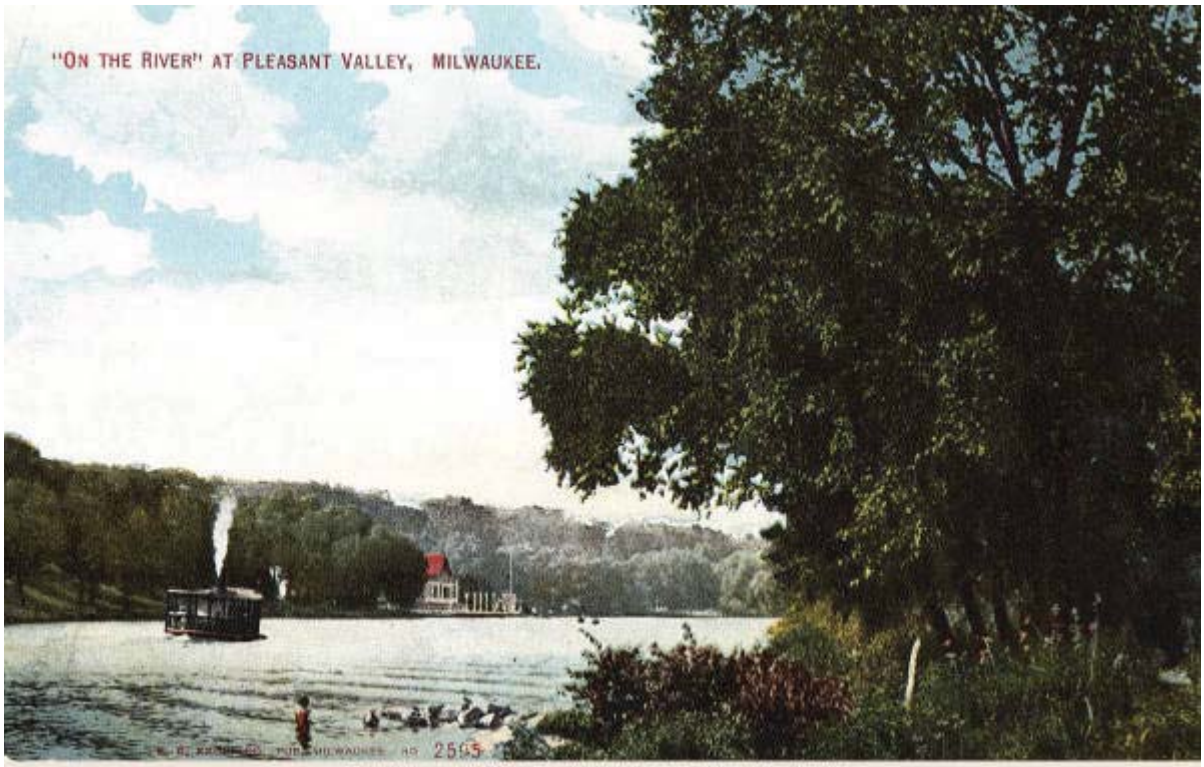

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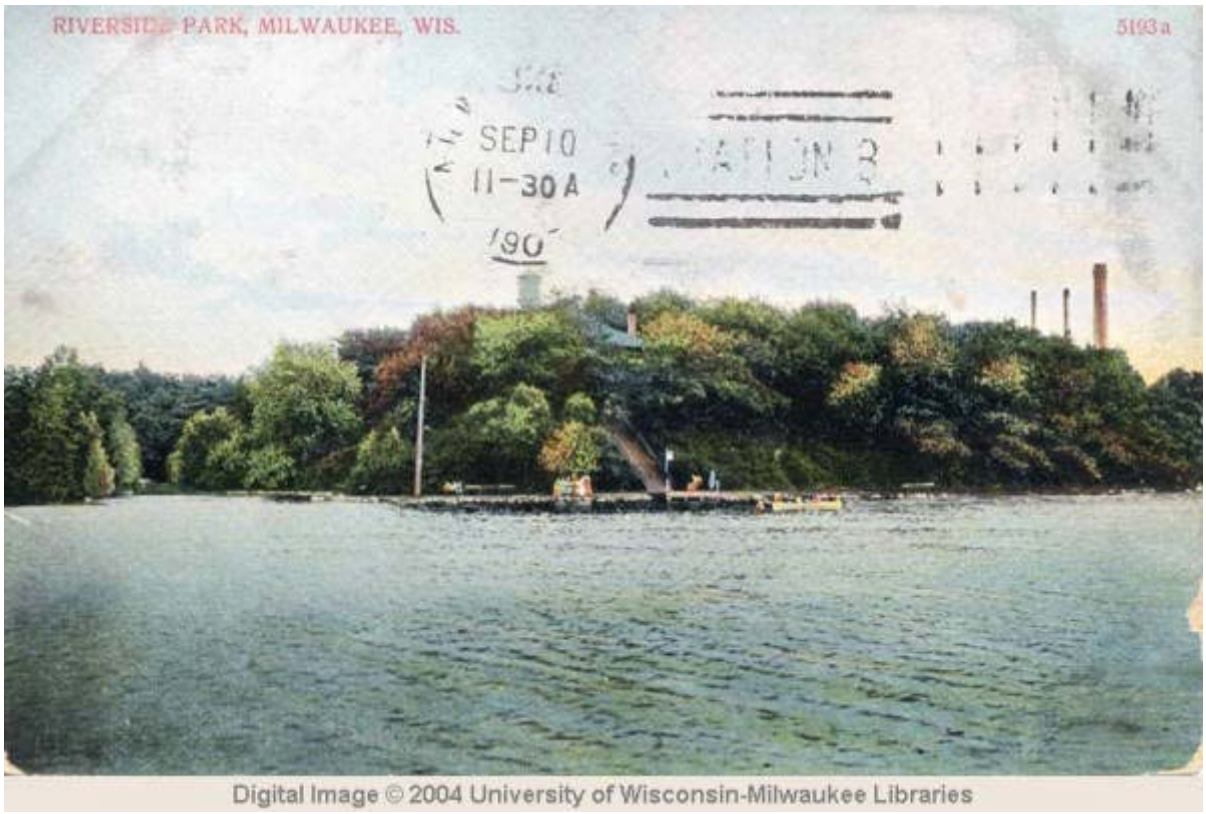
Between 1907 and 1915



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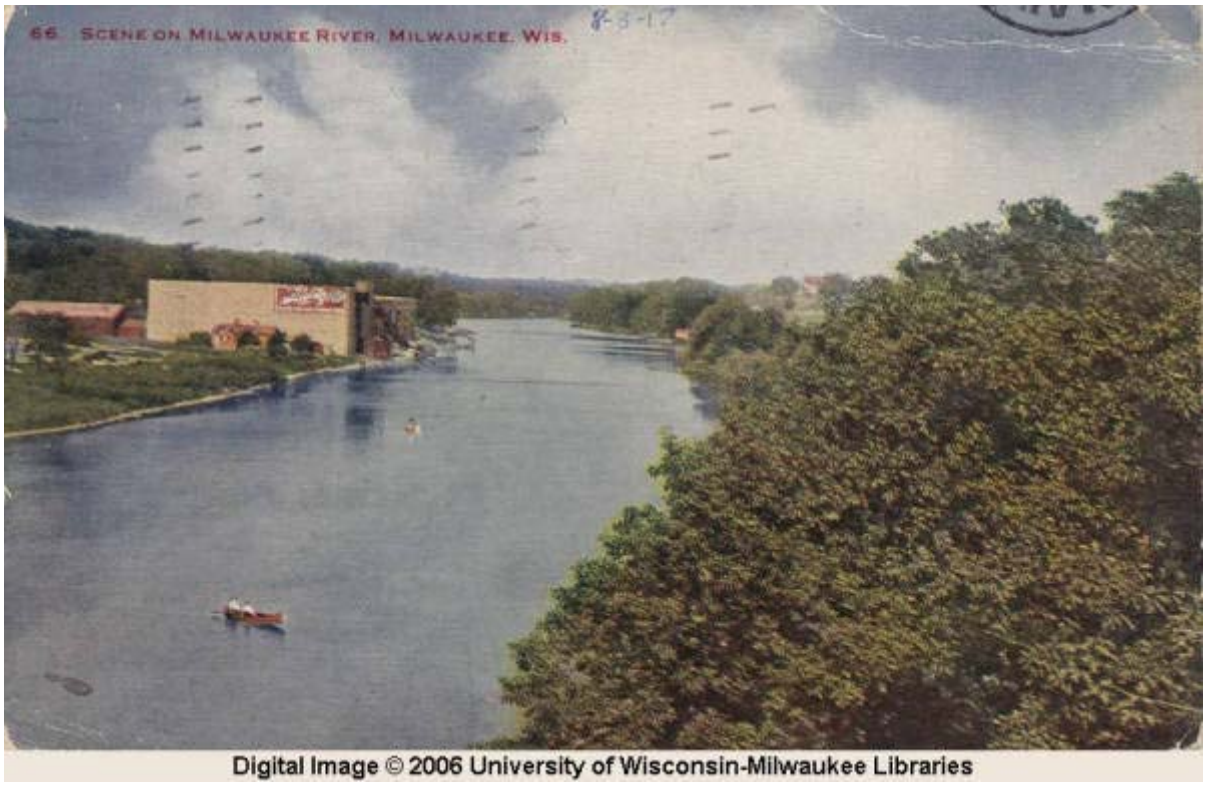
1907



1917

http://collections.lib.uwm.edu/cdm4/item_viewer.php?CISOROOT=/gfmmke&CISOPTR=357&CISOBOX=1&REC=11

Between 1907 and 1930
http://collections.lib.uwm.edu/cdm4/item_viewer.php?CISOROOT=/gfmmke&CISOPTR=256&CISOBOX=1&REC=3

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