SOUTH RED RIVER ACCESS STUDY: SEARCH FOR A RIVER SPIRIT

By

Kenneth J. McKim

A Practicum
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the Degree of

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture
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THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

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Abstract

This practicum addresses the current lack of opportunities within Winnipeg for residents to safely and easily travel from their neighborhoods, to the riverbank, river's edge and even onto the river surface if they so choose. The study focuses on the south end of the city, along the Red River, in exploring the notion of developing the existing inventory of publicly owned riverbank properties, as river access sites. Analysis of existing opportunities, within the context of relevant design and site selection criteria, lead to a recommended twenty (20) proposed river access sites within the study area. Two of these sites were then selected for detailed design proposals, representing the variety of sites found along the Red River and demonstrating the potential of these under-utilized properties. Relevant planning and design issues were researched and distilled into summary guidelines, which were applied to the two demonstration sites through the design proposals. The result is two very distinct solutions to increasing the physical connectivity between the river's edge and adjacent residential neighborhoods and in turn, fostering a greater understanding, enjoyment and spiritual awareness of river environments within our community.

Acknowledgements

I would like to thank the members of my practicum committee- Professor Ted McLachlan (Chair), Professor Alf Simon and Derek Murray - for their input, guidance and patience in bringing this project to fruition. I would also like to thank the Manitoba Association of Landscape Architects for their generous Special Project Grant, which helped subsidize a case study trip to Minneapolis, Minnesota, as well the photography and digital inventory of all of the publicly owned properties along the Red River.

Thanks also to my parents for their unwavering love, support and dedication to their children and for exposing us to the beauty and joy of the natural world.

Finally, I would like to thank my wife, Karen, for inspiring me every day, for keeping me focused on the important things in life and for sharing her life with me.

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1.0 Introduction

A father and son sit on the river's edge, staring at the tips of their fishing poles, enjoying all that the river environment has to offer them. They notice every bob and wiggle of their rods, as the swift current plays with their bait along the muddy river bottom. Shaded under a giant cottonwood, they hear the gentle wind blowing through the leaves high above and the cheeky sounds of squirrels quarreling over a found nut. The pungent smell of the silt-laden water is familiar and comforting and evokes memories of past afternoons spent at this same "secret spot". They say that they have come for the big channel catfish or tasty sauger, but it doesn't matter if they go home empty-handed, the spirit of the river brings them back time and again.

King's Park

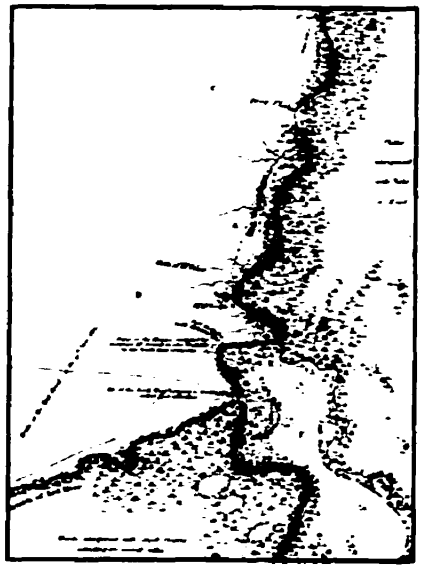
Winnipeg is a city blessed with the abundant nature and beauty of the rivers that run through it. Their waters support ribbons of green forest that meander through the hard urban landscape and provide habitat and shelter for a multitude of plant and animal species. Their watersheds collect the winter's melt and re-distribute vital moisture and nutrients as they flood their banks, rejuvenating the soils of the flood plain. Their movements and processes illuminate both the raw power and delicate patterns of the natural world. They evoke the essence of nature: beautiful yet destructive, enduring yet fragile, essential yet often overlooked.

Silt Beds

It is only recently however, after decades of neglect, that Winnipeggers have begun to value their rivers. Development near the confluence of the Red and Assiniboine Rivers has shown that our rivers are something to be celebrated and experienced by all. To date, much of the debate on river access development has focused on the creation of publicly owned linear greenways along the city's waterways. This long-term vision will become viable as riverbank properties are publicly acquired and consolidated and as funds become available for development costs. It should be noted however, that many ecologists and landscape architects are beginning to question the over-engineered treatment of the river's edge typically utilized on many greenway projects throughout North America. (Snow, 1998 & Mitchell,1999). While this treatment can certainly be justified for such visible and highly used sites such as at the Forks, the riparian ecology and natural aesthetic of Winnipeg's rivers would be severely damaged if this were extended throughout the city. Likewise, providing recreation opportunities throughout

the entire length of the river may be very positive for human use, but may have a serious impact on the movement of species along this important wildlife corridor. Any human intervention into what's left of the riverbottom forest in Winnipeg, must therefore be evaluated carefully to measure the ecological repercussions.

The challenge for Winnipeg stems partly from the original system of surveying the area by French settlers. In these early settlement times, land was partitioned into hundreds of long narrow parcels oriented perpendicular to the river's edge. Over time, street patterns and parcel sub-divisions conformed to this geometry, leaving the majority of riverbank land ownership in private hands. What was once intended to provide equal access to the rivers, now restricts access for the majority of citizens. It will therefore require many properties to be publicly purchased or expropriated for a complete river greenway system to occur. Considering the rights of private property owners, together with the current budget limitations of all three levels of government, it may be decades before Winnipeg's river greenway system reaches its fruition. In the interim, there are still numerous opportunities to develop river access, which could give Winnipeggers the chance to enjoy the river environment within their residential neighborhoods on a more immediate basis.



French Riverlots, Red River Settlement, 1816. (Source: Artibise & Dahl, 1975.)

Thus arises a second challenge: taking advantage of existing public riverbank properties in providing not only for physical and visual access to the river environment, but also creating meaningful and spiritual connections between the river's edge and the adjacent residential neighborhoods. The City currently owns approximately 35.4 kilometers or about 39% of the riverbank frontage along the Red River alone. With the exception of the Downtown Riverwalk and the occasional boat launch in regional parks, few opportunities exist within the city for residents to safely and easily traverse the riverbank to the river's edge within their own neighborhood. Many of those opportunities that do exist are simple dock structures and pathways with no meaningful relationship or connection to the river environment or adjacent residential communities.

Crescent Drive Park Boat Launch

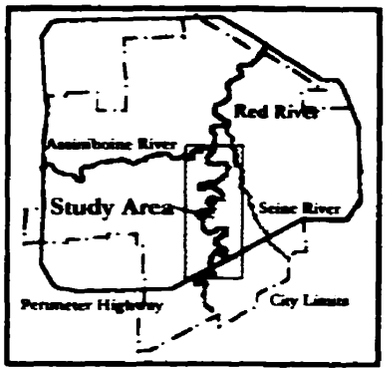
1.1 Access Sites

Sara Jane Greutzner, Project Coordinator, Calgary Urban Parks, defines greenways as, ***"...corridors, places and spaces that play a role in connecting parts of the city. They have evolved from the traditional pathway in a linear park into connections that are consciously and predominantly oriented to pedestrian and bicycle use."*** (Dawe,1996). Utilizing the City's existing inventory

of riverbank properties is a viable and relatively cost effective means of creating these "connections" between residential neighborhoods and the river's edge. The creation of a network of river access sites along the Red River, could provide the key nodes from which future linear connections could be made as funding and properties become available. More importantly, there is great potential for river access sites to act as doorways to the river for both adjacent and surrounding neighborhood residents. Conversely, the abundant nature of the river corridor can be linked and extended to existing and newly created natural areas within neighborhoods, increasing bio-diversity and allowing all citizens to experience nature in their daily lives.

1.2 Study Area

This practicum focuses on an obvious yet often overlooked opportunity, in examining the development potential of some of the hundreds of under-utilized riverbank parcels, already publicly owned in the form of parks, street ends and infrastructure right-of-ways. This study shall focus on the south end of Winnipeg, along both banks of the Red River between the South Perimeter Highway and The Forks. Having this more concise study area will allow for greater clarity and manageability of the project, while still representing the majority of issues found amongst other riverbank properties throughout the city. As such, the exploration of design and site selection issues relative to the study area can provide the basis for further study along other riverbank sections of the city. The intent is that the content and strategies presented in this study can be used by community groups, government officials and designers in developing river access and establishing greater connectivity between Winnipeg's neighborhoods and its natural riparian corridors. Such increased access opportunity can hopefully foster a greater appreciation and environmental responsibility by the public towards these important natural corridors and allow more people to experience the delight of the river spirit within their own neighborhood



Study Area

1.3 Defining River Access

In order to address the current lack of river access opportunities, it seems necessary that a more precise definition of river access be articulated, that goes beyond the distant views from upper banks that are currently being provided. Ann Breen, founder and co-director of the Waterfront Centre in Washington D.C. writes, "***a key point overall is the public's ability- their right- to be able to reach the water's edge***" (Breen, 1983). Surely the experience of the river's edge is the key to river access, as any nature lover,

fisher or canoeist would attest. **Therefore, for the purpose of this study, the term river access shall describe the opportunity for all persons to visually and physically travel from their residential neighborhood to the riverbank, river's edge and even onto the river surface if they so choose.**

1.4 Study Goal and Objectives

The goal of this study is to promote and explore the notion of developing existing publicly owned riverbank properties throughout Winnipeg, as a means to increasing the physical connectivity between the river's edge and adjacent residential neighborhoods and in turn, fostering a greater understanding, enjoyment and spiritual awareness of river environments within our community.

Churchill Drive Park

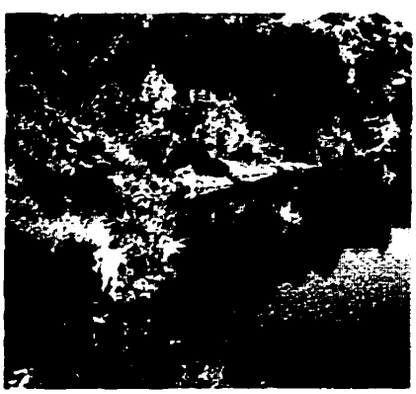
The study has the following objectives:

i) To explore the potential benefits of the development of neighborhood river access sites.

ii) To outline existing and potential river access opportunities within the study area and recommend implementation strategies for the creation of a network of neighborhood river access sites.

iii) To examine the planning and design issues related to the development of river access within Winnipeg and to present design guidelines and strategies relevant to this development. This includes the examination of the current literature and engineering studies pertaining to riverbank development.

iv) To demonstrate the potential of existing, yet under-utilized public riverbank properties through a number of design proposals that invoke physical, visual and spiritual connections between the natural river edge and adjacent residential communities.

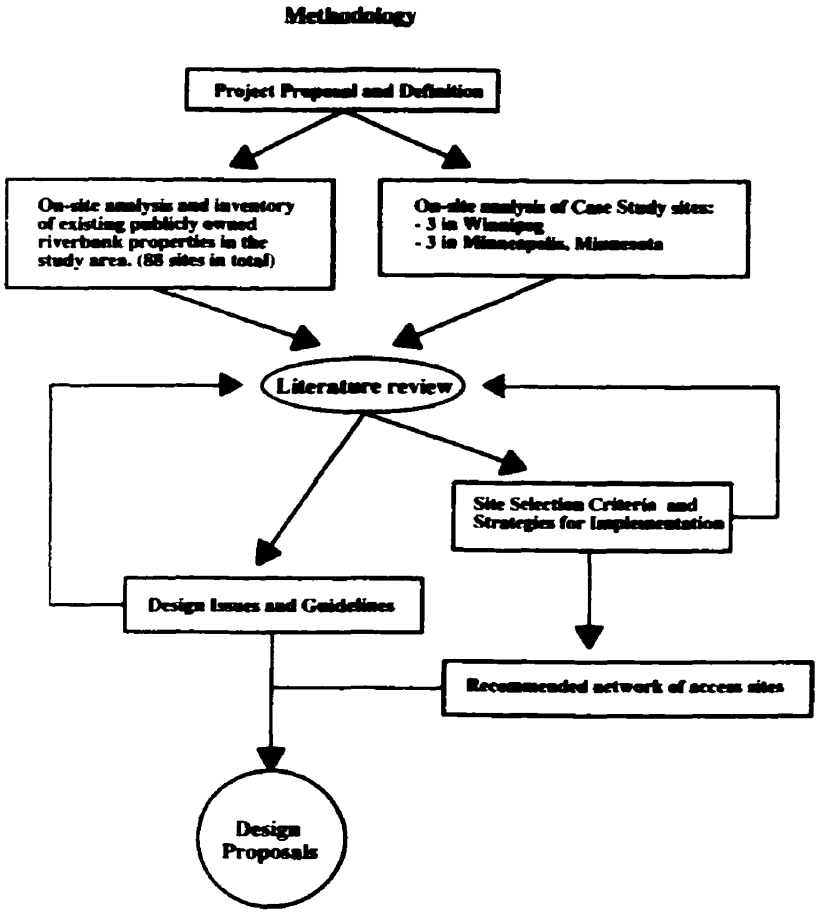


Toilers Park

1.5 Methodology

Evolving out of an interest in riverbank activities and involvement with the Winnipeg Urban Sport Fishing Committee, this study began with site exploration and photo inventory of all of the 88 publicly owned riverbank properties within the study area. A more thorough on-site investigation was carried out at the six case study sites, three within Winnipeg and three within Minneapolis, Minnesota. Analysis of these numerous sites revealed many of the key issues and considerations relevant to riverbank development that merited further research in the currently available literature. Planning and design issues were further explored as they pertained

to the river as both a natural and cultural landscape. From this research, issues were distilled into critical design guidelines that could be used for this and other riverbank development projects in Winnipeg. Concurrently, criteria for site selection were developed based upon relevant literature and site observations. These criteria led to a recommended network of river access sites that could potentially be developed to provide access for the majority of residential neighborhoods adjacent to the Red River within the study area. Two of these recommended sites were then selected for detailed design solutions that could demonstrate the breadth of the proposed guidelines and reveal the potential of these under used properties.



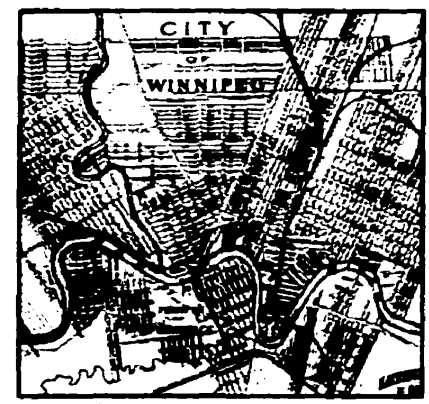
2.0 Riverbank Development

2.1 Winnipeg: A Historical Link to its Rivers

Winnipeg is a city shaped and characterized by its meandering rivers, both in its urban form and its natural features. These powerful prairie rivers have carved their way across the landscape for thousands of years shaping the landscape and nourishing the soils with nutrient rich silt deposits. Early human settlement focused on the banks of these rivers for transportation purposes, as well as relying on their resources of water, fish and forested banks for survival. As the city developed, settlement patterns and urban form responded to the rivers, both in the division of land along the riverbanks, and in the transportation routes that follow the historical trails established by First Nations peoples and fur traders along the rivers.

Nature's patterns

The French system of parallel river lots became the basic unit of settlement, just as it had in eastern Canada. However, because of the meandering form of the rivers, parallel sets of river lots were laid out in various blocks or "parishes" at different angles corresponding to the river's form. As settlement increased and land was further sub-divided, the grid street patterns now seen throughout much of the city evolved from these early surveyed patterns. In many cases, the points where these streets meet the river have remained as undeveloped public property or as infrastructure right-of-ways. In addition, many of Winnipeg's present thoroughfares have evolved from the old trading routes along the river's edge. Maps dating back to as early as 1815, indicate trading routes along the Red and Assiniboine Rivers that correspond with today's Portage Avenue and Main Street. By 1870, archival maps also show trading routes in the south end of the city, that have become the present day Pembina Highway, St. Mary's Road and St. Anne's Road (Artibise and Dahl, 1975)).



Winnipeg Street Grids, 1891.
(Source: Artibise & Dahl, 1975.)

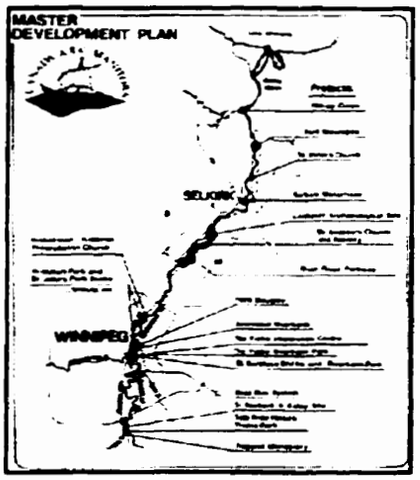
River properties for residential land use have been highly regarded for decades and dwellings on streets such as Wellington Crescent and Kildonan Drive are some of the most prestigious and sought after in the city. In the south end, River Road, Victoria Crescent, Kilkenny Drive and Kingston Row are also some of the most highly revered properties due to their proximity to the Red River and its lush riverbank trees.

Victoria Crescent property

Visionary city forefathers saw the potential of riverbank properties for public park development and acquired a number

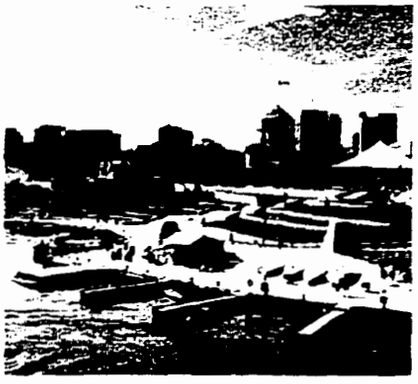
of properties that are today cherished recreation areas for Winnipeggers. These include Lyndale Drive Park (1895), Kildonan Park (1910), St. Vital Park (1929), Churchill Drive Park (1942), and Kings Park, Maple Grove Park and Crescent Drive Park all in the 1960's, (MacDonald, 1995). Despite the development of these parks, there was still relatively little in the way of public access to the Red River.

It is really only in the last 30 years that the general public has come to demand access to the city's rivers. The Canada/ Manitoba Agreement for Recreation and Conservation on the Red River, (ARC Agreement) and its master plan in the 1970's have guided development at the Forks, Assiniboine Riverwalk, Tache Promenade and the future North Winnipeg Corridor (i.e. Red River Corridor prepared by the Manitoba Association of Landscape Architects). These projects have served to reacquaint Winnipeg's citizenship with its rivers and have fostered a growing demand for access to river related activities (i.e. canoeing, rowing, fishing, nature trails, river viewing areas). However, most citizens must still travel from across the city to experience these river and riverbank activities. More recently, plans for further lineal greenways have been unveiled that would link the Forks to Churchill Drive and Assiniboine Park, while the long term vision is for continuous greenways along all segments of the city's rivers.



A.R.C .Agreement Master Plan.
(Source: A.R.C Management Board, 1980)

Further interest in the city's rivers has been displayed through *"Winnipeg Leisure Study"* survey results. Compiled over a five year period between 1991 and 1996, the survey of Winnipeggers revealed that "parks along rivers and creeks" and "nature parks" are two of the most valued recreation services available to Winnipeggers, (Parks and Recreation Department, 1991-1996). A similar survey related to shore fishing indicated that if better and safer access opportunities were available, many more people would use the banks of Winnipeg's rivers for fishing (Province of Manitoba, Fisheries Branch, 1995).


The Forks Market and Marina. (Source: Landscape Architectural Review, May, 1992).

In addition, public input for *"Plan Winnipeg"*, the City's preeminent planning policy document has also revealed the importance that the citizens of Winnipeg place on their rivers. The most recent version is to be released in the summer of 2000, after over a year of renewed public consultation. *"Plan Winnipeg... 2020 Vision"*, presents several policy statements intended to shape the future development of the city including:

"The City shall promote the use of its rivers and riverbanks by facilitating public access to rivers and riverbank lands and

encouraging the use of Winnipeg's rivers for transportation and recreation through the provision of boat launches, docks and other accessibility improvements". The plan also designates environmentally sensitive and significant lands, many of which are riverbank properties, to encourage the protection and preservation of these lands.

2.2 Economic Benefits of Riverbank Development

St. Vital Bridge

The development of existing City properties could involve smaller scale interventions into the riverbottom forest, providing river access opportunities for adjacent neighborhood communities, while minimizing many of the negative costs. Because the City already owns an abundance of sites along both sides of the Red River, including parks, bridges and infrastructure right-of-ways, this approach would not require costly property acquisitions. Many of these existing sites already have some bank stabilization treatment in place, while other smaller sites would not require as extensive riverbank stabilization and development costs as with larger more lineal properties. Such small-scale sites may also serve as test projects to demonstrate the potential of bio-engineering stabilization methods, as opposed to traditional hard engineering solutions. Smaller projects can be more manageable and would be more likely embraced by neighborhood groups or conservation clubs, in terms of volunteer efforts and community fundraising. Also of note, it has been demonstrated in numerous cities that properties located near green space are in higher demand, thus enhancing property values and increasing the local tax revenues, (Dawe,1996). These increased revenues could therefore be used as a justification for development and maintenance costs.

Ernie O'Dowda Park

Suburban and ex-urban sprawl have reached a critical point in Winnipeg, as families migrate away from established neighborhoods, increasing infrastructure and servicing costs while reducing the overall assessment base. Studies have shown that by providing opportunities for people to experience nature within their neighborhood, the subsequent improved quality of life reduces the desire for some people to move to the edges of cities, (Lanarc Consultants, 1996). Providing access to rivers and nature within neighborhoods could be a valuable means of attracting and keeping families in established neighborhoods and potentially reducing sprawl and its negative costs. Also, by having more recreation activities close to home, Winnipeggers could spend significantly less time, money and fuel in reaching their leisure destinations, than the typical trips to lake country.

Local tourism could also benefit from the further development of river access sites within the city limits. Presently, the Winnipeg Urban Sport Fishing Committee and Provincial Fisheries Branch are looking to improve access to Winnipeg's rivers for fishing, with increased tourism being one of several key factors. Attracting people to the "world class" fishery within the city could be one more reason for tourists to choose Winnipeg as their travel destination. With the sport fishing industry already bringing some $90-150 million to the Manitoba economy, the development of river access for fishing could be very beneficial to Winnipeg's economy. Increased access to Winnipeg's rivers by its' citizens could also have other associated economic benefits. By providing access for such activities as shore fishing and canoeing, it has been found that more people locally take part in the activities, and subsequently sales at tackle shops and sporting goods stores show increases. (Gordon, 1983). Finally, the life benefits of increased river access could also help entice more businesses to the city, as quality of life is a major criterion companies and individuals use in selecting cities in which to establish their businesses, (Dawe, 1996).

Freshwater Drum/ Silver Bass

2.3 Environmental Benefits

On an ecological basis, existing public riverbank sites could be preserved or restored as natural "patches" within the river corridor system, creating diverse islands of nature along the hard edges of neighborhoods. Once this network of river access sites was in place, linear connections could be made between them along the river corridor, as properties are acquired and as the impact on the riparian ecology was assessed. These connections could also extend away from the river, to natural areas further into neighborhoods, including nature found on private properties. By encouraging a more complex network of natural areas, more diverse habitat, greater bio-diversity and a richer movement of species becomes possible, (Forman and Godron, 1986). In addition, having local access to such activities as fishing, canoeing and nature watching can result in considerable savings in energy resources and fuel. Rather than a trip out of town, the city dweller could walk, cycle or bus to the nearest river access location. Increased access to nature is also vital for environmental education programs, as well as promoting a higher level of environmental consciousness in our society. Environmental education programs are becoming more and more important to Winnipeg's schools as evidenced by their requirement within the science curriculum for many Elementary and Junior High schools. Limited access to the city's rivers has restricted the study of riparian ecology within these programs. Increased

Harris Park

river access can provide an inexpensive means for teachers to bring their students in contact with one of the most diverse ecological communities on the prairies. This exploration of nature can also take place at a family level, further promoting an understanding, appreciation and hopefully a reverence for natural systems within the urban context.

2.4 Community Benefits

Numerous community benefits can occur with increased access to Winnipeg's rivers. *"The Winnipeg Leisure Study"* and related *"Urban Fishing Survey,"* showed that people were more likely to take part in activities such as shore fishing and nature exploration if the river was more accessible. River access can provide families with the opportunity to take part in these inexpensive recreation activities, while remaining close to home. By making these leisure activities more available and as more people take part, the general health of the community can be increased. What's more, family activities such as shore fishing have been shown to promote closer family ties and contribute to a reduction in crime and increased awareness of the environment among youth (Gordon,1983). It has also been found that access to urban shore fishing and other river related activities is a way to instill confidence in the disabled, a sense of achievement among the elderly, and respect for nature among urban youth, (Marolf, 1984).

Assiniboine Riverwalk

The development of river access sites could have a strong community component in their design and implementation. By involving members of the community directly in the design, development and even construction processes, greater community spirit can be established as people work together to improve their neighborhoods for present and future generations. In addition, greenspace such as river access tend to become identifiable places within the community, places for community interaction and contribute to a sense of community identity, (Lanarc Consultants Ltd., 1995).

Brown Bullhead

Finally, activities and experiences at the river's edge, (whether they be casting a rod, paddling a canoe or watching the fish jump), can alter the way that we perceive the natural world and human impact upon it. As more and more individuals become aware of their relationship to the natural world, that awareness can be translated to a community level, effecting community values and actions. Perhaps one day, a greater understanding and value of our place within nature, will lead to an urban environment that is more

responsive and sensitive to the natural world within our cities.

2.5 Relevant Case Studies

In order for each river access project to reach its full potential, it is imperative that those involved understand the complexity of issues associated with such an endeavor. In doing so, it is possible to learn from past successes and failures and to challenge conventional approaches to riverbank development. This chapter examines several relevant case studies to demonstrate some of the positive and negative attributes of current riverbank development practices.

The following case studies are the result of on-site investigation of a number of river access projects in both Winnipeg, Manitoba and Minneapolis, Minnesota. These projects have been chosen as they demonstrate several different successes and failures for providing river access in a "winter city" environment. The three Winnipeg projects examined represent the first steps in bringing the city's rivers back to its citizens through a linear parkway system that concentrates on the urban core. The selected Minneapolis projects demonstrate a different approach, in developing river access throughout the city, making the edges of its many rivers, lakes and creeks accessible to as many neighborhoods and citizens as possible.

2.5.1 Tache Promenade: Winnipeg, Manitoba

The development of the Tache Promenade in St. Boniface was a direct result of the 1981 ARC Master Development Plan. The objective of the project was "to provide a physical link between the Red River and St. Boniface and to provide a significant opportunity for visitors to appreciate the historic, cultural and recreational resources of St. Boniface," (Hester, 1985). The project was officially opened by Queen Elizebath II in October 1984 and was the culmination of over two years of planning and design by Underwood McLellan Ltd, (presently UMA Ltd.). The interdisciplinary nature of the consulting firm allowed for a design team composed of planners, landscape architects, and architects, as well as geological, structural and electrical engineers. The project includes the development of a boat dock/ river access facility on the Red River, with a stairway and access ramp leading up the riverbank on axis to the St. Boniface Basilica. The stairway also connects to a promenade along Rue Tache, which includes streetscaping work and interpretive signage that strengthen connections to the surrounding neighborhood.

Tache Promenade

This project offers several lessons for future river access development. Firstly, by involving the community in the design process, the project was successful in meeting the needs of the neighborhood and gaining community acceptance. Pathways lead tourists and residents alike from the surrounding neighborhood into the river environment, while educating them on this historic area of Winnipeg. In addition, the design limits intervention of the river's edge to the main dock facility, keeping pedestrian traffic at street level, thus maintaining much of the river edge vegetation. The boat dock is heavily engineered, using pre-cast concrete piles and a rip-rap toe berm to stabilize the bank and is designed to be below spring flood levels in order to minimize ice damage. This consideration of the dynamic forces of the river is critical to the project's success, however very little has been done to demonstrate these processes to the user. The project is also lacking in its' planting scheme, using limited numbers of ornamental species, with little attention to native riverbank plantings. Nonetheless, the project provides one of the only places in the city where a true connection has been created between the river environment and its adjacent residential neighborhood.

Tache Promenade- River Access/ Boat Dock.

2.5.2 The Forks: Winnipeg, Manitoba

The Forks, located at the junction of the Red and Assiniboine Rivers, was also developed as a result of the 1981 ARC Master Development Plan for the Red River. Its intention was to be a meeting place that provides an "attractive park setting in which to describe the historical significance of the site as the beginning of the city and the gateway to the west," (Dickson, 1983). The project was designed in 1988 by Architects Cohlmeyer, Hanson and Associates, with Cynthia Cohlmeyer as project Landscape Architect and the firm of Hilderman, Witty, Crosby, Hanna and Associates as Landscape Architect Technical Advisors. The focus of the 38 acre site is the plaza area defined by three refurbished railway buildings and offering views to the historic river junction. The plaza features a tensile tent structure and artificial ice rink, a pavilion, and a lower plaza that descends into an amphitheater. The amphitheater uses the river as its backdrop, and provides access to a boating basin with lighthouse, as well as the popular Riverwalk. This pedestrian and cycling thoroughfare follows the edge of the two rivers around the Forks site and provides a linkage with the Legislative grounds via the Assiniboine Riverwalk. The design of these features creates access to the rivers for large numbers of people and has become the focal point of Winnipeg.

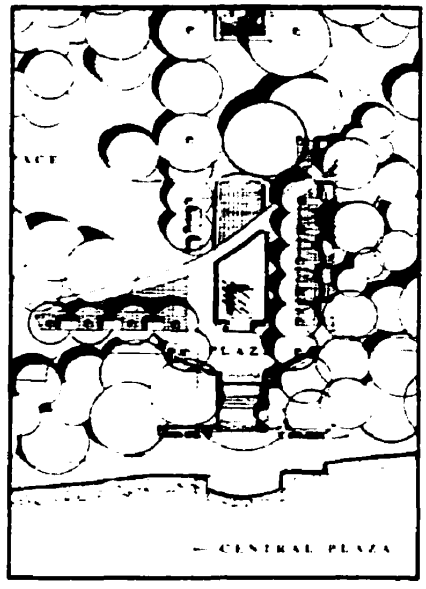
The Forks Marina

The success of the project lies in three urban design strategies implemented by the designers. Firstly, the historical richness of the site is expressed throughout the design, making its history readily available and readable for all who visit. Second, the project represents a successful blending of urban and natural environments. Thus, the design allows a strong architectural composition to overlap with a site sensitive response to the river and its' native vegetation. Thirdly, the detailing expressed in the project allows for the creation of memorable experiences at the site. From paving patterns, light fixtures, and seating to the selection of native riverbank plant species, the selection and detailing of materials is vital to the project. This approach is best described through the words of the architect, Stephen Cohlmeyer when he writes, "the urban environment is seen and remembered at the level of detail." (Cohlmeyer, 1992).

The Forks River Access, (opposite Tache Promenade)

2.5.3 Assiniboine Riverwalk: Winnipeg, Manitoba

The Assiniboine Riverwalk, designed by Scatliffe and Rech Landscape Architects Inc. in 1990, is a linear parkway that links The Forks with the Manitoba Legislative Grounds along the Assiniboine River. Along its length, the walkway provides access to the river from the adjacent downtown by way of a number of direct access points. These access nodes include the Legislative Grounds, Kennedy Street, McFayden Park, Donald Street and Bonneycastle Park. The Legislative Grounds access features a grand staircase on axis with the Legislature Building, which descends to a riverside circular plaza and boat dock. At Kennedy Street, a small fountain and river lookout serve as a gateway to a small staircase that leads to the river. In McFayden Park a small street front entry takes one through a neighborhood playground to a river lookout and stair access down the bank to the river. The Donald Street access uses a serpentine wheelchair accessible pathway to bring people to the river. Bonneycastle Park, the largest of the river entries, is a large urban park that links the downtown to the river. Here, the designers use a very architectural vocabulary to create a plaza with sculptural fountain and an outdoor theatre with a uniquely detailed backdrop structure, while still maintaining the natural feeling of the river environment.



Bonneycastle Park Access- Concept Plan. (Source: Scatliffe & Rech, 1990)

The main achievement of this project is derived from the similar detailing, choice of materials and use of both native and introduced plantings that gives a consistency over its entire 1.5 kilometer length. The use of limestone in both refined and rough textures ties the project to its roots in the Manitoba landscape. Unique urban design features help to bring a part of the city fabric

to the rivers edge, without overpowering the natural environment. The attention to planting detail shows an understanding of native riverbank species, with introduced species added for color and interest. The entire Riverwalk is designed to withstand the stresses of yearly spring flooding, making the rivers' processes more visible to the public. The rivers' edge has been stabilized using limestone rip-rap and geo-textile fabric, which protects the bank but also prevents the growth of shoreline vegetation. Some ecologists have raised concern about the future impact to the riparian ecology if such an approach were used throughout the city. However, this approach is much more site sensitive than typical bank stabilization methods as it preserves the majority of the riverbank vegetation and limits intervention to the river edge. In addition, it has been found that the rock fill which forms the base of the Riverwalk, has improved fish habitat in terms of food, shelter and breeding, (Clark et al, 1987). Overall, the Assiniboine Riverwalk is a good example of the benefits that can be achieved by connecting the urban and river environments.

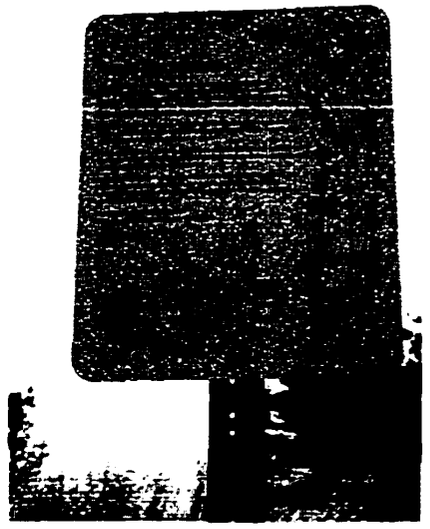
Assiniboine Riverwalk

2.5.4 Boom Island Park: Minneapolis, Minnesota

Located near downtown Minneapolis and designed by the Minnesota Department of Natural Resources, Boom Island Park provides public open space and access to the Mississippi River. Several pedestrian entrances to the site are located at public right-of-ways that occur at streets ending adjacent to the park. The upper floodplain of the park incorporates prairie restoration areas and native plantings along with educational signage. The rest of the site is made up primarily of turf areas mixed with specimen trees and shrub beds. Other site amenities include picnic facilities, public parking and washrooms, as well as riverbank access for fishing, canoeing and river watching. The river shoreline of the park has been dramatically altered to prevent erosion, mainly through the use of limestone rip-rap. This method appears to be highly effective in limiting wave and current induced erosion, but at the cost of eliminating all vegetation from the shoreline. The rip-rap is also a difficult surface to traverse for anyone wanting to get closer to the river for recreation activities. The most significant design feature of the park is a river promenade and access area covering approximately 50 metres of shoreline. The design incorporates a concrete river edge walkway interspersed with native planting beds. Ornamental railings are set at heights that allow for shore fishing, while providing a safety barrier from the strong Mississippi current. In addition, one section of the promenade descends down a series of steps to allow for river access for canoe launching.

Boom Island Park, Minneapolis-
Riverfront Promenade

Boom Island Park has a number of positive attributes,which could be considered for other river developments. Firstly, the use of native tree, shrub and herbaceous plant material along with educational signage, is vital to restoring an understanding and respect for the river environment. The native prairie areas are maintained both by periodic mowing and by burning to demonstrate and emulate the processes that were formerly provided by buffalo and fire. Second, the design of the river promenade not only brings the user to the river, but also considers the activities that they will be taking part in at the river. Thus, an obvious understanding of what is involved in such activities as shore fishing and canoeing is evident in the design. The multi-use programming of the site also helps to bring the community together in a place where the river environment can be celebrated. Most significantly, the strong connections between the site and the adjacent neighborhood have allowed the site to become a meeting place and an integral part of the community.

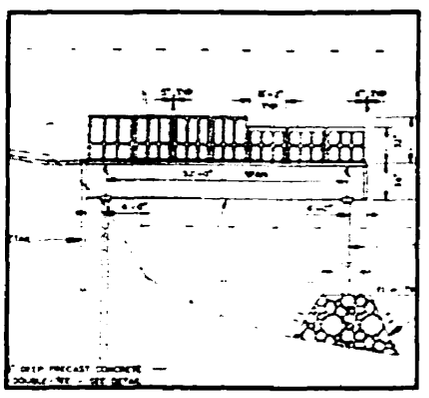


Boom Island Park, Minneapolis-
Educational Signage

2.5.5 Brooklyn Centre Pier: Minneapolis Minnesota

Brooklyn Centre Fishing Pier was designed by the Bureau of Engineering Section of the Minnesota Department of Natural Resources in 1993. It is located along a narrow and unused stretch of land north of downtown Minneapolis, between the Mississippi River and Interstate 94. The site is reached by way of a gravel road that leads from the Interstate to a new 10 car parking lot near the river. From the lot it is a short 40 metre walk along a wheelchair accessible pathway to a pre-cast concrete fishing pier. Designed almost exclusively for shore fishing, anglers have the option of using a concrete pad along the river's edge or the pier, which extends some 16 metres out onto the river. The pier is designed to remain above spring flooding levels, therefore being subjected to the stresses of ice and current flows. It is constructed of a pre-cast concrete double tee slab set on four 30 foot deep cast in place pilings. While being heavily engineered, it does offer some interesting detailing. The safety rails have a 2" by 12" wooden top plate with holes drilled along their length, offering holders for fishing rods. Also, at the end of the pier, a rip-rap fish habitat enhancement structure has been constructed to attract fish.

Brooklyn Centre Fishing Pier'
Minneapolis, Minnesota.



Brooklyn Centre Fishing Pier- Section Drawing. (Source: Minnesota Department of Natural Resources, 1993.)

The successes of this project are limited however, primarily due to a poor site location and hard design approach. The Interstate separates the site from any nearby residential areas, preventing any pedestrian access and making the site feel remote and unsafe. This separation limits the numbers of users and gives the site no sense of ownership. As a result, signs of vandalism and drinking parties

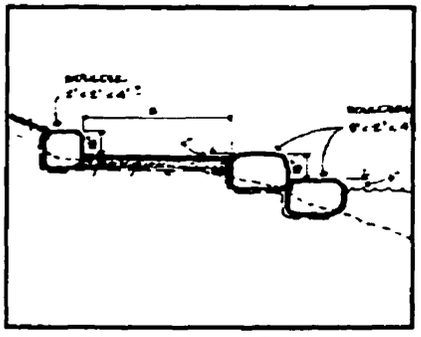
are apparent at the site. The heavily engineered design of the pier is necessary to deal with the river's forces, but little other attention was given to soften the design with detailing or plantings. As such, the project has become an uncomfortable environment for fishing or any other use.

2.5.6 Lake Minnetonka Shore Fishing Site: Minneapolis, Minnesota

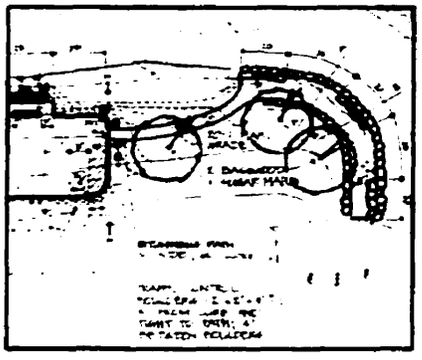
Lake Minnetonka is one of hundreds of small lakes found among the residential communities of Minneapolis. In 1993, the Minnesota Department of Natural Resources designed and constructed a small shore fishing access along a bridge right-of-way near a narrow channel of the lake. Entry to the site is gained from a side road next to the bridge and is indicated by a decorative sign that also outlines local fish species. A small parking lot has been built for eleven cars, one wheelchair vehicle and two portable toilets. From the parking lot, a wheelchair accessible asphalt path leads to the lake edge and the shore fishing area. Here large rectangular limestone quarry stones have been salvaged from a nearby abandoned quarry to provide a solid edging material. The boulders are stepped down into the lake to allow for better access to the water for retrieving fish. Three native basswoods have been planted to provide shade for site users.

Although modest in cost and scale, the Lake Minnetonka Shore Fishing Site is a good example of what can be accomplished in terms of low impact access development. Making use of existing city property, the site is within walking and cycling distance for a large number of area residents. The site also provides the basic amenities of parking and washrooms, and is located across the street from a local gas station where bait, tackle and refreshments are available. As a result of this foresight in planning, the project is both accessible and usable to the community. The use of indigenous stone and plant materials contribute to a sense of place and a connection to the landscape of the area.

Lake Minnetonka, Shore Fishing Site, Minneapolis Minnesota.



Lake Minnetonka Shore Fishing Site-Typical Section. (Source: Minnesota Department of Natural Resources, 1993.)



Lake Minetonka Shore Fishing Site-River Access Plan.
(Source: Minnesota Department of Natural Resources, 1993).

3.0 Design Issues and Summary Guidelines

This chapter deals with many of the relevant design issues that are deemed integral to the creation of river access within the context of Winnipeg. The first section outlines the Natural Resource Issues, or those relative to the natural landscape, while the second section outlines the Cultural Resource Issues, or the issues that relate to human or cultural aspects of river access development. Each issue will be outlined as it pertains to the Winnipeg region and will be followed by summary guidelines for design and development.

Signs of Beaver Habitat

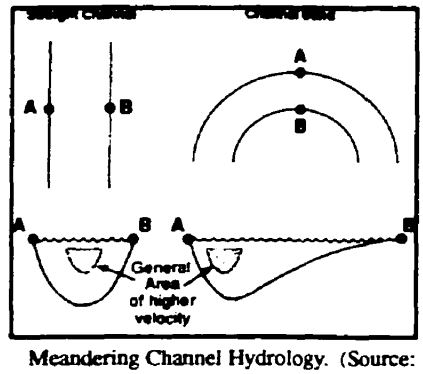
All of the recommended guidelines represent key issues and strategies that should be explored in every river access development. However, each site is different within its own context and it is acceptable that not all of these guidelines can be applied to every project. It is likely that through a comprehensive analysis of each site, certain opportunities and constraints will present themselves that illuminate which guidelines are most appropriate and crucial for that context. Other guidelines may take on a secondary role in the project, while in still other instances, certain guidelines may be deemed inappropriate. The challenge for designers is to address the intent of these guidelines in finding appropriate design solutions that reflect the spirit of the river experience.

3.1 Natural Resource Issues

This section outlines the design and planning issues for river access development that are related to the natural resources of the Red River in Winnipeg. These issues, in conjunction with cultural resource issues, are the key determinants that will influence decision making for site selection and detailed design for this project, and are key factors in any river access development.

3.1.1 Red River Hydrology

The Red River is perhaps the most influential and powerfully occurring natural force shaping the landscape of much of southern Manitoba. As such, an understanding of the hydrology of the river system is necessary for any design intervention within this river environment to be successful. The Red River within Winnipeg comprises only a small fraction of the overall drainage basin, which also includes the Assiniboine River plus numerous tributaries and smaller rivers and streams. The total drainage area exceeds 290,000 square kilometres and includes much of the prairie regions of southern Manitoba, southeastern Saskatchewan, North Dakota,



Meandering Channel Hydrology. (Source: Minnesota Department of Natural Resources, "Streambank Erosion",1991).

as well as northern South Dakota and northwestern Minnesota. (Wardrop, 1991).

Water levels within Winnipeg are influenced by the Lockport Control Dam and the Red River Floodway. From the end of spring runoff until the end of October, water level are regulated to Elevation 223.7 metres (734'), while ice levels for winter are controlled at Elevations 221.3 to 221.9 metres (726-728'). (Hilderman, 1980). The flow of the Red River and its' tributaries is dominated by spring runoff. Typically, large amounts of accumulated winter snowfall in combination with spring rains have been responsible for severe spring flooding. Other factors include high autumn precipitation, followed by an early and continuous freeze before snowfall, a late and sudden spring thaw and the back up of river flow caused by ice jams. Summer floods caused by intense storm events are also common and can result in as much as 3 metre rises in normal river levels.

Riverbank failure, St. Vital Park

Structures, pathways, plantings and other design components must be able to withstand the intense currents of the inevitable spring and summer floods and the debris that they carry. The incredible force of spring ice flows, some of it 3 to 4 feet thick, must also be recognized in any design solution. Normally, spring ice break occurs as river flows increase water levels to 226.8 metres (744'). The river ice mass tends to rise vertically as a solid sheet, breaking up and continuing downstream. Trees, bridges and the banks themselves are all subject to this force and all riverbank facilities must be designed to withstand potential ice damage. Even during normal river level conditions, the natural hydraulic forces of the river act upon the riverbank soils, continuing the ever-changing meandering pattern.

Guideline 1- Design of river access sites must recognize, deal with and celebrate the hydrology of the river, including changes in water levels, the dynamics of both flooding and regular river flows, as well as the impact of ice flows and debris on the riverbank.

3.1.2 Erosion and Bank Failure

It is estimated that approximately 95% of Winnipeg's riverbanks are unstable, (Baracos et al, 1988), which can be significantly attributed to the nature of the soil of the region. The City of Winnipeg, Waterways Branch has recently estimated that it would cost $34.1 million to stabilize and protect the existing inventory of City property on the Red River alone, (City of

Winnipeg, Waterways Branch, 2000).

The outside bends or concave sections of the Red River tend to exhibit glaciolacustrine clay deposits, which are weak and highly plastic. These banks are typically subject to failure where massive sections of the bank slide into the river channel. Riverbank failures are deep-seated extending12 to 15 metres below ground level and in some cases over 80 metres from the river's edge. The main factors influencing riverbank failure include the natural hydraulics of the river, high groundwater levels and progressive soil weakening.

Crescent Drive Park erosion

Meanwhile, inside bends or convex sections of the river tend to consist of alluvial silt deposits, which exhibit a higher strength than glaciolacustrine clays and can maintain a steeper gradient. These banks are subject to erosion whereby shallow sections of the bank face are undercut (toe erosion) and slip into the river. The key causes controlling erosion include river hydraulics, wave action, freeze/thaw and precipitation, (City of Winnipeg, Waterways Branch, 2000). Boat traffic plays a key role in these erosion and failure activities as wave action (especially during summer high water levels), erodes the toe and exposed surfaces of the bank, causing significant loss amongst riverbank properties. This problem is most evident adjacent to the city's boat launches in Maple Grove Park, St. Vital Park, Crescent Drive Park, where huge sections of riverbank have peeled away into the river, due to constant exposure to these wave action forces.

Guideline 2- Design of river access sites must address the multitude of forces that act upon the riverbank, both in minimizing the effects of erosion and failures and in educating the public on the dynamics of these natural river forces.

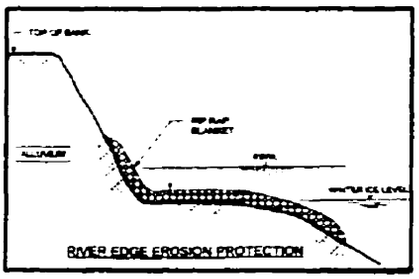
Churchill Drive Park erosion

3.1.3 Riverbank Stabilization and Erosion Control Techniques

Considering the numerous and complex factors that contribute to the instability and potential failure and erosion of the Red River's banks, an understanding of current stabilization techniques is necessary for the development of riverbank access. Each site is different in terms of the erosion factors acting upon it, as well as in the resistance qualities of the riverbank. Prior to design, a complete geo-technical study should be obtained in order to determine the existing condition of the bank, along with technical data such as shear strength of soils, soil stratigraphy, groundwater conditions and depths to till and bedrock. This information can help to identify what the causes or potential causes of bank instability are, as well as guide the design of stabilization and erosion control

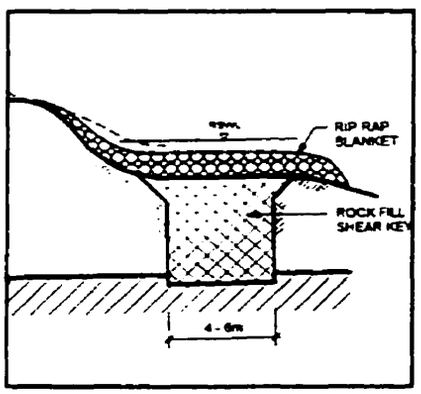
measures.

In general, current engineering practice within Winnipeg concentrates on the use of "hard engineering" techniques that utilize hard construction materials such as stone or steel to resist the erosive forces and shear stresses acting on a riverbank. For outside bends subject to deep-seated failures, installations of shear keys, granular ribs or rock filled caissons are used. These methods provide a "buttress" along the lower portion of the bank, preventing the bank from failing into the waterway by providing higher mass density and frictional resistance than the weak clay soils. For inside bends subject to toe erosion, rip-rap erosion protection is utilized to shield the alluvial soils from the forces of the river. In all cases associated with these techniques, additional works such as riverbank re-grading, drainage improvements and re-vegetation are used, (City of Winnipeg, Waterways Branch, 2000).



Rip-rap erosion control-Typical section. (Source: City of Winnipeg, Waterways Branch, 2000.)

However, these "hard" solutions tend to create significant disturbances of the plant and animal communities of the riverbank environment, both in the short and long term. In many cases, the impact of these solutions is such that all of the identifiable features of a natural riverbank forest have been eliminated. Conversely, the introduction of hard material such as rip-rap does provide the structure required by many fish species for feeding, spawning and shelter from currents. A summary of several hard techniques can be found in Appendix A. The use of artificial reef structures to reduce wave action forces on the riverbanks seems appropriate, but has yet to be seriously tested as an erosion control method within Winnipeg.



Shear Key -Typical section. (Source: City of Winnipeg, Waterways Branch, 2000.)

In contrast, bioengineering techniques use living vegetation to stabilize riverbanks. Schiechtl's book, *Bioengineering for Land Reclamation and Conservation*, represents a very comprehensive look at these more natural approaches to river and stream bank stabilization currently being implemented in Europe. This approach is currently being tested on a section of Sturgeon Creek near Ness Avenue, but has yet to be tried on the larger and more powerful rivers like the Red and Assiniboine. Perhaps the most appropriate approach to bank stabilization in Winnipeg would involve a combination of these hard and bioengineering techniques. In this way the natural environment and aesthetic of the river can be preserved and restored, while ensuring the protection of property. A summary of bioengineering techniques can be found in Appendix A.

Natural Riverbank Stabiliztion

Guideline 3 - Riverbank stabilization methods must minimize their disturbance of natural vegetation and must be integral to the aesthetic and expression of the overall site design, rather than a functional afterthought.

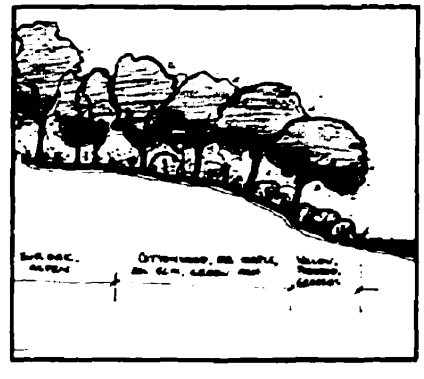
Guideline 4 – Wherever feasible, alternate methods of riverbank stabilization should be tested and used as a part of river access development projects, including bioengineering techniques and artificial reef structures.

3.1.4 Riparian Ecology and the Riverbottom Forest

The plant and animal communities along the banks of the Red River are perhaps the most biologically diverse in Winnipeg. Here, the river and its narrow band of riverbottom forest acts as a vital corridor within the city for the migration of plant and animal species. As one moves along and up the banks of the river, changes in moisture levels, nutrients, soils, light and temperature conditions contribute to a richness in habitat and species diversity. In addition, the river's current and periodic flooding transfer vast amounts of nutrients to the riparian and riverbottom forest communities, sustaining a very complex and extensive energy cycle. Having such complex communities of trees, shrubs and herbs within an urban area helps to stabilize the river banks, entraps sediment, absorbs pollutants from overland runoff and provides food and shelter for fish and wildlife, (Leedy et al., 1981).

Riverbottom Forest

Each species found along the river's banks has adapted to its own particular set of conditions that has allowed it to survive and thrive. At the river's edge, the bank willow community with its peach-leaf and sand bar willows, dogwoods and annual grasses, thrive as pioneer species, establishing themselves on the recently deposited sediment bars. Further up the bank, the riverbottom forest community is dominated by plains cottonwood, american elm, green and black ash, basswood, manitoba maple, willow species and redosier dogwood. These species have adapted to withstand annual spring and occasional summer flooding conditions. Still higher up the bank, the riverbottom forest merges with the bur oak- aspen and tall grass prairie communities. Here, plants less adapted to withstand flooding take advantage of higher ground and drier conditions. Trees dominating these communities are bur oak, trembling aspen and balsam poplar, while shrub species include snowberry, nannyberry, dogwood, saskatoons, wild grape and virginia creeper, (Cohlmeyer, 1992). Herbaceous species include stinging nettle, mint, asters, goldenrod, anemone and numerous prairie grasses. In addition, these riverbank communities provide



Typical Riverbank Section
Sketch by author

habitat for white- tail deer, beaver, rabbits squirrels, fox, muscrats and over fifty types of birds, (Platford, 1998).

Notwithstanding this rich species diversity, human intervention has dramatically modified the composition of the riverbottom forest in Winnipeg. Early settlers used trees as lumber and fuel to such an extent that by the mid 1800's, the river's banks were virtually devoid of trees. Today, although much of the riverbottom forest has regenerated, its long-term survival is still threatened. Commercial, residential and even recreational development, together with current bank stabilization techniques, all continue to eliminate riverbank vegetation. Flood control measures and altered drainage patterns deprive the plant communities of water and rejuvenating sediments. These flood control measures combined with current fire control policies, have allowed dogwood and willow to establish as dense shrub layers, inhibiting the regeneration of basswoods, elms and cottonwoods. Also, Dutch Elm Disease continues to take its toll on the american elm population both along the river and within the urban neighborhoods. It is therefore crucial that future riverbank development protects what is left of the riverbottom forest and restores new areas where possible to ensure that future generations can benefit from their recreation and education opportunities.

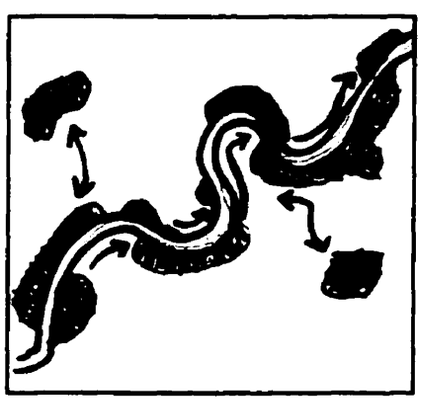
"Monkey Trails"

Guideline 5 – In the development of river access sites, every effort must be made to preserve existing native vegetation and to restore new areas through naturalization techniques.

Guideline 6 – New plantings on river access sites should be selected from native species adapted to those specific conditions, in order to increase survivability and to maintain and improve the regional identity and natural aesthetic of the riverbottom forest.

3.1.5 Landscape Ecology Principles

Landscape ecology provides a spatial language from which to describe and analyze how a heterogeneous combination of ecosystems are structured, function and change, (Forman & Godron, 1986). The concepts of patches, edges, corridors and matrixes found within landscape and community ecology can be applied to restore areas along the Red River and contribute towards self-sustaining communities, with maximum species and habitat diversity. In using these principles, designers of riverbank access projects can create rich natural areas that fit in with the larger regional landscape and exemplify the spirit and aesthetic of the prairie river environment.



Connectivity between river corridor patches
Sketch by author

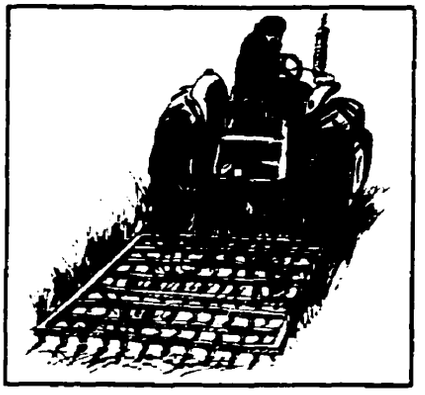
The ecology of the prairie and riverbottom forests communities in Winnipeg has been severely altered due to human intervention and urbanization. What is left is a narrow and often fragmented band of forest running along the banks of the river, providing a corridor through the city that links to larger and more diverse patches to the north and south of the city limits. Within the city limits there are a few sparse connections between this corridor and other remnant patches of riverbottom and bur oak-aspen forests. The challenge for river access projects is to strengthen the patch size, edge conditions and connectivity of sites along the Red River and to choose sites that can be reasonably linked to other natural patches within neighborhoods.

Oak Seedling

Guideline 7 – The design of river access sites should utilize landscape ecology principles to create more diverse and self-sustaining natural patches along the Red River corridor and to strengthen connectivity between these and other natural patches within and beyond the city limits.

3.1.6 Naturalization Techniques

Naturalization can be defined as an approach to landscape design and management that aims to introduce and encourage self-sustaining plant communities through the use of native and non-native plants. Very often, this term is interchanged with the term restoration, meaning an attempt to restore a landscape to its pre-disturbed, natural state. Whichever term is used, the naturalization or restoration of a riverbank community such as that along the Red River, requires an in-depth understanding of not only the plant species and associations of the riverbottom forest community, but also the ecological factors which allow a community to be self-sustaining.

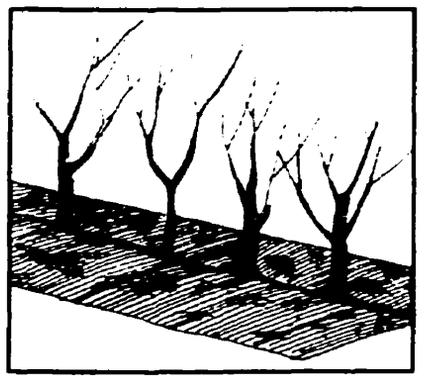


Scarifying turf for meadow planting. (Source: Baines & Sirant,1991).

Diverse landscapes including areas of both meadow and woodlands should be preserved and/or created to encourage both biological diversity as well as a diversity of experiences for human use, (McLachlan & Simon, 1996). In reintroducing nature to a site, either passive or active approaches can take place. Passive approaches involve the cessation of current maintenance regimes such as mowing and allowing natural succession processes to take place. This approach requires effective public education to promote an understanding of the long time frame needed for nature to take its course. More active techniques include managed succession and plantation approaches whereby trees and shrubs of a desired species composition are planted over one or more years. After this initial establishment, natural succession is allowed to continue (Hough

and Barrett,1987). Selection of a naturalization approach should be based upon design intent, budget constraints, time frame and site conditions.

Michael Hough further emphasizes two key points in dealing with naturalization projects in his essay, *"Naturalizing Parks and Nonpark Spaces"*. Firstly, he urges that naturalization does not have to give the image of abandonment and that the design of natural areas can still utilize strong forms, patterns and edges to give meaning and beauty to the site and to convey a sense of purpose and complexity. Such an approach has been shown to have greater public acceptance in many communities. Secondly, Hough stresses that education and information is the key to public acceptance of naturalization programs. This can take place in the form of public meetings, demonstrations, distributing leaflets and providing on-site signage and displays, (Hough, 1990).



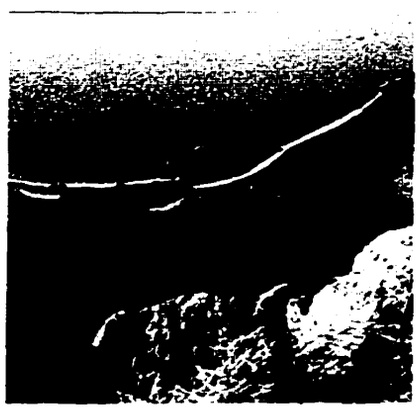
Weed barrier for naturalization plantations. (Source: Baines & Sirant, 1991).

Guideline 8 - In locations where it is appropriate, areas of river access sites should be naturalized to reduce maintenance, provide greater bio-diversity and to restore and enhance the natural aesthetic of the riverbank environment.

Guideline 9 –Naturalization areas should evoke a sense of purpose, meaning and complexity to the site through the use of strong design elements, while public education should be a key component in the design, development and maintenance of such areas.

3.1.7 Fish Habitat

The high sediment load of the Red River produces a river bottom of silty-clay with little in the ways of underwater plants or habitat structure. Despite this apparent lack of fish habitat, the Red River is one of the most bio-diverse rivers in Canada, providing habitat for at least twenty species of sport fish and over forty species of non-sport fish and minnows, (Manitoba Department of Natural Resources, 1995). Within Winnipeg, the Red River is well known for its abundant fishery of channel catfish, goldeye, sauger, walleye, silver bass, and carp. It is therefore important that those involved in river access development projects have an understanding of the behavioral and habitat preferences of fish within the Red River so that existing habitats are not destroyed and where possible, new habitats can be created.



Fish habitat

In general, the fish of the Red River are attracted to any type of underwater structure that can be found. This would include

bridge pilings, docks, fallen trees, log- jams along shore and rock rip-rap that extends into the water. This structure affords the fish places where they can rest in shade, protected from the current and wait for insects and baitfish to float into their path. Fish also seem to be attracted to pools scoured in the river bottom by current or from the outflow of storm sewers. These outflows seem particularly attractive, most likely due to the concentration of insects, debris and other nutrients that flow from them after storm events. The mouths of rivers also provide suitable habitat for many species. In terms of spawning habitat, channel catfish and bullheads require dark secluded areas, under rocks or logs near shore, undercut banks, or even man -made containers in which to lay their eggs. Walleye and sauger prefer coarse gravel, boulders or sand in order to spawn, all of which are quite rare in the Red River but are found in many of its tributaries, (Newbury,1993). Goldeye thrive in the turbid waters of the Red and move into pools in order to spawn. Carp are an introduced species from Asia and Europe that have adapted to the conditions of southern Manitoba conditions. They are primarily bottom feeders that spawn in shallow marshy tributaries of the Red River.

Master Angler Channel Catfish- Author's brother.

Guideline 10 – Design interventions along the river's edge and within the river itself should preserve the habitat requirements of native aquatic species and where possible such habitat should be enhanced.

3.2.8 Water Quality

The fine clay soils of the Red River Valley cloud the river with silt, giving its waters a turbid and muddy appearance, often mistaken for pollution. In reality, the river is relatively clean and healthy, but does suffer some impact from human settlement. Agricultural use south of the city effects water quality through the run-off of nutrients, pesticides and sediments. Also, cities and towns along the river discharge domestic and industrial sewage with varying degrees of treatment into the river. These factors add to the turbidity of the water and can negatively effect the ecological communities of the river through algae blooms and increased toxicity, (Wardrop,1991). Within Winnipeg, discharge from sewage treatment plants, land drainage sewers and combined sewer overflows are the major factors affecting water quality. During dry weather conditions, the discharge volume of the City's three sewage treatment plants are the major influence on nitrogen, phosphorus and fecal coliform levels in the Red and Assiniboine Rivers. In wet weather conditions, large discharges and peak loading occurs from land drainage sewers and combined sewer

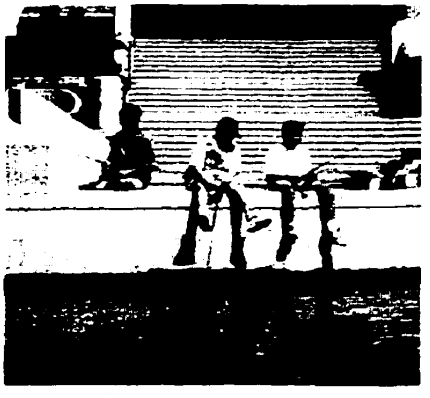
Water Quality Signage

overflows. These wet weather discharges can significantly impact on the physical characteristics of the river (turbidity, suspended solids, grease and oils, etc.) and microbial characteristics (fecal coliform). It should be noted that fecal coliform levels decay rapidly in the river environment, resulting in a 3 to 4 days of peak loading. However, it is often the aesthetic impact of these wet weather discharges that can give the impression that the Red River is polluted, (Wardrop,1991).

Land drainage sewer outfall

A 1986 study by MacLaren Engineers Inc. showed that general public opinion was that the Red River was "contaminated and dirty". A 1990 phone survey by the City concurred with this finding, with over 75% of respondents indicating that the dirty appearance of the river discourages them from recreational use, (Wardrop, 1991). The influence of both rural and urban human activities on the quality of the Red River's waters is quite significant, but perhaps not as detrimental as this public opinion suggests. Primary recreation activities such as swimming and water skiing are not suggested due to the turbidity of the water and potential health problems from direct contact with fecal coliforms. However, secondary activities such as canoeing, rowing and shore fishing pose little risk provided certain precautions are kept. The City and Provincial Health Branches have indicated that fish caught in the Red River are a "safe and nutritious source of food if properly handled, stored and cooked", (Manitoba Department of Natural Resources, "Get Hooked" pamphlet,1996). Likewise, the City of Winnipeg, Water and Waste Department has implemented a program to educate the public on the current status of river water quality and the options and plans for future improvements. If river access developments are to be accepted and used, it is crucial that programs of this type continue, so that the public can begin to understand the river water quality situation in Winnipeg, as well as the complex factors influencing it.

Guideline 11- Design of river access sites should protect users from primary contact with the water especially near combined sewer overflows, but also serve to educate the public on the current water quality situation in Winnipeg.



Shore fishing- Assiniboine Riverwalk

3.2 Cultural Resource Issues

3.2.1 Shore Fishing

Throughout Winnipeg, almost every location where persons can manage to get themselves down to the river's edge, is used for urban shore fishing at some time or another. The development of

river access opportunities throughout the city would undoubtedly attract many anglers looking to enjoy Winnipeg's rich urban fishery. As opposed to the Forks where such activity is banned, future river access sites should be designed to accommodate and attract such use. While there are no universal standards for the design of shore fishing access, several considerations should be integral to any design solution.

In selecting appropriate river access sites, consideration should be given to the proximity of existing fish habitats or such habitat could be provided in the design. Also, the actual process and techniques of shore fishing should be understood and reflected in the design. Safe areas for casting as well as sufficient spaces for landing and netting fish are important for enjoyment, function, and safety. The design should allow anglers to reach and have contact with the water, while still protecting users from falling into the strong current of the Red, through the use of railings and other design detailing. Anglers on the Red tend to cast a line with a pickerel rig and prop up their rod on a stick, waiting for a fish to strike. Access sites should therefore incorporate seating as well as means to prop up angler's rods at the river's edge in the design solution. In addition, micro-climate and shelter from the sun, rain and winds are additional considerations of shore fishing design.

Walleye ("pickerel") caught by author.

Perhaps more importantly, river access opportunities should celebrate and provide an appropriate environment for the experience of fishing. The feeling of escape from the urban city, the solitude and tranquility of the river's edge, the ritual and anticipation of waiting for a fish to strike and then the mystery and excitement of bringing a fish to shore, revealing its size and species, all bring anglers back time and again.

Design Guideline 12 – At the river's edge, access sites should include safe and educational areas for shore fishing that are designed with consideration of the techniques utilized by Red River fishers and that celebrate the ritual, mystique and experience of fishing.

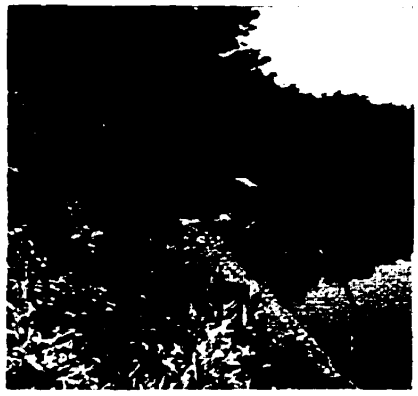
3.2.2 Canoe Launching

Like shore fishing, canoeing is another activity that should to be incorporated into the design of river access opportunities. Perhaps no activities can rival that of canoeing and rowing in terms of experiencing the aesthetic of a river corridor, the abundant fish, wildlife and plant species present, as well as the natural currents of the river flow. In the design of access sites, pathway width, slope

Rower on the Red River

and degree of curvature should reflect the required space needed for a canoe to be carried effectively and safely to the river's edge. Rip-rap should not be located in launching areas to prevent damage to canoe bottoms and designers may also consider a change in the bank configuration to provide a reduction in river current for launching and landing canoes more easily. In addition, the selection of sites should consider the availability of nearby parking so users do not have to carry their canoes and equipment over long distances. Also, the proximity of storm sewer outflows may be a consideration for health reasons, as canoes can be prone to tip. The edge condition itself should be closely considered in terms of providing a safe area for launching and landing a canoe in a variety of river level conditions.

Guideline 13 – The design of river access sites should consider and provide for the launching and landing of canoes, including accessible pathways from the street to the river and in appropriate and safety conscious detailing at the river's edge.



Riverbank ecology

3.2.3 Environmental Education

Recently, many school divisions have begun to develop environmental education as a part of their curriculum, allowing young people the opportunity to learn about biophysical processes and urban ecology. The development of river access sites throughout the city would allow many schools to include riparian and riverbottom forest ecology as a part of this study. Such sites could be restored to a state such that students could be exposed to the greatest possible diversity of plant and animal species within the forest communities along the river. The design of these sites should allow for a diversity of use, from passive and contemplative observation of nature, to more active and exploratory activities. River access should be designed to allow for large classroom groups to reach the river and provide areas for discussion and demonstration. At the river's edge, opportunities for direct contact with the water for the use of dip nets and close observation should be considered in the design, however safety is of key concern. In addition, interpretive signage should be integrated with the design to aid teachers and to allow parents to bring their children to the sites to learn about these important environments.

River pollution/ dumping

Guideline 14 – River access sites should be restored and preserved to display the diverse habitat and ecology of the Red River and riverbottom forest and include signage and interpretive areas for both individual and group environmental education opportunities.

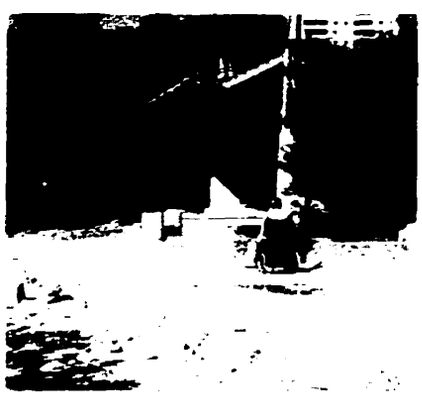
3.2.4 Winter Activities

For the months of November through March each year, Winnipeg already has a potential linear parkway along it's frozen rivers. However for safety reasons, winter activities such as cross country skiing, snow shoeing, skating and ice fishing should be limited to the months of December through February, when ice conditions are at their thickest. Even at these times, discharge from treatment plants, land drainage sewers and industry can create dangerous ice conditions even in the coldest weather. It is therefore important that site selection consider these factors and that any efforts to encourage the winter use of the Red be coordinated with the City's Harbour Master. Nonetheless, the winter use of Winnipeg's rivers is virtually untapped with the exception of areas around the Forks.

Winter ice

Design for river access in winter needs to resolve the movement of people from the upper bank to the drawn down winter ice level. This may include additional stairway areas that are submerged most times of the year except winter. Protection from wind and consideration of solar patterns are also important for comfort and can allow for a more extended period of use. The use of existing and new vegetation can be used to create micro-climatic areas that allow for extended solar exposure and that are sheltered from winter winds. There may also be opportunities where appropriate, to incorporate temporary or permanent structures to act as shelter while putting on skates or skis or for warming up on cold days. Overall, the opportunity for winter enjoyment of the river should not be overlooked.

Guideline 15 – In appropriate locations, access sites should be designed for winter activities, taking into account the lower winter river ice levels, safety and micro-climate.

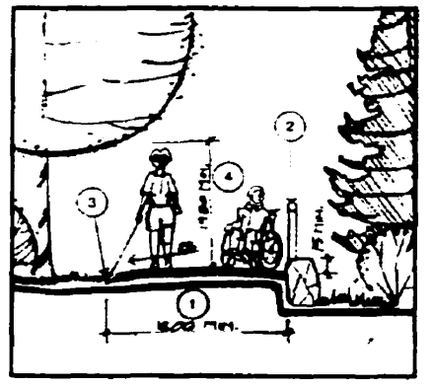


Wheelchair access-
Assiniboine Riverwalk

3.2.5 Universal Access

Over 13% of Canada's population have some form of disability, with that figure increasing dramatically as the mean age of the population increases. The beauty, tranquility and spiritual experience of the river's edge is the right of all citizens and as such, all river access sites should be designed for universal access. Providing for universal access in design goes far beyond wheelchair accessibility, to include a diversity of disabilities ranging from blindness to hearing impaired. By increasing bio-diversity, a greater variety of smells, textures and sounds can be experienced by all site users, including visually and mentally impaired persons.

When considering river access design, the movement of persons down the slope of the bank becomes an important challenge. Changes in grade levels from the street to the river's edge can be as much as 10 to 15 metres along the Red River. Therefore, ramps to the river's edge will likely be needed to provide accessibility and should have no more than an 8.3% slope, with no more than 6 metres between level landings, (National Capital Commission, 1992). Path widths should be a minimum of 1.5 metres wide to allow for adequate movement of wheelchairs and people with other disabilities, while walkways should be of a firm, slip resistant surface with a slope of no more than 5%. The design detailing of railings along stairs and ramps, as well as at the water's edge is important for safety of all users and could be used as a part of the overall design expression.

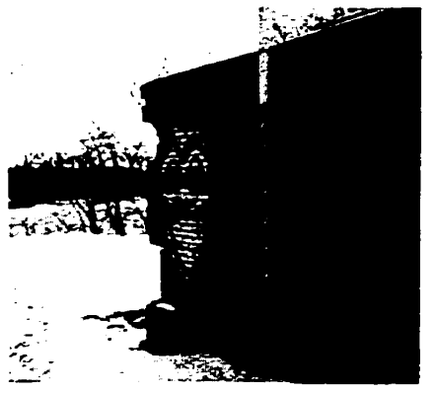


Universal access guidelines. (Source: Natiuonal Capital Commission, 1990).

Guideline 16 – Access to the river's edge should be created for users of all ages and abilities and the detailing of such sites should utilize current universal design strategies to provide for the needs of persons with various disabilities.

3.2.6 Safety/ Crime/ Vandalism

Issues of safety were found to be among some of the key concerns found in a several recent surveys dealing with riverbank access and urban fishing. For example, the "*City of Winnipeg Sport Fishing Survey,*" prepared by the Department of Natural Resources, found that over 47% of respondents who currently fish in Winnipeg stated they would increase their use of the riverbank if locations were safer. When discussing river access development, safety is a broad term that can refer to a number of different safety issues. In one sense, it can refer to the safety inherent in the detailing of the design that reduces or limits the risk of injury for users of the site. Safety can also refer to the safety that persons may or may not have from being so near to the swift currents, ice flows and pure force of the Red River. These aspects of safety must be dealt with successfully in the design so that all potential site users can enjoy the attributes of the river, free from injury. However, when dealing with public open space and more specifically riverbank sites with varying amounts of natural forested areas, safety from both perceived and actual crime is crucial for the success of a project.



Graffiti at combined sewer outfall

Many people perceive risk with the relative isolation that can occur along riverbanks and within wooded areas. However, it has been shown that only a very small percentage of urban crime actually takes place in park and other wooded areas, (Hough and

Barrett,1987). Nonetheless, care must be taken within the design of public open space to prevent potential crime. Crime Prevention Through Environmental Design (C.P.T.E.D), is based upon the premise that the design of physical space can have a bearing on crime and security incidents. Three overlapping strategies of this approach are access control, natural surveillance and territorial reinforcement, (Canin,1994).

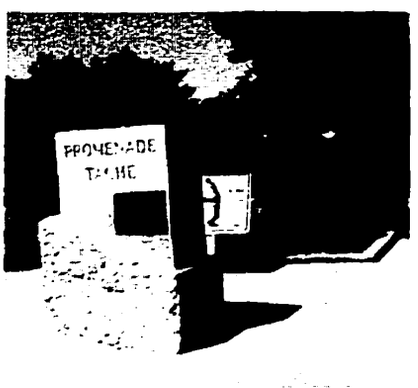
Hough and Barrett also discuss several guidelines that have proven helpful in both discouraging crime and creating a perception of a safe environment in public open space. Firstly, activity areas and circulation space should be clearly visible from nearby streets and residences so that users and potential wrong doers have a sense that the area is being monitored. Also, dense plantings should be set back from pathways in order to create defensible and more open space. Tall trees with an open under-story can be used to define spaces while still allowing visibility. Lighting can be used along pathways in heavily used open spaces to allow for continued visibility and monitoring at night. However, less frequently used spaces should not be lit in order to deter people from using areas that should not be used after dark. Finally, by encouraging a greater variety of activities on a site and subsequently a greater number of site users, public open space can be largely self-policing.

Open views to the river

Guideline 17: River access design should utilize C.P.T.E.D. principles to increase both perceived and actual safety, including clear visibility from streets, adequate lighting and defensible space.

3.2.7 Neighborhood Connectivity

As mentioned previously, one of the key goals of river access development is the potential connectivity that can be created between the river environment and adjacent residential neighborhoods. This linkage should be more than just physical and include the experiential transition from an urban to natural setting. Entrances to river access sites should act as gateways, a visible part of the streetscape inviting residents to a place that is rightfully theirs as a part of their community. These gateways should reflect the unique character and spirit of the residential neighborhoods that they are a part of and can serve to educate about the cultural past of the area. In addition, signage can be used to identify the site by name, as well as to indicate the site's environmental, educational, recreational or cultural significance. Wherever possible, the design character and natural features of the site should be extended to the streetscape and beyond into the neighborhood, linking the site to



Tache Promenade- Streetfront elements

other natural areas, schools, community centres and other important places in the community.

Guideline 18 – River access sites should serve as gateways to the river environment, and should be linked to adjacent neighborhoods, significant community facilities and other natural areas through the use of design elements such as plantings, paving and signage

3.2.8 Neighborhood Identity

Very often, public open space is under-utilized, misunderstood and rejected by the majority of the neighborhood that it was intended for. Much of this relates to the generic treatment of our parks in their programming, design and maintenance, with no consideration for the surrounding context and character of the area. All public open space, including river access sites, should be designed to reflect the unique identity and sense of place that is inherent to that neighborhood. The City of Winnipeg has already conducted intensive study in the creation of neighborhood characterization boundaries for planning initiatives, delineating neighborhood areas based on character, ethnicity, historical development and demographics. Similarly, such factors should be reflected in the design of public open space, helping to make these spaces identifiable parts of the neighborhood, and giving residents a sense of ownership and community pride.

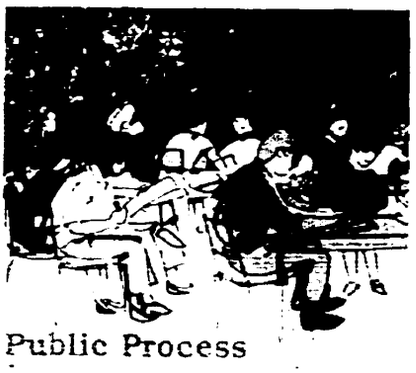
Joseph Royale Park-
Design feature mimics the outline of St. Boniface Basilica

In the creation of river access opportunities, the notion of place should manifest itself in the design, giving both identity and meaning to the site, as well as a sense of connection between the site and the residents of the neighborhood that it is a part of. This connection between people and place is one of the fundamentals of good design and can be explored at a number of different scales. At a regional level, a riverbank site can be described and represented in terms of its connection to the Red River corridor, the Aspen Parkland landscape, the Canadian prairie and the climatic and physical characteristics that are unique to such environments. At a neighborhood level, such sites can be shown as a remnant patch of a riparian ecosystem, as well as a part of a unique neighborhood with its own history, street patterns, architectural character, ethnic population and demographic make-up.

Guideline 19 – Design of river access sites should exhibit a sense of place, reflecting the history, character and spirit of both the regional landscape, as well as the local neighborhood that it is situated in.

3.2.9 Community Participation

As mentioned above, public involvement in the design process is crucial if residents are to have a sense of ownership and pride in neighborhood river access sites. Once this sense of ownership is established, residents are more likely to assist in the policing and maintenance of a site (Hough and Barrett,1987). Children and teens are more likely to use a site and less likely to vandalize it if the feel a part of the process that created it. Such community participation can also help to ensure that the needs of the community are met and that a wide range of activities is provided for in the project program. Public input meetings are also good opportunities for designers and public administrators to educate and inform the community on site issues such as naturalization, water quality and safety. Community involvement is also a means reducing costs of site development and increasing community pride through the use of volunteer labor.



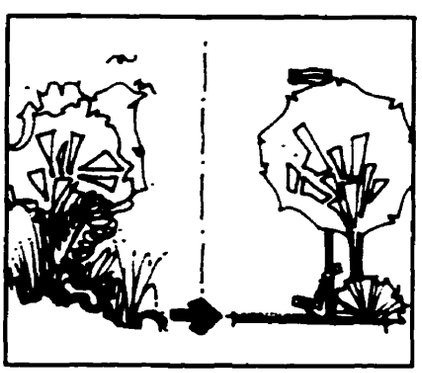
Community involvement.
(Source: Community Greeenways, Lanarc Consultants, 1995

Community groups such as churches, community centres and school associations are instrumental in raising funds and grants for the construction and maintenance of local park development projects. The development of river access sites could be assisted by a number of public interest groups including local rotary clubs, naturalist societies and conservation groups in soliciting grants and political support. Considering the tough budgetary constraints on today's governments, it will take strong community partnerships if river access development is to be realized.

Guideline 20 – The planning and design of river access sites should have strong community focus to educate the neighborhood, promote involvement and encourage community acceptance and ownership.

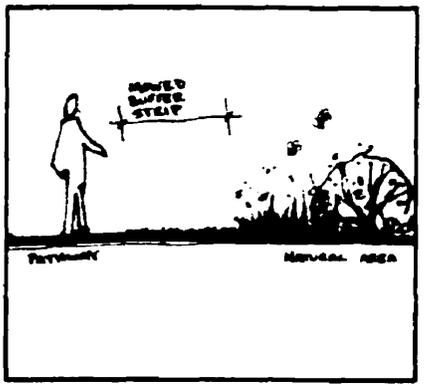
3.2.10 Maintenance

Budgetary cuts, inefficiencies and the continued reliance on traditional turf landscapes have made it difficult for the City to maintain its existing inventory of park and open space. The design of river access sites should strive to minimize areas of mown turf through naturalization and provide a greater diversity of public open space experiences. While requiring maintenance for the first few years, woodland and meadow areas can be low maintenance alternatives to turf, once successfully established. Annual controlled burning or mowing has been shown increase diversity, vigor and cover of native plants and keeps invasive grasses, weeds and woody plants in check, (Diboll, 1986). Buffer strips should be provided



Natural and maintained landscapes.
(Source: Plan Winnipeg- Parks and Recreation Component, 1981).

between naturalized areas and residential properties and the edges of natural areas should be well maintained to eliminate the perception of neglect, (Hough and Barrett,1987). Education of maintenance staff is imperative on such sites to ensure that natural succession processes are allowed to proceed where intended and that proper maintenance regimes are carried out where need be. Well-informed maintenance staff can also provide on-site education to the public for naturalized sites and non-traditional maintenance techniques.



Buffer strip adjacent to natural areas/ pathways

Due to seasonal layoffs, it is often difficult to have staff available in the fall to remove dock structures from the rivers. In addition, extreme fluctuations in river levels during summer flooding can damage most floating dock structures or require constant attention from maintenance staff. As such, permanent access structures rather than moveable docks would be more appropriate in most instances. There is also a need with such sites to have maintenance crews pressure wash silt deposits off of pathways and benches after spring flooding or summer high water level periods. Considering this, pathways should be designed to accommodate the weight of vehicles and should be at least 8 feet wide to allow for their access.

Guideline 21 – Low maintenance landscapes should be a priority in river access site design, incorporating minimal turf areas, clearly defined edges around natural areas and should recognize the maintenance requirements for silt removal near the river's edge after high water periods.

4.0 Site Selection: Opportunities and Recommendations

4.1 Current opportunities

The City of Winnipeg currently owns over 200 parcels (totalling 35.4 kilometers) of riverbank property along the Red River, in the form of park sites, infrastructure right-of-ways, street ends, and bridge crossings. Within the study area (south end), there are at least 88 such opportunities consisting of 4 regional parks, 2 major lineal parks, 41 community park sites, 2 semi-public golf courses, 5 bridge crossings and 34 infrastructure/ street right of ways.

Churchill Drive Park

Formalized access is currently limited to the Downtown Riverwalk, boat docks in the regional parks, along with access nodes at the Tache Promenade, and the newly constructed Old St. Vital River Promenade and Don Gerrie Park on Churchill Drive. People are able to find other informal access areas for shore fishing or river watching wherever bank slope and clearings in vegetation permit. These sites however are not necessarily safe and are not suitable for use by most residents.

Regional Park Sites- Within the study area, Maple Grove Park, Crescent Drive Park, King's Park and St. Vital Park currently offer a combined total of nearly 9 km of riverbank frontage. With the exception of King's Park, these parks have boat launch and dock facilities that provide access to the river's edge and surface. However, these facilities are designed for motorized boat access and as such, generate a fair amount of boat traffic and noise, which are not ideal for fishing or the quiet enjoyment of the river environment. These parks are designed more for automobile access from across the city than for pedestrians in the adjacent residential community, but do offer amenities such as parking, washrooms and picnic facilities. All four of these parks have significant areas of major bank failure and erosion and inaccessible steep banks. There are however numerous access opportunities in these parks, where bank slope and clearings in vegetation allow people to reach the river's edge. Several locations closest to the park entrances (and the adjacent neighborhood) seem most appropriate for developing more formalized river access.

St. Vital Park

Community Parks- Many of the existing riverbank properties designated for community parks have yet to be developed and have been acquired by the City either through tax sale or sub-division

agreements for future lineal greenway development. Many of these undeveloped parcels are situated behind residential properties and are not appropriate for access opportunities until such a greenway is built. Other undeveloped parcels are well situated for providing river access, although construction costs would likely be higher than those park properties that already have been developed. Several parks in newer neighborhoods such as Normand Park and River Pointe are well integrated with the adjacent residential development and could be ideal for creating river access opportunities.


Normand Park

Major Lineal Parks- Churchill Drive Park with 4.5 km and Lyndale Drive Park with 1.75 km of riverbank respectively, are large lineal parks that are highly utilized open space for the neighborhoods that they surround. Both parks have areas where the banks and river's edges are fairly accessible, although not through any formal design or planning. Both parks also suffer from extensive areas of bank failure and erosion, although 260 lineal metres of Lyndale Drive had nearly $1,000,000 in riverbank restoration work over the winter of 1999-2000. In 1999, the City also constructed entry nodes and extensive pathways along the upper banks in both Lyndale Drive and Churchill Drive Parks, as a part of the Winnipeg Development Agreement. Considering that these entry nodes and pathways are already in place, as well as the importance that these parkways play in their respective neighborhoods, these parks seem ideal for the development of river access opportunities. Don Gerrie Park on Churchill Drive, in connection with the Manitoba Kayaking and Canoeing Association facility, has recently had canoe and shore fishing access constructed along the riverbank.


Lyndale Drive Park

Semi-public Golf Courses- Within the study area, Wildwood Golf Course and the Canoe Club Golf Course are both developed on City of Winnipeg land, but are leased and operated by private organizations. The natural areas along the riverbanks of these courses may lend themselves to being a part of a linear parkway in the future. However, encouraging neighborhood access through these sites may be deemed as incompatible with the needs of the golf course patrons. At the very least however, access to the river for winter activities could be achieved. The long-term viability of the Canoe Club Golf Course has been the subject of recent debate and future developments may allow for additional river access opportunities for that neighborhood.

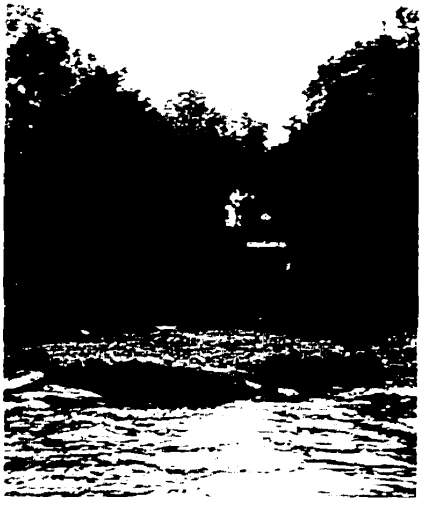

Wildwood Golf Course

Bridge Crossings- The five bridge crossings within the study area include the South Perimeter Bridge, Fort Garry Bridge (Bishop Grandin), St. Vital Bridge, Norwood Bridge, and the Riverdale

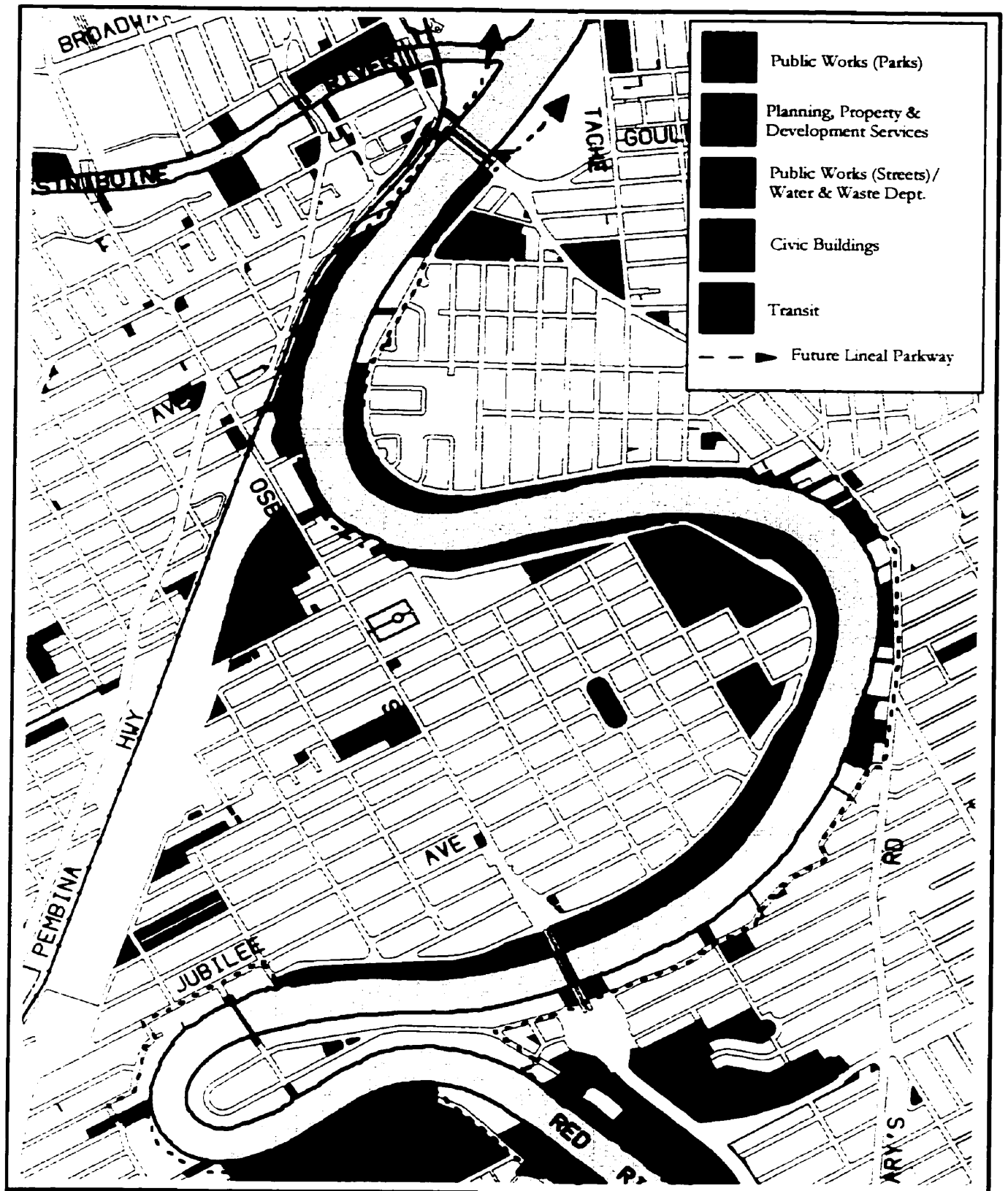
Foot Bridge(BDI). These bridges and their adjacent right-of-ways currently offer access to the river's edge. Stabilization works tend to already be in place to ensure that the structure of the bridge is not compromised. Very often, these rip-rap bank works tend to provide structure and habitat for many fish species and as such, are good opportunities for shore fishing. However, most riverbank vegetation has typically been removed and the overhead noise of traffic takes away from the true experience of the river environment. In addition, the lack of visibility and policing of these sites can gives these locations the perception of being unsafe and may be unsuitable for encouraged pedestrian traffic. The area under the Main/ Norwood Bridge has demonstrated that once a lineal parkway is developed, enough pedestrian and cyclist traffic is generated to make for a safe access opportunity. While the Main/ Norwood Bridge does have a river level walkway under the bridge, it is not designed to allow for canoe access or shore fishing. The Riverdale Foot Bridge may be an excellent opportunity considering that it is a pedestrian bridge and can draw from residential neighborhoods on both sides of the river.

St. Vital Bridge

Infrastructure / street right-of-ways- The majority of these properties are utilized by the Water and Waste Department for land drainage and combined sewer overflows into the river. Water quality can be an issue at combined sewer overflows, where raw sewage may be discharged into the river following peak storm events. There are 16 such combined sewer overflows within the study area, with the majority in the older, more established neighborhoods such as Fort Rouge and Norwood Flats. The land drainage right-of-way parallel to Bishop Grandin Boulevard is a potential lineal parkway in its own right and could be used to link the future Red River Greenway to the Seine River Greenway, (and all neighborhoods in between). Many existing street right-of-ways are undeveloped and could provide direct links to their adjacent neighborhoods.



Moore Avenue land drainage R.O.W.



North

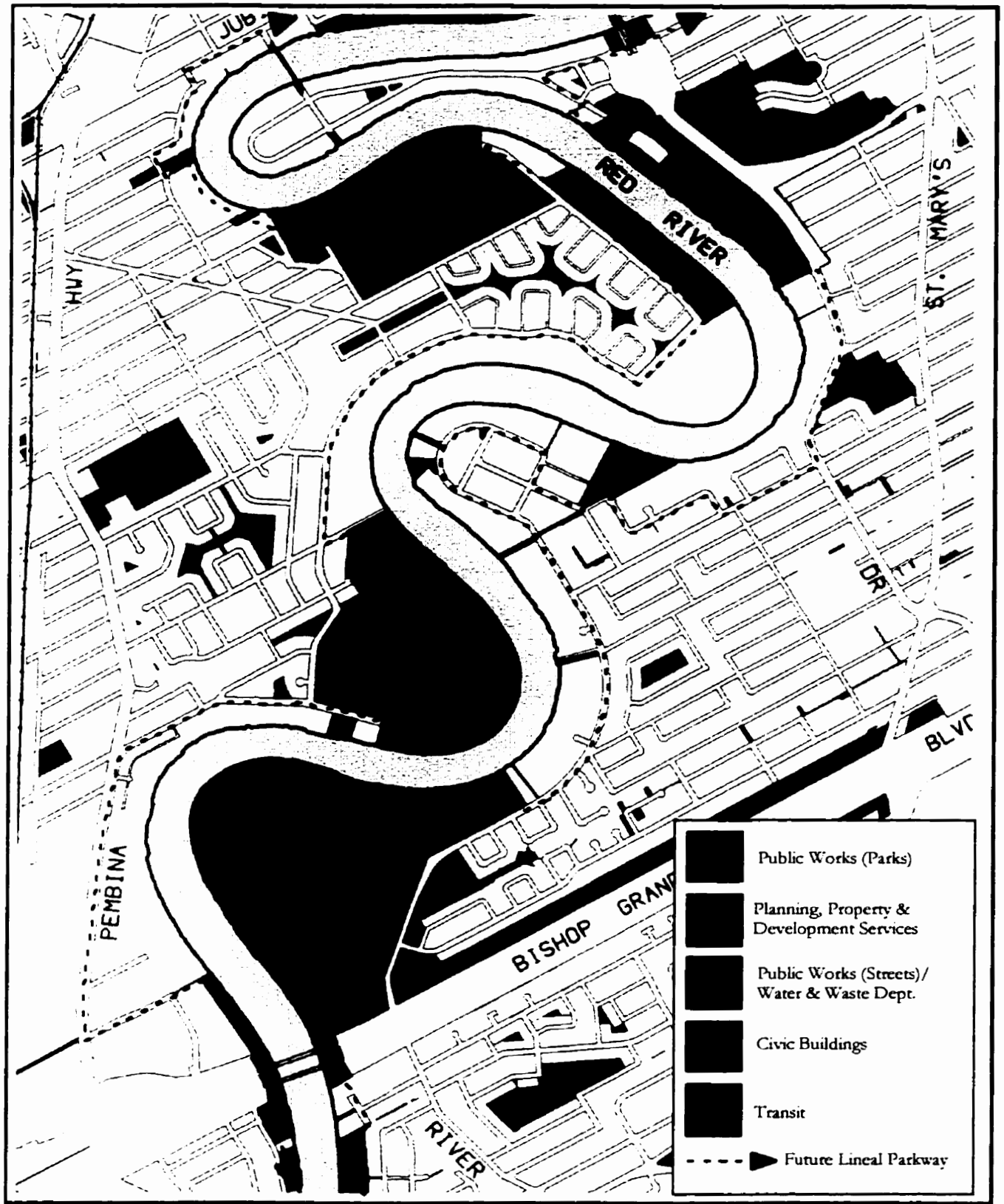
Existing City-Owned Riverbank Properties

(Sheet 1 of 3)

Scale 1:20,000 metric

South Red River Access Study: Search for a River Spirit

Kenneth J. McKim



North

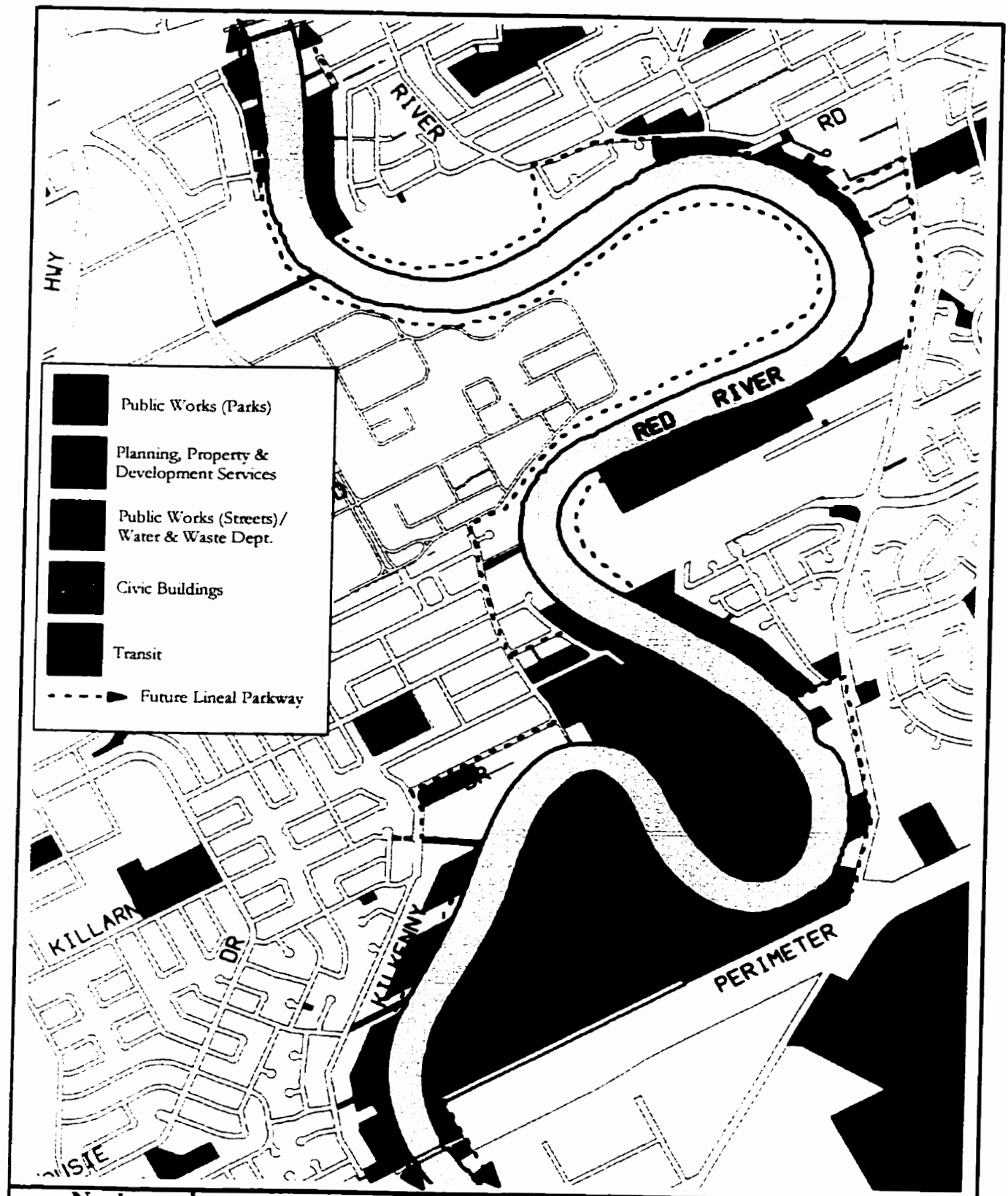
Existing City-Owned Riverbank Properties

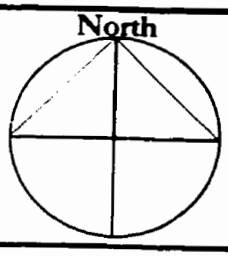
(Sheet 2 of 3)

Scale 1:20,000 metric

South Red River Access Study: Search for a River Spirit

Kenneth J. McKim





Existing City-Owned Riverbank Properties

(Sheet 3 of 3)

Scale 1:20,000 metric

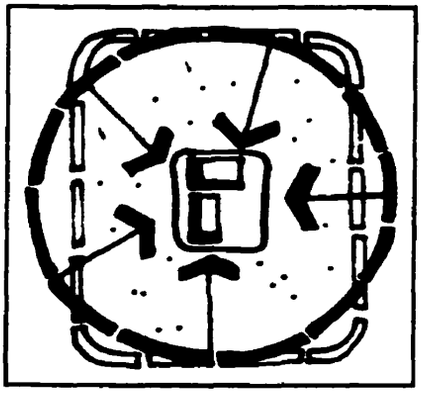
South Red River Access Study: Search for a River Spirit

Kenneth J. McKim

4.2 Site Selection Criteria / Issues

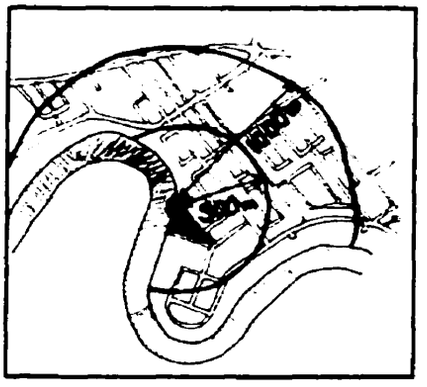
With at least 88 potential properties within the study area, it is imperative to establish criteria that can aid in the selection of appropriate locations and numbers of river access development sites. This study is premised on providing river access on a neighborhood level and therefore ideally, each neighborhood area along the Red River should have an access site within a relatively short walking or cycling distance.

In his book, *A Pattern Language*, Christopher Alexander's investigation of human tendencies within the built environment, he indicates that approximately 750 feet (228.6 metres), or about a three minute walk, is the limit that people will travel on a regular basis to experience a neighborhood park. Leon Krier, one of the key urban planning theorists of this century, argues for communities and amenities "based upon the human figure", or the territory that a person can cross in ten minutes (approximately 1 kilometer). In 1981, the City of Winnipeg, Parks and Recreation Department, set a guideline of 1/4 mile (400 meters) as the maximum walking distance to neighborhood facilities in its "*Plan Winnipeg-Parks and Recreation Component*" document. It should added that the "*Winnipeg Leisure Study*" determined that Winnipeggers not only place a high value on nature and the public use of riverbanks, but also have extremely high interests in walking and cycling as leisure pursuits. It is therefore likely that people would walk or cycle a reasonable distance within their neighborhood to enjoy nature and the river.



1/4 mile radius to neighborhood facilites. (Source: Plan Winnipeg-Parks and Recreation Component, 1981

Considering this information, a 500 meter radius, (1 kilometer diameter) or about a five minute walk, will be used as a measure of the minimum catchment area for new river access sites. A radius of 1 kilometer (2 kilometer diameter) will be used as a measure of the maximum distance that most people would be willing to walk or cycle. While these figures may be used as a guide, one could argue that well designed and enjoyable riverbank destinations would draw from areas well beyond these distances.



Recommended catchment area-500m minimum, 1 km maximum

Other site selection criteria include:

i) Potential for physical and visual connections to other neighborhood amenities such as schools, community centres, cultural and historical sites, as well as park sites and natural areas.

ii) Proximity of a site to a reasonable density of residents making

the development of river access in that location justifiable.

iii) Relationship of a site to existing public open space and walkway systems allowing for stronger neighborhood connections.

iv) Presence of native riverbank vegetation including a mature tree canopy is preferable.

Site selection constraints would include:

i) Proximity to combined sewer overflows due to water quality and health concerns.

ii) Presence of severe bank failure and erosion due to safety concerns and development costs.

iii) Severe slope conditions near river's edge due to safety concerns and development costs.

iv) Isolation of site created by major thoroughfares or railway right-of-ways.

v) Lack of site visibility from public streets and/or residential dwellings.

Erosion on Churchill Drive

4.3 Recommended Network of Access Sites

The following list and attached maps represent a recommended network of 20 river access sites that could be developed to provide access to the majority of neighborhoods located adjacent to the Red River. This list includes 4 existing sites that already provide neighborhood access, although each could be significantly improved. The recommendation of these sites is based upon the site selection criteria identified above, as well as from thorough on-site investigation and study of aerial photography

Site 1- "Spirit Island" (junction of Red and Assiniboine Rivers)

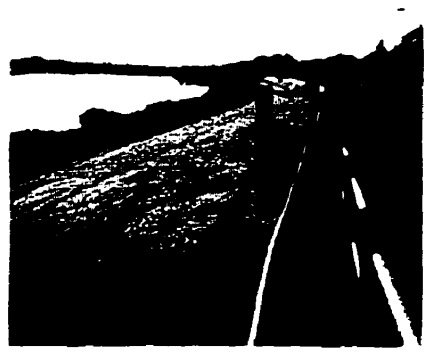
Archaeological findings on this site show evidence of fishing activity dating back many hundreds of years, long before European settlers arrived. The site is being developed as a aboriginal tourism and cultural centre, and there have been discussions that formalized shore fishing and canoe access will be established as a part of this plan.

Site 2- Community Park on Lyndale Drive at Walmer Street
This site is well situated within the Norwood Flats neighborhood for connections to the Norwood Bridge (and downtown), Lyndale Drive Park, Norwood Community Centre, Winnipeg Rowing Club and two local school sites. The property has some good remnant forested areas with a reasonably accessible bank slope.

Don Gerrie Park

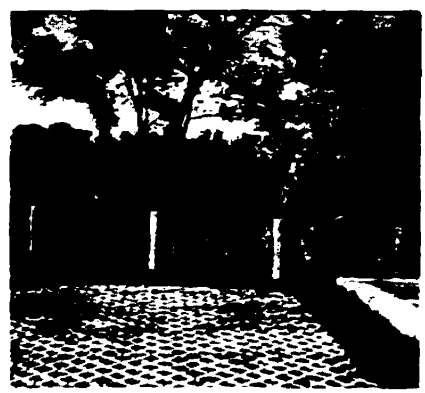
Site 3- Don Gerrie Park Churchill Drive near Fisher Street (Existing Access)
Well situated within the Riverview neighborhood, this site lies directly across from Churchill High School and is on axis with Fisher Park, the main neighborhood open space besides Churchill Drive Park. The site contains the Manitoba Kayaking and Canoeing Association facility and it's recently developed canoe and shore fishing access.

Site 4- Lyndale Drive Park at Gauvin Street
Although lacking vegetation, this site is well situated to serve the southern portion of the Norwood Flats neighborhood, as well as parts of Norwood East and Glenwood. An existing retaining wall along the street edge helps to stabilize the bank and allows for a gentle slope down to the river edge.


Lyndale Drive at Gauvin Street

Site 5- Old St. Vital River Promenade Site (Existing Access)
This recently constructed access fails to provide for handicapped users, is poorly developed along the riverbank, but has great potential. Existing streetscaping links this site to the Glenwood neighborhood and St Vital BIZ area.

Site 6- Churchill Drive Park at Eccles Street
This site is well situated along Churchill Drive to serve the southeast portion of Riverview, with a close proximity to the local community centre. The site has an abundance of mature riverbank forest, but will require slope modification and erosion control works.


Killarney Street land drainage R.O.W.

Site 7- Killarney Street land drainage sewer right-of-way
This site is accessible to most of the Elm Park neighborhood and in close proximity to the local community centre and park space. A recent infrastructure redevelopment of the site failed to address access issues but it could be modified at minimal cost.

Site 8- Churchill Drive Park at Cockburn Street South
This site feature many mature riverbank trees with good viewing of the Riverdale Foot Bridge and St. Vital Bridge. The site is well located along the parkway to serve the Lord Roberts neighborhood

and potentially those across the river in Kingston Crescent.

Site 9- Wildwood Park Community Centre
This is a well-utilized park site within the community with dense vegetation along the riverbank. The site is well located to serve the Wildwood park neighborhood with potential linkages to its Radburn style open space system.

Site 10- Harris Park in Victoria Crescent
This park and land drainage right-of way features a large area of riverbank forest along with maintained park space. The site is well situated to provide access for all of the Victoria Crescent neighborhood and the majority of the Pulberry neighborhood.


Churchill Drive Park at Cockburn Street- (Riverdale Footbridge in distance).

Site 11- Crescent Drive Park at Crane Avenue (Existing Access)
With a good pedestrian connection through the park, as well as up Crane Avenue, this site is already well utilized for riverbank fishing and boat launching. The riverbank slope is gentle at this location and has large elm and green ash trees, but little understorey. There are opportunities to strengthen connections to the neighborhood.

Site 12- St. Vital Park near Falconer Bay entrance
This site is situated near the park entrance and presently serves many shore fishers in the Pulberry neighborhood. Views to Crescent Drive Park, large canopied trees and a gentle riverbank slope make this an ideal access location.


Harris Park/ land drainage R.O.W.

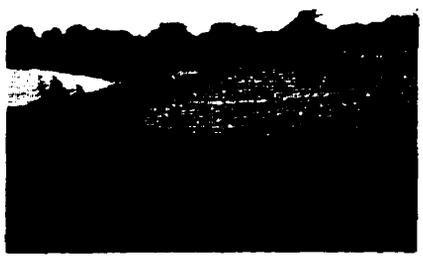
Site 13- Community park site across from Crescent Drive Golf Course.
Located between Crescent Drive Park and a cemetery, this site has a relatively gentle bank slope, large forest canopy and good linkages to the Crescent Park neighborhood.

Site 14- Land drainage right-of-way, north of Bishop Grandin Bridge
This site presents an excellent opportunity to connect with several neighborhoods. Both the Pulberry and Riel areas on either side of the bridge are in close proximity and future greenway development along the Bishop Grandin right-of-way could link the site to the Seine River Greenway.

Site 15- River Pointe Park
A relatively new sub-division, this neighborhood has been designed to preserve the riverbank area and provide access to residents.

There are several good locations within this park where access to the river edge could be constructed, with the point on axis with the main entrance being ideal.

Site 16- River Road Park
This large park site provides excellent views to the river from River Road. Part of the site has been altered through slope modification, sand drains and rip-rap shoreline protection, to ensure the integrity of a land drainage sewer. The more westerly portion of the site has extreme bank failure problems. The site is well situated within the Riel neighborhood with potential connections to Minnetonka School, a large bur oak-aspen forest as well as another large area of riverbottom forest.


River Road Park

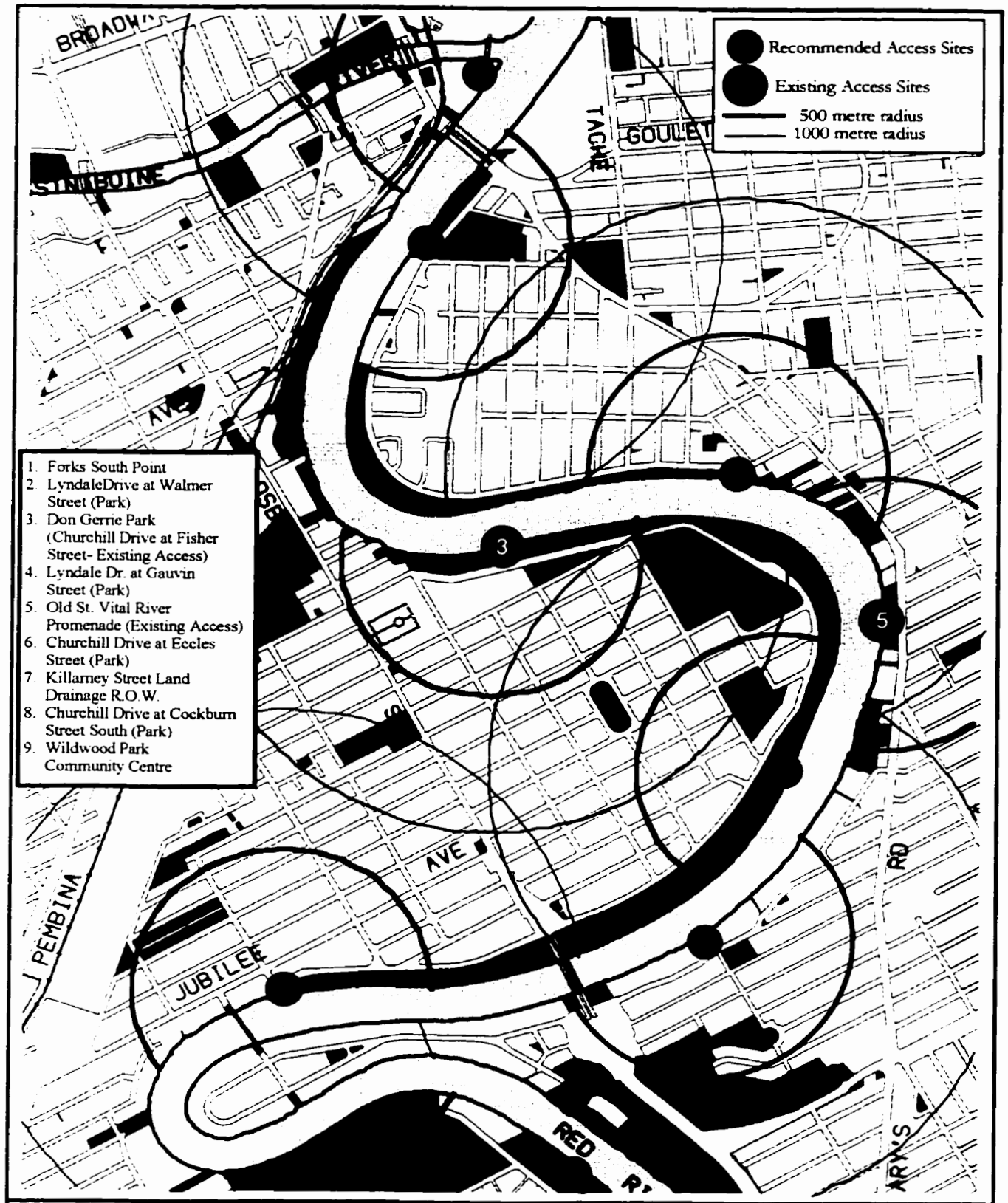
Site 17- Normand Park
Part of another recent residential development, this riverbank park has been designed as a "natural" park with three strong pathway connections to the neighborhood. Large forested areas and workable bank slopes are assets.

Site 18- Maple Grove Park (Existing Access)
This location is one of the most popular shore fishing sites in the city due to accessible banks and abundant fish populations. Proximity to the South End Sewage Treatment Plant outfall is somewhat of a concern due to water quality. Predominantly reached by automobile due to relative isolation and heavy traffic on St. Mary's and Perimeter Highway.


Maple Grove Park

Site 19- Land drainage right-of way, Kilkenny Drive at Linacre Road
This site is a long narrow strip that extends beyond the riverbank into the adjacent Fort Richmond neighborhood. Good potential linkage to forested areas to the north and south that will likely be acquired as park dedication for the future lineal parkway.

Site 20- South Perimeter Bridge and adjacent park
With a close proximity to a large portion of Fort Richmond as well as Cloutier Drive area, this site could provide river access to neighborhoods on both sides of the Perimeter.



North

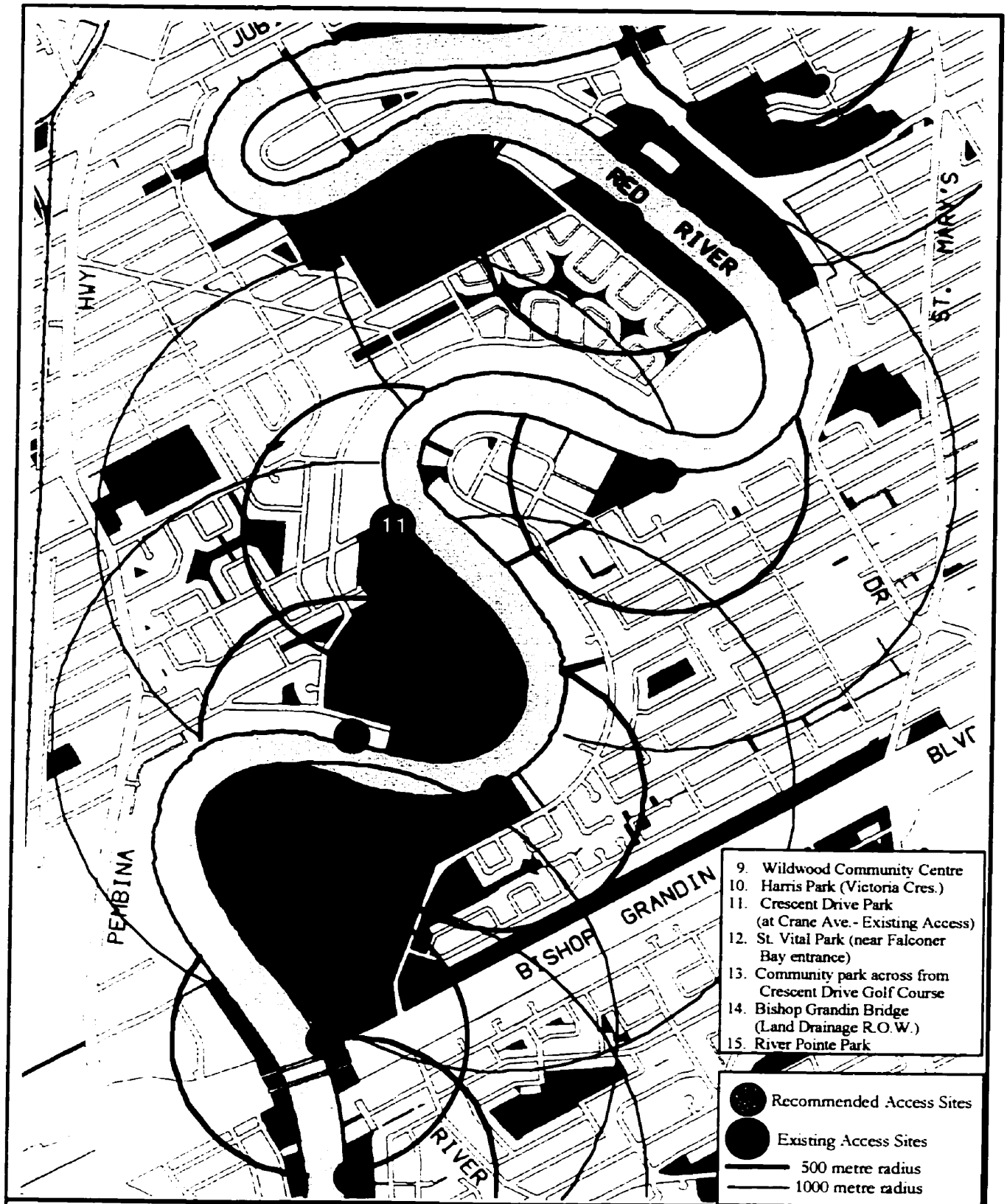
Recommended Network of Riverbank Access Sites

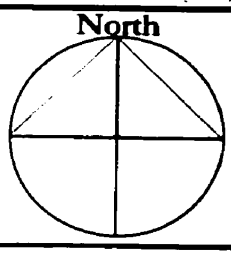
(Sheet 1 of 3)

Scale 1:20,000 metric

South Red River Access Study: Search for a River Spirit

Kenneth J. McKim





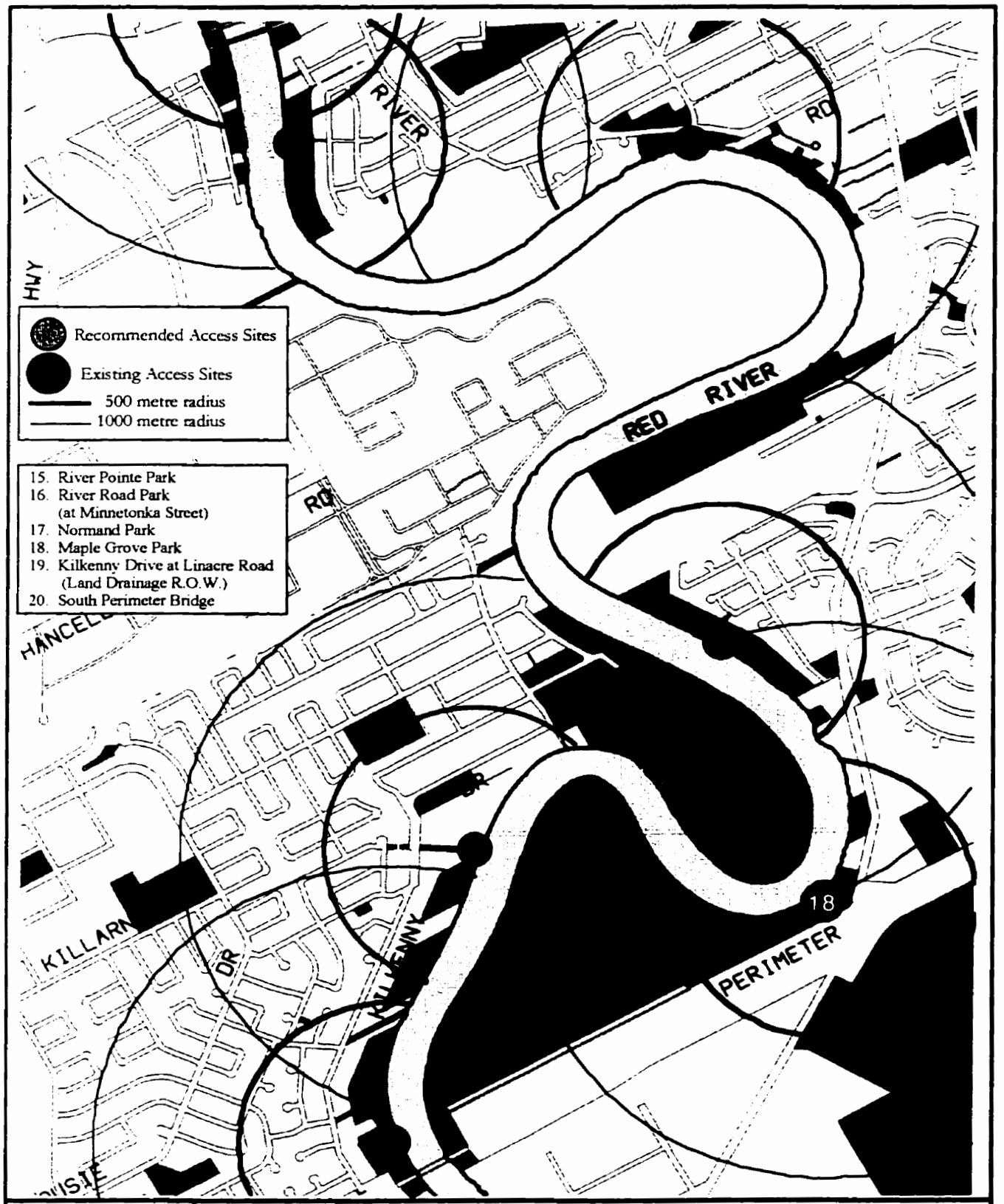
Recommended Network of Riverbank Access Sites

(Sheet 2 of 3)

Scale 1:20,000 metric

South Red River Access Study: Search for a River Spirit

Kenneth J. McKim



North

Recommended Network of Riverbank Access Sites

(Sheet 3 of 3) 0 50 100 200 300 400 500 1000 metres **Scale 1:20,000 metric**

South Red River Access Study:
Search for a River Spirit

Kenneth J. McKim

5.0 Design Proposals

The following two sites have been selected to represent the diversity of site characteristics available along the Red River, as well as to demonstrate the potential of the recommended design guidelines. Site #1 is a long and narrow land drainage right-of-way that is located along a transitional bend in the river, just to the south of King's Park in Fort Richmond. This site represents the abundance of infrastructure and street right-of-ways that are presently under-utilized within Winnipeg's neighborhoods. The narrow width of these sites, oriented perpendicular to the river's edge with residences on either side, presents both a design challenge and an opportunity in creating connections to adjacent neighborhoods. Site #2 is a large community park located on River Road in St. Vital, along an outside bend of the river. The characteristics of this site represent numerous existing riverbank park sites that provide no real river access, have been "sterilized" by over-engineered stabilization methods and that offer little amenity to their adjacent neighborhood. The location of this site in proximity to two large forested areas, as well as a neighborhood school and community centre, allows for great linkage and community focus possibilities.

5.1 Site #1- Kilkenny Drive Land Drainage Right-of-Way (" Kilkenny River Green")

Site Context

Proposed Site #1 is located within the neighborhood of Fort Richmond, approximately half of a kilometer south of King's Park along Kilkenny Drive and approximately one kilometer north of the Perimeter Highway. Kilkenny Drive is a well-utilized pedestrian and cycling route due to this proximity to King's Park. The site actually encompasses three separate parcels of land that extend perpendicularly to the river's edge. The first two parcels each measure 60 feet wide by 110 feet deep and run between Vassar Road on the west and Kilkenny Drive on the east, separated in the middle by a public lane. Residential lots are located to the north and south of each of these properties. The third and largest parcel is 66 feet wide by 650 feet deep and extends from Kilkenny Drive to the edge of the Red River. Adjacent properties to the north and south of this parcel are both privately owned and covered by mature riverbottom forest, that unfortunately may one day be developed as residential properties. However, the most easterly 400 feet of these properties are located below the river Floodway Line and as such, are non-

River Edge/ Outfall

developable and will be obtained by the City for future greenway. In addition, the primary dyke runs along the eastern side of Kilkenny Drive, leaving a good portion of this long parcel subject to spring flood conditions.

Site Analysis

The site is predominantly turf covered, with a grouping of siberian elm, blue spruce and basswood near Vassar Road. At the river's edge, various willow, dogwood, grasses and weeds have begun to colonize the disturbed bank. The site gradually slopes towards the river, averaging about a 3% incline until within approximately 30 metres of the river's edge, where the bank slope steepens to as much as a 40% incline. The total change in grade from Kilkenny Drive to the average summer water level is approximately 8.5 metres. A 1200 mm land drainage sewer runs throughout the entire site, connecting to neighborhood sewers in Vassar Road and angles slightly away from the south lot line until finally discharging into the river. At present, the two smaller parcels are used as a short cut between Vassar Road and Kilkenny Drive, while the larger riverbank property is used as neighborhood open space. Primary activities include dog walking, river watching, and walking and cycling to trails in the adjacent woods.

Site entrance looking east from Linacre Road

Design Proposal

The configuration of these parcels is significant, in that they allow for connections beyond Kilkenny Drive, deeper into the residential neighborhood. As such, both Vassar Road and Kilkenny Drive become gateways into the site. Here, pergola structures set in native plantings and covered with riverbank grape vines, provide an architectural presence along the streetscape, giving a sense of entry and announce "Kilkenny River Green" as an community amenity.

Two related themes are used to reflect the nature and spirit of this long and narrow site. Firstly, the site becomes a gauge for watching, recording and understanding the changes in river levels. Limestone markers denote each meter change in elevation, giving reference points for the seasonal changes in water levels. As the waters rise, markers become inundated and attention turns to the next marker higher up the bank until the flood reaches its peak. The 1997 flood peak is marked as a reminder of the river's extremes and to evaluate the severity of future floods.

Looking west towards Kilkenny Drive

These markers also serve a second purpose, in illuminating and educating the public on the variety and changes in riverbank tree species from upper to lower bank. Groupings of trees are

arranged around the markers, that identify the species and showing leaf and fruit characteristics in a sculptural bronze relief. Upper bank species such as bur oak and aspen give way to basswood, green ash, manitoba maple, american elm and finally cottonwood as one makes their way to the river. The formal arrangement of the trees in grids and lines makes them more recognizable and allows residents to identify their characteristics amongst the trees in the adjacent forest community.

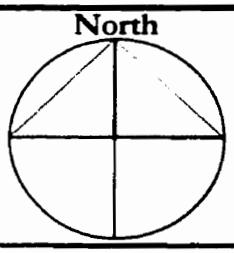
The grade of the site is altered slightly to allow for a more gradual slope towards the river, while a stairway and ramp descend the final 2.5 metres change in elevation. The river's access is designed to have a series of viewing and access points at different elevations to serve during varying river level conditions. The river's edge is also laid out with areas for shore fishing, canoe launching and winter access, as well as passive enjoyment of the river environment. A steel platform straddles the drainage outfall, allowing users to stand above and experience the river current, safely behind guard railings. Rip-rap and artificial reef structures are used to prevent toe erosion, to protect canoeists from the current, as well as to provide fish habitat.

Looking east towards river edge

Site entrance looking east from Vassar Road

Land drainage R.O.W and adjacent homes on Vassar Road

Main Neighborhood Pedestrian/ Cycling Circulation



Proposed Site #1: Kilkenny Drive Land Drainage R.O.W.

Neighborhood Context and Existing Pedestrian Circulation

South Red River Access Study:
Search for a River Spirit

Kenneth J. McKim

Proposed Ri ver
Linacre Road
Park Property zoned "R1-5"
Park Property zoned "R1-5"
Land Drainage Right-of wa
Zoned "A-5"
Vassar Road
Back Lane
Kilkenny Drive
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Oberlin Road
1997 Flood
Peak Level
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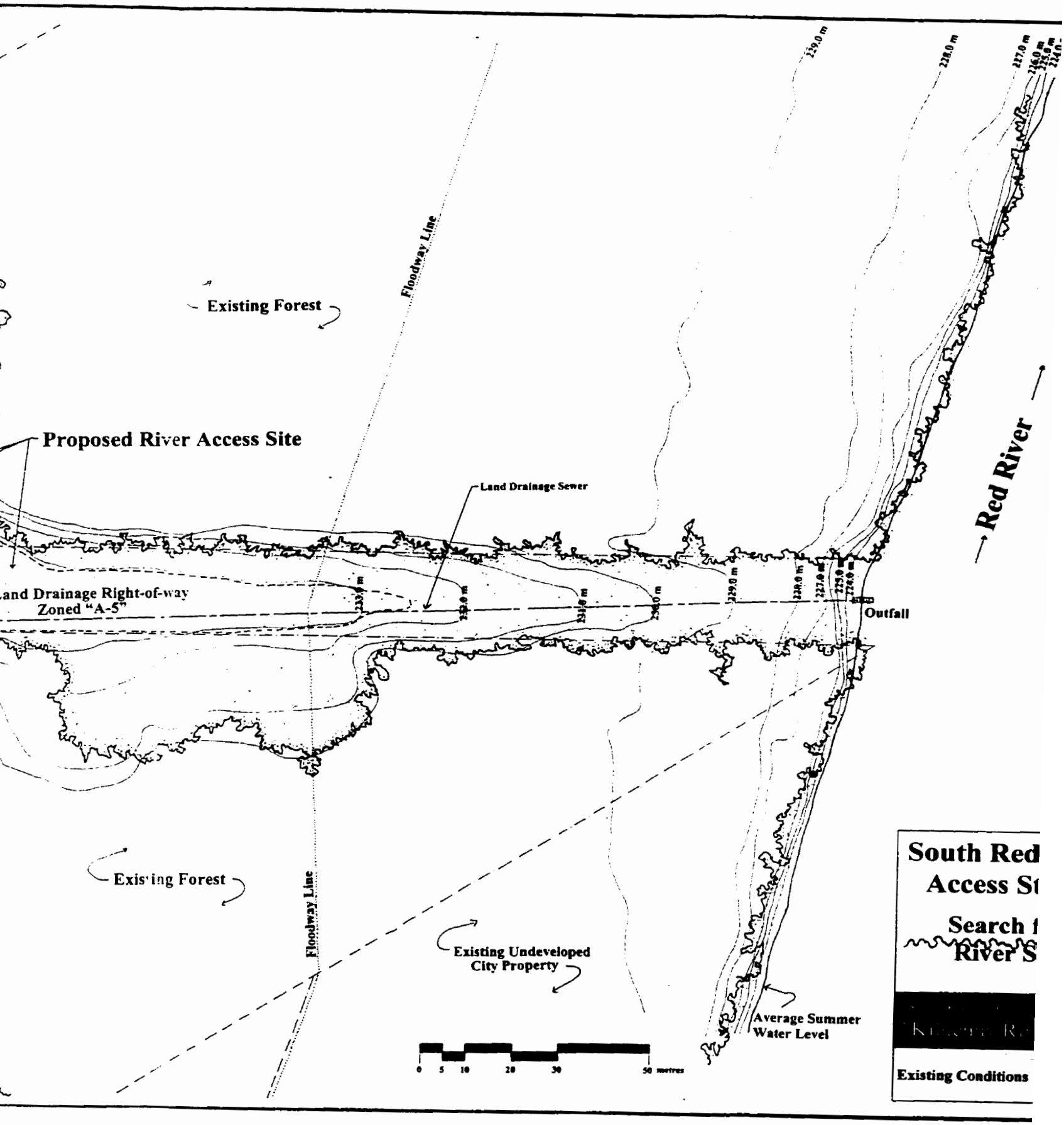
232.0
231.0
230.0


Existing Forest
Floodway Line
Proposed River Access Site
Land Drainage Sewer
Red River
Land Drainage Right-of-way
Zoned "A-5"
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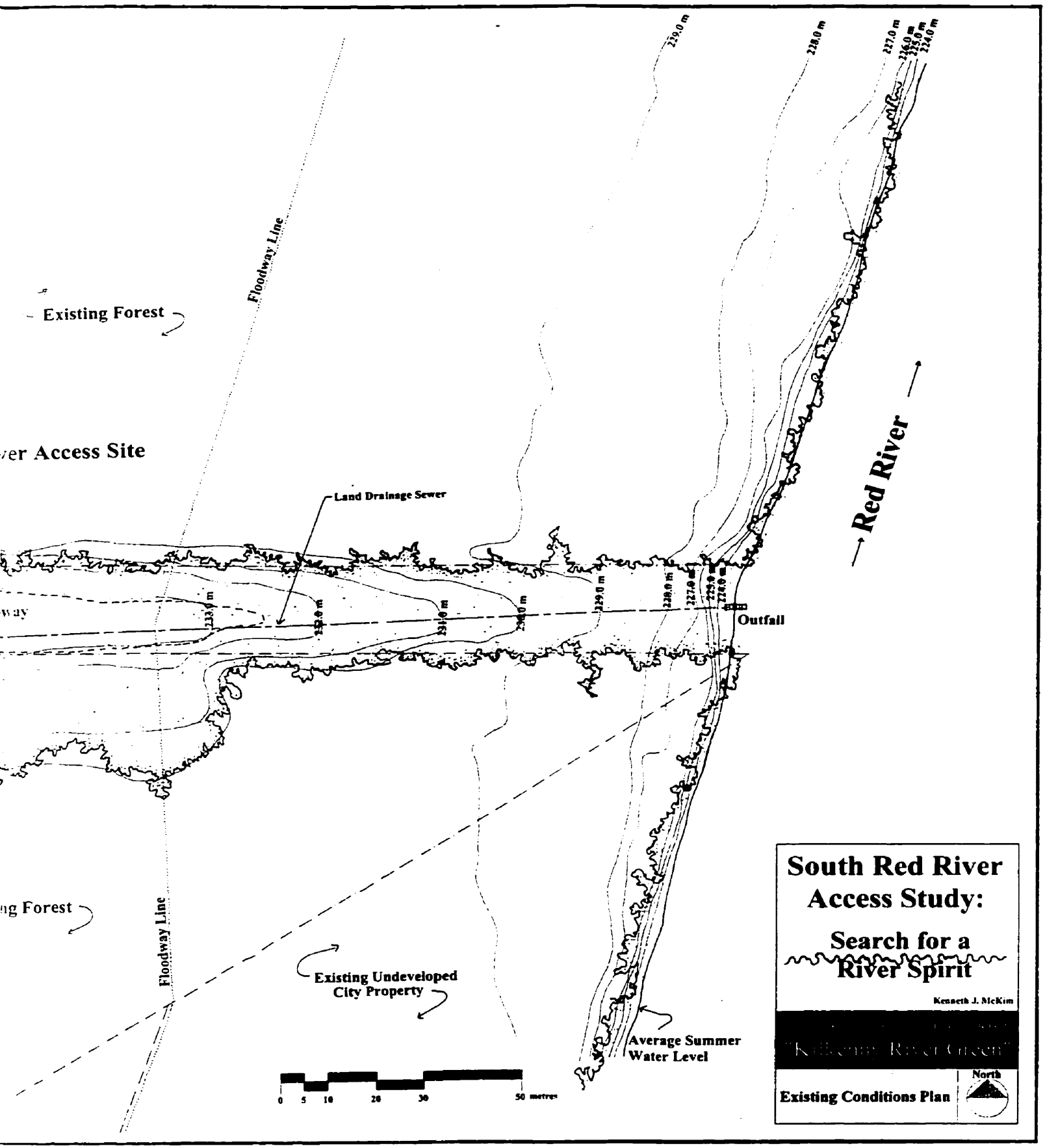
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Red River
Outfall
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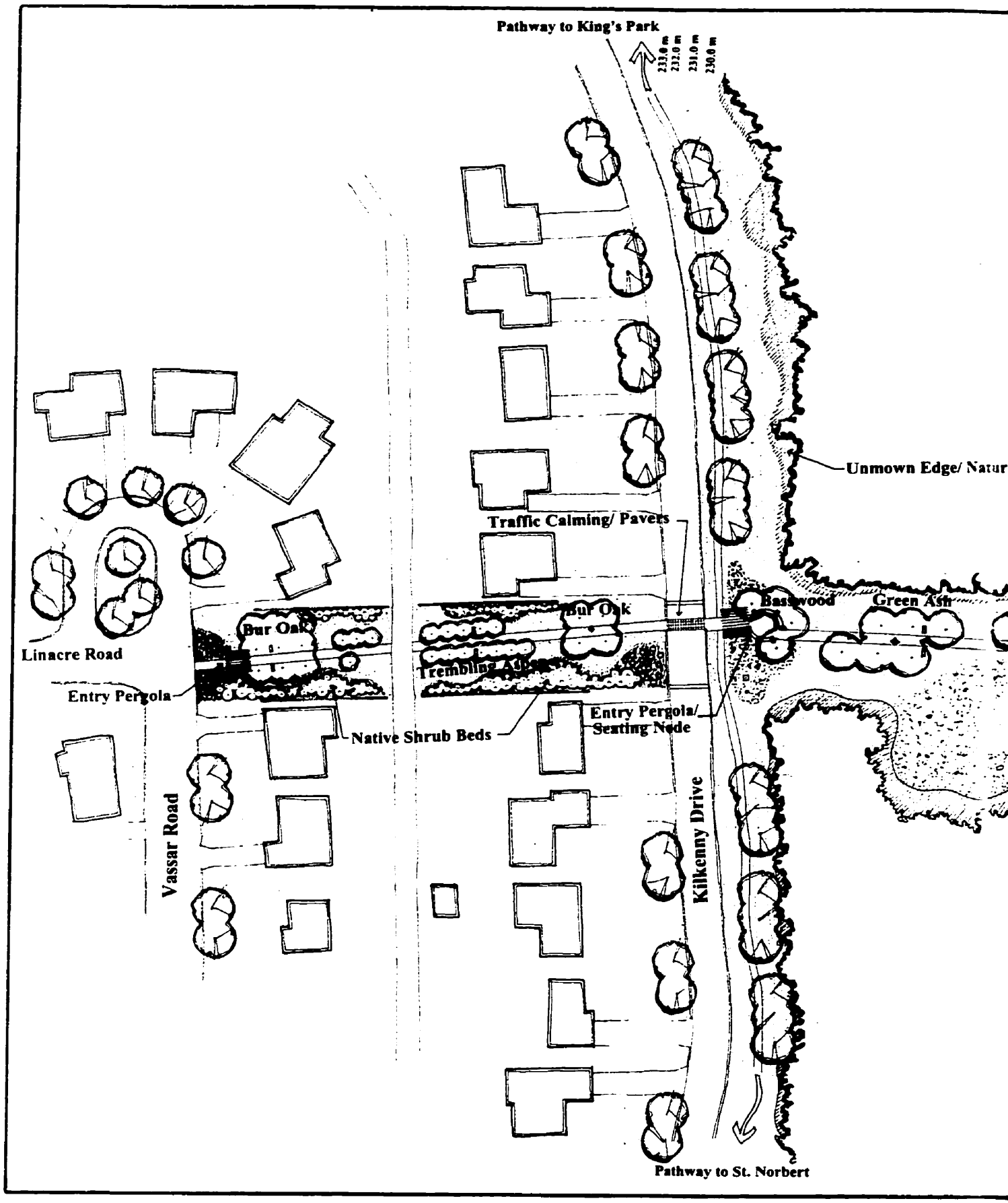
South Red River
Access Study:
Search for a
River Spirit
Kenneth J. McKim
"Kilkenny River Green"
Existing Conditions Plan
North


Pathway to King's Park
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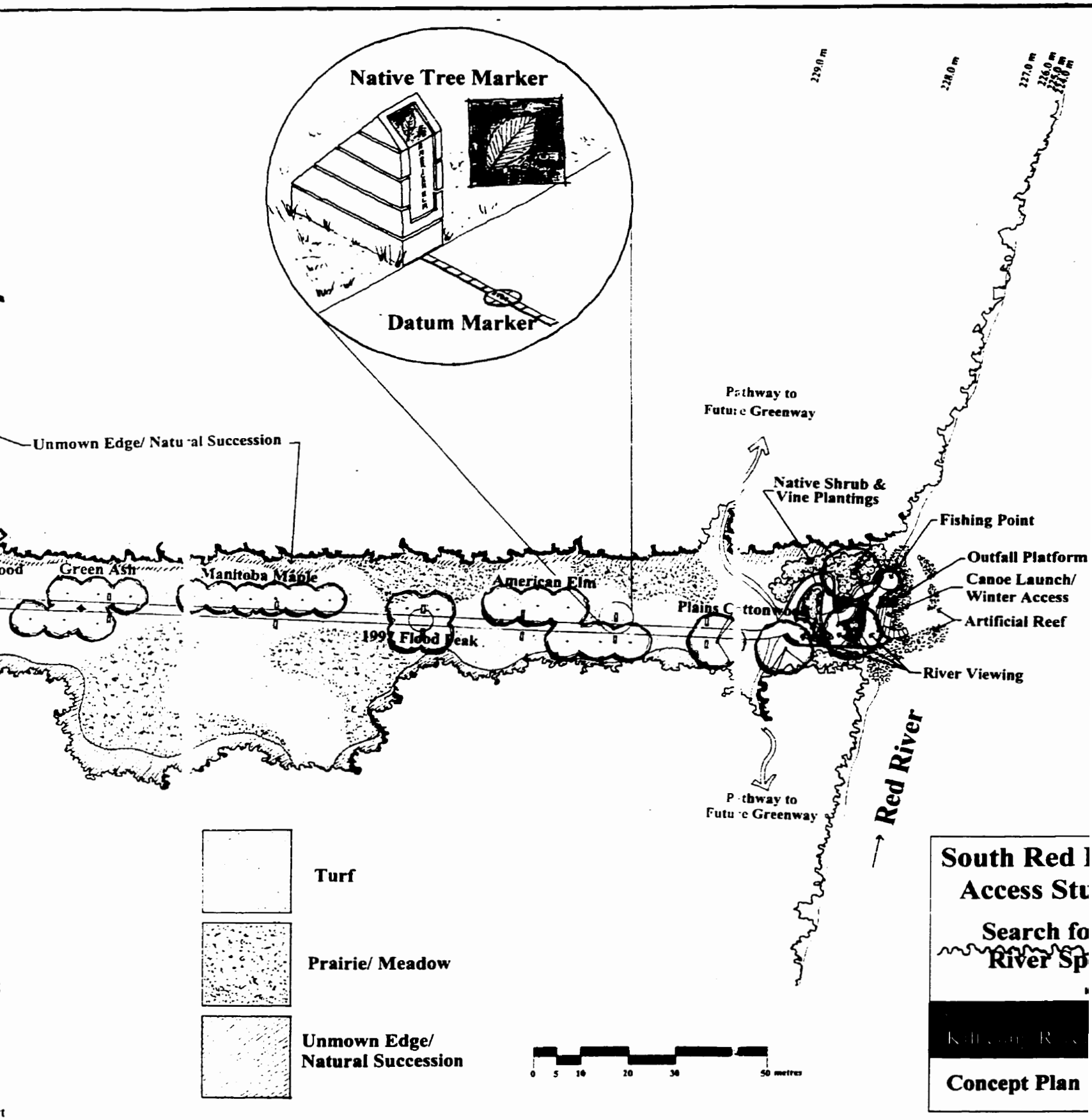
Unmown Edge/ Natur
Traffic Calming/ Pavers
Basswood
Green Ash
Bur Oak
Bur Oak
Trembling Aspen
Linacre Road
Entry Pergola
Native Shrub Beds
Entry Pergola/
Seating Node
Vassar Road
Kilkenny Drive
Pathway to St. Norbert


Native Tree Marker
Datum Marker
Unmown Edge/ Natural Succession
Pathway to Future Greenway
Native Shrub & Vine Plantings
Fishing Point
Outfall Platform
Canoe Launch/ Winter Access
Artificial Reef
River Viewing
Green Ash
Manitoba Maple
American Elm
Plains Cottonwood
1997 Flood Peak
Red River
Turf
Prairie/ Meadow
Unmown Edge/ Natural Succession
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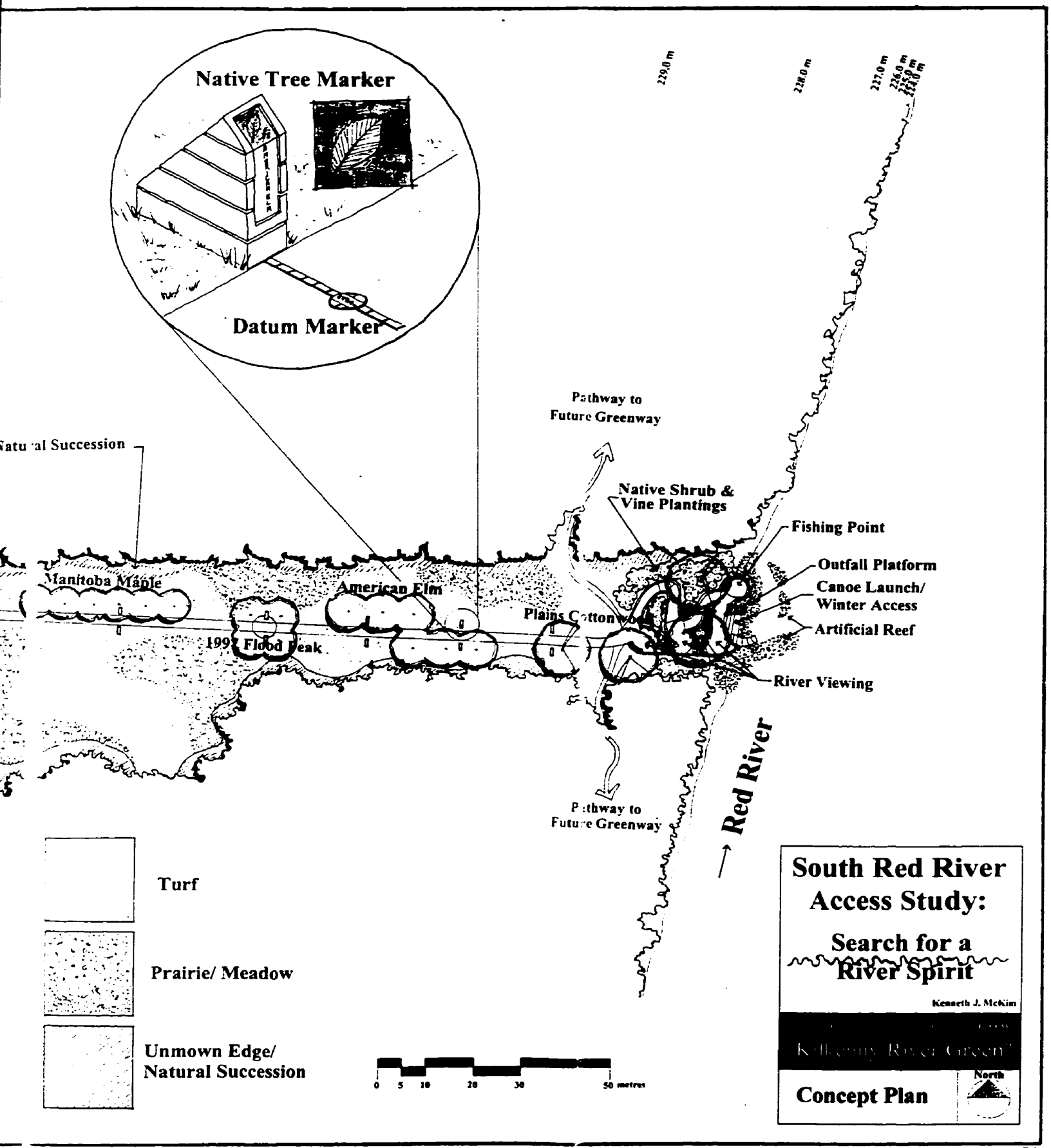
Native Tree Marker
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Pathway to
Future Greenway
Natural Succession
Native Shrub &
Vine Plantings
Fishing Point
Outfall Platform
Canoe Launch/
Winter Access
Artificial Reef
River Viewing
Manitoba Maple
American Elm
Plains Cottonwood
1997 Flood Peak
Pathway to
Future Greenway
Red River
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Prairie/ Meadow
Unmown Edge/
Natural Succession
0 5 10 20 30 50 metres
South Red River
Access Study:
Search for a
River Spirit
Kenneth J. McKim
Kilkenny River Green
Concept Plan
North

Guideline #16 (Universal Access): The river's edge is accessible by a serpentine ramp that extends from the upper bank. The variety of plant material and experiences of the site can allow for enjoyment by all users.

Guideline #4 (B
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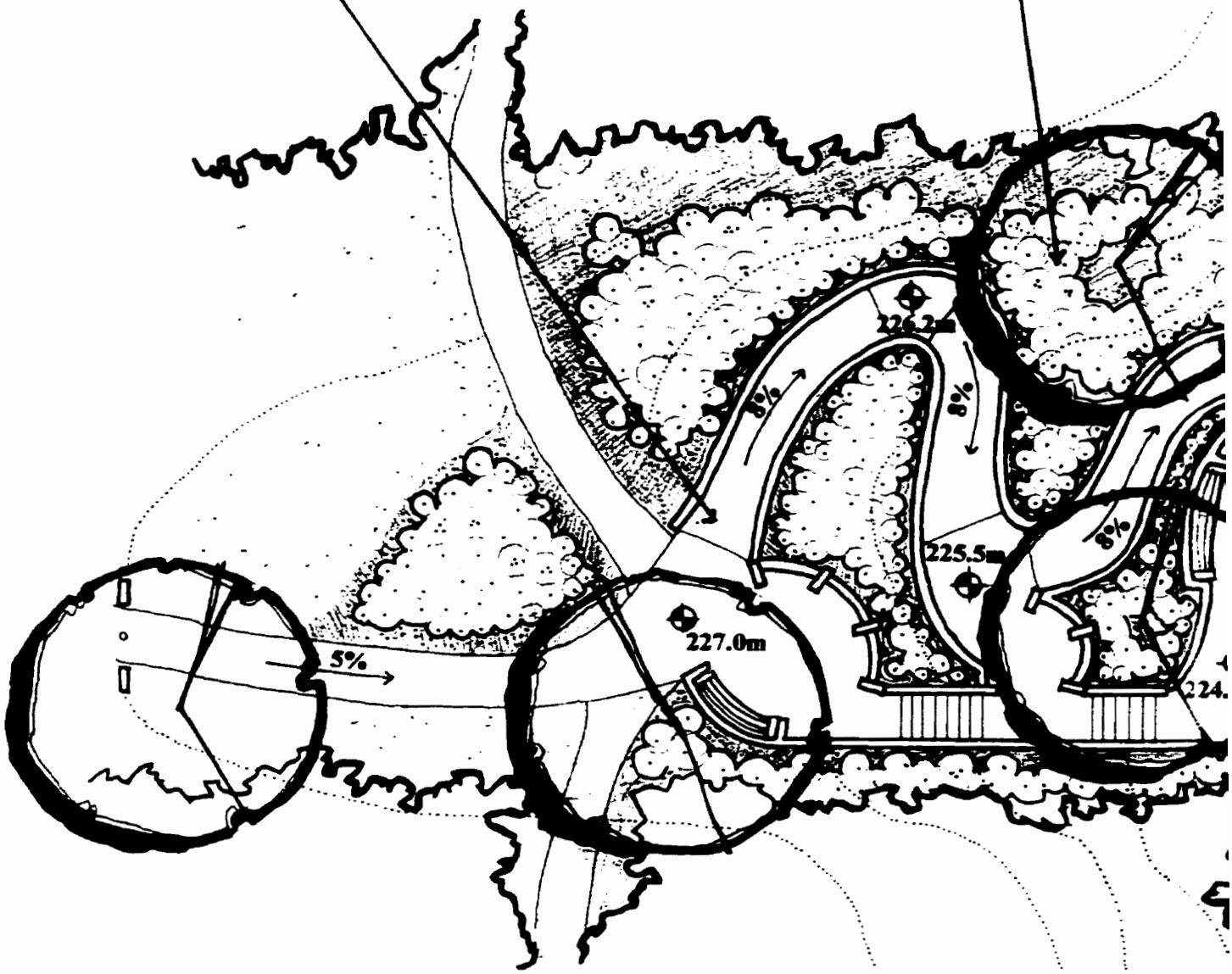


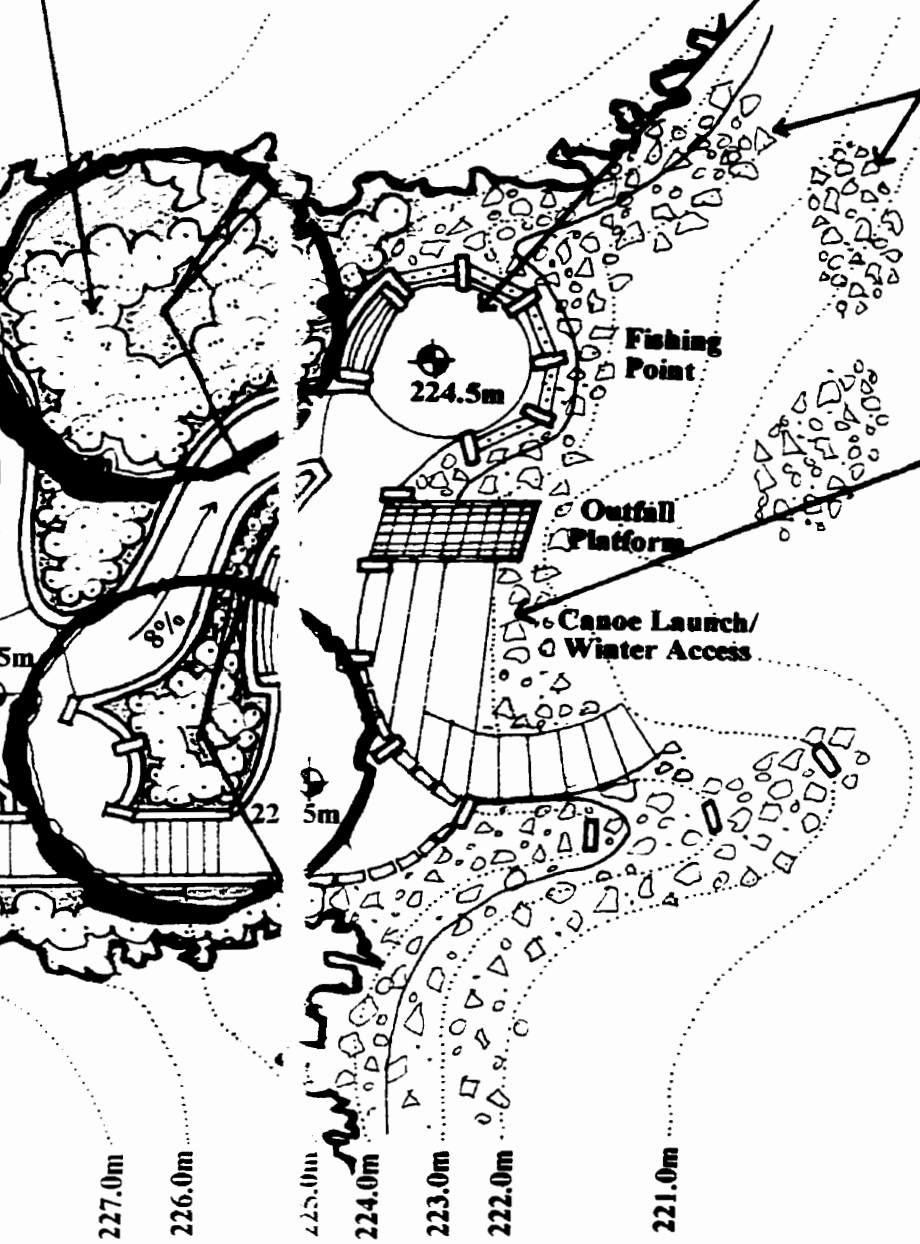
Guidelines # 5 & #6 (Riparian Ecology and the Riverbottom Forest): Native plant species are used as both formal design elements, as well as integral parts of naturalization areas, contributing to a more sustainable landscape and giving a sense of regional identity.

Guideline #4 (Bio-engineering Stabilization): Plantings of willow, dogwood and virginia creeper are used to hold the soil together and reduce bank erosion during periods of flooding.

Guideline #12 (Shore Fishing): The shore fishing are positioned at the most northerly portion of the site to l conflicts with other users and to take advantage of north flowing current. Seating and rod holders woulc integral parts of the design detailing.

Guideline #2 (Erosion & Bank failure) & #3 (Riverbank Stabilization): At the river's e limestone rip-rap and artificial reef structures extend into the river to slow current and wave action, prevent erosion of the bank and to provide additional habitat river fish species.

Guideline #13 (Canoe Launching) & #15 (Wi Activities): At the river's edge, the canoe launch are designed to allow access at varying river levels (22 metres to 222.5 metres). The launch area is pulled i the bank and is protected from fast currents and waves a rip-rap reef. The canoe launch stairs continue down the river to provide access to the ice for winter activitie



Scale 1:200 metric

South Red Riv
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River Spirit

Kenneth J

Kilkenny River Gre

River Edge Plan

(Bio-engineering Stabilization): Plantings
wood and virginia creeper are used to hold
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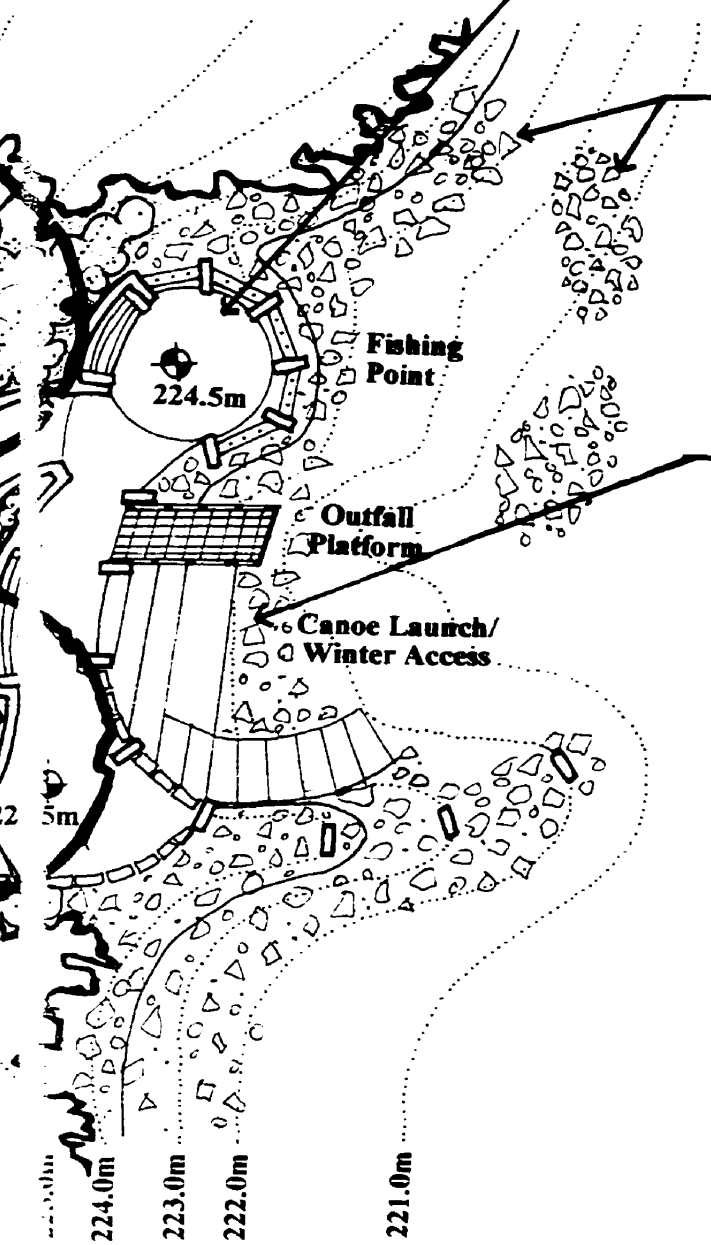
Guideline #12 (Shore Fishing): The shore fishing area is positioned at the most northerly portion of the site to limit conflicts with other users and to take advantage of the north flowing current. Seating and rod holders would be integral parts of the design detailing.

Guideline #2 (Erosion & Bank failure) & #3 (Riverbank Stabilization): At the river's edge, limestone rip-rap and artificial reef structures extend out into the river to slow current and wave action, prevent toe erosion of the bank and to provide additional habitat for river fish species.

Guideline #13 (Canoe Launching) & #15 (Winter Activities): At the river's edge, the canoe launch area is designed to allow access at varying river levels (224.0 metres to 222.5 metres). The launch area is pulled in to the bank and is protected from fast currents and waves by a rip-rap reef. The canoe launch stairs continue down into the river to provide access to the ice for winter activities.



Scale 1:200 metric

South Red River Access Study:

Search for a River Spirit

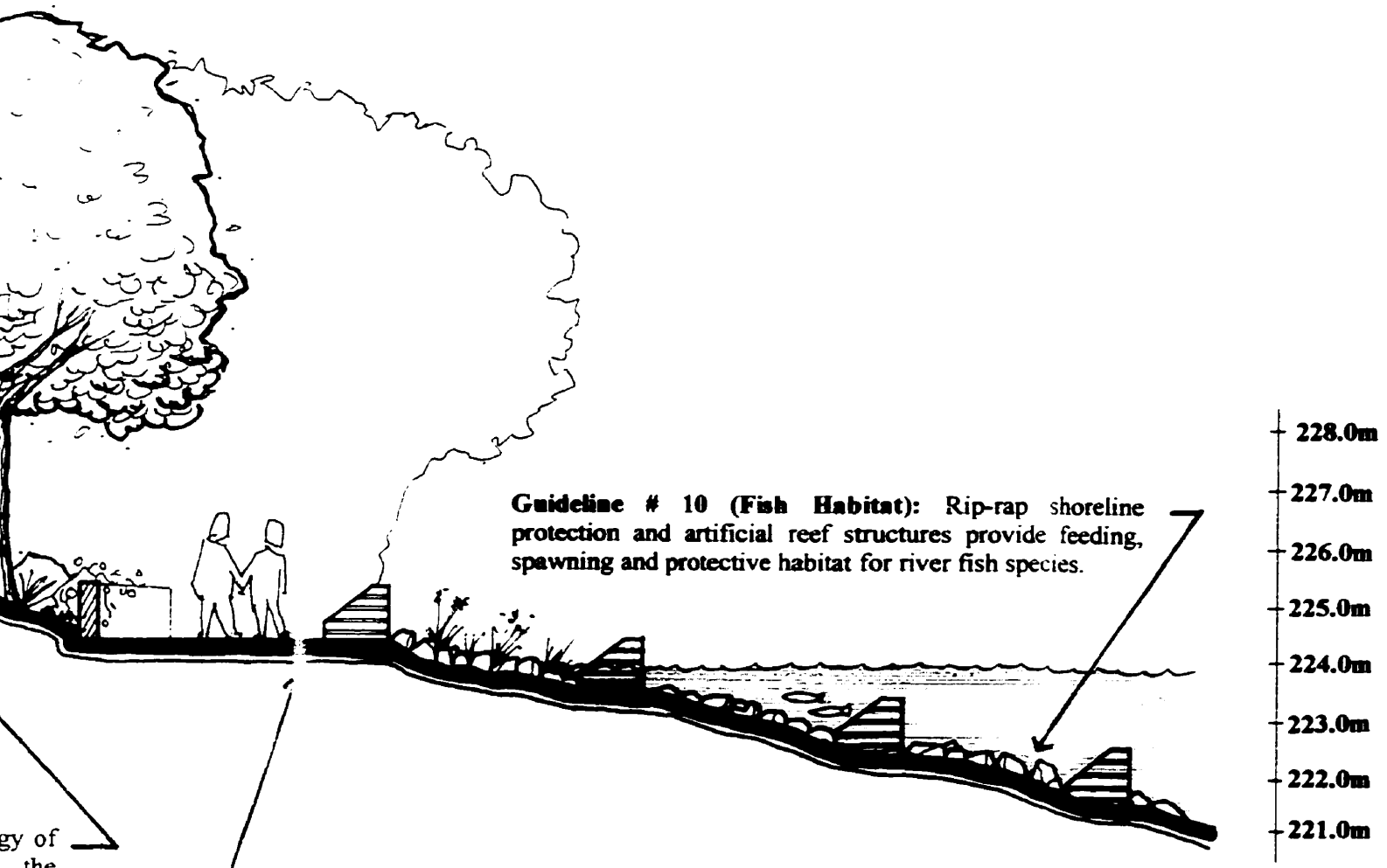
Kenneth J. McKim

"Kilkenny River Green"

River Edge Plan

Guideline #17 (Safety, Crime & Vandalism):
The selection and location of plant material and pathways is intended to keep sight lines as open as possible at pedestrian level and to allow alternative means of egress.

Guideline #1 (Red River Hydrology): The hydrology of the river is displayed and celebrated through the arrangement of limestone markers at each one metre change in site elevation. In addition, river viewing and access is provided at three different elevations, allowing enjoyment of the river during varying river level conditions.



Guideline # 10 (Fish Habitat): Rip-rap shoreline protection and artificial reef structures provide feeding, spawning and protective habitat for river fish species.

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Gu deline #11 (Water Quality): Railings at the fishing point and outfall platform protect users from primary contact with lanc drainage effluent.

South Red Ri
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Riverbank Section

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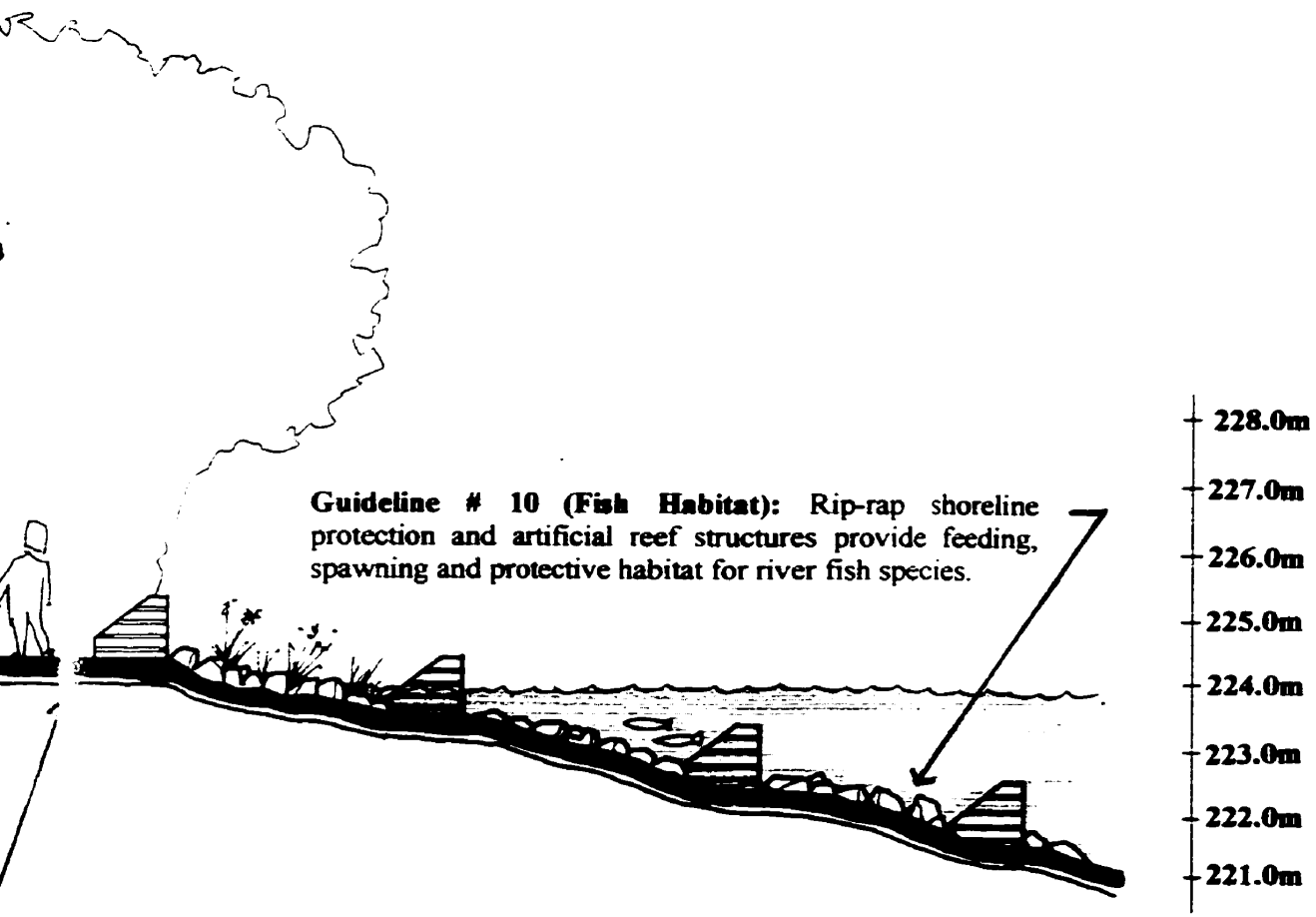


Guideline # 10 (Fish Habitat): Rip-rap shoreline protection and artificial reef structures provide feeding, spawning and protective habitat for river fish species.

Gu eline #11 (Water Quality): Railings at the fishing point and utfall platform protect users from primary contact with lan drainage effluent.

South Red River Access Study:

Search for a River Spirit

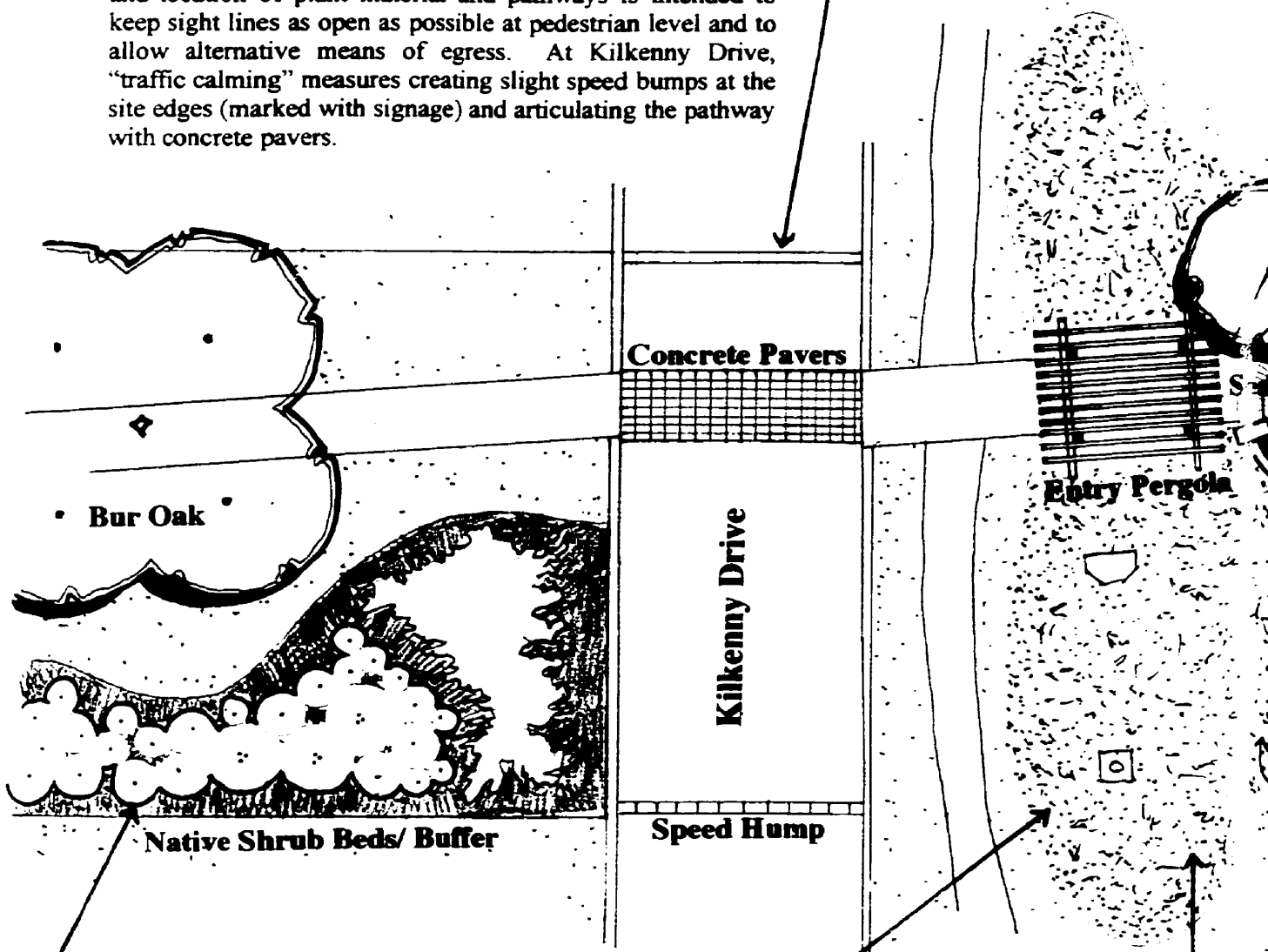
Kenneth J. McKim

"Kilkenny River Green"

Riverbank Section

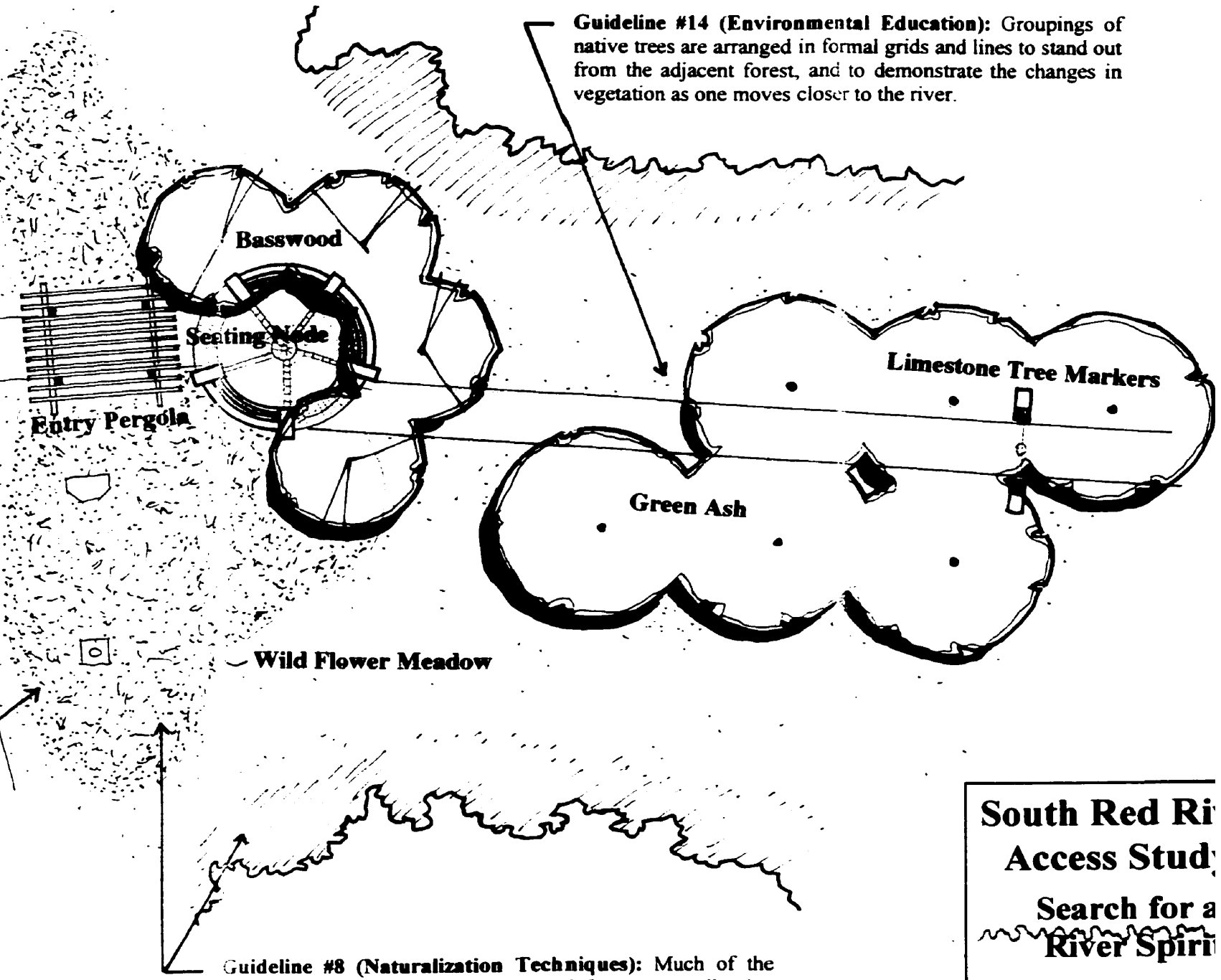
Scale 1:100 metric

Guideline #17 (Safety, Crime & Vandalism): The selection and location of plant material and pathways is intended to keep sight lines as open as possible at pedestrian level and to allow alternative means of egress. At Kilkenny Drive, "traffic calming" measures creating slight speed bumps at the site edges (marked with signage) and articulating the pathway with concrete pavers.



Guideline #21- (Maintenance)- Turf areas are minimized through meadow plantings, reduced maintenance areas and native shrub beds.

Guideline #18- (Neighborhood Connectivity) & Guideline #19 (Community Identity): Groupings of trees, limestone markers and pathway connections extend out into the community, linking the neighborhood to the river environment.



Guideline #14 (Environmental Education): Groupings of native trees are arranged in formal grids and lines to stand out from the adjacent forest, and to demonstrate the changes in vegetation as one moves closer to the river.

Guideline #8 (Naturalization Techniques): Much of the edges of the existing forest would be left unmown, allowing natural succession to take place, providing richer and more diverse edge conditions. In addition, areas of turf would be removed with herbicide and replaced by native perennial grass and wildflower seed mixes.

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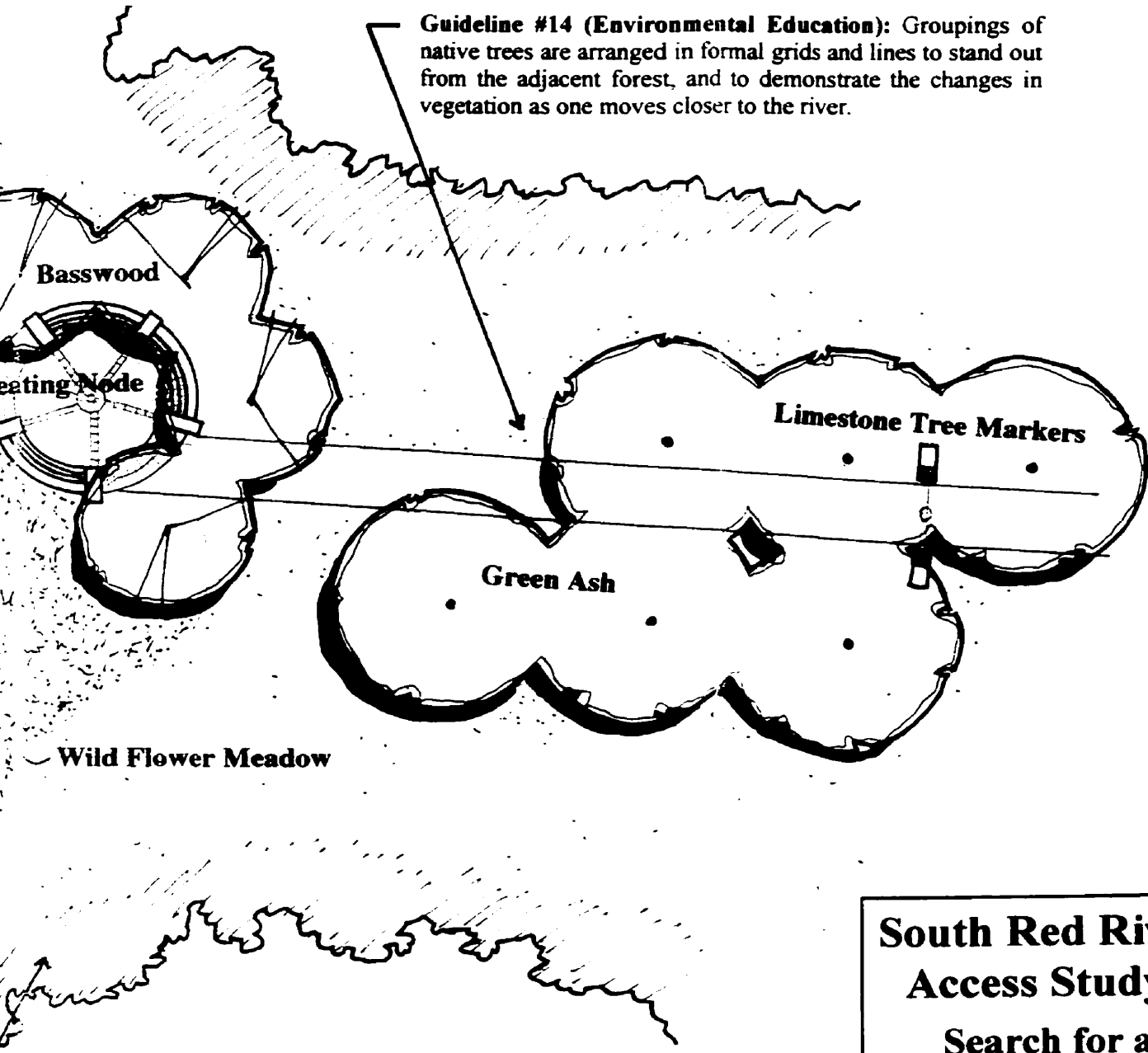
Kilkenny Drive Entrance



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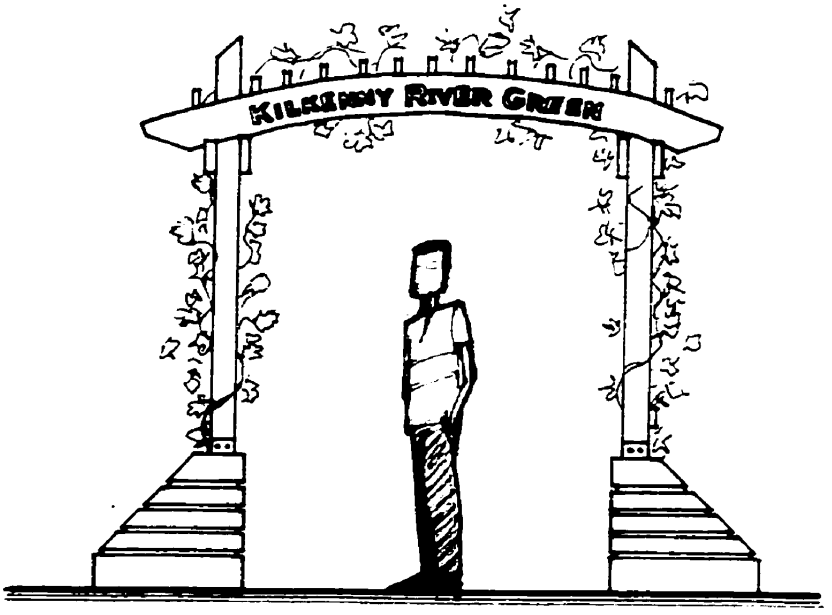
Scale 1:200 metric

South Red River Access Study: Search for a River Spirit

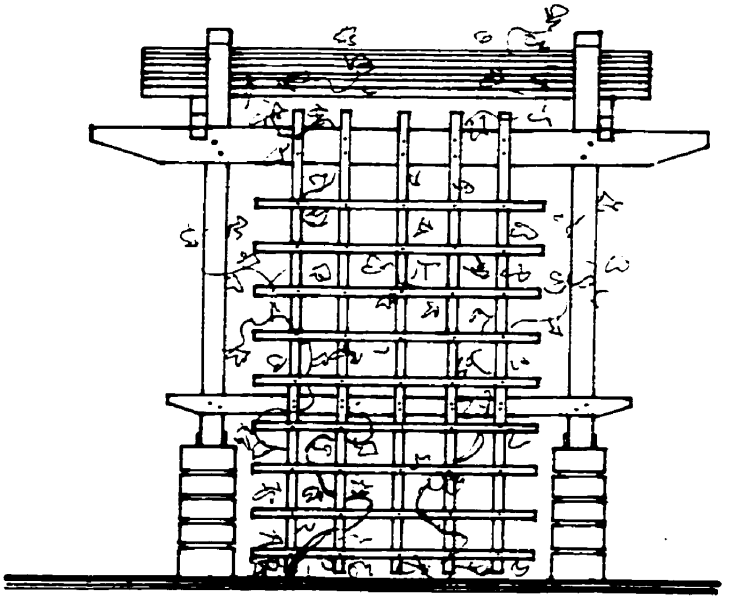
Kenneth J. McKim

"Kilkenny River Green"

Kilkenny Drive Entrance

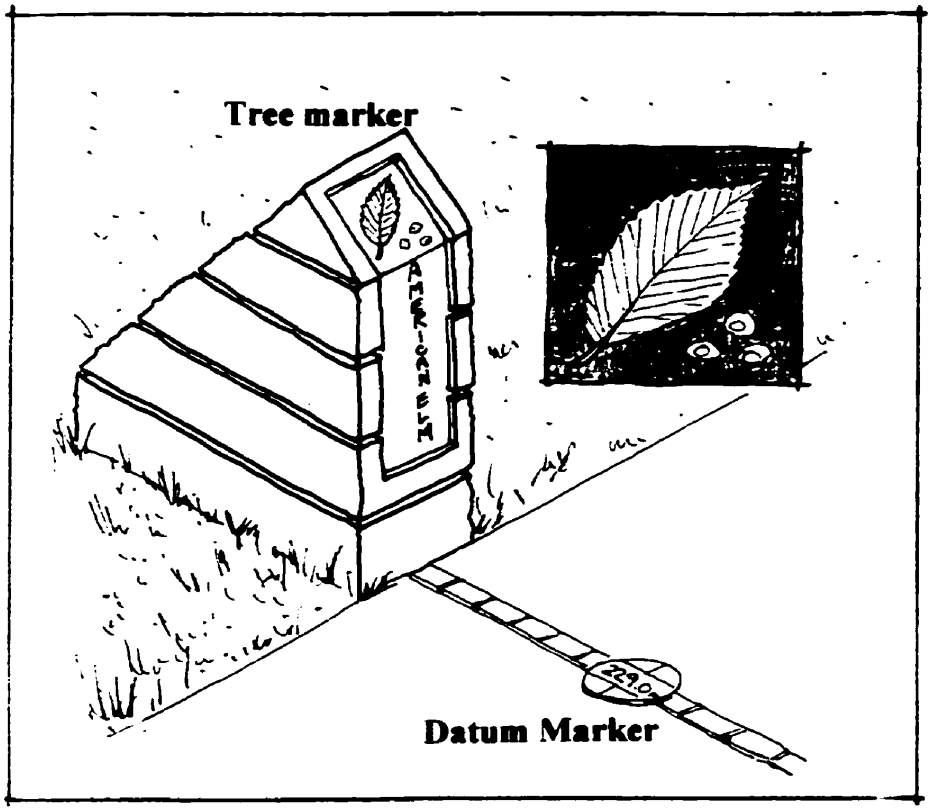


Entry Pergola (Front View) Scale 1: 40 metric



Entry Pergola (Side View) Scale 1: 40 metric

Guideline #18- (Neighborhood
#19 (Community Identity): S
covered with riverbank grapevi
entry and community ownership



n.t.s

Guideline #14 (Environmental education): Limestone markers with bronze reliefs, identify native tree groupings throughout the site, for comparison to those found in the adjacent forest. Also at these locations, datum markers indicate one metre changes in elevation, relating to the changes in tree species from upper to lower bank and to help gauge changing river levels and flood peaks.

Guideline #18- (Neighborhood Connectivity) & Guideline #19 (Community Identity): Streetfront pergola structures covered with riverbank grapevines, give a sense of arrival, entry and community ownership to the site.

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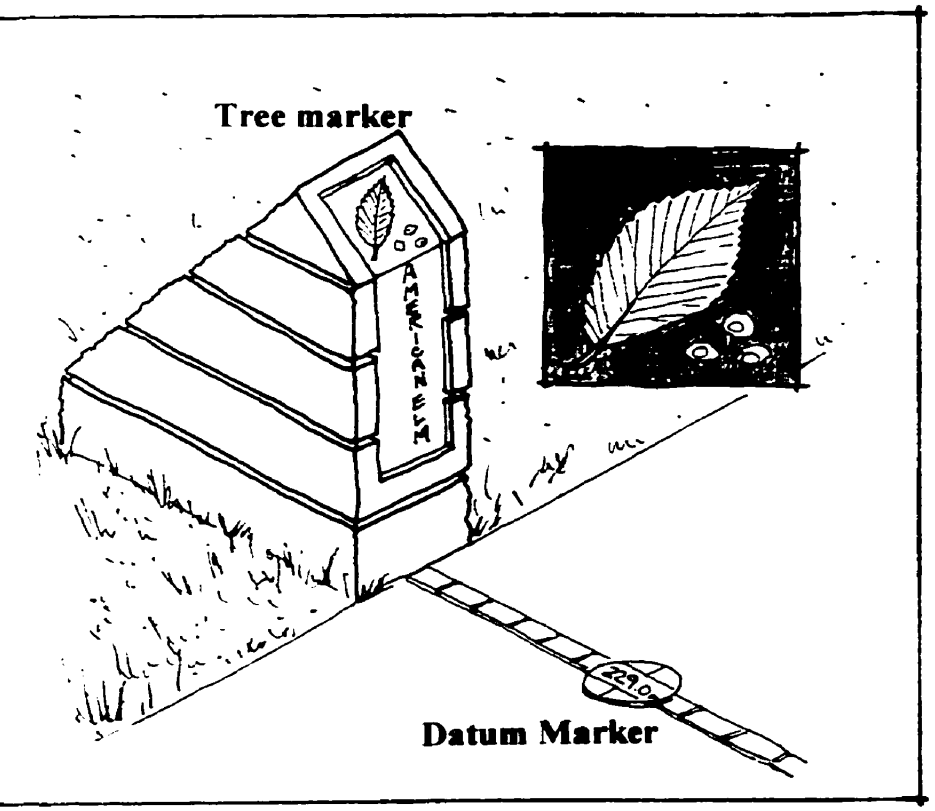

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o-l Connectivity) & Guideline
Streetfront pergola structures
ines, give a sense of arrival,
to the site.

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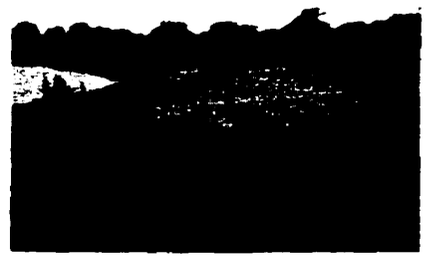
"Kilkenny River Green"

Details

5.2 Site #2: River Road Park ("River Road Nature Park")

Site Context

The site is located at the corner of River Road and Minnetonka Street in South St. Vital. Both of these streets are main vehicular collectors within the neighborhood, as well as major pedestrian and cycling routes. The surrounding neighborhood is predominantly single family residential, however, there are several multiple family developments along River Road to the east. Minnetonka Elementary and Junior High School is located directly across River Road to the north, while Greendell Community Centre is two blocks away. In addition, a large city owned forest, dominated by bur oak, is directly across the street from the park, while large parcels of natural riverbottom forest parkland are separated from this property by only a single privately owned lot.



Turf landscape, looking west

Site Analysis

The site was seriously altered in 1984 & 1986 with a two-phase riverbank stabilization project. At this time, the most easterly two thirds of the site were modified by the construction of 13 sand drains running perpendicular to the river, rip-rap protection, along with slope modification (to approximately 1 V to 5 H) and re-sodding. The result is an open site, devoid of trees save for a few stands on the most westerly third of the site. Here, bank stabilization did not take place and the bank is a relatively steep 1V to 3 H. Being located at an outside bend, views down the river are very open in both directions. A land drainage sewer runs down Minnetonka Street into the river. The site is relatively unused save for river viewing and the occasional fisher.

Existing rip-rap shoreline protection

Design Proposal

The basic premise of this river access design is to present a framework on the site for community involvement in its restoration and naturalization. Lines of 10 meter by 10 meter plots extend perpendicular to the river, reminiscent of the French riverlot patterns. However, these boxed areas will be used by classes of children from the nearby school, to plant a tree plantation grid of native riverbank tree species on 1.5 metre centres. Once a full canopy is achieved after 2-3 years, the weed barrier can be removed and native shrubs can be under-planted. In addition, seeds and nuts from the adjacent forests will migrate with wind or animals, providing richer species diversity. The areas adjacent to these squares as well as the edges of the existing tree stands will be left unmown for natural succession to take place. Closer to the river, a modified slope of 1 V to 5 H,

will be more stable and gradual, but likely too steep to encourage children to plant on. Here, adults and teens from the neighborhood can be involved in tree and shrub plantations that provide a more immediate restoration to protect the bank from erosion. Shrubs would include willow and dogwood on 1 meter centres, with caliper size cottonwood, elm and maple interspersed.

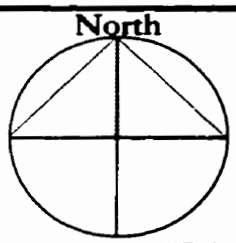
The upper bank of the site would be restored as native prairie and butterfly meadow areas. Pedestrian and cyclist traffic could enter the site from the east and west from two meandering trails along River Road, leading to a central access stair on axis with Minnetonka Street. At the river's edge, areas for seating, fishing and canoe launching are provided over a hundred metre stretch. The existing sand drains are demarcated on the surface by lines of boulders, that further hints to the old riverlot patterns, while making the infrastructure more readable. In addition, these lines of boulders extend into the river providing habitat for fish and reducing the impact of wave action on shore. Groupings of riverbank trees would continue the site vocabulary along River Road and Minnetonka Street into the neighborhood. In addition, manhole covers and catch basins throughout the neighborhood could be marked with impressions of native fish species, identifying the connection of the land drainage system, the park site and the river itself.

Existing pathway link to riverbottom forest

Proposed site, looking east

Proposed site, looking south from Minnetonka Street

Main Neighborhood Pedestrian/ Cycling Circulation



Proposed Site #2: River Road Park

Neighborhood Context and Existing Pedestrian Circulation

South Red River Access Study:
Search for a River Spirit

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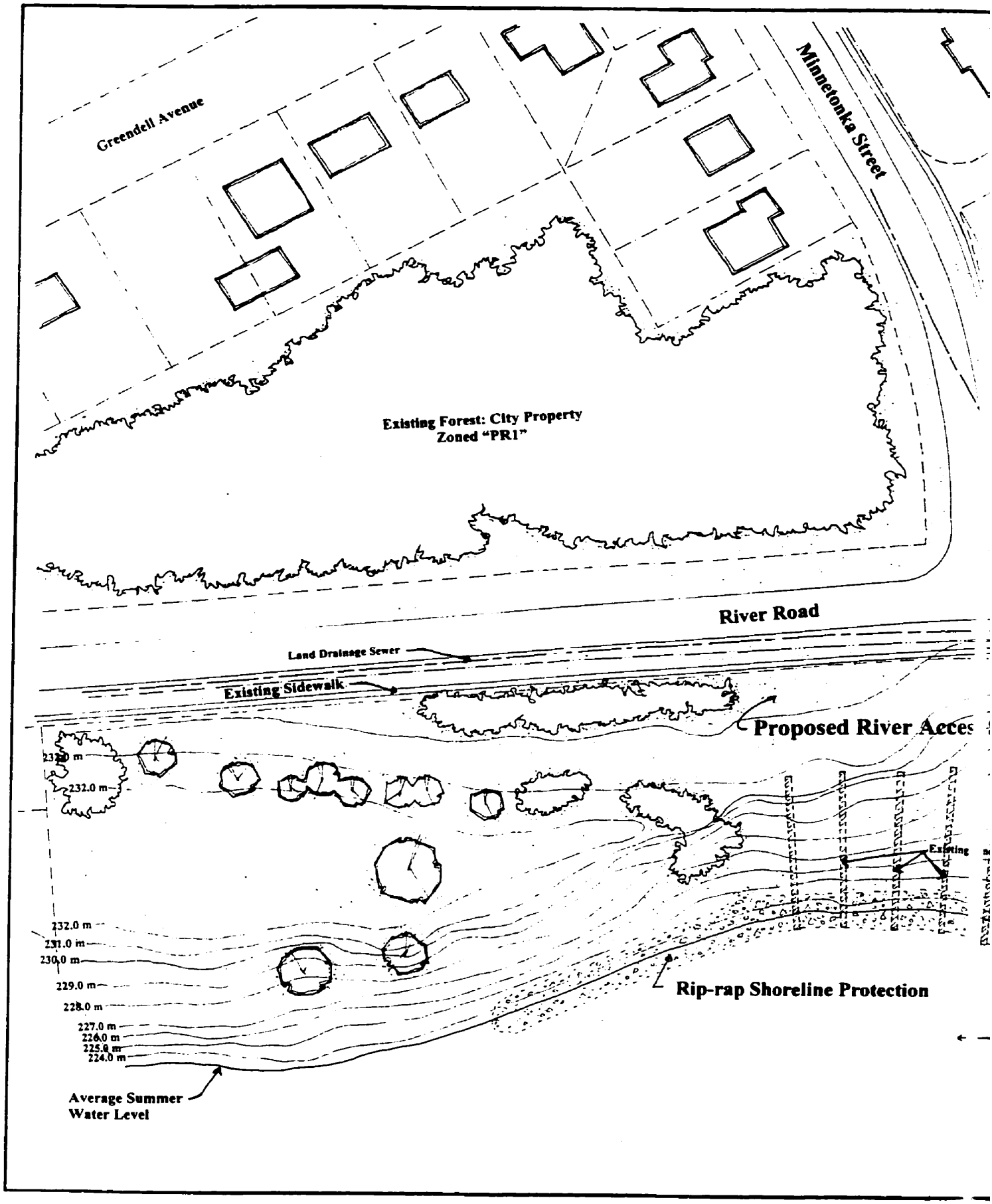
Greendell Avenue
Minnetonka Street
Existing Forest: City Property
Zoned "PR1"
River Road
Land Drainage Sewer
Existing Sidewalk
Proposed River Acces
232.0 m
232.0 m
Existing
232.0 m
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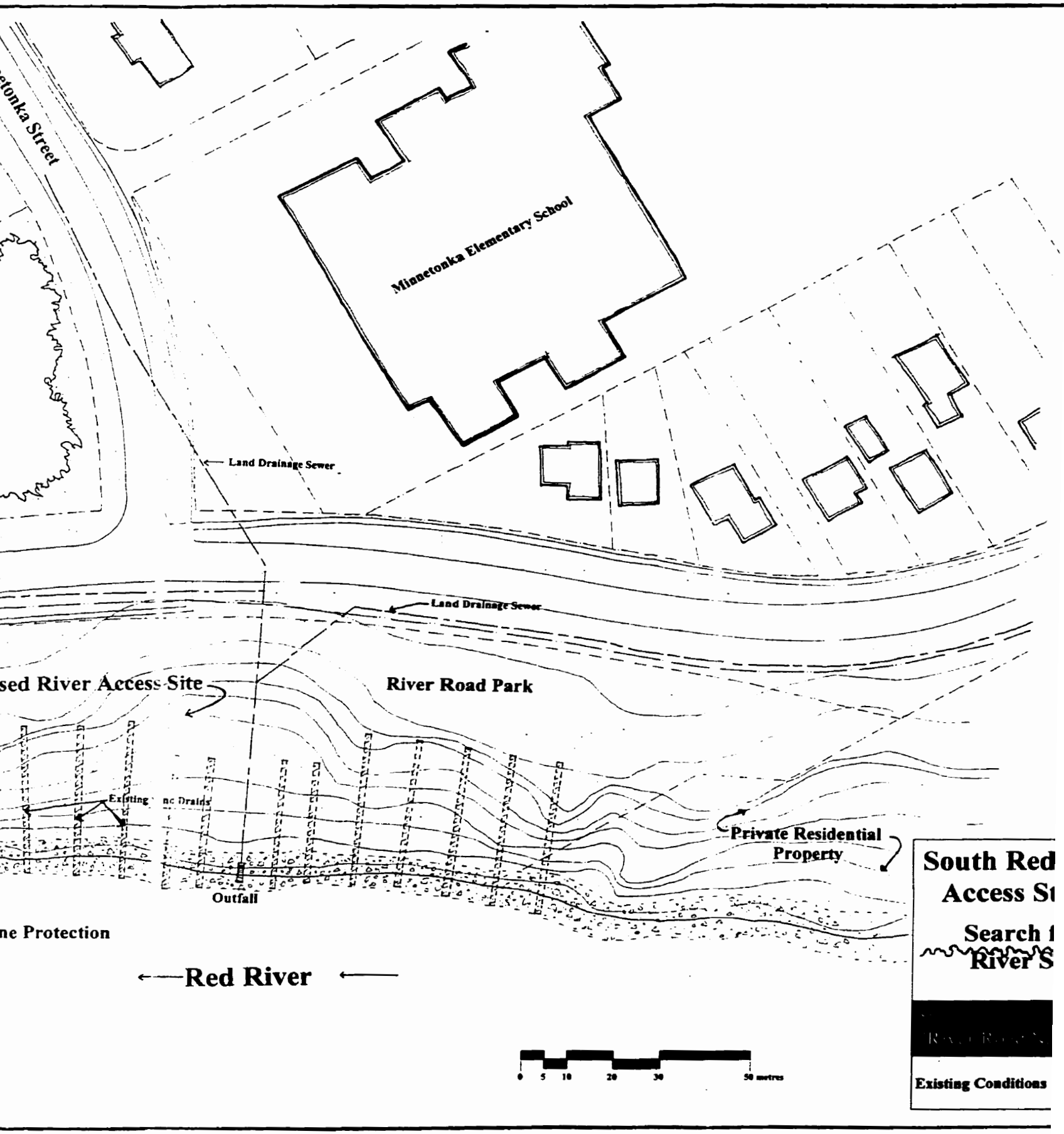
224.0 m
Rip-rap Shoreline Protection
Average Summer
Water Level


etonka Street
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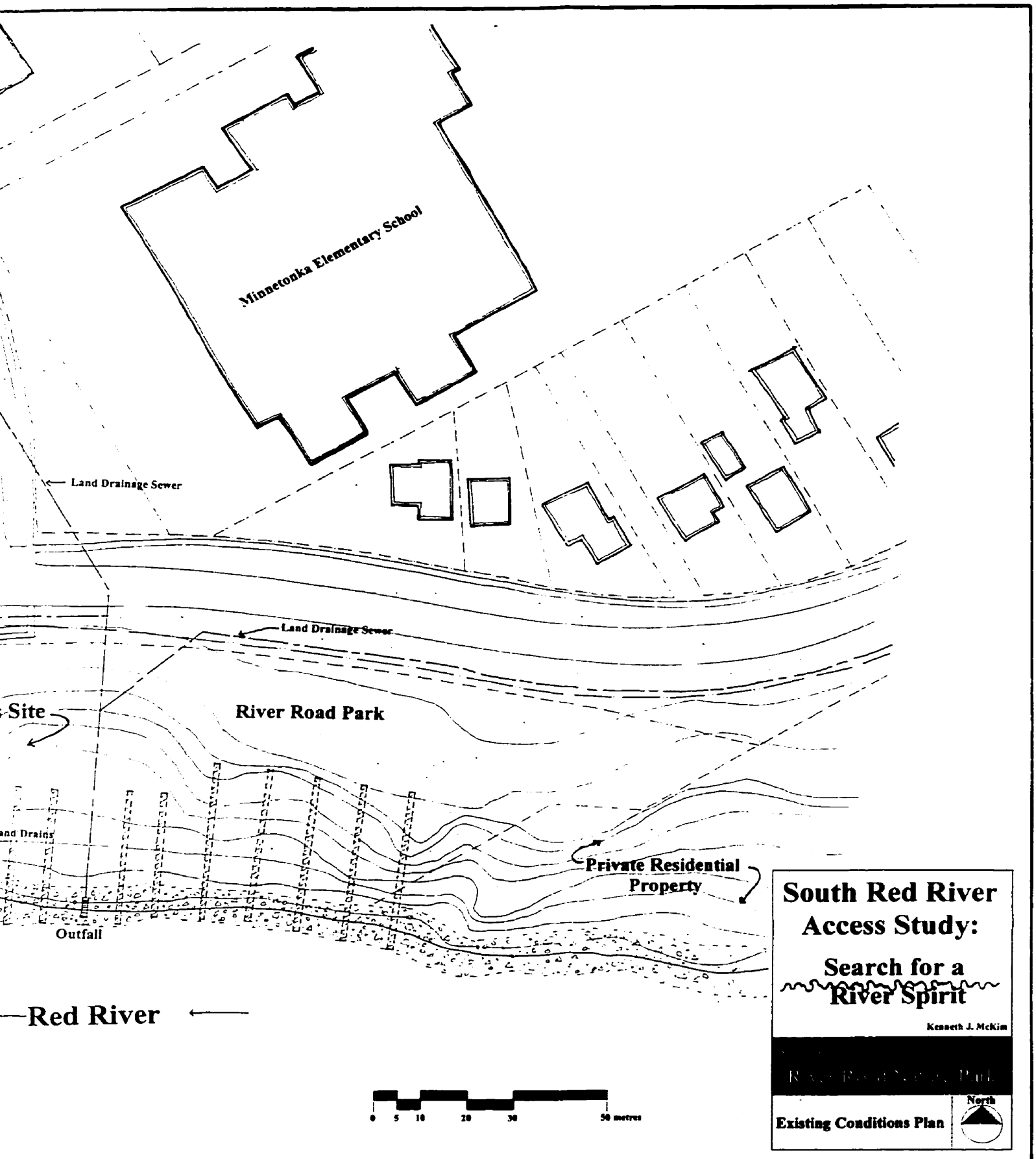
Minnetonka Elementary School
Land Drainage Sewer
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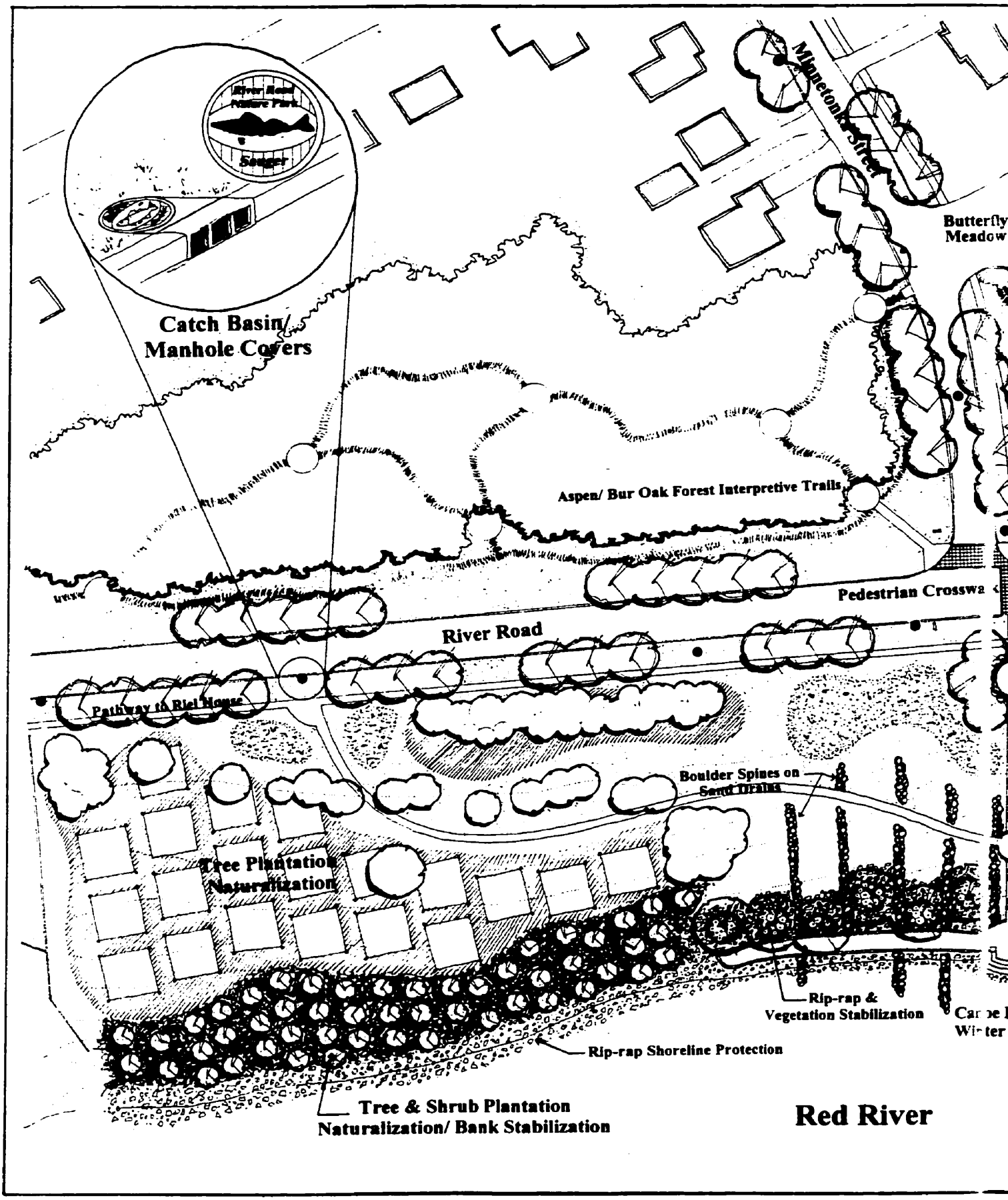
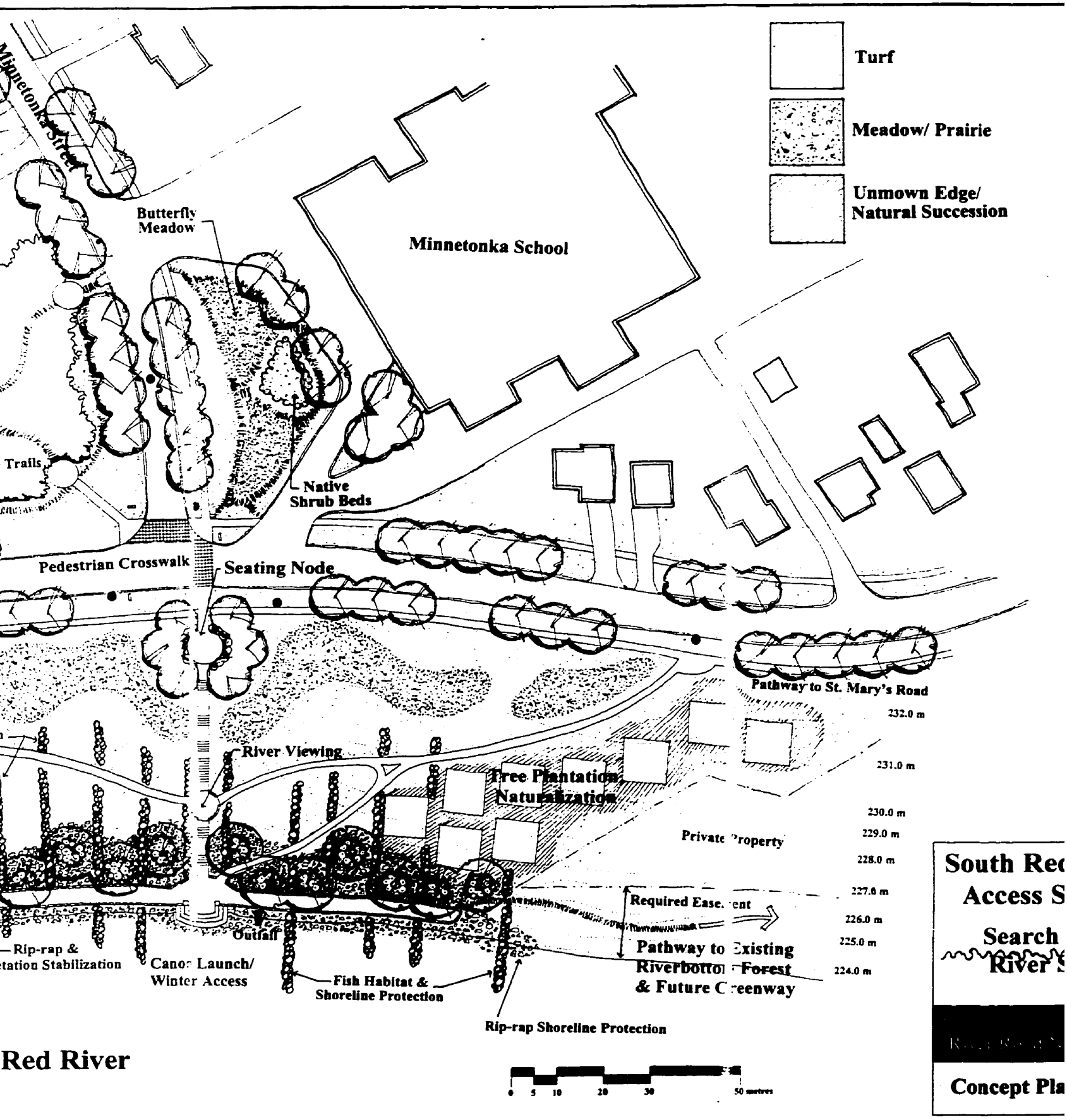
South Red River Access Study:
Search for a River Spirit
Kenneth J. McKim
Existing Conditions Plan
North


River Road
Nature Park
Sewer
Catch Basin/
Manhole Covers
Minnetonka Street
Butterfly
Meadow
Aspen/ Bur Oak Forest Interpretive Trails
Pedestrian Crosswa
River Road
Pathway to Riel House
Boulder Spines on
Sand Drains
Tree Plantation
Naturalization
Rip-rap &
Vegetation Stabilization
Rip-rap Shoreline Protection
Tree & Shrub Plantation
Naturalization/ Bank Stabilization
Red River



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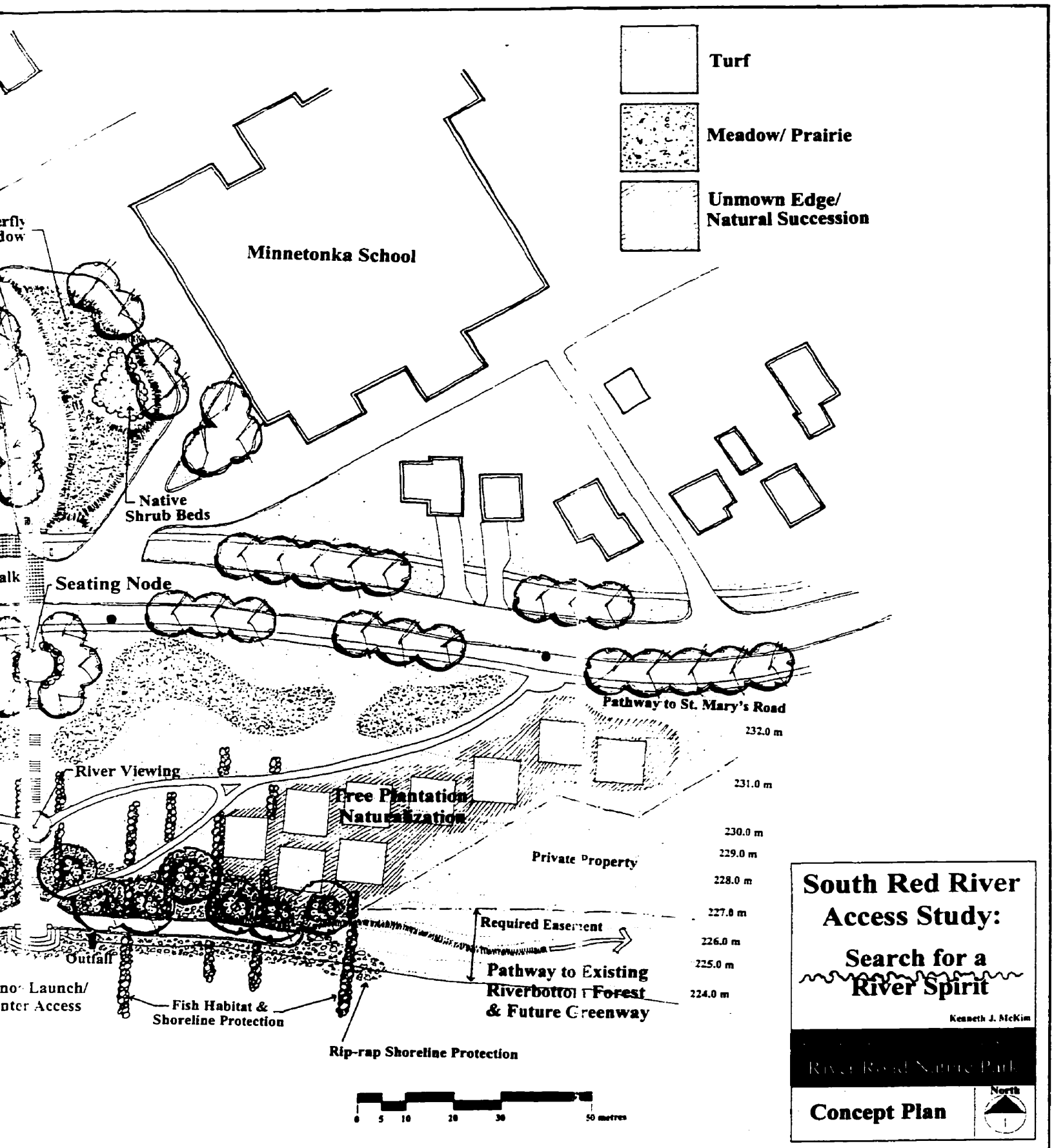
Concept Pla


Turf
Meadow/ Prairie
Unmown Edge/
Natural Succession
Minnetonka School
Native
Shrub Beds
Seating Node
Pathway to St. Mary's Road
River Viewing
Tree Plantation
Naturalization
Private Property
Required Easement
Pathway to Existing
Riverbottom Forest
& Future Greenway
Outfall
Fish Habitat &
Shoreline Protection
Rip-rap Shoreline Protection
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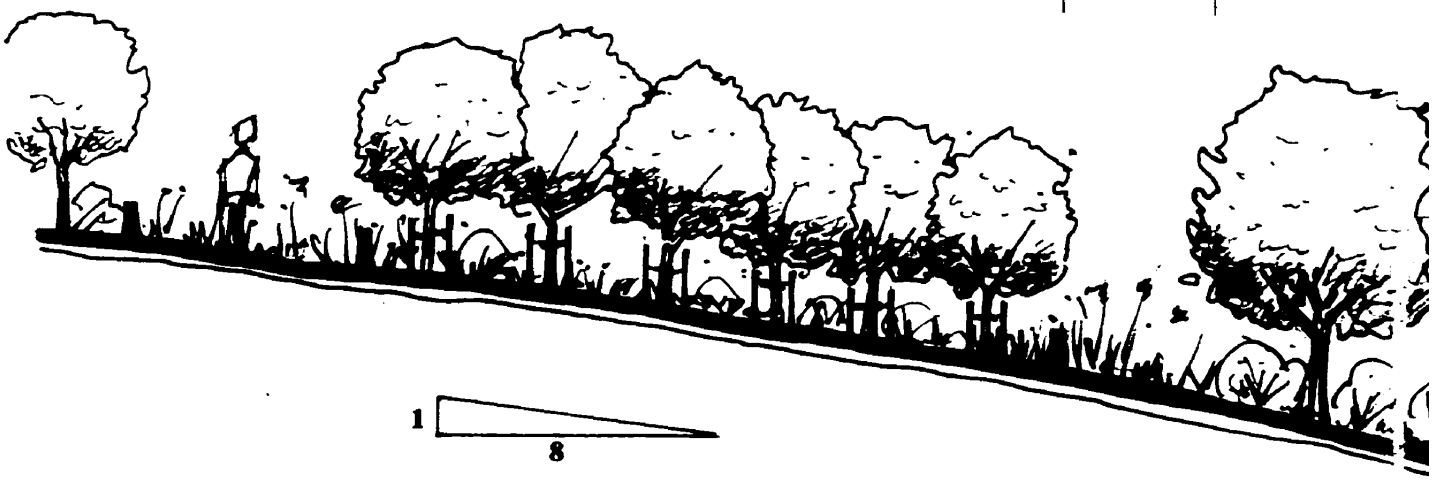
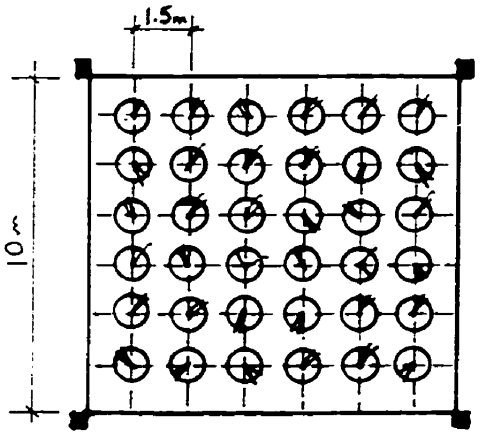
Kenneth J. McKim
River Road Nature Park
Concept Plan
North

Unmown Turf
Natural Succession

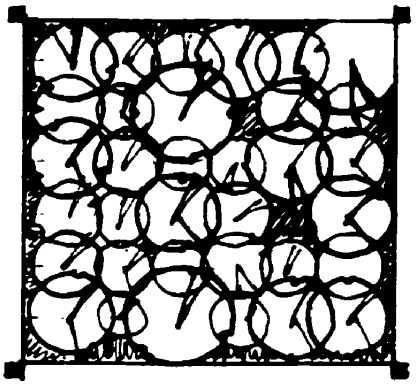
TREE PLANTATION NATURALIZATION
- **tree saplings planted at 1.5m o.c.**
- **natural succession and additional shrub plantings after canopy closure (2-3 years).**
- **mature forest after 20 to 40 years.**

Unmown Turf
Natural Succession

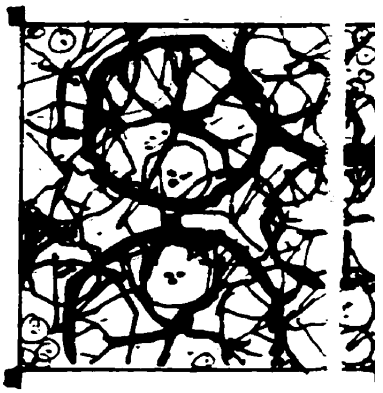




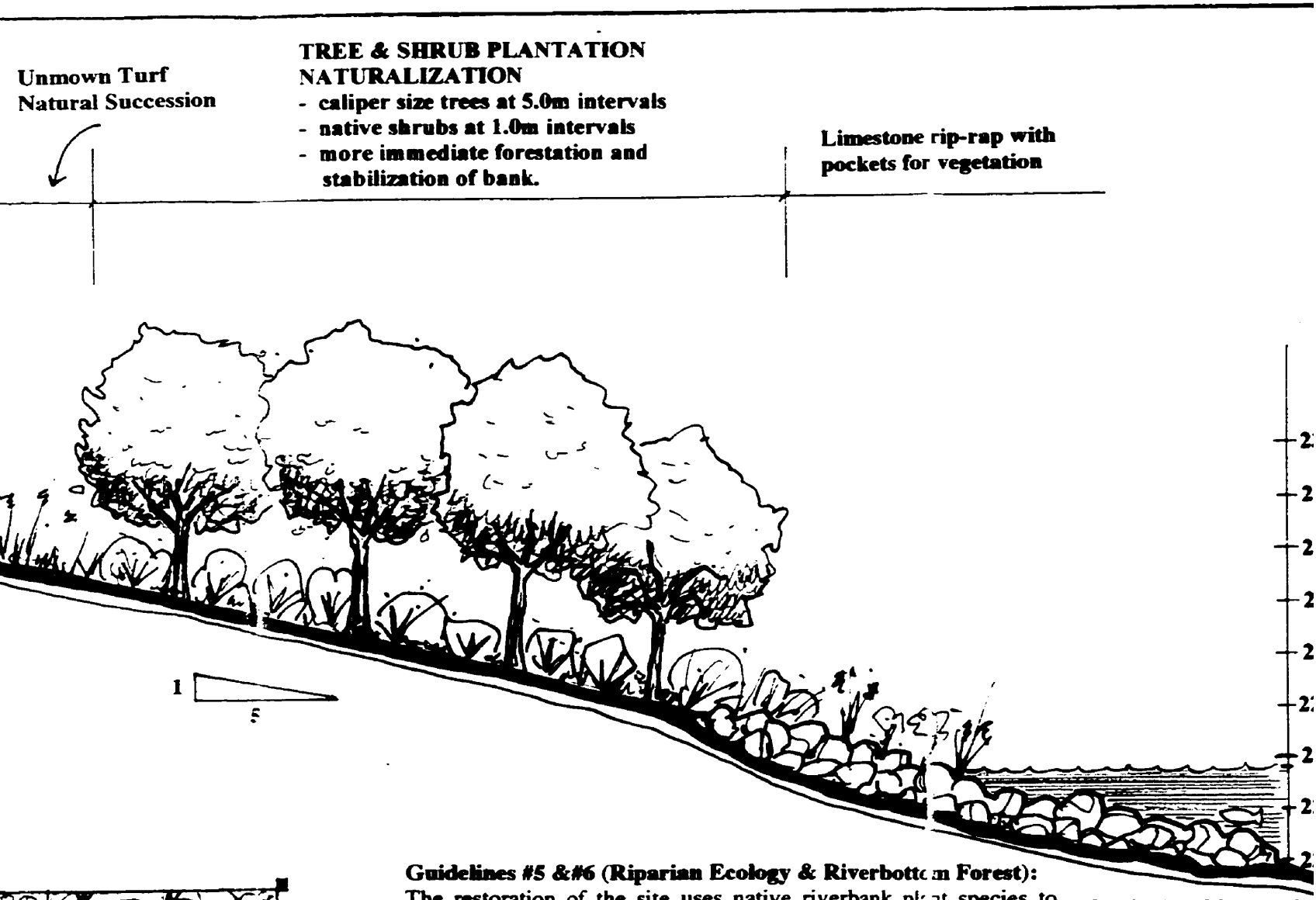
Initial Planting (Year 1)
- Tree saplings planted by area residents and school children in 10m by 10m plots, on a 1.5m grid.
- Plastic weed barrier installed to inhibit weed competition.
- Species mix of green ash, elm, cottonwood, manitoba maple and basswood



100% Tree Canopy (Year 2-3)
- Plastic weed barrier removed and bark mulch spread.
- Closed canopy provides ideal conditions for slower growth species (elm and basswood).
- seed dispersal from adjacent forest and additional shrub plantings add to species diversity.



Developing Forest (Ye: 5-
- Natural succession anc co allowed to take their c ars
- Original grid becomes ess while planting plots bl nd forming a continuous ores



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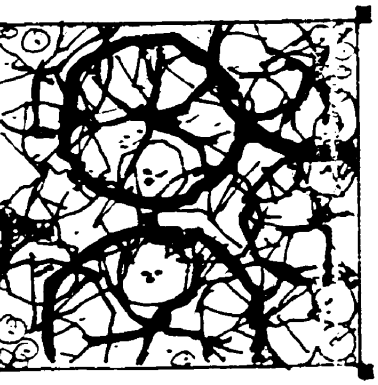

Developing Forest (Year 5+)
- Natural succession and competition allowed to take their course.
- Original grid becomes less evident, while planting plots blend together forming a continuous forest patch.

Guidelines #5 &#6 (Riparian Ecology & Riverbottom Forest):
The restoration of the site uses native riverbank plant species to increase survival rates and to improve the natural aesthetic of the riverbank environment.

Guideline #7 (Landscape Ecology) & 8 (Naturalization): The naturalization and re-forestation of the site will fill an existing gap in the river corridor and provide diverse forest patches with connectivity to other natural areas in the neighborhood.

Guideline # 14 (Environmental Education) & #20 (Community Participation):
Science classes from the adjacent school would plant tree plantings as a part of environmental education curriculum and could study the growth and changes in the forest through the years. More importantly, involving area residents will promote a sense of ownership and community focus to the site.

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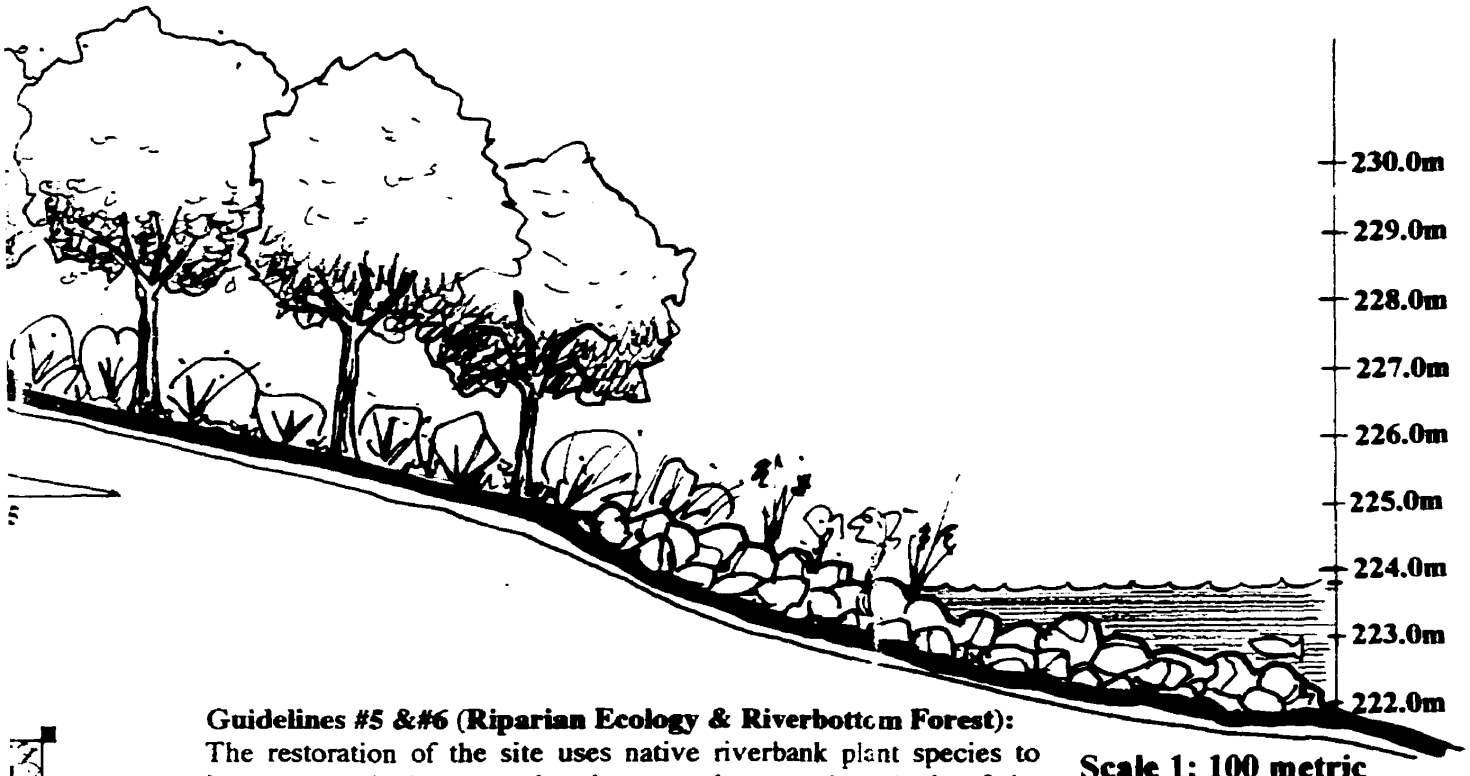
Typical Section Thro
Naturalization Are

TREE & SHRUB PLANTATION NATURALIZATION
- **caliper size trees at 5.0m intervals**
- **native shrubs at 1.0m intervals**
- **more immediate forestation and stabilization of bank.**

Limestone rip-rap with pockets for vegetation



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South Red River Access Study:

Search for a River Spirit

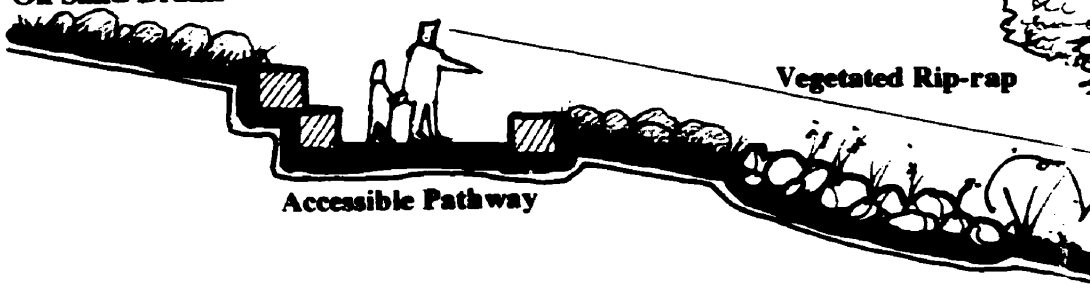
Kenneth J. McKim

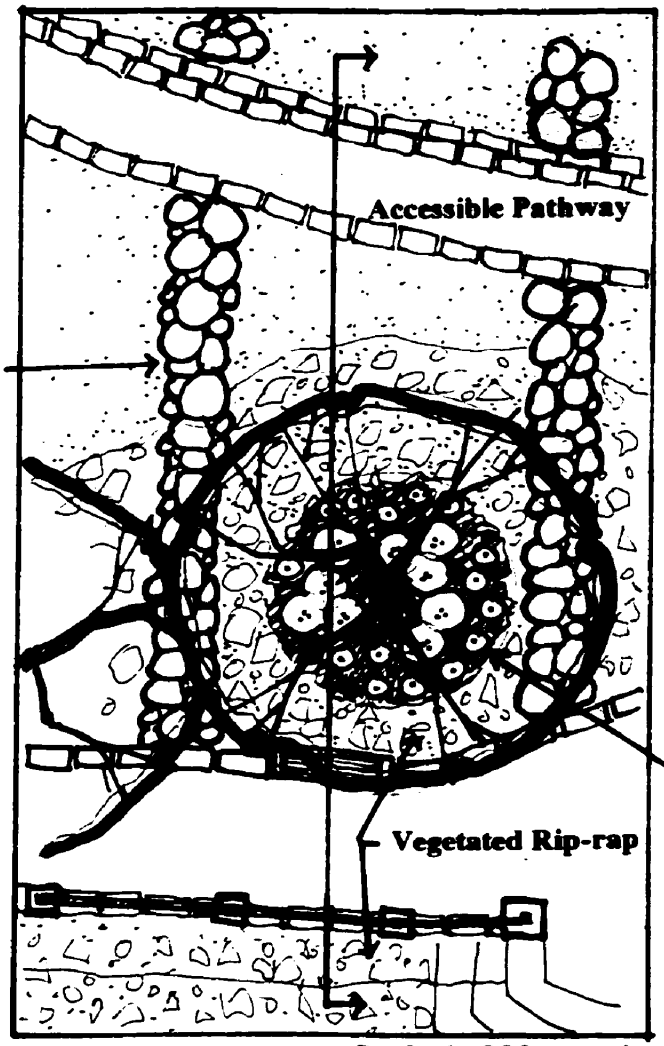
"River Road Nature Park"

Typical Section Through Naturalization Areas

North

Guideline #16 (Universal Access):
Accessible pathways allow for all residents to reach the river's edge safely.





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Bio-engi ie

Guideline #9 (Naturalizat
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Guideline #4 (Bio-engineerin
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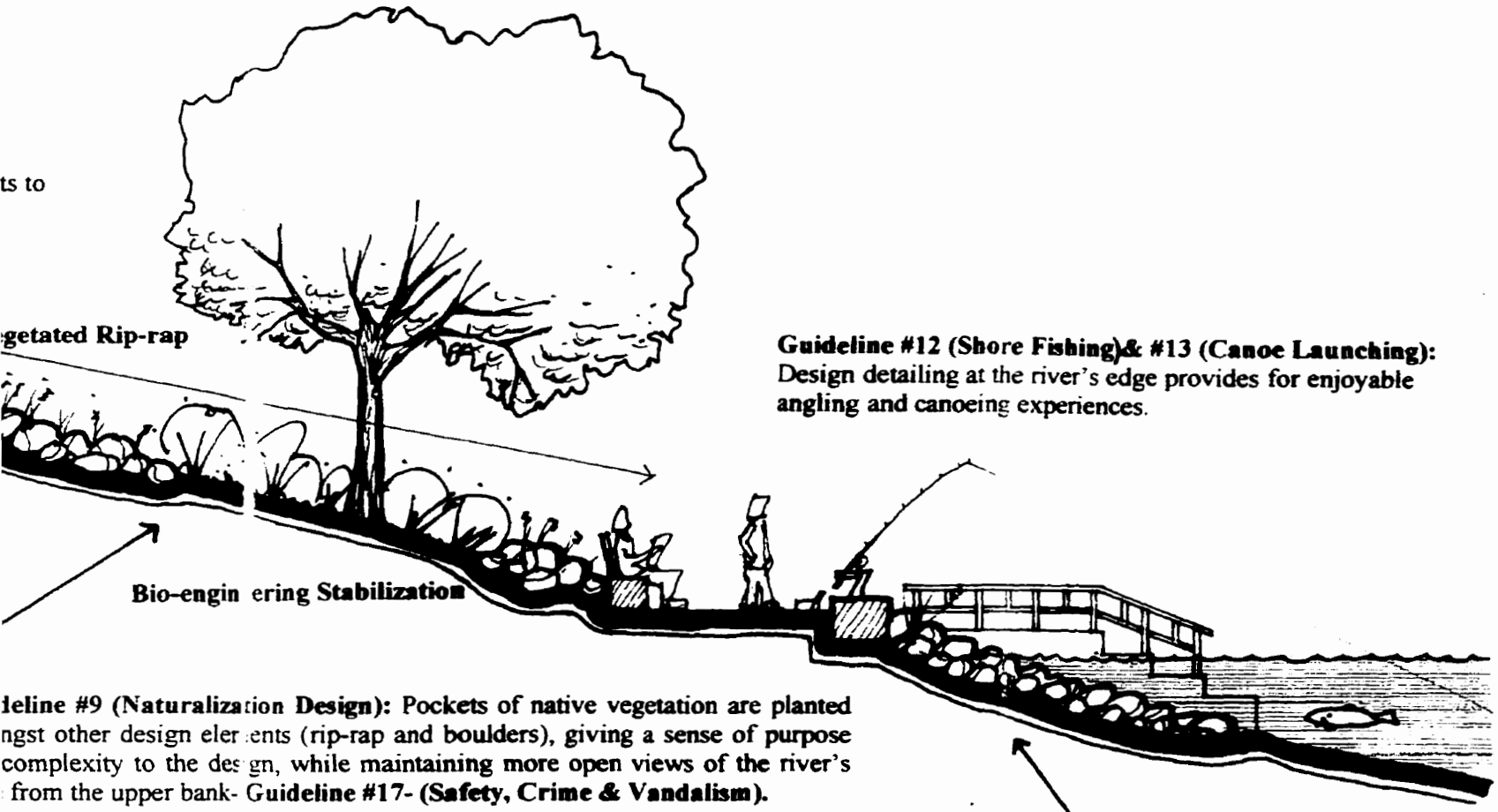


leline #9 (Naturalization Design): Pockets of native vegetation are planted ngst other design eler ents (rip-rap and boulders), giving a sense of purpose complexity to the des gn, while maintaining more open views of the river's from the upper bank- **Guideline #17- (Safety, Crime & Vandalism).**

Scale 1: 100 metric

Gu leline #2- (Erosion and Bank Failure) & Guideline #3 (Stabilization): Lin stone rip-rap is used to protect the river's edge, while lines of boulders exte d out into the river itself to reduce the impact of current and wa e action forc s on the bank. This structure also provides habitat for fish and othe aquatic org isms- **Guideline #10 (Fish Habitat).**

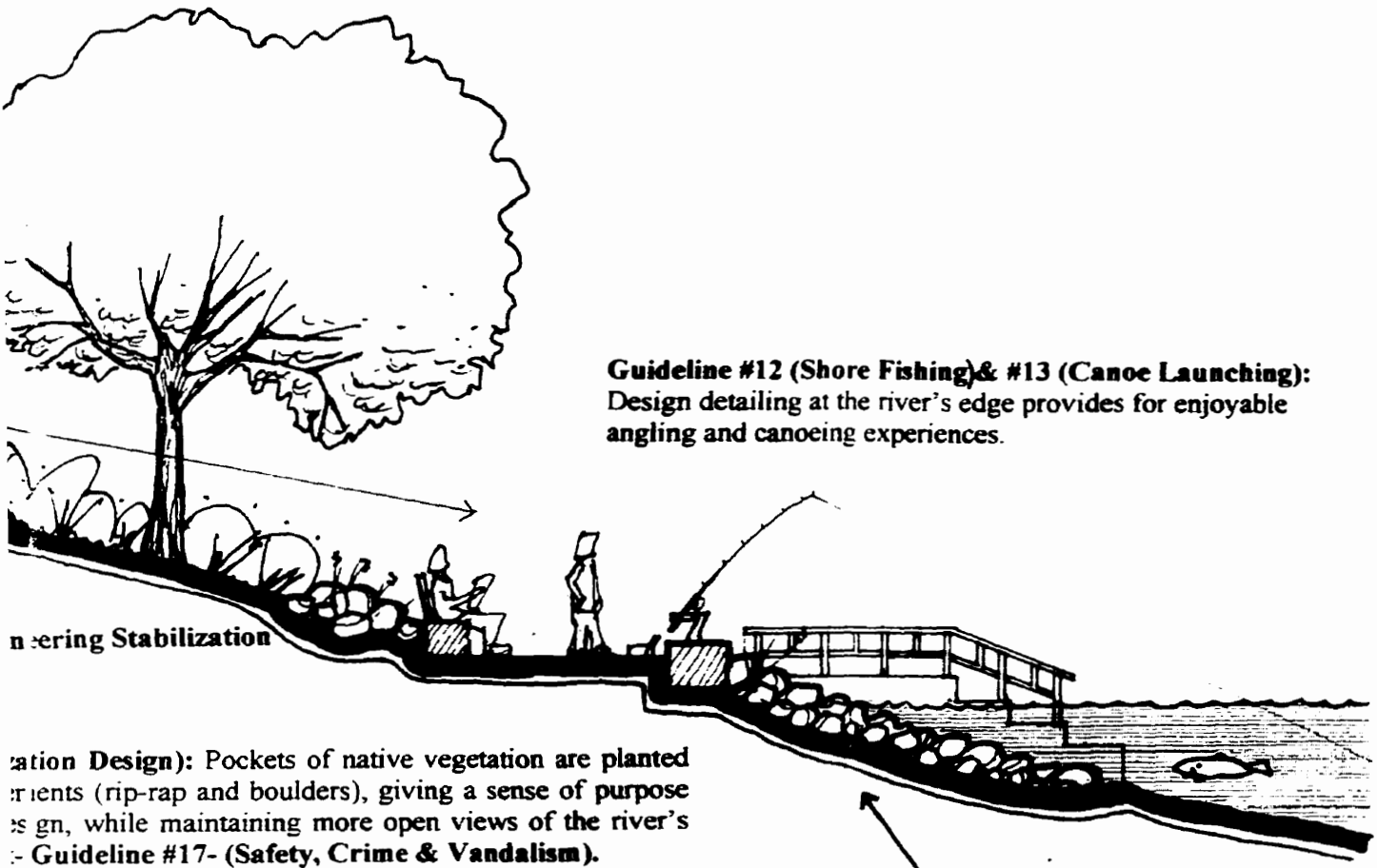
ine #4 (Bio-engineer ng): Plantings of native trees (elm and cottonwood) ubs (willow whips ar : bare root dogwood) are set amongst limestone rip- tabilize the bank duri g normal and high water levels.

South Red Rive
Access Study:
Search for a
River Spirit

Kenneth J. M

"River Road Nature Pa

Plan and Section-
River Edge and
Upper Bank Stabilization



Guideline #12 (Shore Fishing) & #13 (Canoe Launching): Design detailing at the river's edge provides for enjoyable angling and canoeing experiences.

n eering Stabilization

ation Design): Pockets of native vegetation are planted
ments (rip-rap and boulders), giving a sense of purpose
s gn, while maintaining more open views of the river's
- **Guideline #17- (Safety, Crime & Vandalism).**

Scale 1: 100 metric

ideline #2- (Erosion and Bank Failure) & Guideline #3 (Stabilization):
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d bare root dogwood) are set amongst limestone rip-
ng normal and high water levels.

South Red River Access Study:

Search for a River Spirit

Kenneth J. McKim

"River Road Nature Park"

Plan and Section- River Edge and Upper Bank Stabilization

North

6.0 Conclusions

The previous chapters have revealed where opportunities for neighborhood river access can be found, as well as the key design and planning issues crucial to their successful development. Summary guidelines synthesized from these issues have been demonstrated in the design of two very different sites, yet ones that exemplify many of the characteristics of many found along the Red River. The design proposals demonstrate the potential of the literally hundreds of existing City properties that could be utilized for creating access from adjacent neighborhoods. The challenge is now to move forward and to find unique and innovative strategies to bring these opportunities into fruition. The following are just some of several strategies that could be implemented to promote greater river access development.

6.1 Strategies for Implementation

i) Identify and Develop a Stakeholders Action Committee

Riverbank development stakeholders including the three levels of government, business associations, as well as conservation groups such as Fish Futures and the Manitoba Wildlife Federation are already working together on the Winnipeg Urban Sport Fishing Committee. The mandate and membership of such a group could be broadened and strengthened to include canoeing, nature watching and environmental education interests. In addressing more than a single use, such projects can appeal to a wider segment of society, with greater opportunities for fundraising, promotion and implementation.

ii) Develop a Public Awareness Campaign

Public awareness campaigns can serve to educate the public on the access opportunities within their community and how to become involved in their development. The impact of the media can greatly arouse public interest, as well as that of the private sector and promote commitment from politicians. Greater awareness can be fostered through a demonstration site with educational signage, showing residents how they can get involved in their own neighborhood.

iii) Encourage Community Involvement and Volunteerism

Public involvement in the planning and design process is crucial if residents are to utilize and have a sense of ownership of any public park development. Such community participation can

also help to ensure that the needs of the community are met and that the project program represents a wide range of uses and activities. Public input meetings are also good opportunities for designers and public administrators to educate and inform the community on site issues such as naturalization, water quality and safety. Community involvement is also a means reducing labor costs of site development and giving residents a sense of ownership of a project.

In many cases community groups such as churches, community centres and school associations are instrumental in raising funds and grants for the development and maintenance of park development projects. The development of river access sites could be assisted by these, as well as a number of other volunteer groups, including local rotary clubs, naturalist societies and fishing/ wildlife clubs. The City of Winnipeg Community Incentive Grant, Province of Manitoba Community Places and Sustainable Development Grants, and Manitoba Hydro Forest Enhancement Grants are but a few of the many funding sources available to volunteer organizations. Considering the tough budgetary constraints on the City of Winnipeg, it will take active community efforts and fundraising for many access projects to be realized.

iv) Develop Innovative Partnerships

Small and large businesses alike are often eager to support community initiatives as a public relations tool, as well as to showcase products and services. A recent example of such a partnership occurred along Omand's Creek where the Friends of Omand's Creek, the City of Winnipeg and the adjacent commercial land developers worked together to develop pathways and native planting beds along the creek adjacent to a commercial site. Likewise, the Manitoba Wildlife Federation, Mid-Canada Marine Dealers Association and Fish Futures are among a few of the groups that are already working together on the Winnipeg Urban Sport Fishing Committee to bring about urban fishing and river access developments. In instances where government, businesses and the community work together, resources and strengths can be pooled towards a common goal.

v) "Piggy-back" access development on sewer right-of-way projects

River access should be given a priority within infrastructure maintenance and development projects along riverbank properties. For minimal cost, land drainage outflows could be designed to

accommodate pedestrian and cyclist traffic down to the river's edge. Level areas along the shoreline could allow for fishing and river watching. The edge could also be designed for canoe launching if some of the typical rip-rap shoreline protection could be replaced with flat slabs that would not damage a canoe's bottom. The key is to allow for multiple use of these valuable properties rather that a single utilitarian use.

vi) Create river access through riverbank restoration and stabilization projects

In the winter of 1999-2000, nearly $2,000,000 was spent on the restoration of riverbanks that collapsed as a result of the 1997 flood. Unfortunately, the reimbursement guidelines dictated by the Federal government did not allow for river access development as being a part of these projects. As such, a huge opportunity in creating access opportunities for adjoining neighborhoods was lost. A recent estimate by the city Waterways Engineer indicated that approximately $300 million would be needed to stabilize and protect all of the City's inventory of riverbank properties. Any new bank stabilization or restoration projects should consider neighborhood river access and the potential activities that can take place at the river's edge.

vii) Utilize land dedication fees for river access development

Currently, when landowners sub-divide or re-zone land, the owner must pay the City land dedication fees, equal to 10% of the newly increased land values, that will be used for future park developments. When this occurs on river properties, the City invariably takes a portion of the riverbank (typically the floodway fringe area), in lieu of money, to be used for future riverbank greenway development. Considering the importance that Winnipeggers place on nature and access to the rivers, it seems appropriate that at least some of the land dedication funds be used for neighborhood river access development. Ward Councillors could be allotted a certain amount of funds each year that could be granted to community groups developing river access.

In closing, the current lack of river access opportunities along the Red River has deprived many of Winnipeg's residents from enjoying the natural beauty of the river within their own neighborhoods. While planned greenway development will address this in the future, the utilization of the abundant and existing publicly owned riverbank properties, presents a more immediate solution. More importantly, as this study has demonstrated, these

properties present a key opportunity for bringing the citizens of Winnipeg to the river's edge, and the nature of the river environment into the adjacent residential neighborhoods. Hopefully, as more opportunities become available, more and more people can experience the joy and tranquility of the spirit of the river.

7.0 Appendix A

Erosion and Bank Failure

The following is an outline of the key factors, which along with these weak soils contribute to the unstable condition of Winnipeg's riverbanks.

River Flow: As water flows past the banks of the channel, the lack of cohesion and fineness of the clay and silt riverbank soils, allows particles to be swept away by the current. Typically, the region of highest velocity of water flow within a river transfers from the middle of the channel in a straight section, to the outside of the channel as the course of the river moves around a bend. This increased velocity causes scour and erosive activity on the outside bend (concave), and deposition of materials on the inside bend (convex). This constant erosion and deposition of soils along the Red River's course contributes to the meandering and dynamic nature of the river and its' banks.

High ground water/ rapid draw down: During periods of high ground water, caused by such factors as spring melt and high precipitation, the banks of rivers can be very suceptible to failure. Bank failure is most likely when the ground water table is higher than the river level, causing a difference in pressure between the saturated bank and the surrounding air. As a result of the higher pressure behind the bank face, this pressure imbalance causes the ground water in the saturated bank to flow through the bank face. As the water flows, soil particles lose their cohesiveness, and the stability of the bank can be jeopardized. This was often the case in the summer of 1995 where abnormally high rainfall contributed to a higher water table and subsequently significant losses of riverbank property. In addition, when the level of the river is higher due to such high rainfall or spring flooding, the rapid draw down of the river level can also have adverse affects on the riverbanks. In these cases, when the river is high, there is an equilibrium between the water pressure of the river and that exerted by the saturated bank. If the water level is allowed to drop suddenly, as determined by either the Floodway or Lockport dam, the resultant loss of pressure against the river bank creates a pressure imbalance, and potential bank failure.

Wave Action: Whether caused by wind, current or boat traffic, wave action can cause considerable damage to riverbanks, particularily during periods of high water. Although riverbank vegetation can work to deter some of this affect, the continued action by waves causes the soil partcles of the bank to be dislodged and removed by the flow of water. If the loss of soil at the base of the bank is sufficient, the bank may be undercut and the then unsupported material may collapse into the river.(MInnesota DNR, 1991).

Freeze-Thaw and Wet-Dry Cycle: When water freezes within the riverbank soil, the expanding ice layer pushes soil particles out of their original position. When the riverbank thaws, these particles settle back into their original position, but in a looser state than they were to begin with. Similarily, when the clay soils of the Red River's banks absorb water they tend to expand. During dry periods,when this wet clay material dries, it tends to shrink and crack, resulting in a loose and easily erodible surface. These continual freeze-thaw and wet- dry cycles weaken the cohesive strength of the riverbank soils, leaving them more succeptible to other erosive forces

Overbank Drainage: The drainage of water across the land surface is a naturally occuring process which can have a negative impact on riverbank stability, and is compounded by human influence on the landscape. The abundance of hard surfacing within urban areas combined with poorly designed land drainage patterns, can allow for excess surface runoff. This overbank drainage can lead to two different types of erosion of the riverbank. Sheet erosion is a term used when runoff carries away surface particles in thin layers, while rill erosion refers to the process where small channels in the bank material are formed by runoff. The combined effect of these processes can be a loss in bank material, as well as mineral and organic nutrients, (Minnesota DNR, 1991).

Bank Loading: Human influence on the landscape can have a major impact on riverbank stability. The construction of any structure on the top of the bank produces increased loading and higher shear stress on the bank. If these shear stresses are greater than the shear strength of the riverbank soils, then the bank can fail, possibly causing large masses of bank material to slide into the river. Thus, any proposed building, plantings or earthworks must be carefully analysed as to its potential impact on bank stability.

Riverbank Stabilization Techniques

In general, there are two broad categories of riverbank stabilization techniques: hard techniques and bio-engineering techniques. Hard techniques typically involve the use of hard construction materials such as stone or steel to resist the erosive forces and shear stresses acting on a riverbank. These solutions can be engineered to a relatively high degree of certainty and are the most typically used for bank stability problems in Winnipeg. In contrast, bio-engineering techniques use living vegetation to stabilize riverbanks. This approach is relatively untested in the Winnipeg area.

Hard Techniques

Hard techniques are the typical engineering solutions for riverbank instability problems. They typically achieve their success by counteracting the forces of nature that are causing the bank instability. The following is an outline of the most commonly used "hard" techniques for stabilization of riverbanks along the Red River.

Rock Riprap: Perhaps the most common form of erosion control used within Winnipeg, riprap is a highly effective, and moderate cost means of shoreline protection. Riprap consists of rock material, typically limestone, placed on the bank surface to protect it from the erosive forces of the river. Construction usually takes place in winter once the ground is frozen,and the river is drawn down exposing the bank. Stone is dumped or placed so that it protects below and above the normal summer water level. Larger material may be used at the toe and at the end in order to anchor the protection and prevent it from being undercut. Riprap works best when it can extend up the bank to where natural vegetation can continue the protection during high water periods and flooding (Minnesota DNR, 1991). This method is not seriously affected by bank movements and is easily maintained by placement of additional rock material. The two key advantages of this technique are its' relatively natural appearance and the fact that vegetation can become established between individual stones (Smith, 1989). This vegetative growth can provide habitat for invertebrates and fish within the river and cover for animals on land. The riprap used along the Assiniboine Riverwalk

"has proven to be a great addition for the fish habitat in terms of food shelter and breeding" (Clark et al, 1987).

Shear Key: Shear keys are another highly effective method of stabilizing riverbanks along the Red River. This method is usually used when the load imposed on a bank is greater than the shear strength of the bank material. It is also used when toe erosion undercutting a bank can jeopardise it to the point of failure. Shear keys involve the excavation of bank material just above winter ice level. Material is removed down to below glacial till level and replaced with crushed limestone approximately 100-200mm in size. The shear key replaces the weak clay soils with this higher strength material, which offers passive resistance to slope movements and helps to lock the bank in place (Riverbank Management Committee, 1989.). The required excavation makes this method fairly expensive and can be extremely damaging to the bank vegetation due to the heavy machinery used. On the positive side, shear keys can be designed so that they are below summer water levels, virtually out of sight. Thus, a bank can be protected, have addtional fish habitat created and have virtually no visual impact on the natural river environment.

Gabions: Gabions are wire boxes which are filled with stone and used to stabilize the toe of riverbanks and other sloped surfaces. While this method is effective, easy to construct and relatively inexpensive, there is risk of failure if there is any movement of the bank or deterioration to its base (Schiechtl,1980). Other negative attributes include the unnatural appearance and the potential danger for persons climbing on these structures. Use of gabions along the Red River is limited, although they have been successfully used at St. Vital Park as a river edging for shore fishing.

Sheet Piles and Walls: Sheet piles and concrete walls can be driven or placed vertically at a point of severe erosion. These walls must extend to a sufficient depth to ensure so that erosion does not undermine the integrity of the structure at its base. While this technique is very expensive, it can halt bank erosion completely (Minnesota DNR, 1991). Typically, this technique is used at critical points where no erosion can be tolerated, or where the lateral space required for other forms of bank protection is not available. The clean river edge provided by this method is well suited for boat docking areas such as those found at the Forks and Tache Promenade. However, there is an unnatural and overpowering quality to this technique that seems inappropriate in most river settings.

Drainage Trenches: Sand and gravel drainage trenches are an effective stabilization method in cases where high water tables cause an outward pressure behind the bank face, resulting in severe riverbank movement. To counteract this process, drainage trenches are excavated during winter ice levels down through the slide mass of the bank and back into the head scarp. These trenches are typically around 5-6 metres deep and are dug at 6-10 metre intervals. The trenches are then backfilled with sand and compacted to facilitate drainage and then capped with either clay or limestone boulders. These drains are able to reduce the outward water pressure during high water table periods by allowing for easier flow towards the river. In addition, the shear strength of the sand is greater than that of the silty clay it is replacing, and thus helps to stabilize the bank (Lew,1988). This method is very expensive and creates a significant disturbance on the riverbank during construction. However, it has shown to be a successful stabilization technique in several sites along the Red River in Winnipeg as well as along River Road near St. Andrew's.

Rock Pavings: Rock pavings are usually built to protect riverbanks from erosion caused by fluctuating water levels and scouring from heavy ice. Standard contruction involves the use of rough rock paving laid in concrete or asphalt, however it is possible to use dry rock pavings placed on a layer of compacted gavel and set with gravel in the joints (Schiechtl,1980). Rocks must be thick and heavy enough to resist the tractive forces of the river, usually between 20-60 cm in size (Smith,1989). This technique is of most effect on outside bends where banks are much more succeptible to scouring by ice and current.

Slope Modification: Slope modification is a stabilization technique that is usually used in conjunction with other methods. Although slope modification does not make use of hard construction materials as in the previously outlined techniques, it does require the use of heavy machinery in its implementation. In general, this method involves the re-grading of steep riverbanks slopes to a flatter slope angle in order to lessen the load on the bank. This slope is determined by the natural angle of repose of the bank material, although in many instances there is insufficient space to achieve this. Many highly eroded banks in Winnipeg have slopes as steep as 1V:1H or are even completely vertical. Most slope modification projects along the Red River attempt to re-grade to a 1V:5H or flatter, however in doing so, most existing vegetation is eliminated and usually replaced with sod. This practice contradicts the findings of Schiechtl (1980), who states that slopes can be left steeper than their natural incline provided revegetation with indiginous plant material occurs immediately after earthworks are completed.

Hard Points: Hard points are short spurs of rock that extend from the bank into the river. The purpose of the hard point is to stabilize the bank by creating a low velocity zone along the bank downstream from the hard point. Typically, a hard point structure will protect approximately 5 feet of bank for each foot of hard point protruding into the river (Minnesota DNR, 1991). A hard point is made up of two equal length parts, the extension into the river and the root buried into the bank of the channel. These structures are usually constructed in a series to protect a larger area of riverbank. Although not presently used in Winnipeg as a stabilization technique, hard points have been used successfully in Minnesota in numerous rivers and streams. An interesting side benefit to this technique may be in the creation of fish habitat that these structures would provide.

Bio-engineering Techniques

Presently, bio-engineering methods of riverbank stabilization are rarely used along the Red River in Winnipeg. This is due in part to the extreme dynamics and volume of flow of the Red River, but also in the failure of the engineering community to explore its potential. Schiechtl (1980) has stated that very effective stabilization can be obtained through a combination of hard construction and vegetation, or through the use of vegetation alone. In addition, while hard techniques tend to weather with age, bio-engineering solutions increase in their technical effectiveness as plants develop stronger rooting and growth with age. When compared to conventional stabilization methods, bio-engineering systems can have longer durability, better aesthetics, less maintenance and reduced construction costs (Schiechtl, 1980). The following is an outline of some of the methods from Schiechtl's book, Bioengineering for Land Reclamation and Conservation (1980), which could be used for stabiliztion of riverbanks within Winnipeg.

Sodding: The use of sod is common practice for most riverbank stabilization projects in Winnipeg. The main advantage of sod is that it provides an instant matt of vegetation that can help to protect the riverbank soils from erosion during high water. However, the clay soils of the region tend not to allow deep root penetration by the sod. In these cases wire mesh or commercially available turf reinforcement matts can be used to anchor the sod to the bank. If slopes are too steep or the river velocity too high, the sod may require to be staked to the bank. Also, new types of sod using diverse mixes of native ground covers are now available and could be a more appropriate selection for riverbank sites.

Protection Seeding: Seeding of riverbanks should occur immediately after spring flooding has subsided, so that seeds have time to grow and develp a rich root structure over the remaining growing period. Although rarely used in Winnipeg, most erosion control experts recommend hydroseeding as the proven method for slope stabilization (Lee, 1996). This technique involves the use of equipment that can spray seed mixes, fertilizer and mulches in one application. In addition, tackifiers can be added to ensure the seed adheres to steep bank conditions. Mixes of native perennial, annual and even pioneer shrub species seeds have been developed for use with this technique. The result is a very cost effective means of re-vegetating riverbanks with a diverse community of plant material. This diversity contributes to greater bank stability as different plant species establish their root systems to a variety of depths.

Branch Packings: The method of branch packings is designed for the repair and restoration of steep bank failures at very deep waterways. For construction, branches (usually willow), are placed in layers 20-30 cm thick and covered with gravel, rock or
of live branches called fascines. Each layer is tied down with pegs before the next layer is added. Live cuttings are pegged into the outer surface of the slope. The toe of the slope is protected with rock fill to prevent undercutting of the bank. Once the initial cuttings become established, other pioneer species colonate the newly stabilized bank, further adding to the erosion protection.

Joint Plantings: Joint plantings is a bank and shore protection technique frequently used in Europe. It is excellent protection for riverbanks by reducing the water speed acting an the banks as well as absorbing waves and drifting ice. In addition. as the plantings mature, their root structure further reinforces bank stability. This method can be used in conjunction with both the riprap and rock paving techniques outlined above. For riprap, cuttings are planted in spaces between rocks that will allow for penetration to the bank soil. Some rocks will have to moved to allow for this space and additional topsoil may have to be used. With joint planting in rock pavings, holes must be made in the joints with a crowbar or pick to allow for the planting of cuttings. After the joints have been planted, bank soil or topsoil should be used to fill in the spaces. The cuttings must be long enough to penetrate into the riverbank soils below the stone. Cuttings should be planted irregularily to create a natural appearance when they mature. It is also important to plant no lower than the normal summer water level as most woody plants cannot survive more than 6 weeks of flooding.

Rock Fill with Live Branch Layering: Rock fill with live branch layering is a fast annd simple stabilization technique that produces a natural looking result. Its use is suited for repairing small scale bank failures and to protect and repair the toe of riverbank slopes. For construction, large rocks

are deposited in layers following the shoreline and extending from the toe of the bank to several metres above the normal summer water level. Live branches from native pioneer species, (usually willow), are placed butt end into the ground between the rocks. Another layer of rock is added so that when construction is complete, 50-100cm of the branches protrudes from the rocks. The rocks provide immediate shoreline protection and anchor the branches in place so that not even floods can pull them out. The rough surface of the rocks and the protruding flexible branches, reduce the velocity of water and allow for rapid siltation in the gaps between rocks. This contributes towards better growth for the branches and withi a few years, they will develop into a dense stand of brush.

Naturalization Techniques

The following are four naturalization techniques as outlined in Hough and Barrett's People and City Landscapes:

Managed Succession- The managed succession approach to naturalization and reforestation is based on the principles of natural succession, speeded up and assisted by planting and management. Pioneer or fast growing nurse species are planted first, although intermediate and climax species may also be planted at this time or at appropriate intervals in the development of the woodland. Nurse crops function to improve soil drainage, fix nitrogen, stimulate soil micro-organisms and create a micro-climate suitable for climax species. This technique tends to mimic the changes in character and species composition which gradually develop over time in a woodland forest, using a combination of natural processes and management input.

The **"plantation approach"** typically is limited to tree species only, under a system in which the final woodland composition is essentially the same as the initial planting. This technique can be useful in certain urban settings where visual buffering is required or in providing a nurse crop for the subsequent planting of climax species in a managed succession program.

Natural regeneration is the most economical approach to naturalization, but also the slowest. This technique can be achieved by allowing natural succession processes to occur through the discontinuation of mowing or other disturbance activities. This process takes up to 60 years as turf areas develop into meadow, then to a thicket of small shrubs and tree saplings, to a young successional forest of pioneer tree species, and culminating in a closed canopy forest dominated by shade tolerant tree species. The succession may be stopped at the meadow stage by periodic mowing or burning to control woody species.

Seeding- There are also a number of naturalization techniques which make use of commercially available seed mixtures in order to establish low maintenance meadow and prairie areas. Native wildflower, prairie grasses and legume mixtures all can be applied to areas in which the site is properly prepared, free of weeds and other competing plants. Existing turf areas can also be "overseeded" with native seeds to speed up the natural processes of succession. (Hough and Barnett, 1987)

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