

# **EAST BANK OPEN SPACE STUDY**

**Prepared for  
MEEWASIN VALLEY AUTHORITY**

**Prepared by  
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## ACKNOWLEDGEMENTS

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In November, 1980, Hilderman Feir Witty & Associates were contracted by the Meewasin Valley Authority to prepare an open space development plan for the East Bank of the South Saskatchewan River, in the City of Saskatoon. This report documents the process and results of this major study.

This report is intended to be reviewed in conjunction with the map folio submitted under separate cover. Both the report and map folio are organized in the same manner; first, the Plan is described, followed by documentation of Background Information collected and analyzed as an essential part of the planning process. Although this organization does not follow the study process, it is intended to permit those reviewing the report and map folio to clearly understand the proposals. This eliminates the need for complete review of the technical background information, prior to the description of the Plan.

The East Bank Development Plan described in Section A of this report) reflects the major theme of the Meewasin Valley Project; it provides for uninterrupted pedestrian and cyclist circulation from the Idylwyld Bridge in the south to the Forestry Farm Park in the north.

The East Bank study area offers a variety of diverse opportunities for open space development. Within the context of providing a continuous linkage, the Development Plan proposes development which will build upon the inherent potential of six key focal points, in order to increase the attraction of the East Bank to City residents. These focal points are as follows:

1. Rotary Park - intensive recreational development.  
- southern 'anchor' of the East Bank Study Area.
2. Birch Woods Interpretive Unit - in Cosmopolitan Park.  
- characterized by very low key development.
3. Ski Jump Hill - multi-purpose recreational area.
4. Sutherland Beach - a major development area, for education, interpretation and recreation.  
- to include the proposed Meewasin Arboretum a Visitor Centre, horticultural area, etc.
5. Peturrson's Ravine - interpretive unit, park-like open space.
6. Forestry Farm Park - major development area, as set out in the 1979 Forestry Farm Park Conceptual Development Plan.  
- the northern 'anchor' of the East Bank Study area.

Connecting these focal points is a network of multi-purpose pathways, walking trails and, in places, equestrian trails. In addition, it is proposed that a system of cross-country ski trails be developed, although specific alignments for ski trails are not indicated.

Proposals contained in the East Bank Development Plan are centred around the inherent open space potentials of the study area, the concerns and desires of interested members of the public (as expressed at a number of meetings and open houses), and the need for an integrated approach to open space development along the East Bank. Thus they do not necessarily reflect present land ownership

patterns, or detailed plans for future urban development within or adjacent to the study area.

In order to assist in the identification of development priorities, this report suggests a general implementation strategy, phasing programme and general cost estimates, where costs are known.

Implementation of the East Bank Development Plan is expected to occur over the long term, and will require that a number of specific issues be addressed, and that policy and operational decisions be made. To that end, it is recommended:

- That the East Bank Development Plan be approved in principle, and accepted as a general framework for detailed planning and design.
- That responsibility for co-ordinating all aspects of Plan implementation be taken by the Meewasin Valley Authority.
- That the proposals in the Development Plan be prioritized and an implementation strategy and phasing programme established.

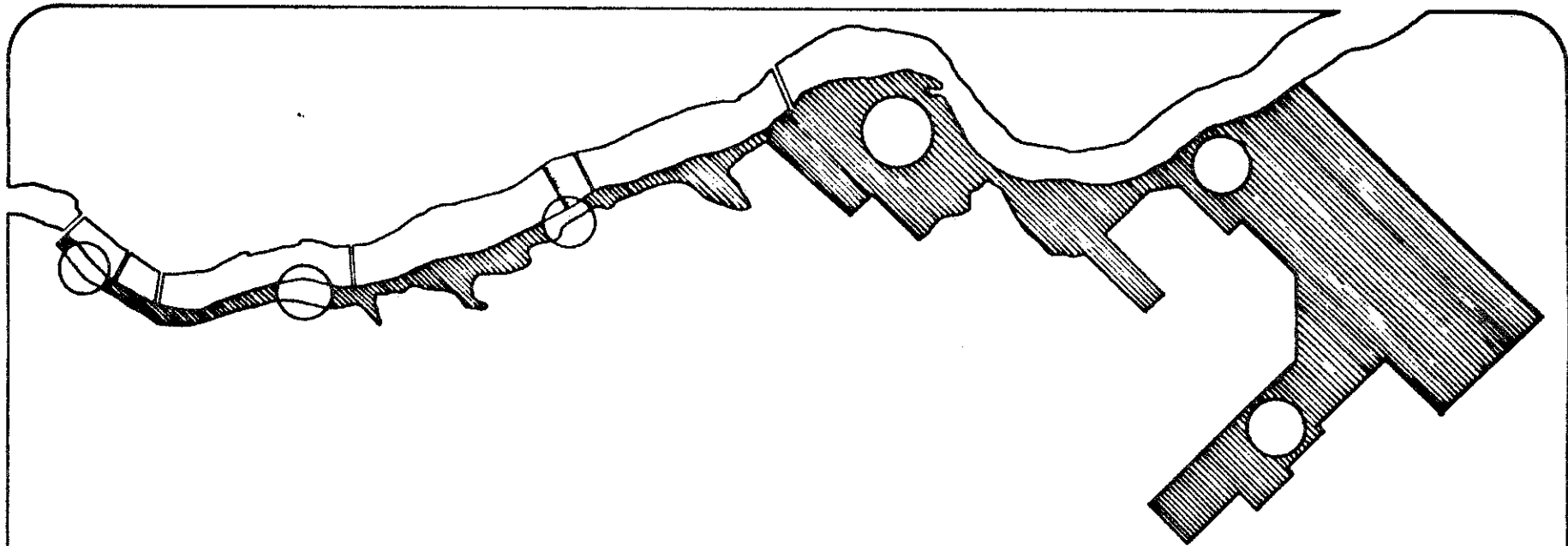
Section B of this report outlines the background to the Development Plan. This information is intended as a description of the information gathered for planning purposes. As well, supplementary information was gathered and described. This supplementary information will be of particular value as a general data base or reference when implementation is undertaken.

A number of factors have combined to limit the information available to the Design Team for analysis.

Due to the timing of the study, data collection occurred during the winter season. Thus much of the information contained in the Ecological Analysis was obtained from secondary, and at times out-dated, sources. These are documented in Section 1.3. of the Background Information. In order to specifically locate and evaluate features of possible ecological significance and of interpretive value, further field investigations will be required.

Terrain analysis information, though suitable for the level of planning undertaken in this study, is not sufficient for detailed design and construction of certain proposed facilities. Additional field investigations will be required before detailed plans are drawn up.

Although the information base compiled for this study was sufficient to evaluate the potentials of various areas within the context of the East Bank Study Area, little is known about how these areas relate to other features in the Meewasin Valley. For example, although it is clear that the Sutherland Beach area offers the greatest potential for a variety of recreational, interpretive and educational activities in terms of the East Bank Study Area, there is little detailed information to suggest how this area would rate within the context of the entire Meewasin Valley. This limitation is due, for the most part, to the fact that this study has been undertaken simultaneously with an overall Development Plan presently being prepared by the MVA. It is therefore recommended that the East Bank Open Space Study be carefully considered as a general planning framework to be coordinated with the Development Plan for the entire Meewasin Valley Project.



# INTRODUCTION

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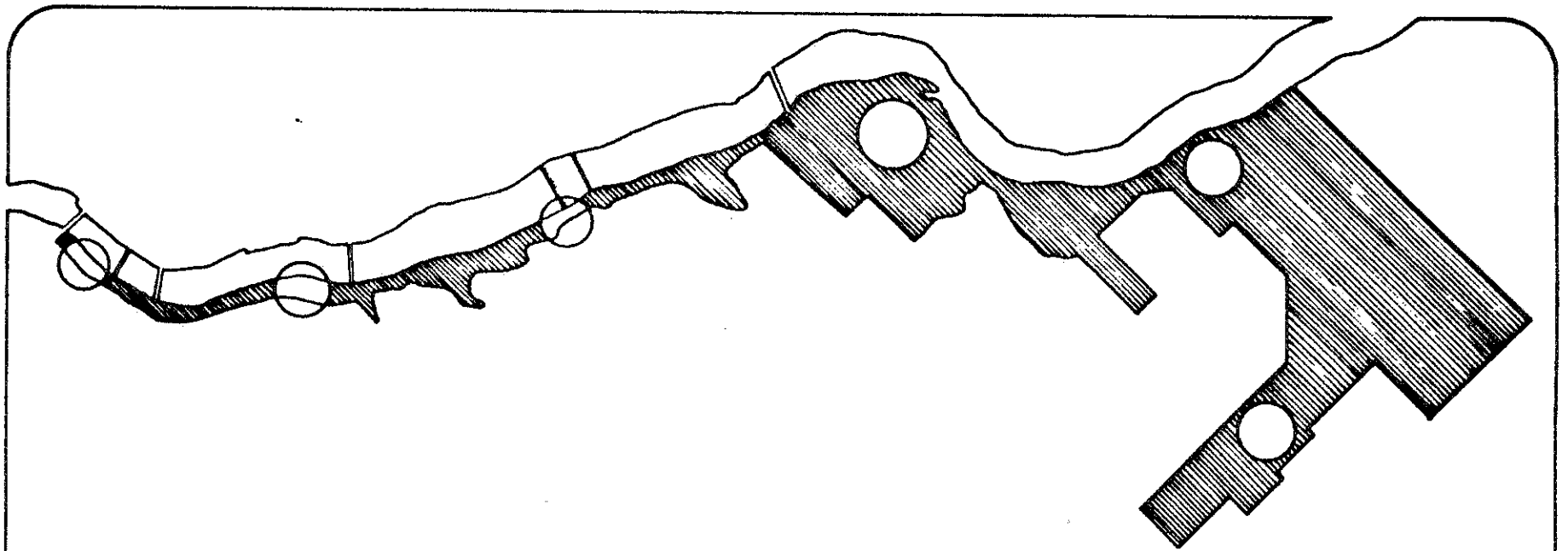
# 1. INTRODUCTION

In November 1980, Hilderman Feir Witty & Associates were contracted by the Meewasin Valley Authority to prepare a long-term development plan for lands along the east bank of the South Saskatchewan River. The study area extends from the Idylwyld Bridge in the south to the city limit in the north. Although the South Saskatchewan river consistently acts as the western boundary of the study area, the eastern boundary definition is somewhat more complex (Map 1). Between the Idylwyld and University Bridges, this boundary follows Saskatchewan Crescent. Within the main campus of the University of Saskatchewan, the boundary conforms to a line lying immediately west of lands either developed or proposed for development. To the north of the main campus, the study area abuts the fields presently cultivated by the University Departments of Crop Science and Animal Science.

At the quarter section line (separating the southeast and northeast quarters of Section 3, T.37, R.5, W3M), the study area boundary turns straight east, as far as Preston Avenue. Following Preston Avenue north for 50 metres and east for 130 metres, the boundary again follows the edges of cultivated fields north and east to Central Avenue.

East of Central Avenue, the study area includes all of the north half of Section 12, T.37, R.5 W3M and all lands presently occupied by the Saskatoon Forestry Farm Park. Thus, the study area incorporates not only a continuous 'ribbon' of land along the east bank of the South Saskatchewan River through most of the city, but also a potential linkage between the riverbank and the Forestry Farm, and a future linkage to the northeast of the Forestry Farm.





**STUDY PROCESS 2**

## 2. STUDY PROCESS

The study area presently consists of several relatively distinct and diverse areas. However, the potential for providing a continuous open space linkage along the east bank of the river from the Idylwyld Bridge to Peturrson's Ravine and the Forestry Farm, suggests that development throughout the study area should be planned and implemented in a co-ordinated manner.

Co-ordinated development can best be ensured through a comprehensive examination of the study area, an assessment of public desires and needs, and the subsequent preparation of an overall planning framework for the entire study area. As the first phase in the process of developing the East Bank Study Area, the preparation of this planning framework, or Development Plan, is an essential step in the development process (Figure 1).

Clearly, implementation of a Development Plan can be phased in a manner which is responsive to growing needs and pressures over time. However, without an overall set of design objectives (as contained in a Development Plan), it would be difficult to ensure that ultimate development and the resulting inter-relationships (both within the study area and between the study area and surrounding lands) conform to the opportunities and constraints offered by the biophysical environment, to the needs and desires of the public, and to the goals of the M.V.A.

In the preparation of a Development Plan for the East Bank, two factors were considered to

be critical: efficient communication between the Client and consultant; and significant public involvement. Client-consultant liaison was effectively realized through regular meetings of the Study Steering Committee. These meetings provided opportunities, not only for keeping the Client informed of study progress, but also for providing the consultant with feedback on planning proposals and future direction for the study. Thus, a two-way avenue of communication was successfully established. The importance of regular Client involvement in the planning process is illustrated in Figure 1.

Figure 1 also indicates two points within the planning process where public involvement occurs. The first stage of public input was a series of informal meetings between the Design Team, the M.V.A. and interested members of the community.

The second opportunity for major public involvement occurred after approval of conceptual plans by the Steering Committee. Two 'open houses' were held, where the three concepts were explained to the public. Response to the concepts was evaluated through the use of a questionnaire.

In addition, the public will have the opportunity to view the outcome of the planning process at a presentation of the approved Development Plan.

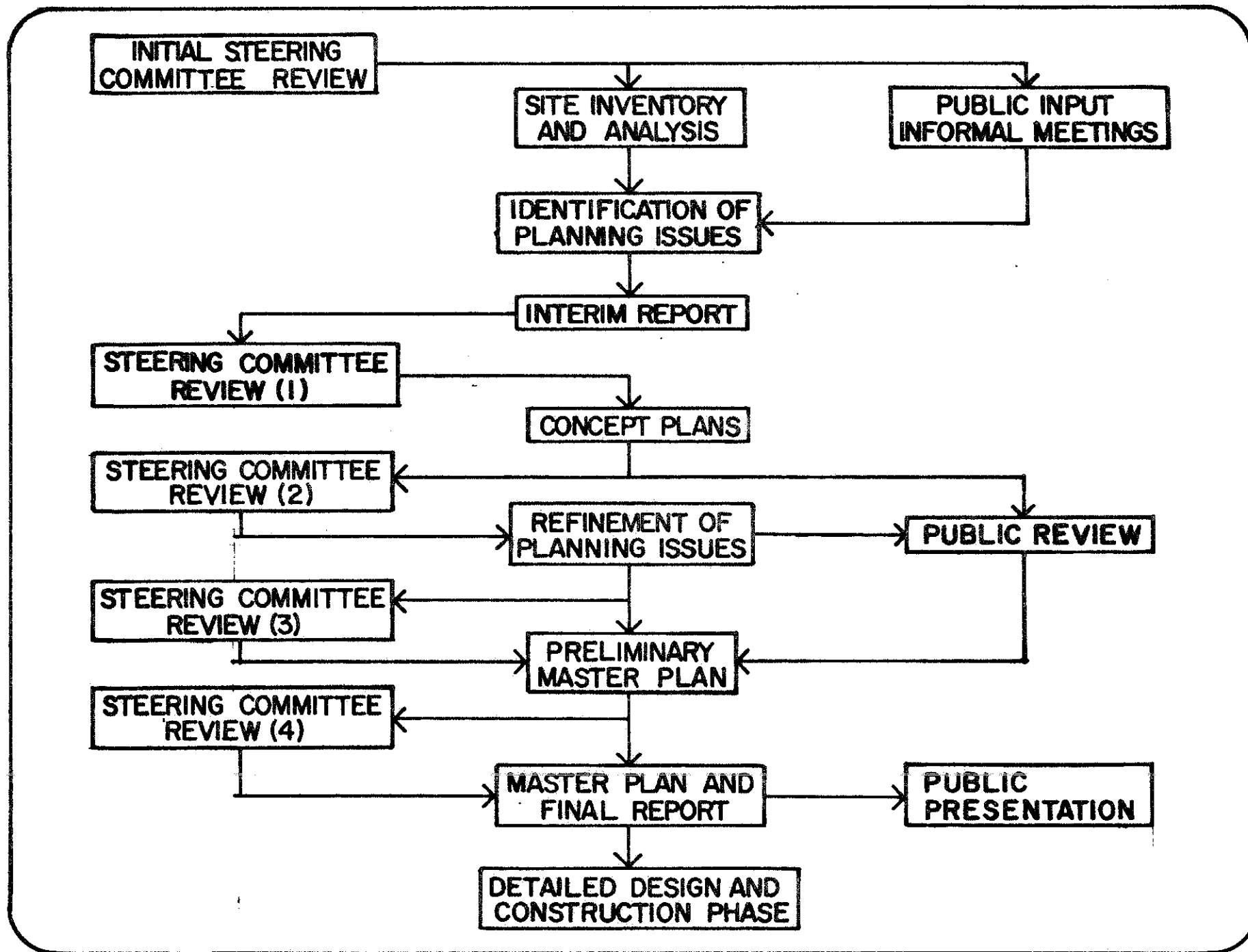
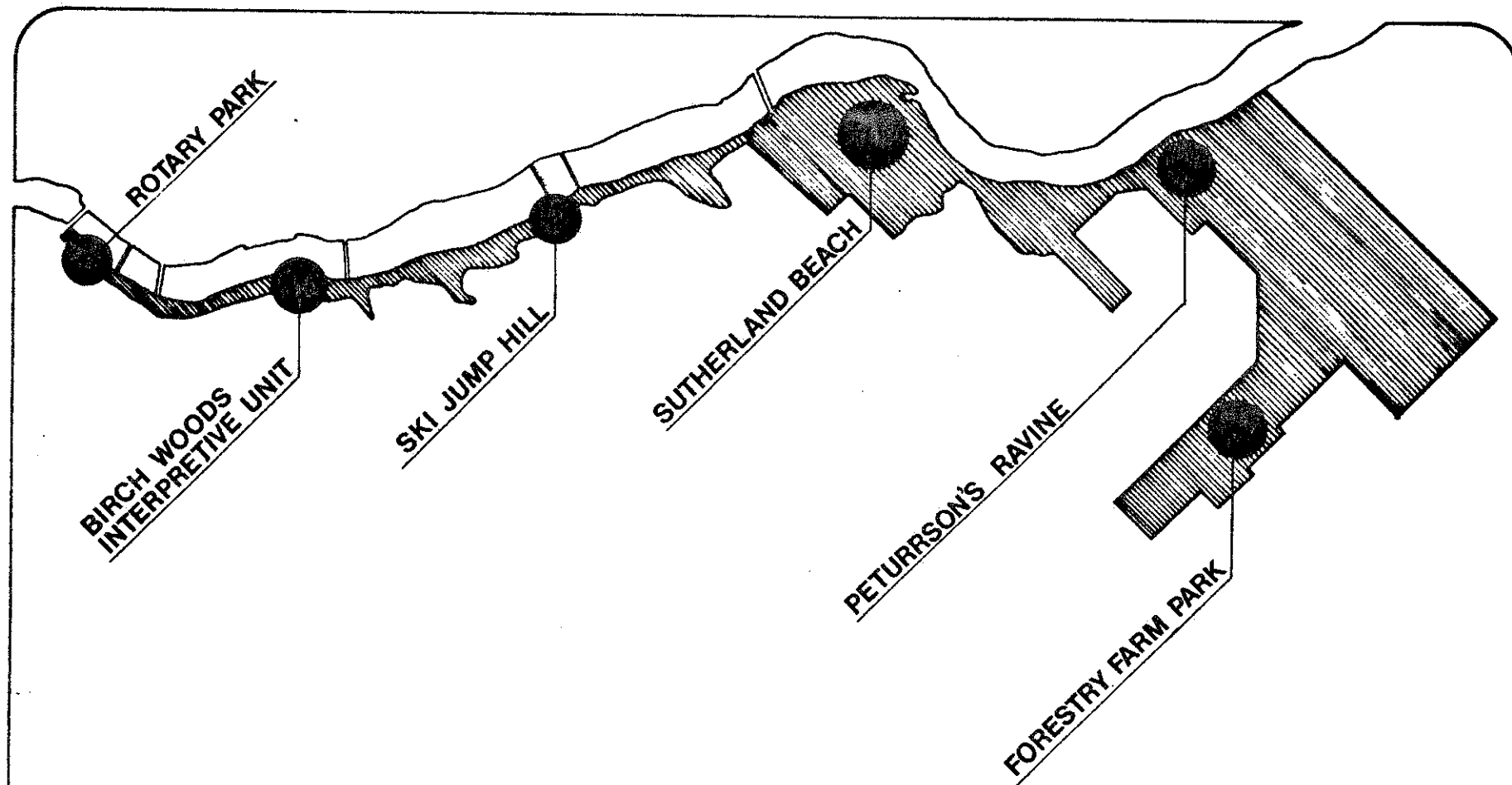


FIGURE 1 STUDY PROCESS



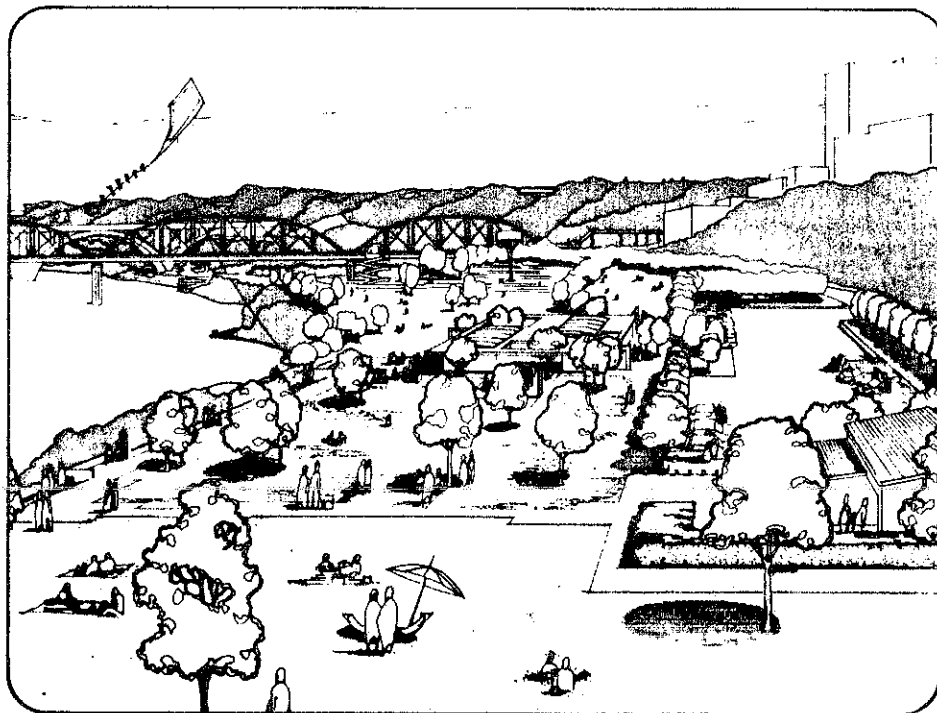
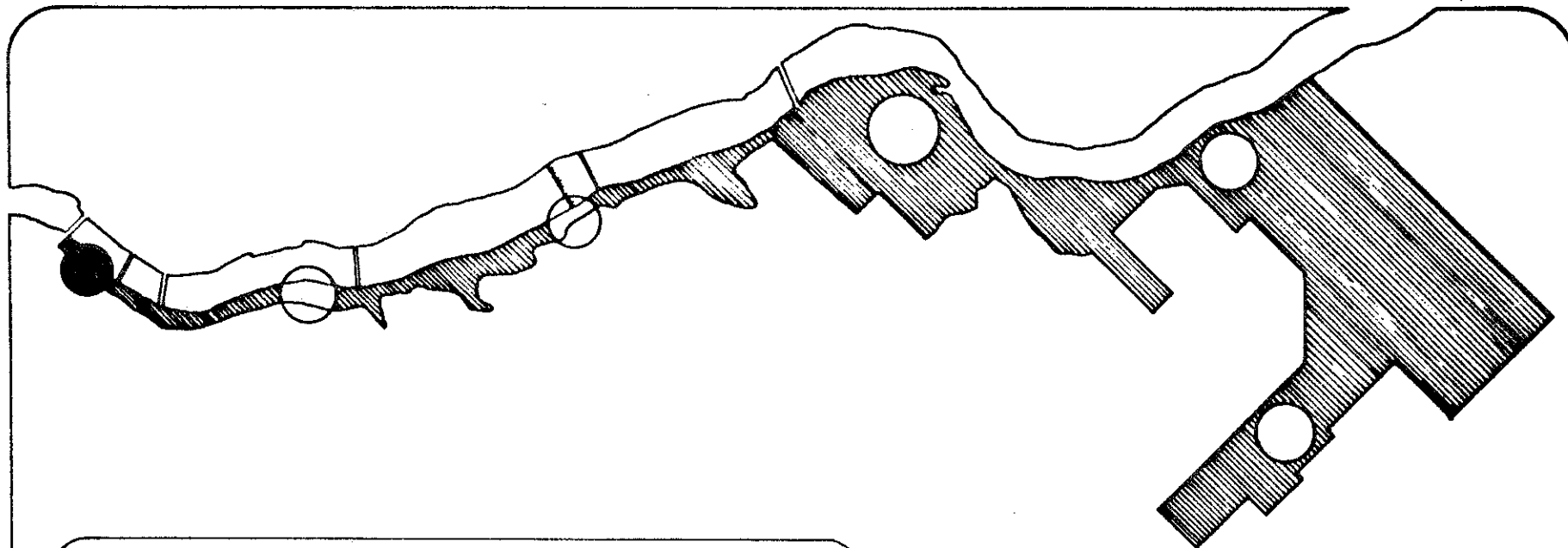
**THE DEVELOPMENT PLAN**

**3**

### 3. THE DEVELOPMENT PLAN

The East Bank Development Plan is intended to provide a general framework to guide future open space development in the study area. To that end, the Plan sets out, in considerable detail, proposals for development at several key focal points along the East Bank. Although the overriding motivation behind the Plan is the provision of a continuous open space linkage from the Idylwyld Bridge in the south to the Forestry Farm Park in the north, it is the focal points which will provide the attraction for people to use this linkage. Clearly, a certain level of attraction already exists along portions of the East Bank. The Development Plan therefore suggests how some of these areas can be preserved, how some may be enhanced, and how other areas may be developed in a manner which builds upon their as yet unrealized open space potential.

The proposals in the Plan are based upon the opportunities, potential and need for integrated open space development, and do not reflect present land ownership patterns. In addition, plans for future urban development within or adjacent to the study area are not totally reflected in the Plan, due to the very conceptual nature of many of the proposals.



**Rotary Park**

Situated between the Idylwyld and Broadway Bridges, Rotary Park presently offers facilities and opportunities for a variety of recreational pursuits. In the Development Plan, it is proposed that the relatively formal character of this urban park be, for the most part, retained, and that existing opportunities for recreation be enhanced through further facility development. Development proposals include the following (Map 2A):

a) Expanded Beach Area

Although swimming in the river is not recommended, sun-bathing and sand play are clearly popular in this area and are considered very appropriate. Expansion of the beach at the west end of the Park would allow for a substantial increase in the level of these activities. The success of this activity is contingent upon elimination of the conflict with motor boats that presently occurs.

b) Expanded Service Building

To accommodate the anticipated increase in the number of sun-bathers and other visitors in Rotary Park, it is recommended that the existing service building be expanded to include both washroom and change-house facilities.

c) Expanded Parking Lot

By widening the existing parking lot by approximately ten feet to accommodate double-loaded parking, it will be possible to effectively double its capacity, to approximately 80 cars.

d) Garden Cafe

A small cafe is proposed in Rotary Park. Such a facility would add a new dimension to the Park, in that visitors would be able to stop for a cup of tea, a light meal or a cold drink. In addition, visitors could bring their own picnic lunches and use the patio tables set around the building. It is suggested that this facility might also function as a passenger depot or stopping point for boat tours and as a rest stop/warm up shelter for skiers during the winter. A portion of the building might also be devoted to a small interpretive display, related to the significance of the Rotary Park area in the history of Saskatoon.

e) Avant Garden

East of the Garden Cafe, in the vicinity of the Sylvite Monument and Victoria Bridge is the Avant Garden. Characterized by the use of native wild-flowers and a non-traditional design, the garden would be a unique floral display. The masses of bright colours present in the garden would make it highly visible, not only to visitors in Rotary Park, but also from across the river. As an area dominated by hardy native perennials, the Avant Garden, once established, should become relatively self-sustaining and would require a minimal level of long term maintenance.

f) Victoria Bridge

Complementing the profusion of colour in the Avant Garden, the use of colours on the Victoria Bridge would enhance the lines of this historically significant structure. The specific designs and colours to be used are not specified here. They might better be the product of an artistic competition, perhaps sponsored by the City and MVA.

#### g) Improved Pedestrian Access

To reduce the hazards associated with pedestrian entry to Rotary Park, a direct physical connection is proposed from the Victoria Bridge into the Park. Visitors would be able to walk down a series of stairs from the Bridge into the Avant Garden. Thus the need for crossing any of the busy streets in the area to enter Rotary Park would be eliminated.

#### h) Expanded Games Area

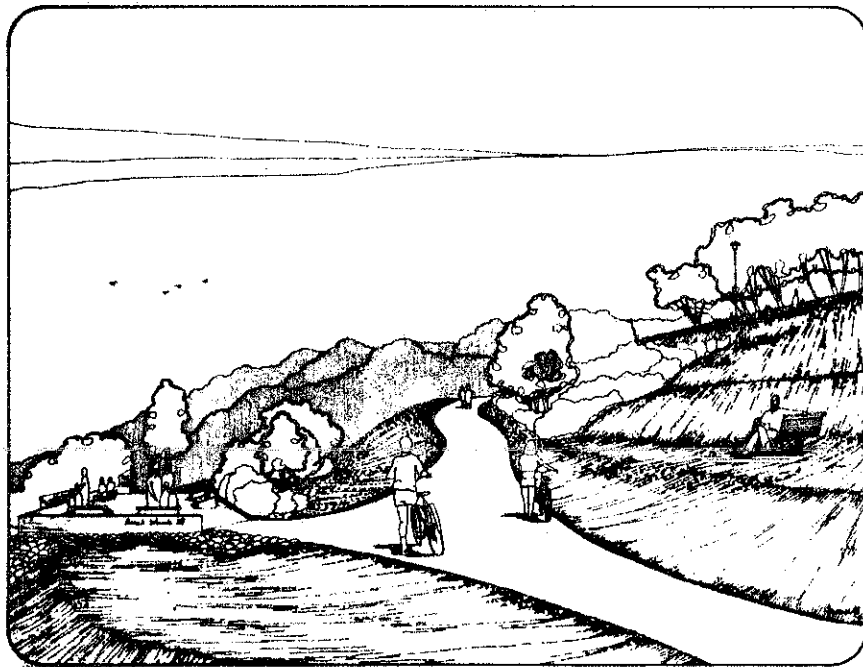
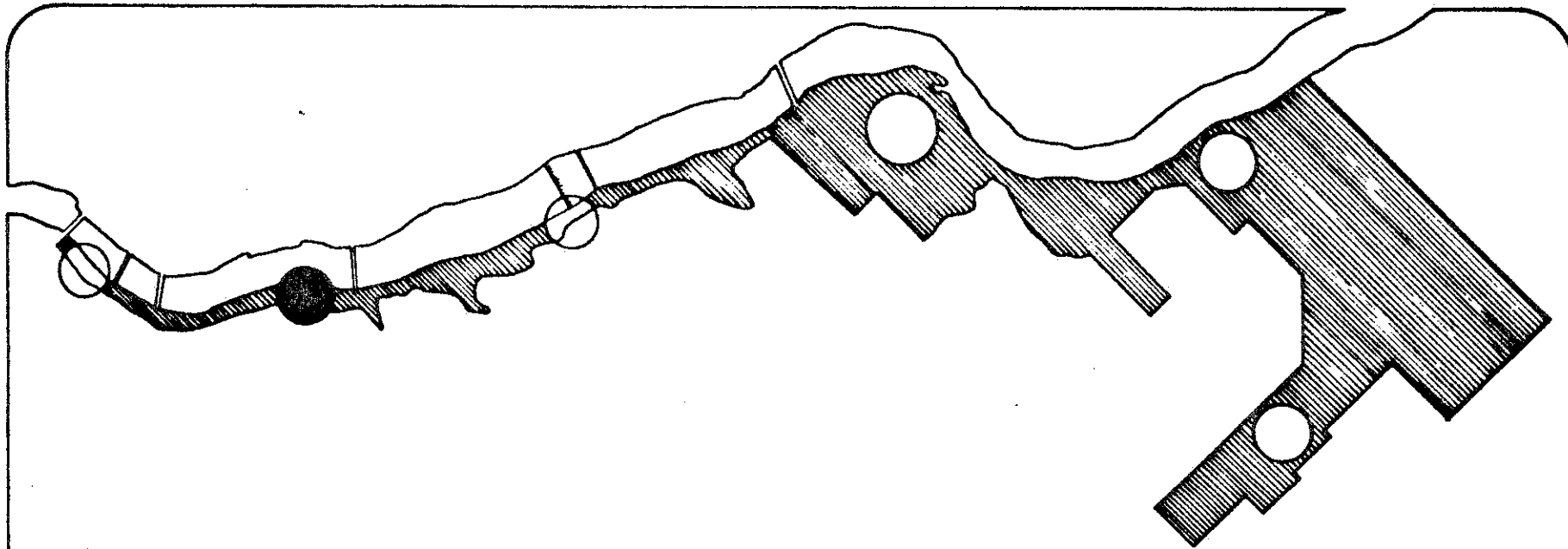
It is proposed that the area around the existing tennis courts, east of the Victoria Bridge, be further developed to provide additional facilities for a variety of outdoor court games (basketball, volleyball, shuffleboard, tetherball, hopscotch, skipping, etc.) for adults and children. Associated with this games area would be a small service building (washrooms, drinking fountain).

#### i) Terraced Garden

Near the south end of the Broadway Bridge, Rotary Park consists of an undeveloped steep slope. It is proposed that this slope be terraced and planted. This terraced garden would not only reduce any surface erosion potential; it would also provide a most attractive view from the west bank of the river, and a stable and safe alignment for the main multi-purpose pathway.

The development proposed for Rotary Park serves several purposes. First, the various proposals combine to reinforce the notion of Rotary Park as the southern 'anchor' of the East Bank Study Area. Improved access for both pedestrians and vehicles make Rotary Park a suitable starting or finishing point for people exploring the East Bank of the river. Second, the urban context of Rotary Park indicates that it is an ideal location for relatively intensive development and use, which is recognized in the nature of the proposals. Finally, development proposed for this area is based, in part, on the notion that Rotary Park should complement future development within the South Downtown Core. Although the final form of development in the South Downtown is not yet known, it is clear that it will be intensive, that it will be a mix of commercial, residential and institutional development, and that the river will play a major role in influencing the orientation and layout of development. Thus, there will be a direct visual relationship between Rotary Park and the South Downtown, and the proposed development in Rotary Park will provide an interesting visual and functional contrast to the intensive urban development across the river.





## **Birch Woods Interpretive Unit**

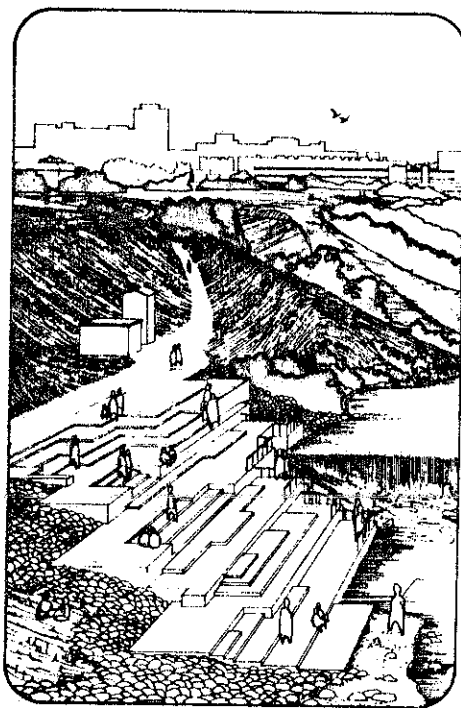
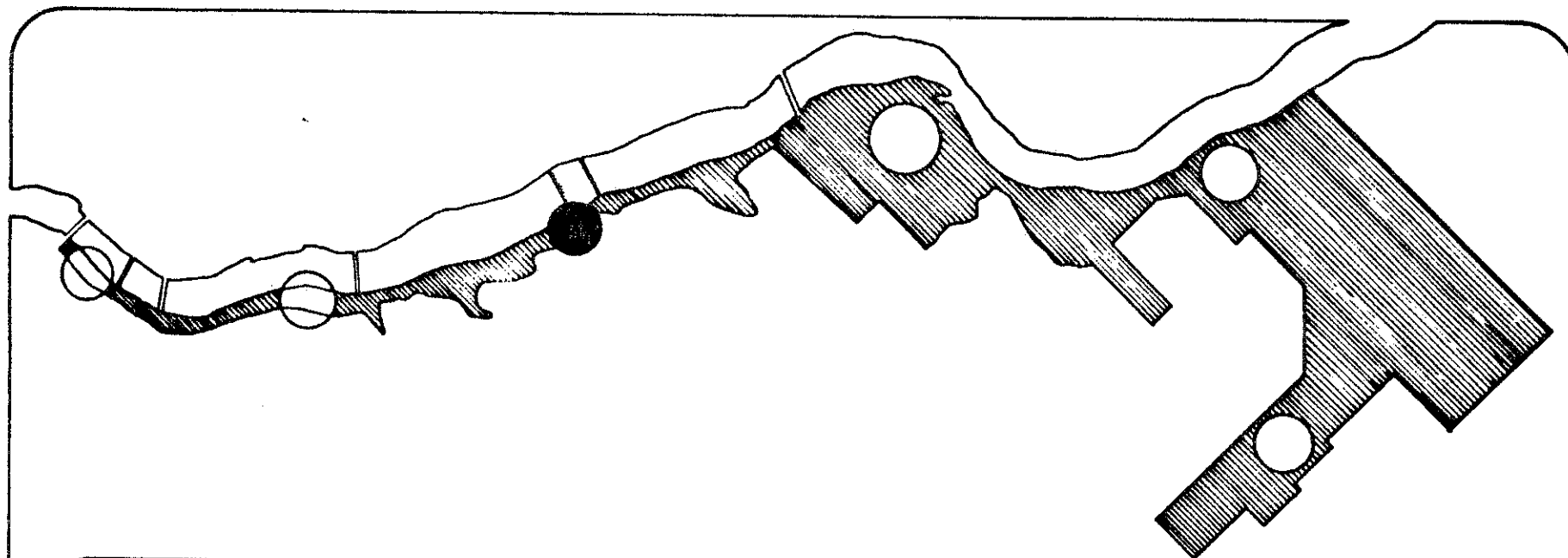
The second focal point along the East Bank is situated in the northern portion of Cosmopolitan Park. In stark contrast to the development proposals for Rotary Park, it is recommended that development in this area be very low key in nature. Already a "hotspot" for bird watchers, the Birch Woods area also offers significant interpretive potential in terms of landslides and slope management, vegetation ecology and history. Specific development proposals are restricted to the following (Map 2A):

a) Trailheads

Two trailheads, or outdoor visitor reception areas, are proposed; one at each end of the Birch Woods. It is at these two points where visitors would learn about what can be seen in the interpretive unit (through the use of maps, signs, plaques, etc.).

b) Interpretive Stations

At various points within the interpretive unit, plaques, signs, diagrams, etc. would be used to describe and explain the various features of interest. These could include landslides, interesting vegetation species and communities, bird species, historical development of the downtown area, and so on.



**Ski Jump Hill**

The area around Ski Jump Hill and the weir is presently very popular for anglers, joggers and others who frequent the area, especially on weekends. In addition, a major pedestrian route (used primarily by members of the University community) from the C.P. Rail Bridge to the Campus cuts through the area. Unfortunately, a combination of heavy use and unrestricted vehicle and pedestrian movement has resulted in considerable damage to portions of the area and could lead to further disruption to some sensitive and significant ecological features.

In order to reduce the negative impact of continued heavy use in this popular area, development proposals are intended to provide an element of control to circulation patterns and to direct activities to areas where the long term potential for environmental disruption is minimized. The key to such control in these proposals is not, however, the use of physical barriers. Clearly, some barriers would be required in certain locations, but control is intended to occur primarily through the appropriate siting of facilities, clearly-marked trails and the development of features which will attract visitors to desirable locations. Development proposals in the Ski Jump Hill area include the following (Map 2B):

#### a) Formal Vehicle Access

A road is proposed to extend north and then west from the North Road on the University Campus, to a small parking lot (capacity approximately 30 cars). This parking lot would be situated north of the Ski Jump coulee and approximately 50 metres back from the top of the riverbank. Only service and emergency vehicles would be allowed beyond this point.

#### b) Ski Jump Pavilion

West of the parking lot, near the top of bank, a small pavilion (consisting of washrooms, perhaps a drinking fountain and a warm-up shelter for skiers) is proposed. A small display, relating to the historic features in the area (ski jump, chalet, weir, C.P. Rail Bridge) could also be incorporated into the pavilion.

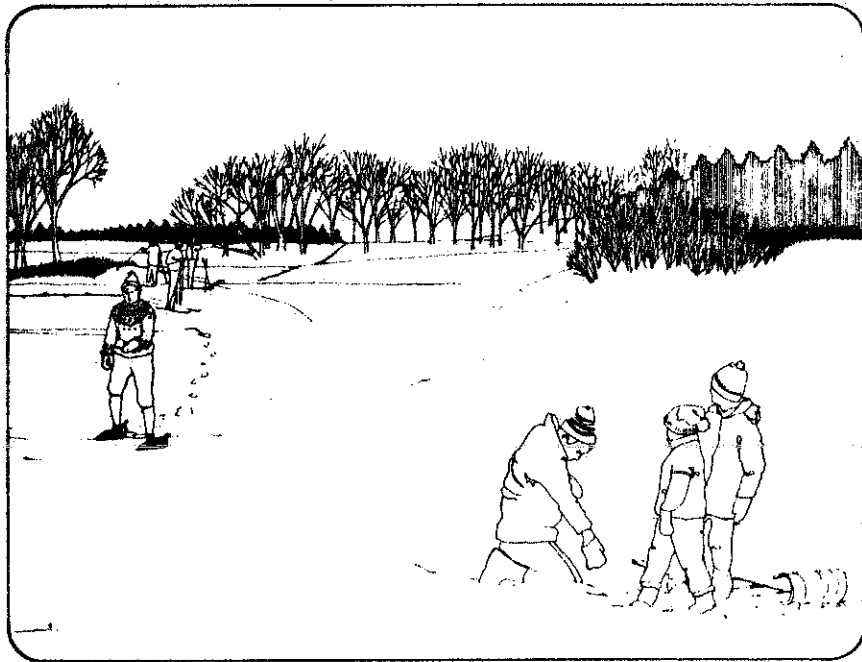
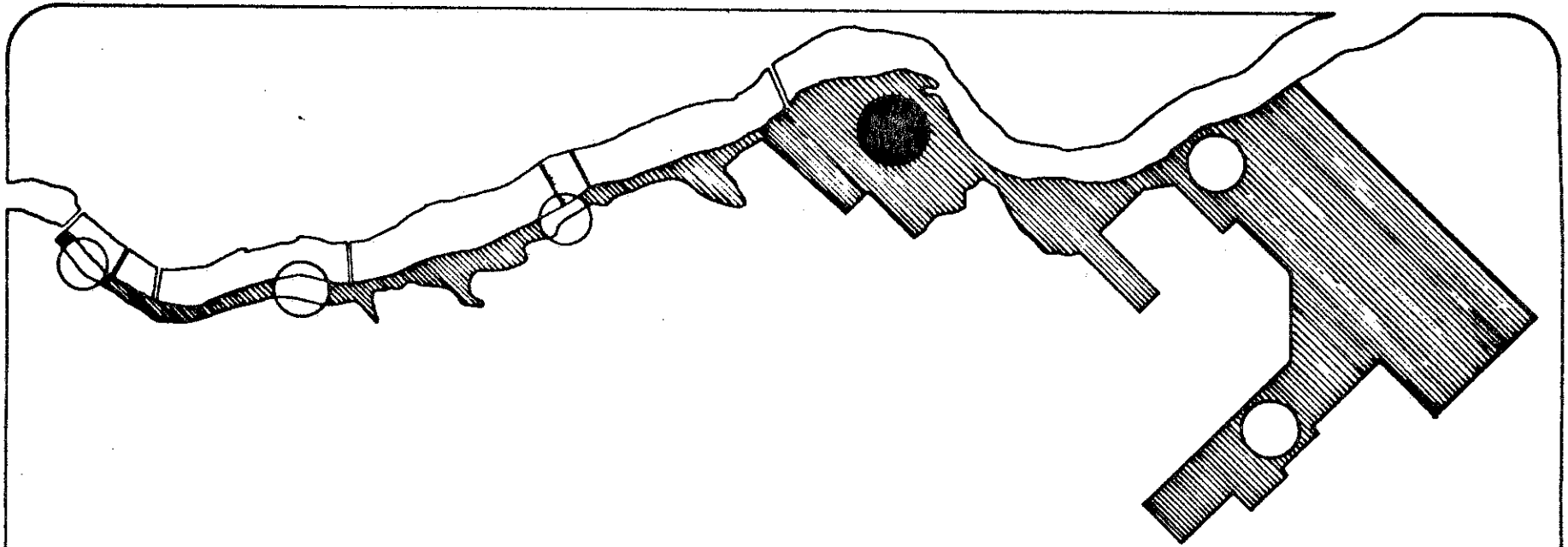
#### c) Terraced Fishing Platform

At present, the steeply sloping concrete apron at the east end of the weir is a very popular spot for anglers, despite the fact that fishing from the apron is both unlawful and extremely dangerous. Recognizing that this practice is very popular, it is proposed that a terraced platform be constructed to allow and encourage safe use of this exciting spot. Such a platform would be popular not only among anglers but also among bird enthusiasts (waterfowl, pelicans, gulls and other birds are regular visitors to the area), and others interested in viewing the river and weir at close quarters.

d) Picnic Area

Along the top of bank, between the weir and the C.P. Bridge, a number of formal picnic/barbeque sites are proposed. Spectacular views, both across the weir and upstream to downtown Saskatoon, would be afforded anyone using the area. In addition, it would provide another attraction for families who enjoy a walk through the University Campus or who want to spend an afternoon fishing at the weir.

The above development proposals, in combination with carefully-located and well-marked pathways and trails, would serve to control circulation patterns, vehicle access and distribution of activities in a manner which minimizes the level of use and associated disruption in sensitive areas such as the Ski Jump coulee.



**Sutherland Beach**

The Sutherland Beach area offers perhaps the greatest potential for open space development of all the focal points in the East Bank Study Area. Opportunities exist for interpretation, education, scientific research and a variety of outdoor recreation activities, including skiing, hiking, horseback riding, camping, and picnicking. Although somewhat isolated from existing residential areas at the present time, completion of the 42nd Street Bridge and Circle Drive extension, and further residential development north of Sutherland will result in much greater accessibility of this area to both a large number of Saskatoon residents and travellers along the Yellowhead Highway.

Development proposals for the Sutherland Beach area are based on opportunities presented by its tremendous diversity, large areal extent, non-linear shape (unlike most portions of the East Bank Study Area), ideal situation (along the river, easily accessible, adjacent to the Yellowhead Highway), and open space potential (interpretive, recreational, and educational). They include the following (Map 2D):

#### a) Meewasin Arboretum

A large facility ( $\pm 16$  ha), open to the public, the Meewasin Arboretum is intended to serve a number of purposes. As a research facility, it would provide horticulturalists at the University of Saskatchewan (and perhaps the City of Saskatoon and/or M.V.A.) with opportunities to test a wide variety of plant materials for hardiness, adaptability, disease-resistance, growth rates and habits under different site conditions, and overall suitability for use in the Saskatoon area. As an interpretive and educational

facility, it would offer an exciting opportunity for school children and adults alike to learn about the diversity of plants that can be grown on the Prairies, methods of propagation, site requirements and maintenance techniques.

Although the Arboretum is intended to be very 'horticultural' in character (i.e. a predominance of non-native species; systematic distribution of plant material etc.), it would be a place for people to enjoy, and the overall setting to be created within the Arboretum should be park-like, or pastoral, in nature. Within such a setting, many opportunities will arise for a pleasant, quiet walk through the woods and meadows, for a relaxing picnic lunch, or for a quiet day watching and listening to the thriving songbird population. More than merely a 'summer place', the Arboretum will also provide ideal conditions for cross-country skiing and snowshoeing in the winter, a chance to enjoy the autumn colours of a crisp September afternoon, and a place to walk among the first flowers of spring.

#### b) Simpkins Farmstead

South of the Circle Drive extension, approximately 4 to 6 hectares of market garden land (the old Simpkins Farmstead) now lies abandoned. It is proposed that this area be used for horticultural purposes. Possible uses include floral displays (associated with the Meewasin Arboretum), botanical research (plant propagation, fertilization experiments), a small nursery operation, or public vegetable garden plots.

#### c) Day Use Area

To the west of the Arboretum, just north of the Circle Drive extension, a major public day use

recreation area is proposed. It is envisioned that the level of facility and landscape development here would be comparable to the existing family picnic area at the Forestry Farm Park. Indeed, it is expected that the development of this new area would help to relieve at least some of the intense pressure and overcrowding problems at the Forestry Farm facilities. Development is proposed to include a number of family picnic and barbeque sites, and a variety of open and wooded areas for exploring, playing catch, or just lying in the sun.

#### d) Group Camping Area

Further north along the west edge of an existing small wooded coulee, it is proposed that a small area be set aside for group camping. It is intended that the use of this area be restricted to organizations such as Beavers, Brownies, Wolf Cubs or small school groups, who could reserve the site for overnight camping 'expeditions', or special outdoor education programmes. This site would provide an opportunity for small children to enjoy an exciting camping experience without having to travel many miles from the City. Winter camping, survival training programmes and other similar activities would extend the season of use of this area throughout the year.

#### e) Sutherland Beach Interpretive Unit

A substantial portion of the Sutherland Beach area remains in a relatively natural state. It is proposed that this area be used for interpretive purposes. The development of a network of interpretive trails will

provide opportunities to view and learn about riverbank ecology, evolution of the river, beaver and other small wildlife, and other natural features and processes.

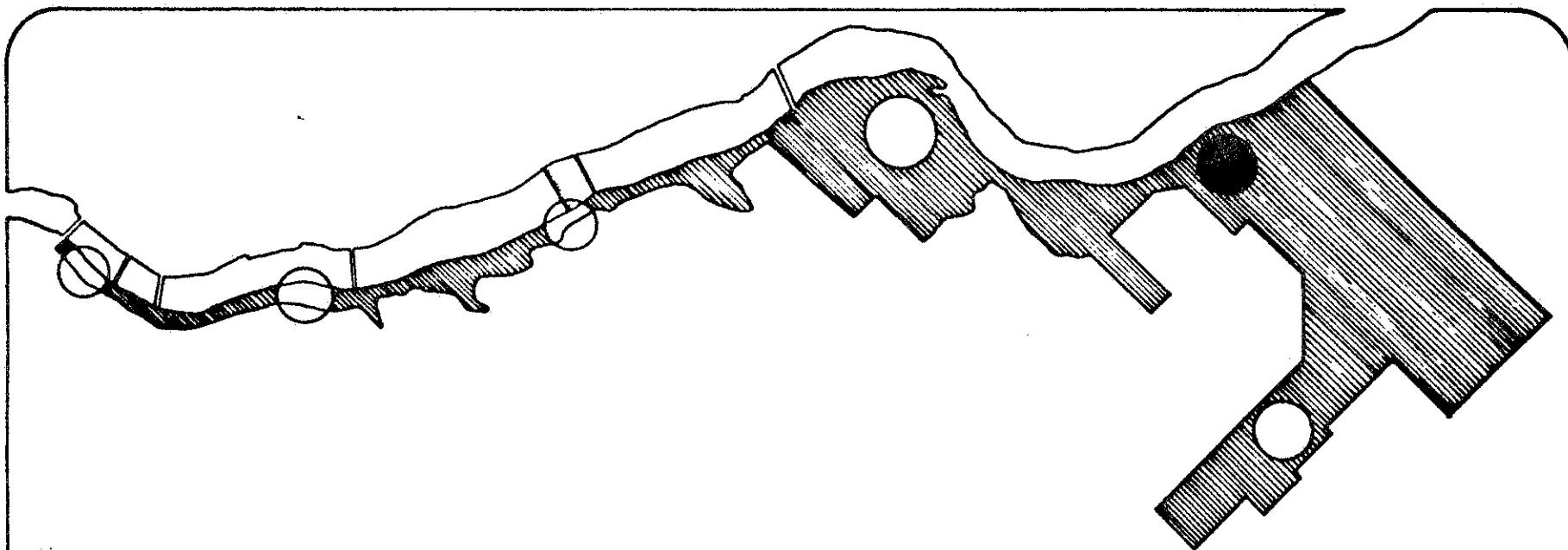
#### f) Feedlot Interpretive Unit

It is proposed that the existing University of Saskatchewan experimental feedlot be open to the public (on a restricted basis), in order that interested individuals or groups may be shown some aspects of agricultural technology and research, livestock management and so on. In its present context, and in the context of the proposed Sutherland Beach development, it is the opinion of the consultant that this feedlot is an appropriate land use. Although vehicle access to the feedlot would be segregated from that to the remainder of the Sutherland Beach area, a multi-purpose pathway is proposed to extend from the Arboretum to the feedlot.

#### g) Visitor Centre

The 'hub' of the proposed Sutherland Beach focal point would be a Visitor Centre, designed to serve three purposes. As a service building, it would include washroom facilities, a warm-up area for winter visitors and perhaps a small concession. As an interpretive centre, it would provide an introduction to the Arboretum, the interpretive units, and possibly to the entire East Bank open space corridor. Finally, the centre could also house the administrative headquarters for the Meewasin Arboretum. Vehicle access to the Visitor Centre would be from the Preston Avenue extension (north of Circle Drive), and a visitor parking lot (capacity initially 50 cars, with room to expand to 100) is proposed along the western edge of the Meewasin Arboretum, immediately south of the Visitor Centre.





**Peturrson's Ravine**

A fascinating area from the point of view of geological processes and ecological relationships, Peturrson's Ravine has, over the years, suffered considerable disruption from the dumping of debris and the removal of borrow material. Disruption has progressed to the point where restoration of some portions to nearly-natural conditions no longer appears feasible. However, other parts of the ravine have retained much of their natural integrity, and development which builds upon the interpretive potential of these areas would be appropriate. Development proposals for this focal point thus effectively suggest two contrasting types of environments within and immediately adjacent to Peturrson's Ravine (Map 2E).

#### a) Public Open Space

The possibility of residential development to the north of Peturrson's Ravine suggests that the ravine could be subject to relatively heavy recreational use. In addition, the east end and north side of the ravine have, for the most part, been extensively disturbed. It is therefore suggested that, in these areas, the ravine be cleaned up, re-graded and landscaped to create a park-like setting. Such open space development should attract the heaviest use, thus protecting the undisturbed portions of the ravine from excessive use.

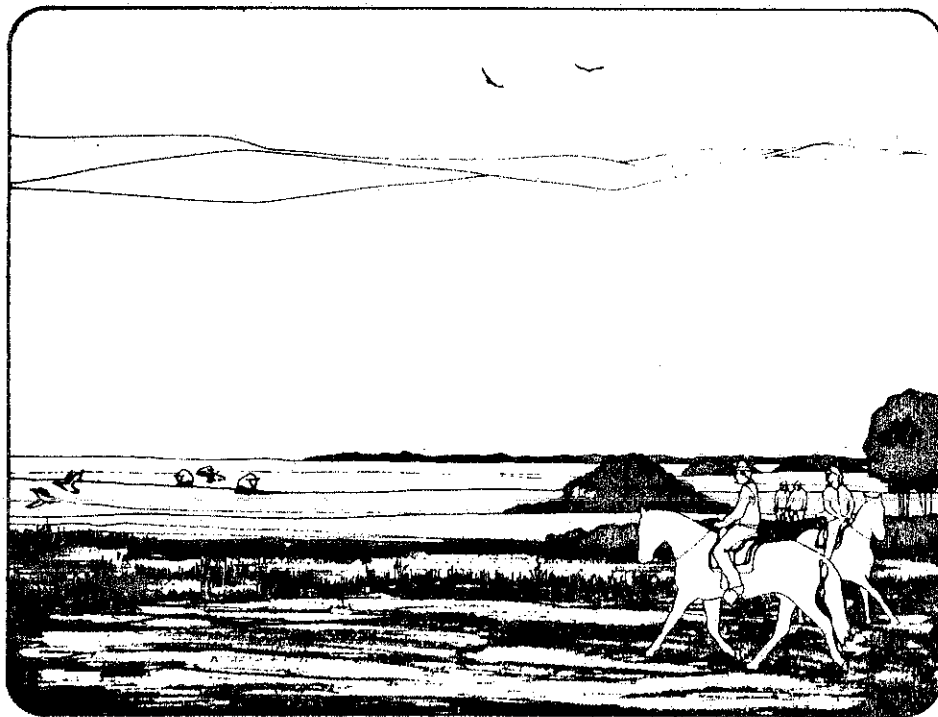
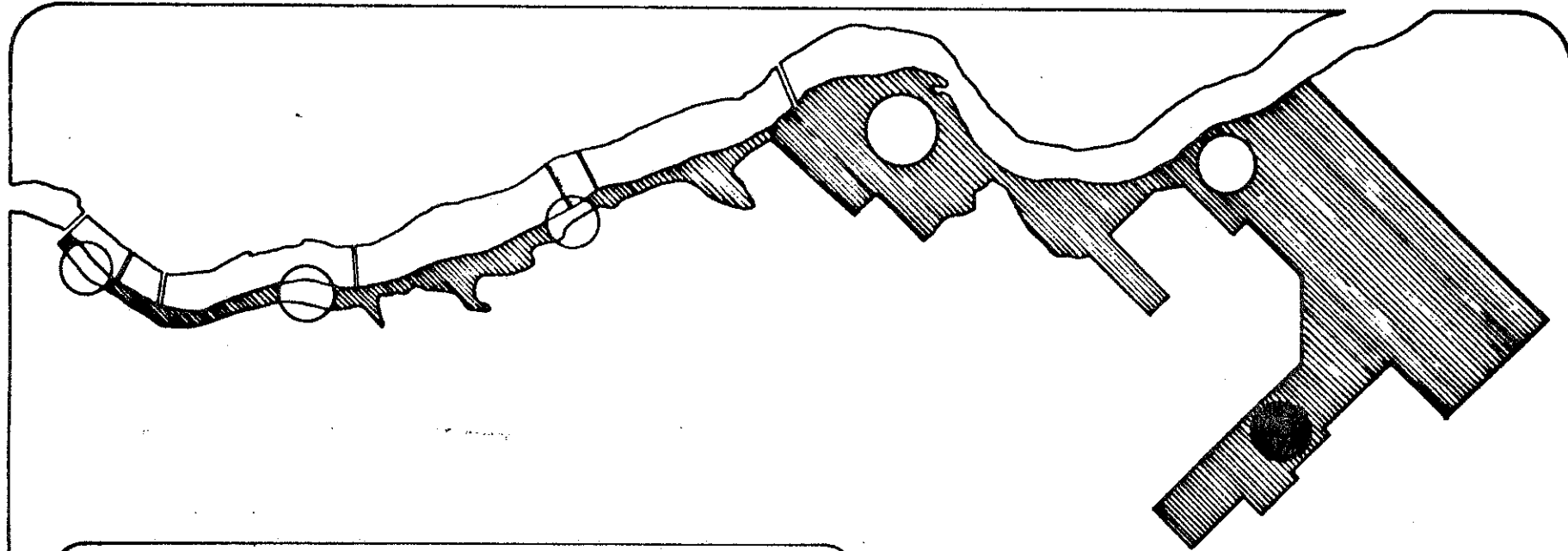
#### b) Peturrson's Ravine Interpretive Unit

From a trailhead on the south side of Peturrson's Ravine, visitors would be able to walk into the ravine and west toward the riverbank. Possible interpretive features along this trail include the high lime marl bog, evidence of the geological processes which led to the creation of the ravine, and the ecological relationships

between dry upland prairie and the moist ravine environment. Vehicle access to the trailhead is proposed along an entry road from Central Avenue to a small parking lot (22 cars).

#### c) Picnic Area

A number of picnic sites are proposed in the vicinity of the parking lot and interpretive unit trailhead. A strong planting buffer is recommended between this area and the Regional Psychiatric Centre property, which lies to the south.



**Forestry Farm**

The Forestry Farm Park, as proposed in the Forestry Farm Park Conceptual Development Plan (Hilderman Feir Witty & Associates, 1979) is intended to be a multi-purpose recreation-facility; not merely a zoo. The Animal Park portion of the Forestry Farm will emphasize the display of animals native to North America, within the context of the following Canadian habitat themes: prairie grasslands; boreal forest; arctic tundra; and alpine. Other facilities and features will include a cricket pitch, field games area, picnic area, bandstand, teahouse, conservatory, outdoor horticultural displays, children's zoo, domestic animal exhibit, indoor exhibits and a tropical grassland exhibit (Map 2F).

With this diversity and abundance of facilities, the Forestry Farm Park will clearly be a major regional attraction. As such, the Forestry Farm is intended (in the East Bank Development Plan) to be the northern anchor for the East Bank project. In order for it to serve this function, it is essential that an open space corridor be developed to link the Forestry Farm to the riverbank, in the vicinity of Peturrrson's Ravine.

Plans for residential and other urban development north and west of the Forestry Farm have not yet been finalized. However, from the point of view of open space development, it is possible to suggest a conceptual alignment for such an open space linkage.

This linkage passes through an interesting landscape of undulating topography, aspen groves and prairie sloughs. It extends northeast from Peterson's Ravine toward the northern study area boundary, and then straight south to the north end of the Forestry Farm. Although this alignment is somewhat indirect, it does connect with what is suggested to be a future linkage from the Forestry Farm to the northeast.

No modifications are proposed to the 1979 Forestry Farm Development Plan itself. However, one addition is recommended. An equestrian stable is proposed, where horseback riders could rent horses and ride along an equestrian trail west to Peterson's Ravine and then south as far as Sutherland Beach.

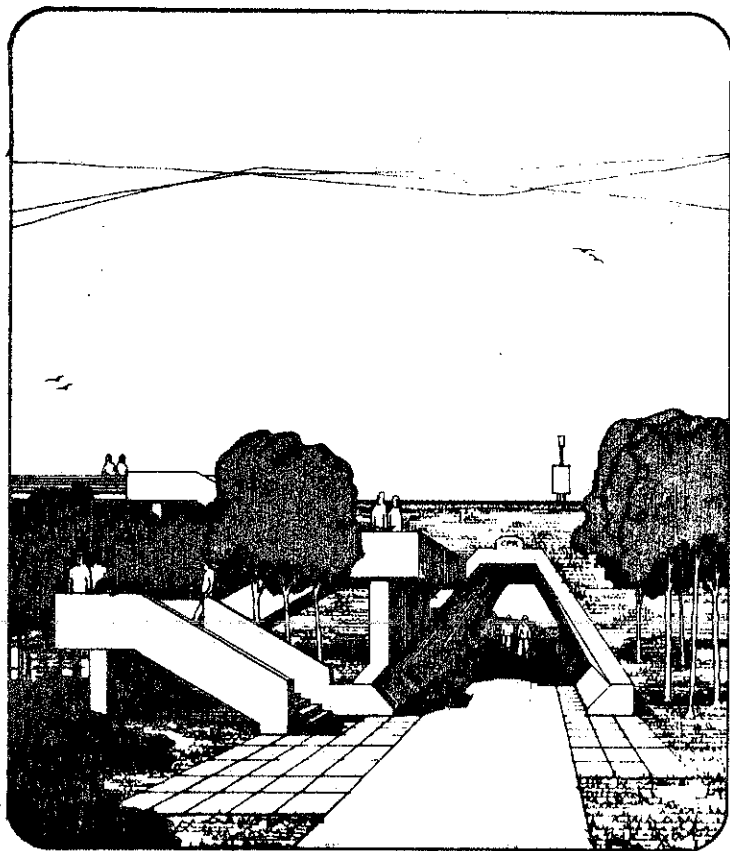
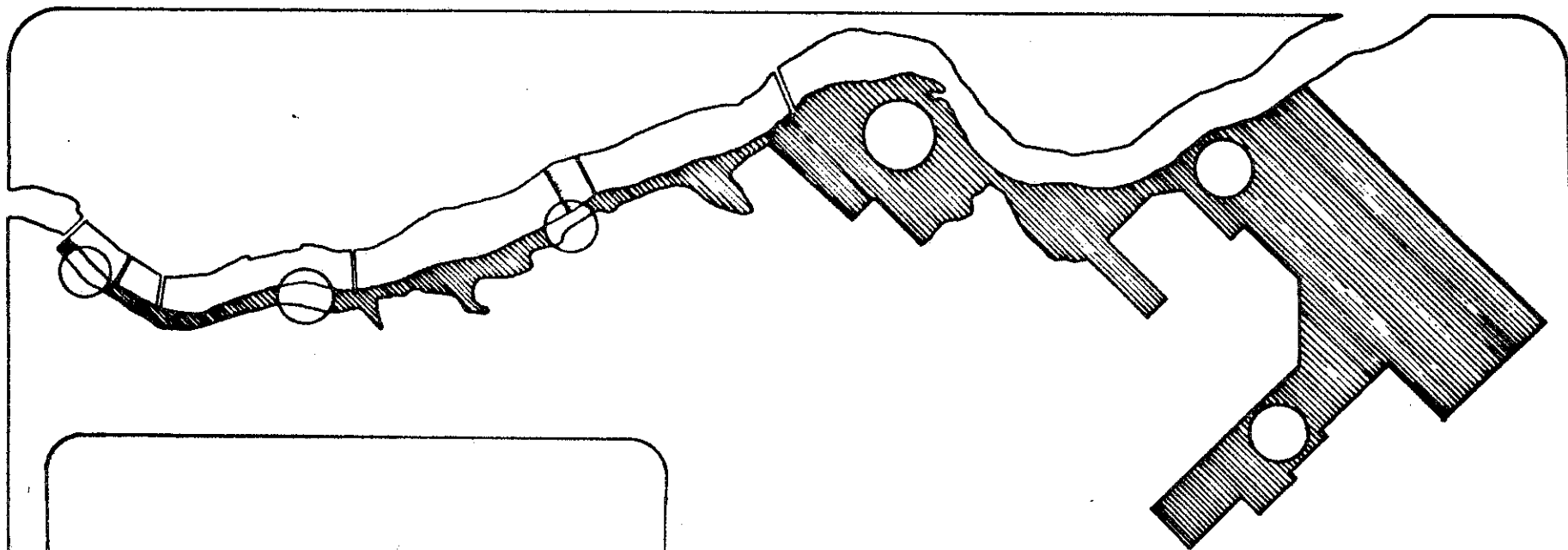
Inherent in the East Bank Development Plan is the provision of a continuous linkage throughout the length of the study area. A system of trails and paths is proposed which allow easy and controlled circulation of cyclists, pedestrians and cross-country skiers. Three main types of linkage are proposed. The first is a multi-purpose path, suitable for use by both cyclists and pedestrians. This type of path would be hard surfaced and would also provide suitable access for park service vehicles along most of the corridor. The second is a walking trail. In many parts of the study area, walking trails already exist, and would require only minor improvements, if any. However, in some areas (especially north of Sutherland Beach along the river), trail development would be required. Such development would, for the most part, entail little more than brush clearing and stump removal. The third type of linkage is an interpretive trail. At certain locations (Sutherland Beach Interpretive Unit, Boulder Interpretive Unit, Peturrson's Ravine Interpretive Unit, Forestry Farm), interpretive trails would provide access from the main multi-purpose path to features and areas of special interest. The level of development of such trails will depend upon such factors as anticipated level of use, tolerance of the site to traffic, and the type of environment through which the trails will extend. Specific alignments of interpretive trails cannot be determined until interpretive features have been more carefully evaluated and located; however, as a general principle, interpretive trails should take on a 'loop' configuration wherever possible.

Presently, the University Bridge and C.P. Rail Bridge are two points where safe movement

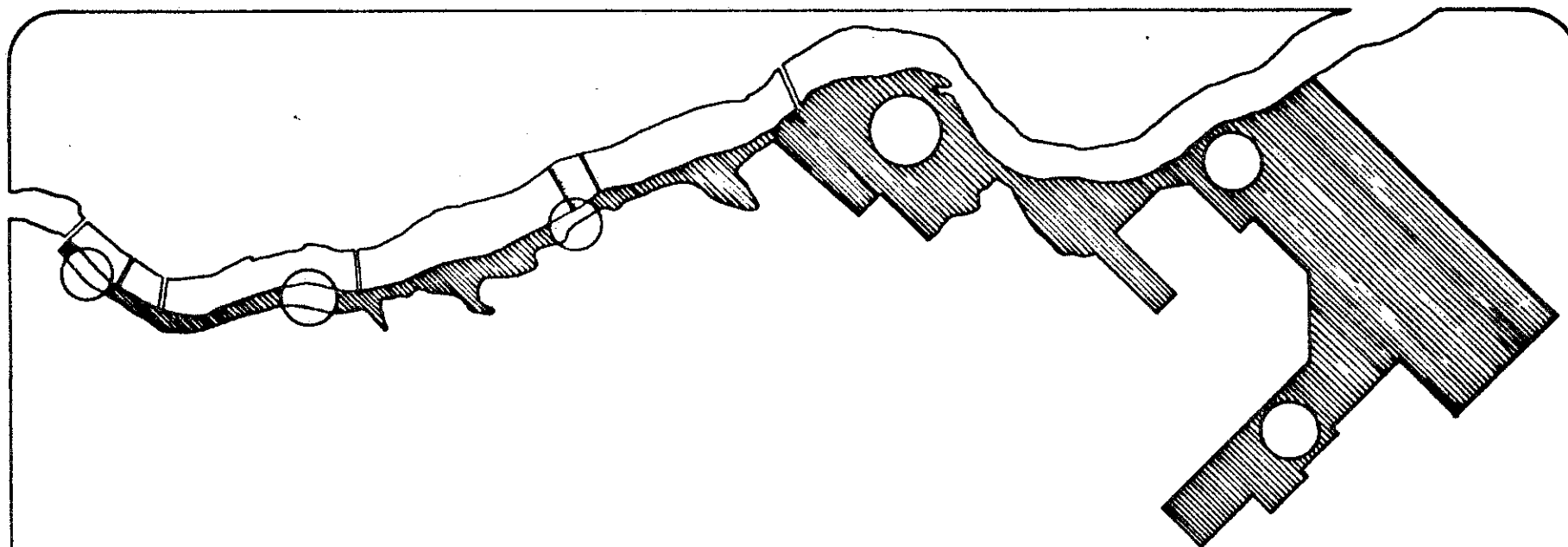
along and into the East Bank Study Area is very difficult. Consequently, connections should be further developed at these two locations. At the University Bridge, some type of structural underpass will be required to connect the multi-purpose paths in Cosmopolitan Park and the University Campus. At the C.P. Rail Bridge, two structures are proposed. The first is a stairway leading down from the bridge abutment, which would facilitate access to and from the pedestrian walkway on the bridge. The second is an underpass of the railway embankment, which will allow safe north-south circulation without the need for crossing the tracks.

In addition to the path and trail system proposed for the East Bank, a network of cross-country ski trails should also be developed. Map 3 indicates a proposed schematic layout for such a network.

Finally, an equestrian trail is proposed. This trail would be physically separated from multi-purpose paths and walking trails, and would extend from the Forestry Farm, south of Peturrson's Ravine and along the top of the riverbank to the Visitor Centre at Sutherland Beach.



**Circulation**



**Other Development  
Considerations**

A number of possibilities for future development along the East Bank have not been indicated in the Development Plan, since the feasibility for these developments is contingent upon further planning decision-making and studies with respect to a number of projects. These possible developments include the following:

#### a) Pedestrian Linkage

It may be desirable that the linkage between the South Downtown and Rotary Park (proposed to be a visual linkage only in this study) be further developed into a direct physical linkage at some point in the future. Consequently, the possibility of a pedestrian connection (separate from any existing traffic bridges) across the river in this area should be examined within the context of both development in Rotary Park and the ultimate form of development in the South Downtown Core.

#### b) Whitewater Chute

An opportunity exists to develop a whitewater chute in the vicinity of the weir. Such a facility would provide recreational opportunities for experienced canoeists and would also broaden the base of facilities in Saskatoon for such athletic events as the Canada Summer Games, national and international whitewater competitions, etc. The feasibility of developing a whitewater chute is clearly dependent upon decisions regarding the future of the weir, and other engineering and river use considerations.

#### c) Extension of Open Space System

As Saskatoon grows, it is quite possible that open space development may continue along the East Bank north of the existing city limits, and to the northeast of the Forestry Farm toward the Strawberry Hills. Such development should reflect not only the recreational and interpretive opportunities which are provided in these new open space areas, but also the opportunities for extending the linkages proposed in this study. These opportunities include the extension of the walking trails and multi-purpose pathway systems, as well as the development of an equestrian trail network, which could not be accommodated within the confines of the East Bank Study Area.

#### d) Future Campus Development

A possible site for a future building (perhaps a Fine Arts Centre) has been identified (by the University Administration) between the Diefenbaker Centre and the Lutheran Seminary. The specific siting, orientation and layout of such a building is clearly beyond the mandate of the East Bank Study. Furthermore, decisions regarding building design and location must be based on numerous considerations. However, within the context of open space development along the East Bank, a number of guidelines are offered for consideration:

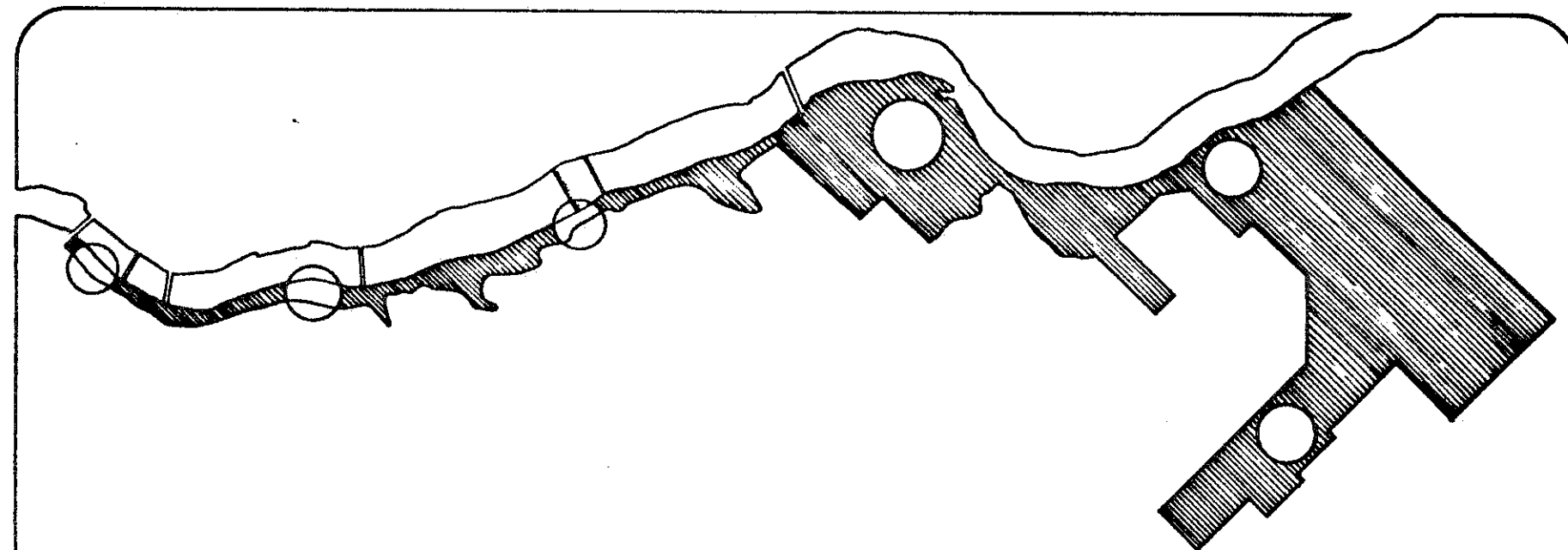
- i) Proposed circulation patterns along the East Bank should be considered in any building design.
- ii) A building which physically and visually ties the campus to the river would add a new and exciting dimension to the visual and functional character of the East Bank.



- iii) Site development (landscaping) in the vicinity of the building should be co-ordinated with the landscaping theme in adjacent areas along the river.
- iv) Vehicle access (roads, parking lots) should be kept well back from the top of bank.
- v) Depending upon the ultimate function of the building, the notion of its role as an 'entry point' to the East Bank (similar to the role proposed for the Diefenbaker Centre) should be considered.

#### e) Experimental Community

In the report of the Meewasin Valley Project (Moriyama, 1978) an experimental community was proposed for development on University lands to the north and east of the main campus. Within the context of the East Bank Study, it is suggested that the idea of an experimental community between Sutherland Beach and Central Avenue be considered. Such a development would, of course, require the relocation of the University of Saskatchewan Feedlot. However, the removal of the feedlot, and subsequent development of this type, should not affect the integrity of proposed development in the Sutherland Beach area or, for that matter, in any of the East Bank Study Area.



**River Use**

Although this study deals specifically with open space development along the East Bank of the South Saskatchewan River, such development cannot be considered in total isolation of activities on the river itself. Consequently, it was necessary to examine the various activities common along the river and to recommend how incompatible uses may be accommodated. Clearly, the following recommendations have not been based upon an in-depth analysis of the magnitude and desirability of the various activities, nor upon an evaluation of use-conflicts. Indeed, it is recommended that such a study be undertaken in the near future. However, from the point of view of development along the East Bank, the following comments and observations are offered for consideration.

#### a) Swimming

Swimming is not considered an appropriate activity in the river due to what many consider to be, hazardous conditions.

#### b) Fishing

Although high mercury concentrations have led to the designation of the South Saskatchewan as a 'fish for fun' river, angling continues to be popular, especially near the Idylwyld Bridge, the weir and Sutherland Beach. It is recommended that fishing be encouraged near the weir (after construction of a terraced fishing platform), and that it be allowed throughout the length of the study area. Fishing should not be allowed from any bridge.

#### c) Tour Boats

The use of the beach area in Rotary Park as a primary passenger depot for tour boats is not considered compatible with other activities. However, an ideal docking area would be created with the development of the Garden Cafe and associated waterfront promenade. It is proposed within the context of this study, that this be the only tour boat depot along the East Bank.

#### d) Canoeing/Kayaking

This activity is considered appropriate along the river throughout the study area, with one exception. That portion of the river between the C.P. Rail Bridge and the south end of the island across from the Diefenbaker Centre should be closed to all watercraft. This should assist in the retention of the island as a sanctuary for birds, and will also minimize the hazardous use of canoes in the vicinity of the weir. No formal launching facilities are proposed along the East Bank because of often steep and hazardous bank conditions. In addition, it is suggested by the Design Team, that river traffic be based in a single major "marina" facility, perhaps located at the South Downtown development.

#### e) Sailing

The South Saskatchewan River is not suitable for sailboats. Sandbars, submerged boulders, a strong current and bridges all create hazards and reduce the enjoyment associated with this activity. Sailing should therefore not be considered a priority activity in the river.

#### f) Motorboats

Powered watercraft can in general terms, operate safely upstream of the weir only. The greatest conflict with power boating along the East Bank occurs in Rotary Park, where the beach is, at times monopolized by boaters. It is therefore recommended that other docking and/or pull-up facilities be found for motorboats and that motorboats be banned from the Rotary Park beach.

#### g) Water-Skiing

The Rotary Park beach is heavily used as a pick-up and drop-off area for water skiers, creating a conflict with other beach activities. It is recommended that, once alternative water-ski bases have been identified and developed, this activity also be banned at Rotary Park.

# **IMPLEMENTATION 4**

## 4.1 Implementation Process

To ensure that open space development occurs in a smooth, co-ordinated fashion and that development priorities and budgets are accurately reflected by the timing and costs of construction, it is essential that a clearly defined implementation process be closely followed. It is therefore recommended that the following step-by-step process be followed for the purposes of implementing development proposals along the East Bank.

### 4.1.1. INITIAL STEPS

1. Review of Development Plan by approving agencies and the general public.
2. Approval of the Plan in principle, by all affected approving agencies (MVA, City of Saskatoon, University of Saskatchewan).
3. Prioritize proposed developments.

### 4.1.2. IMPLEMENTATION OF SPECIFIC PROPOSALS

- 1a. Collect detailed site information. Such information would include:
  - detailed site survey and base maps.
  - geotechnical site analysis (where required)
  - ecological site analysis (where required)
- 1b. Define a specific development programme. This could include such items as facilities to be developed, size and functions of

any buildings, level and type of landscape development, general budgeting guidelines, etc.

2. Prepare preliminary design plans.
3. Review and approve preliminary design plans (by all affected approving agencies).
4. Prepare tender documents and detailed cost estimates.
5. Review and approve tender documents and cost estimates.
6. Hire contractor and undertake construction.

Too often, the complexity of the development process is not understood by the public, and for this reason public impatience with apparent development delays has the potential to cause a 'short-circuiting' of the process. However, for development to occur in an orderly manner and for problems of cost overruns and poor co-ordination to be avoided, it is imperative that an implementation process be adopted and closely followed.

## 4.2 Phasing

The first priority of development should be to make the public aware of the nature and long term intent of the East Bank open space system. Therefore, highly visible projects that would, by their very nature attract a wide variety of people, seem most appropriate. Such proposals as the Birch Woods Interpretive Unit in Cosmopolitan Park and the expanded games area in Rotary Park would seem to qualify as high priority projects.

It also seems appropriate to begin development of and complete an entire focal point of area, rather than attempt scattered and piecemeal projects throughout the study area. This does not preclude staging development within an area or beginning development at several focal points at one time, but development of each focal point, once started, should appear to steadily progress to a conclusion which would reflect the detailed plans of each area. No construction should begin within an area until complete and detailed designs for all site development, facilities and services have been prepared and approved for that area.

Establishing priorities for future development of a complex and diverse project such as the East Bank open space system is at best a highly speculative venture. There are far too many unknowns, such as the availability of funds and land, political preferences and future development in adjacent areas, to suggest an overall phasing programme. However, in order to assist the Meewasin Valley Authority in the setting of priorities and establishment of a phasing strategy, a number of "priority groups" are outlined below. These groups represent a suggested ordinal ranking and general phasing of development. Clearly, priorities may be subject to considerable revision as development progresses and as plans for adjacent areas become finalized. No time frame is suggested for development of the various areas, although on the basis of what is now known, it is recommended that all projects in a given priority group be completed before construction of any projects in the next priority group is initiated.

#### Priority Group 1

1. Improve linkages at key points in the southern portion of the study area. This would include development of the following:
  - a) pedestrian connection from Victoria Bridge to Rotary Park.
  - b) underpass of the University Bridge.
  - c) stairs at the east end of the CP Rail Bridge.
2. Development of Cosmopolitan Park (including pathways, trails, Birch Woods Interpretive Units).
3. Development of that portion of Rotary Park between the Broadway and Victoria Bridges (including expanded games area, service building, terraced garden, parking lot, viewpoint, small parking lot, multi-purpose pathways and connection under Broadway Bridge.).

#### Priority Group 2

1. University of Saskatchewan (including linkage to Memorial Gates, up-graded bus stop and shelter on College Drive, bird sanctuary viewpoint, connections from the riverbank into the Campus, and soft landscaping.)
2. Development of the Ski Jump Hill focal point (including access road, parking lot, pavilion, terraced fishing platform, picnic area, underpass of CP Railway embankment and CP Bridge viewpoint.).

### Priority Group 3

1. Development of that portion of Rotary Park between the Victoria and Idylwyld Bridges (including painting of Victoria Bridge, Avant Garden, Garden Cafe, expanded parking lot, expanded service building, expanded beach area, waterfront promenade and multi-purpose pathway).
2. Development of pathways and trails between the CP Rail and 42nd Street Bridges.

### Priority Group 4

1. Development of the Sutherland Beach focal point. (NOTE: With the completion of the 42nd Street Bridge and Circle Drive extension improved access to Sutherland Beach could lead to uncontrolled heavy use of this area prior to development. To reduce the potentially severe impact of such use, steps may be required to restrict certain activities prior to actual development of this key focal point in the East Bank system. Alternately, development of the Sutherland Beach area could be placed in a higher priority group, in order that the timing of such development would better coincide with completion of the Circle Drive project.)
2. Development of planting buffer around the Regional Psychiatric Centre. (NOTE: It may be desirable to make this item a higher priority, in order that the plant material may become better established before the area comes under heavy use).

### Priority Group 5

1. Development of the Peturrson's Ravine focal point (NOTE: Depending on the timing of development in adjacent areas, it may become necessary to place this item in a higher priority group.).
2. Development of pathways and trails to Forestry Farm Park. (NOTE: Although detailed designs and development may not be a high priority item, it is essential that sufficient lands be allocated for an open space corridor in final plans for urban development in this area. This may well occur much earlier in the East Bank implementation programme.).
3. Development of pathways and trails between Sutherland Beach and Peturrson's Ravine area (including the Boulder Interpretive Unit).

The establishment of these priority groups is based on the general notion of giving first priority to development in areas where there is already an existing population base to take advantage of facilities and services. Thus, development should initially occur in inner city areas, and gradually move northward, as demands increase and funds allow.



### 4.3 Estimated Development Costs

The estimation of development costs at this stage of the planning process can be based on very general information only. Accurate cost estimates must await detailed design of the various focal points and areas along the East Bank. Indeed, the estimation of development costs for certain items is impossible without a more detailed examination of site conditions and programme requirements.

In order to provide general cost estimates for landscape development, it was first necessary to make some assumptions regarding the level of such development. For the purposes of these cost estimates, the following categories of landscape development were used:

#### a) Low

- general clean-up of debris and underbrush.
- pruning of dead and broken branches.
- complementary planting using indigenous species.
- approximate cost \$6000.00/ha.

#### b) Moderate

- clean-up of debris and underbrush thinning.
- pruning of dead and broken branches and general thinning.
- minimal earthwork required in shaping or berming.
- complementary planting and new planting including horticultural species.
- turf installation (predominantly seeding with localized sodding).
- development of water source.
- approximate cost \$42,000.00/ha.

#### c) High

- clean-up of debris and clearing.
- pruning and shaping.
- earthwork for shaping and general landscape structuring.
- intensive planting (planted shrub beds and trees) using horticultural species.
- turf installation (approximately equal amounts of sodding and seeding).
- site lighting (for pedestrian use).
- irrigation (quick coupling system).
- approximate cost \$62,000.00/ha.

The following estimates outline the general costs (where known) based on 1981 dollars of facility and landscape development. Estimates for facility development do not include costs of service connections.

#### 4.3.1. PRIORITY GROUP 1

##### a) Improved Linkages in Southern Portion of Study Area

- Victoria Bridge to Rotary Park . . .unknown
- University Bridge underpass . . . . unknown
- stair access at C.P. Rail Bridge . .unknown

##### b) Cosmopolitan Park

- multi-purpose pathways . . . . . \$70,000.00
  - 2000 lin. m. @ \$35.00
- walking trails . . . . . \$13,200.00
  - 2200 lin. m. @ \$6.00
- landscape development . . . . . \$70,800.00
  - 11.8 ha @ \$6,000.00
- Birch Woods Interpretive Unit . . .unknown

##### c) Victoria Bridge to Broadway Bridge

- multi-purpose pathways . . . . . \$19,600.00
  - 560 lin. m. @ \$35.00
- parking lot . . . . . \$36,000.00
  - 36 stalls @ \$1,000.00

- expanded games area . . . . . \$18,000.00
  - 1800 m<sup>2</sup> @ \$10.00

- service building . . . . . \$15,000.00
  - 20 m<sup>2</sup> @ \$750.00

- terraced garden and viewpoint . . .unknown

- landscape development
  - 0.2 ha @ \$6,000.00 . . . . . \$39,000.00
  - 0.9 ha @ \$42,000.00

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ESTIMATED COSTS - PRIORITY GROUP 1 \$281,600.00  
plus unknowns

#### 4.3.2. PRIORITY GROUP 2

##### a) University of Saskatchewan

- multi-purpose pathways . . . . \$101,500.00
  - 2900 lin. m. @ \$35.00
- walking trails . . . . . \$ 8,400.00
  - 1400 lin. m. @ \$6.00
- up-graded bus stop and shelter . . . unknown
- Bird Sanctuary viewpoint . . . . . unknown
- landscape development . . . . . \$ 91,800.00
  - 15.3 ha @ \$6,000.00
- picnic sites . . . . . \$ 27,000.00
  - 3 @ \$9,000.00

##### b) Ski Jump Hill Focal Point

- parking lot . . . . . \$ 28,000.00
  - 28 stalls @ \$1,000.00
- access road . . . . . unknown
- pavilion . . . . . \$ 67,500.00
  - 90 m<sup>2</sup> @ \$750.00

- terraced fishing platform . . . . unknown
- picnic sites . . . . . \$ 72,000.00
  - 8 @ \$9,000.00
- C.P. Rail underpass . . . . . unknown
- C.P. Bridge viewpoint . . . . . unknown
- landscape development . . . . . \$147,000.00
  - 3.5 ha @ \$42,000.00

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ESTIMATED COSTS - PRIORITY GROUP 2	\$543,200.00
	plus unknowns

#### 4.3.3. PRIORITY GROUP 3

##### a) Victoria Bridge to Idylwyld Bridge

- painting of Victoria Bridge . . unknown
- Avant Garden . . . . . \$ 31,000.00
  - 0.5 ha @ \$62,000.00
- Garden Cafe . . . . . \$225,000.00
  - 250 m<sup>2</sup> @ \$900.00
- expanded parking lot . . . . . \$ 40,000.00
  - 40 stalls @ \$1,000.00
- expanded service building . . . \$ 15,000.00
  - 20 m<sup>2</sup> @ \$750.00
- expanded beach area . . . . . \$ 77,500.00
  - 3100 m<sup>2</sup> @ \$25.00
- waterfront promenade . . . . . \$165,000.00
  - 3300 m<sup>2</sup> @ \$50.00
- multi-purpose pathways . . . . . \$ 10,500.00
  - 300 lin. m. @ \$35.00

- landscape development . . . . . \$ 59,500.00
  - 0.26 ha @ \$6,000.00
  - 1.38 ha @ \$42,000.00

##### b) C.P. to 42nd Street Bridge

- multi-purpose pathways . . . . . \$ 38,500.00
  - 1100 lin. m. @ \$35.00
- walking trails . . . . . \$ 7,200.00
  - 1200 lin. m. @ \$6.00
- landscape development . . . . . \$ 74,400.00
  - 12.4 ha @ \$6,000.00

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ESTIMATED COSTS - PRIORITY GROUP 3	\$743,600.00
	plus unknowns

#### 4.3.4. PRIORITY GROUP 4

##### a) Sutherland Beach

- access road . . . . . \$ 48,000.00
  - 3200 m<sup>2</sup> @ \$15.00
- parking lot . . . . . \$ 50,000.00
  - 50 stalls @ \$1,000.00
- Visitor Centre . . . . . \$225,000.00
  - 300 m<sup>2</sup> @ \$750.00
- picnic sites . . . . . \$ 90,000.00
  - 10 @ \$9,000.00
- interpretive unit . . . . . unknown
- equestrian trail . . . . . \$ 15,000.00
  - 1500 lin. m. @ \$10.00
- corral . . . . . \$ 5,000.00
- multi-purpose pathway . . . . . \$122,500.00
  - 3500 lin. m. @ \$35.00

- landscape development . . . . . \$1,859,000.00
  - 29 ha @ \$6,000.00
  - 16.5 ha @ \$42,000.00
  - 16 ha @ \$62,000.00

##### b) Psychiatric Centre Planting Buffer

- landscape development . . . . . \$ 94,500.00
  - 2.25 ha @ \$42,000.00

ESTIMATED COSTS - PRIORITY GROUP 4 . . \$2,509,000.00  
plus unknowns

#### 4.3.5. PRIORITY GROUP 5

##### a) Proposed Footbridge to Peturrson's Ravine

- multi-purpose pathways west of Central Avenue . . . . . \$122,500.00
  - 3500 lin. m. @ \$35.00
- walking trails west of Central Avenue . . . . . \$ 10,800.00
  - 1800 lin. m. @ \$6.00
- equestrian trails west of Central Avenue . . . . . \$ 14,000.00
  - 1400 lin. m. @ \$10.00
- access road . . . . . \$ 30,000.00
  - 2000 m<sup>2</sup> @ \$15.00
- parking lot . . . . . \$ 22,000.00
  - 22 stalls @ \$1,000.00
- Peturrson's Ravine Interpretive Unit . . . . . unknown
- landscape development . . . . . \$876,000.00
  - 20 ha @ \$6,000.00
  - 18 ha @ \$42,000.00

- boulder interpretive unit . . . . unknown

##### b) Linkage to Forestry Farm

- multi-purpose pathways . . . . . \$122,500.00
  - 3500 lin. m. @ \$35.00
- equestrian trail. . . . . \$ 24,000.00
  - 2400 lin. m. @ \$10.00
- stable and corral . . . . . \$ 25,000.00
- landscape development . . . . . \$3,255,000.00
  - 77.5 ha @ \$42,000.00

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ESTIMATED COSTS - PRIORITY GROUP 5	\$4,501,800.00
	plus unknowns

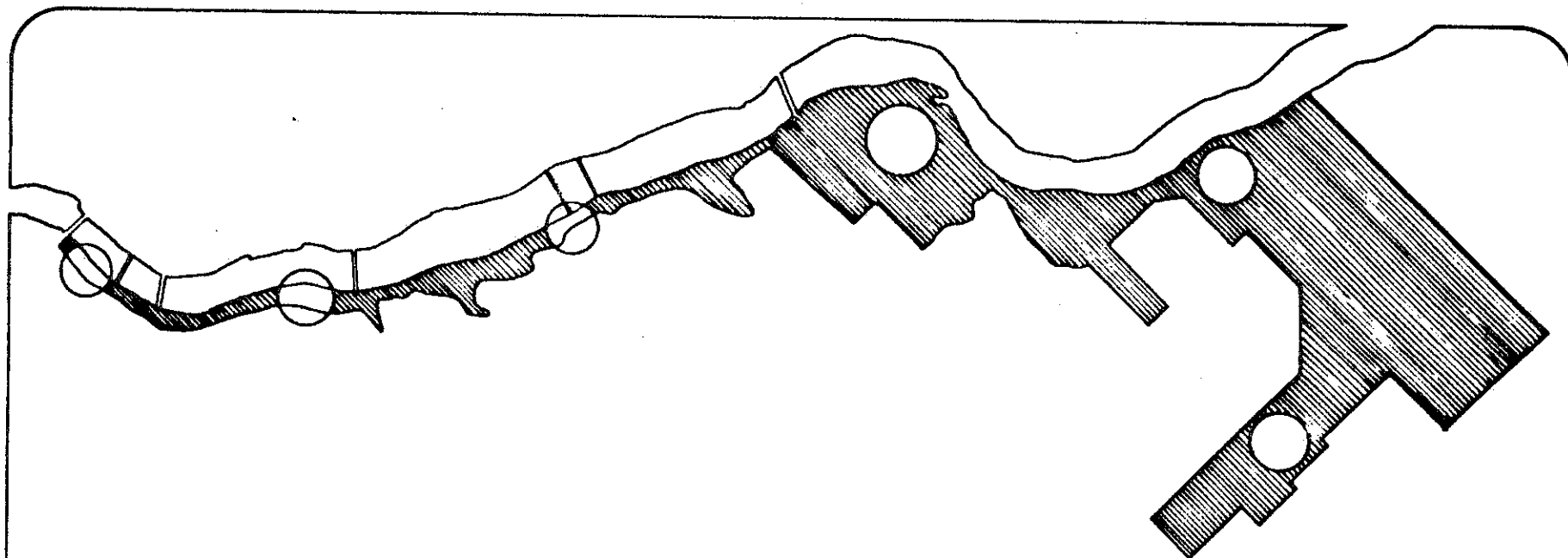
4.3.6. SUMMARY OF ESTIMATED DEVELOPMENT COSTS

Priority Group 1 . . . . .	\$ 281,600.00
Priority Group 2 . . . . .	\$ 543,200.00
Priority Group 3 . . . . .	\$ 743,600.00
Priority Group 4 . . . . .	\$2,509,000.00
Priority Group 5 . . . . .	\$4,501,800.00

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TOTAL . . . . .	\$8,579,200.00
	plus unknowns

Because of the very general nature of these estimates, and because of the large number of unknown costs, no attempt has been made to allow for either contingencies or professional fees.



# **SITE INVENTORY AND ANALYSIS**

# **1**



# 1. SITE INVENTORY AND ANALYSIS

An inventory of site conditions within and adjacent to the study area was carried out by means of aerial photographic and cartographic interpretation, restricted field checking, literature reviews and discussions with knowledgeable resource people. Information was collected with respect to the following parameters: topography; land use; land ownership; zoning; circulation and access routes into and within the study area; historical and archaeological resources; and the visual character of the study area. In addition, to ensure a comprehensive analysis of biophysical opportunities for, and constraints on, development in the study area, the services of two specialist consulting firms were retained. First, Clifton Associates Ltd., Consulting Geotechnical Engineers were asked to undertake a terrain analysis of the East Bank study area, and to comment upon any geotechnical resources and hazards, as they may pertain to open space development. Second, David R. M. Hatch and Associates, Environmental Consultants, were retained to collect and analyze, within the same context, all available information pertaining to the vegetation and wildlife resources in the area.

Due to the timing and duration of the East Bank Study (essentially a winter study), field inventories of biophysical conditions were severely restricted. However, due to the extent of previous biological and geological research undertaken in the area, the approach in this study centred around a compilation of existing information and the identification of any gaps in this information, where they may appear. It is intended that, where

necessary, these information gaps would be filled prior to any site-specific planning at the detailed design stage of the development process.

In addition, considerable time was spent in the field at the outset of the study, documenting (photographically) existing site conditions throughout the study area. Weather conditions in November were quite favourable, and the Design Team was able to record conditions prior to winter snow-cover.

## 1.1 Topography & Slopes (Map 4)

Slope analysis entailed the classification of all slopes in the study area according to four broad categories: less than 5 percent; 5-15 percent; 16-30 percent; and greater than 30 percent. With the exception of small, localized areas, all slopes were either north-facing or west-facing. North-facing slopes were predominant in the vicinities of Rotary Park and the University of Saskatchewan Feedlot.

As anticipated, the steepest slopes were found along the river valley, with the greatest concentrations of very steep (greater than 30%) in Cosmopolitan Park, near the main University campus, and near the Regional Psychiatric Centre. Within the river valley, the only area where gentle (less than 5%) and moderate (5-15%) slopes dominated was in Rotary Park.

In the upland areas, slopes were, for the most part, gentle. However, moderate slopes were identified in the main campus, in the Sutherland Beach area and, occasionally, in the area between Peturrson's Ravine and the Forestry Farm.

## 1.2 Terrain Analysis (Map 5)

### 1.2.1. HISTORY OF THE SASKATOON LANDSCAPE

The present landscape is an expression of many millions of years of deposition, erosion and other physical processes. Although the present landscape features are formed in only the surficial one hundred feet or so of sediments, the deposition and shaping of these materials has been going on for many millions of years. This section presents a brief overview of the general geologic history of the Saskatoon area. More specific historical data on the geology of the study area is presented in Section 2.2.

#### a) Preglacial History

The crystalline rocks of Precambrian age form the base of a series of sediments that began to accumulate about 600 million years ago. These sediments, which are a series of sands, silts, clays, and various precipitates, are laid down as a series of carbonate rocks, sandstones, shales and organic strata that were deposited by ancient seas which extended from the Gulf of Mexico to the Arctic Ocean. The vertical sequence of sediments was documented by Christiansen (1970).

These great preglacial seas were bounded on the east by vast peneplains and on the west by the Western Cordillera. Cyclical changes in the sea levels, and isostatic changes in elevations of the earth's crust, caused wide variations in the extent and depth of the seas.

Major alterations in the character of the landscape occurred during the late Cretaceous period

when the Rocky Mountains were actively forming. At this time, heavy loads of detritus, eroding from the uplifting landscape to the west and southwest, were deposited in the Central Plains area as a series of marine and non-marine sediments, depending upon the prevailing sea level. The seas slowly retreated and the landscape was uplifted. Well integrated drainage developed as weathering and erosion occurred. Present day knowledge of preglacial bedrock valleys indicates that prior to glaciation, drainage was highly developed and probably directed towards the Arctic Ocean. It is probable that the landscape was highly dissected with perhaps a badlands appearance.

Christiansen (1967) reports that up to 600 feet of evaporites consisting of various soluble salts and precipitates were deposited in the Saskatoon area during the Devonian Era. Although this stratum occurs about 4000 feet below the present surface, subsequent solution has removed much of it from under a section of the City. This has apparently caused down-dropping of a portion of the earth's crust resulting in the "Saskatoon Low". This structural depression has been infilled by a great thickness of till and stratified drift deposited during repeated glaciations of the area.

A considerable depth of sediments of various geologic ages is missing from much of the Central Plains. The youngest preglacial materials beneath the Saskatoon area are estimated to be about 70 million years old (Caldwell, 1968 and Maclean, 1971). The Quaternary or glacial period began about 3 million years ago. Therefore, more than 60 million years of geologic history has been removed by erosion, weathering and the action of glaciers.

## b) Glacial History

Major climatic changes initiated the glacial period about 1 million years ago. Immediately prior to the first glaciation, heavy fluvial erosion deposited a layer of sand and gravel called the Empress Group. This material was subsequently covered by ice and water-laid sediments left after at least four major glacial advances through the Saskatoon area. A period of weathering and erosion followed each major retreat of the ice front.

Christiansen (1968) interprets the duration of the last (Wisconsin) glaciation as being between 12,000 and 20,000 years before the present. This glacier, which originated from a zone of accumulation in the Keewatin District, near the east shore of Hudson's Bay in the Northwest Territories, deposited the sediments and was the source of meltwater that shaped the present day landscape. The large igneous and limestone boulders found on the surface originated from the outcrops of Precambrian and the Devonian aged formations respectively, which occur about 400 to 500 km northeast of Saskatoon. These and most other erratics, such as pebbles that form the gravel deposits, were transported by the ice as it moved from northeast to southwest across the landscape.

## c) Post-Glacial History

Glacial ice retreating downslope to the north and northeast blocked the regional drainage system and created an ice-dammed lake that covered much of the area around the present City of Saskatoon. Recent radiocarbon dates (Koster, 1978) indicate that this lake persisted

for about 3000 years and was likely drained by about 9000 years before the present. While it persisted, over 200 feet of stratified clay and silt were deposited on some areas of the land it covered. Sand, probably deposited as a delta where the South Saskatchewan and other drainage channels dumped into glacial Lake Saskatoon, was deposited on top of finer grained sediments. As the lake drained, these sediments were exhumed and form the present surface. The sand has been reworked into dunes by wind. The most active period of dune formation was apparently in the period prior to 3000 years before the present, although some wind movement of the sand is still occurring.

When the ice front had retreated sufficiently to expose an outlet, drainage of the glacial lake occurred rapidly through a glacial spillway along the ice margin. This channel rapidly eroded to capture the South Saskatchewan River from its previous course down the Qu'Appelle Valley. During its rapid erosion, the South Saskatchewan River downcut through the sandy lacustrine sediments, and less quickly through the more competent glacial debris.

In its early stages, flowing meltwater broadly covered a wide area of the glacial till plain parallel to the present valley, leaving an eroded surface covered with gravel and boulders. This formed the eroded till plain that has been covered with a veneer of fluvial-lacustrine silt and clay. Several high level current scars, such as the Hudson Bay Slough, and others, mark the former abandoned river channels that were formed at that time. Some of these have been drained and infilled for urban development. Others such as those along Central Avenue north of Sutherland formed at a later stage in the valley development. This area is composed of abandoned gravel bars heavily armoured with boulders. Some of these now are

commercial gravel deposits.

Erosion of the river channel occurred very rapidly. Radiocarbon dates reported by Turchenek et al. (1-74) suggest that the Saskatoon terrace, on which the City core has developed, was eroded to its present elevation about 8000 years ago, and was abandoned by the river perhaps 3000 years ago. Other dates (Koster 1978) suggest that river level was stabilized at Frenchman Flats about 35 kilometres south of Saskatoon about 3000 years before present. Erosion, at a slower rate, has proceeded since that time, as has dissection and slumping of the valley walls. These and other landforming processes are continuing.

#### 1.2.2. LANDFORMS WITHIN THE STUDY AREA

Two major landform types are present within the study area. They are classified as proglacial landforms, or those that are formed away from the glacial ice. The surficial landform which extends from the Idylwyld Bridge to the University of Saskatchewan Campus is classified as a glacial-lacustrine plain, or more specifically a glacial lake basin. The surficial deposits were deposited in glacial Lake Saskatoon during the retreat of the ice front. At that time, the glacier had blocked the regional drainage system and created an ice-dammed lake, which covered much of the area around the present City of Saskatoon location. This deposition occurred in a regressive off-lap sequence. In this sequence, the clays were deposited in deeper water, and as the ice front retreated to the north, the delta also advanced northward, and coarser grain sediments consisting of silt and sands were deposited over the highly plastic clay.

Thus the general stratigraphic sequence is glacial till overlain by highly plastic clay which becomes progressively siltier and sandier towards surface. In the northern portion of the area, namely in the University of Saskatchewan Campus area, highly plastic clay is found at ground surface.

As the ice front retreated to the north and drainage of the lake occurred rapidly, the river downcut through the lacustrine sediments into the glacial till. Thus the contact between the surficial stratified drift deposits and the glacial till is above the elevation of the present river bed. The lacustrine sediments with higher silt and clay content form a landscape with relatively low relief and good agricultural capability. The lacustrine clays are weak, sensitive sediments that allow the formation of numerous landslides; evident from the Idylwyld Bridge to the President's Residence.

North of the University Campus (from Ski Jump Hill north and east), the basic landform is an eroded till plain which was developed by the action of flowing water. When the outlet from glacial Lake Saskatoon started to develop, flowing water covered a broad area with no definite channel. North of the University this flow resulted in a type of sheet erosion, leaving behind a lag of gravel and boulders. Virtually all the identifying relief features of the underlying till plain were obliterated in this process. As the channel was abandoned a thin veneer of fluvial-lacustrine silt and sand was deposited on the surface of the eroded till in some locations. In other areas, erosion was very rapid with no subsequent deposition of gravel and sand. The fine fractions were removed from the soil leaving only an armouring of boulders covering the hills and till ridges. This boulder strewn till surface is a truly eroded till. Its rough rocky surface is an impediment to travel except by foot.

In certain areas, channels at the higher elevations became more sharply incised in the surrounding plain. These eroded abandoned channels are called current scars. These contain gravel bars and boulders marking the ancestral location of a point bar in the developing river. These are particularly well defined north of Sutherland, where they are associated with boulder strewn ridges formed of glacial till or very bouldery gravel. These are heavily armoured and resistant to erosion. These ridges, sculpted by fast flowing water, probably mark the location of former rapids in a river bed that could not be eroded. The river, therefore, slipped off these heavily armoured slopes onto less defended soils where a channel could be formed.

The area from the C.P. Rail bridge to a point east of the existing feedlot consists of an eroded till overlain by surficial sands and silts. Northeast of this area is an eroded till plain with surficial boulders, sand and gravel. In the area immediately northeast of Peturrson's Ravine, the eroded till is overlain by varying depths of sand and silt.

The Forestry Farm Park lies within a glacial lake basin (lacustrine plain) landform with a thin veneer of surficial clay overlying glacial till.

### 1.2.3. GEOTECHNICAL ANALYSIS

#### a) Idylwyld Bridge to the President's Residence

As noted in Section 1.2.2., the surficial landform through this area is a glacial lake basin. The general stratigraphy in this area is surficial silt and lacustrine clays overlying glacial till. The South Saskatchewan River has eroded into the glacial till and the contact between the glacial till and surficial stratified drift is generally above the river level. In general, the groundwater levels are quite high with the piezometric surface being above the till-clay contact. The river bank is generally unstable and landslides are evident throughout this area.

#### i) Rotary Park

The conceptual stratigraphy between the Idylwyld Bridge and the Victoria Bridge is illustrated on Figure 2. Rotary Park was created by depositing fill riverward from Saskatchewan Crescent. This fill was placed between 1956 and 1967. The quality or composition of this fill is not known, however, it is presumed to be non-select material and may contain a great variety of soil types and possibly debris. Landsliding and slope instability in this area exists on the valley walls with the toe of the landslides lying behind the houses on the south side of Saskatchewan Crescent.

Developments in Rotary Park will not directly effect the instability which exists on the valley wall between Saskatchewan Crescent and 11th Street. Since the Park lies on the inside bend of the river the landfill is not being severely attacked by river erosion. This suggests that development

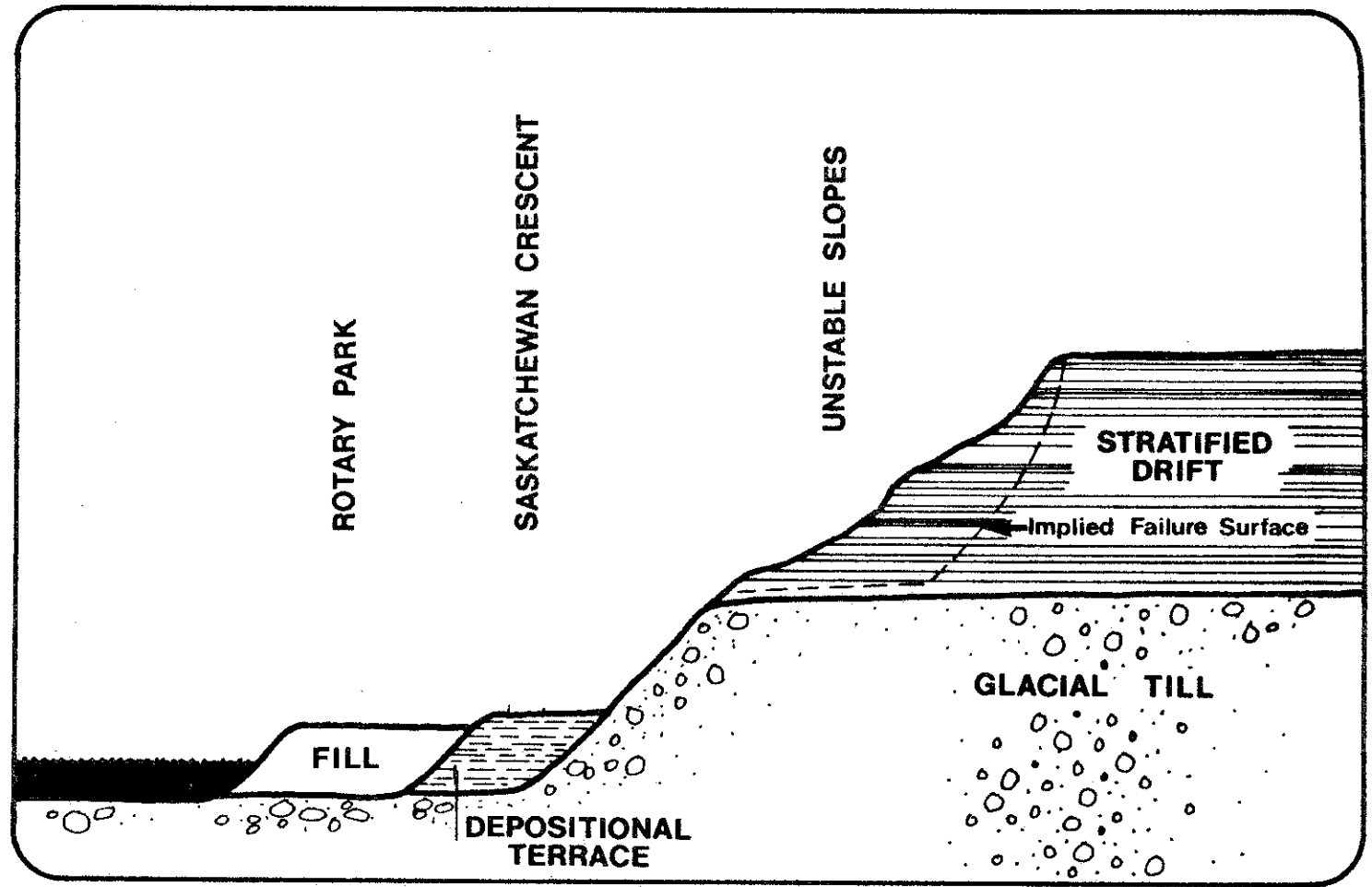


FIGURE 2 CONCEPTUAL STRATIGRAPHY - ROTARY PARK

of a beach along the shoreline in this area may be feasible. Foundation conditions on the Park landfill are presumed to be relatively poor. However, no difficulty should exist in supporting lightly-loaded structures.

Because of the variable nature of the materials, water containment (such as a pond) may be somewhat difficult, and seepage and loss of water from such a pond may occur. Thus, some type of lining would be required.

## ii) Victoria Bridge to the President's Residence

The stratigraphy in this area again consists of lacustrine clay and silt overlying glacial till. The stratigraphic boundary between these materials is again above the river level and the ground-water regime is similar to that previously described; that is, with the piezometric surface lying in the stratified drift materials. This section of the river bank has an extensive history of landsliding which probably extends back to the formation of the river valley in postglacial times. Records of river bank instability can be found in the files which the City of Saskatoon Engineering Department has maintained since 1913. Generally, the landslides seemed to invariably have failure surfaces which follow the stratigraphic boundary between the surficial stratified drift and the underlying glacial till. Since this contact is above the river level this results in the sliding mass moving out and falling over the edge of the original till bank.

Some of the major instability problems are discussed below:

Long Hill Slide - 1913 - A major slide inter-

rupted streetcar services on the incline from the 19th Street Bridge to Broadway Avenue.

Nutana Collegiate Slide - A major landslide which occurred just east of the Victoria Bridge encroached upon the collegiate grounds and the approaches to the 19th Street Bridge. The slide has been active for a long period of time and may still be active.

McCraney Slide - 1929 - Slide occurred at 16th Street between the Broadway Bridge and the 25th Street Bridge.

The 15th Street Slide - 1954 - This major slide occurred approximately one block south of the McCraney slide. It was approximately 45 metres wide at the crest and 60 metres wide at the toe.

The 18th Street Slide - Early 1960's - This slide, which occurred on the river bank at the intersection of Saskatchewan Crescent and 18th Street, resulted in severe damage to the Saskatchewan Crescent roadway.

The 13th Street Slide - Early 1960's - This slide, which occurred in the vicinity of the Broadway Bridge abutment, damaged gas lines and affected the stability of the bridge abutment. Slope indicators were installed in the vicinity of the Broadway Bridge and recorded movement as late as 1968.

President's Residence - 1970 - Several hundred cubic metres of material slid down the slope on a failure surface above river level and debris flowed some distance out into the river. The scarp of this slide was only 15 metres from the President's Residence. Lawn watering was halted with the result that water levels dropped nearly 2 metres (Hamilton and Tao, 1977). After groundwater interceptor trenches had been installed and the Residence had

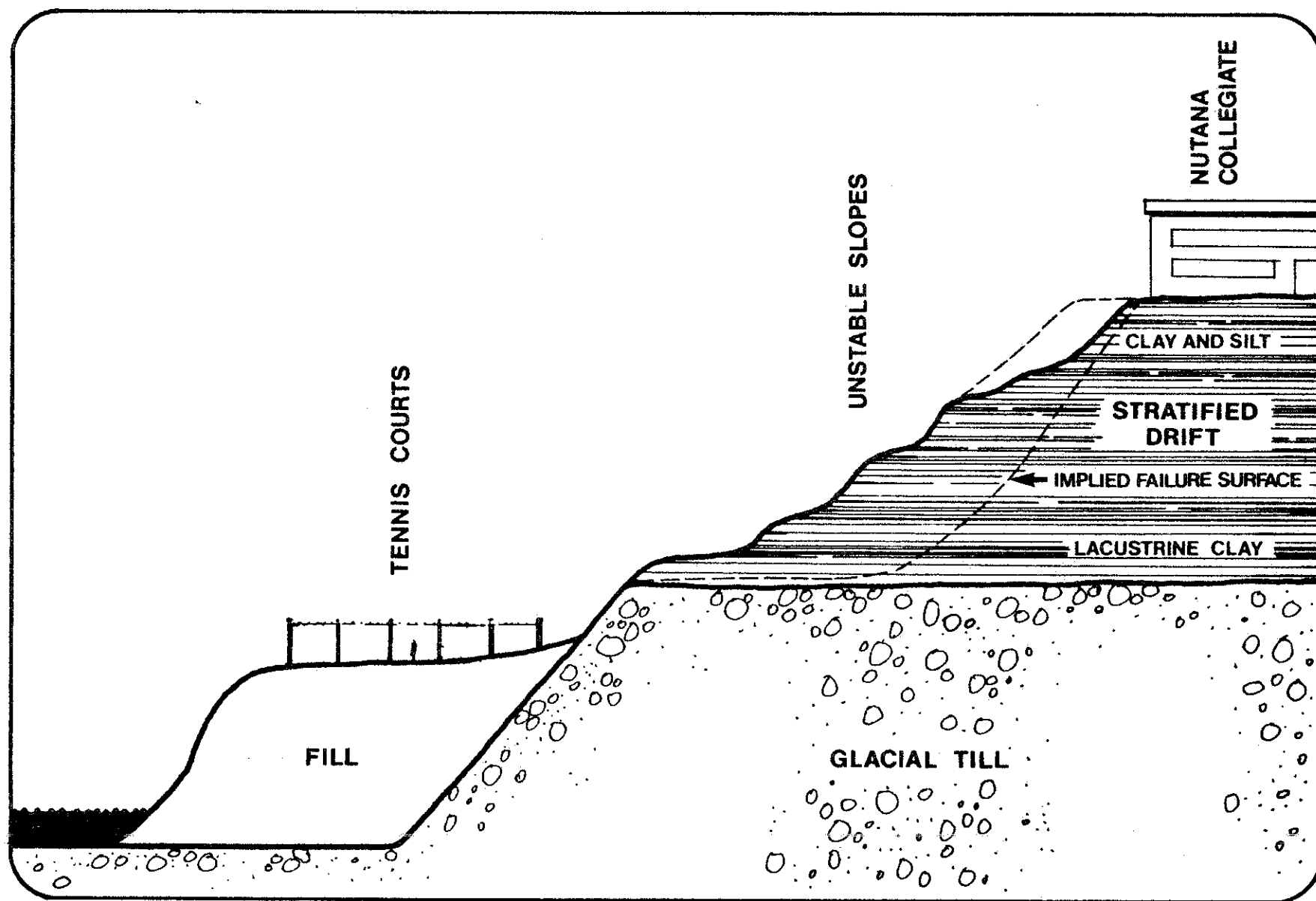


FIGURE 3 CONCEPTUAL STRATIGRAPHY - LONG HILL SLIDE



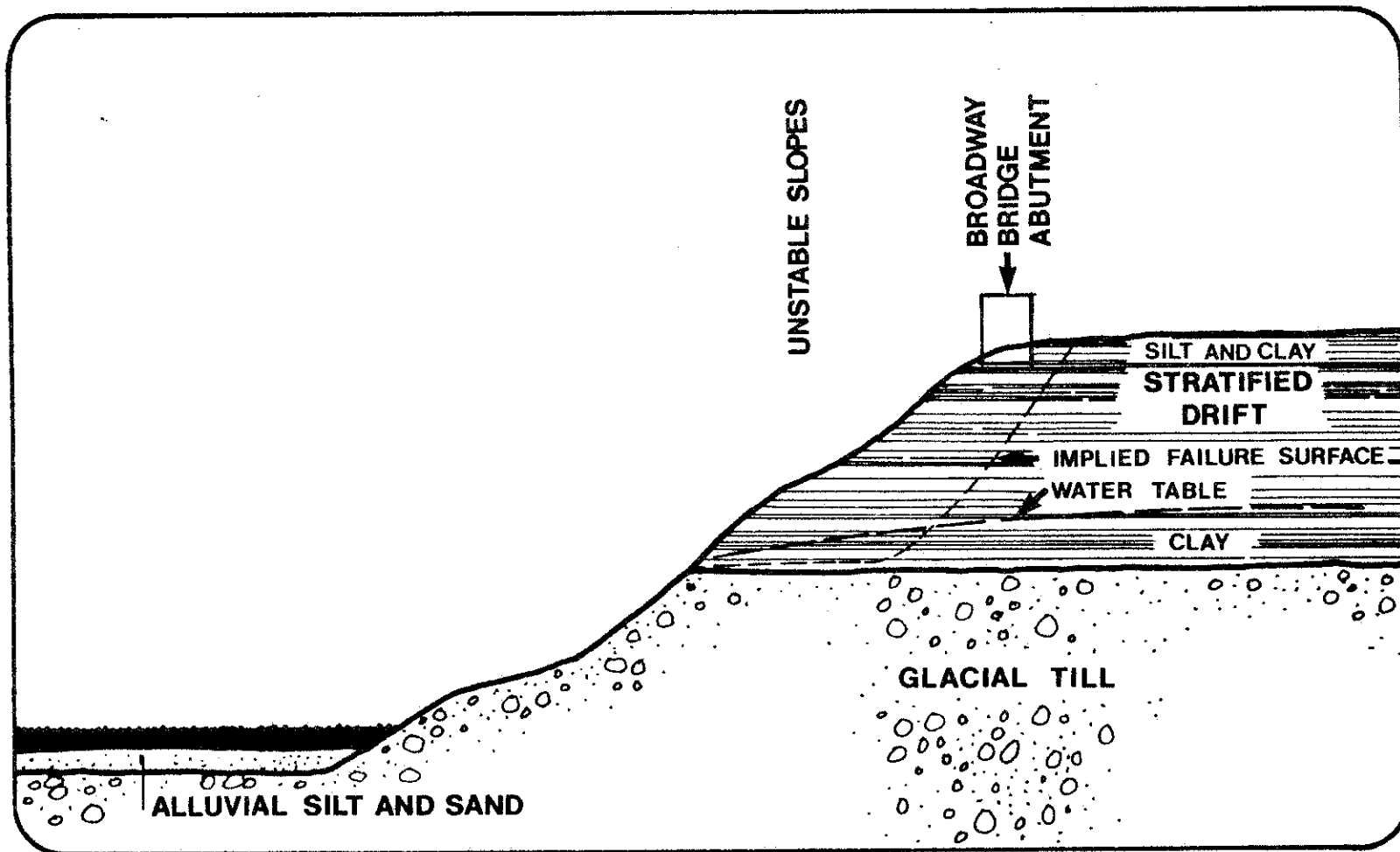


FIGURE 4 CONCEPTUAL STRATIGRAPHY - BROADWAY BRIDGE AREA

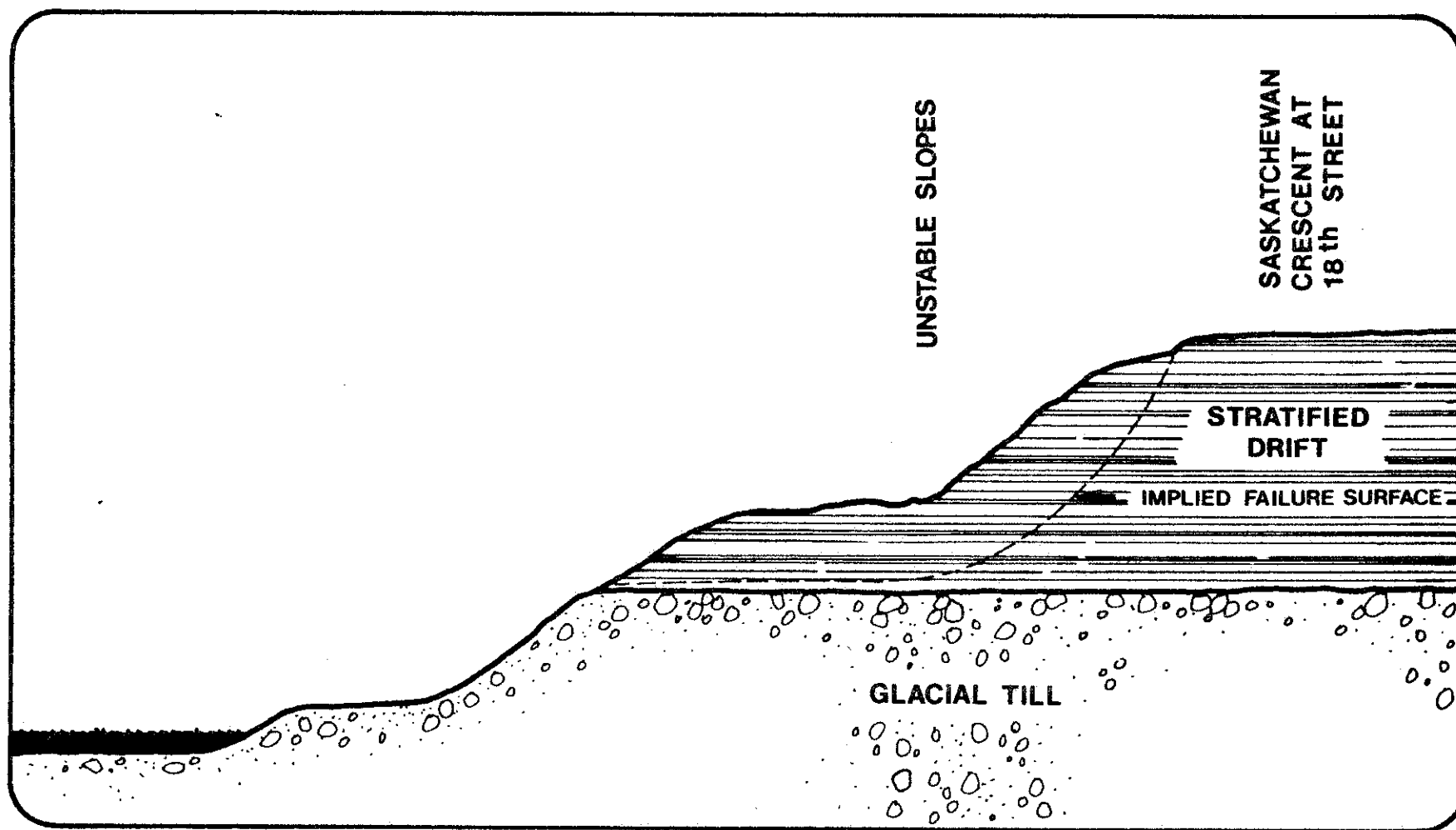


FIGURE 5 CONCEPTUAL STRATIGRAPHY - COSMOPOLITAN PARK

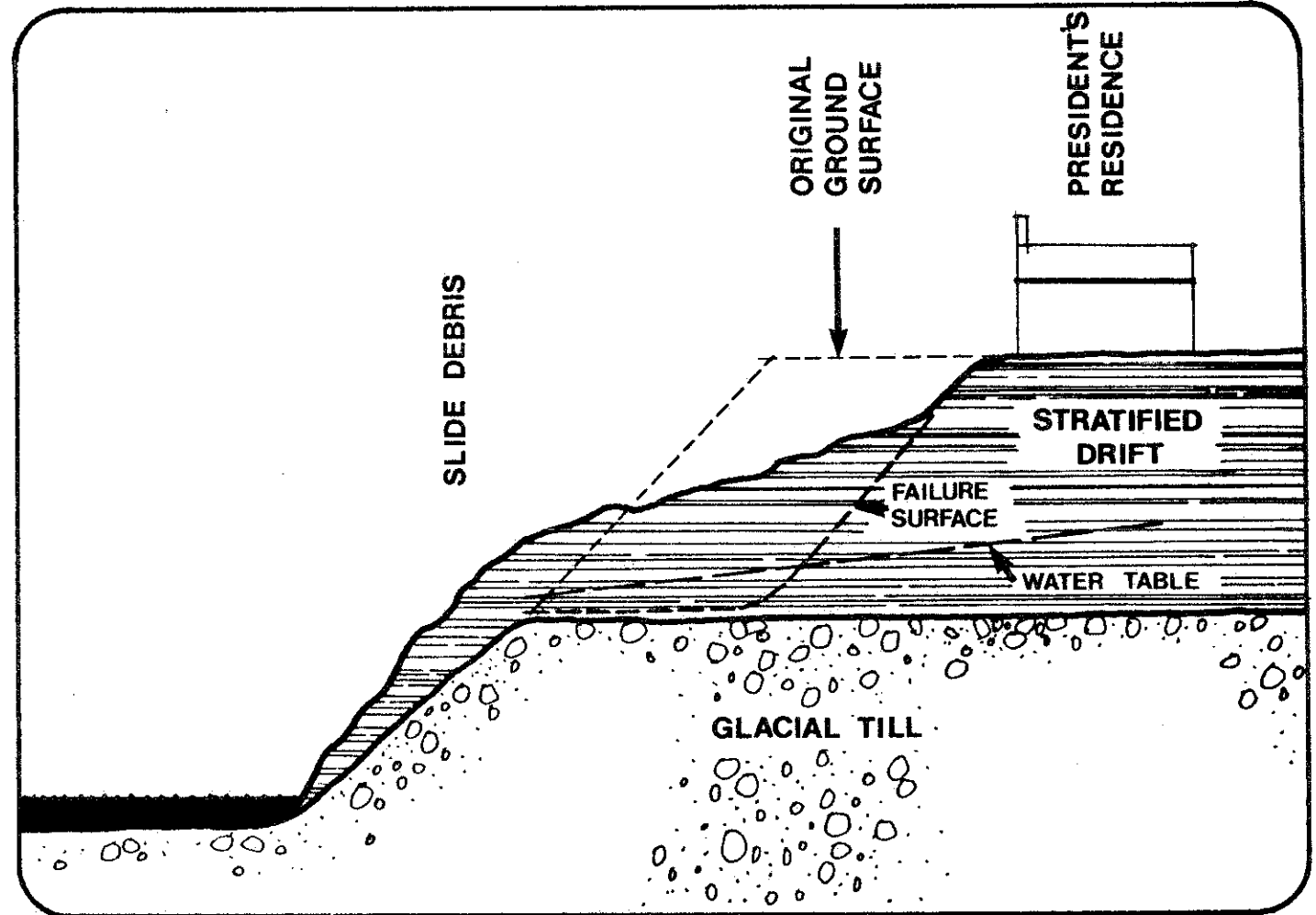


FIGURE 6 CONCEPTUAL STRATIGRAPHY - PRESIDENT'S RESIDENCE SLIDE

been underpinned, the water levels again rose to their original levels when irrigation of the lawns was resumed.

Documented remedial measures which have been carried out along this section of riverbank consist primarily of subsurface drains and berming at the riverbank toe. The long term effectiveness of the drains has not yet been established and most berming has been carried out at an elevation lower than the failure surface and does not have a significant effect upon the slope stability. More monitoring of stability and groundwater levels is required.

### iii) Geotechnical Considerations

For the area which encompasses Rotary Park and the landfill immediately east of the Victoria Bridge (on which the tennis courts are developed) few geotechnical constraints have been identified. Rotary Park is suitable for beach development and is suitable for structures, although heavily-loaded foundation units may be costly to construct. There are few constraints on vegetation or irrigation activities. The access from Rotary Park to the east side of the Victoria Bridge could be improved using minor landscaping without any detrimental effects.

The major concern in the area from the Victoria Bridge to the University Campus is related to slope stability and the implications of landslide activity within an urban area. Pedestrian access and pathways can be improved, provided landscaping is minimal on the existing slump blocks. Major landscaping for vehicular traffic should not be considered, particularly in the vicinity of major bridge structures. Since the land-

slides appear to have failure surfaces which follow the stratigraphic boundary between the surficial stratified drift and the glacial till, much more freedom for landscaping and development activities exists below the till contact.

Major drainage patterns on the slopes must be maintained or improved. Concentrated drainage or drainage impediments should be avoided at all costs. Irrigation has the most detrimental effects on the upper slopes and the uplands behind the scarp areas. There is opportunity for minor irrigation on the lower slopes depending upon the stratigraphy and materials. Because of the dramatic effect on the groundwater levels which accompanies urban development particularly that type which employs extensive irrigation of lawns and gardens, these activities must be very carefully regulated and controlled in the scarp and near the top of the slope. These slopes are not considered suitable for construction of permanent structures.

A comprehensive policy of slope management must be developed for this area. A detailed study of stratigraphy and existing instability must be undertaken for any site-specific developments. Existing landslides should be evaluated in more detail, and remedial and monitoring procedures initiated. Much more extensive studies are required along this section of riverbank to establish guidelines for both park development and fringe developments which may have an effect on the environment of the slopes.

### b) University Campus

The subsurface stratigraphy at the University generally consists of surficial clay overlying glacial till. A thin upper till is separated from an older till deposit by an extensive inter-till sand unit. This sand unit exits on the riverbank

above river level. It is a relatively major regional aquifer which is fed by infiltration in the Strawberry Hills to the east of the City of Saskatoon. This results in a subartesian groundwater system throughout the University Campus area. This groundwater exits the sand aquifer on the riverbank and has resulted in one major ancient piping failure - Devil's Dip. Piping is not a serious problem in this area; however, the groundwater discharge on the riverbank does result in small glacier and ice dams forming on the river bank during the winter months.

Because the upper layer of lacustrine clay is relatively thin in this area, slope instability has not been a major problem to date. The situation has been aided somewhat by the absence of intensive development or lawn watering adjacent to the river edge.

Opportunities exist for the development of major structures near the river bank in this area, provided careful planning and geotechnical design is carried out, such that any potential of slope instability is removed and the groundwater discharge is handled in a positive manner.

The abandoned ski-jump site is located at the northern fringe of this area. The gully upon which this development has been carried out is a result of a combination of groundwater discharge and surficial erosion. The environment is relatively stable at this time although it is very sensitive to disturbance. This is a relatively significant geological site, where an exposure provides the geologic reference section for the three major glacial tills identified in Saskatchewan. The site is unique in that the three tills (Battleford

Till, Floral Till, Sutherland Till) are all exposed on the riverbank and can be readily examined. This section provides the potential to be a significant geologic interpretive feature, which could also function as a teaching resource for the University of Saskatchewan.

The east abutment of the CP Rail bridge appears to be relatively stable. The lower slopes at this site are comprised of glacial till and therefore the opportunity exists to develop pedestrian pathways beneath the bridge on the lower level of the river bank.

#### c) CP Rail Bridge to the University Feedlot

This area, which encompasses University irrigation plots, the eastern approach to the new Circle Drive River Bridge, Sutherland Beach, and the University Feedlot, is classified as an eroded till plain overlain by a variable thickness of silt and sand. The glacial till was eroded by fast flowing water during the drainage of glacial Lake Saskatoon resulting in an irregular, boulder-armoured eroded till surface, which was subsequently blanketed by alluvial sand and silt. The action of water and wind erosion has resulted in an irregular surface with poorly developed drainage patterns.

The surficial materials are relatively sensitive and are highly susceptible to erosion, particularly when the vegetation cover is removed. Some erosion is evident along the top of the river bank at one or two locations where drainage has been concentrated. One such location is at the exit point of an apparently abandoned drain, which is part of the irrigation system on the University plots. Landscaping should be carried out to halt further erosion and revegetate this area.

Sutherland Beach is relatively stable minor deposit-

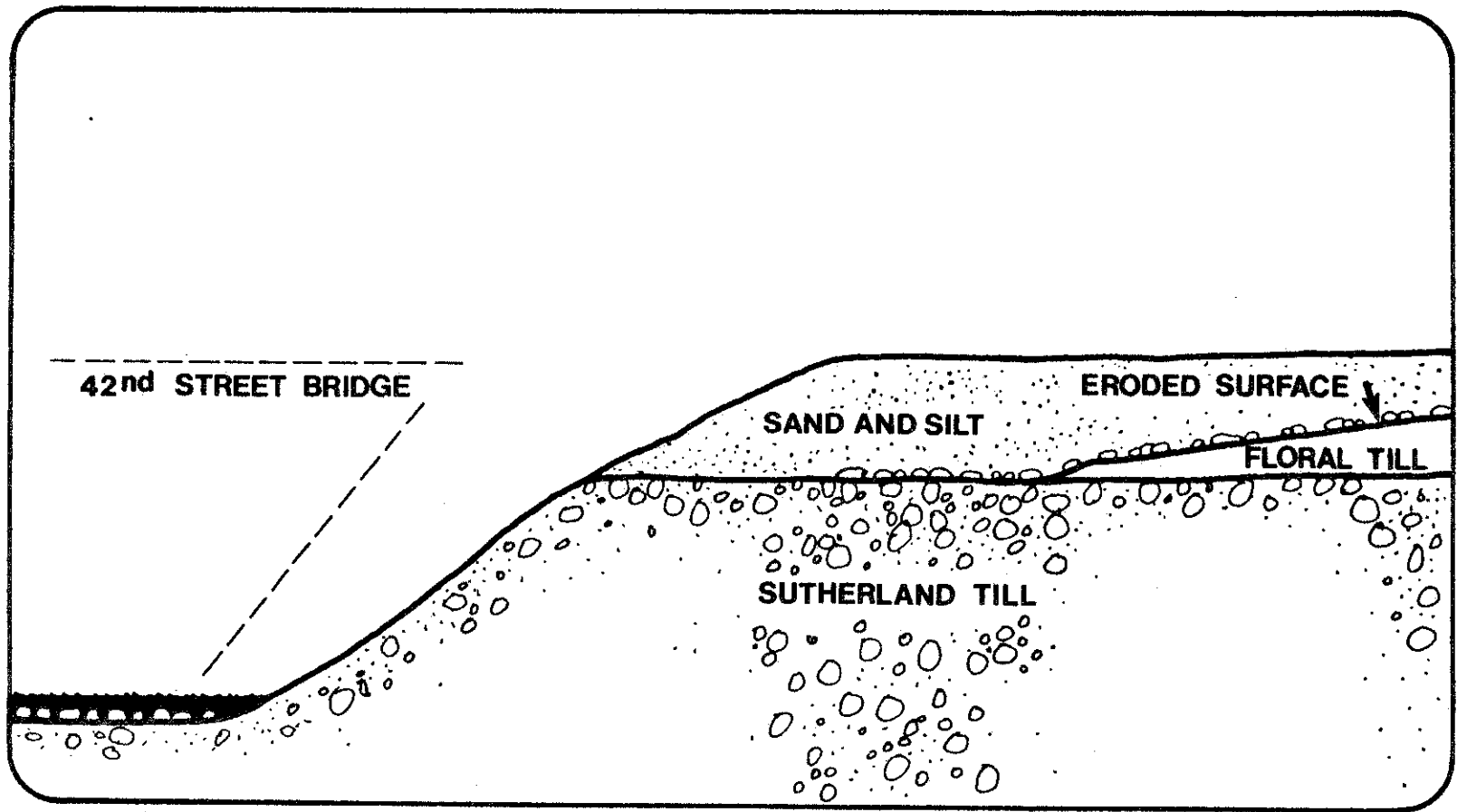


FIGURE 7      CONCEPTUAL STRATIGRAPHY - 42ND STREET BRIDGE SITE

ional terrace developed on the inside bend of the river.

Riverbank instability is not a problem in this area. The major geotechnical consideration is the sensitivity of the surficial non-cohesive soils which may become a problem if large areas are stripped of the surficial organic and vegetative protection. The possibility of salinization of the soil which may result from irrigation on the University test plots should be further investigated.

#### d) Sutherland North

The surficial landform in this portion of the study area is an eroded till plain. In the area of the Regional Psychiatric Centre, the sheet-type erosion has left behind a lag of gravel and boulders on the ground surface. Very little deposition of gravel and sand occurred subsequent to the erosion resulting in an armouring of boulders which covers the undulating till surface. It is generally very rough and rocky. In the area of Peturrson's Ravine the erosion was followed by a deposition of sand and gravel over the eroded till surface.

The eroded stratigraphic contact is underlain by an extensive inter-till sand deposit known as the Forestry Farm Aquifer. Sands and gravels of the Forestry Farm Aquifer in turn overlie the till of the Sutherland Group. This contact outcrops on the riverbank above the river level. This aquifer is of a relatively large regional extent and is recharged by surficial infiltration in the uplands to the east of the area. Groundwater discharge from this aquifer onto the riverbank and subsequently into the South Saskatchewan River, is occurring

along the entire reach of the riverbank in this area. Although this groundwater discharge is occurring to some extent along the entire length of the river bank, two very dramatic piping failures have developed, namely Peturrson's Ravine and a second piping failure south of Peturrson's Ravine adjacent to the Regional Psychiatric Centre.

Foundation conditions are generally good in the area and are suitable for intensive or heavily-loaded development. Grading and earthworks can be somewhat difficult due to the concentration of boulders, the sand deposits and the groundwater regime which exists in the Forestry Farm Aquifer. Major development may be considered for this area provided that the geotechnical implications of the above items are considered in detail for any proposed development and the implications of groundwater control are incorporated into the development design.

No major geotechnical restrictions on landscaping exist along the river bank with the exception of the major piping failures. Peturrson's Ravine is a significant geologic feature and offers a very unique environment for study. It is very possible that the University of Saskatchewan landfill operation, located immediately to the east of the head of the ravine, is contaminating the groundwater regime. Pollutants originating at this landfill operation can potentially very easily enter the groundwater system and be transported to the river. An early assessment of this operation is required. Cleanup operations should begin at the earliest possible date to prevent further fouling which may require several decades to flush from the natural environment.

Considerable dumping of rubble and garbage has occurred in and around Peturrson's Ravine over the

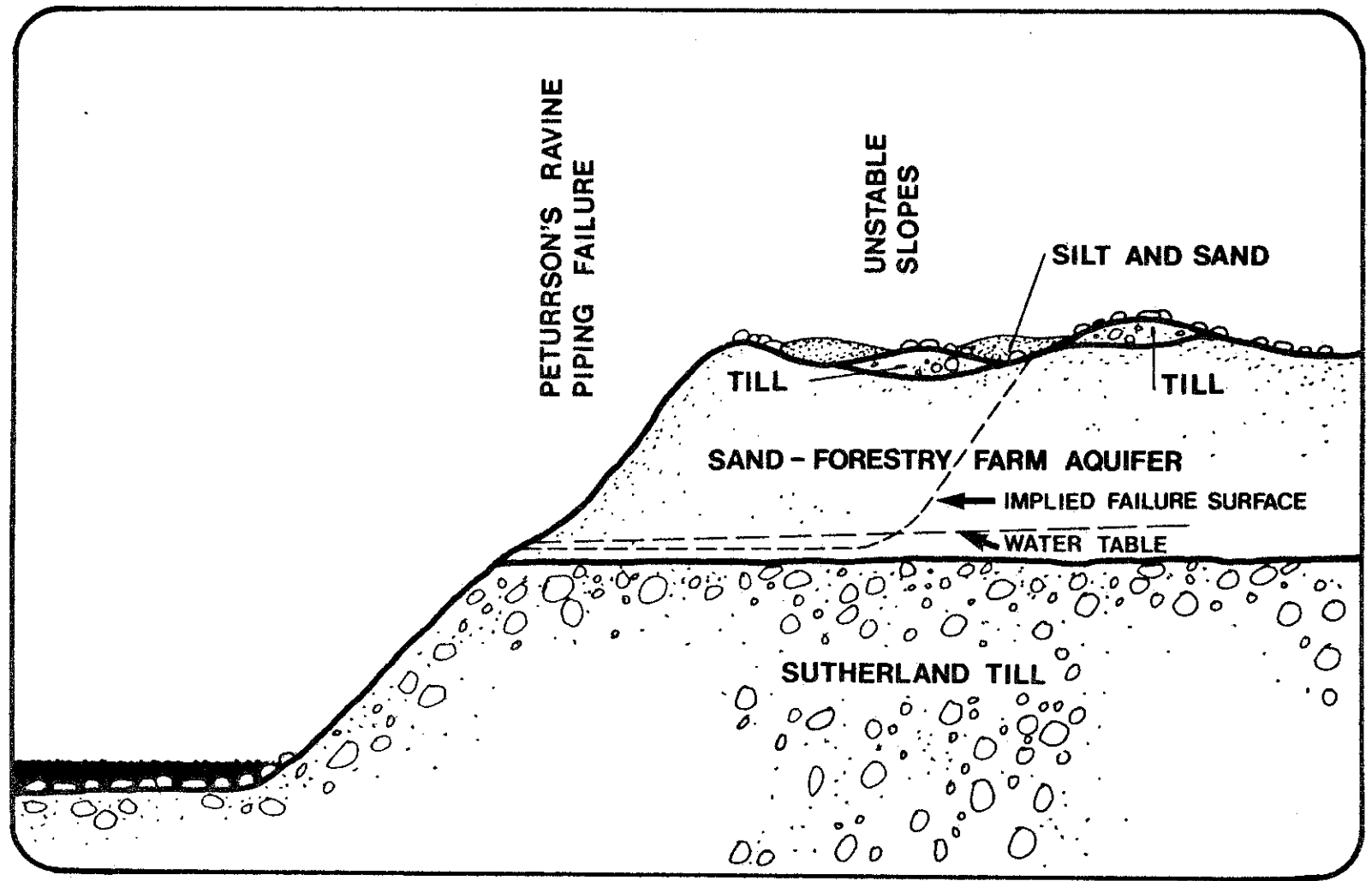


FIGURE 8 CONCEPTUAL STRATIGRAPHY - PETURRSON'S RAVINE AREA



past few years. However, infilling of the Ravine is not recommended; nor does it appear feasible.

#### e) River Morphology

The South Saskatchewan River has downcut into competent glacial till throughout the study area; however, two distinct river bottom conditions have developed. Following the rapid downcutting which accompanied the drainage of glacial Lake Saskatoon, erosion of the river bottom was halted by the development of a boulder pavement and heavily armoured river bed. This condition has been maintained in the river below the weir. Downstream from the weir, the river is relatively shallow and the base consists of a very dense layer of relatively large sized boulders. This extensive boulder cover coupled with relatively shallow water depth make it extremely hazardous for use by motorized water craft. Following construction of the wier, that portion of the river upstream from the weir, was changed to a depositional environment and a varying thickness of silt and sand has effectively masked the boulders. The environment is very dynamic and considerable shifting of the sand and silt at the river base occurs, as can be noted by the ever-changing configuration of the sand bars. However, the alteration of the river bed in this fashion has resulted in a stretch of river that is suited for use by both motorized and non-motorized water craft without serious danger of damage to the craft. The shifting sand bars and fluctuating water levels may pose a nuisance.

## 1.3 Ecological Analysis

### 1.3.1. VEGETATION (Map 6)

#### a) Vegetation Zones

##### i) Flood Zone

The flood zone is found along the shore of the river where spring floods and ice scouring kill back woody perennials every year. Cottonwood (Populus deltoides), sandbar willow (Salix interior), and yellow willow (Salix lutea) are found in the short sprout stage.

The wide gravel bar at Sutherland Beach is a prominent example of the flood zone. Silt deposits between the rocks provide fertile substrates for the establishment of plants. These nooks are protected from the spring and summer flood peaks so that many low species are able to invade. These species include several annuals such as white sweet-clover (Melilotus alba), stinkweed (Thlapsi arvense), and doorweed (Polygonum aviculare). A rich variety of annuals is a distinguishing feature of annually flooded fertile substrates. Perennials such as Indian hemp (Apocynum sibiricum), foxtail (Hordeum jubatum), and couch grass (Agropyron repens) are found interspersed among the annuals and sprouts of woody species.

In late summer, the gravel bar becomes dry and the herbs die of drought on the coarse-textured soil. The sprouts of woody species have deeper roots which enable them to obtain moisture so that they can survive until spring.

In deeper swales of the gravel bar, where shallow

pools of water may persist over the major part of the summer, spike-rushes (Elocharis palustris and E. acicularis) and sedges (Carex spp.) dominate.

In the flood zone, succession is set back to the beginning every spring. Therefore, this zone is kept in early of successional stages.

## ii) Willow Zone

The willow zone occurs in places that are frequently flooded including the lower slopes and terraces of the riverbanks and the edges of sloughs. Along the river, there is generally a narrow band of sandbar willow at the edge of the flood zone. Cottonwood, balsam poplar (Populus balsamifera), and yellow willow saplings are often associated with the sandbar willow. Examples of herbs in the understorey are goldenrod (Solidago spp.), brome grass (Bromus inermis), wild licorice (Glycyrrhiza lepidota), and marsh horsetail (Equisetum palustre).

There are sloughs in the channel scar area north of the Forestry Farm. Willows are found around the edge of these sloughs. The species of willows and understorey herbs there have not been investigated.

## iii) Shrub Tree Zone

The shrub-tree zone is found on the mid and upper slopes of the riverbank. These locations are more elevated than the lower slope and are therefore, infrequently flooded.

In the shrub-tree zone, the shrubs are dominant. Tall trees protrude from the dense shrub cover in a scattered distribution. There is generally a transition from red-osier dogwood (Cornus

stolonifera) and wolf willow (Elaeagnus commutata) on the mid slope to choke cherry (Prunus virginiana) and saskatoon (Amelanchier alnifolia) on the upper slope. The yellow willow, which is a tall shrub when full grown, can be seen scattered amongst the dogwood and wilf willow on the mid slope. Rose (Rosa spp.) and snowberry (Symphoricarpos spp.) form a low shrub layer on both the mid and upper slopes.

Balsam poplars and cottonwood trees are generally found on the mid slope. River birch (Betula fontinalis) and white birch (Betula papyrifera) trees occur there as well but in fewer numbers. However, the birch trees are abundant at the north end of Cosmopolitan Park because they are suited to the unstable slopes that exist there as a result of groundwater seepage.

Manitoba maple (Acer negundo) and green ash (Fraxinus pennsylvanica) saplings and trees are found scattered on the upper slope. They have shade tolerant seedlings that are capable of growing up through the dense shrub layers there.

Herbs present in the shrub-tree zone include blunt-leaved sandwort (Arenaria lateriflora), veiny meadow-rue (Thalictrum venulosum), and American vetch (Vicia americana) on the mid slope. On the upper slope, northern bedstraw (Galium boreale), western Canada violet (Viola rugulosa), and American vetch are found.

In addition to the natural species of shrubs found along the river bank, other species have escaped from nearby plantings. Escaped shrub species that have been seen in the shrub-tree zone include caragana, honeysuckle, and lilac. These shrubs have been seen west of the Simpkins Farmstead and in Cosmopolitan Park.

At Sutherland beach, the river bank is terraced. The low terrace is in the willow zone. The mid terrace corresponds to the wolf willow-red-osier dogwood association as described for the mid slope. The upper terrace corresponds to the saskatoon-choke cherry association as described for the upper slope.

#### iv) Tree Clump Zone

In the tree clump zone, trees are abundant and dominate the shrub layer, if indeed a shrub layer exists at all. Overstoreys in this zone are of three main types:

- i) trembling aspen in clumps north of the Forestry Farm;
- ii) green ash and Manitoba maple in the clump lying between the Simpkins farmstead and Sutherland Beach;
- iii) Manitoba maple in the clump at Cosmopolitan Park.

Understorey species in the tree clump zone have not been investigated.

#### v) Planted Clump Zone

This vegetation zone includes the hedgerows, spruce rows in the Simpkins farmstead area; all plantings in the Forestry Farm; and the various plantings on the University Campus, in Cosmopolitan Park and in Rotary Park.

#### vi) Prairie-Disturbed Zone

The prairie and disturbed areas have been included together in one zone. Field work is required to

outline exactly which areas have been disturbed and recolonized and which areas are natural prairie. It is probable that parts of the upland adjacent to the University of Saskatchewan property and within the East Bank Study Area are natural prairie.

According to Rowe (1980), a small area of natural grassland appears to have persisted a few yards north of the CPR bridge with a normal species spectrum and composition. The principal grasses include western porcupine grass (Stipa spartea var. curtiseta), spear grass (Stipa comata), green needle grass (Stipa viridula), northern wheatgrass (Agropyron dasystachyum) western wheatgrass (Agropyron smithii), brome grass (Bromis inermis), and Kentucky bluegrass (Poa pretensis).

In the channel scar, north of the Forestry Farm, there is a good example of fescue grassland. Rough fescue (Festuca scabrella) is common there. Parts of this area were probably disturbed when dolomite boulders were removed to be used for building stone (Hudson pers. comm.).

Shrubs are found scattered and in clumps in the prairie-disturbed zone. The most common of these are rose and snowberry. In areas of this zone, north of the CPR bridge and south of the Regional Psychiatric Centre, small circular depressions have been found which are inhabited by snowberry clumps. An explanation for these depressions has been offered by Wright (pers. comm.). They were originally thought to be buffalo wallows, and were therefore called bovarsenations (the American buffalo is a member of the family Bovidae). However, presently there is a different theory to explain the formation of bovarsenations. It is theorized that glacial erratics or boulders were buried just beneath the surface. The thin layer of soil above the erratic was unable to retain

moisture, and in periods of drought, the plants growing in this soil died and no longer held the soil together. As a result of wind erosion, a blow-out would form over top of the erratic. The elimination of the prairie herbs in the blow-out would allow the snowberry to move in.

#### vii) Coulee Zone

The slopes of the coulees have vegetation similar to that in the shrub-tree zone, although the vegetation in the coulee bottoms varies.

At the bottom of the coulees at Devils Dip and Ski Jump Hill, there are pools of water with cattails (Typha latifolia) and willows. The pool in the Ski Jump Hill coulee is brackish and there are a number of halophytic species present, such as sea-milkwort (Glaux maritima), three-square bulrush (Scirpus americanus), and seaside arrow-grass (Triglochin maritima).

The coulee at Sutherland beach appears to be completely full of shrub-tree vegetation.

The bottom of Peturrson's Ravine has been described as a high lime marl bog (Hudson, pers. com.). It has not been investigated to determine the common species; however, the dwarf bullrush (Scirpus pumilus) has been seen there by Hudson.

#### b) Rare Plants

An indication of plants that are rare or at their geographical limits, and that could be found in the East Bank Study area was obtained from Hudson (pers. comm.) and Rowe (1980). The original field work from which this information came was done before 1975. Therefore,

additional field work would be necessary to determine if these plants are still there or if they can be found at other locations as well within the study area.

In the vicinity of Ski Jump Hill, in the prairie-disturbed zone, there is a rich flora of herbs that are near the northern-most region of their range. They are the following:

two-grooved milk-vetch (Astragalus bisulcatus)  
cushion milk-vetch (Astragalus gilviflorus)  
narrow-leaved milk-vetch (Astragalus pectinatus)  
loose-flowered milk-vetch (Astragalus tenellus)  
yellow umbrellaplant (Eriogonum flavum)  
winterfat (Eurotia lanata)  
Nuttall's atriplex (Atriplex nuttalli)  
Colorado rubberweed (Hymenoxys richardsonii)

Also near the northern limits of their range and occurring in the prairie-disturbed zone north of the CPR bridge are the following:

linear-leaved wormwood (Artemisia dracunculus)  
common broomweed (Gutierrezia sarothrae)

The carrionflower (Smilax herbacea) has been seen in the shrub-tree zone in Cosmopolitan Park where it is near the north edge of its range.

The dwarf bulrush has been seen in the high lime marl bog at Peturrson's Ravine. It is included on the list of rare vascular plants of Saskatchewan (Maher et al, 1979).

The red bullrush (Scirpus rufus), which is also on the list of rare Saskatchewan plants, has been found at a saline spring south of Peturrson's Ravine. Two other plants which are not on the list but are relatively rare have been seen in the same general

area of this spring. They are the few-flowered aster (Aster pauciflorus) and the marsh felwort (Lomatogonium rotatum).

### 1.3.2. WILDLIFE

#### a) Birds

Bird enthusiasts have been active in a few areas of the East Bank Study and a fairly complete inventory is available. Of the 240 species on the Saskatoon bird list (Gollop and Johns 1977), over 150 can be observed in or from the East Bank Study area.

Cosmopolitan Park, especially the north area, and the Forestry Farm are the best areas in Saskatoon for observing vireos, warblers, and sparrows.

The Simpkins farmstead area and the Forestry Farm are the best locations for birding in the winter. Crossbills and grosbeaks are attracted to the coniferous trees that are found there. Great-horned hawk, and saw-whet owls have been seen at the Simpkins farmstead in the winter.

A location on the riverbank overlooking the weir provides a good opportunity for observing waterfowl. Cooling water from the Queen Elizabeth Generating Station prevents ice from forming on the river and common goldeneye can often be seen at the weir in the winter. There are often concentrations of gulls at the weir and pelicans have been seen feeding there as well.

The channel scar area, north of the Forestry Farm, is good for observing grassland birds such as meadowlarks and grassland sparrows such as the Baird's, savannah, and clay-coloured.

Saskatoon has a permanent resident population of merlins which is unusual in a city. Merlin nests have been found in the Forestry Farm and the Simpkins farmstead area.

There is not much known about the birds in the Sutherland beach area as it is privately owned and birders therefore do not frequently visit the area.

#### b) Mammals

Neal and Jones (pers. comm.) prepared a list of mammals for the East Bank Study Area. Godwin and Polson (pers. comm.) provided some additional information on the mammals.

Of 28 species on the mammal list, 19 have been trapped or observed in the study area. They include the masked shrew, least weasel, long-tailed weasel, striped skunk, white-tailed jack rabbit, snowshoe rabbit, woodchuck, Richardson's ground squirrel, thirteen-lined ground squirrel, Franklin's ground squirrel, least chipmunk, red squirrel, deer mouse, Gapper's red-backed mouse, meadow vole, norway rat, and house mouse. Beaver and muskrat have also been seen along the river, and beaver lodges can be seen from the bank.

There are four small mammals which have not been seen or trapped in the study area but are very likely to be there. These are the short-tailed shrew, northern pocket gopher, prairie vole, and meadow jumping mouse.

There are five species of mammals that may be observed from time to time as transients in the study area. They are the red fox, coyote, badger, porcupine, and white-tailed deer. The channel scar that stretches from northeast of the city into the

north end of the study area is not arable land. Thus, it has been left as natural habitat which provides a corridor that draws transient mammals into the city.

#### c) Fish Ladder

There is a fish ladder built into the east end of the weir. It is presently blocked with rock and not working. However, when it was operating, three species of suckers could be seen migrating through it during the spring spawning run (Godwin and Polson, pers. comm.).

#### 1.3.3. RESEARCH REQUIRED

No original research is being carried out for this study. Gaps in the information that is presently available are as follows:

- a) Although presently there are many plants known to occur in the East Bank study area, the list in Appendix 3, is not complete. There are plants in the Fraser Herbarium at the University of Saskatchewan that have been collected on the riverbank but the locations given on the labels are too general to determine if they were taken from the study area. The species composition needs to be investigated in the following areas:
  - Peturrson's Ravine
  - the understorey layers in the tree clumps
  - the willow zones of the sloughs
  - the Fescue grassland in the channel scar
- b) It is necessary to check that the rare plants that were seen in the study area before 1975 are still there.

- c) Field work is necessary to outline which areas are natural prairie and which areas are disturbed in the prairie-disturbed zone.
- d) Field work is necessary to determine whether or not the five species of mammals which are considered likely to be in the area are actually there.
- e) No information is presently available on the abundance and distribution of mammals in the study area.
- f) The reptiles, amphibians, and invertebrates have not been investigated.
- g) There is not much known about the birds in the Sutherland beach area as it is privately owned.

#### 1.3.4. KEY AREAS FOR NATURE INTERPRETATION AND/OR PRESERVATION

##### a) Areas Used by University Ecology Classes

The key areas that have been used regularly by the University of Saskatchewan Ecology classes and would therefore be worthy of preservation are:

- Cosmopolitan Park
- Devil's Dip
- the coulee near Ski Jump Hill
- Sutherland Beach
- Peturrson's Ravine

##### b) Birding Areas

In order for Cosmopolitan Park to remain as one of the best birding areas in Saskatoon, it should be disturbed as little as possible.

The Forestry Farm and any viewpoint overlooking the weir are very good birding areas that should be easy to maintain as such.

The Simpkins farmstead area is another good location for birding although the construction of the Circle Drive extension and the 42nd Street bridge has removed a large piece of it.

#### c) Natural Prairie

Any areas of natural prairie that can be identified in the study are worthy of preservation. There is not much natural prairie left in North America.

#### d) Ski Jump Viewpoint

A viewpoint from a high spot on the bank near the old Ski Jump would be a good place for interpretation. Messages that could be interpreted there include:

- formation and vegetation of the island that is forming in the river below the viewpoint
- the juniper-saskatoon rust cycle on the riverbank
- the birds at the weir

#### e) Sutherland Beach

The terraces at Sutherland Beach provide a good location for the interpretation of the relationships between elevation above the water level, the frequency of flooding and vegetation. As there is an abundance of natural habitat there, the area would probably be good for viewing wildlife if public access were provided.

#### f) Channel Scar

The channel scar area north of the Forestry Farm is valuable for interpretation and preservation because:

- it is a good example of Fescue grassland
- it provides good habitat for grassland birds
- it is part of a corridor through which wildlife is drawn into the city providing opportunities for viewing by city residents.

## 1.4 Land Use (Map 7)

Land uses in and near the study area represent a broad cross-section of urban, industrial, rural and natural occupations.

Significant urban uses include the following:

- RESIDENTIAL - Nutana, City Park, North Park, Richmond Heights, River Heights, Lawson Heights and Forest Grove.
  - existing and proposed high density developments in the vicinity of Broadway and Victoria Bridges.
  - future residential areas west of the Forestry Farm.
- COMMERCIAL - proposed South Downtown Core
  - Saskatoon C.B.D.
  - future commercial area in the vicinity of the Forestry Farm
- INSTITUTIONAL - Nutana Collegiate
  - Victoria School
  - University of Saskatchewan
  - Innovation Place
- RECREATIONAL - Rotary Park
  - Cosmopolitan Park
  - Friendship Park
  - Kiwanis Park
  - Kinsmen Park
  - Meewasin Park
  - Forestry Farm Park
  - Archibald Park
  - tennis courts near Victoria Bridge
  - undeveloped open space along both riverbanks

Industrial uses include:

- WASTE DISPOSAL - sewage lagoons
  - garbage dump
- TRANSPORTATION - all existing roads and bridges
  - C.P. Rail line
  - boat launch
  - Circle Drive extension
  - 42nd Street Bridge
  - future Sutherland arterial connection to Circle Drive extension
- EXTRACTION - borrow pits in northern portion of study area

There are a number of rural land use categories represented in and around the study area, including:

- CULTIVATED FARMLAND - irrigated and non-irrigated
- ABANDONED FARMLAND
- FARMSTEADS - occupied and abandoned
- LIVESTOCK OPERATIONS - U. of S. Experimental Feedlot and R.O.P. Unit
- AGRICULTURAL RESEARCH - Agriculture Canada Research Station.

A few areas remain in a relatively natural state, including the north end of Cosmopolitan Park and some stretches of the riverbank in the vicinity of Sutherland Beach and Peturrson's Ravine.



## 1.5 Circulation & Access (Map 8)

In this portion of the analysis, existing circulation patterns within the study area and major points of access into the study area were identified.

As Rotary Park has undergone significant development in the past, pedestrian circulation is relatively unrestricted. However, an informal trail has been created by visitors along the riverbank. Pedestrian entry points to Rotary Park are located at the Idylwyld Bridge (both from the bridge and under the bridge from the west) and at the Victoria Bridge. A major vehicle access point has been developed from Saskatchewan Crescent to the Rotary Park parking lot.

Between the Victoria and Broadway Bridges, pedestrians can follow a parking lot ramp up the hill from the tennis courts to Cosmopolitan Park. A minor vehicle access point exists at the tennis court parking lot.

In Cosmopolitan Park, pedestrians follow, for the most part, two trails; one along the terrace between Saskatchewan Crescent and the riverbank, and one near the toe of the slope along the riverbank. A number of short, steep trails connect these two major circulation routes. Several pedestrian entry points are to be found in Cosmo Park; one at each of the Broadway and University Bridges, and a number along Saskatchewan Crescent.

From the University Bridge to Devil's Dip, a single trail follows the top of the bank.

At Devil's Dip, pedestrians can either continue north along this upper trail or follow a lower trail along the riverbank to the C.P. Bridge. The upper and lower trails are connected by short, steep trails, which cut down the slope in places. Two minor vehicle access points are located in the campus area. The first is at Diefenbaker Centre, where a parking lot is available to the public. The second is just north of Ski Jump Hill, where a dirt road extends in from North Road on the campus. A pedestrian entry point is located at the east end of the C.P. Rail Bridge, which also serves as a pedestrian crossing.

Between the C.P. Bridge and the site of the proposed 42nd Street Bridge, a single trail again follows the top of the bank. Pedestrians and cyclists will be able to enter the study area from walkways on the 42nd Street Bridge.

The area between the 42nd Street Bridge and the U. of S. Feedlot is criss-crossed by a web of trails. A major vehicle access point has been identified at the north end of Preston Avenue, west of the Feedlot.

From Sutherland Beach east and north to Peturrson's Ravine, a single trail, in places very poorly developed, follows the riverbank and, in places, top of bank. It passes a pedestrian access point at the site of the proposed footbridge from the Meewasin Park Activity Centre. At Peturrson's Ravine, this trail joins a network of trails which wind in and around the ravine. A minor vehicle access point is situated along Central Avenue, just south of the ravine. A second minor vehicle entry point is located on Central Avenue at the City Limit. Further north, another proposed footbridge from Meewasin Park could provide pedestrian access into the study area.

Trail connections between the river and Forestry Farm are, at present, poorly developed. However, it is known that a cross-country ski circuit has been laid out from the Forestry Farm to Peturrson's Ravine and north along the top of bank to the City Limit (personal communication, J. Sonderhausen, January 1981). In addition, an intricate network of pedestrian circulation routes has been developed within the Forestry Farm. A major vehicle entry point presently exists at the main entrance of the Forestry Farm. Finally, one minor vehicle entry point has been identified at the extreme northeast corner of the study area.

## 1.6 Land Ownership (Map 10)

There are two major owners of lands within the study area: the City of Saskatoon and the University of Saskatchewan. There are, however, three large areas and one small area which are under private ownership. The three large areas may be described as follows:

1. All of the northeast quarter, Section 12, Township 37, Range 5 W3M (north of the Forestry Farm);
2. That portion of the northeast quarter, Section 11, Township 37, Range 5 W3M; lying east of the South Saskatchewan River (Peturrson's Ravine area); and
3. That portion of the northeast quarter, Section 3, Township 37, Range 5 W3M lying east of the South Saskatchewan River (excluding those lands acquired by the City of Saskatoon for the Circle Drive extension right-of-way) (Sutherland Beach area).

The single small area of patent land is that portion of the C.P. Rail right-of-way which passes through the study area.

## 1.7 Historical Resources (Map 11)

The Saskatoon Heritage Society has identified twelve significant historic sites within the East Bank Study Area. In addition, a number of sites are located in close proximity to the study area.

This section is devoted to a discussion of some of these sites. An attempt has been made to work through the study area from south to north, rather than discuss the historic sites in chronological order.

The site of the first sawmill in Saskatoon (ca. 1883) has not been specifically identified. However, it is believed to be either at the north end of Lorne Avenue or at the foot of 11th Street, just west of the study area. Timber for this sawmill was floated downstream from Medicine Hat, and was processed into lumber used for the first houses in Saskatoon. The house still standing at 326 11th Street (Riel Rebellion Hospital) was built of lumber from this sawmill. The mill itself was relatively short-lived, as it had disappeared by 1899 when the first railway bridge was built across the river at the foot of McPherson Avenue.

Within Rotary Park are three sites of significance, two of which are related to river transportation. Approximately half-way between the Idylwyld and Victoria Bridges is the site where river steamers stopped and moored during their stays in Saskatoon. Just downstream of this point is the site of the second ferry crossing in Saskatoon. The third historic site in Rotary Park is the Sylvite Monument, dedicated to the three major natural resources in Saskatchewan: potash, oil and wheat.

According to John Duerkop (President, Saskatoon Heritage Society), the Victoria Bridge is the second most important historic feature in Saskatoon (second only to the Riel Rebellion Hospital on 11th Street). Built in 1906-07, the "traffic bridge" was the first bridge in the city not constructed for railway crossing of the river. It is interesting to note however, that the Province and City were, in 1915, still attempting to acquire land for the approach to the bridge (Saskatoon Star-Phoenix, September 4, 1980).

Moving north, the next significant historic feature in the study area is the Broadway Bridge. Built in 1933-35, this bridge was the third traffic bridge in the city.

In Cosmopolitan Park, there are two sites of significance, both relating to the settlement history of Saskatoon. The first is the Pioneer Cairn, erected in 1952 by the Saskatoon Oldtimers Association "in memory of Saskatoon Pioneers of 1882". Approximately 60 metres east of the Cairn is the site of the first habitation in Saskatoon. Less a "house" than a "pit with a sod roof", this dwelling was occupied by Messrs. Pugsley and Kahn in 1882.

The second bridge in the city was built in 1916, connecting College Drive in the east with 25th Street in the west. Much of the design input for the University Bridge came from the University of Saskatchewan Engineering Department. As late as 1914, construction of the University Bridge was in considerable doubt. Although the South Saskatchewan River was not considered a viable transportation route, the government felt obligated to "protect the stream against the day when the density of population and the consequent heavier traffic would lend the people of northern and central Saskatchewan to seek a cheaper route by water" (Saskatoon Star-Phoenix, September 4, 1980). There was a belief that, with channel improvements and construction of locks, it would be possible to transport goods and people from Saskatoon, along the Saskatchewan River, to Lake Winnipeg and up the Red River to the City of Winnipeg.

The introduction, in 1908, of the University Act in Saskatchewan was followed a year later by the purchase of a site for the University of Saskatchewan, on the east bank of the river and, in 1910, by the laying of the cornerstone for the first building

by Sir Wilfred Laurier. Since then, numerous buildings have been constructed on the campus, and development is continuing.

Of recent and national significance was the construction of the Diefenbaker Centre. Situated immediately west of the building are the graves of the Right Honourable John George Diefenbaker and his wife Olive.

Among the more significant features, from an historical perspective, on campus are the Memorial Gates, dedicated May 3, 1928. Not only are the gates an important memorial, they also happen to sit precisely on the alignment of the old Batoche Trail. This trail followed the present alignment of University Drive, through the present University campus, north through the channel scar area to the north and west of the Forestry Farm, and on to Clark's Crossing and Batoche. It may be that some evidence of the Batoche Trail still exists in the northern portion of the study area.

North of the main campus, a weir acts to raise river levels in the downtown area. Contrary to popular belief, the weir was not built for this purpose. Rather it was simply a 'make-work' project during the Great Depression (J. Duerkop, personal communication, December 19, 1980). Construction of the weir was completed in 1939.

Just upstream of the weir, a ski jump was a popular attraction for adventurous Saskatonians between 1930 and 1959. After 1959, the ski jump lay unused for at least thirteen years, when it was finally torn down. Today, the remains of rope tow machinery and the bases of the jump supports are all that mark the site of this facility. Nearby, and associated with

the ski jump, was a small chalet. Only a fireplace chimney and concrete slab remain, after the chalet was destroyed by fire in the mid 1970's.

Immediately north of the weir is the C.P. Rail bridge. Completed soon after the Grand Trunk Pacific bridge south of the city in 1908, the C.P. bridge was one part of a larger project which also included the construction of a passenger station at Avenue A (Idylwyld Drive) and 23rd Street.

Prior to World War I, the area now known as Sutherland Beach (north of the proposed 42nd Street Bridge) was one of a number of outlying areas proposed for development. During the period of frenzied land speculation in 1912, a number of developments were heavily promoted, including Factoria, Transcona Park, MacKenzie, Pleasant Park and Swastika Park. Unlike these areas, Poplar Point or Poplar Beach (as Sutherland Beach was then known) was not being promoted as an industrial development. Rather, it was advertised as a residential area. However, 1913 saw the end of the boom in Saskatoon, and no homes were ever built in Poplar Point or Poplar Beach.

The major historical feature in the northern portion of the study area is the Saskatoon Forestry Farm and Animal Park. This park has, over the years developed into a major recreational resource for the City of Saskatoon. Started in 1913, the Forestry Farm was officially opened in 1914, and was dedicated to the propagation and production of trees for the prairie environment. Owned and operated by the Federal Government, the Forestry Farm was laid out with landscape demonstration areas as well as with actual production and experimental plots. As the plant material grew and matured, the demonstration areas of the Farm became popular places for an afternoon stroll, for church picnics and for field days. The demand for recreational use

of the farm increased over the years, and in 1966, the site was acquired by the City of Saskatoon.

Prior to the acquisition of the Forestry Farm, overtures began in February of 1964 for the City of Saskatoon to acquire the Golden Gate Animal Farm. City Council decided to purchase the animals, birds and equipment and maintain them until facilities could be prepared at Sutherland Forestry Farm.

The animals from the Golden Gate Animal Farm were eventually moved to the Forestry Farm Park site and the new Animal Park was opened in 1972. Since then, the emphasis of the Park has shifted from that of a tree farm to that of a city park and zoo. By 1979, the Park had reached the point where a long term, co-ordinated development plan was required. Therefore, a Concept Plan, emphasizing the role of the Forestry Farm as a recreation facility (not only as a zoo), was prepared. Implementation of Phase I of this Plan is now underway.

## 1.8 Aesthetic Concerns (Map 12)

Three types of information were collected in this portion of the site analysis. They were the following:

1. The description of zones according to their visual characteristics.
2. The identification of prominent viewpoints within the study area.
3. The identification of features considered to be dominant or significant when viewed from within the study area or from other areas nearby.

Typical visual environments ranged from the relatively pristine wooded areas near Sutherland Beach and in Cosmopolitan Park, to the highly-developed, highly maintained green spaces of Rotary Park and the U. of S. Campus.

A number of prominent viewpoints were identified along the river. It is interesting to note that not all of these viewpoints are situated on uplands, where the views are down over the river. At certain locations, viewpoints are right at river level, where the views are quite spectacular both upstream and downstream, and where the bridges play a major role in framing views.

Dominant visual features include all bridges in the study area, as well as the weir. In addition, a number of large buildings in the vicinity of the Victoria Bridge and on the U. of S. Campus dominate the landscape. Other dominant features include the Regional Psychiatric Centre, the Psychiatric Centre

pipng failure and a major storm sewer outfall located northeast of the U. of S. Feedlot.

Less dominant, but still significant, are a number of features including the proposed condominiums near the Broadway Bridge, the Diefenbaker Centre, the Circle Drive extension, the landfill in the north end of the study area, and the U. of S. Feedlot. The Feedlot is significant not only in visual terms, but also in terms of odours which emanate from this facility for a short period of time each spring.

## 1.9 Synthesis (Map 13)

The preceding sections in this site analysis have each discussed a single set of environmental parameters. In an attempt to synthesize the information collected, a map entitled 'Noteworthy Features' was compiled. This map is a composite of all basic inventory maps, in that all 'key' or important, features and areas from these maps were transferred to the synthesis map. Fourteen such noteworthy features were identified and delineated. The rationale for their selection as noteworthy features is summarized in Table 1.

In addition, based on the site inventory and analysis, and on input from interested people and groups, it was possible to rate the 'flexibility' of these fourteen features, in terms of their amenability to being treated in a variety of fashions within conceptual plans and the final Master Plan.

Five of the fourteen noteworthy features were determined to be relatively inflexible; that is, they could be treated in only one fashion in all conceptual plans and, ultimately, in the final Master Plan. These five inflexible features are the following:

1. Forestry Farm Park - the Park is to appear (in any plans for the East Bank Study Area) as proposed in the Forestry Farm Development Plan, completed in 1979.
2. U. of S. Landfill - this facility will be indicated as shut down and cleaned up.
3. Sewage Lagoons - this U. of S. research facility is to be retained.

4. Regional Psychiatric Centre - this institution will be retained in its present form.
5. North portion of Cosmo Park and President's Residence Slide area - because of severe stability problems, biological significance and visual sensitivity, no development is to occur in this area.

Six of the fourteen features were deemed to have limited flexibility, in that only a very few options are open to treating them as components in an integrated system of open space along the East Bank. These features are as follows:

1. Devil's Dip - the educational role of this feature is to be maintained; this could be accomplished in a number of ways.
2. Peturrson's Ravine - although rehabilitation is considered essential, there are a few options as to how this process could be carried out.
3. U. of S. Feedlot - basically two options: either relocate this facility or retain it and integrate it into the open space.
4. 'Mendel Gallery Island' - treatment of this area should centre around its biological significance and value as an educational resource and wildlife habitat.
5. South Portion of Cosmopolitan Park - geo-technical sensitivity severely restricts options for development.

6. Victoria Bridge - the historical importance of this structure can be reinforced, but techniques for doing so are quite limited.

The final three noteworthy features in the study area were determined to be quite amenable to a variety of approaches to planning and design. In other words, they are flexible to different treatments in any conceptual plans. These three areas are Rotary Park, the Ski Jump Hill area and the Sutherland Beach area.

TABLE 1: NOTEWORTHY FEATURES							
FEATURE	VISUALLY/ AESTHETICALLY SIGNIFICANT	BIOLOGICALLY SIGNIFICANT	RESEARCH/ EDUCATIONAL VALUE	PROXIMITY TO MAJOR ACCESS POINT	HISTORICALLY SIGNIFICANT	GEOLOGICALLY SIGNIFICANT	GEOTECHNICALLY SENSITIVE
SKI JUMP HILL	●	●	●	●	●	●	
SUTHERLAND BEACH	●	●	●	●	●		
PETURRRSON'S RAVINE	●	●	●			●	●
FORESTRY FARM	●	●	●	●	●		
COSMO PARK NORTH	●	●	●				●
DEVIL'S DIP	●	●	●				
MENDEL GALLERY ISLAND	●	●	●				
ROTARY PARK	●			●	●		
COSMO PARK SOUTH	●				●		●
U. OF S. FEEDLOT	●		●	●			
VICTORIA BRIDGE	●				●		
U. OF S. LANDFILL	●						●
PSYCH CENTRE	●						
LAGOONS			●				

#### REMARKS

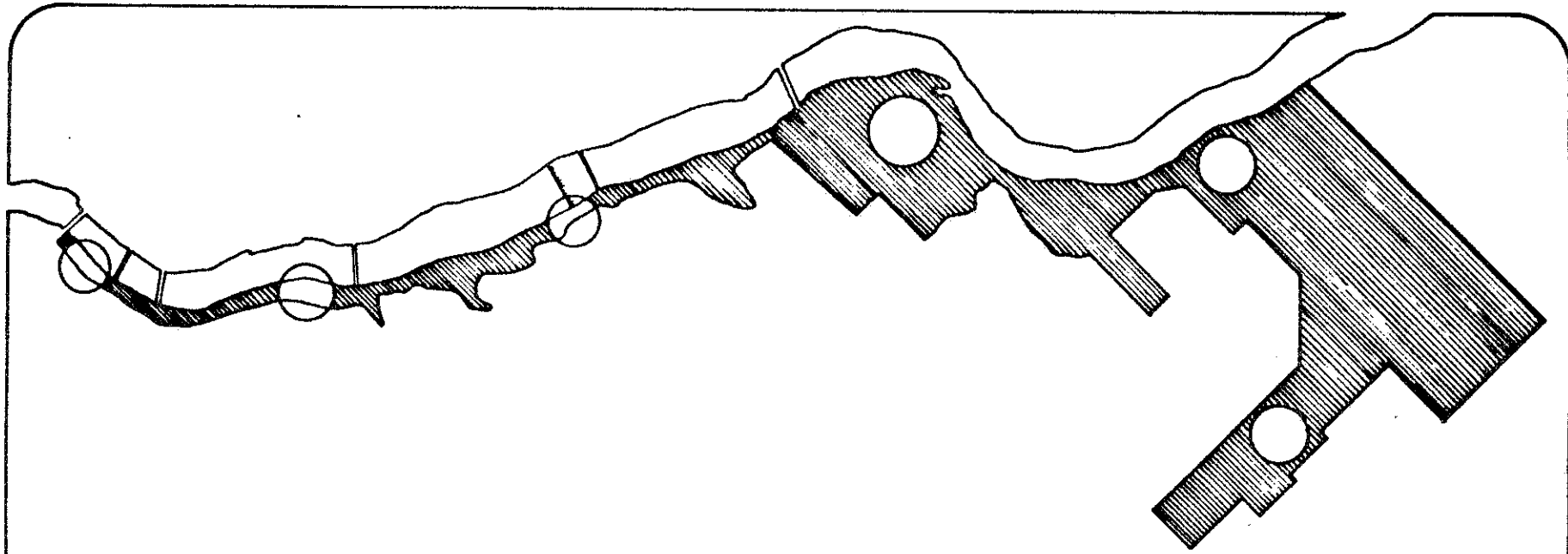
Devil's Dip could provide a link from riverbank back into U. of S. Campus.

Regional Psych Centre has specific, but not unreasonable concerns, about adjacent uses in study area.

Sewage lagoons to be retained at request of U. of S. Engineering Department.

Landfill is possible source of contamination of Forestry Farm Aquifer (and Peturrson's Ravine).





# CONCERNS AND GOALS 2

## 2. CONCERNS AND GOALS

On the basis of site inventory and analysis, and of public input received in the early stages of the study, a set of planning concerns and goals was established. It is these concerns and goals which provided general direction for conceptual designs and the final Master Plan.

### 2.1 General

- CONCERN:** A well-developed, continuous open space linkage does not presently exist along the east bank of the river in the City of Saskatoon.
- GOAL:** The Master Plan should provide for a co-ordinated circulation system and series of public open space areas throughout this portion of the City.
- CONCERN:** Open space linkages between riverbank areas and backshore areas are poorly developed.
- GOAL:** The Master Plan should indicate how such linkages may be improved. Specifically, connections in the vicinity of Rotary Park, the University of Saskatchewan main campus and the Forestry Farm Park should be examined in more detail.
- CONCERN:** There are presently no policies regarding use of the river by motorized and non-motorized watercraft.

**GOAL:** The Master Plan should include recommendations regarding control of river use by watercraft, in order to minimize conflicts between uses and to indicate suitable areas for different uses.

**CONCERN:** Major development is proposed in a number of areas along the west bank of the river across from the study area.

**GOAL:** The Master Plan should recognize the nature of these proposals and should ensure that planning proposals for the east bank are co-ordinated with them.

### 2.2 Idylwyld to Broadway

- CONCERN:** Access to Rotary Park is perceived by local residents, to be, at times, both difficult and hazardous.
- GOAL:** The Master Plan should indicate how access to Rotary Park from adjacent neighbourhoods may be improved.
- CONCERN:** The use of the Rotary Park beach area by power boaters and water skiers is perceived, by some Park users, as a nuisance.
- GOAL:** The Master Plan should indicate how this use conflict may be resolved.
- CONCERN:** The use of Rotary Park as an operating base for Northcote boat tours is perceived, by some local residents and Park users, as inappropriate.
- GOAL:** The Master Plan should indicate how this problem may be resolved.

**CONCERN:** The Victoria Bridge is considered, by the Saskatoon Heritage Society, to be the second most important historical feature in Saskatoon.

**GOAL:** The Master Plan should indicate how this significant feature might be incorporated into an overall open space design for the riverbank area.

**CONCERN:** Access from Rotary Park to Cosmopolitan Park is, at present, poorly developed.

**GOAL:** The Plan should indicate how this connection could be improved.

**CONCERN:** Rotary Park serves as a major entry point to the East Bank Study Area.

**GOAL:** Plans for further development of Rotary Park should recognize this important role.

## 2.3 Cosmopolitan Park

**CONCERNS:** Geologically, Cosmo Park is highly sensitive to any terrain disturbance.

- : Cosmo Park is considered, by local naturalists, to be one of the most important birdwatching areas in the City.
- : Because of its high visibility from the west bank, Cosmo Park is, visually, highly sensitive to any major alterations.

**GOAL:** The Master Plan will not propose any major structural development in Cosmopolitan Park.

**CONCERN:** Considerable interest has been expressed in the provision of lighted ski trails along this portion of the east bank.

**GOAL:** The Plan should address the benefits of providing such facilities, within the context of the geological, biological and visual constraints noted above.

**CONCERN:** Present connections from Cosmopolitan Park to the University of Saskatchewan are very poorly developed and hazardous.

**GOAL:** The Plan should indicate how such a connection can be developed.

## 2.4 University Campus

**CONCERN:** Devil's Dip is a significant educational resource.

**GOAL:** The Plan will recognize and maintain this role for Devil's Dip.

**CONCERN:** The area around Ski Jump Hill offers significant interpretive potential, in terms of geology, history, plant ecology and wildlife.

**GOAL:** The Master Plan should indicate development that will build upon this potential.

**CONCERN:** It is possible that part of the top of the riverbank in the campus area is unbroken natural prairie.

- GOAL:** If this is confirmed, the Plan should call for retention of this rare ecological feature.
- CONCERN:** The main campus of the University offers an already-developed area of open space, as well as several facilities and features of considerable educational and interpretive value.
- GOAL:** The Plan should indicate development along the riverbank which would complement existing development within the campus.

## 2.5 CP Bridge to 42nd Street

- CONCERN:** Existing connections across the C.P. Rail line are poorly developed.
- GOAL:** The Plan will recommend how such a linkage may be improved.
- CONCERN:** Pedestrian linkages onto and across Circle Drive have not yet been finalized.
- GOAL:** The Plan will recommend pedestrian linkages that are co-ordinated with designs for the 42nd Street Bridge, and which provide for safe and efficient access along the east bank and across the river.
- CONCERN:** Irrigation practices on University farmland may be causing salinity problems and gully erosion in one area between the C.P. and 42nd Street Bridges.

- GOAL:** The extent of these problems, and confirmation of cause should be documented, and action taken to ensure that these problems may be rectified (this is considered beyond the mandate of the East Bank Study).

## 2.6 Sutherland Beach Area

- CONCERN:** The area around the Simpkins farmstead offers significant wildlife habitat potential (especially during the winter) because of the existing hedgerows and evergreen trees.
- GOAL:** As much as possible, the existing hedgerows will be retained (outside the Circle Drive right-of-way).
- CONCERNS:** The Sutherland Beach area has the potential to support a variety of types and levels of recreation activities.
- : This area, in its present state, offers a wide spectrum of opportunities for 'exploration', 'discovery' and interpretation.
- GOAL:** The Master Plan will indicate development that will build upon the interpretive and recreational potential of the Sutherland Beach area.
- CONCERNS:** The University of Saskatchewan experimental feedlot and R.O.P. station is viewed by some local residents as a negative feature in the area. In addition, the University Department of Animal Science is sensitive about its impact on nearby neighbourhoods,

and would welcome opportunities to improve its public image.

- : The feedlot operation presents an opportunity for education and for understanding one aspect of the agriculture industry within the confines of a major urban area.

**GOAL:** The Master Plan will indicate an appropriate method for dealing with this facility, within the context of uses proposed for adjacent areas.

## 2.7 University Lands North

**CONCERN:** The University of Saskatchewan Department of Civil Engineering is desirous of maintaining its presently unused experimental sewage lagoon facility in its present location.

**GOAL:** The Master Plan should allow for retention of this facility.

**CONCERN:** The Regional Psychiatric Centre Administration has expressed concern about certain uses in close proximity to this facility.

**GOAL:** The Master Plan should recognize that certain uses and facilities are inappropriate in the vicinity of the Psychiatric Centre.

## 2.8 Peturrson's Ravine and East

**CONCERNS:** Potentially contaminated groundwater is discharging at ground surface in Peturrson's Ravine. The source of this possible contamination is a landfill operation located immediately east of the Ravine.

- : Because of its value as a learning resource, Peturrson's Ravine has, historically, been used for educational purposes.

- : The operation of a landfill is an inappropriate use within the context of any open space development and proposed residential development in its nearby areas.

- : Peturrson's Ravine offers, in a restricted area, the potential for interpretation of an interesting combination of ecosystem types.

**GOAL:** Operation of the adjacent landfill should cease immediately. The feasibility of clean-up operations, to prevent further possible groundwater contamination, should be investigated.

**CONCERN:** Portions of Peturrson's Ravine have been used, in the past, as garbage dump areas.

**GOAL:** The Plan should include a general analysis of the feasibility of various restoration processes, including the re-establishment of natural vegetation communities.

**CONCERN:** The area north and west of the Forestry Farm is of interest from the points of view of vegetation ecology, wildlife habitat and history.

**GOALS:** A link between the Forestry Farm and the river will be created through this area, in a manner which will allow for the 'current scar' (as identified by Moriyama) to be retained as a corridor for both people and wildlife.

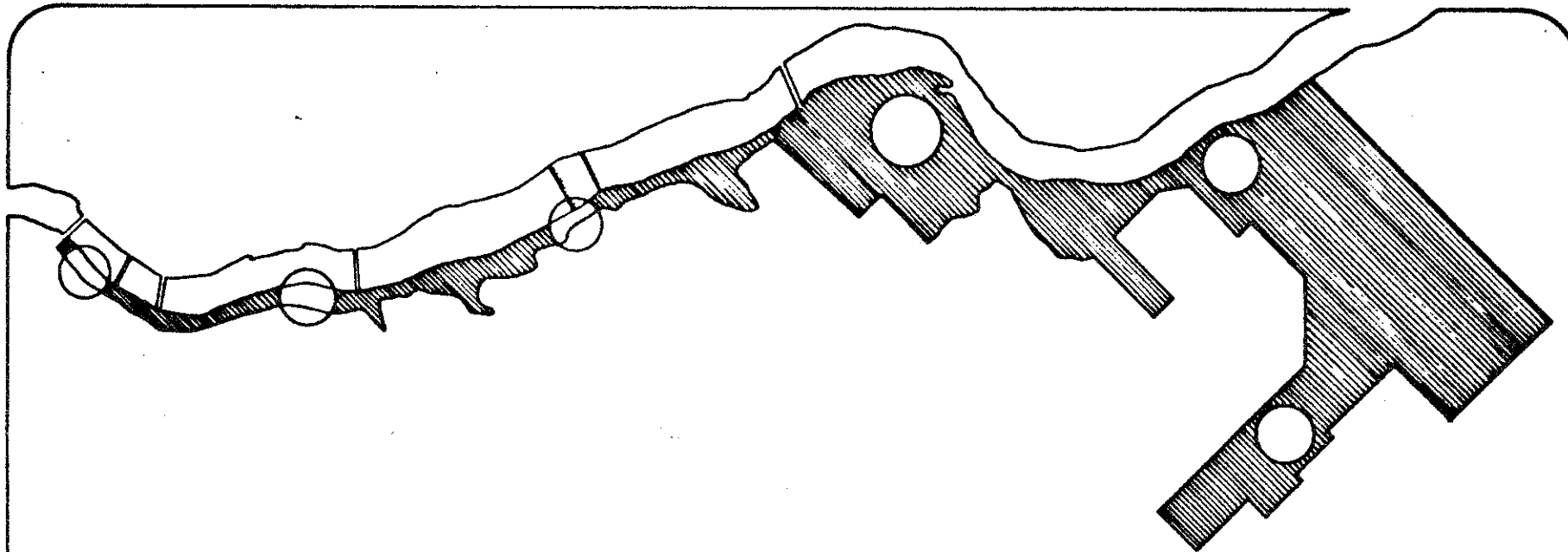
: A link to the northeast, along the channel scar, is to be retained.

**CONCERN:** A long-term development plan has been completed for the Forestry Farm Park.

**GOAL:** The East Bank Master Plan will be co-ordinated with the Forestry Farm Plan.

**CONCERN:** The Forestry Farm Park serves as a major entry point to the East Bank Study Area.

**GOAL:** Because of this role, development of the Forestry Farm should be viewed as an integral component in the creation of a continuous system of public open space on the East Bank.



**CONCEPT PLANS**

**3**

### 3. CONCEPT PLANS

In order to generate additional public response to open space development proposals along the East Bank, and to give further direction to the Design Team in the preparation of a Master Plan, three conceptual plans were compiled and presented at two 'open house' displays. Each of the three concepts represented a distinct approach to the orientation and type of proposed development in the study area, although a number of elements were common to all three.

Because of the specific motivation behind each of the three concepts, it was felt that none of the three could stand on its own as a viable Master Plan. The purpose of developing the concepts in this fashion was not to present alternatives, but rather to solicit reactions from the public and the Study Steering Committee, and on that basis, determine the most appropriate combination of elements from all three concepts to be included in the Master Plan.

#### 3.1 Common Features

Several elements remained constant within all three of the conceptual plans, including the following:

1. A continuous, developed open space linkage along the East Bank from Rotary Park to the Forestry Farm and to the northeast of the Forestry Farm.
2. Direct pedestrian access from the Victoria Bridge to Rotary Park.
3. No structural development in Cosmopolitan Park.
4. Formal public vehicle access to Rotary Park, Diefenbaker Centre, the vicinity of the weir and Ski Jump Hill, Sutherland Beach and the Forestry Farm.
5. No facility development (aside from linkage) between the C.P. Rail Bridge and the Simpkins Farmstead.
6. Retention of the University of Saskatchewan experimental sewage lagoons.
7. Residential development between Central Avenue and the Forestry Farm, northwest of the Forestry Farm, and north of the Forestry Farm.
8. Forestry Farm development as indicated in the 1979 Forestry Farm Master Plan.
9. The shut-down and clean-up of the University of Saskatchewan landfill, near the head of Peturrson's Ravine.



## 3.2 The Concepts

### 3.2.1. CONCEPT 1 - INTERPRETATION (Map 14)

In this concept, the intent was to focus proposed development around the interpretive potential of the East Bank. The theme was one of 'facilities-oriented interpretation', in which people would be able to walk through the area and learn about their environment, without the assistance of interpretive guides. This concept was based on the assumption that the interpretive headquarters for the entire Meewasin Valley Project is to be developed outside the boundaries of the East Bank Study Area; perhaps in the proposed South Downtown Core. The circulation network illustrated in this concept was based on the notion of one main linkage with smaller, secondary, interpretive trails 'looping' off the main linkage in key areas.

Within the context of 'facilities-oriented interpretation', a number of areas offer significant potential for development. These are briefly described below.

#### a) Rotary Park

##### Civic Heritage Interpretive Unit

- centred around the interpretation of the various historic features, sites and artifacts in the Rotary Park area.
- could include plaques, photographic displays, artifacts, reconstructions and features still in existence.

- visitor reception area (trailhead) located near a major park entry point, to orient visitors and introduce them to the interpretive unit.

#### b) Cosmopolitan Park

##### Birch Woods Interpretive Unit

- based upon the interpretation of geological features (landslides), slope management, vegetation communities, wildlife populations, historic sites and historical development of the downtown area across the river.
- could include plaques, explanatory signs, graphic and photographic displays.
- visitor reception area located at the northern edge of the developed portion of Cosmo Park.

#### c) University of Saskatchewan Campus

##### President's Residence Landslide

- illustrate the effects of urbanization on an unstable riverbank slope.

##### Memorial Gates

- historic significance, in terms of both a memorial to armed forces personnel and the route of the original Batoche Trail.

##### J.G. Diefenbaker Interpretive Unit

- historic interpretation (Diefenbaker Centre, Diefenbaker grave), biological significance of Devil's Dip and native prairie remnants, and remote interpretation of an island wildlife sanctuary.

- visitor reception area at the Diefenbaker Centre.

#### Ski Jump Interpretive Unit

- based on interpretation of rare plant species in the ski jump coulee, reference geological section, historic significance of the weir, ski jump and chalet, and biological significance of the fish ladder, and viewing of pelican and waterfowl visitors to the weir area.
- visitor reception area on the crest of Ski Jump Hill.

#### d) Sutherland Beach Area

##### Simpkins Farmstead Interpretive Unit

- based on interpretation of various types of horticultural displays.

##### Sutherland Beach Interpretive Unit

- potential for interpretation of geological processes, vegetative succession, river-bank ecosystems and wildlife populations.
- small interpretive centre to be incorporated into this area.

##### U. of S. Feedlot Interpretive Unit

- to be integrated with Sutherland Beach Interpretive Unit.
- centred around interpretation of agricultural technology, livestock operations, etc.

#### e) North End

##### Buffalo Wallow Interpretive Unit

- small unit centred around interpretation of bovarsinations and lichen growths.

##### Peturrson's Ravine Interpretive Unit

- based on interpretation of geological and hydrological features, vegetation communities, rare plant species and wildlife.
- development of interpretive unit would require major clean-up of Peturrson's Ravine and the possible establishment of natural restoration test plots.

##### Landfill Restoration Interpretive Unit

- interpretation of the land reclamation process at the site of the shut-down U. of S. landfill operation.

##### Aspen Grove Interpretive Unit

- developed around the interpretive potential of the fescue grassland, aspen bluff and prairie slough ecosystems, and the examples of eroded till (boulder pavement) common in the area.

### 3.2.2. CONCEPT 2 - RECREATION (Map 15)

The motivation behind this concept was the development of the East Bank for a variety of recreation activities. Although the notion of a continuous linkage along the East Bank was maintained, the form of this linkage differed significantly from that shown in Concept 1. Rather than proposing one main linkage with a series of looping trails at key areas, this concept proposed a more complex network of linkages (perhaps upper and lower trails, where space and site conditions permitted). Such a circulation system facilitates the movement of recreationists (hikers, skiers, etc.) throughout the area, without the need for back-tracking.

The major proposals for recreation-oriented development included the following:

#### a) Rotary Park

##### New Service Building

- to serve as both a changehouse and washroom facility.

##### Beach

- expanded beach area
- although swimming in the river is not considered an appropriate activity, sun-bathing and sand play is considered quite appropriate in this area.

##### Playground

- for children

##### Pavilion

- to include a small, tasteful restaurant and a skate change/warm-up facility.

##### Pond/Skating Area

- a visual attraction during the summer (perhaps also usable for wading) and a small pleasure skating area during the winter.

##### Formal Garden

- reminiscent of an 'English Garden' intensively planted; quiet and colourful.

##### Games Area

- expanding on the existing tennis courts to include outdoor volleyball, basketball, lawn bowling areas, etc.

#### b) Cosmopolitan Park

##### Picnic Area

- development of picnicking sites in the southern portion of Cosmo Park.

#### c) University of Saskatchewan Campus

##### Re-developed Bus Stop

- as a potentially major entry point for visitors to the East Bank area, this bus stop and shelter could be made to better complement the surrounding landscape (U. of S. Campus and riverbank areas).

Picnic Area

- in the vicinity of the Diefenbaker Centre
- for families who like to tour through the University Campus (existing well-developed open space) on weekends, a place to stop for a picnic along the riverbank.

Ski Centre/Summer Pavilion

- near the site of the old Chalet at Ski Jump Hill.
- a starting/stopping point for skiers during the winter; also a rest/warm-up area.
- during the summer, washrooms and perhaps a drinking fountain for cyclists, hikers and other visitors.

Terraced Fishing Platform

- at the east end of the weir.
- recognizing that fishing is a regular activity in the area, despite the fact that it is unlawful; such a facility would at least make this use considerably safer.

d) Sutherland Beach AreaGarden Plots

- in the vicinity of the Simpkins Farmstead, south of the Circle Drive extension.
- rental plots for apartment dwellers or other city residents who need land for vegetable gardening.

Picnic Area

- a large, high quality picnic area, similar (in terms of level of development) to the picnic area at the Forestry Farm.

Commercial Campground

- fully-serviced large campground for R.V.'s, trailers and tents
- would include an outdoor recreation area, indoor recreation centre, service building administration/ tourist information centre.
- this facility could support such winter activities as winter carnivals, festivals, etc.

e) North EndRegional Psychiatric Centre

- major planting programme (street tree planting) along perimeter of Psych. Centre grounds, as a visual buffer.

Peturrson's Ravine

- basic site clean-up and re-development as green space.

Riding Stables

- in the Forestry Farm Park, with equestrian trails leading to the river, then both north and south along the river.

### 3.2.3. CONCEPT 3 - INNOVATION (Map 16)

This concept illustrated some of the areas where the potential exists for some rather different, or innovative, approaches to open space development, as well as other forms of urban development. These areas are discussed below.

#### a) Rotary Park

Rotary Park development proposed in this concept is centred on the notion of complementing development within the proposed South Downtown Core, immediately across the river from Rotary Park. Within this context, the following is proposed.

#### Pedestrian Crossing

- a direct link across the river between the South Downtown Core and Rotary Park.
- a separate crossing from any of the existing traffic bridges.
- such a link would help to integrate the use of both sides of the river in this area.

#### Hard Riveredge

- to complement the hard riveredge proposed by Moriama for the South Downtown Core.

#### Promenade

- a broad, hard-surfaced walkway extending from the Idylwyld Bridge to the Victoria Bridge, and up the hill into Cosmopolitan Park.

- in Rotary Park, a formal layout with hard edges.

#### 'Avant Garden'

- a non-traditional design for an intensively planted, very colourful, formal garden.

#### Victoria Bridge

- use of colour (paint) to enhance the lines of the bridge structure.

#### Terraced Garden

- on the steeply sloping area of fill in the vicinity of the Broadway Bridge.
- would act to prevent any erosion on the slope and would also be highly visible from the west side of the river.

#### b) Cosmopolitan Park

#### Promenade Extension

- a continuation of the promenade from Rotary Park into the southern portion of Cosmo Park, although considerably less formal in character.

#### c) University of Saskatchewan Campus

- a building for drama, music and fine arts programmes.
- unlike any other building on campus, this building should (through its location, orientation and design) begin to integrate the campus and the river.

### Linkage to Innovation Place

- a connection from the research park to the riverbank; highly structural in character.
- related to technological innovations/hydrological research.

### White-Water Chute

- to be built along the East Bank, in the vicinity of the weir.
- an adventure opportunity for skilled canoeists.

### d) Sutherland Beach Area

#### Experimental Community

- joint private/public sector project
- research into the social and technological aspects of urban life in the 'post-petroleum era'.

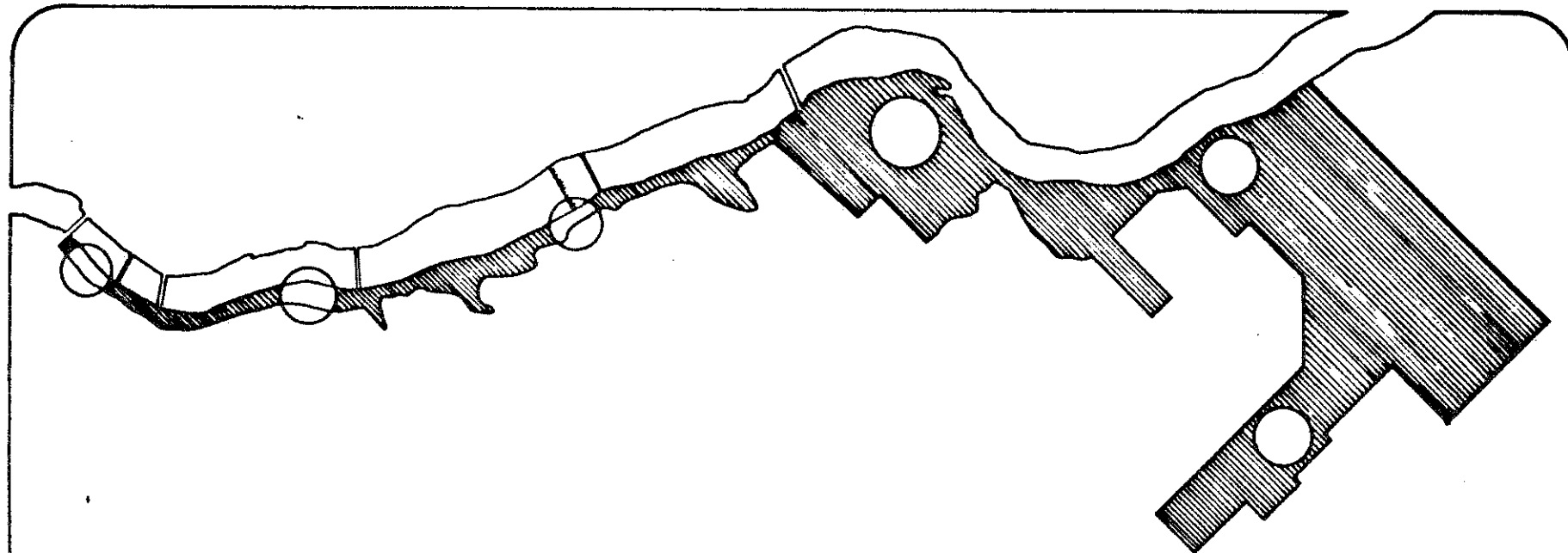
### e) North End

#### Peturrson's Ravine

- total restoration of natural ecosystems

#### Special Development

- a private development low-rise/high density residential



# APPENDIX **1**

## Mammal List

OCCURRENCE KEY

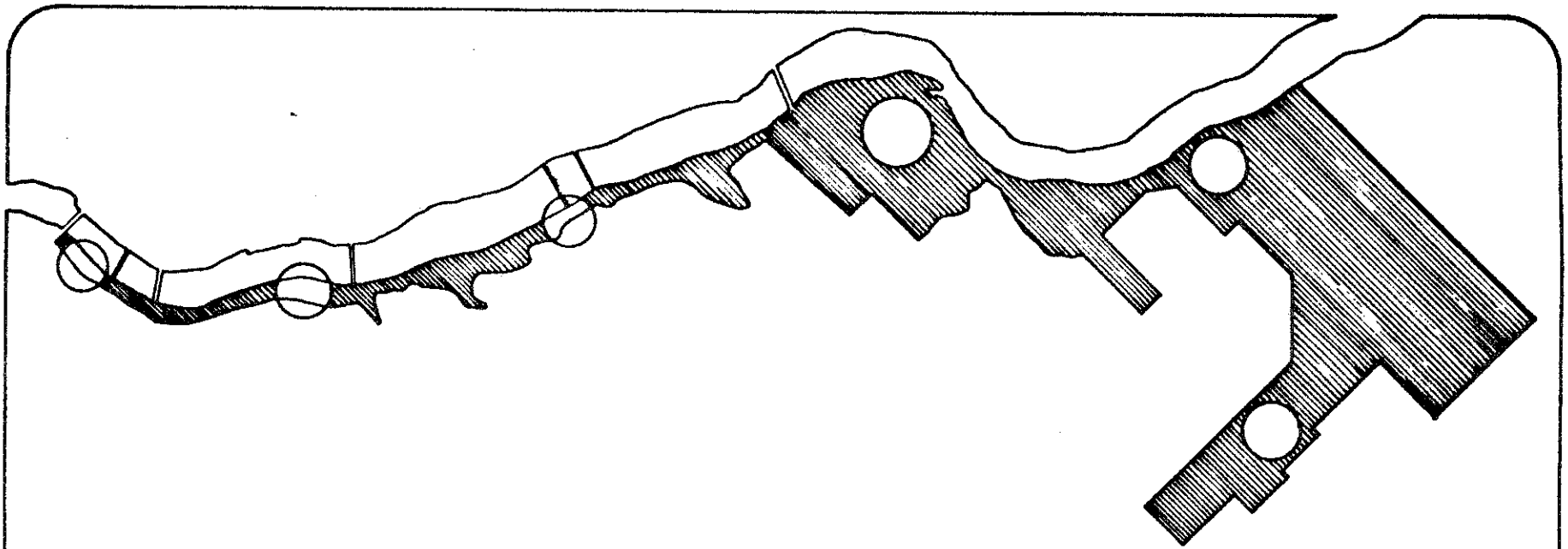
- 0 - Have been trapped or observed in the study area.  
 X - Very likely to be in the study area, but as yet not recorded.  
 T - May be observed from time to time as transients in the area.

<u>SPECIES</u>	<u>STATUS</u>
<u>Soricidae - shrew family</u>	
<u>Sorex cinereus</u> - masked shrew	0
<u>Blarina brevicauda</u> - short-tailed shrew	X
<u>Canidae - fox and wolf family</u>	
<u>Vulpes vulpes</u> - red fox	T
<u>Canis latrans</u> - coyote	T
<u>Mustelidae - weasel, otter and skunk family</u>	
<u>Mustela rixosa</u> - least weasel	0
<u>Mustela frenata</u> - long-tailed weasel	0
<u>Mephitis mephitis</u> - striped skunk	0
<u>Taxidea taxus</u> - badger	T
<u>Leporidae - hare and rabbit family</u>	
<u>Lepus townsendii</u> - white-tailed jack rabbit	0
<u>Lepus americanus</u> - snowshoe rabbit	0



<u>SPECIES</u>	<u>STATUS</u>
<u>Sciuridae - squirrel family</u>	
<u>Marmota monax</u> - woodchuck	0
<u>Spermophilus richardsonii</u> - Richardson's ground squirrel	0
<u>Spermophilus tridecemlineatus</u> - thirteen-lined ground squirrel	0
<u>Spermophilus franklinii</u> - Franklin's ground squirrel	0
<u>Eutamias minimus</u> - least chipmunk	0
<u>Tamiasciurus hudsonicus</u> - red squirrel	0
 <u>Geomyidae - pocket gopher family</u>	
<u>Thomomys talpoides</u> - northern pocket gopher	X
 <u>Castoridae - beaver family</u>	
<u>Castor canadensis</u> - beaver	0
 <u>Cricetidae - native mouse, rat, and vole family</u>	
<u>Peromyscus maniculatus</u> - deer mouse	0
<u>Clethrionomys gapperi</u> - Gapper's red-backed vole	0
<u>Microtus pennsylvanicus</u> - meadow vole	0
<u>Pedomys ochrogaster</u> - prairie vole	X
<u>Ondatra zibethicus</u> - muskrat	0
 <u>Muridae - introduced old world rat and mouse family</u>	
<u>Rattus norvegicus</u> - Norway rat	0
<u>Mus musculus</u> - house mouse	0

<u>SPECIES</u>	<u>STATUS</u>
<u>Zapodidae - jumping mouse family</u>	
<u>Zapus hudsonius</u> - meadow jumping mouse	X
<u>Erethizontidae - porcupine family</u>	
<u>Erethizon dorsatum</u> - porcupine	T
<u>Cervidae - deer family</u>	
<u>Odocoileus virginianus</u> - white-tailed deer	T



**APPENDIX**  
**Bird List** **2**

### Area Key

MG = The Simpkins market garden area including the river slope and flood zone.

CP = Cosmopolitan Park including birds that can be seen in the water from the park.

W = A view point from the riverbank overlooking the weir.

FF = The Forestry Farm and the channel scar area north of it.

### Occurrence Key

R = Regular: expected annually.

I = Irregular: not known to occur on an annual basis.

Species	Status			
	MG	CP	W	FF
Common Loon		I		
Red-necked Grebe		I		
Horned Grebe		I		
Western Grebe		R	R	
White Pelican			R	
Double-crested Cormorant			R	
Great Blue Heron			R	
Black-crowned Night Heron			I	
Whistling Swan			I	
Canada Goose			I	
White-fronted Goose			I	

Species	Status			
	MG	CP	W	FF
Mallard		R	R	
Common Pintail			R	
Green-winged Teal			R	
Blue-winged Teal			R	
American Wigeon			R	
Northern Shoveler			I	
Lesser Scaup			R	
Common Goldeneye			R	
Bufflehead			R	
Old Squaw		I		
Harlequin Duck			I	
Ruddy Duck			I	
Common Merganser			R	
Red-breasted Merganser			R	
Turkey Vulture	I			
Northern Goshawk	I			
Sharp-shinned Hawk	R			
Cooper's Hawk	R			
Red-tailed Hawk	I			
Golden Eagle	I	R	R	
Bald Eagle	I	R	R	
Marsh Hawk	R			

Species	Status			
	MG	CP	W	FF
Osprey			R	
Peregrine Falcon	I			
Merlin	R	R	R	R
American Kestrel	R			
Ruffed Grouse	I			
Sharp-tailed Grouse	I			
Ring-necked Pheasant	R			R
Gray Partridge	R			R
Sora Rail	I			
American Coot		R	R	
Killdeer	R	R	R	
Marbled Godwit	I		R	
Greater Yellowlegs	I	R	R	
Lesser Yellowlegs	I	R	R	
Spotted Sandpiper	R	R	R	
Common Snipe	R			
Pectoral Sandpiper	I			
Herring Gull	I	R	R	
California Gull	R	R	R	R
Ring-billed Gull		R	R	R
Franklin's Gull		R	R	

Species	Status			
	MG	CP	W	FF
Bonaparte's Gull			R	
Forster's Tern			R	
Common Tern			R	
Rock Dove	I	R	R	
Mourning Dove	R	R		
Black-billed Cuckoo	I	R		
Great Horned Owl	R	R		R
Snowy Owl			R	R
Long-eared Owl	I	R		
Short-eared Owl				R
Saw-whet Owl	I			R
Common Nighthawk	R	R		
Ruby-throated Hummingbird	R	R		R
Belted Kingfisher	I	R	R	
Common Flicker	R	R		R
Yellow-bellied Sapsucker	R	R		R
Hairy Woodpecker	R	R		R
Downy Woodpecker	R	R		R
Black-backed Three-toed Woodpecker				I
Northern Three-toed Woodpecker				I
Eastern Kingbird	R	R	R	R
Western Kingbird	I			

Species	Status			
	MG	CP	W	FF
Eastern Phoebe	I	R		
Yellow-bellied Flycatcher	I	R		
Alder Flycatcher	I	R		
Least Flycatcher	R	R		R
Western Pewee	I	R		
Olive-sided Flycatcher	I	R		R
Horned Lark				R
Tree Swallow	I	R		R
Barn Swallow	R	R		R
Gray Jay	I			I
Blue Jay	R	R		R
Black-billed Magpie	R	R	R	R
American Crow	R	R	R	R
Black-capped Chickadee	R	R		R
White-breasted Nuthatch	I	R		R
Red-breasted Nuthatch	R	R		R
Brown Creeper	I	R		
House Wren	R	R		R
Gray Catbird	R	R		R
Brown Thrasher	R	R		R
American Robin	R	R		R
Hermit Thrush	R	R		R

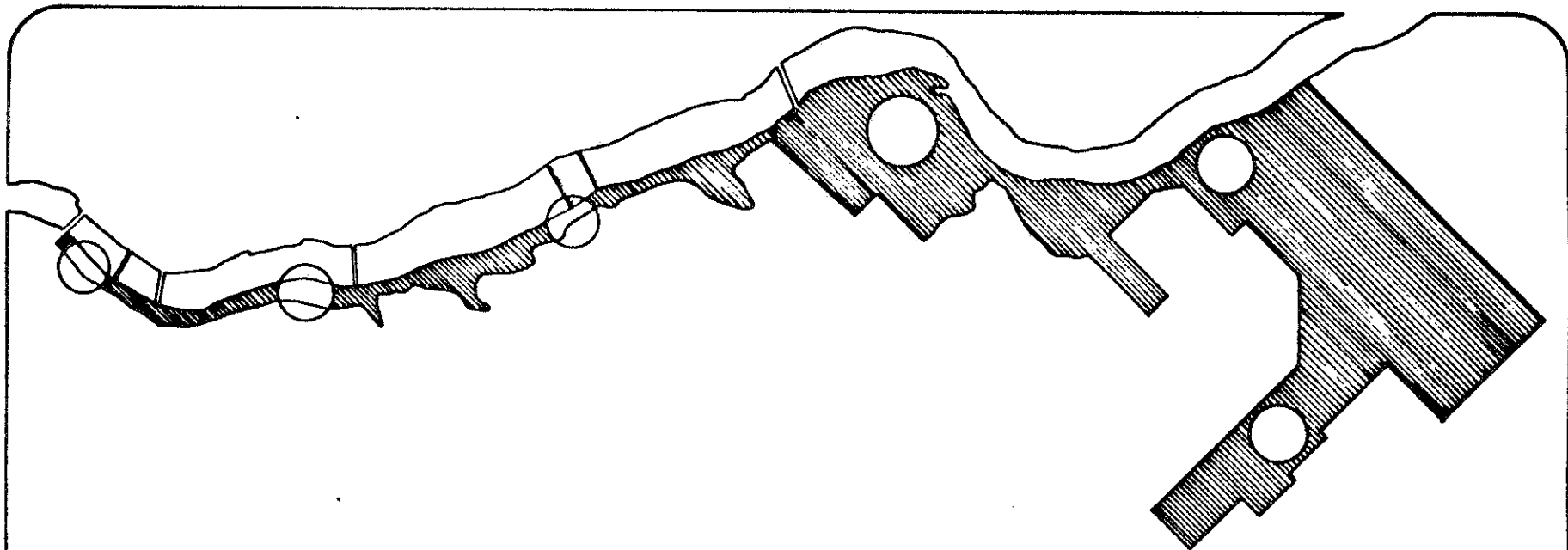


Species	Status			
	MG	CP	W	FF
Swainson's Thrush	R	R		R
Gray-cheeked Thrush	R	R		R
Veery	I	R		R
Mountain Bluebird	I			
Golden-crowned Kinglet	R			R
Ruby-crowned Kinglet	R			R
Bohemian Waxwing	R	R		R
Northern Shrike	I			I
Loggerhead Shrike	I			R
European Starling	R	R		R
Solitary Vireo	R	R		R
Red-eyed Vireo	R	R		R
Philadelphia Vireo	I	R		R
Warbling Vireo	R	R		R
Black-and-White Warbler	R	R		R
Tennessee Warbler	R	R		R
Orange-crowned Warbler	R	R		R
Nashville Warbler		I		I
Northern Parula Warbler		I		I
Yellow Warbler	R	R		R
Magnolia Warbler	I	R		R
Cape May Warbler	I	R		R
Black-throated Blue Warbler		I		I

Species	Status			
	MG	CP	W	FF
Yellow-rumped Warbler	R	R		R
Townsend's Warbler		I		I
Black-throated Green Warbler	I	R		R
Blackburnian Warbler	I	R		R
Chestnut-sided Warbler	I	I		I
Bay-breasted Warbler	I	R		R
Blackpoll Warbler	R	R		R
Palm Warbler	R	R		R
Ovenbird	R	R		R
Northern Waterthrush	R	R		R
Connecticut Warbler	I	R		R
Mourning Warbler		R		R
Common Yellowthroat	R	R		R
Yellow-breasted Chat		R		R
Wilson's Warbler	R	R		R
Canada Warbler		R		R
American Redstart	R	R		R
House Sparrow	R	R		R
Western Meadowlark		R		R
Yellow-headed Blackbird	I			
Red-winged Blackbird	R			R
Orchard Oriole	R			
Northern Oriole		R		R

Species	Status			
	MG	CP	W	FF
Rusty Blackbird	I			
Brewer's Blackbird	R	R		R
Common Grackle	R	R		R
Brown-headed Cowbird	R			R
Rose-breasted Grosbeak	I	R		R
Evening Grosbeak	R			R
Purple Finch	R	R		R
Pine Grosbeak	R	R		R
Hoary Redpoll	I			R
Common Redpoll	R	R		R
Pine Siskin	R	R		R
American Goldfinch	R	R		R
Red Crossbill	I	I		R
White-winged Crossbill	I	I		R
Rufous-sided Towhee	I	R		R
Savannah Sparrow	I			R
Baird's Sparrow				R
Vesper Sparrow	R	R		R
Northern Junco	R	R		R
American Tree Sparrow	R			
Chipping Sparrow	R	R		R
Clay-coloured Sparrow	R	R		R

Species	Status			
	MG	GP	W	FF
Harris' Sparrow	R	R		R
White-crowned Sparrow	R	R		R
White-throated Sparrow	R	R		R
Fox Sparrow	I	R		R
Lincoln's Sparrow	R	R		R
Swamp Sparrow		R		
Song Sparrow	R	R		R



# **APPENDIX**

## **Plant List**

# **3**

The following key is used to show in which vegetation zones the plants are located:

F = Flood Zone (areas flooded briefly most years)

W = Willow Zone

S = Shrub - Tree Zone

T = Tree Clump Zone

P = Planted Clump Zone

P-D = Prairie - Disturbed Zone

C = Coulee Zone (a landform type in which all six above vegetation zones may occur)

After each species name, the vegetation zone in which it is found is identified:

Polypodiaceae - fern family

Cyopteris fragilis - fragile fern (S + C)

Equisetaceae - horsetail family

Equisetum hyemale var. affine - common scouring rush (W)

Equisetum palustre - marsh horsetail (F + W)

Equisetum spp. - horsetail (S + C)

Pinaceae - pine family

Picea glauca - white spruce (P)

Cupressaceae - cypress family

Juniperus horizontalis - creeping juniper (S + C)

Typaceae - cattail family

Typha latifolia - common cattail (C)

Juncaginaceae - arrow-grass family

Triglochin maritima - seaside arrow-grass (C)

Gramineae - grass family

Agropyron cristatum - crested wheatgrass (P-D + C)

Agropyron dasystachyum - northern wheatgrass (P-D)

Agropyron griffithsii - awned northern wheatgrass (P-D)

Agropyron repens - couch grass (F + W)

Agropyron smithii - western wheatgrass (P-D)

Agropyron trachycaulum var. unilaterale - awned wheatgrass (P-D + C)

Agropyron trachycaulum var. trachycaulum - slender wheatgrass (P-D + C)

Andropogon scoparius - little blue stem (P-D)

Bouteloua gracilis - blue grama (P-D)

Bromus inermis - smooth brome (F + W + P-D + C)

Deschampsia caespitosa - tufted hairgrass (F)

Festuca scabrella - northern rough fescue (P-D)

Hordeum jubatum - wild barley (F)

Koeleria cristata - june grass (P-D)

Muhlenbergia cuspidata - prairie muhly (P-D)

Poa palustris - fowl bluegrass (F + W)

Poa pratensis - kentucky bluegrass (W + P-D + C)

Poa spp. - bluegrass (F)

Stipa comata - spear grass (P-D)

Stipa spartea var. curtiseta - western porcupine grass (P-D)

Stipa viridula - green needle grass (P-D)

Cyperaceae - sedge family

Carex eleocharis - low sedge (P-D + C)

Carex sprengelii - Sprengel's sedge (S + C)

Carex spp. - sedge (F + P-D + C)

Eleocharis acicularis - needle spike-rush (F)

Eleocharis palustris - creeping spike-rush (F)

Scirpus americanus - three-square bulrush (C)

Scirpus pumilus - dwarf bulrush (C)

Scirpus rufus - red bulrush (C)

Juncaceae - rush family

Juncus balicus - baltic rush (F)

Liliaceae - lily family

Disporum trachycarpum - fairybells (S + C)

Maianthemum canadense - wild lily-of-the-valley (S + C)

Smilacina stellata - star-flowered solomon's-seal (S + C)

Smilax herbacea - carrion flower (S + C)

Smilax lasioneura - carrion flower (S + C)

Salicaceae - willow family

Populus balsamifera - balsam poplar (F + W + S + C)



Populus deltoides - cottonwood (F + W + S + C)

Populus tremuloides - aspen poplar (S + T + C)

Salix interior - sandbar willow (F + W)

Salix lutea - yellow willow (F + W + S + C)

Salix spp. - willow (W + C)

Betulaceae - birch family

Betula fontinalis - river birch (S + C)

Betula papyrifera - white birch (S + C)

Santalaceae - sandalwood family

Commandra pollida - bastard toadflax (P-D + C)

Polygonaceae - buckwheat family

Eriogonum flavum - yellow umbrella plant (P-D + C)

Polygonum aviculare - doorwood (F)

Chenopodiaceae - goosefoot family

Atriplex nuttallii - Nuttall's atriplex (P-D + C)

Axyris amaranthoides - Russian pigweed (F)

Chenopodium album - lamb's quarters (F)

Chenopodium rubrum - red goosefoot (F)

Eurotia lanata - winterfat (P-D + C)

Kochia scoparia - summer - cypress (F)

Caryophyllaceae - pink family

Arenaria lateriflora - blunt-leaved sandwort (W + S + C)

Ranunculaceae - crowfoot family

Actaea rubra - red baneberry (S + C)

Anemone canadensis - Canada anemone (W + S + C)

Thalictrum venulosum - veiny meadow-rue (S + C)

Cruciferae - mustard family

Descurainia spp. - tansy mustard (F)

Lepidium densiflorum - common pepper-grass (F)

Rorippa islandica - marsh yellow cress (F)

Thlaspi arvense - stinkweed (F)

Saxifragaceae - saxifrage family

Ribes oxycanthoides - northern gooseberry (S + C)

Rosaceae - rose family

Amelanchier alnifolia - saskatoon (S + C)

Crataegus rotundifolia - round-leaved hawthorn (S + C)

Geum aleppicum - yellow avens (S + C)

Potentilla anserina - silverweed (F + C)

Prunus virginiana - choke cherry (S + C)

Rosa spp. - rose (S + P-D + C)

Rubus spp. - raspberry (S + C)

Leguminosae - pea family

Astragalus bisulcatus - two-grooved milk-vetch (P-D + C)

Astragalus gilviflorus - cushion milk-vetch (P-D + C)

Astragalus pectinatus - narrow-leaved milk-vetch (P-D + C)

Astragalus tenellus - loose-flowered milk-vetch (P-D + C)

Caragana arborescens - common caragana (S + P)

Glycyrrhiza lepidota - wild licorice (F + W + P-D + C)

Hedysarum boreale - northern hedysarum (P-D + C)

Melilotus alba - white sweet-clover (F + W + S + C)

Psoralea esculenta - Indian breadroot (P-D)

Vicia americana - American vetch (W + S + C)

Linaceae - flax family

Linum spp. - flax (P-D + C)

Aceraceae - maple family

Acer negundo - Manitoba maple (F + S + T + P + C)

Violaceae - violet family

Viola rugulosa - western Canada violet (S + C)

Elaeagnaceae - oleaster family

Elaeagnus commutata - wolf-willow (W + S + P-D + C)

Shepherdia argentea - buffaloberry (S + C)

Shepherdia canadensis - Canada buffaloberry (S + C)

Onagraceae - evening-primrose family

Gaura coccinea - scarlet guara (P-D + C)

Araliaceae - ginseng family

Aralia nudicaulis - wild sarsaparilla (S + C)

Umbelliferae - parsley family

Cicuta douglassi - water-hemlock (C)

Heracleum lanatum - cow-parsnip (S + C)

Osmorhiza spp. - sweet cicely (S + C)

Cornaceae - dogwood family

Cornus stolonifera - red-osier dogwood (W + S + C)

Pyrolaceae - wintergreen family

Pyrola spp. wintergreen (S + C)

Primulaceae - primrose family

Dodecatheon pulchellum - saline shootingstar (P-D)

Glaux maritima - sea - milkwort (C)

Primula incana - mealy primrose (P-D)

Oleaceae - olive family

Fraxinus pennsylvanica - green ash (F + S + T + C)

Syringa vulgaris - common lilac (S)

Gentianaceae - gentian family

Lomatogonium rotatum - marsh felwort (P-D)

Apocynaceae - dogbane family

Apocynum sibiricum - Indian hemp (F + P-D)

Labiatae - mint family

Mentha arvensis var. villosa - field mint (F)

Mentha spp. - mint (C)

Scrophulariaceae - figwort family

Penstemon nitidus - smooth blue beardtongue (P-D, + C)

Plantaginaceae - plantain family

Plantago major - common plantain (F + S + C)

Rubiaceae - madder family

Galium boreale - northern bedstraw (S + C)

Galium triflorum - sweet-scented bedstraw (S + C)

Caprifoliaceae - honeysuckle family

Lonicera dioica - twining honeysuckle (S + C)

Lonicera tatarica - tartarian honeysuckle (S)

Symphoricarpos albus - snowberry (S + C)

Symphoricarpos occidentalis - western snowberry (S + C)

Viburnum edule - low-bush-cranberry (T)

Compositae - composite family

Achillea lanulosa - yarrow (S + C)

Artemisia biennis - biennial wormwood (F)

Artemisia dracunculus - linear-leaved wormwood (P-D + C)

Artemisia frigida - pasture sage (P-D + C)

Aster brachyactis - rayless aster (C)

Aster pauciflorus - few-flowered aster (P-D + C)

Aster spp. - aster (F)

Chrysopsis villosa - hairy golden-aster (P-D + C)

Crepis tectorum - narrow-leaved hawk's-beard (F)

Erigeron glabellus var. pubescens - smooth fleabone (S + C)

Grindelia squarrosa - gumweed (S + P-D)

Gutierrezia sarothrae - common broomweed (S + P-D + C)

Hymenoxys richardsonii - Colorado rubberweed (P-D + C)

Liatris ligulistylis - meadow blazingstar (P-D)

Liatris punctata - dotted blazingstar (P-D + C)

Lygodesmia juncea - skeletonweed (P-D + C)

Petasites sagittatus - arrow-leaved colt's-foot (S)

Senecio canus - silvery groundsel (P-D + C)

Solidago graminifolia - flat-topped goldenrod (F)

Solidago spp. - goldenrod (F + W)

Sonchus arvensis - perennial sow-thistle (F)

Sonchus spp. - sow-thistle (F + W)

Taraxacum officinale - dandelion (S + C)

Xanthium italicum - cocklebur (F)

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