

Terwillegar  
Heights



**Servicing Concept  
Design Brief**  
(SCDB)

# *Terwillegar Heights Servicing Design Concept Brief*

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Office Consolidation June 2021

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*Prepared by:*

*Development Services  
Urban Planning and Economy  
City of Edmonton*

**The Terwillegar Heights Servicing Concept Design Brief (SCDB) was approved by resolution by Council in September 1992. In June 2021, this document was consolidated by virtue of the incorporation of the following amendments:**

Terwillegar Heights SCDB approved by resolution September 14, 1992

Amendment approved by resolution January 12, 1993 (to locate a Mixed Use Employment Centre at the intersection of 23 Avenue and 142 Street (Rabbit Hill Road))

Amendment approved by resolution July 17, 1995 (to realign 142 Street (Rabbit Hill Road) and neighbourhood cells; and removed the proposed cemetery and municipal services yard)

Amendment approved by resolution December 6, 2002 (amend Part III, Section 1.3 (f))

Amendment approved by resolution April 26, 2005 (replace the Development Concept map)

Amendment approved by resolution December 12, 2006 (to accommodate the development of housing for first time homebuyers on vacant surplus school building envelope located on a school/park site)

Amendment approved by resolution July 16, 2012 (to extend the boundary of the Mactaggart neighbourhood to incorporate surplus TUC land and include text to allow for a larger commercial centre in Mactaggart)

Amendment approved by resolution November 5, 2018 (to change the land use in the Terwillegar Concept Design Brief that abuts the North Saskatchewan River Valley Area Redevelopment Plan (NSRV ARP) to be consistent with the proposed boundary changes in the NSRV ARP)

PLAN REPEALED approved on June 8, 2021 (Bylaw 19725)

## **Editor's Note:**

This is an office consolidation edition of the Terwillegar Heights SCDB as approved by resolution by City Council on September 14, 1992. This edition contains all amendments and additions to the SCDB.

For the sake of clarity, new maps and a standardized format were utilized in this Plan. All names of City departments have been standardized to reflect their present titles. Private owners' names have been removed in accordance with the Freedom of Information and Protection of Privacy Act. Furthermore, all reasonable attempts were made to accurately reflect the original SCDB. All text changes are noted in the right margin and are italicized where applicable.

This office consolidation is intended for convenience only. In case of uncertainty, the reader is advised to consult the original plan, available at the office of the City Clerk.

City of Edmonton  
Urban Planning and Economy

## PREFACE

At the September 14, 1992 non-statutory public hearing with respect to the Terwillegar Heights Servicing Concept Design brief, City Council concurred in the following motion, as amended:

1. That a non-statutory public hearing be held at City Council on September 14, 1992 to hear submissions on the Terwillegar Heights Servicing Concept Design Brief.
2. That the Terwillegar Heights Servicing Concept Design Brief be APPROVED with the following amendments:
  - (i) that the Local Employment Mixed Use Centre, identified on the Plan as City-owned land, be deleted; and
  - (ii) that the Administration arrange a meeting between the affected landowners to discuss an alternate site for the Local Employment Mixed Use Centre and report back to Council.

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Transportation (Transportation Planning Branch, Drainage Branch)

Parks and Recreation (Development Branch)

Public Works (Water Branch, Building Engineering Branch, Roadways Engineering Branch, Civic Buildings and Accommodation Branch)

Finance

Edmonton Public School Board

Edmonton Separate School Board

Edmonton Power

Amended by Editor

*Private Corporation*

Ed Tel

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## PART I

### GENERAL

#### 1. INTRODUCTION AND STUDY AREA CONTEXT

##### 1.1 Location, Purpose and General Background

The purpose of this report is to provide the policy basis for City Council to establish a generalized framework for municipal infrastructure, servicing, planning and development guidelines and basic environmental requirements for the Terwillegar Heights area, and to facilitate the staged submission of specific Neighbourhood Area Structure Plans (NASP) by private developers. **This document is not a statutory plan under the provisions of the Planning Act.**

This report contains the elements of an Area Structure Plan and it is intended that the SCDB be adopted by simple resolution of City Council. As such, this report provides a proactive, forward-planning statement of the civic position on the general placement and development of major land uses, including municipal and school facilities, within an 873.50ha (2203.30ac) area of southwest Edmonton, known as Terwillegar Heights, to which subsequent Neighbourhood Area Structure Plans (NASP's) should attempt to comply.

The study area is bounded by the *power transmission* line right-of-way to the north (north of 23 Avenue), the proposed Outer Ring Road (Anthony Henday Drive) and provincial transportation and utility corridor on the west and south, and Whitemud Creek, to the east (See Map 1, Location and Study Area Boundary).

Amended by Editor

##### 1.2 Administrative Context

The SCDB represents a new way of municipal servicing and land use planning for Edmonton's future suburban areas.

**Although the SCDB is not a statutory plan, there are certain administrative and technical advantages inherent in its adoption through resolution of Council, as follows:**

(i) non-statutory approval allows substantial flexibility with respect to unanticipated and innovative types of development, land use patterns and servicing concepts/ techniques;

(ii) due to its inherent flexibility, the SCDB does not need to be amended in the light of new technical information, market uncertainty, differing landowner aspirations and other circumstances which may affect timing and phasing of development; (It should be noted that similar land use policy documents adopted by resolution such as the Calgary Trail Land Use Study of 1984, have never been required to be amended, despite applying to a dynamic development environment).

(iii) as a declared policy of Council, the SCDB will be recognized by all contributing civic departments and agencies;

(iv) development processing timelines are likely to be less than those associated with

the conventional statutory ASP process, particularly if there are disagreements among landowners and developers and uncertainties in defining City servicing requirements;

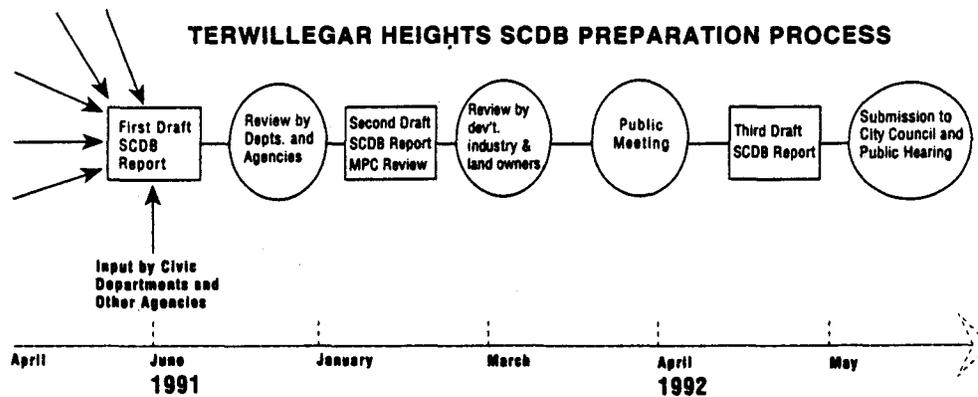
(v) ongoing input by owners, developers and the general public is facilitated without recourse to a formalized statutory planning process; and

(vi) "fixed" statutory land use planning will only need to be undertaken for smaller neighbourhood cells using the normal NASP, redistricting and subdivision processes

The SCDB process could be applied to other new suburban areas of the City where municipal servicing requirements are to be defined well in advance of anticipated development. The SCDB approach will also assist the City in the ongoing development of its Capital Priorities Plan (CPP), as the cost of capital servicing and improvements for such areas can be identified in advance and assigned with an appropriate priority within the CPP.

### 1.3 SCDB Preparation Process

The process for preparing the SCDB is summarized in the diagram shown as Figure 1, below.



A special committee composed of representatives of the Planning and Development, Transportation, Public Works, Parks and Recreation, Fire, Edmonton Power, a private utility corporation and the Edmonton Public and Separate School Boards was established to assemble and review civic departmental and agency requirements.

Amended by Editor

This was achieved through a series of "round table" discussions and a design working session (design charette) during which each department or agency advocated its requirements in an open forum rather than presenting fait accompli positions. This approach ensured mutual recognition of each department's/agency's requirements and a more flexible approach to accommodating mutual aims and reducing land use and servicing conflicts.

Production of this report was subsequently co-ordinated by the Planning and Development Department, then reviewed by the participating civic departments/ agencies. It was presented to the Municipal Planning Commission on February 13, 1992. The Commission authorized its distribution to landowners and development industry interests in the area.

A public meeting was held on April 28 1992, which was attended by landowners, their agents/consultants and civic staff. Some modifications were made to this report as a result of input from the public meeting, through submission of written briefs and meetings with owners. This report was subsequently approved by the Utilities and Finance Committee on September 8, 1992. On September 14, 1992 the document was approved with modifications at a non-statutory public hearing by City Council, as described in the preface to this report.

#### **1.4 History of Recent Submissions**

A draft Terwillegar Heights Area Structure Plan<sup>1</sup> was formally submitted to the Planning and Development Department in September, 1990. The plan envisaged development of an 851.9 ha (2,150 ac.) study area with eight neighbourhoods, ranging from a population of 7,105 to a low of 3,697, giving a total study area population of approximately 43,000 persons (revised figure submitted by consultant). The design concept for the ASP was based on a series of looped distributor roadways with RF1 (Single Detached) housing comprising 54.5% of the gross developable area (GDA), multiple housing (RF5/RA7) comprising 13.4% of the GDA and Municipal Reserves accounting for 11.4% of the GDA.

Various substantial issues and problems with the proposed ASP were identified as a result of circulation responses from civic departments. These are summarized in Table I, next page.

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<sup>1</sup> Prepared by IMC Consulting Group Inc.

## TABLE 1

### Proposed Terwillegar Heights ASP • Summary of Concerns and Issues by Civic Departments Following Circulation of the December, 1990 Document

- Drainage Branch/Transportation Dept - non-support until the necessary technical studies are submitted and approved
- Water Branch/ Public Works Dept - non-support until the necessary technical studies are submitted and approved
- Transportation Dept - non-support based on inadequate transportation network.  
- submission of traffic impact assessment is required
- Fire Department - requires early provision of a Fire Station site (in the northern portion of the Plan area), to be acquired in 1992 and operational by 1994.
- Public Works – requires a Southwest Integrated Yard site and a City-owned cemetery.
- Parks and Recreation requires additional information to assess the suitability of the city gravel extraction site for the district recreation complex associated with the campus site.
- The Public and Catholic School Boards require senior high campus to be relocated south of 23 Avenue.
- Alberta Public Works requires Solicitor General's Staff College lands be deleted from development proposals for Neighbourhood 1. (*a private corporation*)
- Planning and Development - timing of the reclamation and development of the private Bulat extraction pit located in the centre of the Plan area is a major unresolved impediment to overall development of the area. There is no rationale for deleting the requirement for a town/regional shopping centre per the policies of the General Municipal Plan.

Amended by Editor

In December, 1990 a *developer* submitted a request to create a separate Neighbourhood Area Structure Plan (NASP) for its own and other owners lands in Neighbourhood 1, located at the northwest corner of the study area. Of particular interest and concern to the Administration was the development, servicing and fiscal implications of this

Amended by Editor

proposal and how the City of Edmonton's "conventional" planning process for new suburban areas can be adjusted to accommodate small NASP's without such development becoming prejudicial to the efficient servicing and development of larger "downstream" areas.

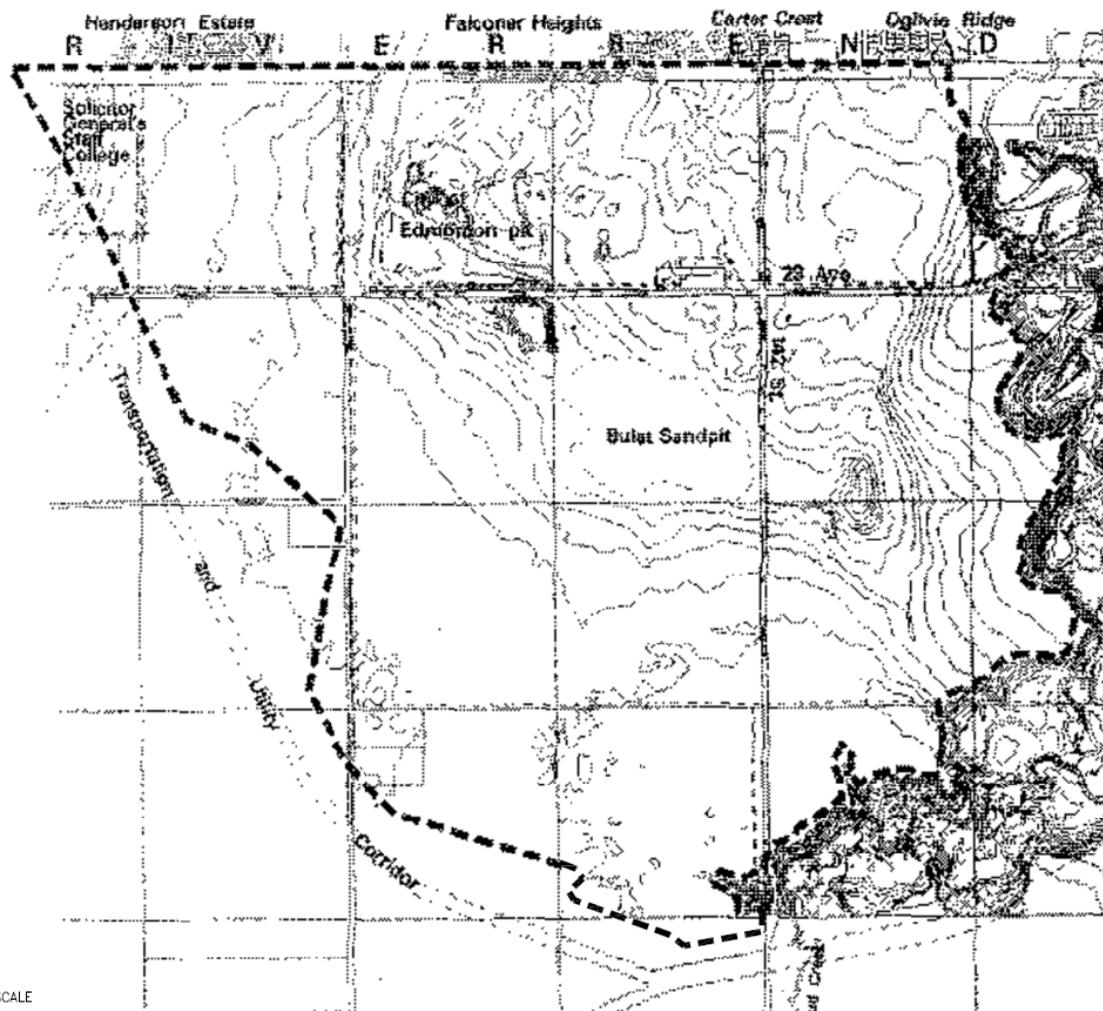
The *developer* proposal<sup>2</sup> applies to an area of 128.5 ha (317.5 acres) with a projected population of 6,559 people (see Map3). Otherwise known as Neighbourhood 1, this proposal represents 15% of the total area and 15% of the total population of the proposed Terwillegar Heights Area Structure Plan.

Amended by Editor

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<sup>2</sup> Also prepared by IMC.

Map 1: Location and Study Area Boundary (July 16, 2012)



NOT TO SCALE

Terwillegar Heights  
Servicing Concept Design Brief (SCDB)



### 1 Location and Study Boundary

--- Study Area Boundary



Figure **Map 1.0**

Title **Location and Study Area Boundary**

*Another developer* has also advised the Planning and Development Department that it may request NASP authorization for Neighbourhoods 4, 5 and 7 where it is the majority owner. The three neighbourhoods, if authorized by a separate area NSP, would account for approximately 35% of the ASP total area and 37% of its population.

Amended by Editor

For the reasons outlined above, a special meeting of the Municipal Planning Commission was convened on April 25, 1991 and it was resolved that a Servicing Concept Design Brief would be prepared by the civic administration and be forwarded to City Council with a covering report recommending support of the SCDB as the basis to allow for staged submissions of specific NASPs.

## 1.5 Land Ownership

*The land ownership pattern for the 877 ha study area, including the 21.57 ha Power transmission right-of-way, located along the northern boundary is depicted in Map 2, on next page.*

Amended by Editor  
Resolution Jul 16, 2012

Table 2 provides an inventory of owners as of March 1, 1992.

## 1.6 Existing Site Features and Environmental Assets/Constraints

### (a) Soils and Topography

The Alberta Soils Survey classifies the soils within the study area as having a wide range of agricultural productivity capabilities. The Canada Land Inventory identifies local soils as Classes 1, 4 and 6, ranging from no limitations for agriculture, severe limitations for agriculture to suitable for perennial forage crops only.

The topography of the study area provides a variety of vistas. A high knoll of land 500 m south of 23 Avenue and 200 m east of 142 Street (*Rabbit Hill Road*) is part of a ridge that traverses the site in a northwest/ southeast direction. The land gently rolls to the northeast and southwest with slopes ranging from 10% to 20%. The land gradually levels and flattens out in the south portion of plan area. Approximately 40 metres of relief is available throughout the plan area. The major height of land provides opportunities for vistas in all directions.

Amended by Editor

### (b) Disturbed Lands

There are three areas of disturbed land in the study area - the disused City of Edmonton Rabbit Hill gravel pit at 156 Street and 23 Avenue (covering 36 ha) the privately owned 24.30 ha Bulat Sand pit, south of 23 Avenue and west of *Rabbit Hill Road*, and abandoned underground and surface coal mine workings in the extreme southeast of the study area flanking Whitemud Creek. Both the City-owned and Bulat pits constitute significant constraints to urban development and will require major restoration actions to make them suitable for urban uses, including open spaces.

Amended by Editor

Map 2: Land Ownership (July 16, 2012)

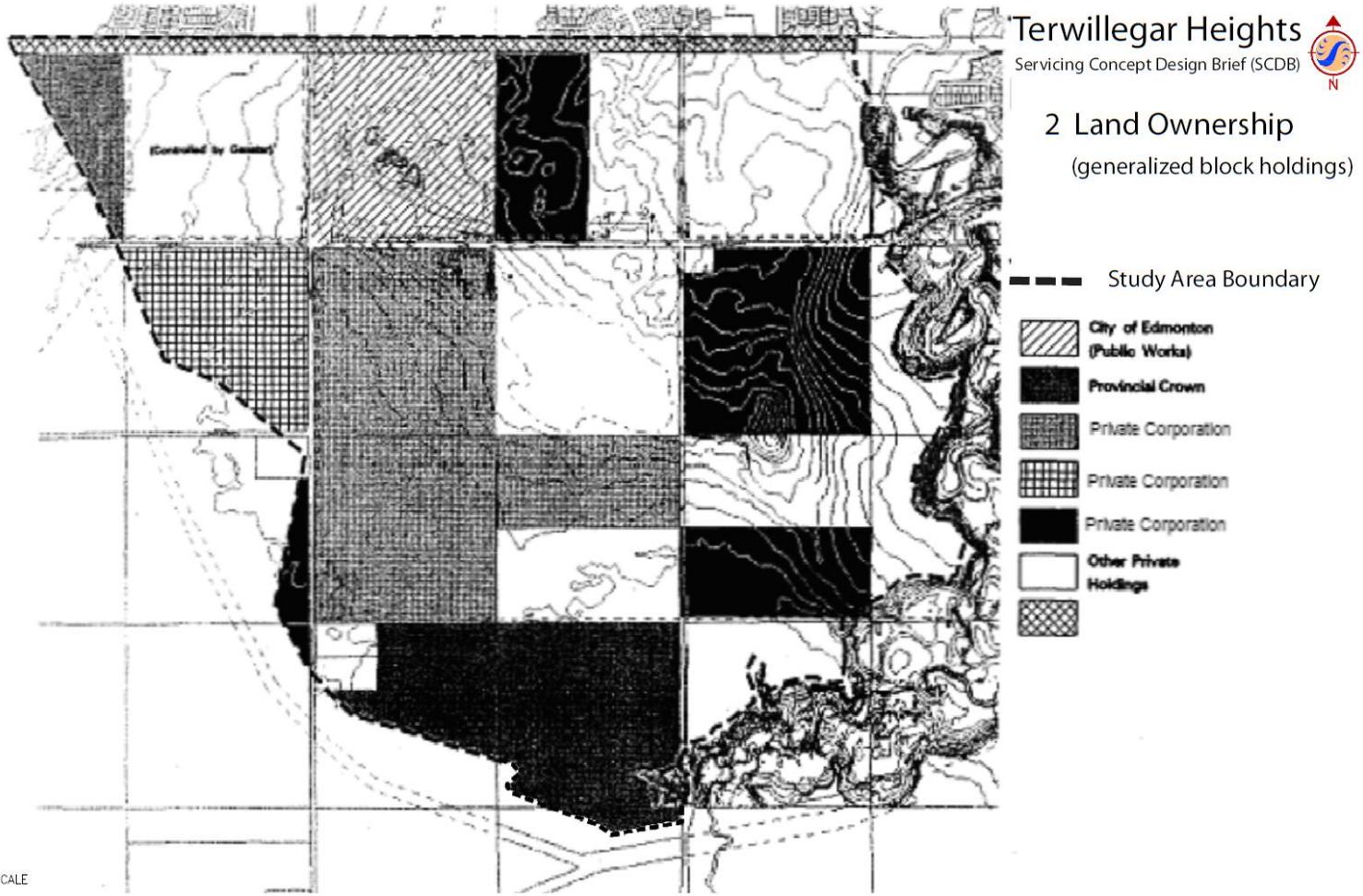


Figure **Map 2.0**  
Title **Land Ownership**

TABLE 2

## Inventory of Land Ownership in Study Area (March,1992)

(Amended by Editor)

| Property Owner(s)                           | Hectares | Acres  | %  |
|---|----------|--------|----|
| <b>Larger Holdings (greater than 32 ha)</b> |          |        |    |
| Provincial Crown                            | 109.24   | 269.92 | 12 |
| City  | 51.20    | 127.36 | 6  |
| <i>Private Corporate Owner</i>              | 34.00    | 84.01  | 4  |
| <i>Private Corporate Owner</i>              |          |        |    |
| <i>Private Corporate Owner</i>              | 60.70    | 150.00 | 7  |
| <i>Private Corporate Owner</i>              |          |        |    |
| <i>Private Corporate Owner</i>              | 37.47    | 88.63  | 4  |
| <i>Private Corporate Owner</i>              | 140.95   | 348.23 | 16 |
| <i>Private Corporate Owner</i>              | 161.40   | 399.00 | 18 |
| <i>Private Non-Corporate Owners</i>         | 64.30    | 159.00 | 7  |
| <i>Private Corporate Owner.</i>             | 32.40    | 80.00  | 4  |
| <i>Private Non-Corporate Owner</i>          | 32.40    | 80.00  | 4  |
| <i>Private Corporate Owner</i>              |          |        |    |
| <i>Private Corporate Owner</i>              |          |        |    |
| <i>Private Corporate Owner</i>              | 63.66    | 157.44 | 7  |
| <i>Private Corporate Owner</i>              |          |        |    |
| <i>Private Corporate Owner</i>              |          |        |    |
| <i>Private Corporate Owner</i>              |          |        |    |
|   |          |        |    |
| <b>Smaller Holdings (less than 32 ha)</b>   |          |        |    |
| <i>Private Non-Corporate Owner</i>          | 0.079    | 0.19   |    |
| <i>Private Corporate Owner</i>              | 0.83     | 2.05   |    |
| <i>Private Corporate Owner</i>              | 25.56    | 63.16  |    |
| <i>Private Corporate Owner</i>              | 2.90     | 7.16   |    |
| <i>Private Corporate Owner</i>              | 16.20    | 40.00  |    |
| <i>Private Corporate Owner (25%)</i>        |          |        |    |
| <i>Private Corporate Owner (50%)</i>        | 1.16     | 2.86   |    |
| <i>Private Corporate Owner (25%)</i>        |          |        |    |
| <i>Private Non-Corporate Owner</i>          | 5.10     | 12.60  |    |
| <i>Private Corporate Owner</i>              | 2.02     | 4.99   |    |
| <i>Private Non-Corporate Owner</i>          | 3.97     | 9.81   |    |
| <i>Private Non-Corporate Owners</i>         | 3.97     | 9.81   |    |
| <i>Private Non-Corporate Owners</i>         | 0.83     | 2.05   |    |
| <i>Private Corporate Owner</i>              | 21.57    | 53.30  |    |
| <i>Private Corporate Owner</i>              | 16.19    | 40.00  |    |
| <i>Private Non-Corporate Owner</i>          | 14.17    | 35.01  |    |
| Sub Total of Smaller Holdings               | 114.55   | 282.99 | 13 |
| Study Area Total = 873.50 ha (2,203.30 ac.) |          |        |    |

Note: In July 2012, the Study Area was amended to incorporate a 3.5 ha surplus portion of Transportation Utility Corridor (TUC) owned by the Provincial Crown. (Resolution July 16, 2012)

Map 3: Proposal for a Neighbourhood Area Structure by a Private Corporation (July 16, 2012)

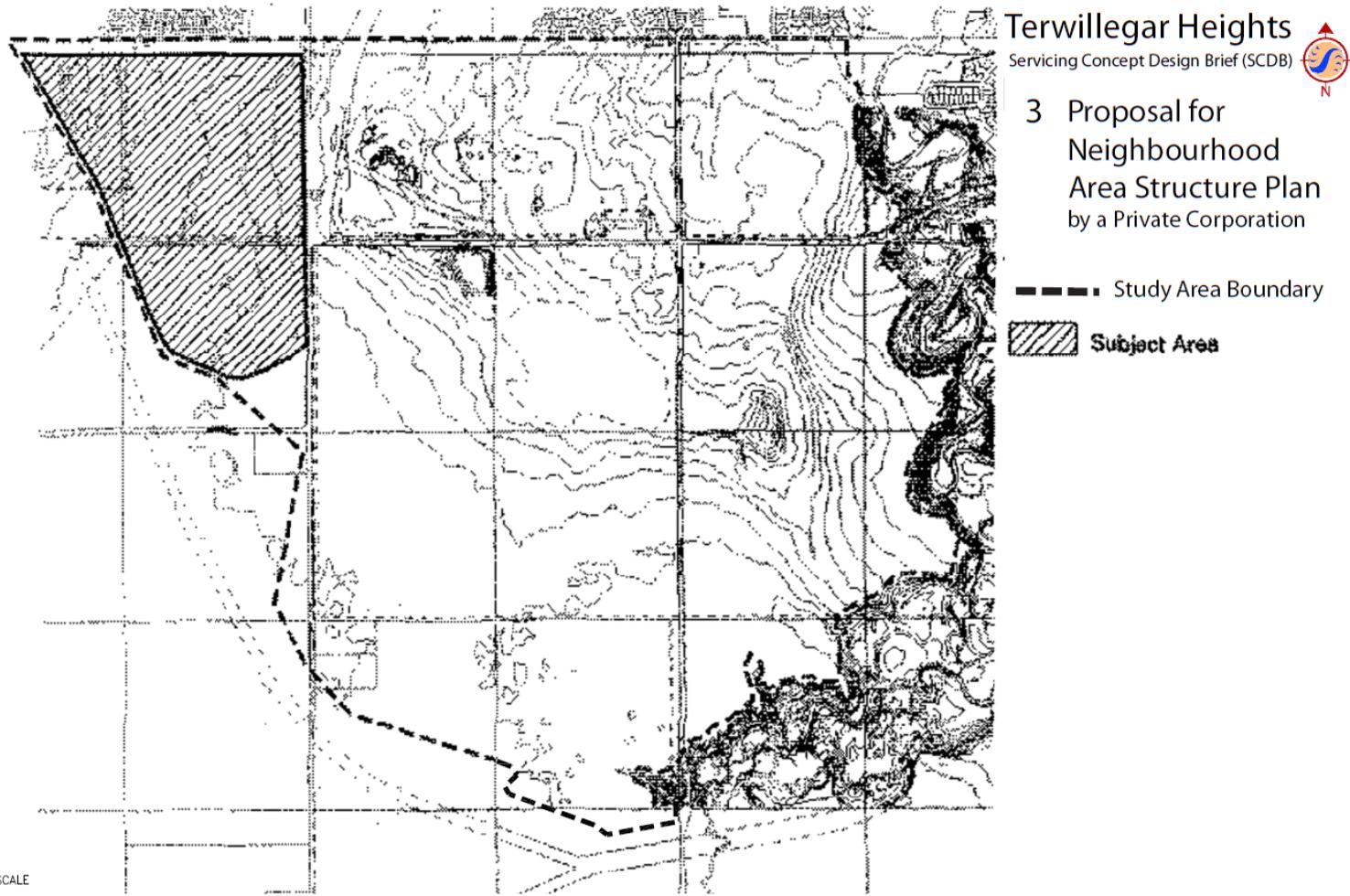


Figure **Map 3.0**  
Title **Proposal for a Neighbourhood Area Structure by a Private Corporation**

The Administration has serious concerns about the absence of detailed final geotechnical information for both the City of Edmonton and Bulat pits. This information is necessary to ensure that the pits are restored to a capability to accommodate beneficial urban uses, (including playfields and other open spaces). It is essential to avoid a future development scenario whereby the pits are left as undevelopable voids within future residential areas, as they pose significant physical, security, economic and aesthetic constraints to the development of adjacent lands. Avoiding resolution of this issue will also affect population projections and school requirements.

A preliminary evaluation of the study area entitled "Hydrogeotechnical Evaluation Terwillegar Area (Drainage) Master Plan" has been prepared for the Drainage Branch, Transportation Department by A.D.Williams Engineering Limited (November, 1991) as part of an assessment for the design of a drainage system for the area. The major findings of this report are summarized as Appendix II to this report.

Both Bulat and the City have ceased their extraction operations. The City of Edmonton owned pit (SW 2-52-25-W4M) operated prior to provincial regulations governing the reclamation of gravel pits. The City's pit has undergone some reclamation and until 1987, the quality of fill used to reclaim it was monitored by a geotechnical engineering consultant engaged by the Public Works Department. Public Works has now engaged a consultant to review the monitoring of fill and reclamation of the Rabbit Hill pit.

With respect to the Bulat sand operation, (NE 35-51-25-W4M) of the 24 ha of disturbed land at this site, only 4 ha were most recently "mined" and would have to be restored by the owner to a previous agricultural or equivalent use in accordance with provincial regulations. The remaining 20 ha were excavated prior to the reclamation plans being required by the Province. The limiting factors in the further development of the Bulat pit are that it has been excavated to groundwater level, is 20 m deeper than the City pit and has been used as a dump for construction debris. (see Appendix II). Approximately 10 million m<sup>3</sup> of fill would be required to fully reclaim the Bulat pit, although partial filling and regrading may be a feasible reclamation option.

In the extreme southeast of the study area, abutting Whitemud Creek are old surface and underground coal mine workings, including an area of subsidence (see Appendix II and Maps 4 and AI). Further investigation of these constraints will be necessary at the NASP stage of development

(c) Natural Areas

The majority of the study area is under cultivation, except for areas bordering Whitemud Creek, disturbed lands (sand/gravel pits) and areas already developed for urban uses (e.g., Solicitor General's Staff College). There are also significant areas of "man-made" hedgerows and shelterbelts along the present roadway network dissecting the study area (See Map 4).

Map 4: Natural Features and Disturbed Lands (July 16, 2012)

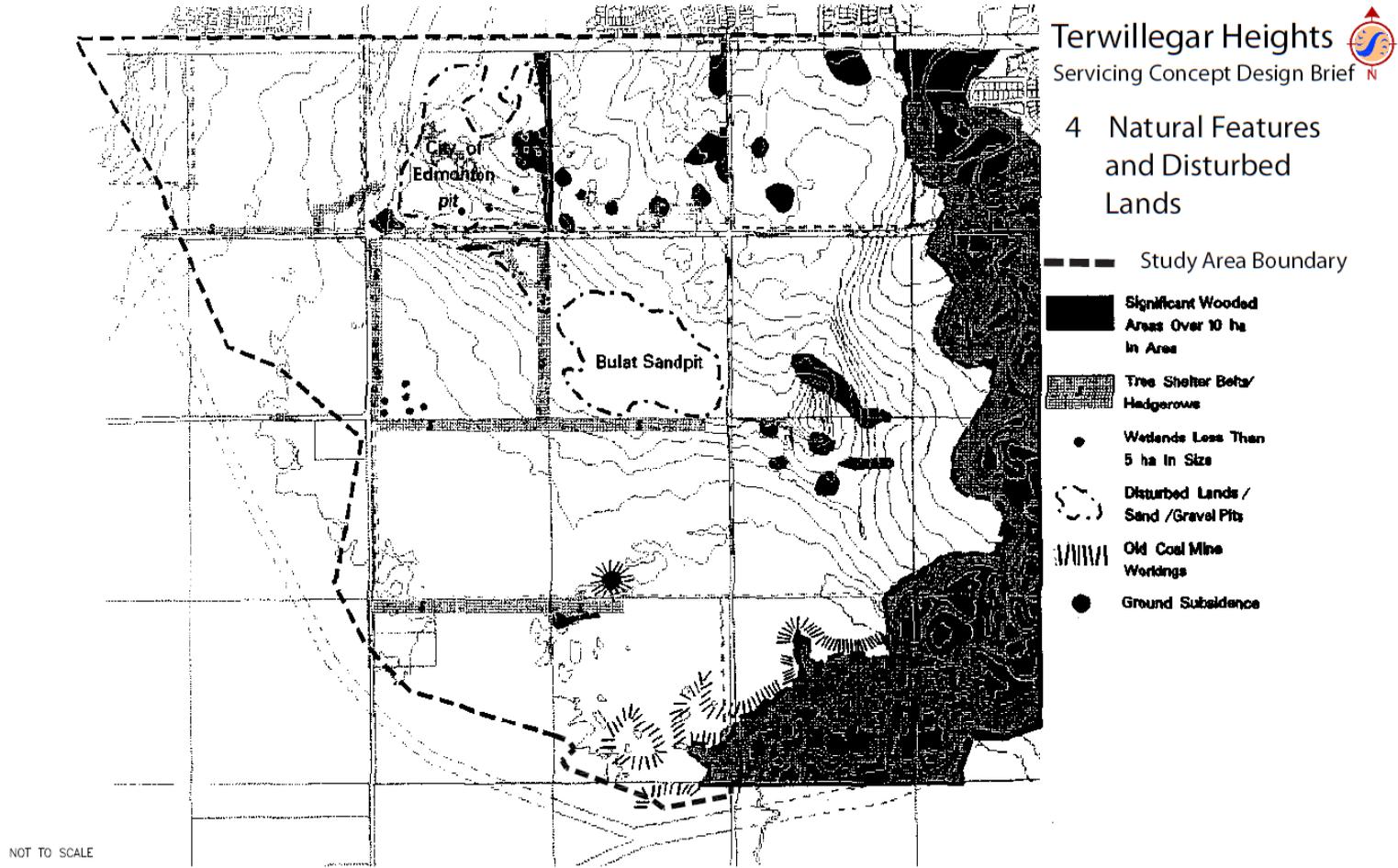


Figure **Map 4.0**  
Title **Natural Features and Disturbed Lands**

Woodlands and mixed wetlands greater than 5ha in area have been identified in the "Natural Areas located in Edmonton's Suburban and Agricultural Areas" mapping, made available by the Strategic Planning Branch of the Planning and Development Department, and through field inspection. These areas, which are suitable for incorporation as open space features during the process of subsequent NASPs and subdivision, are identified on Map 4.

Appendix I identifies requirements for a preliminary environmental inventory data base to be incorporated into the terms of reference for the preparation of subsequent NASPs.

(d) Existing Land Uses

Agriculture is the predominant existing land use in the study area. The Solicitor General's Staff College is located at the extreme northwest corner of the study area. As previously indicated, two gravel pits occupy a central and northwest portion of the study area.

Two major utility corridors abut the study area and serve as the north and south boundaries of the planning area. The southern boundary abuts the provincial Transportation and Utility Corridor which includes the proposed Outer Ring Road and the 500 kV Keephills-Ellerslie Power Transmission lines. This 300 metre right-of-way lies north of the proposed Outer Ring Road (Anthony Henday Drive). The northern boundary is occupied by the 61 metre *power transmission* right-of-way which separates Terwillegar from Riverbend. This corridor has been incorporated within the study area for servicing and planning purposes.

Amended by Editor

There are various pipeline and utility rights-of-way within the study area. A *private corporation operates* a major pipeline within the study area. This natural gas pipeline runs in an east-west direction across the southern portion of the plan and in a north-south direction along the west side of the study area. The pipeline is a 30.48 cm (12 inch) high pressure line occupying a 15.2 metre right-of-way. Assuming that adequate setback requirements are observed, the pipeline will not constrain future development in Terwillegar Heights. Appropriate development setbacks and precautions will need to be established in accordance with the City of Edmonton Interim Guidelines for Development Adjacent to Pipeline Corridors.

Amended by Editor

(e) Proposed Transportation Corridors

A six lane divided freeway is proposed within the Transportation and Utility Corridor located adjacent to the study area. The Outer Ring Road will incorporate two interchanges servicing the study area. One interchange provides access to Terwillegar and Riverbend via Terwillegar Drive while the other interchange will provide access from the Outer Ring Road to the major arterial (142 Street/Rabbit Hill Road) bisecting the study area.

The major east-west arterial roadway will be the extension of 23 Avenue from Whitemud Creek to Terwillegar Drive. Arterial roadway requirements are described in Part II, Section 1.1 of this report.

## 1.7 Policy Context/Considerations

The SCDB study area is impacted to various degrees by the following statutory plans and regulations:

(a) Edmonton Regional Metropolitan Plan (1987)

The study area is designated as a "Potential Urban Expansion Area", indicating its suitability for the development of residential, institutional and commercial development

(b) Edmonton General Municipal Plan (1991)

This plan designates the study area as a suburban expansion area with component policies to allow market forces to facilitate growth in a heterogeneous, orderly and economic manner. This includes encouragement of a town centre/district shopping centre with employment opportunities. Flexibility in designing attractive and functional neighbourhoods is encouraged, whilst protecting environmentally sensitive areas which contribute to an attractive community image.

(c) North Saskatchewan River Valley ARP (The River Valley Bylaw. 1985)

The extreme northwest tip and eastern margins of the study area bordering the top-of-the-bank of Whitemud Creek Ravine are subject to the provisions of the River Valley Bylaw, which entail the protection of the natural environment of areas below the river valley and ravine system top-of-the-bank, as well as requirements for the provision of top-of-the-bank roadways.

(d) Adjacent Area and Neighbourhood Structure Plans

The study area is bounded on the north (running from west to east) by the Henderson Estate, Falconer Heights, Carter Crest and Ogilvie Ridge Neighbourhood Structure Plans, which comprise the southern portion of the Riverbend ASP. The most convenient physical servicing tie in to a *developer's* portion (neighbourhood 1) of the study area is via Henderson Estate and Falconer Heights.

Amended by Editor

(e) Provincial Restricted Development Area (RDA). Transportation and Utility Corridor

The western and southern margins of the study area are bounded by the Provincial Restricted Development Area Regulations, administered by Alberta Environment. The Restricted Development Area is reserved as a transportation and utility corridor and the proposed Outer Ring Road (Anthony Heday Drive) and Terwillegar Drive extension will occupy a major portion of the RDA.

## PART II

### MUNICIPAL SERVICING INFRASTRUCTURE REQUIREMENTS

#### 1. ROADWAYS AND TRANSPORTATION FACILITIES

The following design criteria for roadway and transportation facilities have been supplied by the Transportation Planning Branch of the Transportation Department.

##### 1.1 Arterial Roadways

(a) Arterial Roadway Network

The study area will be served by the following arterial roadways:

(i)..... 23 Avenue

(ii)..... 142 Street (*Rabbit Hill Road*)

Amended by Editor

(iii) ..... Riverbend Road

(iv)..... Terwillegar Drive

(iii) ..... Outer Ring Road (O.R.R.)/Anthony Henday Drive

The general configuration of the arterial roadway network is depicted in Map 5.

(b) Arterial Network Constraints

A number of elements of the arterial roadway network have been defined by previous planning efforts and existing development patterns on the periphery of the study area. The Transportation Department regards the following elements as fixed, with no latitude for change:

(i) ..... Alignment of 23 Avenue.

(ii)..... Alignment of Terwillegar Drive.

(iii) ..... Alignment of Outer Ring Road (O.R.R.).

(iv)..... Intersection of 142 Street (*Rabbit Hill Road*) and the *private corporation's* Right-of-Way.

Amended by Editor

(v) ..... Intersection of Riverbend Road and the *private corporation's* Right-of-Way.

(vi) ..... Intersection of 142 Street (*Rabbit Hill Road*) and Outer Ring Road.

(c) Arterial Right-of-Way and Lane Requirements

The right-of-way and lane requirements for arterials serving the study area are as follows:

Map 5: Major Roadway Network (July 16, 2012)

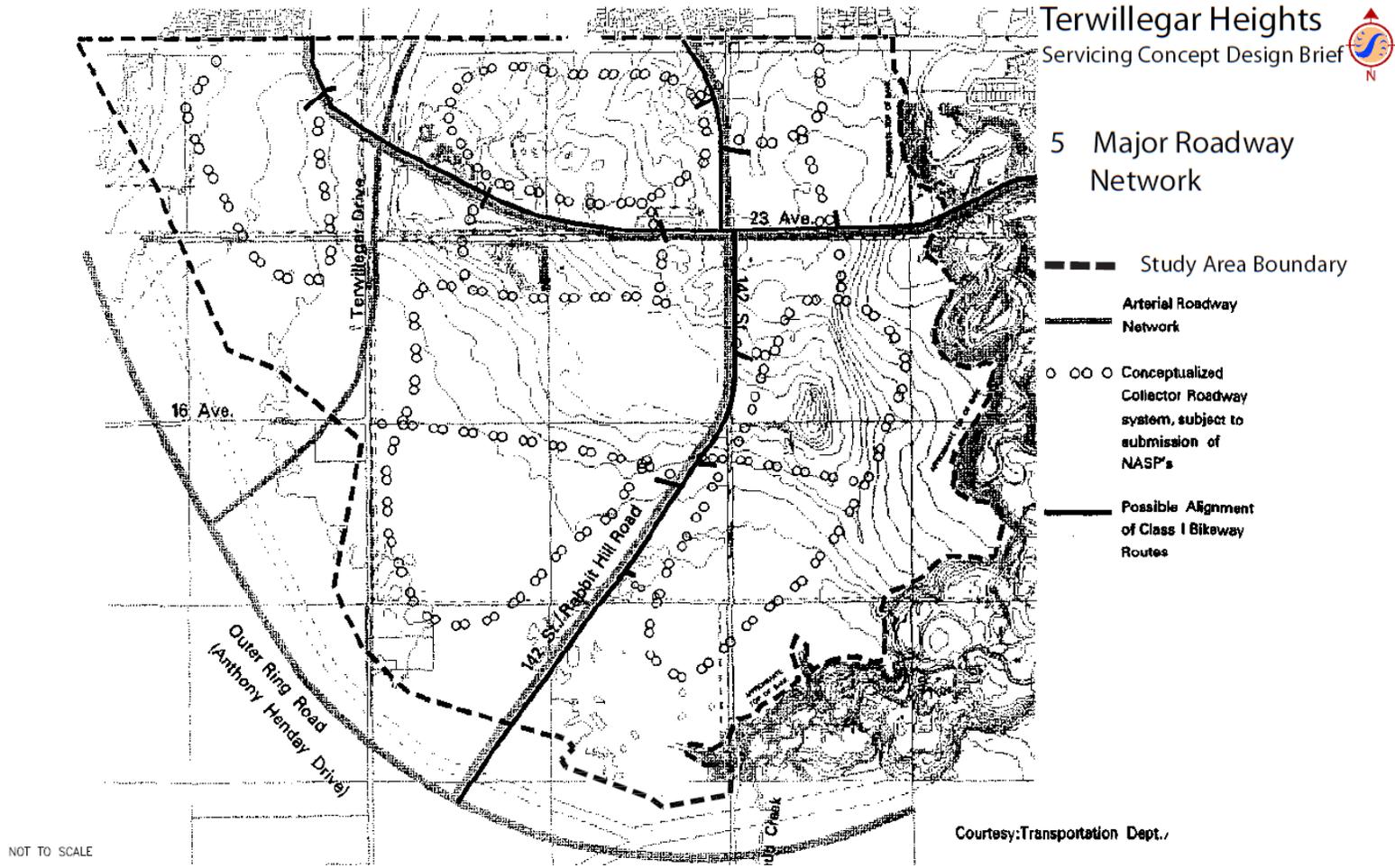


Figure **Map 5.0**  
 Title **Major Roadway Network**

| Roadway  | Section  | Through Lanes | Nominal Right-of-Way |
|--|--|---------------|----------------------|
| Riverbend Rd. 142 Street ( <i>Rabbit Hill Road</i> ) | <i>Power Transmission</i> ROW to Terwillegar Dr. | 4             | 30 - 44 m            |
|  | <i>Power Transmission</i> ROW to 23 Avenue       | 4             | 37 m                 |
|  | 23 Ave. to Outer Ring Road                       | 6             | 44 m                 |
| 23 Avenue  | Blackmud Creek to Terwillegar Drive              | 6             | 44 m                 |
| Outer Ring Rd.                                       | Blackmud Creek to River Rd.                      | 6             | Within R.D.A.        |
| Terwillegar Dr.                                      | <i>Power Transmission</i> ROW to Outer Ring Road | 6             | Varies               |

In addition to the above, there is a requirement to provide adequate channelization at arterial and collector intersections with corresponding right-of-way requirements. These specific channelization details will be defined at the Neighbourhood Area Structure Plan (N.A.S.P.) stage when specific land use distributions are more definitively proposed.

(d) Access Criteria

There shall be no direct access to arterial roadways from individual residential properties. Direct access to arterials from commercial properties may be available subject to site specific conditions established by the Transportation Department.

Exceptions to the above are Terwillegar Drive and the Outer Ring Road, where direct access will not be permitted for any land use as these two facilities will ultimately be developed to expressway standards.

(e) Truck Route/Dangerous Goods Route (DGR) Designations

The following roads are or will be designated as Truck Routes under Bylaw 5590:

- (i) ..... 23 Avenue
- (ii)..... Terwillegar Drive
- (iii)..... Outer Ring Road

The Outer Ring Road has been designated as a Dangerous Goods Route (DGR).

(f) Noise Attenuation

The City's requirements for noise attenuation will be addressed at the subdivision stage of development to the satisfaction of the General Manager of the Transportation Department. Any residential lots abutting arterial roadways will have to be of sufficient depth to accommodate any berming or other noise attenuation facilities as determined by the Transportation Department at the subdivision stage.

(g) Construction Staging Criteria

All stages of arterial roadways required to serve new developments must be designed and constructed to include a 20-year pavement life, sidewalk on at least one side and lighting to arterial roadway standards.

**1.2 Collector Roadways**

The collector roadway network planned for the subject area must meet the following minimal criteria:

(a) Number of Collectors

The number of collectors to be provided in the plan area will be a function of their expected traffic load and spacing.<sup>3</sup>

There should be sufficient collectors in each neighbourhood so as to maintain the traffic load on each at 5000 vehicles per day or less.

Table 3 provides estimates of the collectors required to connect each neighbourhood or block of neighbourhoods to the defined arterial network.

Where it is not feasible to meet the traffic load criterion for a collector, the collector should be oversized at critical locations (typically at neighbourhood entrances) to minimize operational problems.

**TABLE 3**

**Neighbourhood Access Requirements**

| <b>Neighbourhood Phasing</b> | <b>Estimated Max. Dwelling Units<sup>4</sup></b> | <b>Estimated Daily Traffic</b> | <b>Required Collector Accesses</b>                   |
|------------------------------|--|--------------------------------|--|
| 1                            | 1,751  | 16,100                         | 3 (2 to Riverbend Rd., 1 to Terwillegar Dr.)         |
| 2a                           | 1,305  | 12,000                         | 3 (2 to 23 Ave., 1 to 142 St.)                       |
| 2c                           | 1,070  | 9,650                          | 2 (1 to 23 Ave., 2 to 142 St.)                       |
| 2b, 3, 5                     | 4,569  | 42,000                         | 9 (3 to 23 Ave., 4 to 142 St., 1 to Terwillegar Dr.) |
| 4a, 4b/2d                    | 3,501  | 32,200                         | 7 (3 to 23 Ave., 4 to 142 St.)                       |

<sup>3</sup> Consideration may be given to modifying these standards in their application at the NASP and subdivision stages of planning if applicants propose innovative neighbourhood designs that could justify departures from current standards.

<sup>4</sup> These maximums may not be reached as they are subject to the build-out characteristics described in the population projection (see Part IV, Section 3.2 of this report)

(b) Location of Collectors

Edmonton Transit's bus service will operate primarily on the collector roadway network. As such, it is necessary for the collector network to penetrate each neighbourhood. Ideally, the collector roadway network should be designed to be as close as possible to each property and no further than 400 metres from each property.

The design standards for collector roadways should be sufficiently flexible to allow for variations in roadway functions as determined by land uses and their distribution within neighbourhoods. (MPC Amendment February 13,1992).

Land uses such as schools, senior citizen's housing and multi-family housing, which are high transit passenger generators, should be located to abut the collector and arterial roadway network to minimize the walking distance and potential pedestrian/vehicular conflicts.

As noted in Table 3, a collector connection to Terwillegar Drive will be required from neighbourhood phases 1 and 4a/4b/2d with the intersection to be located in the vicinity of 21 Avenue. The exact configuration of the interchange at this location is yet to be determined by the Transportation Department.

(c) Access to Collectors

Access will be permitted to all collectors from any land use, except where such access may conflict with a transit zone or where it will create operational problems, such as at neighbourhood entrances.

(d) Emergency Access

Each subdivision, or stage thereof, shall have at least two permanent points of access.

(e) Interim Access

If permanent collector roadway access cannot be provided, then an interim (i.e., temporary/permanent) access configuration may be provided subject to the satisfaction of the Transportation Department. All interim access roads must, as a minimum, include a 20-year pavement design, sidewalks, lighting and drainage.

(f) Top-of-the-Bank Roadway Requirement

A top-of-the-bank roadway system will be provided along Whitemud Creek Ravine in accordance with City policy. This will provide convenient and safe public access to a natural amenity area for the public and buffer the ravine lands from more intense development at its edge, as well as preventing encroachment/disturbance on public land.

In instances where geotechnical, engineering, planning or environmental circumstances indicate that it is not appropriate to locate the roadway along the top-of-the-bank, a public upland setback and walkway will be provided along the ravine. The setback width will be a minimum of 7.5 metres. However, a greater width may be required in some areas because of safety and/or stability problems and concerns. A detailed geotechnical study will provide the necessary information as to additional setback requirements and walkway alignment.

The upland setback and walkway alignment, width and surfacing will be further defined at the NASP stage.

(g) Pedestrian Circulation

All collector roadways should include a sidewalk on each side. In addition, walkways must be provided within each neighbourhood to allow for convenient pedestrian access to neighbourhood amenities, schools and bus stops. Where required, top-of-bank walkways should consist of a 1.5 m wide shale path designed to encourage pedestrian use only.

All local streets shall include a sidewalk on at least one side, but preferably on both sides in order to maximize pedestrian convenience, comfort and safety. Wherever possible, walkways should cross arterial and collector roadways at intersection locations, rather than mid-block.

(h) Walkway/Bikeway System

A safe, enjoyable and integrated bicycle/walkway system is important in accommodating the needs of the community. In addition to the walkways provided in conjunction with the roadway network, supplementary walkways will be provided to connect various destination points within and between neighbourhoods. These will include, for example, parks and schools, playgrounds, employment centres, natural areas, recreation facilities, ravine and river valley lands.

Each neighbourhood shall contain a designated on-street bicycle route which connects to the arterial roadway network or other designated bicycle facilities. Where it is necessary to provide a joint use (pedestrian/bicycle) path, such facility shall be at least 3.0 metres wide to minimize pedestrian/bicycle conflicts.

Although bicycle and pedestrian movements will be accommodated within roadway rights-of-way, where this cannot be accomplished, such facilities will incorporate interblock residential connections, utilization of utility rights-of-way and pipeline corridors and development along the ravine and river valley areas. Also, there is a possibility that some of the lands in the RDA may be accessed by the walkway network.

In accordance with the Bicycle Transportation Plan, Class I bikeways located along arterial roadways will access future neighbourhoods via collector roadways and walkway connections.

Walkway development will be further detailed and defined in the Neighbourhood Area Structure Plans. The owners/developers will be responsible for providing the walkway system in accordance with civic policy and they will be constructed at the time of subdivision.

Map 5 indicates possible alignments for Class I bikeway routes and Maps 12 and 14 indicate conceptualized walkway linkages from neighbourhood cells to school/ park sites.

(i) School Site Drop-off Bays

All school sites will be serviced with on-site student drop-off bays. These facilities are essential for safety purposes and are also needed to prevent traffic congestion. All utilities within the roadway right-of-way shall be constructed in such a manner as to minimize disruption of such services when the drop-off bays are constructed.

## **2. DRAINAGE NETWORK**

In August 1991, IMC Consulting Group Inc. was retained by the City of Edmonton Transportation Department, Drainage Branch, to prepare Phase 1 - the Preliminary Terwillegar Heights Drainage Area Master Plan. This report has been summarized as a basic component of this Servicing Concept Design Brief. The purpose of this preliminary phase of the Drainage Area Master Plan is to provide the framework for the development of stormwater management and sanitary trunk systems in the Terwillegar area. In conjunction with this report, a hydrogeotechnical study for the Terwillegar area was completed by A.D. Williams Engineering Ltd. (see Appendix II)

For a full appreciation of the servicing proposals and preliminary identification of geotechnical constraints affecting the study area, please refer to the above-noted reports.

### **2.1 Sanitary Drainage System**

In analyzing sewer servicing for the Terwillegar area, all design parameters used in the Drainage Area Master Plan were based on the 1990 edition of the City of Edmonton Servicing Standards Manual. The objectives outlined in the City's Drainage Master Plan were also reviewed. A conservative figure of 50 people per gross hectare was used as a design population for generating sanitary flows. An allowance was made to accept 1.12 cm of sanitary flow from the west portion of the Heritage Valley area to the south of the study area.

(a) Drainage Basins

With the natural ridge running from east to northwest, two distinct natural drainage basins are created (see Map 6). The Drainage Area Master Plan further splits the area south of the ridge into two additional basins, utilizing the natural break that would be created by the Terwillegar Drive right-of-way in the future. The creation of these three basins (A, B and C) allows for a more logical analysis of the sanitary and storm servicing. The largest gravel pit, the Bulat (*Privately Owned*) pit, was included in Basin C to provide a conservative design scenario.

Amended by Editor

(b) Existing Services

There are five existing sanitary outlets available to service the Terwillegar area. A 1350 mm sanitary sewer is located on Riverbend Road at the north *the power transmission* right-of-way and will service Basin A/B. There are two existing sanitary sewers, a 375 mm sewer located at Rabbit Hill Road and a 450 mm line northeast of the study area, and two proposed sewers which will service Basin C. All of the existing and proposed sewers ultimately drain to the Gold Bar Wastewater Treatment Plant. There may potentially be a Regional Trunk Sanitary Sewer built south of the study area to direct flows to the Regional Wastewater Treatment Plant. The purpose of the Drainage Area Master Plan is to review the flexibility of the proposed sanitary alternatives with regards to redirecting flows to the possible regional line.

Amended by Editor

(c) Drainage Area Master Plan Proposals

The Drainage Area Master Plan reviewed three alternatives for Basin A/B and only one alternative was analyzed for Basin C. The first alternative for Basin A/B looked at an entirely gravity system. This resulted in some extreme trunk depths (up to 11 m) in the northwest portion of the study area, which would cause construction problems as soil conditions appear to be poor at deeper depths. This alternative also had little flexibility for future redirection of flows to a possible Regional Trunk line in the Transportation and Utilities Corridor. The overall cost for this alternative was estimated at \$3,046,980.

The second Basin A/B alternative looked at a gravity system with one lift station located in the southwest portion of the study area. The addition of this lift station raised the gravity system by as much as 3 to 4m, thereby possibly avoiding the poor soil conditions which may be encountered in the first alternative. This alternative has greater flexibility for staged development, as well as for future redirection of flows to the Regional line. The cost of this alternative was estimated at \$2,985,250.

Map 6: Natural Drainage Basins (July 16, 2012)

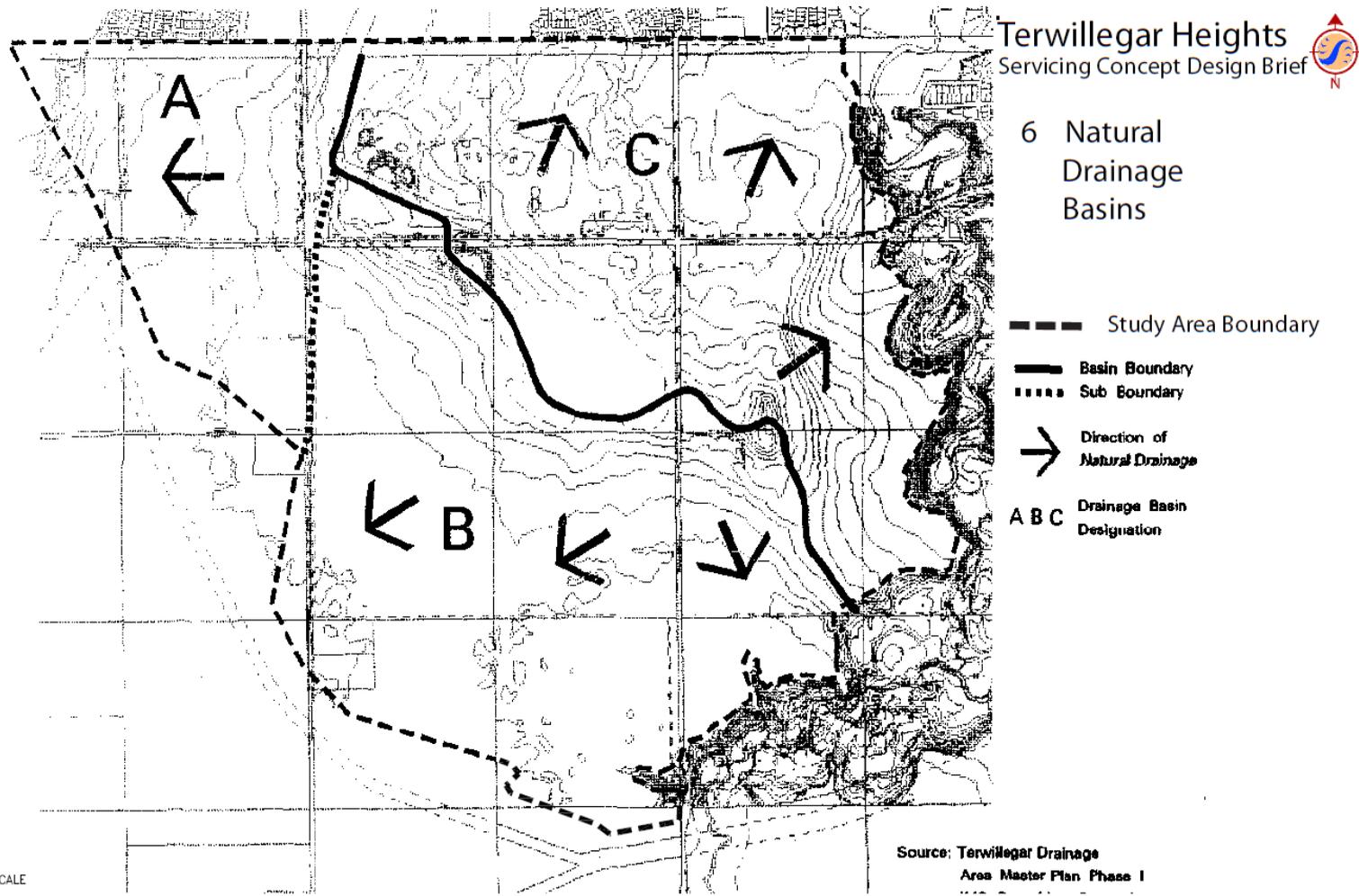


Figure **Map 6.0**  
Title **Natural Drainage Basins**

Alternative three consisted of a gravity system with two lift stations, located in the southwest and southeast portions of Basin A/B. The estimated overall cost was \$3,294,150. This alternative has the flexibility of rerouting further flows to the Regional trunk line over Alternative 2, as well as having greater flexibility for staged development.

The one alternative for Basin C utilizes an entirely gravity system. The possibility of using a lift station was reviewed, but it was found that no benefit to the overall scheme was achieved. All flows from Basin C were directed to the existing and proposed outlets to the north. The trunk cost for the Basin C alternative was estimated at \$587,500.

Map 7 shows the overall recommended sanitary servicing scheme for Terwillegar. This map is a simplified summary map of the consultant's detailed proposals. This scheme utilized Alternative 3 as the recommended alternative for Basin A/B. This sanitary servicing concept was arrived at for the following reasons:

- (i) It is possible to reroute 293 ha of flow to the Regional trunk at any time during and after development.
- (ii) The depth of the trunk system downstream of Manhole #15 is shallow, thereby avoiding the poor soil conditions at greater depths. This shallow trunk system eliminates a large unknown associated with the cost of installing the trunks within the poor soil region.
- (iii) The cost of operation and maintenance for each of the Basin A/B alternatives was considered to be relatively equal over the long term.
- (iv) This servicing scheme has the most flexibility for staging development with the least amount of initial cost.
- (v) The surcharge on the existing system was shown to be minimal.
- (vi) Flows from a portion of possible future development areas southwest of the study area and T.U.C. (Heritage Valley) area can be accommodated, as the existing sewer system in Riverbend was "oversized" to accommodate both Terwillegar Heights and Heritage Valley flows, within a greater southwest Edmonton context.

Map 7: Sanitary Servicing Recommended Alternative (July 16, 2012)

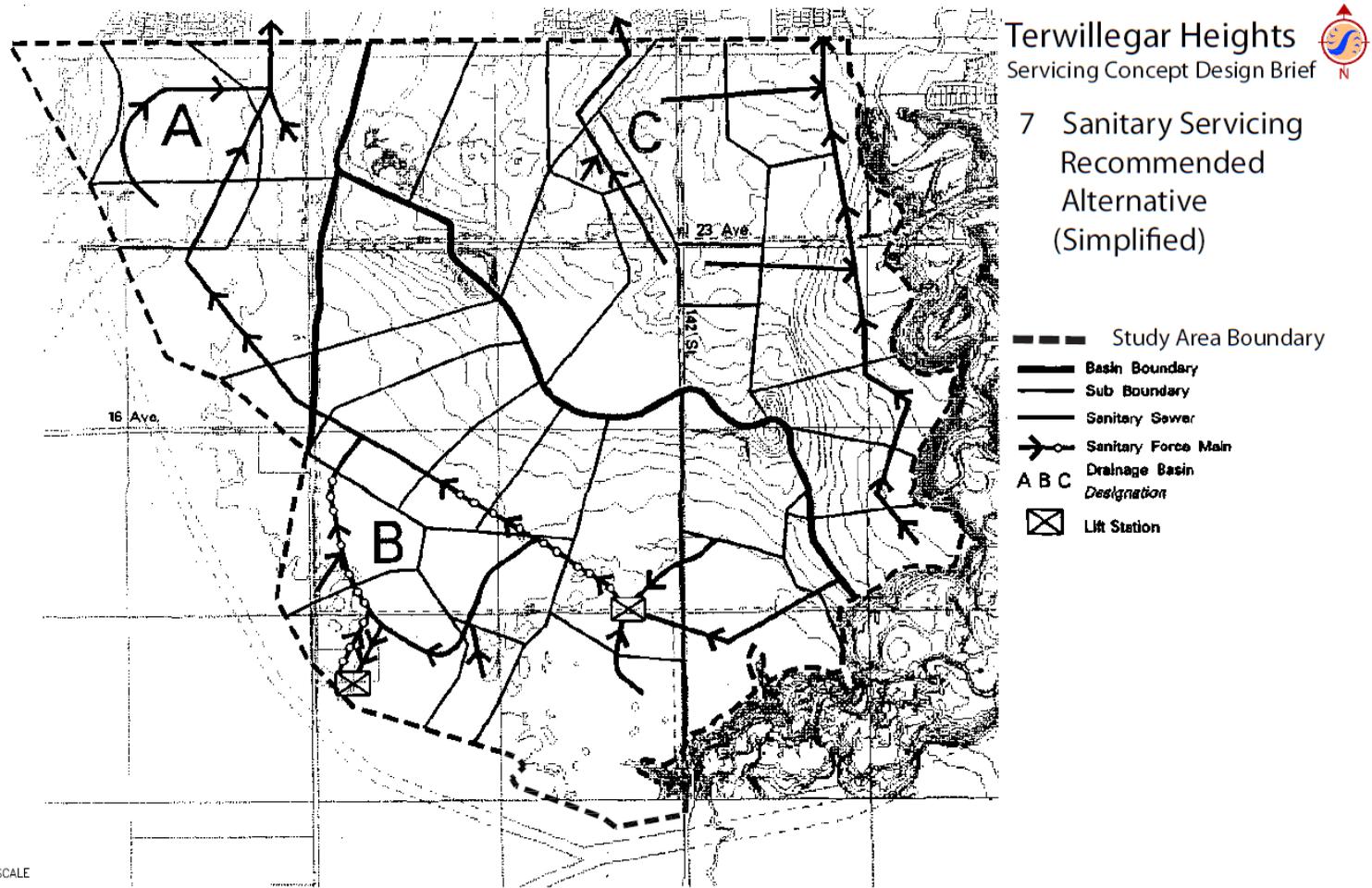


Figure **Map 7.0**  
Title **Sanitary Servicing Recommended Alternative**

A cost comparison of the three Basin A/B alternatives and the one Basin C alternative is shown in Table 4, below.

**TABLE 4  
Cost Comparison of Sanitary Alternatives**

**BASINS A/B**

|              | <b>Alternative 1</b> | <b>Alternative 2</b> | <b>Alternative 3</b> | <b>Basin C</b>   |
|--------------|----------------------|----------------------|----------------------|------------------|
| Gravity      | 3,046,980            | 1,675,650            | 1,257,150            | 587,500          |
| Station 1    | -                    | 600,000              | 600,000              | -                |
| Forcemain    |                      | 145,600              | 145,600              | -                |
| Storage      |                      | 564,000              | 216,000              | -                |
| Station 2    | -                    | -                    | 600,000              |                  |
| Forcemain    | -                    | -                    | 127,400              | -                |
| Storage      | -                    | -                    | 348,000              | -                |
|              |                      |                      |                      |                  |
| <b>TOTAL</b> | <b>\$3,046,980</b>   | <b>\$2,985,250</b>   | <b>\$3,294,150</b>   | <b>\$587,500</b> |

Source: IMC Consulting Group Inc.

## 2.2 Storm Water Drainage System

All design parameters for the storm system analysis utilized the 1990 edition of the City of Edmonton Servicing Standards Manual as well as the objectives of the City's Drainage Master Plan. The proposed drainage basins followed those outlined in the sanitary servicing section.

### (a) Design Assumptions

The following assumptions were made in the storm water system analysis:

- (i) At the direction of the Drainage Branch, based upon the IDE Engineering Outer Ring Road Drainage Study, it was assumed that the storm water systems for both Terwillegar Drive and the Transportation and Utilities Corridor are independent of the Terwillegar Heights study area. Therefore, no allowance for storm contributions from these two road right-of-ways has been allowed for in the Terwillegar Heights storm water management system. However, the preferred alternative should have the flexibility of accommodating drainage from both these roadways, if required.

- (ii) The Drainage Branch also directed that the complete study area should contain some means of detaining a 120 mm major rainfall. This is contrary to the 1982 Ecos Whitemud/Blackmud Creek Watershed Plan which recommends that major flow can be discharged at selected points to the North Saskatchewan River and Whitemud Creek without detention, and that only minor flows need be detained.
- (iii) No allowance has been made for weeping tile flow in the design of the storm sewer due to the negligible impact of such flows.
- (iv) Pumping storm water discharge from a lake is acceptable for those lakes where a gravity outlet system would result in unreasonable depths and not be cost-effective.
- (v) The Rabbit Hill pit will be filled and reclaimed as developable land.
- (vi) No major or minor flow can be discharged to the North Saskatchewan River upstream of the E.L. Smith Water Treatment Plant
- (vii) No allowance has been made for accepting flows from the Heritage Valley Area. It should be noted that all sanitary flows will be directed to the waste water treatment plant, whereas storm flows from Heritage Lakes can be directed to Whitemud Creek, the closest major natural drainage course.

(b) Existing Services

There are three existing storm outlets which have capacity to service portions of the study area. The 30th Avenue storm trunk line, a 5100 mm sewer approximately 35 m to 40 m deep has an existing drop manhole structure northeast of Terwillegar. A 1650 mm storm sewer is located at Bulyea Road and Rabbit Hill Road and will be extended as a 600 mm pipe through Neighbourhood 9 to service Terwillegar. The third sewer is a 1350 mm pipe located at Riverbend Road and the north *power transmission* right-of-way. Both the second and third outlets ultimately connect to the 30th Avenue storm trunk line, which discharges into the North Saskatchewan River downstream of the E.L. Smith Water Treatment Plant

Amended by Editor

(c) Drainage Area Master Plan Proposals (see Map 8)

The Drainage Area Master Plan reviewed three storm servicing alternatives for Basins A and B, and two alternatives for Basin C. The first Basin A/B alternative looked at one lake for Basin A and four lakes in Basin B. Two lakes in Basin B would be drained by gravity to Whitemud Creek. The remaining two lakes in Basin B would use a combination of pumping and gravity to direct discharge to the proposed lake in Basin A. This lake would outlet to the 1350 mm pipe at Riverbend Road. The estimated overall cost of this storm water trunk and lake system is \$13,610,000. This alternative allows for development to proceed along the flanks of Whitemud Creek independently of the other areas. However, if development were to occur initially in the central portion of the study area the developer would have to carry a considerable off-site trunk sewer over expenditure or provide an interim off-site alternative.

Map 8: Storm Servicing Recommended Alternative (July 16, 2012)

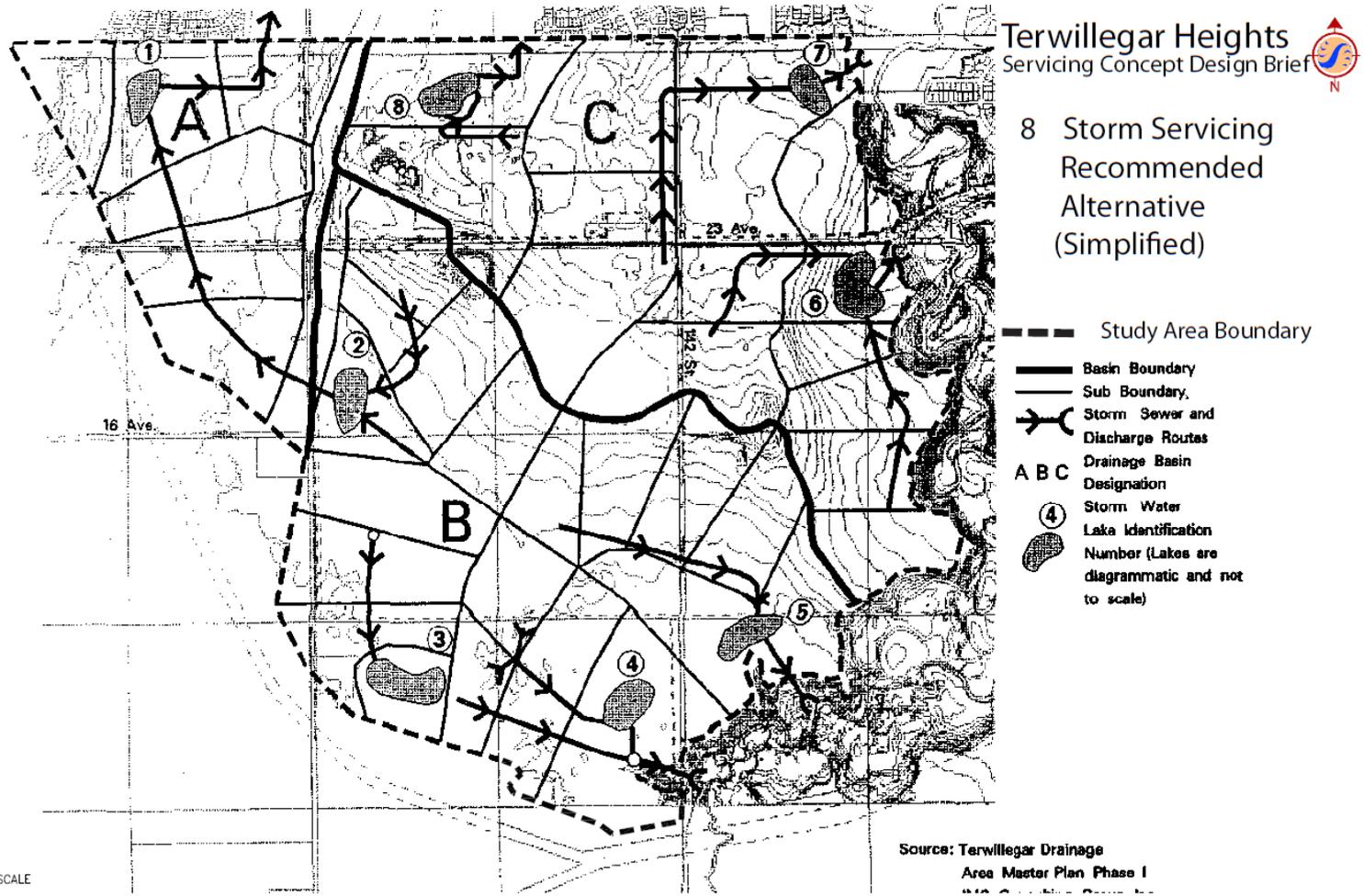


Figure **Map 8.0**  
Title **Storm Servicing Recommended Alternative**

The second A/B alternative completely separates the A and B basins. The same number of lakes are retained as in the first alternative. However, all of Basin B would be ultimately discharged to Whitemud Creek. Some pumping via a forcemain is still required in Basin B. The cost of this alternative is estimated at \$13,850,000. As with the first alternative, considerable off-site trunk sewer over expenditure or an interim off-site alternative would be required if development were to proceed initially in the central part of the study area.

The third alternative for Basin A/B proposes the same number and locations of lakes. However, only one lake in Basin B directs discharge, via gravity, to the lake in Basin A. The remaining Basin B lakes ultimately drain to Whitemud Creek, but the need for pumping is eliminated. This alternative has an estimated cost of \$13,120,000. Off-site over expenditures or interim off-site alternatives would also be incurred if central development were to occur first. However, the cost of the trunk sewer between the connecting A and B basin lakes is only slightly higher than the cost of constructing the Basin A trunks with no flow from Basin B. Therefore, having a contributing flow from Basin B to A would allow the trunks between the two lakes to be cost-shared.

The first Basin C alternative looked at a three lake scenario reflecting natural topography. Two lakes would discharge into Whitemud Creek, and the third lake would discharge into the future 600 mm pipe to the north. The estimated cost for this alternative is \$9,000,000 and has the advantage that all three lakes are independent of each other.

The second alternative for Basin C deletes one lake, and instead, directs minor flow from the sub-basin to the drop structure on the 30 Avenue trunk sewer. The overall estimated trunk cost for this alternative is \$9,710,000. Although this alternative deletes one lake and outfall to Whitemud Creek, the cost of the required sewer tunnel is considerable. Also, land would still be required for a dry pond to attenuate major drainage prior to entering Whitemud Creek.

A cost comparison of the three storm alternatives for Basin A/B and the two alternatives for Basin C is show in Table 5, below.

**TABLE 5**

**Storm Servicing Alternatives Cost Comparison**

|                     | <b>Basin A/B</b> | <b>Alternative 1</b> | <b>Alternative 2</b> | <b>Alternative 3*</b> |
|---------------------|------------------|----------------------|----------------------|-----------------------|
| 1. Trunks           | \$4,315,000      | \$4,485,000          | <b>\$4,660,000</b>   |                       |
| 2. Lift stations    |                  | 300,000              | 500,000              | N/A                   |
| 3. Lakes            |                  |                      |                      |                       |
| (a) Land            |                  | 4,060,000            | 3,965,000            | <b>3,820,000</b>      |
| (b) Excavation      |                  | 3,405,000            | 3,370,000            | 3,135,000             |
| (c) Inlet/Outlet    |                  | 565,000              | 565,000              | 565,000               |
| (d) Shore Treatment |                  | <b>400,000</b>       | 390,000              | 375,000               |
| (e) Landscaping     |                  | <b>565,000</b>       | <b>575,000</b>       | <b>565,000</b>        |
| <b>TOTAL</b>        |                  | <b>\$13,610,000</b>  | <b>\$13,850,000</b>  | <b>\$13,120,000</b>   |

| <b>Basin C</b>      | <b>Alternative 1*</b> | <b>Alternative 2</b> |
|---------------------|-----------------------|----------------------|
| 1. Trunks           |                       | \$5,460,000          |
| 2. Lakes            |                       |                      |
| (a) Land            | <b>2,620,000</b>      | 2,045,000            |
| (b) Excavation      | 2,115,000             | 1,445,000            |
| (c) Inlet/Outlet    | 515,000               | 280,000              |
| (d) Shore Treatment | 245,000               | 210,000              |
| (e) Landscaping     | <b>325,000</b>        | 270,000              |
| <b>TOTAL</b>        | <b>\$9,090,000</b>    | <b>\$9,710,000</b>   |

Source: IMC Consulting Inc.

\*Recommended alternatives

Map 8 shows the overall recommended storm servicing scheme for the study area. This concept recommends using Alternative3 for Basin A/B and Alternative 1 for Basin C. It should be noted that all storm lakes are located at the peripheries of neighbourhoods as these are the most low laying locations for gravity drainage.

Table 6 illustrates the detailed sizing levels and areas contributing to each lake. This scheme was recommended for the following reasons:

- (i) It is the most economic of the alternatives reviewed.
- (ii) Average depth ranges are in the order of 4-5 m, allowing conventional construction techniques to be used.

- (iii) The concept has staging flexibility with the ability to use temporary or permanent piping connections to reduce the amount of off-site trunk construction costs.
- (iii) The lake basin areas can be economically developed fully within a ten-year period.
- (iv) Should it be required, this storm concept would be available to service Terwillegar Drive and/or the Transportation and Utilities Corridor.
- (v) Five of the eight lakes can be constructed with emergency swales to handle storm flows that exceed the design high water level.

**TABLE 6**  
**Recommended Storm Servicing Lake Details**

| Lake No.     | Drainage Area(Ha) | Storage Volume (m2) | Lake Area At NWL (Ha) | Lake At HWL (Ha) | Existing Ground Elevation | NWL Elevation | HWL Elevation |
|--------------|-------------------|---------------------|-----------------------|------------------|---------------------------|---------------|---------------|
| 1            | 119.0             | 142,000             | 4.0                   | 5.6              | 678.5                     | 675.0         | 678.0         |
| 2            | 103.0             | 123,600             | 3.2                   | 4.8              | 686.0                     | 681.8         | 685.0         |
| 3            | 69.7              | 83,640              | 2.0                   | 3.4              | 685.0                     | 680.6         | 684.0         |
| 4            | 106.0             | 127,200             | 2.6                   | 4.3              | 684.0                     | 679.3         | 683.0         |
| 5            | 135.0             | 161,900             | 3.9                   | 5.7              | 683.0                     | 678.6         | 682.0         |
| 6            | 163.3             | 196,000             | 5.6                   | 7.5              | 673.0                     | 669.5         | 672.5         |
| 7            | 129.6             | 145,800             | 4.1                   | 5.7              | 677.0                     | 672.5         | 675.5         |
| 8            | 59.9              | 71,900              | 2.0                   | 3.1              | 690.0                     | 686.7         | 689.5         |
| <b>TOTAL</b> |                   |                     | <b>27.4</b>           | <b>40.1</b>      |                           | <b>-</b>      | <b>-</b>      |

NWL = Normal Water Level

HWL = High Water Level

Source: IMC Consultina Inc.

### 2.3 Geotechnical Considerations

A hydrogeotechnical evaluation of the study area, as summarized in Appendix II, was conducted by A.D. Williams Engineering Ltd. The scope of the work included office research and field drilling programs to determine the soils and groundwater conditions relevant to the residential development of the area. The main objectives of the evaluation were to determine the suitability of the site conditions with respect to the proposed development and to provide preliminary design parameters and construction guidelines appropriate for the proposed development.

Previous geotechnical reports, studies, maps and logs were collected. A site reconnaissance was conducted to observe the general site conditions. Fifteen boreholes were drilled in September, 1991, at strategic locations to supplement existing borehole information. Standpipe piezometers were installed in the boreholes and monitored for groundwater levels.

The A.D. Williams' report concludes that generally the soils and groundwater conditions are suitable for residential development, and that normal design and construction practices can be used. The ridge that runs east to northwest consists of very sandy material and will require special consideration when designing and constructing utility infrastructure. Special construction techniques may also be necessary in those areas of sand below the water table. The sand, silt and sand and gravel deposits present at about the 11 m depth in the northwest portion of the study area may pose some difficulty for construction of deep trunk sewers and either special construction techniques, or raising of the sewer to avoid these soils condition, is recommended. Further analysis will also be required for those stormwater ponds adjacent to Whitemud Creek, in order that the proper setback distances may be determined.

The A.D. Williams' report also recommends that it may not be practical or economical to fill in the Bulat (*Privately Owned*) Pit. The Bulat pit may be best suited for private open space uses. In addition, the report identified some abandoned underground coal mines in the southeast corner of the study area which may pose some design constraints, requiring further geotechnical analysis.

Amended by Editor

## **2.4 Recommendations For Future Drainage Studies**

Subsequent to Phase 1 of the Drainage Area Master Plan, Phase 2 study will need to be completed. This Phase 2 study can be a "stand-alone" report addressing in further detail the concept presented in the Phase 1 report, or it can be associated with Neighbourhood Design reports and provide a detailed discussion of the issues associated with separate neighbourhoods within the Terwillegar Area.

The following is a series of recommendations for areas of review for subsequent reports.

- (i) Future studies should use NASP population statistics to better reflect actual flows generated.
- (ii) Further evaluation at the NASP stage of development of the sanitary storage and stand-by power associated with lift stations should occur. The risks associated with lift station failure should be reviewed.
- (iii) Assumptions about the storage requirements for the eight stormwater lakes will need to be reviewed. This may result in an increase in the projected area used for residential development. The possibility of increasing the discharge rate to Whitemud Creek should certainly reduce the storage requirements for Lakes 3, 4, 5, 6 and 7, although the issue of creek bank erosion must be addressed.

- (iv) Further review, in accordance with the Watershed Study, should be performed to evaluate the major flow storage for all of the lakes. The possibility of combining the major flows, or a portion of the major flows, from Lakes 1 and 2 could substantially reduce storage requirements.
- (iv) To reduce land requirements for lakes, further studies at the NASP stage should review the potential for either a lake/dry pond combination or a modified dry pond that attenuates events smaller than the present minimum of 1 in 2 year design standard.

Future studies should also review the possibility of associating lake/dry pond combinations with school/park sites. This evaluation must address the school boards' concerns associated with lakes adjacent to school sites. The question of dual uses of dry pond facilities will need to be subsequently negotiated between the *Parkland Services Branch*, the school boards and the Drainage Branch.

Amended by Editor

- (v) Drainage from the Transportation and Utility Corridor (TUC) will be addressed in future, detailed drainage reports.
- (vi) This Phase 1 report reviewed the gravel pit areas assuming them to be reclaimable and developable; however, further studies must review this assumption in detail. Based on the analysis in the hydrogeotechnical report, complete backfilling of the Bulat pit would not be practical or economical. A possible use for the Bulat pit would be for private open space purposes. However, these recommendations should not preclude innovative development alternatives involving partial or full reclamation of the pits, subject to further study and review.
- (vii) Detailed design and preparation of NASP's and subsequent subdivision design must endeavour to maintain the routes chosen for minor/major storm drainage and for sanitary sewer routes. It will not always be feasible to be able to maintain all routes; however future planning and design must be cognizant of the preferred routes. Existing natural environment constraints and vegetation cover should also be considered in the planning and design of the final routes.
- (viii) Further geotechnical studies should be performed by appropriate landowners at the next stage of review to evaluate in greater detail issues pertinent to areas requiring more detailed study (eg. coal mining areas, gravel pits and unstable ravine lands). Such studies could be done in conjunction with delineation of the top-of-the-bank at the NASP stage of development.
- (ix) An Environmental Impact Assessment should be completed in conjunction with the Phase 2 report or at the Neighbourhood Design Report stage to address the impact that flows from Terwillegar would have on the Whitemud Creek.
- (x) The form and shape of the lakes indicated in this report are schematic only. Further assessment on the shape of these lakes should be done at the Neighbourhood Design Report stage and Neighbourhood Area Structure Plan stage in order that these detention/retention facilities will be visually pleasing and integrated with the surrounding community.

- (xi) A review of costs should be performed for the Terwillegar area to set a Permanent Area Contribution rate for development. The impact that the development of the Terwillegar Area would have on the existing Riverbend PAC system should also be reviewed.

### 3. WATER SUPPLY

The following information and preliminary servicing requirements have been supplied by the Water Branch of the Public Works Department

(a) Existing Water Supply Facilities

There are no water supply mains within the study area. Existing watermains terminate at the northern boundary of the study area servicing Henderson Estate, Carter Crest and Ogilvie Ridge, just north of the *power transmission* right-of-way (see Map 9).

Amended by Editor

(b) Proposed Water Supply System

The tentative schematic water supply system requirements for the Terwillegar Heights area are depicted on Map 9. This scheme is based upon the City of Edmonton Master Plan Water Modelling mapping.

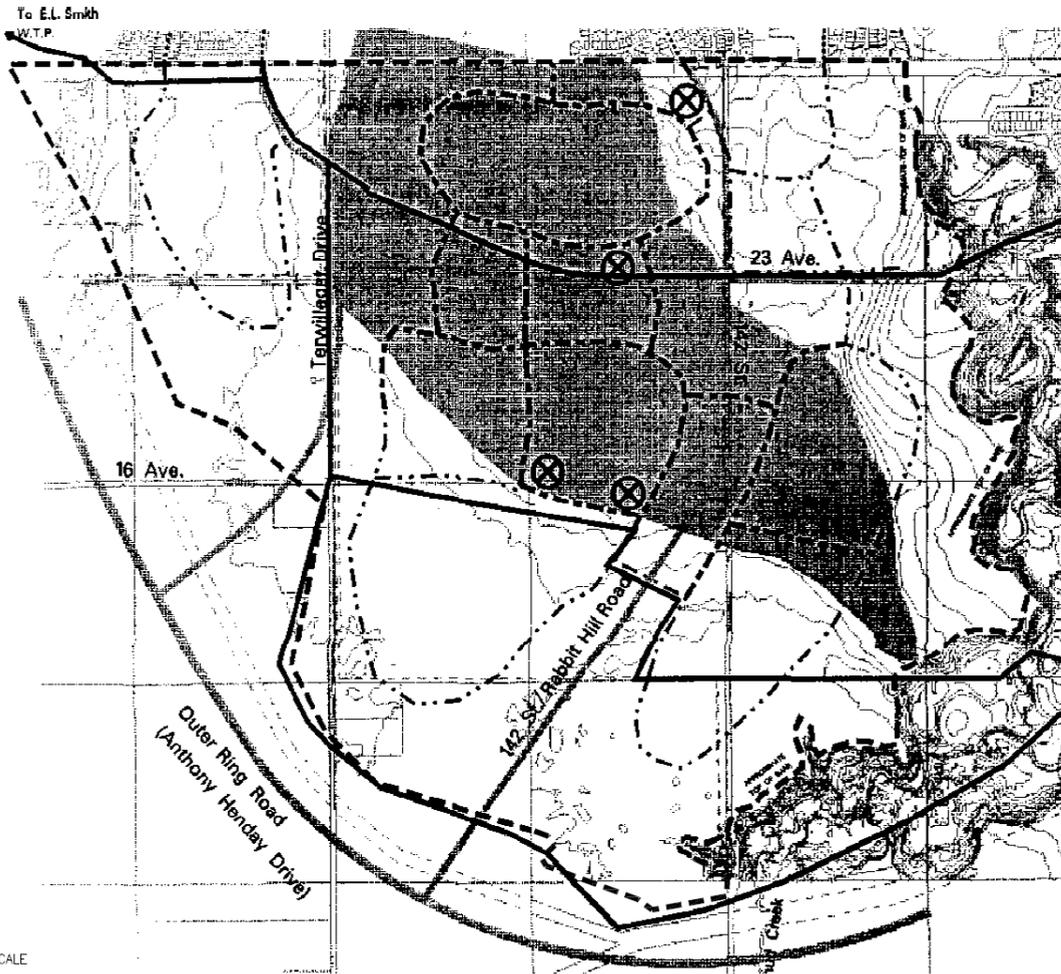
Currently (November, 1991), the Water Branch is working with consultants in attempting to confirm the routing for the South Ring Transmission Watermain originating at the E.L. Smith Water Treatment Plant. The ring transmission main will traverse the study area - and will be tentatively completed from the E.L. Smith Plant to Terwillegar Drive by the end of 1994.

Map 9 indicates the general routing and disposition of the proposed watermains, as well as alternative locations for a booster station to service Terwillegar Heights.

A suitable site for a booster station would not occupy a site greater than 900 m<sup>2</sup> in area. The precise location(s) of the booster station will be confirmed by the Water Branch's consultant during work associated with designing the water network model for the area. Costs of the pump station will be the responsibility of the developers.

With respect to development phasing in the study area (please refer to Map 15), the Water Branch has determined on a preliminary basis that water supply pressure boosting will be required for a portion of Terwillegar Heights. Please refer to Map 9 which outlines the likely extent of a high pressure service zone (735 m T.H.). However, before the Water Branch can state its more detailed and meaningful requirements with respect to development phasing and land use, detailed modelling in the form of a valid hydraulic analysis suitable to an NASP will be required.

Map 9: Water Servicing Network (July 16, 2012)



Terwillegar Heights  
 Servicing Concept Design Brief

9 Water Servicing Network

- Study Area Boundary
- ..... Existing Water Mains
- - - Proposed Water Mains
- - - Proposed Water Mains (High Pressure)
- High Pressure Service Zone (735m T.H.)
- South Ring Main (Alternatives)
- ⊗ Alternative Locations For Booster Station

SCALE 1:5000  
 Courtesy : Water Branch,  
 Public Works Dept.

NOT TO SCALE



Figure **Map 9.0**  
 Title **Water Servicing Network**

At this stage, the Water Branch indicates that the proposed development phasing is not likely to present any technical difficulties, provided that services are available from the existing system on the northern boundary of the study area. The Water Branch is unable to support a specific phasing of development for the area east of Terwillegar Drive until its modelling and water pressure zones have been addressed.

#### 4. ELECTRIC POWER

(a) Maior Power Supply Substation

It is proposed to service the whole of Terwillegar Heights development area from the existing major substation (Petrolia), located at 30 Avenue/142 Street (*Rabbit Hill Road*), adjacent to the *power transmission* Right-of-Way at the northeast corner of the development area.

Amended by Editor

(b) Additional Transmission/Substation Requirements

No additional power transmission corridor or major substation is required within the development area.

(c) Power Distribution System Layout and Requirements

The power distribution system will be designed in accordance with City of Edmonton standards and will be adequate to serve the full development area.

As per the present information, about three power circuits will be required to service the total area. All the three circuits will originate from the existing Petrolia substation, and enter the development area from the Trans Alta Right-of-Way, at the northern periphery of the study area.

(d) Existing Facilities

Edmonton Power's existing facilities in the development area is shown in Map 10. As development proceeds in the area from the north, the existing aerial facilities located outside the *power transmission* Right-of-Way will be dismantled and removed or replaced by new underground facilities as warranted by the pace of the development. Temporary retention of the existing aerial facilities may be required to supply any existing customers, and the cost of subsequent modifications or conversion to underground service will be borne by the developer.

Amended by Editor

#### 5. TELECOMMUNICATIONS

The following information has been provided by Ed Tel (Edmonton Telephones).

Map 10 indicates three telephone service areas for the study area. Area 1 will be serviced from the existing Terwillegar service centre via Riverbend Road. Area 2 will be serviced via 23 Avenue from the Twin Brooks Switching Centre.

Map 10: Electric Power Facilities and Telephone Service Areas (July 16, 2012)

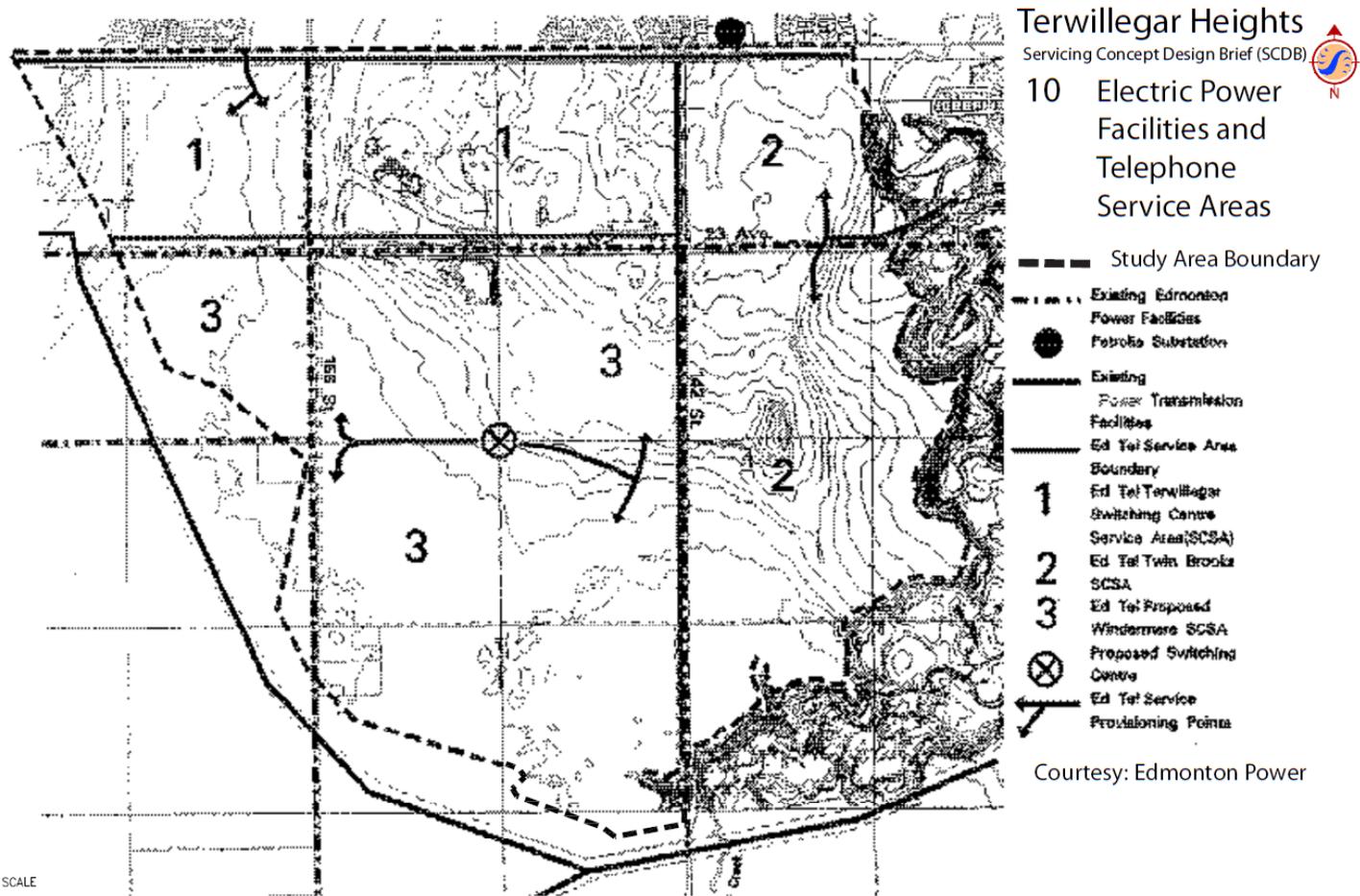


Figure **Map 10.0**  
Title **Electric Power Facilities and Telephone Service Areas**

Area 3 will be serviced from the proposed Windermere Switching Centre at approximately 16 Avenue and 149 Street. The location chosen for the proposed switching centre accommodates telecommunications transmission characteristics. A building size of approximately 250 m<sup>2</sup> is required on initiation of development in the area.

The cost of temporary service and existing facility modification will be borne by the developer.

## 6. NATURAL GAS SERVICING

The following has been provided by *private corporation*.

Amended by Editor

### (a) Existing Gas Facilities

*The private corporation's* existing facilities in the study area include a 323 mm transmission main, a temporary gate regulating station, and several rural and urban distribution mains, as shown on Map 11.

Amended by Editor

*The private corporation's* 323 mm High Pressure (HP) transmission line serves the existing urban and rural system in the study area, as well as serving other Edmonton communities. This line is essential to the system and requires the following precautions to be undertaken.

Amended by Editor

Any work near HP lines requires special consideration for creating a safe working and operating environment. All work of any nature, on or near *the private corporation's* right-of-ways and/or HP lines requires a formal crossing agreement. *The private corporation* requires that HP lines be placed in lots created for their sole use and that HP lines be placed in roads only at right angle crossings.

Amended by Editor

*The private corporation's* existing high pressure main and urban system, as shown on Map 11 will remain as shown. Lowering or relocation of this system will be done only at the expense of the land developer. *The corporation's* rural system will be replaced as its urban system expands southward. If abandonment of the rural system can be done at the same time that *corporation* extends its urban system, then there will be no cost to the developer of the land.

Amended by Editor

*The private corporation's* existing regulating equipment (located above ground) will be abandoned as development proceeds in Terwillegar Heights. Currently, *the private corporation's* plan is to serve this area by one gate regulating station, as shown on Map 11.

Amended by Editor

### (b) Proposed Gate Regulating Station

*The private corporation* intends to construct a major gate station to serve both Terwillegar Heights and southern Riverbend in 1992. It is preferable that this facility (requiring a 50 m x 50 m site) be purchased by *the corporation* and be located abutting other public facilities such as the proposed Fire Department station site in the vicinity of Terwillegar Drive and 23 Avenue. This site is recommended due to its proximity to *the private corporation's* high pressure right-of-way and existing distribution facilities. There is a small temporary station in this area.

Amended by Editor

Map 11: Natural Gas Distribution System (July 16, 2012)

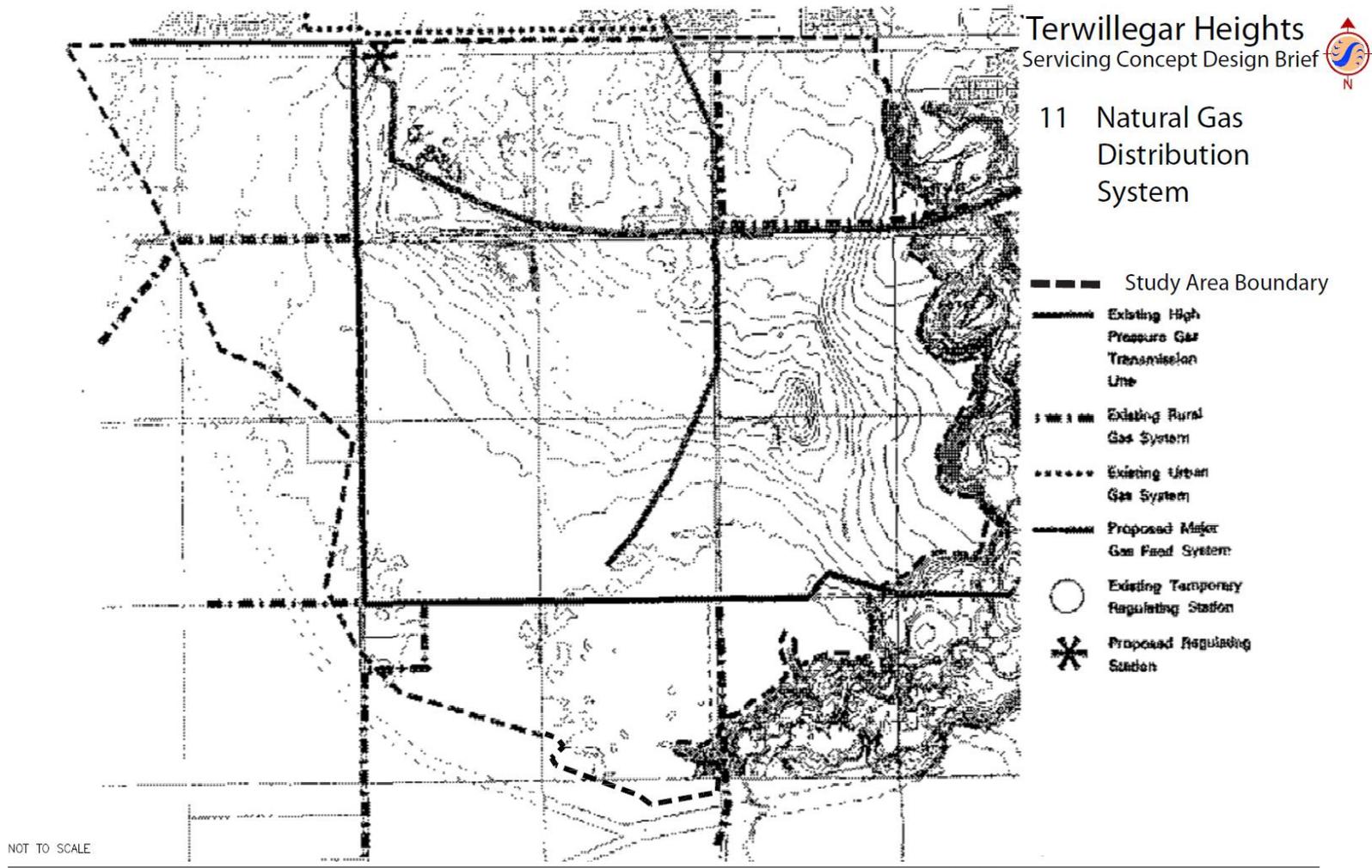


Figure **Map 11.0**  
Title **Natural Gas Distribution System**

(c) Design Overview: Layout of Major Gas Mains

In terms of major distribution gas mains, in stages, over the next 20 years, *the private corporation* plans to construct a 508 mm gas main from its station site along 23 Avenue towards existing facilities east of the Whitemud and Blackmud Creeks. *The private corporation* will require a single alignment along 23 Avenue which should not change from one stage of development to the next.

Amended by Editor

One other main feed line will be extended south from the *power transmission* right-of-way. This main will follow the Rabbit Hill Road (142 Street) alignment. Branches will be taken off this main and run along collector roads within proposed neighbourhoods.

Amended by Editor

(d) Servicing Requirements

*The private corporation's* gas source is along the north boundary of this area. *The private corporation* will require graded access to proposed subdivisions. Temporary facilities will be provided for servicing only at the developer's/owner's expense. Further detailed servicing requirements are available from *the private corporation*.

Amended by Editor

## **PART III**

### **COMMUNITY SERVICE REQUIREMENTS**

#### **1. SCHOOL AND PARKS/OPEN SPACE NATURAL ENVIRONMENT**

##### **1.1 Development Intent and Objectives**

The school and parks/open space/natural environment elements of the Terwillegar Heights SCDB are a key component in formulating a cohesive and integrated framework for local community development. It is important that development in Terwillegar Heights be coordinated within the context of development of a wider area of southwest Edmonton, taking into account needs, concerns and interests beyond the boundaries of the study area. The following principles for guiding the development of schools, parks, open space and the natural environment in the Terwillegar area have been provided by the Parks and Recreation Department and the Public and Separate School Boards.

- (a) School locations are to be determined in cooperation with the Public and Catholic School Boards, taking into account physical site requirements and future student attendance areas.
- (b) Parks sites will be integrated with school sites whenever possible, as the two land uses are mutually beneficial. Joint use and development can better serve community needs and combined sites will use public lands more efficiently.
- (c) Open space in the form of active, passive and natural park areas is required to provide a variety of recreational opportunities throughout the study area.
- (d) Existing flora should be retained for physical, environmental and aesthetic enhancement of the community.
- (e) Natural hazard lands and areas determined to be environmentally sensitive to development in their natural state are to remain undisturbed and dedicated as environmental reserve.
- (f) Areas of historical/archaeological/visual significance are to be identified and preserved, where possible.
- (g) Efficient and enjoyable pedestrian movement is required to areas and facilities within neighbourhoods and between neighbourhoods and to the river valley and ravine system.
- (h) Utility rights-of-way, pipeline right-of-way, public utility lots and RDA lands present opportunities for recreational/pedestrian development and should be integrated into a comprehensive open space program.
- (i) Storm water management facilities (dry ponds and wet ponds) will be located and designed in order to maximize their potential for use as recreational areas within the community.

The following text details a number of important considerations and requirements in locating school/park sites. Map 12 illustrates the location of those sites which will best serve the needs within Terwillegar Heights and the surrounding areas.

## **1.2 Geotechnical Considerations**

### **(a) Geotechnical Reports**

Geotechnical reports submitted at the time of the preparation of Neighbourhood Structure Plans will address specific development restrictions and requirements for those areas in the vicinities of the top-of-the-bank. Among other requirements, these reports will be required to address:

- the erosion/slumping effect and subsequent retreat of the edge of the ravine at 25, 50 and 75 year intervals;
- the use of fill material in site preparation;
- the top-of-the-bank roadway setback;
- the top-of-the-bank upland setback and walkway location;
- development setbacks for buildings;
- development restrictions for such items as fences, water features/ ornamental pools, swimming pools, water discharge from roof leaders and down spouts, lot grading and irrigation systems.

Restrictive covenants with the appropriate development conditions will be registered on the titles of the affected properties at the time of subdivision approval and plan endorsement

### **(b) Requirement for EIA**

If proposed development of adjacent upland areas is to impact the environmental reserve, an Environmental Impact Assessment (EIA) will be prepared prior to subdivision and construction. This study will fully assess the potential impacts on the sensitive area(s) and will provide a basis upon which to guide development. Any developments which may be dangerous or harmful to the ravine or other sensitive areas will need to be modified to protect the environment

## **1.3 School Sites**

Schools are one of the basic focal points in the design and function of neighbourhoods. As such, careful consideration must be given to the configuration, size, and location of school sites so that they can effectively serve community needs.

Map 12: School/Park Requirements (July 16, 2012)

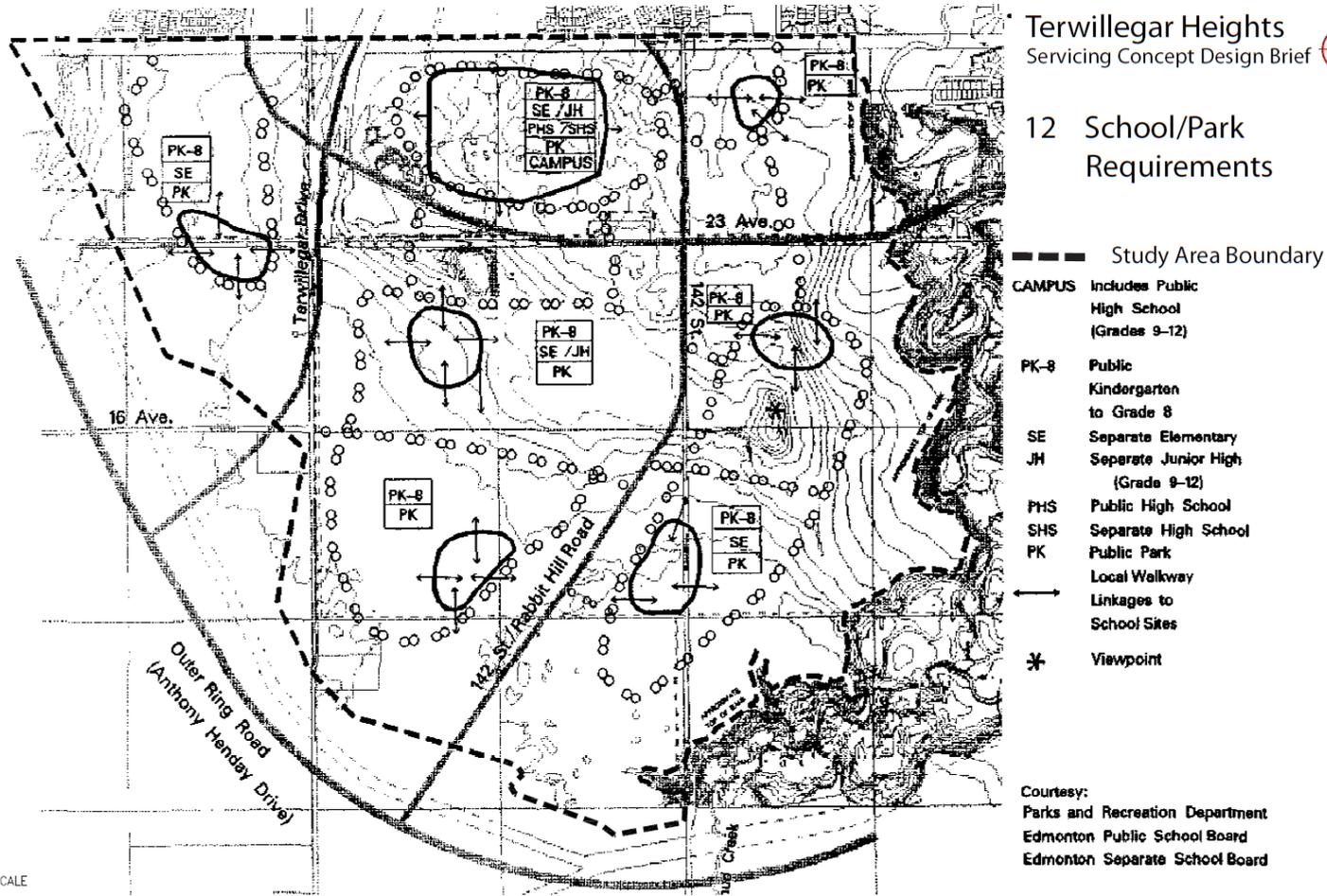


Figure **Map 12.0**  
Title **School/ Park Requirements**

The following requirements must be addressed in determining school site locations:

(a) Neighbourhood Size and Configuration

Generally, a neighbourhood with a population up to approximately 6000 people will generate an adequate number of children to support a Public K-8<sup>5</sup> school. The catchment area for the Separate School Board will be somewhat greater than a single neighbourhood because of lower student generation factors. The physical configuration of the neighbourhood should be compact and regular in form so that the school site can be centrally located, preferably abutting the collector and arterial roadway network, and be readily accessed by users in the surrounding area. It is a generally accepted school planning standard that elementary age children should not walk more than 1.2 kilometres to a school site.

(b) Access and Circulation

Schools function as destination and origin areas for both pedestrian and vehicular traffic. Accordingly, they should be located abutting collector and arterial roadways with transit service and where large volumes of traffic do not disrupt the wider community.

Vehicular access and transit service is particularly important in meeting the transportation requirements for the high school/campus and recreation centre/district park site because of the large numbers of people these facilities will serve through the day and evening. These facilities will be used by the local communities and will also serve large numbers of students and citizens who commute from a much wider area. Thus, the parks and education campus must be easily accessible and serviced by an efficient and direct arterial/collector roadway network, which does not impact upon the local traffic patterns of surrounding neighbourhoods. In this regard, it is necessary to closely coordinate the planning of the campus/recreation site and the roadway system.

(c) Parcel Configuration and Frontage

It is intended, where circumstances dictate, to consolidate Public school sites, Catholic school sites and park sites in single locations in order to make more efficient use of land and facilities.

The shape and frontage of school sites are important considerations. Ideally, school sites require a minimum 162 metre roadway frontage and neighbourhood parks 283 metres of frontage. The depth of the site should be no less than 240-250 metres with a rectangular site shape and no undevelopable niches ("dead land").

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<sup>5</sup> Kindergarten through to Grade 8. Edmonton Public School Board intends to apply its new two tier grade system (K-8 and grades9-12) in the study area.

(d) Soil Conditions

Soil tests for school/park sites will be provided as supporting documentation for a proposed Neighbourhood Structure Plan. It will be necessary to adjust the boundaries or relocate these sites should this information indicate an area is unsuitable for its intended purposes. Geotechnical information is important where there has been substantial sand or gravel extraction. School/park locations will generally avoid these areas because of potential hazards and complications in the placing of large structures on disturbed lands. The number and location of test holes in reserve areas will be determined in consultation with the *Asset Management and Public Works Department*.

Amended by Editor

(e) Servicing

In order to properly develop a school/park site in an efficient and timely manner, the developer should plan to provide services to reserve parcels upon their dedication. All site servicing shall include extensions from the roadway into the reserve lands and be provided by developers/owners at their full cost. Servicing along site frontages will be completed as the land is assembled.

(f) Pipeline Corridors/Utility Rights-of-Way

School/park sites will not be situated in locations traversed by existing pipeline or utility rights-of-way. It is important that these sites not be disrupted or hindered by the presence of these facilities so that they may be developed and utilized to their maximum extent. Also, servicing of the surrounding development shall be accomplished without infringing upon the reserve lands.

In some circumstances school/park sites may be located adjacent to existing utility corridors so that they may be easily integrated into a pedestrian system which may be developed utilizing such rights-of-way. Due to health and safety concerns, adequate separation distances must be maintained between the school facilities and utility lines. Walkway connections will be provided to access to pipeline and utility rights-of-way if it is intended that they are to be utilized for pedestrian purposes.

Resolution  
December 6, 2002

Educational and recreational facilities will be located such that there is adequate separation between the two land uses.

(g) Site Drainage

The developer will assist in the provision of positive drainage on reserve sites and if mechanical drainage is required, it will be installed by the developer to the satisfaction of the *Community Services* Department. School/park sites should not accommodate drainage from surrounding developments, except where the *Community Services* Department and the Drainage Branch (Transportation Department) agree that this is necessary to accommodate storm water flows.

Amended by Editor

(h) Storm Water Management

Due to safety concerns, wet storm water management facilities should not be located on or adjacent to school/park sites. A "comfortable" separation distance should be maintained between these land uses by providing an intervening type of development which is more compatible with school lands. Grading surrounding development in a manner that directs water on to the school/park site is not permissible. At the present time, the City and the School Boards are reviewing the possibility of utilizing portions of school/ park sites for dry pond facilities.

(i) Assembly of Land and Staging of Site Development

School/park sites will be assembled in an efficient, orderly and expeditious manner so that the land base will be available when facilities are required in the neighbourhood. In this regard, efforts should be made to prededicate reserve lands in large parcels at the initial stage of subdivision. The fragmented and piecemeal method (based solely on the area to be subdivided) creates unnecessary problems and uncertainties (eg. re-use of surplus lands) in the land assembly process. The school/park sites will be assembled when approximately one-half the neighbourhood has received subdivision approval.

The staging of neighbourhood cells is a very important consideration in planning for school facility development and as such will be closely coordinated with educational recreational needs and interests. The staging process will give high priority to the assembly and servicing of the school/park sites.

A Public high school (grades 9-12) will be needed at an early stage in the development of Terwillegar Heights in order to facilitate the new grade organization which is to be implemented in this area. The Catholic School Board also requires a high school site in the southwest and as such a campus site to accommodate these requirements is of particular importance. Also, a Catholic elementary/junior high school site is a high priority during the early stages of development, as this school would serve adjacent Riverbend neighbourhoods in addition to Terwillegar Heights neighbourhoods. The above noted requirements, as well as a Public K-8 site and a district Parks and Recreation site, will be accommodated on a large reserve parcel to be located in the north central part of the plan area. Ideally, this site should be assembled and dedicated during the initial stages of development.

(j) Commercial Development

Commercial Development in close vicinity to K-8 and/or elementary/junior high schools is perceived by the school boards as likely to create pedestrian/ vehicular conflicts. Therefore, the locations of these types of developments should be adequately separated from school sites.

## 1.4 Open Space/Parks

### (a) Parks/Open Space System

The provision of a variety of park spaces to accommodate different users and interests is important in the development of new neighbourhoods and in creating a sense of cohesiveness within the community. The open space/parks system within Terwillegar Heights will consist of active and passive park areas within school/park sites, environmental reserve lands in the Whitemud Creek Ravine, passive parks and pedestrian walkway/bicycle paths within walkway lots and utility/pipeline corridors.

### (b) Neighbourhood Parks

As indicated previously, neighbourhood park sites are integrated with school sites because of their mutually beneficial functions. Where there are both separate and public schools on a single site, it is intended that the park be located between the schools. In cases where there is only one school, the park will be situated adjacent to the school. Each 2.23 ha park site will be of sufficient size to accommodate a community league facility, should such an amenity be required at a future date. The total amount of land allocated for such neighbourhood parks is 15.61 ha.

### (c) Campus Site

The 36.7 ha parks and education campus site requires a substantial amount of parkland because of its district level function and the possibility of locating recreation centre between the proposed public and separate high schools. Thus 11.35 ha of reserve (9.28 ha for district athletic fields and 2.07 ha for passive recreational use) has been allocated for active and park use in this area, although it may be difficult to assemble such a large parcel solely from developers' dedications.

The precise location of the campus site and its component uses will be determined by the outcome of the detailed geotechnical reclamation study described in Part IV, Section 2.1 (c) of this report

### (d) Viewpoint Park

The original ASP submission indicated the preservation of approximately 4.0 ha in the east central portion of the plan area. This is a well-defined and heavily treed geographic high point in southwest Edmonton. A small (0.50 ha) "pocket park" area should be retained in its natural state to serve as a visual and passive recreational amenity. The viewpoint feature should be obtained as Municipal Reserve. However, if this steep terrain is unstable or creates hazards for development, it might be dedicated to the municipality as environmental reserve. The final disposition or acquisition of this parcel by the City will be determined at the NSP stage of development when detailed geotechnical information is available.

(e) Environmental and Municipal Reserve

The open space/parks network will be completed through environmental reserve dedication in Whitemud Creek Ravine and by developing a series of walkways/bikeways in walkway lots, utility rights-of-way and pipeline corridors. The developers/owners will be responsible for facility design and construction and landscaping within the walkway lots, utility rights-of-way and pipeline corridors. This will be provided in accordance with City requirements and policies and with the approval of the utility agencies.

(i) Whitemud Creek Ravine

Whitemud Creek Ravine consists of a small meandering waterway contained within an incised valley. Due to natural processes topographic relief in the valley varies from gently rolling hills to relatively level flood plain areas, steep embankments and high cliffs.

Because of its sensitivity to disturbance and natural environmental processes, under "normal" circumstances the entire ravine area would be designated as Environmental Reserve and be retained in its natural state and serve as a physical, visual, educational and wildlife amenity for the immediately surrounding area, as well as the entire city. However, negotiations are being conducted between the City, the Province and Maclab Enterprises Limited to facilitate the expansion of the Mactaggart Sanctuary to occupy most of Whitemud Creek abutting the study area. If negotiations are successfully concluded there will be very little requirement for Environmental Reserve.

As outlined in Section! 1.7 (c) of this report, the Whitemud Creek Ravine is within the boundaries of the North Saskatchewan River Valley Area Redevelopment Plan, which provides a comprehensive framework for the management and development of recreation facilities and opportunities in the ravine.

(ii) Delineation of Environmental Reserve

The delineation of the Environmental Reserve area will be undertaken at the time of the preparation of NASP's. A top-of-the-bank inspection will be conducted by the *Community Services and Planning and Development* Department with the owners/developers in order to establish the top-of-the-bank. The top-of-the-bank will be surveyed and those areas below the top-of-the-bank will be dedicated as Environmental Reserve at the time of subdivision, in accordance with the Planning Act.

Amended by Editor

A total of 30.96 ha of land is proposed to be dedicated as municipal reserve for park purposes. This exceeds entitlements by approximately 5.38 ha (See Tables 8 and 9). This discrepancy is primarily due to the need to provide a sufficiently large amount of active and passive recreation space on the campus site and at the viewpoint area. Since the campus site is a district facility, which will jointly serve the needs of both the Riverbend and Terwillegar communities, some of the excess reserve entitlements from Riverbend (money-in-lieu of land) will be used to acquire the additional land in Terwillegar Heights. The additional 5.38 ha of land will be purchased by the City based on cash-in-lieu appraisal methods.

(f) Storm Water Management Facilities

In order to more effectively use storm management facilities on public utility lots and to help accommodate community needs, the Parks and Recreation Department prefers that ponds be of the dry type. These areas can then be developed as ornamental parks or they can be designed and graded so that playfields can be accommodated on them. This work will be completed by the developers/owners at their cost

Storm water lakes will also be required at various locations throughout the study area. A 0.5 hectare municipal reserve area is normally required adjacent to each storm water holding facility for a view point park. However, because of the need for municipal reserve elsewhere, entitlements are not sufficient to cover the dedication of these parcels through the statutory requirements. Being major land users and because of their impacts upon the surrounding area, storm water holding facilities will be developed to complement/supplement other neighbourhood amenities. Therefore, 0.5 hectare view point parks should be provided if agreement can be reached with the developer.

**1.5 School/Municipal Reserve Entitlement and Allocation**

Reserve requirements for school and municipal purposes shown in Table 8 are based upon the land use allocations shown in Table 10, Part IV, Section 3.1 of this document. If there are changes in this base information due to reconsideration of some of the servicing and development concepts, modifications or adjustments may be required for school and park allocations.

**TABLE 7  
Reserve Dedication Summary**

**Resolution Approved July 16, 2012**

|    |                                      |                       |
|----|--------------------------------------|-----------------------|
| 1. | Gross Developable Area               | 828.0 ha <sup>6</sup> |
| 2. | School/Municipal Reserve Entitlement | 82.8 ha               |
| 3. | School/Park Allocation               | 93.0 ha               |

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<sup>6</sup> GDA is 49 ha less than the study area total of 877 ha.

**TABLE 8**  
**Reserve Dedication Requirements**

| <b>Neighbourhood Cell Phasing</b> | <b>Facility Required</b>                           | <b>Edmonton Public School Board (ha)</b> | <b>Edmonton Catholic School Board (ha)</b> | <b>Parks and Recreation (ha)</b> |
|-----------------------------------|--|--|--|----------------------------------|
| 1                                 | PK-8/SE/PK   | 4.45                                     | 2.03                                       | 2.23                             |
| 2a                                | PK-8/SE-JH/PKC Campus <sup>7</sup><br>(PHS/SHS/PK) | 4.45<br>11.34                            | 4.05<br>3.28                               | 2.23<br>11.35                    |
| 2c                                | PK-8/PK  | 4.45                                     |  | 2.23                             |
| 2b/5                              | PK-8/SE-JH/PK                                      | 4.45                                     | 4.05                                       | 2.23                             |
| 4b/2d                             | PK-8/PK<br>Viewpoint                               | 4.45                                     |  | 2.23<br>4.00                     |
| 3                                 | PK-8/PK  | 4.45                                     |  | 2.23                             |
| 4a                                | PK-8/SE/PK   | 4.45                                     | 2.83                                       | 2.23                             |
| <b>TOTALS</b>                     |  | <b>42.49</b>                             | <b>17.04</b>                               | <b>30.96</b>                     |

**TABLE 9**  
**Reserve Summary**

| <b>Agency Requirement</b>      | <b>Entitlement (ha)</b> | <b>Proposed (ha)</b> | <b>Balance (ha)</b> |
|--------------------------------|-------------------------|----------------------|---------------------|
| Edmonton Public School Board   | 42.60                   | 42.49                | -0.11               |
| Edmonton Catholic School Board | 17.04                   | 17.04                | -                   |
| Edmonton Parks and Recreation  | 25.58                   | 30.96                | +5.38               |

<sup>7</sup> Total area of parks and education campus site is 36.7ha.

**1.6 Archaeological and Historical Resources**

Developers will be required to contact the Alberta Culture Archaeological Survey Branch in order to ascertain the existence of any significant archaeological and/or historical resources in the study area, so that only resources be safeguarded, as determined through analysis and survey.

**1.7 Community/Institutional Requirements**

The development concept for Terwillegar Heights must also take into account the site requirements for a number of agencies which provide essential public services. It is unclear as to the requirements of some of these groups. However, their interests will be noted and accommodated as future needs are determined.

(a) Fire Station Site

The Fire Department did indicate a high priority (1993/1994) for development of a fire station in southwest Edmonton. However, this facility may now not be developed until 1995/1996 due to budgeting considerations. It is important that such a facility be located on a major arterial roadway (23 Avenue). This will allow easy and efficient access to service areas. Because of the relative urgency in establishing this facility, the Fire Department wishes to locate in an area which is likely to be developed in the near future - the north central or northwest part of the plan area. In the previous ASP submission, the Fire Department identified a site adjacent to an extension of 23Avenue, west of Terwillegar Heights Drive. This location has been incorporated into the development concept.

(b) Integrated Service Yard – Section Deleted

(c) Municipal Cemetery – Section Deleted

Resolution  
July 17, 1995

Map 13: Other Municipal Service Requirements (July 16, 2012)

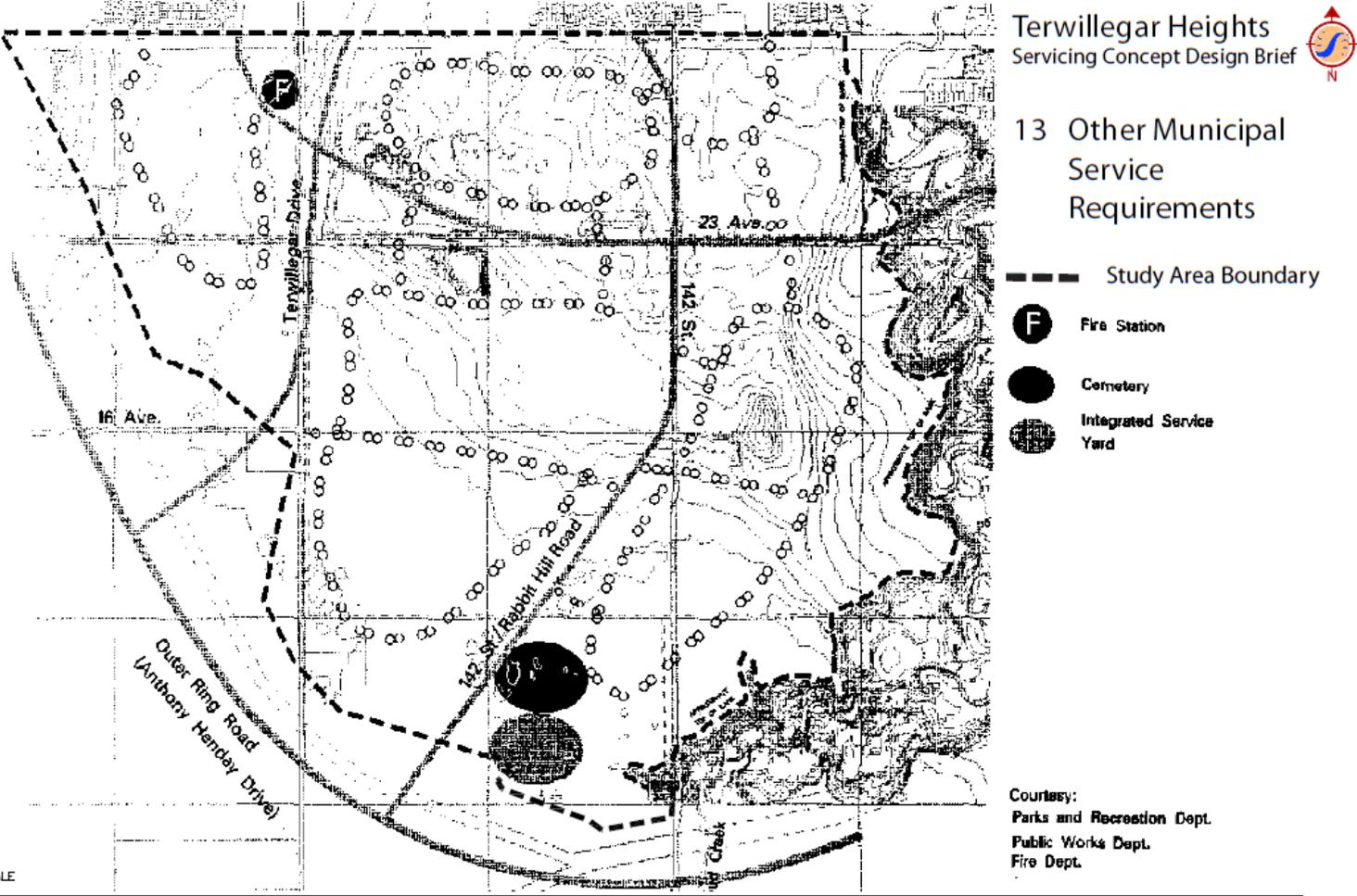


Figure **Map 13.0**  
Title **Other Municipal Service Requirements**

## **PART IV**

### **PLANNING AND DEVELOPMENT PRINCIPLES, DEVELOPMENT CONCEPT AND PHASING**

#### **1. BASIC PRINCIPLES AND GUIDELINES FOR DEVELOPMENT**

The Terwillegar Heights area presents an opportunity to view changing needs as planning and design challenges, and to design neighbourhoods that are sensitive to both the environment and the people who will call the development "home". The 1990 General Municipal Plan (GMP) supports the desire to offer reasonable land prices, while recognizing that peoples' preferences are changing and a sensitivity to the environment is now a necessity rather than an option. The area is also unique in that it is self contained and defined by major arterial roadways which provide convenient access opportunities to the entire Edmonton region.

To plan and design with these changing opportunities, several basic planning and development principles need to be accommodated within the preparation of subsequent and more detailed NASP's. These principles or guidelines are summarized as follows:

- A variety of housing types at various densities should be provided to meet the needs of diverse residents and to achieve a balanced and integrated social structure.
- Additional employment opportunities should be planned to offer a range of options within the study area.
- Transportation alternatives should foster improved opportunities for non-motorized means of travel within the study area.
- An activity focus for the neighbourhood should offer a range of functions, services and activities that will bring local residents into the specialized area.
- The natural topography and environment should be protected and enhanced for both environmental and marketing reasons.
- A variety of urban design features should be incorporated into the plan to create a more human scale living environment.

These basic principles and guidelines for the planning and development of Terwillegar Heights are elaborated in the following subsections. Each planning and development principle is followed by a statement (in italic type) explaining and justifying the principle. Each principle is cross-referenced to the appropriate policies of the GMP, where appropriate.

## 1.1 Housing Types and Density Opportunities:

- (a) Provide a balanced blend of housing types in each neighbourhood according to recently approved Council density distribution guidelines (i.e., 85/15 and 65/35 proportions of single detached to multiple housing types). (GMP Policy 2.C.1.)

*A variety of housing options offers choices of style, size and costs so that a diverse range of residents can be accommodated*

- (b) Allow for innovative design to accommodate all types of housing, especially "affordable" housing.

*Well thought out site plans and subdivision layouts encourage innovative private sector housing design. Innovatively designed, affordable housing should also be planned for and integrated into the NASP's. Innovative design adds interest and marketability and will offer more housing options to existing and potential residents.*

- (c) Encourage integration of housing types along local streets (i.e., no large block groupings of multi-family housing). (GMP 2.C.2)

*All housing within the NASP's, particularly multi-family, should be integrated at local street level and throughout the neighbourhood. Careful integration and modest sized parcels of multi-family housing will help to create a more cohesive neighbourhood.*

- (d) The size of neighbourhoods should be flexible in both geographic and population size.

*Neighbourhood size should vary to take advantage of natural areas or to meet specific neighbourhood design goals. A size range of 2500 - 6000 residents per neighbourhood is appropriate to generate an adequate range of community service facilities.*

- (e) Promote some housing at increased densities to maximize utilization of municipal infrastructure investments.

*Higher density housing results in better utilization of municipal infrastructure. Examples of higher density arrangements include zero lot line, linked housing, smaller lots, and additional units within buildings. When well-designed, these types of housing meet the amenities sought by home buyers and will offer more diverse and interesting neighbourhoods.*

## 1.2 Local Employment Opportunities

- (a) Provide opportunities for a range of functions so that the study area does not ultimately develop as a suburban dormitory. (i.e., create opportunities for employment, recreation, schools, commercial/retail.)

*A range of functions in the study area means many of the daily activities can be undertaken within local neighbourhood(s). Opportunities for employment, recreation, schools, and commercial/retail uses will result in a more diverse and dynamic community.*

- (b) Review opportunities for further employment options in addition to conventional employment at local neighbourhood schools or commercial establishments. (i.e., commercial or service sectors such as professional offices).

*Although the provision of additional local employment will not result in all residents working within their neighbourhood, it will provide opportunities for some residents to do so if desired or required.*

- (c) Two opportunities for providing the form of commercial services to the community should be considered:

- (i) A town centre/activity centre to serve both the Terwillegar and Riverbend communities.

*The town centre/activity centre option offers opportunities for active and passive recreation, child care, commercial and service functions on a sector basis, as well as providing a central focus for the neighbourhoods. Such an activity centre should be at least 8 ha in site area with a building(s) area of 20,000 m<sup>2</sup>. Please refer to the preface of this report with respect to City Council's direction respecting the location of this type of facility.*

- (ii) A "conventional" district shopping centre with small dispersed commercial uses serving individual or groups of neighbourhoods.

*The traditional layout of a district shopping centre offers the standard commercial uses required by residents but does not tend to offer a variety of complimentary services such as recreation or additional employment. In this scenario small dispersed shopping sites may be placed at the periphery of various neighbourhoods to serve home-bound traffic  
AND*

- (d) *Local Employment Centre, consisting of mixed use commercial/light industrial/residential uses, will be located on the four corner site at the intersection of 23 Avenue and 142 Street (Rabbit Hill Road), servicing the surrounding neighbourhoods.*

Resolution  
January 12, 1993

### **1.3 Transportation System and Utility Corridors**

- (a) Provide a transportation system that reflects the character of the intended development, meets the unique demands of each neighbourhood or NASP, as well as the City's wider transportation objectives.

*Transportation systems should meet wider transportation objectives and be designed specifically to meet the circulation demands of each NASP area, with appropriate connections to the adjoining road network Collector roadways (if required at all) should not be overdesigned and the application of current engineering design standards should be reviewed accordingly.*

- (b) Encourage efficient and economic phased development (i.e., no "leapfrog" development).

*Contiguous development results in less costs, efficient use and better provision of services, (eg. transit) and more cohesive neighbourhoods. A contiguous development pattern will also facilitate the "balancing" of urban development on either side of 142 Street which bisects the study area.*

- (c) Design roadway systems that follow and take advantage of natural features.

*Roadways designed with the lay of the land work with existing natural drainage patterns and take advantage of natural views and vistas, and result in lower construction costs (ie., less cut and fill and smaller gradient changes.)*

- (d) Design integrated transportation and movement systems at the outset (bicycle/ pedestrian/transit and private vehicles).

*Vehicular, pedestrian and bicycle transportation systems should be planned concurrently, (at the beginning of the planning exercise) to provide integrated systems that offer choices to residents. Integration of bicycle and pedestrian systems with the roads adds visibility to these non-motorized modes of transportation as well as adding interest and visual quality.*

- (e) Ensure that the Provincial Transportation Utility Corridor (T.U.C.) is used for major utility and roadway facilities and for interim secondary land use (GMP 7.B.3).

*The transportation utility corridor's principal function is to provide for the roadway and major utility systems. Segmented development on the fringes of the T.U.C. should be allowed if proposed uses are compatible with adjacent land uses. Secondary interim uses that are also compatible and non intrusive, such as parking lots or landscaped green spaces, could also be allowed on the fringe until the corridor is needed for its intended use.*

- (f) Ensure compatibility of transportation utility corridor uses with future adjacent uses.

#### **1.4 Neighbourhood Focus**

- (a) Ensure that each neighbourhood has a central focus that provides an activity centre rather than a static, geographical feature (i.e., storm water lakes or dry ponds). (GMP 2.B.3)

*A central focus, such as a view point, is successful when a range of activities are offered, including passive and active, supervised or unsupervised as well as activities that offer choices to different age groups and activity levels.*

- (b) Allow flexibility in composition of central focus ensuring a range of services, amenities, and employment opportunities.

*A neighbourhood central focus offers a range of services, functions, amenities, and a unifying theme that is identifiable by neighbourhood residents. The focus should be activity oriented and combine uses that draw people to the centre.*

- (c) Design for linkages (pedestrian, bicycle, vehicular) from the surrounding communities to the centre.

*An integrated and useable linkage system, that provides a pedestrian alternative to access public spaces is desirable. If residents are offered alternatives to the automobile, they will be more tempted to take advantage of them.*

- (d) Placement of the community focus need not always be in the geographic centre of a neighbourhood. Flexibility, particularly with park and school sites, is required if their focus is to serve a larger area.

*Many traditional subdivision plans place the focus at the geographic centre of the neighbourhood surrounded by residential uses. In some instances, an arrangement that relates to the natural topography or a special feature or that meets specific neighbourhood activities may be a better location. Conversely, the focus could be placed on the periphery of the neighbourhood, especially if it is to serve more than one neighbourhood.*

- (e) Plan for and sensitively design activities that draw people to the centre (eg. super mailboxes, fire stations and other service focal points).

*Post office or "super mailboxes" that are placed along, or in conjunction with, a convenience store or cafe, restaurants, (especially if there is outdoor seating), a playground near other uses enhance community focus points.*

- (f) Plan for the rehabilitation of sand and gravel pits in an environmentally sensitive manner and integrate them into the NASP design. (GMP 7.D.1)

*The planning and rehabilitation of the City of Edmonton and Bulat sand and gravel pits needs to be pursued at the beginning of the planning process. Unmanaged, non-integrated gravel pits will be visually unappealing and a physical and marketing liability. Reclamation of the City owned pit should be undertaken to provide a community feature, and lessen any liability potential. The Bulat gravel pit should also be reclaimed, recontoured and integrated as a central design feature for the area.*

## 1.5 Environmental Features

- (a) Allow for the protection and positive exploitation of natural features when designing and planning services. Use natural sites as park/open space features.

*Natural features should be protected and enhanced for their scenic contribution. Having foresight to plan with the environment will result in long term benefits at site level and for the City as a whole. Areas with special features, either natural or design enhanced should be positively exploited for environmental safeguards and for enjoyment by local residents.*

- (b) Encourage developers to design to facilitate retention of existing natural features with respect to:
- orientation of lots
  - views and vistas
  - conservation of natural flora
  - protection of natural drainage systems
  - tree planting to *replace* vegetation destroyed as a result of development activity.

*Planning with nature rather than against it, saves money, energy, materials, maintenance requirements and enhances site amenities. For example, planning road and walkway systems to run parallel with prevailing winter wind can result in noticeable natural snow clearance. Roadway layout and the resulting placement of housing to exploit solar heating potential results in less energy consumption. Incorporating natural drainage patterns into new development results in continued natural drainage and less demand for extensive storm sewer systems. Planning with existing views and vistas and minimizing the amount of vegetation cleared during initial construction adds to the aesthetic quality of an area.*

- (e) Require a *more extensive* evaluation of natural site features and their potential for incorporation into the pattern of urban development.

*In many cases the suburban home buyer is looking for the feeling of living in the country. An assessment of the land base allows successful exploitation of potential amenities, while at the same time ensuring that these amenities are preserved and maintained.*

- (f) Where feasible, use natural features such as drainage courses to provide linkages *between* and within neighbourhoods.

*Natural areas should be used as linkages within the plan area. Integration of these natural features to accommodate such things as bikeways and pedestrian linkages from housing to the school, or to the central focus will reinforce the need to protect natural areas.*

## 1.6 Urban Design

- (a) Consider innovative design approaches to accommodate alternatives to standard subdivision design such as:

- modified roadway rights-of-way for both collector and local streets
- tree planting on boulevards
- linear public parks or "greenways" along local streets leading to neighbourhood service centres
- services installed within boulevards
- alternative configurations to cul-de-sacs
- zero lot line housing
- reduced setbacks
- a return to the modified grid street pattern
- back lanes (for housing designed with rear garages)
- rear garages

*These types of amenities have been incorporated into various new town and suburban expansion plans prepared by neo-traditional designers, and are a combination of the most desirable traits found in existing mature and pre 1950's neighbourhoods. These design elements, which emphasize pedestrian circulation over vehicular, and the creation of a sense of "place" have been found to be marketable in the USA and most recently in southeast Calgary (DouglasGlen and Mackenzie Town).*

- (b) Encourage attention to design/details, especially in regard to functional linkages (i.e., routes to centre etc.).

*To ensure that the proposed uses and linkages are used by future residents, carefully designed details need to be incorporated. Examples include pathways that follow well observed, high traffic routes to ensure security, desire lines to and from activity centres, amenities that are designed to accommodate the handicapped and people of all ages, as well as well-lit areas to encourage provision and use of street furniture.*

- (c) Design for energy efficiency in subdivision layout. (GMP 5.A.8)

*Subdivision layouts should be designed to maximize solar heating potential and to minimize energy expenditures. Methods of achieving these initiatives include designing with the lay of land, with the roads following the contours. The houses would be placed on their lots not directly facing the street, but oriented in a south/southwest direction. This would be incorporated with the innovative application of a neo-traditional modified street grid.*

- (d) Incorporate housing needs for special groups.

*Offering affordable housing that is sensitively designed and placed within the residential fabric can offer alternative housing for those with special physical or socio-economic needs. Accessibility for the less mobile should be automatically designed into every new area. This can be accomplished by such design approaches as sensitive grading, choice of building finishes and street paving materials and pedestrian routes designed to allow unimpeded passage by the handicapped.*

## 2. DEVELOPMENT CONCEPT

### 2.1 Area Design

#### (a) Area Context

The development concept for Terwillegar Heights illustrated on Map 14 indicates a land use and transportation pattern embodying the planning and development principles described in the previous section and the servicing and development requirements of civic departments and utility agencies detailed in Parts II and III of this report

The community profile of Terwillegar Heights is expected to resemble that of the Riverbend neighbourhoods that are developing immediately north of the study area. Terwillegar Heights will develop predominantly with single detached housing, with components of multiple family and apartment housing ranging from 15 to 35 percent of the total anticipated number of units, in accordance with Council's recently adopted neighbourhood density distribution guidelines.

Although the area is expected to develop in a "conventional" market-driven manner similar to the adjacent Riverbend area, the unique location of the area, in terms of being one of the last vacant residential areas north of the Outer Ring Road and defined by a fixed pattern of major arterial roadways, means that development will take advantage of the area's strategic geographical location.

It is likely, therefore, that in addition to functioning as a conventional suburban dormitory area, Terwillegar Heights will also contain additional employment opportunities and a range of housing types for special needs. These types of special needs will have an impact on the type of neighbourhood services that will be required in the area.

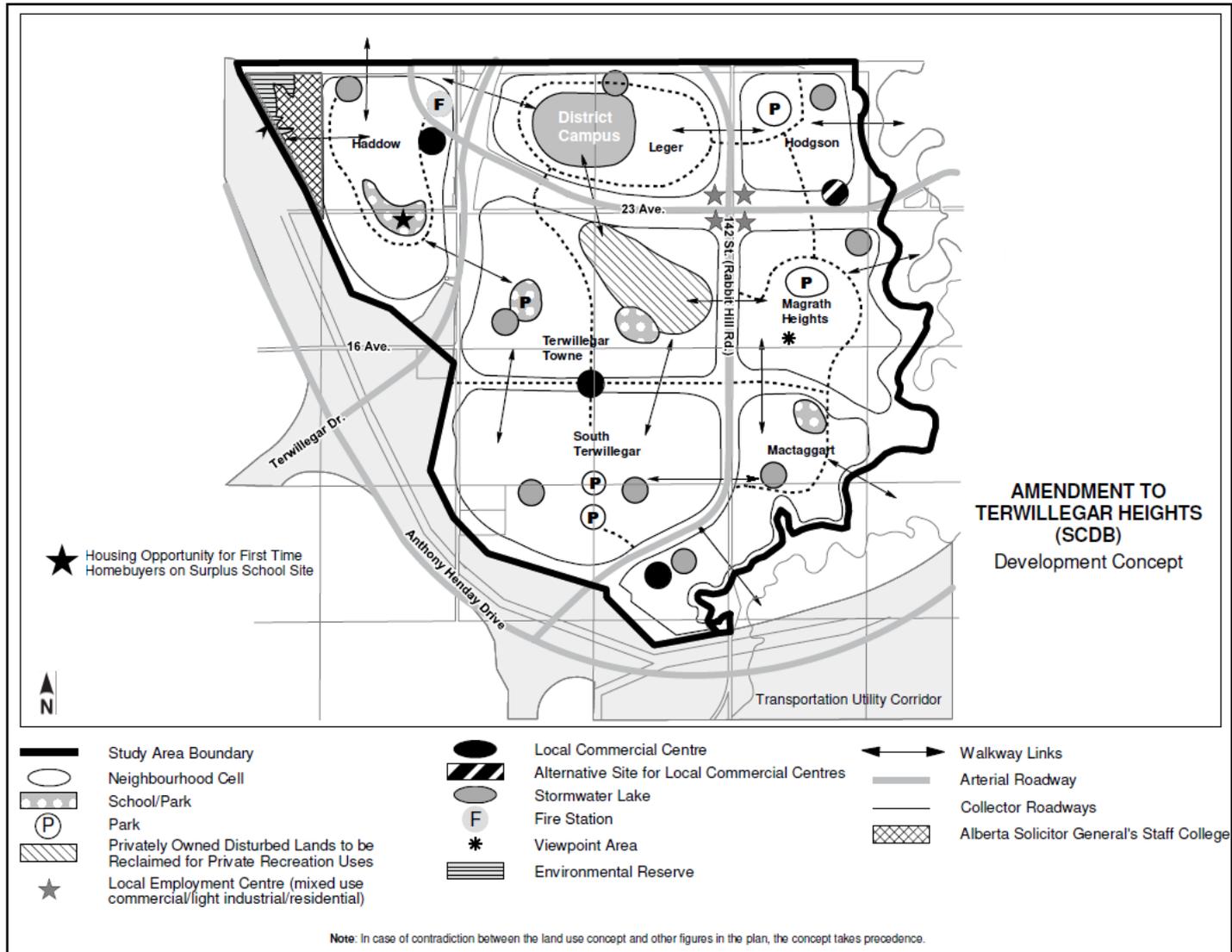
The special characteristics of Terwillegar Heights in terms of its future neighbourhoods and employment potential are discussed in the following subsections.

In addition, Terwillegar Heights will be physically, socially and economically integrated with Riverbend. This will be expressed in terms of roadways, utilities, parks, pedestrian and bicycle connections, and the provision of schools and employment opportunities which are intended to service new suburban areas in Southwest Edmonton beyond the boundaries of the study area.

#### (b) Development Pattern

The development concept shown as Map 14 provides Council, the administration and private land owners/developers with a generalized land use, servicing and environmental protection framework to guide the subsequent submission of component NASP's which will reflect the general principles, guidelines and requirements contained in this report

Map 14: Development Concept (November 5, 2018)



The development concept, reflecting some elements of the IMC Consulting Inc. ASP submission of late 1990, indicates a predominantly residential form of development divided into eight neighbourhood cells. The north-central cell is occupied by residential uses and the District Parks and Education Campus. Part of the campus will occupy suitably reclaimed lands within the boundary of the City of Edmonton's Rabbit Hill pit.

Although the two school boards and the Parks and Recreation Department regard the site shown on Map 14 as optimum, if significant physical or financial problems arise in developing the campus site, an alternative site in the north central portion of the study area will be required.

(c) Reclamation of Disturbed Lands

Ideally, a restoration/reclamation plan for both the City's Rabbit Hill Road gravel pit and the Bulat pit should be prepared prior to final approval of this Servicing Concept Design Brief. However, the Public Works Department has hired a consultant to monitor and design reclamation options for the Rabbit Hill pit. Residential uses, open space, parking lot and playfield components of the District Parks and Education Campus will also occupy restored lands, as previously mentioned in subsection (b) above, assuming site valuation and site reclamation concerns are resolved at the corporate level.

The Bulat (*Private Owner*) Pit in its present condition is unsuitable for urban development. However, if the owners undertake a restoration plan involving recontouring and the partial filling of the pit with clean material, this site will be suitable for re-use as a private recreational facility such as a golf course or facility of a similar nature.

An approximate 30 ha area immediately north of the Bulat pit site will be suitable for residential development, provided buffering and safety precautions related to its proximity to the Bulat pit (and anticipated reclamation operations) are addressed.

If agreement cannot be reached with appropriate parties to undertake reclamation, restoration/reclamation plans must be prepared and incorporated as part of the submission of subsequent Neighbourhood Area Structure Plans for the development of appropriate neighbourhood cells.

## 2.2 Neighbourhood Design

The development concept is based on eight neighbourhood cells ranging in approximate population size from 3500 to 7000 persons. The residential component of each cell would be developed in accordance with Council's population density distribution guideline ranges of 85/15 and 65/35 splits between single detached and multiple housing. It is anticipated that the split between row housing units and apartment units (multiple housing developments) will be 60/40. Each cell will contain community facilities, or shared facilities with adjacent neighbourhoods, in accordance with the servicing and planning principles and requirements of this report.

## 2.3 Access, Circulation and Movement

Each cell is defined by the basic arterial roadway system specified by the Transportation Department in Part II, Section 1 of this report. This grid consists of 23 Avenue and the Outer Ring Road (east/west) and Rabbit Hill Road/142 Street and Terwillegar Drive (north/south). A conceptualized pattern of collector roadways has been indicated for the purpose of defining the frontage and locational requirements of school/parks sites and other community activity centres as indicated in Part II of this report.

An inter-neighbourhood walkway system which indicates conceptualized linkages between school/park sites and neighbourhood cells is shown on the Development Concept Map. Where possible, this walkway system should follow the local or collector roadway pattern or be accommodated on a separate right-of-way where convenient and safe linkage is not possible (see Part II, Section 1.2(h), Transportation).

A spine bikeway system following major arterial roads is described in Part II, Section 1.2(h) of this report and indicated on Map 5.

## 2.4 Community Facilities

### (a) School/Park Sites

The eight neighbourhoods focus on joint school/park sites (as detailed in Part II of this report) with two district high schools on a campus site and a district park located north of 23 Avenue between Terwillegar Drive and Rabbit Hill Road. The school/park sites will be linked to the neighbourhoods with a walkway/bikeway system which complements the pedestrian and bicycle routes on the collector and local roadway system.

### (b) Commercial Service Centres

*Although this SCDB provides for three local commercial service centres these sites have been strategically located to serve clusters or groups of neighbourhoods, along collector roadways.*

Resolution  
July 16, 2012

In the event that three neighbourhood commercial sites are insufficient or otherwise non-viable, as demonstrated through the submission of subsequent NASP's, one local commercial site not exceeding 1.5 ha in size should be allocated for each neighbourhood. As mentioned in subsection (b) above, seven alternative allocations for commercial sites are shown on Map 14. Such sites ideally should be located on the "going-home" side of arterial and/or collector roadways, in accordance with the requirements of the Transportation Department outlined in Part II of this report.

(c) Local Employment Mixed Use Centre Site Location

The development of a mixed use mini "town centre" site would focus on a dual role as a district retail and service centre with a residential element. The centre will require an 8 ha site with a net building area of 20,000 m<sup>2</sup>. The centre would be developed in accordance with the principles described in Section 1.2, above.

As described in the preface to this report, City Council has directed as part of its approval of this SCDB that the location of the Local Employment Center is to be determined when an agreement is reached by land owners within the study area.

The local employment centre would be developed to a high standard of appearance and design (akin to those applied to the Edmonton Research Park). This would be achieved through the development of an urban design brief involving the application of site specific direct control districting to ensure high architectural, site layout and landscaping standards. Typical uses would include district level and specialist retailing, business and professional offices, industrial business (IB) uses including service and custom manufacturing and retailing operations.

(d) Other Civic Uses

*Requirements for other civic uses, including a fire station, is described in more detail in Part III of this report*

Resolution  
July 17, 1995

### **3. DEVELOPMENT CONCEPT • LAND USE AND POPULATION STATISTICAL SUMMARY**

#### **3.1 Land Use**

*The total study area is approximately 877 ha in size and includes the power transmission right-of-way. The updated Development Concept Land Use Statistic shows a gross developable area of 828 ha. A net developable residential area of 489 ha has been derived by debiting non-residential land use allocations as shown in Table 10.*

Resolution  
July 16, 2012  
Amended by Editor

The Bulat sand pit site has not been included in the net residential development area, as its long term reclamation for housing development will not be feasible unless extensive privately financed reclamation/restoration measures are undertaken. In the foreseeable future, subject to some limited recontouring and application of clean fill, it is anticipated that the Bulat pit will be used for private recreational purposes.

**TABLE 10**  
**Development Concept Land Use Statistics**  
**Resolution July 16, 2012**

|  | Area (ha)  | % of GDA      |
|--|------------|---------------|
| <b>Gross Area</b>                                | <b>877</b> | 100%          |
| Natural Area (Environmental Reserve)             | 11         | 1.21          |
| Pipeline & Utility Right-of-Way                  | 17         | 1.95          |
| Arterial Road Right-of-Way                       | 14         | 1.57          |
| Solicitor General Staff College                  | 8          | 0.9           |
| <b>Gross Developable Area</b>                    | <b>828</b> | <b>100</b>    |
| Commercial                                       | 25         | 3.05          |
| Parkland, Recreation, School (Municipal Reserve) | 93         | 11.23         |
| Open Spaces/Park (Non Municipal Reserve)         | 6          | 0.67          |
| Institutional                                    |            |               |
| Fire Station                                     | 3          | 0.32          |
| Transportation                                   |            |               |
| Circulation                                      | 163        | 19.71         |
| Transit Centre                                   | 1          | 0.08          |
| Infrastructure and Servicing                     |            |               |
| Stormwater Management Facility                   | 45         | 5.48          |
| Public Utility                                   | 3          | 0.35          |
| <b>Total Non-Residential Area</b>                | <b>339</b> | <b>40.89%</b> |
| <b>Total Net Residential</b>                     | <b>489</b> | <b>59.11</b>  |

### 3.2 Design Population/Population Projections

*According to the Land Use and Population Statistics of the approved Neighbourhood Area Structure Plan within the SCDB area, the complete build out of Terwillegar Heights will result in an approximate population of 42000.*

Resolution  
July 16, 2012  
Amended by Editor

|      |                                      |               |            |
|------|--------------------------------------|---------------|------------|
| (i)  | Low Scenario: based on 85/15 split:  |               |            |
|      | Net residential development area     |               | 505.49 ha  |
|      | Single detached housing population   | 24,833        | 478.49 ha  |
|      | Multiple housing population          |               |            |
|      | - row housing                        | 2,461         | ] 27.00 ha |
|      | - apartments                         | <u>1,033</u>  |            |
|      | <b>TOTAL</b>                         | <b>28,327</b> |            |
| (ii) | High Scenario: based on 65/35 split: |               |            |
|      | Net residential development area •   |               | 505.49 ha  |
|      | Single detached housing population   | 22,318        | 430.01 ha  |
|      | Multiple housing population          |               |            |
|      | - row housing                        | 6,674         | ] 75.08 ha |
|      | - apartments                         | <u>2,796</u>  |            |
|      | <b>TOTAL</b>                         | <b>31,788</b> |            |

Please note that these figures are less than the 40,000 estimate originally submitted by MG, due to an assessment of actual built out rates in recently completed subdivisions in the Riverbend area and the submission of detailed land area requirements from civic departments that were higher than originally anticipated, (e.g., *storm lakes*). The estimate also accounts for non-residential re-use of the Bulat pit

Resolution  
July 17, 1995

#### 4. DEVELOPMENT PHASING

The recommended sequence and rationale for development of each neighbourhood cell is shown on Map 15 and summarized in Table 11.

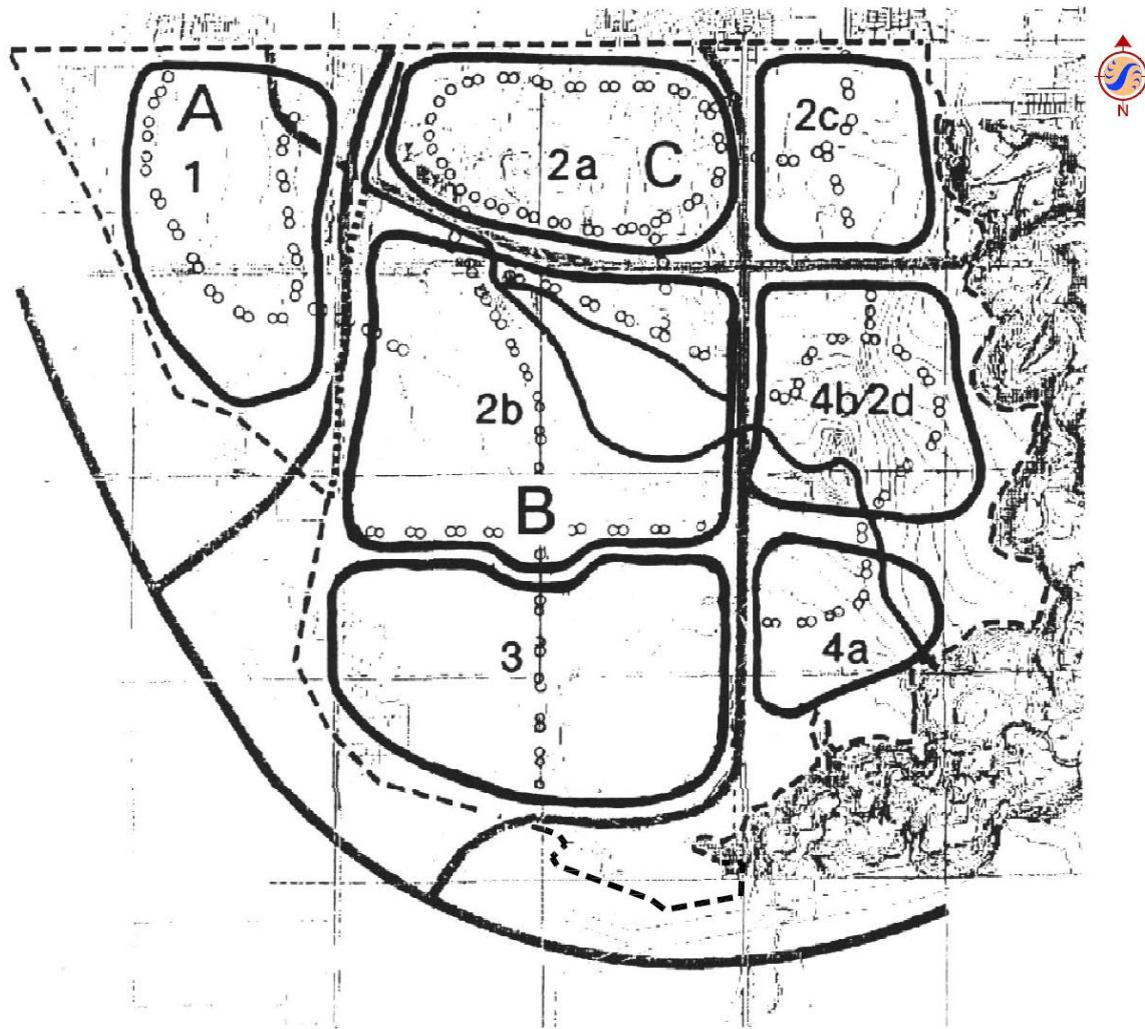
##### 4.1 Factors Determining Development Phasing

The following factors determine development phasing;

- General Plan policies specifying contiguous development;
- the allocation and priorities assigned to City funding for service infrastructure;
- proximity of neighbourhood cells to existing transportation and utility tie-in points;
- preferred drainage basin development sequence;
- land ownership characteristics and preferences of owners/developers about development timing;
- The school boards' and *Community Services* Department's preferences for early development of the parks and education campus; and
- geotechnical/environmental constraints.

Amended by Editor

Map 15: Recommended Development Phasing (July 16, 2012)



- STUDY AREA BOUNDARY
- Neighbourhood Cell
- Drainage Basin Boundary
- A B C Drainage Basin
- Arterial Roadway
- Conceptualized Collector Roadway System

NOT TO SCALE



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Figure **15.0**

Title **Recommended Development Phasing**

JUNE 11, 2012  
1161 69089 RS

(a) General Municipal Plan (GMP) Policies.

GMP Policy 2.A.1. and related policies addressing orderly and efficient development indicate that the submission of NASP's for each neighbourhood cell must be contiguous with (adjoin) existing urban development, or areas under active development and near completion. This means that the early phases of development (neighbourhood cells 1, 2a, and 2c) are contiguous with development in Riverbend, immediately north of the *power transmission* right-of-way.

Amended by Editor

(b) Allocation of City Funding for Service Infrastructure

The City will ensure that its limited funds for servicing infrastructure are allocated in an efficient and rational manner, based on the relative scarcity of resources and equity of allocation of such resources on a City-wide basis. Other corporate priorities may affect the City's ability to provide services on a demand basis, as this will be limited to the allocation of appropriate capital funds in the approved Capital Priorities Plan (CPP) in future years.

(c) Proximity of Neighbourhood Cells to Transportation and Utility Tie-in Points

Tie-in points for roadways, drainage and other "hard" utility services are located along the northern boundary of the study area. There are, for example, sanitary and storm servicing tie-ins at Falconer Heights and Ogilvie. Similar tie-in points exist for natural gas, water supply and electric power services.

(d) Drainage Basin Development Sequence:

The drainage consultants (IMC Consulting Inc.) in their Phase I Area Master Plan report recommend a drainage basin development sequence of "A-B-C", in accordance with their notion of a rational and relatively flexible sequencing of development, starting with the northern tier of neighbourhood cells (see Part II, Section 2 for details).

(e) Land Ownership Characteristics and Development Timing Preferences

As outlined in Part I, Section 1.4 of this report, a *developer* expressed firm interest in developing the northwest neighbourhood cell (1) through its December, 1990 request for an NASP. Similarly, *another developer*, wishes the early development of their lands as expressed in the IMC Consulting Inc. September, 1990 ASP submission (Cells 2b, 3 and part of 4a).

Amended by Editor

(f) School Sites and Parks

The *Community Services* Department, and the two school boards have stated that they require the early development of the north central parks and education campus, as described in Section 2.4(a), previously. Both school boards have stated that their facilities will serve the entire Terwillegar Heights and Riverbend areas. The Edmonton Separate School Board has identified an immediate need for a Junior High School, preferably on the campus site, as that Board did not take full advantage of land dedication allocations during previous development stages of Riverbend, and must now satisfy this deficiency in Terwillegar Heights. The Separate School Board anticipates acquiring and developing a site for the 1994 school year.

Amended by Editor

(g) Geotechnical and Environmental Constraints

Geotechnical and environmental factors determine the timing of development in three neighbourhood cells - 2a, 5, 6 and part of 4a. Cell 2a, the campus site, is partially occupied by the City's Rabbit Hill pit, now subject to reclamation. It is anticipated that reclamation efforts will not impede early development of portions of the campus for parks, playfield and similar open space uses.

Cells 5 and 6 are affected by the Bulatpit Cell 5 may be developed, if adequate buffering precautions are taken to separate it from the Bulat Pit. However, the development of Cell 6 for private open space purposes is anticipated to be long term due to the need for extensive recontouring and filling of the pit by the owner.

The development of some portions of Cell 4a is affected by abandoned coal mines and mining-induced land subsidence. A detailed geotechnical investigation of these areas (see Map 4) is necessary prior to commencement of development.

#### 4.2 Neighbourhood Cell Phasing Sequence

The detailed phasing of development for each neighbourhood cell and its rationale is summarized in Table 11, below.

**TABLE 11**  
**Development Phasing by Neighbourhood Cell**  
**(Amended by Editor)**

| Neighbourhood Cell Development Sequence | Block Ownership(s)  | Proposed Uses/ Development   | Development Factors   |
|---|---|--|---|
| 1                                       | <i>Private Corporation</i> and others                         | Residential, school/park fire station, local commercial  | Extreme NW location abutting existing development and service connections   |
| 2a                                      | City of Edmonton, <i>A Private Corporation</i> and others     | Parks and Education Campus, Employment Mixed Use Commercial Centre, residential, school/park, local commercial | North central location abutting existing development and service connections. Separate School Board requires Junior High School by 1994. The campus site will occupy part of the city's Rabbit Hill pit for open space development. |
| 2b                                      | <i>Private Corporation</i>                                    | Residential, schools/park, local commercial  | West-central location, contiguous with Cells 1 and 2a, above.   |
| 2c                                      | various private owners  | Residential, school/park, local commercial   | Northeast location, abuts existing development and service connections. Can proceed in advance or simultaneously with 2a above.   |
| 3                                       | <i>Two Private Corporations</i> , Provincial Crown and others | Residential, school/park   | Southwest location. Contiguous with 2b. Can proceed following development of 2b.  |
| 4a                                      | <i>Two Private Corporations</i> , Provincial Crown and others | Residential, schools/park, local commercial, municipal service yard, municipal cemetery                        | Southeast location. Contiguous with Cell 3. Development can proceed following development of Cell 3 or Cell 4b/2d   |
| 4b/2d                                   | <i>A Private Corporation</i> , and others                     | Residential, school/park local commercial, viewpoint area  | East-central location. Is contiguous with Cell 2c. Can develop after 2c or after development of 4a.   |
| 5                                       | <i>Private Non-Corporate Owners</i>                           | Residential  | Northern undisturbed portion of Bulat pit land. Buffering required to protect development from Bulat pit reclamation operations.  |
| 6                                       | <i>Private Non-Corporate Owners</i>                           | Private Recreational (open space)  | Subject to successful completion of restoration actions by owner, site can be developed for private recreational open space uses.   |

## APPENDIX I

### REQUIREMENTS FOR AN ENVIRONMENTAL INVENTORY/ DATA BASE TO BE INCORPORATED IN TERMS OF REFERENCE FOR THE PREPARATION OF NEIGHBOURHOOD AREA STRUCTURE PLANS.

1. Review any existing environmental information pertinent to the study area to take advantage of previous work in the area and to identify any existing and proposed environmental regulatory constraints on new development in the area.
2. Undertake a site examination and data analysis to identify, at a broad level, the following items:
  - (a) Significant natural resources and natural features within project area, focusing on vegetation, wildlife habitat, and surface waters (wetlands). Within project area, investigations will focus on resources in the immediate vicinity of the proposed development (e.g., Whitemud, Black Mud Creek Ravine and North Saskatchewan River Valley). These investigations will identify any sensitivities related to these resources and natural features that may influence or constrain the design of the proposed NASP and, to a lesser extent, the opportunities for the integration of these resources into proposed future land use/neighbourhoods. In addition, the general impacts that may be associated with general development will be identified and some general mitigation measures suggested.
  - (b) Potential air pollution and noise levels associated with the proposed transportation network.
  - (c) Assemble and synthesize environmental and resource information with the conceptual developmental plans.
3. Area Inventory and Analysis

The objectives of this task will be to document existing resources and features within the project area to allow for identification of impacts, constraints, sensitivities and mitigation measures as previously outlined. The inventory and analysis will consist of the following:

- (a) An initial reconnaissance survey of the project area.
- (b) A review of existing information pertinent to the area. Sources to be checked will include: North Saskatchewan River Valley and Ravine System Biophysical Study (1981), the Alberta Breeding Bird Atlas (if available), Ducks Unlimited (Canada) Inc., the North Saskatchewan River Valley Area Redevelopment Plan (City of Edmonton Bylaw 7188) and Urban national History Interpretive Sites and Adjacent to the Edmonton Region Mapping. This will be a prelude for site inspections, as necessary.
- (c) Site inspections to identify significant natural resources and features in the project area including woodlands, wetlands, man-made landscape features such as woodlands, hedgerows and shelterbelts. This will include a broad scale mapping of significant features and potentially sensitive areas in the project area.

4. Data Analysis

Data analysis will involve examining the proposed developments plans in relation to the synthesized biophysical information to identify potential environmental sensitivities, constraints, and opportunities within the project area and to predict, in a general sense, potential impacts of development within the project area. Some general mitigation measures will be identified to address these impacts. The broad, conceptual nature of this project precludes prediction of site-specific impacts and mitigation measures.

5. Preparation of Technical Report

This report will address all required topics and will include illustration of significant resources and issues in the form of photographs and a site map.

Map A1: Natural Features and Disturbed Lands (July 16, 2012)

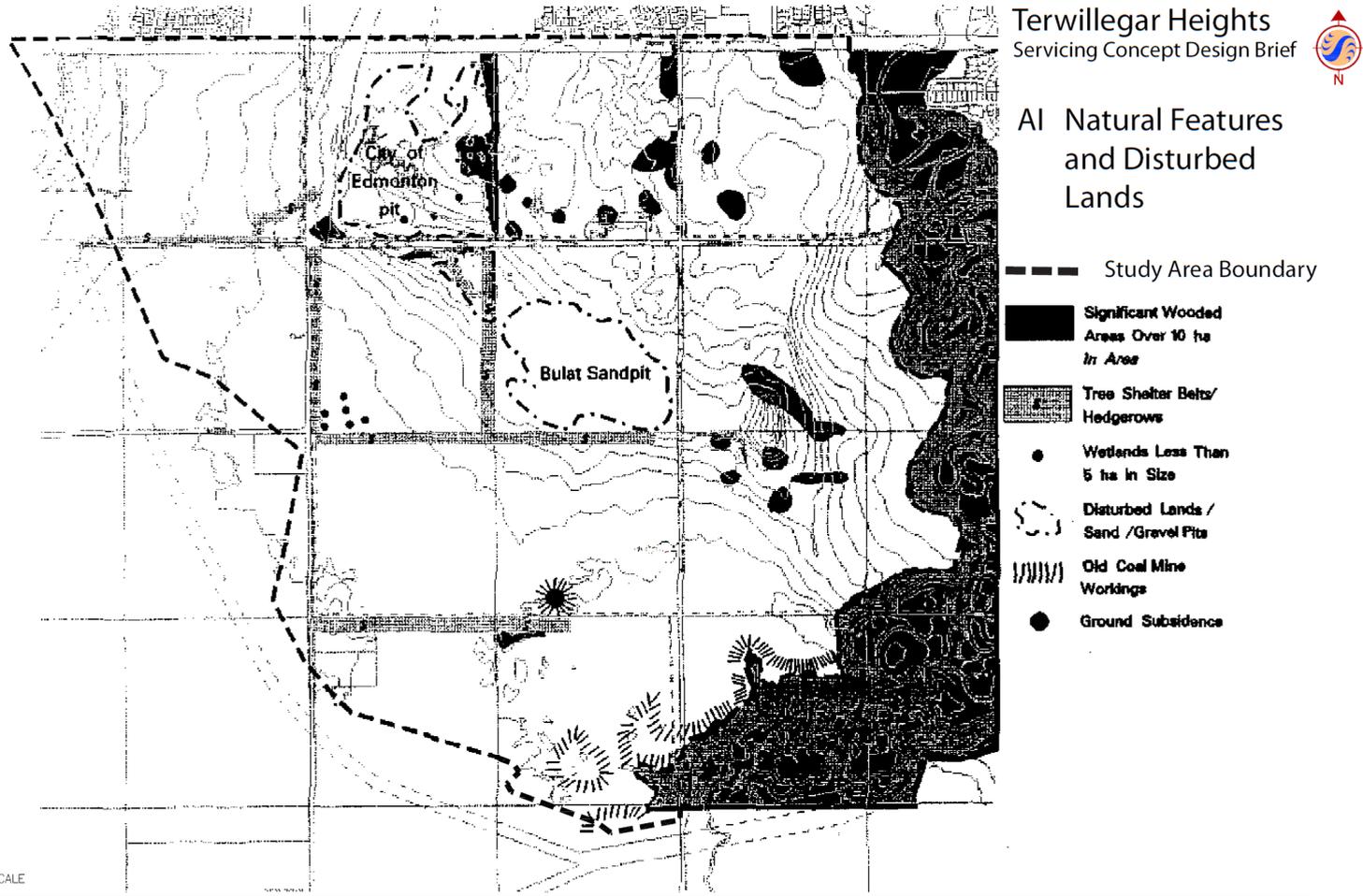


Figure **Map A1**  
Title **Natural Features and Disturbed Lands**  
JUNE 13, 2012

## APPENDIX II

### SUMMARY OF PRELIMINARY HYDROGEOTECHNICAL EVALUATION STUDY

#### 1. General

A preliminary report entitled "Hydrogeotechnical Evaluation Terwillegar Area (Drainage) Master Plan" was submitted to the Drainage Branch in mid-November, 1991 by A.D. Williams Engineering Limited. Reference should be made to that report for a full understanding of hydrogeotechnical constraints in the study area respecting its servicing potential.

The scope of the study included office research and field drilling programs to determine the soils and groundwater conditions relevant to the residential development in the area. The objectives of the evaluation were to determine the suitability of the site conditions with respect to the proposed development and to provide preliminary design parameters and construction guidelines appropriate for future urban development.

The City of Edmonton Drainage Branch had requested IMC Consulting Group Inc. to prepare an Area (Drainage) Master Plan for the Terwillegar area and as a part of this requirement a hydrogeotechnical evaluation was required. The specific items addressed in the hydrogeotechnical evaluation were as follows:

- (a) Review existing reports for the area.
- (b) If significant gaps in the information base exist, plan and implement a hydrogeologic investigation to complete the information base.
- (c) Identify conditions that would require special design and construction measures for drainage facilities.
- (d) Identify areas of high groundwater tables and estimate weeping tile flow rates.
- (e) Recommend the use of the study area or specific parts of the study area.
- (f) Identify any design constraints.

#### 2. Surface Features and Constraints

There are two major geotechnical constraints within the study area and these are related to borrow pits and old coal mine workings.

##### 2.1 Borrow Pits

There are two borrow pits located within the study area, one owned by The City of Edmonton and the other by *two private owners* of Calgary, which is referred to as the "Bulat pit" elsewhere in this report

Amended by Editor

##### 2.1.1 City of Edmonton Rabbit Hill Pit

For about 30 years, the City of Edmonton has operated the Rabbit Hill pit as a source of sand backfill for sewer and water line construction. Currently, backfilling of the pit is ongoing. Previous geotechnical studies were undertaken in 1986 and 1987 by the

City of Edmonton and by Hardy BBT Limited, on behalf of the City of Edmonton, respectively on the Rabbit Hill pit. The 1986 study was conducted to determine the quantity of the recoverable clay suitable for backfilling purposes. The 1987 study was conducted to review geotechnical data and identify the considerations associated with settlements and foundations on deep fills for residential developments.

Based on the above two geotechnical reports, the maximum depth of relief of the original surface before pit operations was about 10 to 12 metres. The major lithologic (soils) units are sand and silt deposits extending to depths up to 45 metres or to Elevation 656 metres, approximately. Beneath the sand and silt, glacial till composed of a clayey matrix is present. Beyond the kame mound, on the northeastern extremities the major lithologic units are shallow lacustrine clays or silts overlying clay till.

According to the above 1987 Hardy BBT report, backfilling was initiated as early as 1962, but significant quantities were placed in the mid-1970's at the southwest and the north central regions of the property. No specific compaction effort was directed on the backfill materials which comprised mainly clay from trench excavation, up until about 1985. After 1985, nominal compaction of these backfill in thick lifts was conducted using a self-propelled "sheep's foot" roller equipped with a blade. It is not clear whether any field density monitoring of the compacted backfill was taken. The maximum depth of fill is expected to be in the order of 20 to 22 metres.

The Roadways Engineering Branch, Public Works Department, is currently (November, 1991) in the process of preparing terms of reference for a more detail geotechnical monitoring study for the reclamation of the City of Edmonton (Rabbit Hill) gravel pit

### **2.1.2. Privately Owned (Bulat) Pit**

Amended by Editor

The *privately owned* pit has also been operated for about 30 years by various operators. No reports or records on this pit were available for review. Therefore, most current information about this pit is based on discussions with the current pit operator by A.D. Williams Engineering Limited.

The pit operation occupies over 60 percent of the quarter section area in which it is located. No actual surveying was conducted for the hydrogeotechnical study, however, the bottom of the pit is currently located a depth of approximately 15 to 20 metres below the surrounding area.

It is understood that sand had been extracted from the pit until about 1989. Since then, the pit has been used as a dump site for construction debris from various parts of Edmonton and the surrounding area. No compaction was intended for all the fill materials placed in this pit. A sand deposit extends to a depth of 10 metres below the present bottom of the pit.

## **2.2 Abandoned Underground and Strip Coal Mines**

Extensive underground mining activities at the southeastern portion of the study area near the Whitemud Creek valley were described by R.S. Taylor in his 1971 "Atlas: Coal Mine Workings of the Edmonton Area". According to this publication, there were at least six mining operations along the southeastern boundary of the study area. Most of the mining operations were underground "room-and-pillar mines" and a small proportion of surface strip mines. An approximate outline of the mining operations is shown on Maps 4 and A1.

Coal seams mined by the underground operations are generally located at depths of 15 to 30 metres. The thickness of the coal seams in this area was about 1-2metres.

The room and pillar mining method generally requires the removal of pillars following mining of the rooms. The removal of the pillars generally causes the ground to subside. Whether ground subsidence had occurred within the study area has not determined. However, one known ground subsidence area has been identified during a cursory examination of air photos mining records. The subsidence is located near the south boundary of SE Section 35, Township 51, Range 25, West of 4th Meridian, coincide with mine No.1091 (Rabbit Hill Collieries).

The observed area of the subsidence was oval in plan and 45 metres x 30 metres, with a maximum vertical displacement of about 3.6 metres. The subsidence was attributed to the "quicksand" which had broken into the workings at one or more points and flooded the mine. The remnant of the subsidence is still visible and indicated on Maps 4 and A1.

The strip mine area was generally located mainly in the creek bottom. This mining process required the excavation and stockpiling of all overburden above the coal seam, removal of the coal and subsequent pit backfilling. Examination of historic air photos reveals that Whitemud Creek flowed through the strip mining area and that the open pit area was inundated by water.

### **3. Conclusions and Recommendations**

Based on an evaluation of the information obtained for the A.D. Williams Engineering Study, the soils and groundwater conditions in the study area are suitable for the proposed residential developments. "Normal" design and construction practices are generally applicable for future urban development within the study area.

#### **3.1 Deep Trunk Sewers**

In construction of deep facilities in the sand area below water table, construction dewatering or other means of treatment, such as freezing or chemical grouting may be required. The selection of construction and treatment should be based on the specific requirements of the facilities and the specific site conditions. A detailed geotechnical evaluation is required in each case.

Construction of the proposed deep trunk sewer along the west portion of the study area would require a specific geotechnical evaluation once the alignment of the sewer is defined. If the sewer is constructed deep within the bedrock, conventional tunnelling method is applicable. It should be noted that sand, silt and sand and gravel deposits are present in the west portion of the study area. These materials are generally difficult for tunnel construction, especially below water table. In this case, special treatments, such as chemical grouting, or special tunnelling technique using a bentonite shield may be required. Alternatively, the sewer may be raised as much as possible to avoid adverse ground conditions. Detailed site investigation and evaluation of tunnelling techniques are required for the design and construction of the proposed deep trunk sewer.

#### **3.2 Stormwater Management Facilities**

A number of storm water management ponds are proposed in the Area Master Plan. It is understood that west ponds are currently considered for these facilities. These ponds are tentatively located in the central, west and east along the top of Whitemud Creek valley.

For those ponds located in the central and west portions of the study area, clayey soil is expected within the construction depth of these ponds. Normal design and construction practices are applicable in these areas.

Because of the high permeability of sand, it is generally not advisable to have the wet ponds located within the kame mound or in the area where the construction depth extends below the sand deposit. However, in order to achieve optimum use of the land, there are occasions where such construction is necessary. In this case, an impervious liner or similar design may be required. Because of the uncontrolled backfill within the pit area, potential settlement beneath the wet pond and its effect on the integrity of the liner should also be considered in the design.

For those wet ponds located near the top of the bank along the Whitemud Creek, special considerations should be given to the setback distance from the top-of-the-bank line in order to minimize any impact on the slope stability.

A report prepared by R.M. Hardy & Associates Ltd. in 1974 for Alberta Environment, entitled "Whitemud Creek Bank Stability" provides some preliminary design charts for the determination of setback distance for water ponds from the top of the bank. The design charts as presented in the report are unsafe for application purposes.

A recent report by Cruden and DeLugt, 1991, for Alberta Municipal Affairs has addressed the setback distance. However, the report only considered building setbacks and not the design of wet ponds.

Setback distances related to wet pond design should be based on a site-specific evaluation. Within the study area, there are subsurface conditions, such as the presence of sand deposits and underground coal mines near Whitemud Creek on the south half of the study area, that require detailed evaluation. In the underground coal mining area, the design of wet pond should consider not only the slope stability, but also the potential of water induced ground subsidence.

However, as a preliminary guide, based on our experience on the Brookview pond, a minimum setback distance of 80 to 100 metres should be provided for the two proposed ponds adjacent to Whitemud Creek on the north half of the study area.

### **3.3 City of Edmonton Rabbit Hill Pit**

In the Rabbit Hill pit, up to a maximum of 22 metres of backfill are expected. Most of the backfill materials were placed without controlled compaction. According to the 1987 Hardy BBT report, total settlements of the existing fill due to consolidation under self-weight could be expected two to six percent of fill depth. Therefore, using this estimation for a fill thickness of 22 metres, a settlement of 0.4 to 1.3 metres could be expected. Since settlement of the backfill would have started as soon as the backfill was placed, some of the anticipated settlement would have already taken place and some settlement would likely continue to occur. Preliminary special design considerations and measures have also been outlined in the 1987 Hardy BBT report, including:

- (a) providing valleys or stepped contours for a subdivision;
- (b) ensuring uniformity of soils compaction both vertically and horizontally;
- (c) preloading of fill where differential movements are critical;
- (d) providing deep foundations for heavy structures with precautions on negative skin friction; and
- (e) using a uniform mat of increased stiffness.

It is recommended that the pit backfill be further evaluated as the previous study is five years old. Furthermore, additional backfilling may have occurred with different

compaction procedures, if any.

### **3.4 Privately Owned (Bulat) Pit**

In the area of the *privately owned* (Bulat) pit where the operations have extended to a depth of 15 to 20 metres below the surrounding area, complete backfill of the pit is not practical nor economical based on the current market conditions. Therefore, the pit could be developed for private recreational open space uses. Since uncontrolled backfilling has been taking place for two years, special designs for building structures constructed on these fill materials should be undertaken to minimize the differential settlements. In addition to the measures noted above, depending upon the fill thickness, driven pile foundations supporting structural slabs or space slab foundations, which have been originally applied to permafrost terrain for single storey buildings, may be used to overcome potential differential settlement problems.

Storm water retention ponds may be constructed within the pit area. However, the provision of an impervious liner for these ponds should be considered because the previous nature of the sand subsoil.

### **3.5 Abandoned Underground Coal Mining Areas**

The areas shown as old coal mining area on Maps 4 and A1 are based on a cursory review of existing mining records and, therefore, are considered approximate. However, residential developments may also be possible, subject to a detailed investigation of the underground mining limits, mining procedures, depths of mining operations and potential for ground subsidence.

It is not recommended to have stormwater ponds constructed within the underground mining area because of the potential for water-induced ground subsidence. Should such pond construction be required, a site specific geotechnical study should be conducted to study the ground behaviours around the mining area.

## **4. Recommended Further Work**

The current study is intended as a preliminary hydrogeotechnical evaluation appropriate for an Area Master Plan submission. As such, much of the information contained in this report preliminary in nature. Consequently, further work such as the monitoring and reclamation program for the Rabbit Hill pit to be undertaken by Public Works is required for the next level of submission.

The following is a list of recommended further work, some of which have been previously mentioned.

- (a) The groundwater monitoring program should be continued for at least one more year to determine the seasonal fluctuation of the local water table. Considerations should be given to replace the damaged piezometers.
- (b) A higher density of boreholes should be drilled and groundwater level monitored, especially along the west regions of the study area where thick and deep silty soils have been identified by previous studies.
- (c) Alignment specific geotechnical investigations should be conducted for shallow sewers to further define the subsurface conditions. Associated with these investigations, an evaluation on the applicability of the one-point proctor criteria for trench backfill compaction should be undertaken.
- (d) An alignment specific geotechnical investigation should be conducted for the

deep trunk sewer to determine the subsurface conditions and evaluate the appropriate tunnelling procedures.

- (e) Site specific geotechnical investigations should be conducted for deep facilities, such as drop structures, to ensure the design and construction procedures are compatible with the subsurface conditions. Special construction measures, such as advanced dewatering, freezing or chemical grouting may be required at some locations where cohesionless silt or sand are present below the water table.
- (f) A detailed top-of-bank study should be conducted along the Whitemud Creek to determine the appropriate guidelines for the developments along the top of the bank. Such study should include the determination of the stratigraphy, water table and existing slope stability of the Whitemud Creek valley. From such a study, development setback distances for houses, water retention structures, roadways, etc. may be provided.
- (g) A detailed review and investigation of the underground coal mining area to determine the underground extent (plan and depth) of the mining operations and the types of underground mining procedures (whether the pillars were pulled after mining the rooms, etc.). Such information would provide an insight on the anticipated ground subsidence which would affect the construction and operation of surface facilities.