A Regional Alternative for a Suburban Landscape

by
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A REGIONAL ALTERNATIVE FOR A SUBURBAN LANDSCAPE

BY

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A practicum submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of

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Abstract

This practicum explores a method of finding space for the development of an alternative landscape within the current pattern and structure of suburban development. This alternative landscape reflects its natural regional setting and provides visual and ecological connections to the greater bio-region and its natural history.

This landscape can become a dynamic and interesting element of suburban development and provide a richness of experience through on-going change and diversity of habitats.

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1.0 Introduction

In Out of Place, Michael Hough states, "Landscape is an expression of a place's regional context especially in the absence of distinguishing architectural styles" (pp.15). If this test were applied to most Winnipeg suburbs, they would be found lacking *landscape* . In this context, *landscape* refers to the whole system that creates a regionally identifiable landscape, including ecological and geological components such as plants and animals, soils, and its natural history.

Currently, the landscape within Winnipeg's suburbs is more a product of the process that creates suburbs throughout North America and less a product of the regionally identifiable landscape. This process has caused a striking similarity in the appearance of the mass produced North American suburb. It has led to a lack of both regional and neighbourhood character, especially in newer neighbourhoods. These similarities arise in a number of elements: house style and exterior finish; zoning requirements that include house siting, size, and configuration; efficiencies of land use and the supply of services, such as roads and sewers; and landscaping. Landscaping is usually the last element of the process to be implemented and is overlayed in the spaces that remain. It is visible mostly as planting.

The suburban landscape is also an important component of the overall landscape of the city because it usually covers large areas.

In recent years the suburban development of Whyte Ridge has evolved in the southern part of Winnipeg. It is being promoted by its developers, Cairns Developments Ltd., with the slogan: *'Its the parks and lakes that make the difference.'* In this case landscape imagery is being used to attract potential home buyers.

The landscape in Whyte Ridge is typical in that it consists of vast areas of sod with single specimen trees and well defined shrub beds. It is an artificial horticultural construction, often high in maintenance and energy inputs. Little attention is given to the unseen aspects of the landscape such as soil development. Visually, it derives little or nothing from the local naturally occurring plant communities of the Winnipeg area: aspen, oak, and floodplain forests, tall grass prairie, and wetlands. Instead, isolated from nature, the suburban landscape conveys a strong sense of ecological separation from the greater bio-region. A recognizable visual and emotional connection to the local ecological environment and natural history is essential in the creation of landscape that has regional identity and a sense of place.[1] It is important that residents feel a sense of belonging to a greater ecological area within the reaches of day-to-day living spaces.[2] Hough states: "Creating a sense of place involves a conscious decision to do so... A valid design philosophy is tied to ecological values and principles; to the notions of environmental and social health; to the essential bond of people to nature, and to

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1 Norberg-Schulz, Christian, Genius Loci (Rizzoli Publishers, 1979) p.10

2 Hough, Michael, Out of Place (Yale University Press, 1990) p.189

the biological sustainability of life itself." (p.179)

The landscape has the potential to be a dynamic or semi-fixed element of the process that creates suburbs. The other elements are static or fixed[3], designed to be built once and stay in place for years. Currently in Whyte Ridge, as in other developments, a collection of plants is set in place in infant form and only allowed to change through the process of individual maturation. Diversity is restricted to a few horticultural selections. On-going change through self-regenerating and locally responsive plantings that reflect the diversity of the native landscape would add to the richness of the experience of the landscape and further strengthen the sense of place.[4]

This alternative landscape is not likely to include a pure reconstruction of any one regional biotic community. The community should be thought of and promoted as a *managed* one rather than a *natural* one. As the landscape matures and the community becomes self-sustaining, active management should become less important. However, the need to keep residents informed and educated about the concepts behind the alternative landscape should continue in order to ensure its long term success.

The process which currently creates suburbia has within it entrenched values and accepted standards. Achieving any change

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[3] Rapoport, Amos, The Meaning of the Built Environment (University of Arizona Press, 1990) p.88

[4] Ibid. p.183

in the approach to the suburban landscape will require a change in these values and standards. While it is not the intent of this practicum to address these issues, it is important to recognize the impact such a change would have on accepted cultural ideals.

This practicum will explore a method of finding space for an alternative landscape within a suburban development. This alternative landscape will reflect "an expression of a place's regional context" and, through diversity and change, add to the richness of experience of the landscape.

2.0 Scope of Study

2.1 Statement of Goal

The goal of this practicum is to find space for an alternative, ecologically and regionally identifiable landscape within the current pattern of suburban development.

2.2 Objectives

The objectives of this study are:

-to identify a basis for an alternative landscape;

-to find space for this landscape that extends to each residential lot; and,

-to develop a plan for an alternative landscape for the study site.

2.3 Methodology

2.3.1 Whyte Ridge and the Suburban Structure

The existing suburban neighbourhood of Whyte Ridge has been selected to serve as a base for the study of the current structure of typical suburban development. It is explored in terms of: physical appearance; spatial configuration (lot size and dimension, house siting); land use in area, including total areas of hard landscape (roads, driveways, sidewalks, and houses) and soft landscape (public reserve land and private landscaping, in both turf areas and other plantings); and public and private ownership. The existing landscaping, including grading, landform, soil development, and planting is also examined.

2.3.2 Identifying an Alternative Landscape

In order to establish the basis for an alternative landscape that is both ecologically responsive and regionally identifiable, naturally occurring landscapes and their plant communities are explored. The adaptability and diversity of biotic communities provides a strong argument for a more ecologically responsive landscape. An exploration of how and why plant communities occur and how they are arranged provides insights into how this landscape can be implemented. The specific plant communities of the area are reviewed to provide a basis for the link to a regional

identity. They are aspen, oak, and floodplain forests, grasslands, and wetlands. Each community is described by the typical plant species which comprise it, its visual qualities, the soil and moisture conditions it requires, and where it might occur within Whyte Ridge.

2.3.3 Finding Space

A series of manipulations that alter the space available for the alternative landscape are proposed as variables. Elements accepted for variation include the placing of controls on the use of private land, house location restrictions (set-backs and side yards), other zoned components (driveways, boulevard dimension and location, etc.), grading and drainage, and use of public reserve areas. Since this practicum is set within the current pattern of suburban development, some elements are considered non-variable. These include the existing or established engineering infrastructures (i.e. street locations, widths and shapes, underground services), and the footprint of typical housing units.

Each variable is discussed in terms of changes required to the existing plan and is assessed as to its individual effect upon the overall increase in available space and how that space extends throughout the study area. Differences in totals for hard and soft landscape, and private and public ownership are noted in tabular form. These variables are then combined in models which were also assessed for their overall effect upon space available for the

alternative landscape.

2.3.4 Developing a Plan

A combination of variables was chosen for the development of a plan. Within this space found for the alternative landscape, proposals are made for the location and implementation of appropriate managed biotic communities that reflect the local ecological environment and natural history.

3.0 Whyte Ridge: Suburban Image and Structure

3.1 Site Description

Whyte Ridge is typical of suburban subdivisions currently under development in the City of Winnipeg or throughout North America. The process that generates suburban developments entrenches a set of imagery into them and results in a high degree of similarity. The design and construction of the suburban landscape is usually the last part of this process.

Whyte Ridge, located west of the Red River in south Winnipeg, is promoted with strong reference to the landscape, using the sales slogan: *'It's the parks and lakes that make the difference.'* Designed by Cairns Developments Ltd., it is exclusively single family detached housing covering 535 acres (217 hectares) of what was previously highly productive agricultural land. When completed in the late 1990's, Whyte Ridge will have 2,350 lots.

Construction began in 1985. There is a gross density of approximately 4.3 units per acre (10.6 units per hectare), with about 45 per cent of the total land area used as roads, lakes, public reserve, and school properties.[5] The net density is 8 residential lots per acre (19.8 lots per hectare). Streets are

[5] Interview with James Gallagher, General Manager, Cairns Develoments, January 1992

arranged in an hierarchical system of collectors and feeders. Cul-de-sacs are common and are seen to be the most desirable locations.[6]

Public reserve areas, or 'the parks', focus on the lakes and are located in prominent areas, visible from the main collector streets. Park areas are not physically connected, other than along streets. Schoolgrounds are located adjacent to public reserves, combining recreational areas such as baseball diamonds and soccer pitches.

As a sales feature, the development is under 'architectural controls' which establish strict house design guidelines. Constraints are placed on roof lines, exterior finishes and colours, and all houses must have a double attached garage. The developer sees these constraints as an important selling tool in the conservative Winnipeg market.[7]

Landscaping is also included under the 'architectural controls', suggesting that it will reinforce the objective of creating "a park-like setting" through extensive tree and shrub planting to provide "shade and comfort" and provide "a psychological link to nature."[8] However, there is no further discussion of how an appropriate image of a "park-like setting" or "a psychological link to nature" is to be achieved. Implicitly there is some indication of what may be meant in the landscaping of the public reserve areas.

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6 Ibid.

7 Ibid.

8 Whyte Ridge Developments Ltd. "Architectural Control Guidelines. Vol. VII" November 1991

For the purposes of this study, a portion of the first phase of Whyte Ridge was selected for detailed analysis. It was built in 1985 and 1986, in the north east corner of the development, immediately south of Scurfield Road. The study area contains 107 houses on just over 26 acres (10.5 hectares), about 5 per cent of the total 535 acre (217 hectare) area that Whyte Ridge will cover when completed.

The study site comprises design conditions that are typical through the rest of Whyte Ridge.

It contains lots of different size and configuration, ranging from the typical 5,500 square feet (511 m^2) to over 16,000 square feet (1,487 m^2). Smaller lots are generally rectangular, while the largest lots are 'pie-shaped' with generous back yards, located on the cul-de-sacs.

All grading within individual lots is designed to drain excess water from downspouts, sump pumps, and the lot surface to the street and into the larger storm water management system.

There are a variety of property edge conditions with lots abutting other lots, the storm water retention lake, the public reserve areas, or a major access street.

The study area contains portions of the public reserve adjacent to the lake. This reserve area contains the only substantial slope, dropping about 13' (4 m) to the normal water level.

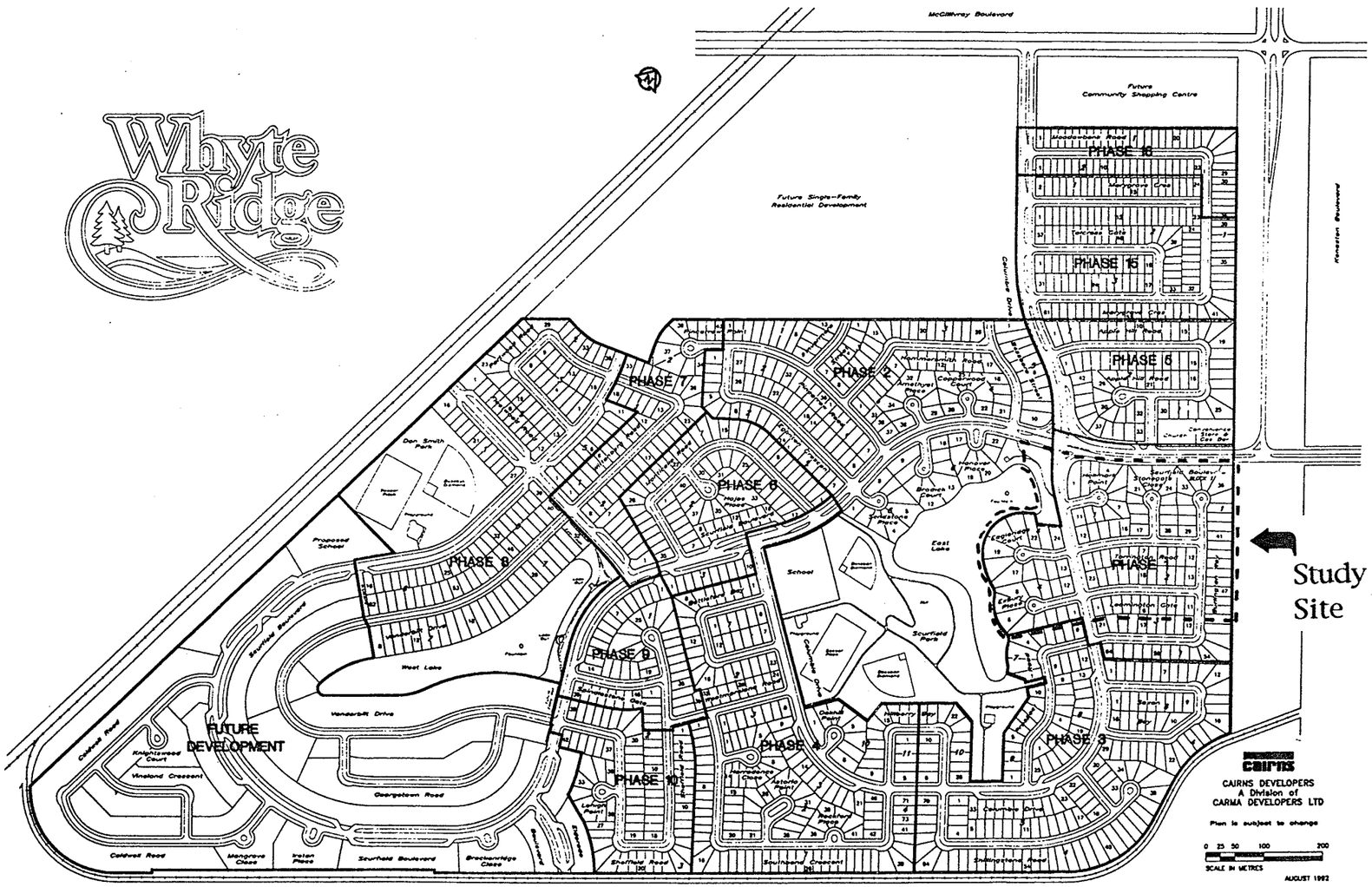

Figure 1 - Site Map
Whyte Ridge with study area outlined
(Source: Cairns Developers Ltd.)

3.2 The Suburban Structure in Whyte Ridge

3.2.1 Appearance

The overall appearance and layout of the Whyte Ridge development is controlled by both the developer's 'Architectural Control Guidelines' and the City of Winnipeg's zoning bylaws.

The 'Architectural Control Guidelines' govern everything from the size of the house to roof line and finish colour, and require a double attached garage. All corner houses must be bungalows, and 'visually larger' houses must be set back further on the property.[9] Most houses have 1,500 to 2,500 square feet (139 to 232 m^2) of living space and three or four bedrooms.

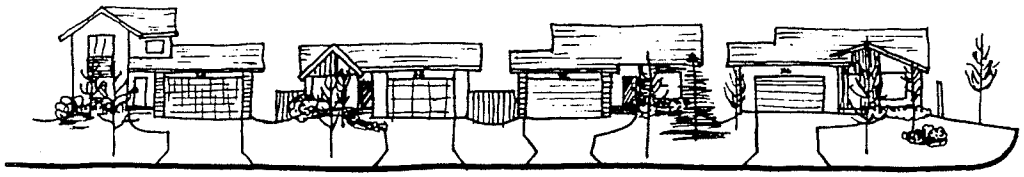

Figure 2 - Facades Along a Typical Block

These guidelines and bylaws are supervised by a local architectural firm to ensure house setbacks and styles vary along the total length of any one block. The desired and advertized result is a homogeneous neighbourhood in density, spacing, and appearance. The similarity of size and massing of the houses, the limited range of architectural style, the narrow range of facade finish and colours, the controls on spacing and setbacks, all work

9 Ibid.

together to produce little variation within the development.

3.2.2 Spatial Arrangement

City zoning bylaws cover setbacks, fencing standards, grading, and driveway dimensions. Side yard dimensions are set at a 5-foot (1.5 m) minimum and a 6-foot (1.8 m) maximum. Front setbacks from the property line and rear setbacks are set at a minimum of 25 feet (7.6 m). Fences are limited to a height of 78 inches (198 cm) in backyards, however most are built at a height of 72 inches (183 cm).

Driveway approach widths at the property line are limited to 16 feet (4.9 m) and flare to 26 feet (7.9 m) at the street. The standard length of the approach (17 feet / 5.2 m) with the average length of the driveway on private land (30 feet / 9.1 m) combine to make a total of approximately 47 feet (14.3 m).

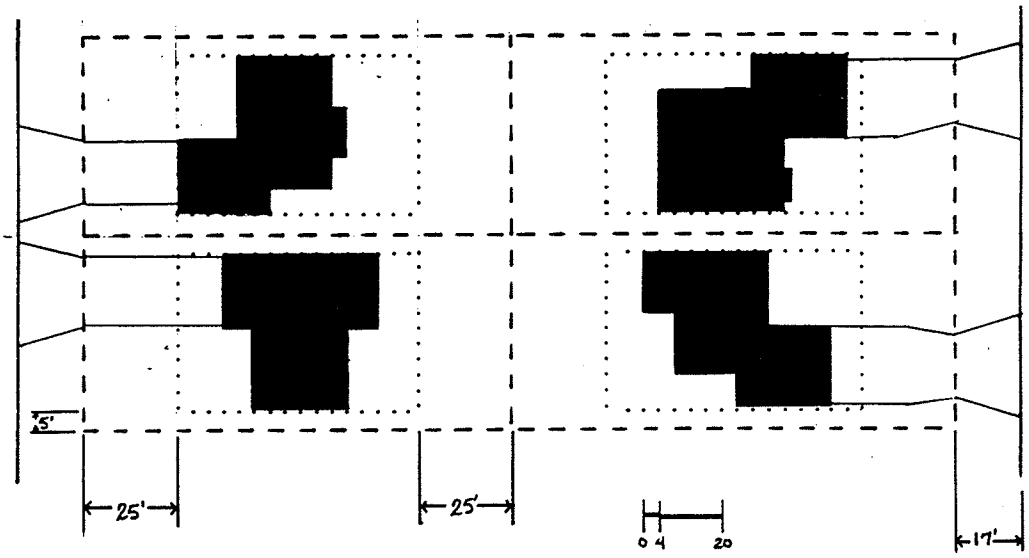

Figure 3 - Setbacks, Sideyards, and Boulevard

3.2.3 Land Use and Ownership

Currently almost 40 per cent of the specific study area is covered with hard surfaces; roads, sidewalks, driveways, and roofs. Roof surface is the single largest component at 17 per cent of the total area, followed by roads at about 13 per cent, driveways and driveway approaches at 8 per cent. Taken together, area designated for automobiles, roads and driveways, accounts for the largest portion of the hard surface area at about 21 per cent. Fifty-six per cent of all hard surface area is on private land.

Approximately 81 per cent of all soft landscape area is on private land. Over 90 per cent of the entire soft landscape area is currently planted as sod.

Within the study area, 28.5 per cent of land is publicly owned and only 40 per cent of this is available for landscaping (i.e. not hard surface). This primarily comprises boulevard space adjacent to private lots and, as such, does not appear to be 'public' land. Of the privately owned land, two-thirds is available for landscape development.

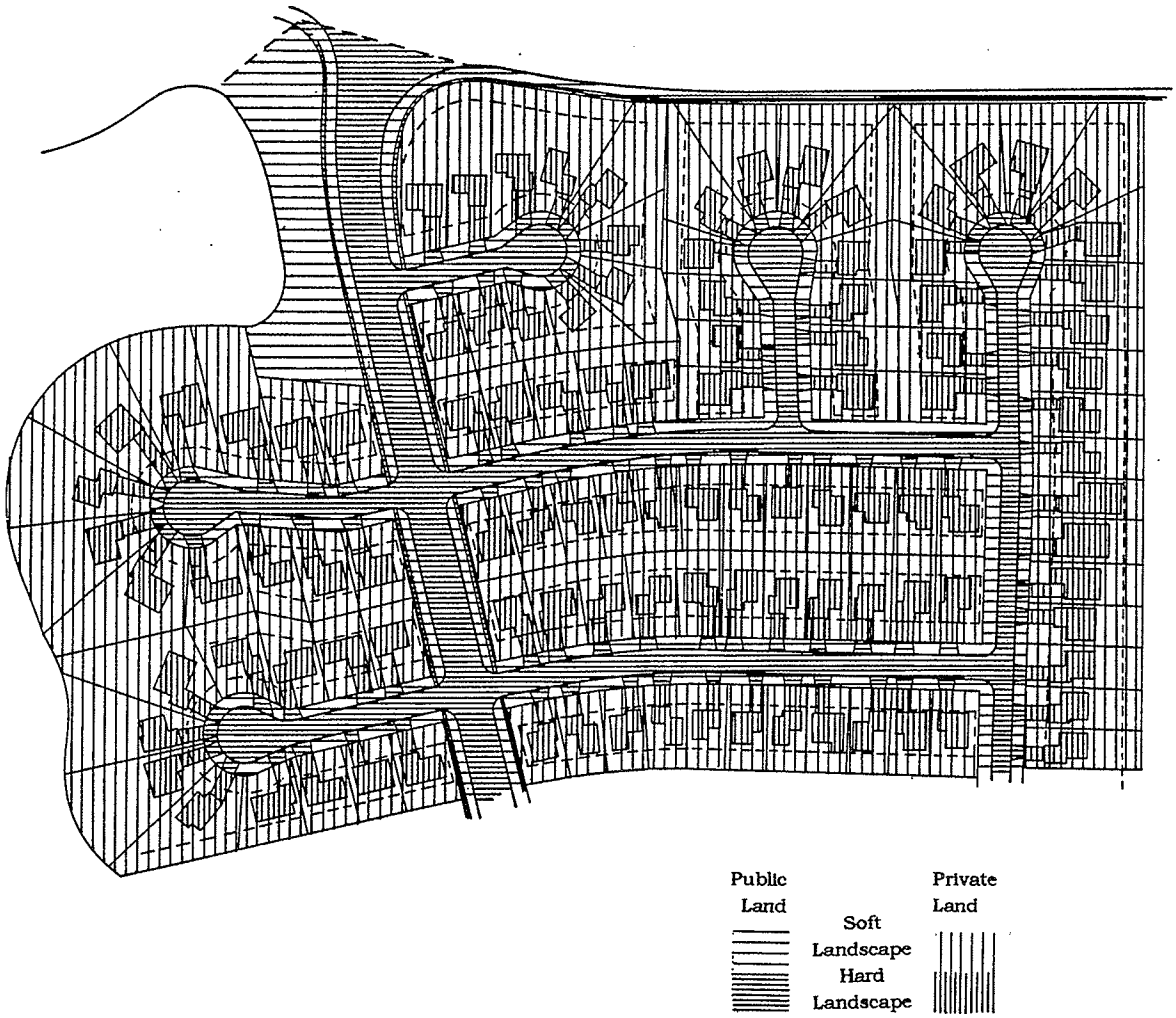

Figure 4 - Land Ownership/Soft and Hard Landscape

3.2.4 Soft Landscape

Landscape development within the subdivision occurs on the large public reserve areas and land within or adjacent to each lot. The soft landscape appears to be located, for the most part, in spaces left over from other elements that make up the development. For example, the soft landscape in front yards is defined by what space remains from the street, driveway, sidewalk, and house.

The public reserve areas, which focus on two storm water retention ponds, are the 'parks' that the developer uses in its advertising as a promotional feature. Most of the landscaping in these areas consists of single specimen trees planted in broad sodded areas, creating the image of a 'park' that is one clean green carpet dotted with occasional trees.

The land within or adjacent to residential lots is governed by the less specific guidelines referred to previously, but few attempts are made by homeowners to create variation or an unusual landscape which stands out from others. But given the strict guidelines and homogeneous look of the development, this cannot be considered out of character.

Front yards are developed as the setting for the house front. There is little functional use made of this land other than as an approach to the house. The configuration of these houses, with a

double attached garage approached from the street, creates a space in which a majority of the landscaping in the front yard is done on one side of the concrete driveway. A small ornamental tree (Shubert chokecherry) provided by the developer is planted closer to the house, and foundation planting under the picture window is common. Occasionally a lot will feature an island bed with a spruce tree. Visually included in the front yard is the 17-foot wide city-owned boulevard with its required tree, usually a basswood. This space appears to belong more to the individual house than to the development.

Back yards are designed to be the 'family' portion of the lot, potentially incorporating a wide range of functions. In newer parts of the development the back yard is often landscaped only with close mown sod. Tree or shrub planting is usually around the periphery, with or without a fence, often incorporating species which provide privacy from immediate neighbours. Vegetable gardens are frequent. A raised wooden deck off the house is also a common element.

Plants used throughout Whyte Ridge are almost exclusively restricted to ornamental selections. Kentucky Bluegrass sod provides the green carpet of lawn. Shrubs are commonly spirea, silver dogwood, cotoneaster, and lilac, none of which are native to this region. Evergreens, which are completely foreign to this area, consist of Colorado spruce, pyramidal cedars, mugho pines, and junipers. Only the tree component of the plantings provide some

link to the regional plant communities through the use of basswood and green ash, although these too are often horticultural selections. They are supplemented by other ornamental trees such as Shubert chokecherry and flowering crabapples.

Little attempt is made to reflect the arrangement of plants in natural settings with layering into 'strata' and 'edge conditions.' Instead they are spaced apart in infant form as part of an apparent abstract composition.

The soil horizon is greatly disturbed and re-configured during construction. The original topsoil is removed and the entire area is re-graded with clay fill. Over this fill, a thin layer of topsoil is re-applied. Unlike soils in natural conditions, little organic material is allowed to return to the ground to compost into more fresh soil. The soil building process is arrested and any amendments are usually made in the form of synthetic fertilizers.

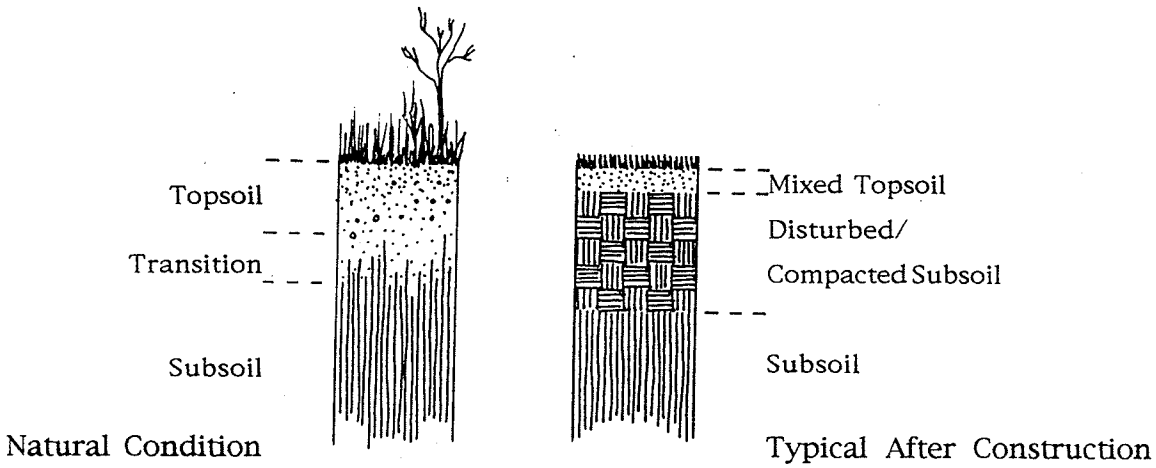

Figure 5 - Soil Horizons

Grading and landform within Whyte Ridge have but one goal,

the efficient drainage of all run-off water as part of an integrated system. Lots are graded away from the house in long constant slopes to the street, directing all run-off along the property lines. This creates visible swales between houses and along property lines. Run-off water is directed to drains within the street system, and conducted underground to the lakes. The water level within the lakes varies to allow slower release of storm water into the region's rivers. Grading combined with an altered soil profile provide little opportunity for ground water recharge.

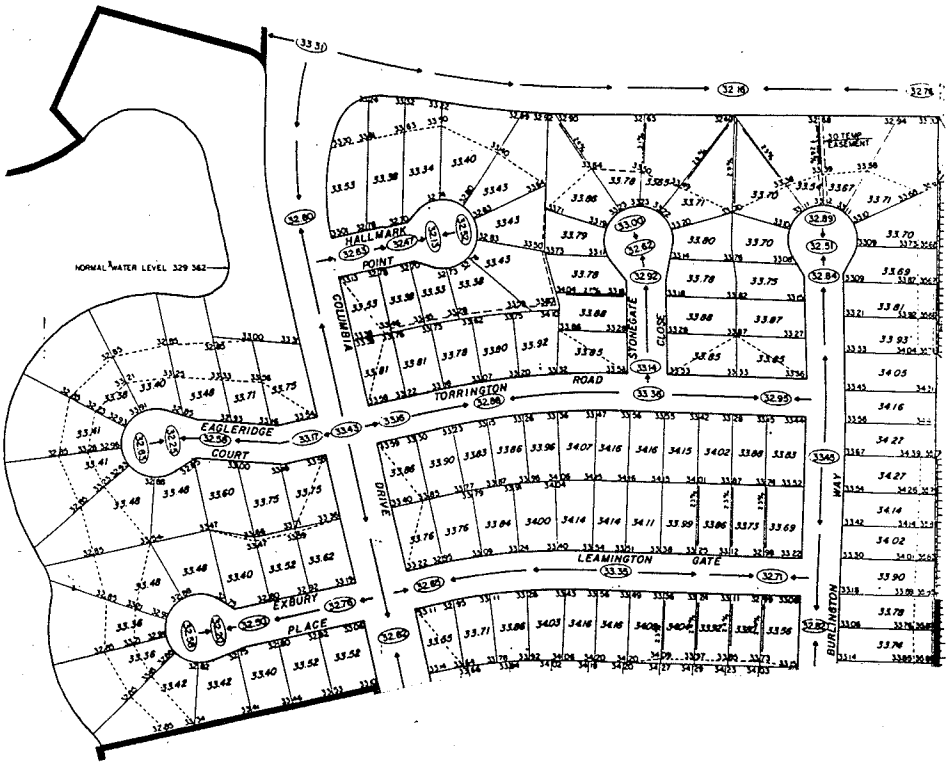

Figure 6 - Grading Elevations
(Source: City of Winnipeg, Operations Dept.)

4.0 Identifying Alternative Landscape

4.1 An Alternative Landscape for Whyte Ridge

A basis for an alternative landscape for Whyte Ridge can be found within the regional biotic communities. The naturally occurring communities of a region have already adapted to climate, geography, and soil conditions.

An opportunity is provided to restore a regional identity to the landscape though references to the regional biotic communities. This is achieved partly through the species that make up the community as well as the form and structure that the community takes.

4.1.1 The Biotic Community

A biotic community is one that is shared by all living organisms -- plant, animal, insect, lichen, and bacteria -- each a necessary component. The natural world is organized into these definable communities, aggregations of organisms having mutual relationships among themselves and to their environment.[10] Natural biotic communities share an environment which has the same solar, water, soil, and nutrient resources. These

[10] Oosting, Henry The Study of Plant Communities (W H Freeman & Co., 1948) p.21

communities have evolved over thousands of years and continue to undergo both long and short term changes. To create an alternative residential landscape, it is important to understand how plant communities are formed and how they operate on a number of different levels.

At a macro scale, the oxygen and hydrologic cycles of a community are part of a much larger system that recirculates the key components of the global environment. The biotic community responds locally to the hydrologic cycle and soil moisture, usually returning its biomass directly to the ground through leaf litter and decay.

Without human intervention, the biotic community cleanses polluted air to release oxygen; it filters water and reduces run-off to help recharge aquifers; and allows evaporation of water into the atmosphere.

Biotic communities have evolved over time in response to the regional climate and they continue to adapt to long-term climatic changes. Specific species may adapt or gradually be replaced with others. This kind of change is separate from the short-term change associated with the movement through growth phases to a climax condition.

Periodicity, or seasonal change, is another adaptation of a biotic community. Certain species flourish and bloom at particular times in the growing season, filling specific niches. For example, as tree leaves emerge, herbaceous plants under a heavy tree canopy will change from those which need full sun to those which are more shade tolerant.

Biotic communities contain a broader genetic diversity for both plant and animal components. Each component fits into a specific niche within the community. The more niches there are to occupy, the more diverse the community will be.

The landscape created by the biotic community provides habitat for a wide range of animals, birds, and insects. This is important in establishing a regional identity. The activity of ground burrowing animals, for example, in a grassland community not only provides valuable soil aeration and seed dispersal, but also creates a visual link to that biotic community and its natural processes.

Each component of a biotic community reinforces its link to the region in which it evolved. This results in a particular physical characteristic that creates a 'regional identity,' created by the detail of the biotic community.

In any region a number of communities will be found that correspond to site specific conditions within a new suburban development. However, no one pure community or combination of communities will completely serve the purpose. There are natural processes that have shaped the regional biotic community which may not be appropriate to a residential subdivision, and the subdivision itself will influence the development of the landscape.

4.1.2 Influences on Biotic Communities

Two of the natural processes that have shaped biotic communities in this region are fire and the actions of animals.

Fire is important in grassland communities, reducing the invasion of tree species. Widespread fire within a suburban residential development is not desirable.

The effect of animals through grazing or disturbance helps maintain communities at a 'subclimax' state and are an integral part of the biotic community. The rubbing and wallowing of buffalo in grasslands tramples down grass and destroys small trees. The browsing of elk and deer affects tree and shrub growth in forested areas. Animals disperse seeds through their droppings or food-gathering -- the 'clumping' form of oaks is often attributed to squirrel acorn caches. It is unlikely that a complete animal community would be able to accompany the appropriate plant community in a suburban setting. The lack of uninterrupted space would affect the success of larger animals and the presence of cats, dogs and automobiles is likely to affect smaller ones.

Another influence to consider is the close presence of suburban residences. For example, non-native plants which 'escape' from the garden are likely to compete with native plants. Often, as in the case of Purple Loosestrife *(Lythrum sp.)*, they can outcompete native ones. Occasionally these plants can find an appropriate niche within the community and become a part of it like Chinese Lantern *(Physalis sp.)*. Weedy species, like

dandelions *(Taraxacum officinale)*, thrive in residential landscapes and escape. Control measures would be difficult, and non-native plants would likely be considered part of the new landscape community.

Watering practices will also change the specific environment and community. Areas along the edge of the residential environment are likely to receive more moisture through both watering and run-off. This may cause a different species mix or growth pattern in various areas. Plants which compete favourably in dry environments, for example, are more likely to succumb to competition from moisture-loving species.

Grading in Whyte Ridge, as in other Winnipeg residential subdivisions, conforms to an engineered drainage system designed to drain excess water away from houses and lots into the storm water system. The land drains quickly and provides little opportunity for ground water recharge and absorption by the plants. Changing lot grading with more gentle slopes or creating terraces to slow run-off would also influence the development of the plant community. Grading could be adapted to suit the desired community.

Excavation, construction, and subsequent grading results in a disturbed soil profile. The disruption may be caused by a mixing of the profile due to excavation and grading or compaction due to the use of heavy machinery. The regional plant communities have evolved in a soil that has taken centuries to develop. The building of a soil profile continues in the natural setting while in the typical suburban setting, this process has been arrested. A

different community will develop on a disturbed soil base, with 'pioneer' species invading initially. While this has the practical function of the redevelopment of the soil, it does not necessarily allow the development of a long-term sustainable community.

Steps could be taken in the initial design of the development to minimize disruption of the soil. Soil that must be disturbed could be removed and stored on site until it can be replaced. The amount of grading required would be reduced if slower run-offs were permitted. Limited access of heavy equipment over soil areas would reduce compaction. Care in the excavation of foundations and the dispersal of fill would also be necessary.

For this practicum, the influence of restricted land area for the biotic community is of particular importance. Fragmentation of the biotic community into isolated islands reduces biodiversity, especially in animal populations. Genetic and species diversity is reduced in a number of ways: areas are too small to support wide ranging animals; remaining populations are too small to reproduce successfully with no in-migration to make up for losses, leading to inbreeding; there are fewer microhabitats; and only edge conditions may exist with no interior habitat.[11] Each regional community requires a minimum land area and configuration in order to be sustainable, and it is unlikely that such an entire land area could be found in a suburban development. Corridors which extend and connect habitat are important in the reduction of

[11] Lansky, Mitch Beyond the Beauty Strip (Old Bridge Press, 1993) p.250

fragmentation.

There are also considerations of orientation, which affect plant growth. For example, a long narrow band of forested community that is oriented on an east-west axis creates more opportunities for shade tolerant species along its north side than a similar band that is oriented north-south.

The provision of the largest possible area with an appropriate configuration and connection within the development is an important goal.

Regional biotic communities are only guides to the type and structure that the alternative landscape communities will take. Rather than the strict transference of specific communities, the alternative is a managed landscape that is both dynamic and eventually sustainable. A regional biotic community is the best source for hardy plant materials adapted to a specific area.

Since this practicum focuses on the Winnipeg region, the major biotic community groupings found in the area will be reviewed. They are identified by the plant species which define them.

4.2 Regional Biotic Communities

The area immediately around present-day Winnipeg was once part of the large aspen parkland that extended, from the Rocky Mountains to the Canadian Shield. Its productive and sustainable biotic communities evolved over a long period, successfully adapting to the climate and soil conditions.

The biotic communities in and around Winnipeg have changed dramatically in a relatively short period of time -- beginning with the first settlers. Vast areas that were once forest, grassland, or wetland have been transformed into large tracts of agricultural land, and urban and suburban development.

Each community develops distinctive associations and structures as they evolve, with specific soil and moisture requirements. These are reflected in the three types of plant communities found in the aspen parkland region; forest, grassland and wetland.[12] Isolated remnants of all communities survive.

In the following sections, each community is discussed in terms of: its dominant and associated plants; its physical appearance; the conditions in which it is likely to occur; and where these conditions might be found within Whyte Ridge.

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[12] Bird, Ralph Ecology of the Aspen Parkland (Dept. of Agriculture, 1961) p.3

4.2.1 The Forest Communities

The evolution of forest communities in this region is the result of appropriate soil, moisture, topographical, and climatic conditions. The aspen and the oak forests are named for dominant species, while the floodplain forest indicates its location.

Forests, in part, are made up of horizontal layers or strata of plants. Tree strata are the tallest and usually have the most influence on the entire community. The shrub strata vary with soil conditions and location within the community. The types of shrubs and their densities vary with their location under the canopy. Soil moisture is also a factor, with wetter soils supporting a different shrub stratum than drier ones.

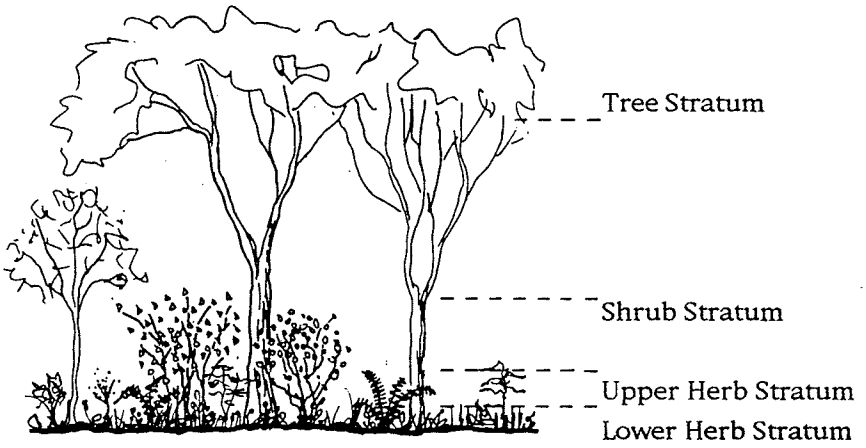


Figure 7 - Strata in Forests

The herb strata also vary, depending upon time of year as well as with soil and moisture conditions. Most herbaceous growth is perennial. Barbour and Pitts[13] point out that the characteristic

[13] Barbour, M. Terrestrial Plant Ecology, (Benjamin, Cummings Pub., 1987)

herb species will vary throughout the season. Early spring, before the tree canopy is in full leaf, is usually the period with the most activity in the 'spring ephemeral' herb layer. As the tree canopy -- the main environmental control for the herb layer -- fills in, these herbs die back, leaving only the shade tolerant 'summer green' herbs. These herbaceous species are usually active until fall.

The animal component of the forest communities relies on the forest for its shelter and food. Their actions contribute to sustainability. Small mammals such as the snowshoe hare and red squirrel are often found within the forest while the red-backed mouse and skunk are common at the forest edge.[14] Birds are abundant, especially at the forest edge. Invertebrates thrive in the leaf litter of a forest as do insects that feed upon tree leaves. Micro-organisms break down plant substances, providing refreshed soil for continued growth.

In the southern prairies, the aspen poplar community is considered to be in a climax stage. A climax community is one that has reached a self-perpetuating equilibrium where, given constant environmental conditions, little change occurs in its species mix. There are four distinct strata within this community; tree, shrub, tall herb, and low herb.

The dominant tree in this area is trembling aspen (*Populus tremuloides*), which usually occurs in pure stands because its

pp.515-516

[14] Bird. p.16

main method of propagation is by root suckers. This community has prominent shrub and herb strata.

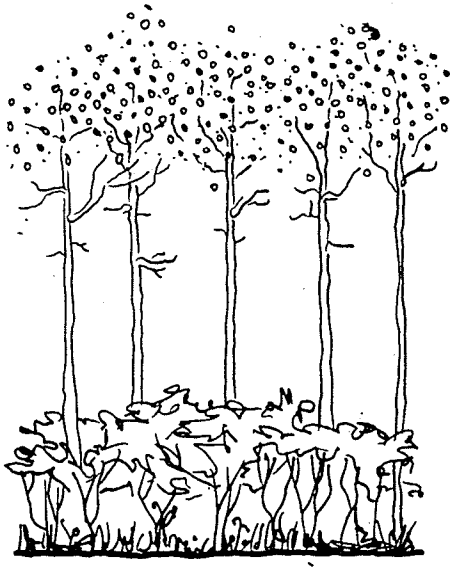


Figure 8 - Aspen Forest

The shrub stratum includes hazelnut (*Corylus americana*) in well drained areas, dogwood (*Cornus stolonifera*) and cranberry (*Viburnum opulus*) in more moist areas, mixed with rose (*Rosa spp* .), chokecherry (*Prunus virginiana*), pin cherry (*Prunus pensylvanica*), saskatoon (*Amelanchier alnifolia*), and snowberry (*Symphoricarpos occidentalis*).

The upper herb stratum is dominated by sarsaparilla (*Aralia nudicaulis*) and also includes baneberry (*Actea rubra*), aster (*Aster spp* .), and bedstraw (*Galium triflorum*). Areas of poison ivy (*Rhus radicans*) are also found. A lower herb stratum includes wintergreen (*Pyrola asarifloia*), bunchberry (*Cornus canadensis*), false lily-of-the-valley (*Maianthemum canadense*), solomon's seal (*Smilacina stellata*), strawberry (*Fragaria spp.*), dewberry (*Rubus pubescens* .), and sandwort (*Arenaria*

lateriflora).

The relative openness of the aspen canopy allows for a strong shrub strata, resulting in a mid-summer appearance at eye level of dense and dark foliage. The white trunks of the aspen contrast with this darkness, and lead up to a bright canopy. There is a sense of horizontal visual enclosure. The vertical enclosure is less pronounced above the shrub layer. The winter effect of the shrub layer is reduced but still noticeable. The close proximity of aspens, their small crowns, trembling leaves, lower dead branches, small trunk diameters for their height, and light trunk colour all result in a light, often insubstantial appearance to this forest. This is especially evident when contrasted with the floodplain community.

Aspen forest can occur in almost any soil condition but grows best in well-drained, occasionally moist conditions. It was the dominant forest community in the immediate area now occupied by Whyte Ridge. Around the Winnipeg area it usually found in pure stands or mixed with bur oak in large, flat bluffs, often surrounded by grassland communities.

Conditions suitable to aspen forest occur in a number of locations in Whyte Ridge. Any relatively level, well drained area is conducive to its growth. Aspen grows in clumps and is better located in pockets of open area rather than in long thin strips. This allows an edge condition to develop as the forest advances. Areas such as these could be found along the back yards of houses, and the higher, flatter areas of the public reserve.

The floodplain forest community is found along the area's rivers. The tree stratum is more diverse and includes Manitoba maple (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), cottonwood (*Populus sargentii*) and -- specific to the Winnipeg area -- basswood (*Tilia americana*). Immediately along the rivers are found peachleaved willow (*Salix amygdaloides*) which occur in abundance.

Undergrowth is sparse in floodplain communities, except under gaps in the canopy, along the edges of the forest and immediately along the river where more discernable shrub and herb strata are found. Sandbar willow *(Salix interior)* is abundant along rivers. Edge and gap areas consist of less shade tolerant species like hawthorn *(Crataegus sp.)* and chokecherry. Under the dense canopy, dogwood and younger tree species are found, with tall shade-tolerant herbs such as ostrich fern *(Pteretis pensylvanica)* and wood nettle *(Laportea canadensis)* growing in what might otherwise be the shrub layer.

In most places within the floodplain community, the canopy is closed. This blocks the light penetration to the shrub and herb strata in summer, making it sparse.

The sense of enclosure is predominantly vertical to the underside of the canopy. Long horizontal vistas are broken by the occasional shrub or tall herb, but mostly by large diameter, well spaced trunks, creating the feeling of a large volume of space. Light which does penetrate the canopy has a green filtered tinge

in the summer. In winter, the structure of the trees alone dominates the view, as most lower growth has died back to the ground.

The floodplain forest community occurs, as its name implies, within the natural seasonal flooded areas along the river. It usually develops in deep, rich soils on a series of terraces. Each terrace will experience a different amount of flooding and is likely to have a different mix of species.

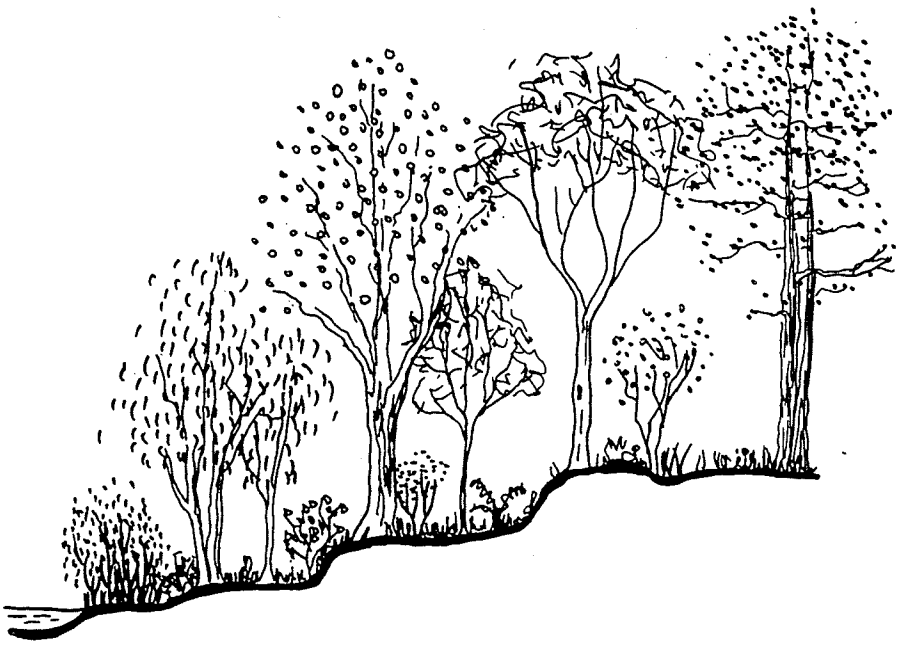


Figure 9 - Floodplain Forest with Terraces

The only locations in Whyte Ridge which could provide such a setting are along the edges of the storm water retention lakes. Like the rivers of the region, water levels of these lakes fluctuate, and can provide the seasonal flooding required. Seasonal water levels can be maintained by adjusting the control valve on the lake's outlet. However, while the water movement in a river creates terracing, it would be difficult to reproduce in a retention

pond. Initial grading would be required to re-create conditions similar to those found in nature.

The bur oak (*Quercus macrocarpa*) community is often dominated by this one species and like the aspen, usually occurs in pure stands. Due to exposure to wind or browsing of animals, oak forest can take on a stunted 'scrubby' appearance.

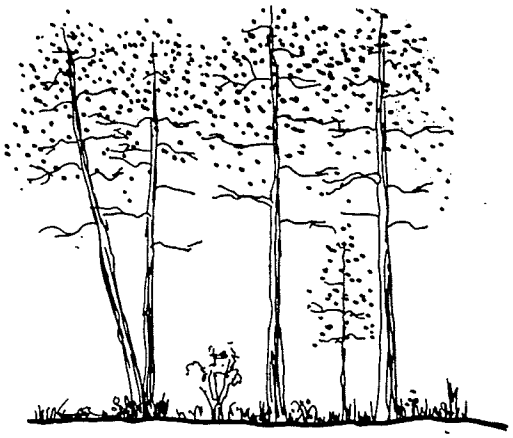


Figure 10 - Bur Oak Forest

Like the flood plain community, the maturing oak forest has less prominent shrub and herb stratum under its canopy. These layers vary with the maturity of the forest: smaller forests with more open canopy will have more shrub growth, such as snowberry and chokecherry: more mature forests will have the recruitment of young oaks in the shrub layer. Spring ephemeral herbs are abundant because the oak is late leafing out. Their composition is similar to those in the floodplain community.

In winter the visual qualities of an oak forest are very much

determined by the qualities of the oak trees themselves. The rigid horizontal branches and short twigs give the winter canopy a unique pattern. The darkness of the bark contrasts greatly with the whiteness of a winter sky. In early spring, the greenness of the forest floor is dominant because oak trees leaf out slowly and later in the season. As the canopy fills in and the herbaceous layer fades, the greenness moves to the canopy. At this stage the sense of enclosure is similar to the floodplain community, but there are usually more tree trunks, especially younger ones, blocking horizontal vistas.

The bur oak forest in the Winnipeg area occurs on deep rich soil that is well drained. It is often associated with the top terrace surrounding the floodplain forest.

A bur oak forest could occur in any well drained area within Whyte Ridge. Opportunities for its establishment exist along the highest levels adjacent to the lake, along strips in back yards, and in groupings in front yards.

Each of these three communities has a similar basic structure although the strength of the herb and shrub strata vary and, as indicated above, the species composition varies. The species diversity also varies, with the floodplain community being more diverse. Any of these three communities may constitute a climax forest with the growth of new trees of the same species below.

4.2.2 The Grassland Communities

The grassland communities vary in composition and association, as do forest communities. General soil conditions and moisture levels play an important role in determining species composition. Within the community, plants adapt to site-specific conditions. In general, richer soils tend to support taller, more vigorous growth.

Layering of plants in strata does occur, but it is not as obvious as in forest communities. There are a large number of seasonal associations, such as prairie crocus (*Anemone patens*) in spring, white prairie clover (*Petalostemum candidum*) in summer, and asters in the fall. Associations are also dependent on height, which increases toward the end of each growing season. Woody plants or shrubs such as snowberry and rose may also develop.

Natural processes, such as fire or disturbances from animals, play an important role in the composition of the community. Grasslands are generally located in areas of low or variable soil moisture, which, in pre-settlement times, was prone to wildfire due to lightning. This controlled and rejuvenated the grassland communities. Only with a higher soil moisture and infrequent fire will aspen forest develop from a grassland community.

Historically, bison were the dominant animal. Grazing, trampling, and wallowing had a strong effect, particularly affecting the emergence of forest in these areas. The grazing and trampling of other animals such as antelope and elk has a similar but less pronounced effect. Other mammals like voles and

gophers live in the thatch and below ground and aerate soils, as do insects such as ants.

The rich soils around Winnipeg provide one of the few suitable environments for 'Tall Grass Prairie' in western Canada, characterized by big blue stem (*Andropogon gerardi*). Mostly herbaceous, plants die down to the ground in fall, giving the community a changing appearance throughout the growing season. In the spring, as the potentially taller grass begins to grow, there is a bright green colouration over a fairly uniform low height, allowing the viewer's eye to travel out to the horizon. As the season progresses, grass height increases and the colour often fades to more brown shades. By the end of the growing season, the tallest species are dominant. The feeling of horizontal enclosure is more pronounced, but the sky remains a huge dome overhead. The wavey, ocean-like vista is emphasized by the wind blowing through the grass.

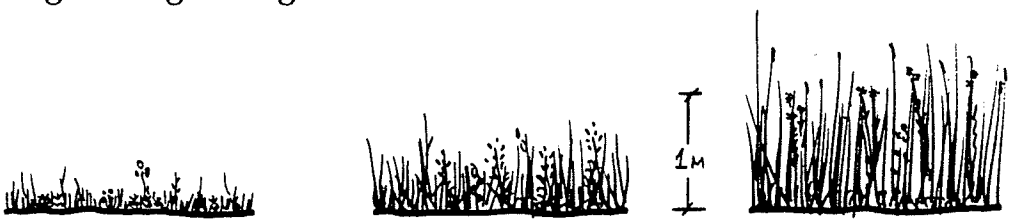


Figure 11 - Grasslands with Seasonal Heights

The rich, deep soil in the Winnipeg area was created by prairie and provides an appropriate base for tall grass prairie. The area that Whyte Ridge now occupies was once grassland and aspen forest.

Areas for grassland occur throughout Whyte Ridge. Initially, it

could be used as a soil stabilizing community before aspen forest develops. Grassland management practices such as burning would be difficult within a residential setting. Therefore, other species are likely to become established. Grassland areas should be thought of as meadows, mowed or grazed seasonally.

4.2.3 The Wetland Community

Wetland communities occur on two scales; large wetland areas, and smaller 'pot-holes' or 'sloughs,' which may be intermittent during the season. The aquatic plant communities can be divided into emergent plants (ones that grow above the water) and submergent (those completely below the water). Edges of wetland areas are often characterized by willows, and further back, aspen.

The condition of the water will have an effect on the species composition: cattail (*Typha latifolia*) is more likely to be found in larger bodies of water with some movement, while reed grass (*Phragmites communis*) is more common in stagnant areas.[15]

If a wetland fills in with decayed plant matter or soil due to erosion, grassland and eventually forest may develop. This is seen in the change of species from the wetland species noted above through cord grass *(Spartina pectinata)* in poorly drained soil to blue grass *(Poa spp.)* on intermediate sites, then grassland with western wheat grass *(Agropyron smithii)* and wolf willow *(Elaeagnuscommutata)* on the driest soils.

Similar to the grassland, the wetland community increases in

15 Bird. p.18

height with the growing season. At the end of the growing season, a stand of cattail can be well over the viewers head, offering a dense, visually impenetrable wall of uniform vertical 'blades.'

Perhaps more than any other community, humans associate wetlands with their animal components. Ducks, geese, and other birds, such as red-winged or yellow-headed blackbirds rely on this community for habitat. These birds and the leopard frog provide an important audible association to wetlands. Water-borne insects such as mosquitoes provide an important food source for some birds and other insects.

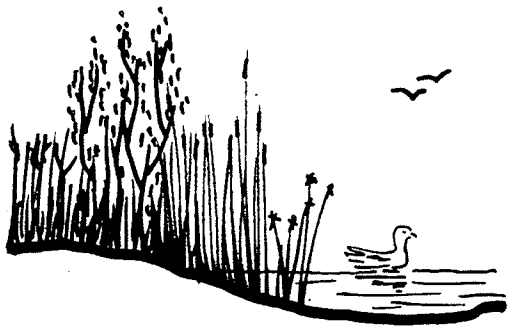


Figure 12 - Wetlands

Because grades are engineered in Whyte Ridge, the variably wet conditions required to establish a wetland area are currently found only along the edge of the storm water retention lakes. However, with some grading changes this community could occur in other open areas.

The regional biotic communities can be used as a basis for an alternative landscape by providing a guide to structure, species composition, and growing conditions. Once this has been defined,

space must be found to accommodate them within the suburban development.

5.0 Finding Space

This practicum proposes alternative landscape communities for Whyte Ridge which are identified on the basis of the regional biotic communities. In order to accommodate them successfully, space must be found within the suburban development that: 1) has the largest land area possible, and; 2) the highest number of corridors to extend and connect the alternative landscape, reducing framentation.

Existing public land, limited to public reserve and boulevards, is unlikely to provide an adequate land area to sustain an alternative landscape throughout the development. Although the public reserve contains the largest contiguous area, it is isolated from most lots. Boulevards adjacent to each lot are small and fragmented.

A series of manipulations of the space available within Whyte Ridge may provide an adequate and contiguous area for an alternative landscape. They are explored as variations on the existing suburban development plan and arise from the parameters set out in Section 2.3.3. These variables are individual manipulations of existing zoning by-laws and controls placed on house locations and land use. They include the reduction of set backs and side yards, driveway and boulevard dimensions, and controls placed on the use of private land. They affect the space available for an alternative landscape in both size and

configuration.

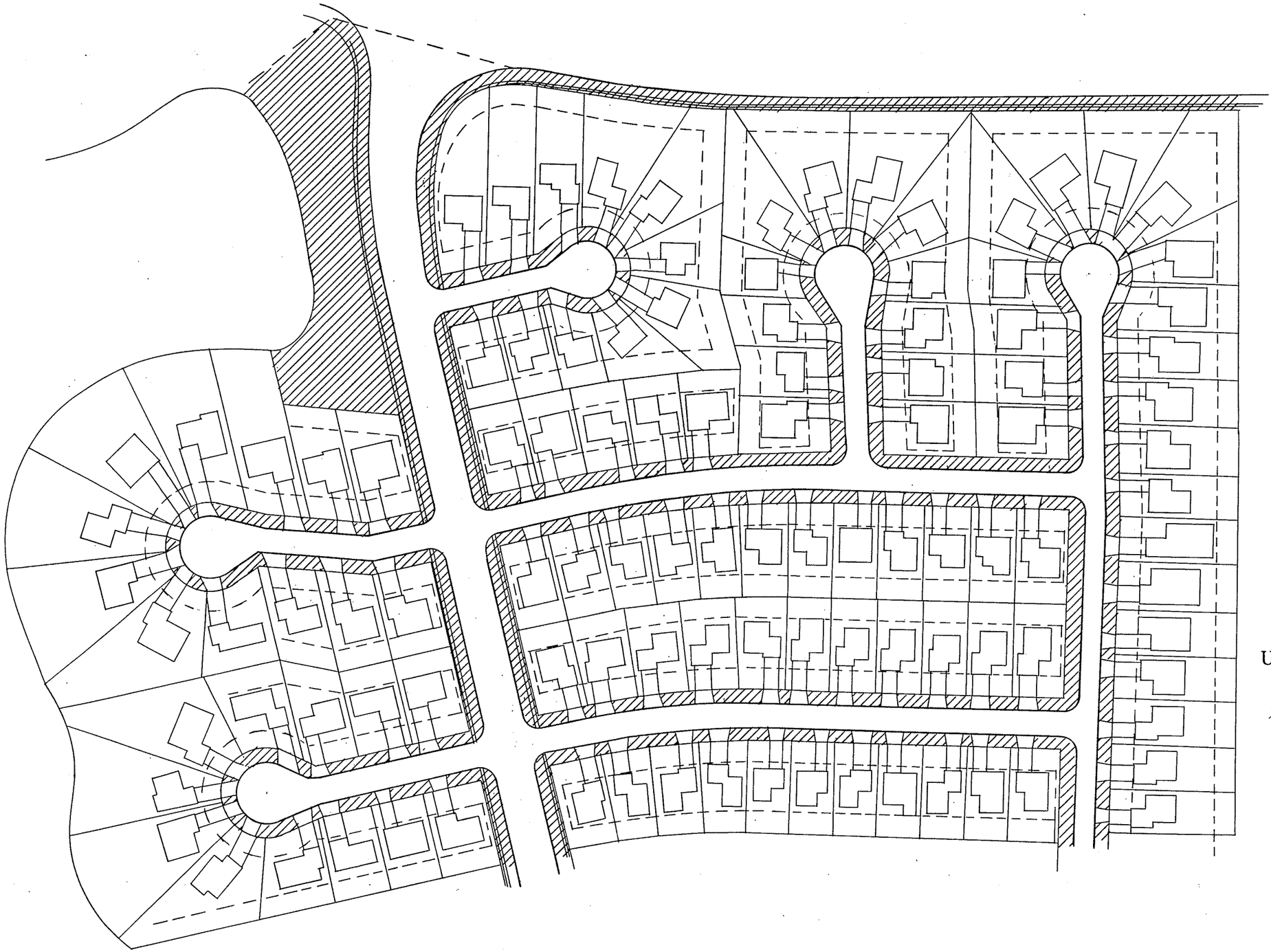
Variables are then combined to study their cumulative effect. The desired result is to increase the area of landscape dedicated to an alternative landscape throughout the study site and to provide the possibility of extending it to each lot.

The variables and combinations established here are the result of the parameters and goals of this study only. Other parameters would result in different variables, and other goals would result in different combinations.

5.1 Existing Conditions

Without placing controls on private land, space found for an alternative landscape within the existing conditions of Whyte Ridge is restricted to the public land, which is under the control of the developer. This area is made up entirely of public reserve and boulevards.

The public reserve provides the only land area large enough for an alternative landscape to occur. It is built adjacent to a storm water retention lake, offering opportunity for a wide range of biotic communities. Beyond these reserve areas, public land is limited to narrow boulevards immediately adjacent to roads. This creates a series of small spaces broken up with driveway approaches. For lots around cul-de-sacs, this area is particularly small. Other demands placed on boulevards, such as snow storage and underground services, further restrict their use. While each lot has the potential of connecting to this landscape, it is limited mostly to front yards.



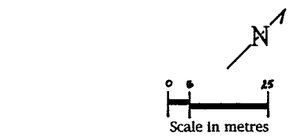


Figure 13
Using Existing Land

Alternative Landscape

Using Existing Land

Areas in square metres (percentages of whole)

	current condition	using existing land
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	
Total public	30 330(28.5%)	
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	
Total private	76 093(71.5%)	
Total hard surface	41 105(38.6%)	
turf area	60 746 (57.1%)	48 522 (45.6%)
community	4 572 (4.3%)	16 797 (15.8%)
Total soft landscape	65 318(61.4%)	
Total area	106 423	

Total number of units 107.0

Net units/hectare 10.0

Total private area/number of units: 711 sq.m.
Total public area /number of units : 283 sq.m.

5.2 Variables

The proposed variables are specific manipulations of zoning restrictions or controls placed on land use. Each will be discussed in terms of the changes required to the existing plan, how it modifies the area available for an alternative landscape, its implications for the implementation of an alternative landscape, and how that variable affects land use and ownership. A tabulation of changes in area and percentage of the total that result from each variable is included. It notes the areas held publicly and privately, in hard landscape or soft landscape, and the amount of area dedicated to an alternative landscape. The result of each variable is calculated as if applied to the existing condition and is indicated on the table only if a change occurs in that category.

Six variables have been chosen for this study:

Variable 1 establishes a 20-foot strip along the back of the houses for outdoor activity, the remaining area dedicated to an alternative landscape.

Variable 2 re-allocates 10 feet of the 17-foot front boulevard to the back property line.

Variable 3 reduces minimum front setbacks from 25 feet to 15 feet.

Variable 4 establishes a 10-foot strip for an alternative landscape along side property lines where driveways are opposite.

Variable 5 allows for the reversal of house footprints to accommodate more of these 10-foot side strips.

Variable 6 removes five houses from the study site, their lots dedicated to an alternative landscape.

A summary of the effects of the variables appears on page 65.

5.2.1 Variable 1 - A "20-Foot Living Strip"

The outdoor space adjacent to houses has demands placed on it for outdoor activities, and this demand must be balanced with the ecologically responsive and sustainable landscape. This variation would place controls on private land as it exists without altering the footprint of the study area. It establishes an average 20-foot wide strip along the back of each house to accommodate outdoor requirements. Any land beyond this limit would be dedicated to the alternative landscape.

This variable increases the potential area for the landscape to one-quarter of the total land area within the study site (25.8%).

Variable 1 would extend an alternative landscape to each back yard. However, its effect is limited only to back yards. It does not affect boulevards or public reserves -- any increase in the alternative area is entirely on private land.

The dedicated land is very narrow in places. Where two houses back-to-back are built to the maximum 25-foot setback, only 10 feet remains. This narrow band may not be able to support a sustainable alternative landscape.

This variable places controls over land use within private land and affects the rights of the residents to have complete use of their lot.

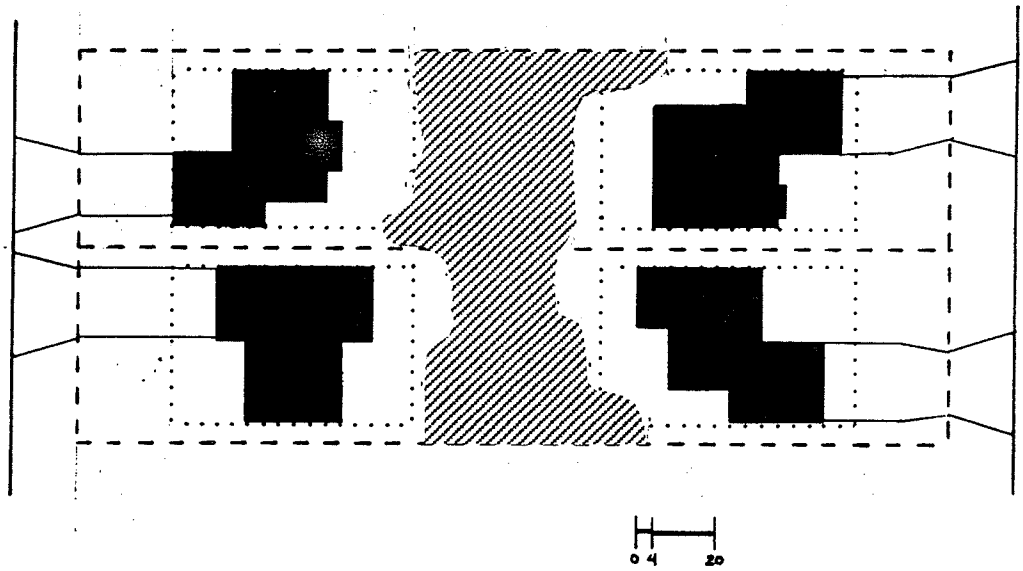


Figure 14 - Variable 1 - 20-foot Living Strip

Toned area indicates land dedicated to alternative landscape

Variable 1 - A 20 foot 'Living Strip'

Areas in square metres (percentages of whole)

	current condition	variable #1
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	
Total public	30 330(28.5%)	
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	
Total private	76 093(71.5%)	
Total hard surface	41 105(38.6%)	
turf area	60 746 (57.1%)	37 866 (35.6%)
community	4 572 (4.3%)	27 453 (25.8%)
Total soft landscape	65 318(61.4%)	
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	

Total private area/number of units: 711 sq.m.
Total public area /number of units : 283 sq.m.

5.2.2 Variable 2 - Re-Allocation of Boulevard Space

A large area of land in Whyte Ridge is used as boulevard space along streets, in front of each house. A total of 3 acres (1.2 hectares) is used for driveway approaches, sod, and solitary boulevard trees. The boulevard also accommodates some of the underground services to each lot such as water, sewer, natural gas, electricity, and telephone.

This variable re-allocates 10 feet of the 17-foot-wide front boulevard to the rear property line. This leaves a 7-foot-wide public boulevard in front of each house for services and snow storage space. The 10-foot strip is dedicated to an alternative landscape.

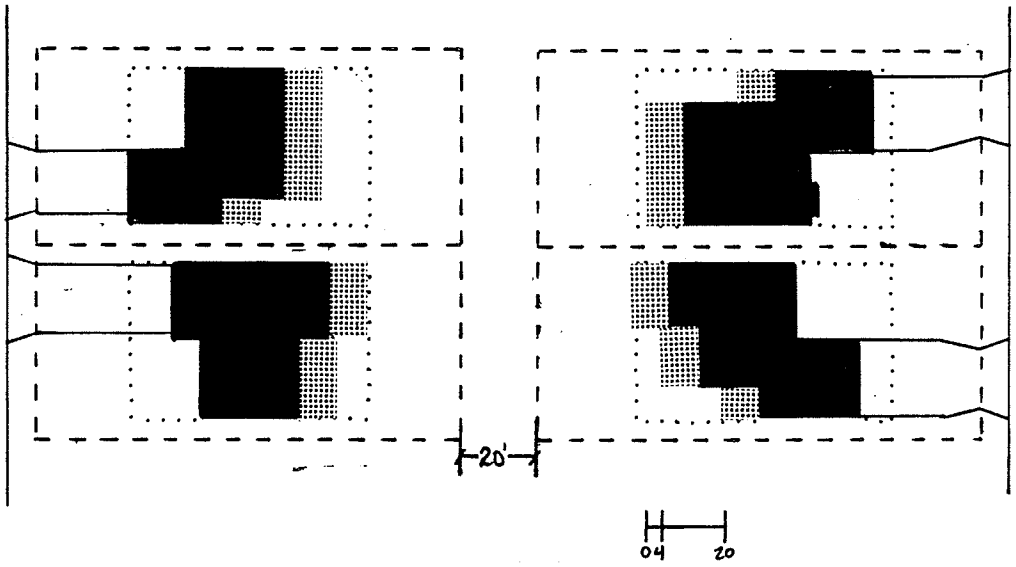


Figure 15 - Variable 2 - Re-Allocation of Boulevard Space

Toned area indicates original house location

This option increases the area available for an alternative landscape to 11.6%, all on public land. It also results in a nominal

2.3 per cent decrease in the total square footage of privately-held land because of the 'pie-shaped' lots on cul-de-sacs. (The width of the property is greater at the back.) This variable reduces the area required for driveway approaches on public boulevards by more than half.

Like the previous variable, this allows the extension of an alternative landscape to each back yard. However, it is limited only to back yards. Although the reduction of driveway approaches seems small for an individual lot, the cumulative effect of a 2 per cent decrease in hard surface would be significant for the entire development. This has positive implications for the design of storm water management systems.

This variable does not affect space within the individual lot, nor impede the rights of the individual homeowner. Where two houses back one another, a 20-foot strip of public land is created.

Variable 2 - Re-allocation of Boulevard Space

Areas in square metres (percentages of whole)

	current condition	variable #2
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	1 392 (1.3%)
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	15 770 (14.8%)
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	13 474 (12.7%)
Total soft landscape	12 224 (11.5%)	17 027 (16.0%)
Total public	30 330(28.5%)	32 797(30.8%)
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	50 627 (47.6%)
Total private	76 093(71.5%)	73 626(69.2%)
Total hard surface	41 105(38.6%)	38 768(36.4%)
turf area	60 746 (57.1%)	55 299 (52.0%)
community	4 572 (4.3%)	12 355 (11.6%)
Total soft landscape	65 318(61.4%)	67 654(63.6%)
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	
Total private area/number of units:	711 sq.m.	688 sq.m.
Total public area /number of units :	283 sq.m.	306 sq.m.

5.2.3 Variable 3 - Reducing Minimum Setback

Currently the minimum setback from front property lines is 25 feet. As mentioned previously, most front yards have little functional use, other than as a driveway approach. This variable reduces the minimum setback to 15 feet. It should be noted however that due to the configuration of 'pie-shaped' lots on cul-de-sacs, the house cannot be moved forward 10 feet in every instance.

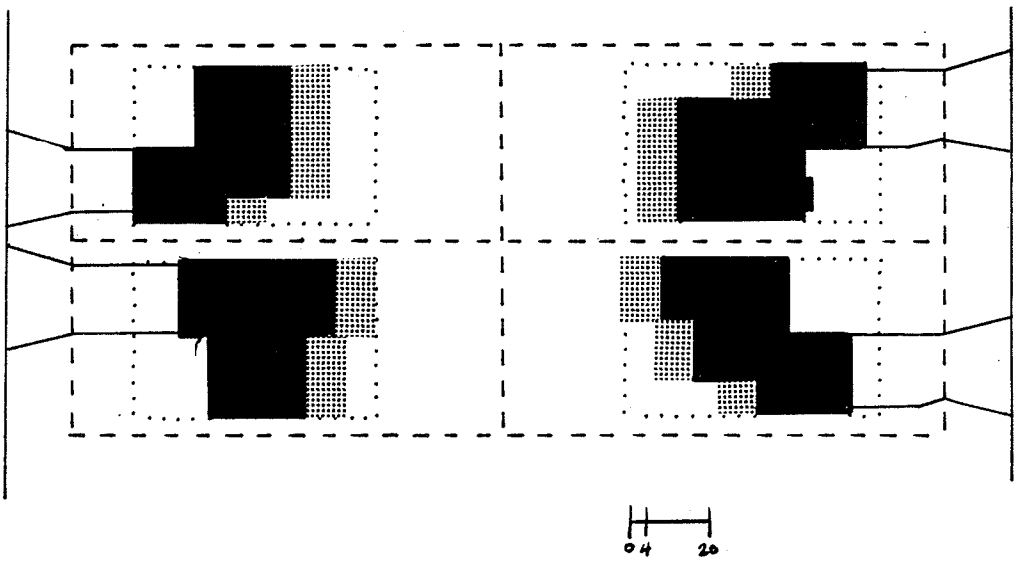


Figure 16 - Variable 3 - Reducing Minimum Setback
Toned area indicates original house location

Alone, this variable has little effect on the total area available for an alternative landscape. However, when combined with others in the following section, the effect is more substantial. Like Variable 2, the reduction in driveway areas by one per cent over

the entire development has implications for the storm-water management system.

There is no effect of this manipulation upon public land. Its only effect is to reduce the area used for private driveways by 0.4 hectare, and increasing land available for landscaping in back yards.

This variable changes only the minimum front setback, allowing houses to be located closer to the street where desired.

Variable 3 - Reducing Minimum Setback from Front Property Line

Areas in square metres (percentages of whole)

	current condition	variable #3
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	
Total public	30 330(28.5%)	
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	3 497 (3.3%)
Total hard surface	22 999 (21.6%)	21 688 (20.4%)
Soft landscape	53 094 (49.9%)	54 405 (51.1%)
Total private	76 093(71.5%)	
Total hard surface	41 105(38.6%)	39 793(37.4%)
turf area	60 746 (57.1%)	
community	4 572 (4.3%)	
Total soft landscape	65 318(61.4%)	66 629(62.6%)
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	

Total private area/number of units: 711 sq.m.
Total public area /number of units : 283 sq.m.

5.2.4 Variable 4 - 10-Foot Side Planting Strip Where Driveways are Opposite

A 10-foot-wide strip of land occurs between most houses in Whyte Ridge due to the zoning requirement for a minimum 5-foot side yard. Often this space is wasted, as it is difficult to maintain with traditional landscaping methods. This variable dedicates to an alternative landscape the side yards along the property line where the driveways are opposite. Because some space is required for functional access to the backyard, it is not feasible to utilize both side yards.

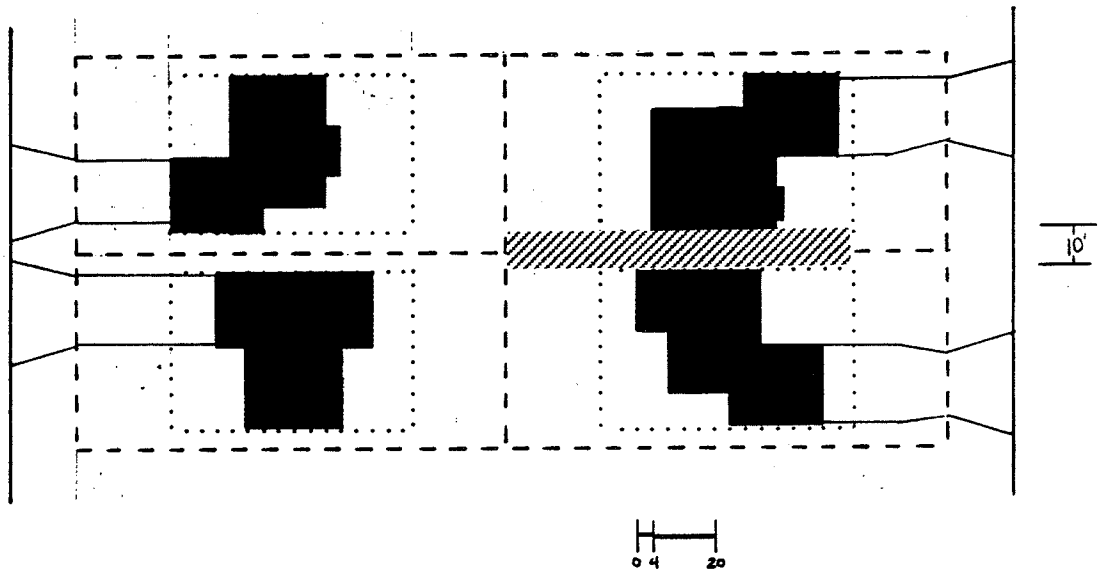


Figure 17 - 10-foot Planting Strip where Driveways Opposite
Toned area indicates land dedicated to alternative landscape

The incidences of side yards where both driveways are opposite are relatively few in the existing conditions. Of the 107 houses in the study area, only 19 opportunities exist. Because of this, the overall increase in the alternative landscape is small.

This variable also has implications for the management of storm water run-off. All drainage off the lot from sump pumps and downspouts is directed along the side property lines. A biotic community that can slow or absorb this run-off will further reduce the demand on the storm water system.

This variable involves placing a control on the use of private land. However, it provides the opportunity to extend the alternative landscape from the back yards to the front yards when combined with other variables.

Variable 4 - 10-foot Side Planting Strip Where Driveways are Opposite

Areas in square metres (percentages of whole)

	current conditions	variable #4
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	
Total public	30 330(28.5%)	
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	
Total private	76 093(71.5%)	
Total hard surface	41 105(38.6%)	
turf area	60 746 (57.1%)	58 684 (55.1%)
community	4 572 (4.3%)	6 635 (6.2%)
Total soft landscape	65 318(61.4%)	
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	

Total private area/number of units: 711 sq.m.
Total public area /number of units : 283 sq.m.

5.2.5 Variable 5 - Reversing Footprints to Allow for 10-Foot Planting Strip

This variable builds on Variable 4. By reversing the footprint of a number of units, greater opportunities are created for a 10-foot planting strip. Access can be created on at least one side of the planting strip by reversing the footprints of 41 of the 107 houses.

This manipulation increases the dedicated land a further 2.6% over Variable 4.

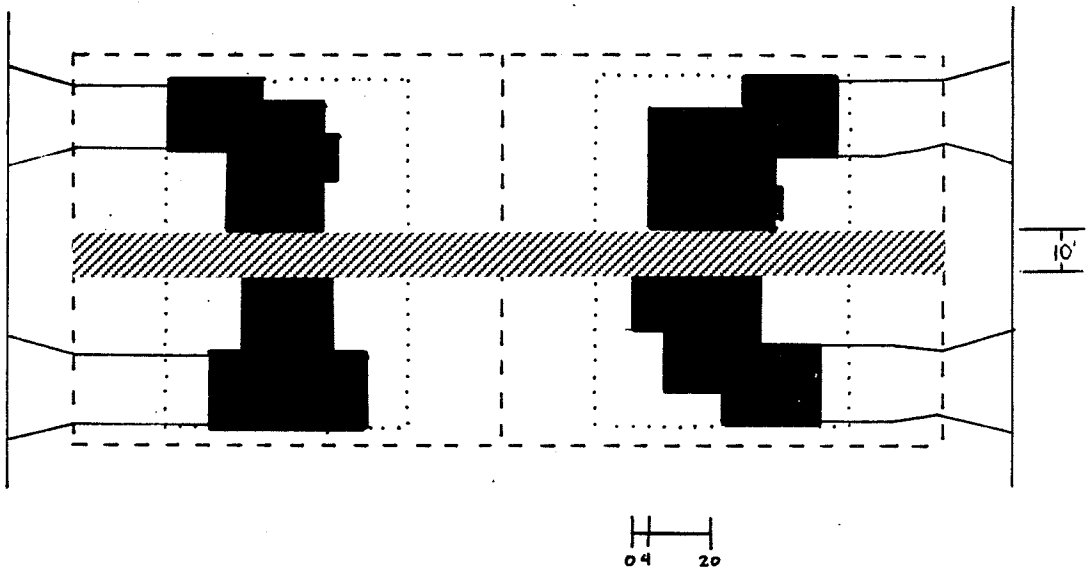


Figure 18 - Variable 5 - Reversing Footprints

Toned area indicates land dedicated to alternative landscape

Variable 5 - Reversing Footprints to Allow for 10-Foot Planting Strips

Areas in square metres (percentages of whole)

	current conditions	variable #5
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	
Total public	30 330(28.5%)	
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	
Total private	76 093(71.5%)	
Total hard surface	41 105(38.6%)	
turf area	60 746 (57.1%)	55 943 (52.6%)
community	4 572 (4.3%)	9 375 (8.8%)
Total soft landscape	65 318(61.4%)	
Total area	**106 423**	
Total number of units	107.0	
Net units/hectare	10.0	

Total private area/number of units: 711 sq.m.
Total public area /number of units : 283 sq.m.

5.2.6 Variable 6 - Removing Five Units

In order to provide a series of contiguous spaces for an alternative landscape, it may be necessary to remove some housing units. This will have the effect of further reducing fragmentation.

By dedicating five houses and their lots (4.7 per cent of the total number of units) to public use, the total public land is increased by 3.2 per cent., and the total soft landscape area is increased by just over one per cent (average lot size, house size, driveway area, etc., have been used in these calculations).

This variable could have important implications both for the development's profitability and the larger issue of land use. A 4.7 per cent decrease in available lots would have to be accounted for in the overall economic feasibility of the development since the current infrastructure, such as roads and sewers, would still be necessary to service less houses. Also, suburbs already consume large amounts of land in most North American cities. Increasing this area by a seeming small amount of 5 per cent using the current pattern of development could mean thousand of hectares of more land would be used for suburban development, removed from agricultural production or the natural landscape.

Variable 6 - Removing Five Units

Areas in square metres (percentages of whole)

	current condition	variable #6
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	3 552 (3.3%)
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	17 931 (16.8%)
Soft landscape		
Public reserve	3 553 (3.3%)	7 109 (6.7%)
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	15 780 (14.8%)
Total public	30 330(28.5%)	33 710(31.7%)
Private		
Hard surface		
House/roof	18 191 (17.0%)	17 336 (16.3%)
Driveways	4 808 (4.5%)	4 581 (4.3%)
Total hard surface	22 999 (21.6%)	21 917 (20.6%)
Soft landscape	53 094 (49.9%)	50 795 (47.7%)
Total private	76 093(71.5%)	72 712(68.3%)
Total hard surface	41 105(38.6%)	39 848(37.4%)
turf area	60 746 (57.1%)	58 446 (54.9%)
community	4 572 (4.3%)	8 127 (7.6%)
Total soft landscape	65 318(61.4%)	66 575(16.2%)
Total area	106 423	
Total number of units	107.0	102.0
Net units/hectare	10.0	9.6
Total private area/number of units:	711 sq.m.	713 sq.m
Total public area /number of units :	283 sq.m.	331 sq.m.

Summary of Variables :

(in percentages, noting changes only)

	current existing		var.1	var.2	var.3	var.4	var.5	var.6
Public								
Hard Landscape								
Road surface	12.8							
Driveway approach	3.5			1.3				3.3
Sidewalk	0.7							
Total hard surface	16.9			14.8				16.8
Soft landscape								
Public reserve	3.3							
Boulevard	8.1			12.7				6.7
Total soft landscape	11.5			16.0				14.8
Total public	28.5			30.8				31.7
Private								
Hard surface								
House/roof	17.0							16.3
Driveways	4.5				3.3			4.3
Total hard surface	21.6				20.4			20.6
Soft landscape	49.9			47.6	51.1			47.7
Total private	71.5			69.2				68.3
Total hard surface	38.6			36.4	37.4			37.4
turf area	57.1	45.6	35.6	52.0		55.1	52.6	54.9
community	4.3	15.8	25.8	11.6		6.2	8.8	7.6
Total soft landscape	61.4			63.6	62.6			16.2
Total area	100							

5.3 Combining Variables

In this process any combination of variables can be put together to form models. The goal of these combinations is to increase the area dedicated to an alternative landscape, and to provide the extension of the landscape to each individual lot. Here variables are combined in a cumulative way, one upon another, but other methods of determining combinations could also be used.

By combining variables, their effect is often different than a cumulation of the mathematical difference each may achieve.

The criteria for assessing a combination of variables are derived from the objectives outlined in Section 2.0 The main criteria for assessing a combination are:

1) The increase in land area that can be dedicated to an alternative landscape. The most successful combinations resulted in the largest increase; least successful combinations resulted in the smallest increase.

2) The provision of the most 'corridors' to extend and connect the alternative landscape. This will also allow the extension of the landscape to each lot. These corridors will vary in width and configuration, but in general wider corridors will be more successful.

Each combination contains a general description of the variables used, a summary of the results, an assessment of the combination based on the criteria, and the detailed calculations

and percentages. Each combination builds upon the previous, with the addition of one or more variables.

Combination 1 combines the use of all existing public land in the form of boulevards and public reserve with Variable 1, which establishes the controlled use of private land beyond a 20-foot outdoor living area at the rear of the house.

Combination 2 adds Variables 2 and 4 to Combination 1. This moves 10 feet of the 17-foot front boulevard to the back property line, and extends a 10-foot wide planting strip along side property lines where driveways are opposite.

Combination 3 continues to build on the previous two combinations by adding Variable 3. This permits a 15-foot minimum front set-back where possible.

Combination 4 varies the previous combination by allowing the reversal of individual house footprints to provide for the maximum number of the 10-foot wide planting strips along the property lines.

Combination 5 combines all variables. It provides for the removal of 5 houses, with those lots dedicated to an alternative landscape.

A summary of the combinations appears on page 85.

5.3.1 Combination 1

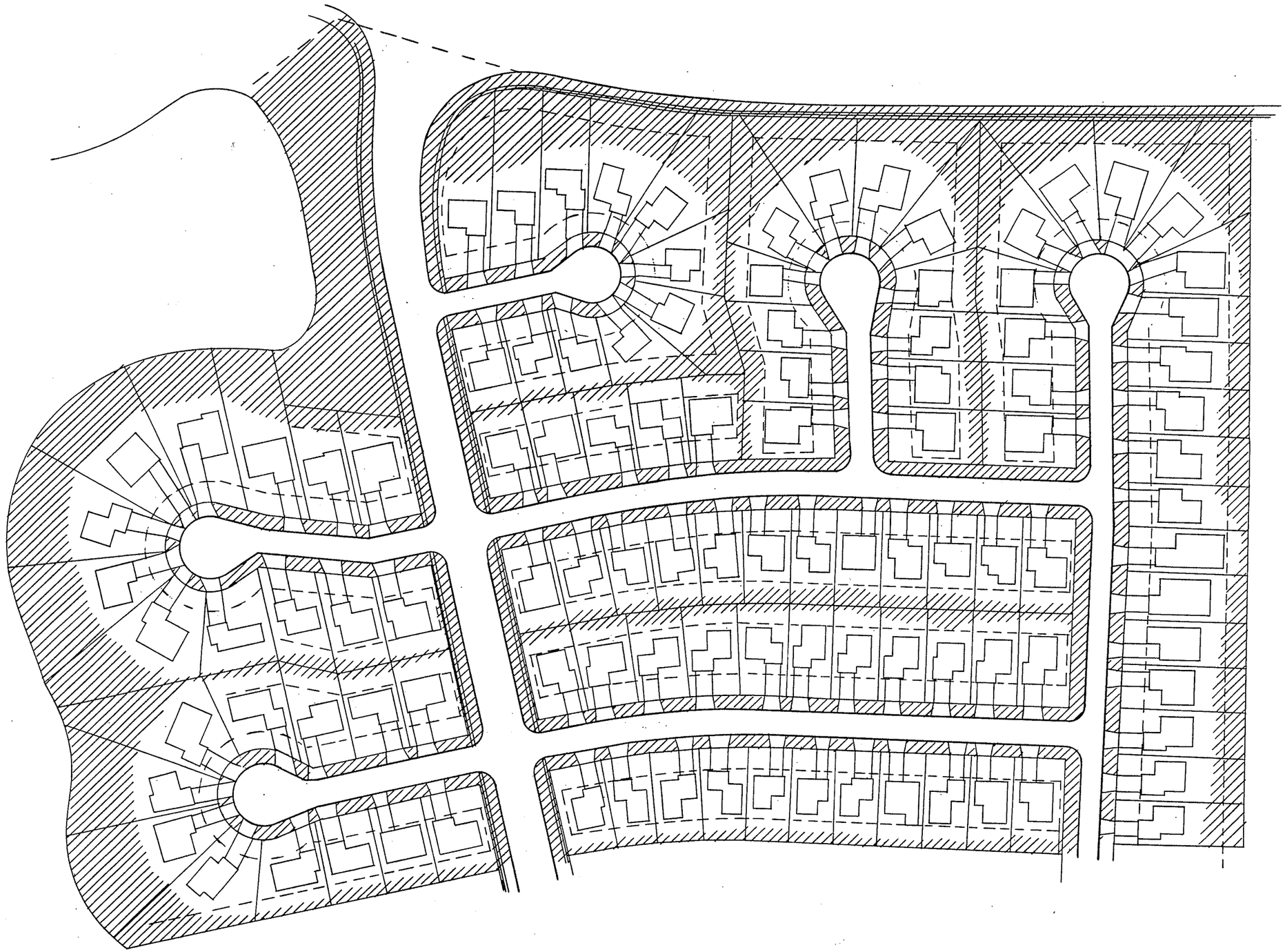
This combines the use of existing public land and Variable 1, which established an average 20-foot wide strip along the back of each house for outdoor living, with the remainder devoted to an alternative landscape.

This combination does not change in any way the footprint of the existing development, the percentages of hard and soft landscape, or public and private land. It only increases the land area dedicated to an alternative landscape through controls placed on existing land.

This combination increases the total area dedicated to an alternative landscape from the existing 4.3 per cent (estimated) to 38.9 per cent -- an increase which is almost the sum of the two variables (41.6 per cent). (The remainder of the existing estimated area dedicated to an alternative landscape in backyards is now included in the area beyond the 20' outdoor living strip, reducing the total.)

This combination is extremely efficient in increasing total land area dedicated to an alternative landscape with a minimum imposition on the existing subdivision design. It also provides the extension of the landscape to both the front and back yards of most lots. However, in places the resulting corridors in the back yards are very narrow if two houses are built far back on the lot.

Land in the front yards is broken up by driveway approaches. This may not provide the ecological connection required.



N

0 5 25

Scale in metres

Figure 19

Combination1

Alternative Landscape

Combination 1 - Existing Land & Variable 1

Existing Public Land
+
Variable 1 — 20-foot outdoor living strip along the back

Areas in square metres (percentages of whole)

	current condition	Combination 1
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	
Total soft landscape	12 224 (11.5%)	
Total public	30 330(28.5%)	
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	
Total private	76 093(71.5%)	
Total hard surface	41 105(38.6%)	
turf area	60 746 (57.1%)est.	23 945 (22.5%)
community	4 572 (4.3%)est.	41 373 (38.9%)
Total soft landscape	65 318(61.4%)	
Total area	**106 423**	

Total number of units 107.0

Net units/hectare 10.0

Total private area/number of units: 711 sq.m.
Total public area /number of units : 283 sq.m.

5.3.2 Combination 2

This combination builds on Combination 1, but adds Variables 2 and 4. These move 10 feet of the existing 17-foot front boulevard to the back property line, and allows for 10-foot wide planting strips where driveways are opposite. This has the effect of moving most houses 10 feet closer to the street (except on pie-shaped cul-de-sac lots), but keeping the house in the same relative position within the lot. It increases the distance between houses in the back yards.

This combination slightly increases the total area dedicated to the soft landscape, bringing the total area devoted to an alternative landscape to 43.4 per cent. This is only a 4.5 per cent increase over Combination 1, since there are only 19 locations among 107 properties where driveways are opposite, and a 10-foot wide planting strip. There are only 19 opportunities among the 107 lots where driveways are opposite to provide the 10' wide planting strip along the property lines.

In gross area dedicated to an alternative landscape, this appears to make little gain on the previous combination. However, it does increase the width of the back yard corridors, making them more useful ecological connections. It also reduces the area used as driveway approaches on private land.

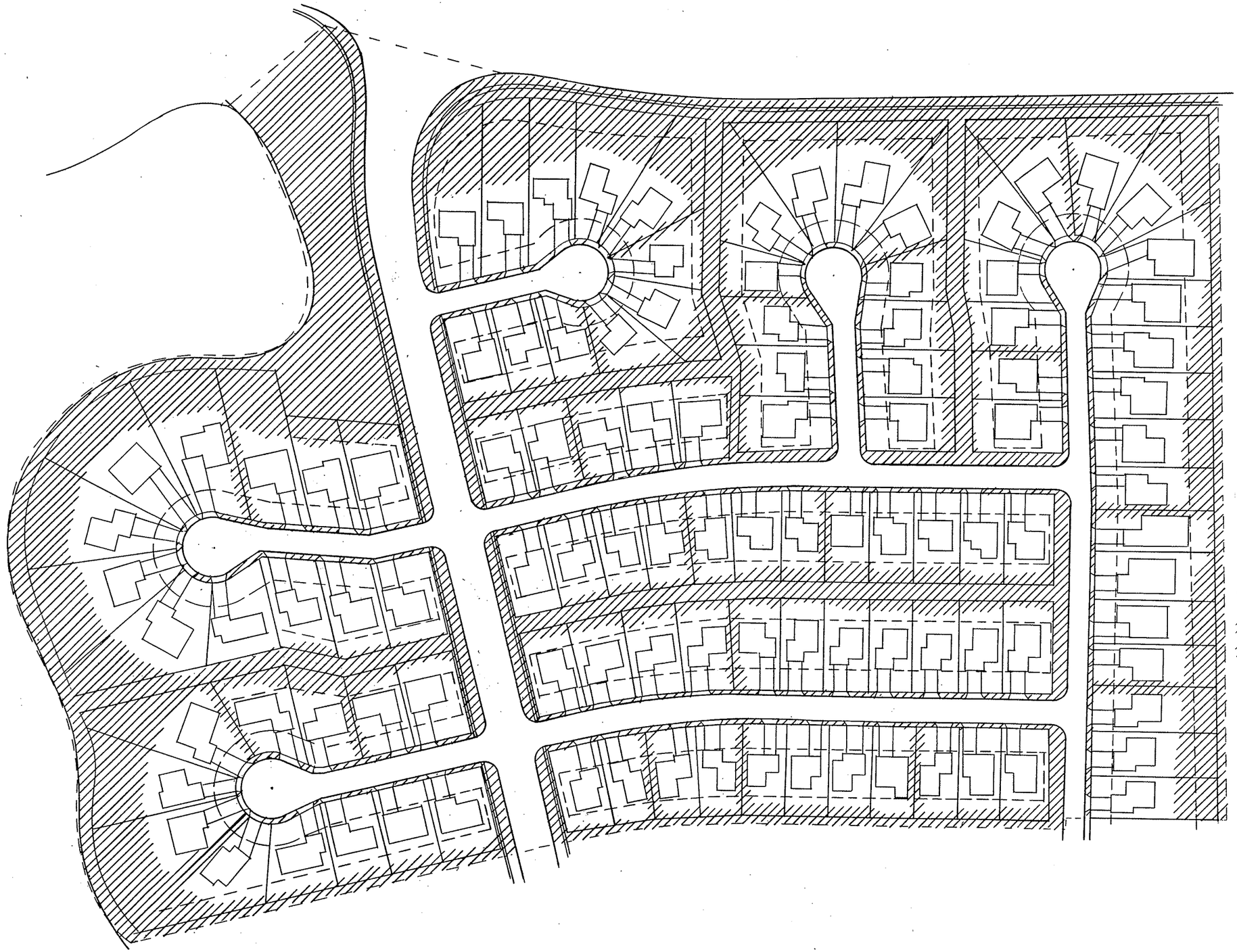


Figure 20
Combination2

Alternative
Landscape

Combination 2 - Existing Land & Variables 1, 2, &4

Existing Public Land
+
Variable 1 — 20-foot outdoor living strip along the back
+
Variable 2 — 10 feet of boulevard moved to back property line
+
Variable 4 — 10-foot wide strips where driveways opposite

Areas in square metres (percentages of whole)

	current condition	Combination 2
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	1 392 (1.3%)
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	15 770 (14.8%)
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	13 474 (12.7%)
Total soft landscape	12 224 (11.5%)	17 027 (16.0%)
Total public	30 330(28.5%)	32 797(30.8%)
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	
Total hard surface	22 999 (21.6%)	
Soft landscape	53 094 (49.9%)	50 627 (47.6%)
Total private	76 093(71.5%)	73 626(69.2%)
Total hard surface	41 105(38.6%)	38 768(36.4%)
turf area	60 746 (57.1%)est.	21 479 (20.2%)
community	4 572 (4.3%)est.	46 175 (43.4%)
Total soft landscape	65 318(61.4%)	67 654(63.6%)
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	
Total private area/number of units:	711 sq.m.	688 sq.m.
Total public area /number of units :	283 sq.m.	306 sq.m.

5.3.3 Combination 3

Combination 3 adds Variable 3 to the previous one, allowing for a minimum 15-foot setback for the fronts of houses. This has the effect of moving the house closer to the street within the lot, although this is not possible on pie-shaped lots on cul-de-sacs. The addition of this variable to the combination decreases the lengths of most driveways and therefore increases the total area of soft landscape. It also increases the width of the back yard corridors. Total area dedicated to an alternative landscape increases to 52.6 per cent

As in Combination 2, this combination appears to show increases in total land area dedicated to an alternative landscape as a result of a major change to the layout of the subdivision. It increases the width and area of the back yard corridors further in most cases.

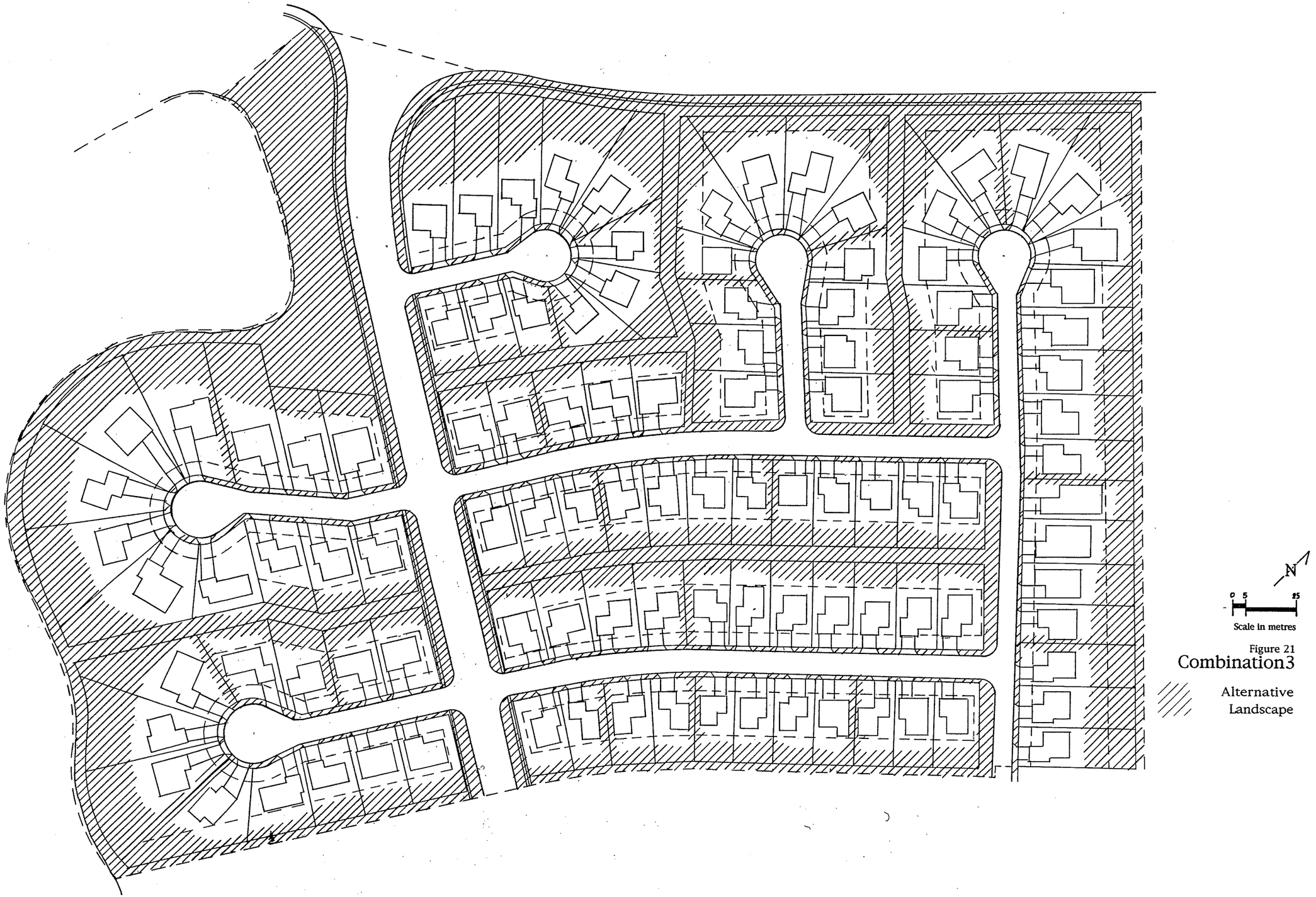


Figure 21
Combination3

Alternative
Landscape

Combination 3 - Existing Land & Variables 1, 2, 3, & 4

Existing Public Land
+
Variable 1 — 20-foot outdoor living strip along the back
+
Variable 2 — 10 feet of boulevard moved to back property line
+
Variable 4 — 10-foot wide strips where driveways opposite
+
Variable 3 — Reducing minimum set back to 15 feet

Areas in square metres (percentages of whole)

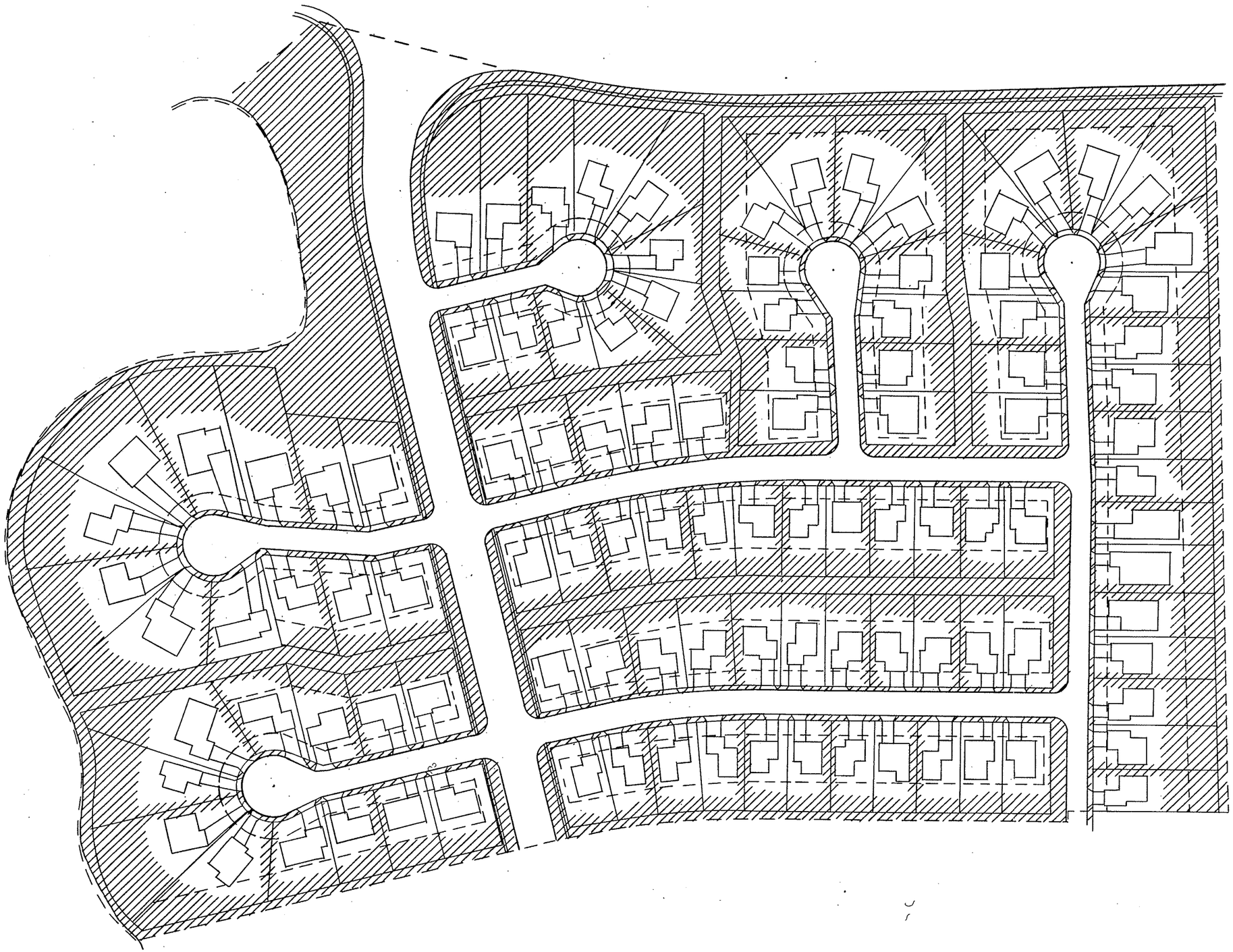
	current conditions	Combination 3
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	1 392 (1.3%)
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	15 770 (14.8%)
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	13 474 (12.7%)
Total soft landscape	12 224 (11.5%)	17 027 (16.0%)
Total public	30 330(28.5%)	32 797(30.8%)
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	3 386 (3.2%)
Total hard surface	22 999 (21.6%)	21 577 (20.3%)
Soft landscape	53 094 (49.9%)	52 049 (48.9%)
Total private	76 093(71.5%)	73 626(69.2%)
Total hard surface	41 105(38.6%)	37 347(35.1%)
turf area	60 746 (57.1%)est.	13 052 (12.3%)
community	4 572 (4.3%)est.	56 024 (52.6%)
Total soft landscape	65 318(61.4%)	69 076(64.9%)
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	
Total private area/number of units:	711 sq.m.	688 sq.m.
Total public area /number of units :	283 sq.m.	306 sq.m.

5.3.4 Combination 4

Combination 4 adds Variable 5 to the previous combination. This reverses the footprints of a number of houses to provide the maximum number of 10-foot wide planting strip, where driveways are opposite. This would result in little difference in the appearance of the subdivision.

A total of 41 of the 107 units would be reversed to provide 43 planting strips, and increase of 24 over Combination 3. The total area dedicated to an alternative landscape increases by 1.6% over Combination3.

While the addition of this variable increases the total area dedicated to an alternative landscape only modestly, it greatly increases the opportunity to connect the landscape from the backyard corridors to the front yards.



Scale in metres

Figure 22
Combination4

Alternative Landscape

Combination 4 - Existing Land & Variables 1, 2, 3, 4, & 5

Existing Public Land	
+	
Variable 1	20-foot outdoor living strip along the back
+	
Variable 2	10 feet of boulevard moved to back property line
+	
Variable 4	10-foot wide strips where driveways opposite
+	
Variable 3	Reducing minimum set back to 15 feet
+	
Variable 5	Reversing footprints to allow more 10-foot strips

Areas in square metres (percentages of whole)

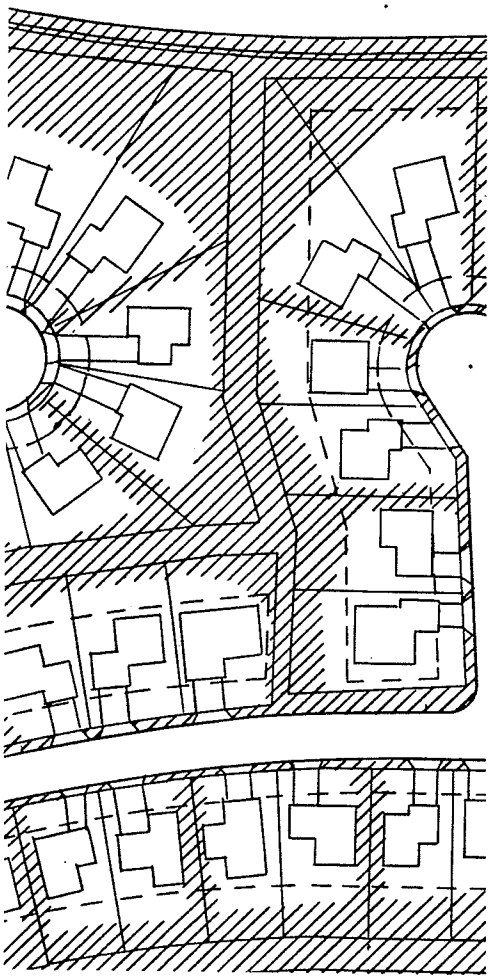
	current condition	Combination 4
Public		
Hard Landscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	1 392 (1.3%)
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	15 770 (14.8%)
Soft landscape		
Public reserve	3 553 (3.3%)	
Boulevard	8 671 (8.1%)	13 474 (12.7%)
Total soft landscape	12 224 (11.5%)	17 027 (16.0%)
Total public	30 330(28.5%)	32 797(30.8%)
Private		
Hard surface		
House/roof	18 191 (17.0%)	
Driveways	4 808 (4.5%)	3 386 (3.2%)
Total hard surface	22 999 (21.6%)	21 577 (20.3%)
Soft landscape	53 094 (49.9%)	52 049 (48.9%)
Total private	76 093(71.5%)	73 626(69.2%)
Total hard surface	41 105(38.6%)	37 347(35.1%)
turf area	60 746 (57.1%)est.	11 398 (10.7%)
community	4 572 (4.3%)est.	57 678 (54.2%)
Total soft landscape	65 318(61.4%)	69 076(64.9%)
Total area	106 423	
Total number of units	107.0	
Net units/hectare	10.0	
Total private area/number of units:	711 sq.m.	688 sq.m.
Total public area /number of units :	283 sq.m.	306 sq.m.

6.2.5 Combination 5

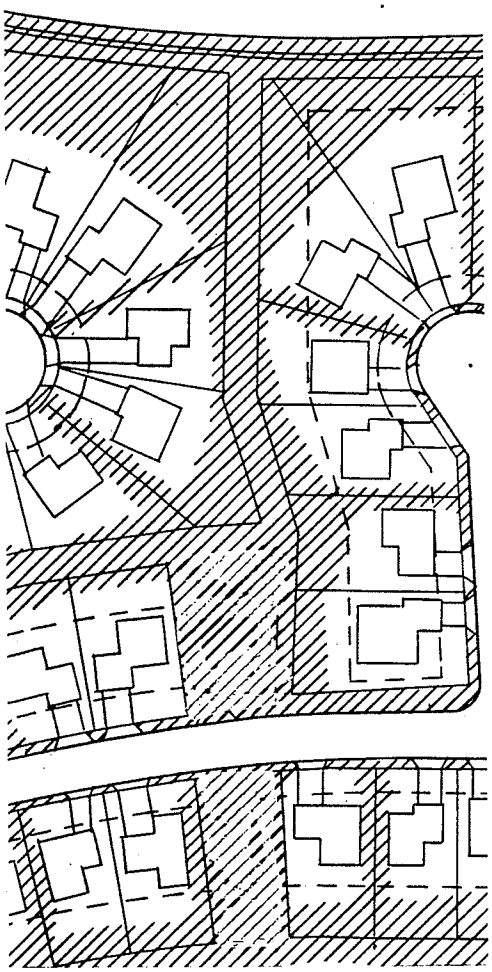
This removes 5 houses from the subdivision with the addition of Variable 6 to the combination. The land area from these lots is dedicated to an alternative landscape and becomes part of public reserve area. In this case, averages of lots size, house footprint, etc. are used in the calculations.

The total area of public reserve land doubles with the addition of the land area of the 5 lots. Also, hard landscape areas -- such as driveways, driveway approaches, and roof area -- decreases. The area dedicated to an alternative landscape increases by 3.2 per cent to 57.4 per cent, while the total number of units per acre decreases slightly from 4.1 to 3.9.

This combination results in a marginal increase in the land area dedicated to an alternative landscape, but it offers the opportunity to connect the landscape corridors that run through the back yards through the block and to each other, reducing fragmentation.



Combination 4



Combination 5

Figure 23 - Combination 5
Removing Houses to Reduce Fragmentation

Combination 5 - Existing Land & Variables 1, 2, 3, 4, 5, & 6

Existing Public Land
+
Variable 1 — 20-foot outdoor living strip along the back
+
Variable 2 — 10 feet of boulevard moved to back property line
+
Variable 4 — 10-foot wide strips where driveways opposite
+
Variable 3 — Reducing minimum set back to 15 feet
+
Variable 5 — Reversing footprints to allow more 10-foot strips
+
Variable 6 — Removing 5 houses

Areas in square metres (percentages of whole)

Public		
HardLandscape		
Road surface	13 651 (12.8%)	
Driveway approach	3 728 (3.5%)	1 216 (1.1%)
Sidewalk	727 (0.7%)	
Total hard surface	18 106 (16.9%)	15 595 (14.7%)
Softlandscape		
Public reserve	3 553 (3.3%)	6 994 (6.6%)
Boulevard	8 671 (8.1%)	13 474 (12.7%)
Totalsoftlandscape	12 224 (11.5%)	20 468 (19.2%)
Total public	30 330(28.5%)	36 062(33.9%)
Private		
Hard surface		
House/roof	18 191 (17.0%)	17 341 (16.3%)
Driveways	4 808 (4.5%)	3 228 (3.0%)
Total hard surface	22 999 (21.6%)	20 569 (19.3%)
Softlandscape	53 094 (49.9%)	49 791 (46.8%)
Total private	76 093(71.5%)	70 360(66.1%)
Total hard surface	41 105 (38.6%)	36 163 (34.0%)
turf area	60 746 (57.1%)est.	9 141 (8.6%)
community	4 572 (4.3%)est.	61 118 (57.4%)
Total soft landscape	65 318(61.4%)	70 259(66.0%)
Total area	106 423	
Total number of units	107.0	102.0
Net units/hectare	10.0	9.6
Total private area/number of units:	711 sq.m.	690 sq.m.
Total public area /number of units :	283 sq.m.	354 sq.m.

5.4 Summary of Combinations

Variables have been combined to increase the land area dedicated to an alternative landscape. The criteria for assessing the success of combinations were; the largest increase in land area, and the provision of 'corridors' to extend and connect the alternative landscape.

The use of existing public land (reserve areas and boulevard space) increased the area dedicated to an alternative landscape to about 16 per cent. However, beyond the public reserve, these areas were fragmented and limited to front yards only.

Combination 1 combined the use of all existing public land with land beyond a 20-foot outdoor living strip in back yards. This provided the largest single increase of land available for an alternative landscape (to 39 per cent) and allowed it to be extended to back yards.

Combination2 increased the area to 43 per cent by moving 10 feet of the 17-foot boulevard to the back property line and providing 10-foot wide planting strips along side property lines where driveways were opposite. This increased the viability of the corridors along the back yards while offering an extension through to the front yards in some cases.

Combination 3 reduced the minimum front setback from 25 feet to 15 feet, moving houses closer to the street. In most cases this reduced the amount of driveway area and increased the width of the back corridor. Total land area available for an

alternative landscape increased to 53 per cent.

Combination 4 reversed house footprints to maximize the number of 10-foot side planting strips. This resulted in a small 1.6 per cent increase in land, but a great increase in the number of small corridors.

Combination 5 removed five houses from the study area. It best met the criteria of reduced fragmentation of an alternative landscape and provided the largest area. This reduction of 4.7 per cent of units created only a 3.2 per cent increase.

Summary of Combinations:
(in percentages, noting changes only)

	current	comb.1	comb.2	comb.3	comb.4	comb.5
Public						
Hard Landscape						
Road surface	12.8					
Driveway approach	3.5		1.3	1.3	1.3	1.1
Sidewalk	0.7					
Total hard surface	16.9		14.8	14.8	14.8	14.7
Soft landscape						
Public reserve	3.3					6.6
Boulevard	8.1		12.7	12.7	12.7	12.7
Total soft landscape	11.5		16.0	16.0	16.0	19.2
Total public	28.5		30.8	30.8	30.8	33.9
Private						
Hard surface						
House/roof	17.0					16.3
Driveways	4.5			3.2	3.2	3.0
Total hard surface	21.6			20.3	20.3	19.3
Soft landscape	49.9		47.6	48.9	48.9	46.8
Total private	71.5		69.2	69.2	69.2	66.1
Total hard surface	38.6		36.4	35.1	35.1	34.0
turf area	57.1	22.5	20.2	12.3	10.7	8.6
community	4.3	38.9	43.4	52.6	54.2	57.4
Total soft landscape	61.4		63.6	64.9	64.9	66.0
Total area	100					

6.0 An Alternative Landscape Proposal

Having identified a process for finding space, a new proposal can be made that illustrates an alternative approach to the suburban landscape. A combination of variables is chosen and landscape communities are assigned to the found space, depending on their specific growing requirements and goals established by the developer. This proposal illustrates an integration of an alternative landscape into a suburban development.

This method of creating a proposal has great flexibility, with the proposal explored here being only one of many that could be developed from the variables and combinations in Section 5. The developer may wish to explore another combination of these variables or establish different variables to achieve other goals.

The criteria for assigning landscape communities to the found space offers further flexibility. The developer may want to use an alternative landscape to establish a unique image for the development, such as an entire grassland meadow community broken up with only occasional bluffs of aspen.

6.1 Space Found

Any one of the combinations explored in Section 5 could be developed further into a proposal. This is a demonstration of the use of space found in Combination 4.

Combination 4 met the first criterion of providing a large land area, over half the total (54.2%). This combination retains the density and basic pattern of the development with the same number of lots while allowing for the integration of the alternative landscape. Almost all the increase in land area was due to the re-dedication of existing soft landscape areas (turf).

Total hard surface areas were reduced by 3.5 per cent. This may seem a small gain for the alternative landscape, but it has larger implications for storm water management and construction costs.

This combination met the second criterion by providing a large number of 'corridors' through the development. Fragmentation is reduced by wider corridors along the back yards, and narrower corridors resulting from side planting strips where driveways are opposite. These narrower corridors were maximized in this combination with the reversal of forty-one house footprints.

6.2 Landscape Communities Assigned

The five regional biotic communities of the Winnipeg area, discussed in Section 4, are the basis for the alternative landscape communities. For the purposes of this proposal, soil moisture was used as the main criterion for plant community designation.

The soil moisture gradient is wettest at the edge of the lake, with occasional flooding. This area would be best planted as wetland and floodplain forest. Further away from the lake, the soil is better drained and would accommodate bur oak, aspen, and grassland communities.

6.3 A Proposal

In this proposal, each residence has access to at least one type of community, usually from more than one point. This provides residents with a richness of experience based on diversity and change within the alternative landscape.

There is a greater potential for biodiversity by locating a number of different communities within the subdivision. Biodiversity helps ensure a broader species and genetic base for the entire development in both the short- and long-terms.

A grassland community is proposed for all boulevards adjacent to streets. Because burning, which helps control non-prairie species, is not desirable so close to residences, these areas should be managed as meadows and mowed seasonally. Larger meadow areas may also be grazed occasionally by domesticated animals, such as cattle or goats. This will limit the invasion of trees and shrubs and reduce the chance of accidental grass fires. Grassland meadows away from boulevards can act as nurse crops for aspen forest communities. In these cases, mowing should be limited.

The use of grassland meadows along boulevards allows for easier snow storage and access to underground utilities. It keeps views to and from the house and street open and makes street intersections safer by maintaining visibility at corners. It is also more conducive to on-street parking, allowing for easier car door opening. Grassland boulevards also allow the home owner the

opportunity to extend the grassland community into the front yard as an alternative to a close-mown lawn.

The larger areas of public reserve and back corridors are more suitable for aspen and bur oak forest communities, as well as grassland. Because aspen spreads into grassland, and oak evolves out of aspen, these three types of communities can be mixed together, increasing diversity and providing opportunity for long-term change.

Aspen forest grows in clumps with an edge condition that allows it to spread. It has a dense shrub strata that can provide eye level screening for privacy from neighbours.

Bur oak forest has a less dense shrub strata than aspen forest but species that grow at the edge of the forest can provide screening.

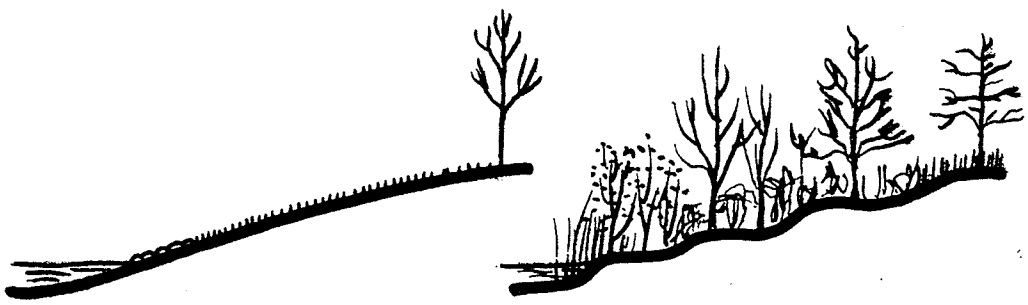
The best location for the floodplain forest and wetland communities is along the storm water retention lake which can provide seasonal flooding and variably wet conditions. Grading in these areas can be terraced to create a more natural appearance and a diversity of habitat within the forest.

The relative openness of the shrub and herb strata of the mature floodplain community will allow glimpses through it, down to the water and the wetland community.

Diversity can be best expressed here as the alternative landscape moves up from the aquatic environment of the wetland,

to the willows at the water's edge, through the floodplain forest, up into bur oak, aspen, and grassland.

The edge of the lake, currently a crisply defined line, is proposed to be softened by creating a varied edge with emergent vegetation. This would provide cover for animals that would frequent the edge of the lake.



current condition altered grading and edge condition

Figure 24 - Altered Grading Along Lakes

Part of the richness of experience within the alternative landscape is derived from change. Change occurs in two time frames, seasonal and long-term

The range of seasonal change is as diverse as the different biotic communities. In spring the bur oak community will be the last to leaf out fully, allowing a surge of growth below in its herb stratum. As the season continues there will be a continual increase in height and change in blossoms of the grassland meadow. Waterfowl populations along their migration routes will come and go from wetland areas. In autumn, the brief golden

shimmer of a trembling aspen will stand out over the redness of dogwood leaves. Winter will offer contrast between the white bark of aspen and red bark of dogwood. The dark knobby shapes of the bur oak will stand out against a winter sky. The occasional outings of squirrels between oaks on milder days will be recorded in the snow.

Long-term change will be evident as one community evolves into another. Meadow may become bush which, in turn, may become aspen. Long time residents may notice the gradual shift from slender white-stem aspens to solid furrow-bark oaks. Over many years the forest communities will evolve towards a climax state. One community, such as floodplain forest, may eventually dominate most of the alternative landscape.

As this alternative landscape evolves, exploration paths will be worn through it, yearly nesting places will be watched, blossoms will be anticipated and, perhaps, residents will feel a stronger connection to nature just outside their doors. This connection will be of this place, this regional landscape.

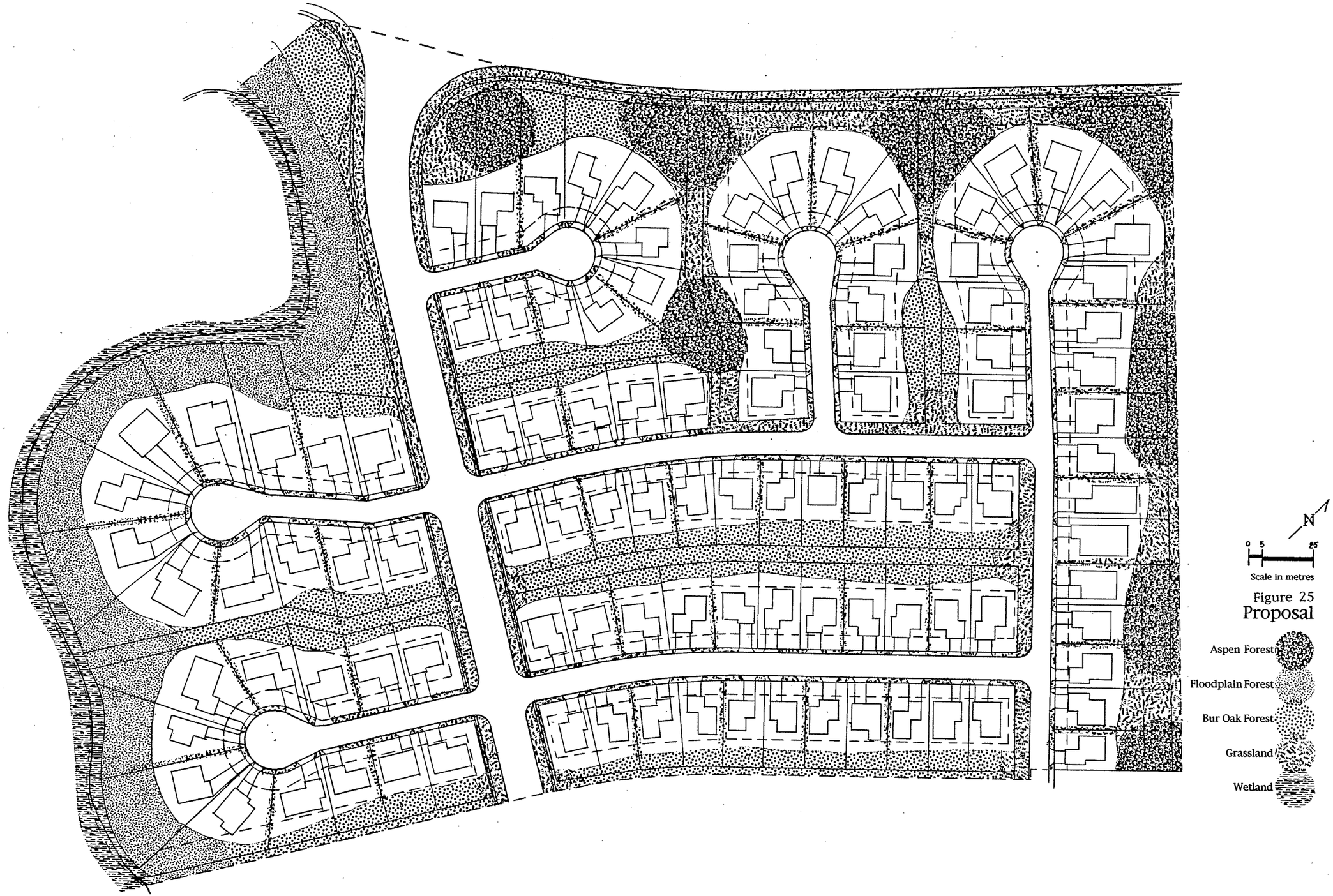


Figure 25
Proposal

Aspen Forest
Floodplain Forest
Bur Oak Forest
Grassland
Wetland

6.4 Implications

This alternative landscape proposal has many implications beyond the scope of this practicum that deserve future study.

The proper implementation of this kind of landscape needs careful and detailed study in order to ensure its success. Attention should be given to modified grading, soil horizons, pioneer species, and the establishment of diversity.

Once this alternative landscape is established, it will require on-going management. Regular re-planting combined with eradication of undesirable species will help promote diversity. Controlled mowing will maintain grassland meadows or allow forests to develop. Management should also extend to the animal population. Initially, intense management of the alternative landscape will be required. Over time, adaptation and maturation of the vegetation will mean much less maintenance than is currently necessary.

The involvement of the residents in the management of the landscape and in continuing education programs will increase their understanding and appreciation of the alternative landscape. This is especially important because much of the alternative landscape occurs on private land. An understanding of the landscape is more likely to ensure its protection and success over

the long term than by-laws and regulations.

The cost implications of this proposal deserve further study. For example, a 3.5 per cent reduction of hard surfaces and a more absorbent landscape could have positive implications for the design of waste water management systems. Implementation and management costs should be explored.

The implications of this alternative landscape upon current by-laws, regulations, and construction practices should also be examined. Set backs and driveway regulations are two of many zoning by-laws that would require revision.

This alternative landscape proposal has strong implications for change to the entrenched values and accepted standards of suburban development. Its implementation should include promotion and education for initial home buyers so they can understand the concepts behind the alternative landscape and accept the change from current cultural ideals.

7.0 Conclusions

Suburban developments can have a *landscape* that is "an expression of a place's regional context." With a few modifications an alternative, ecologically and regionally identifiable landscape can be successfully integrated into the current pattern of suburban development.

It is possible for the suburban landscape to be more a product of the regionally identifiable landscape and less a product of the process that creates suburbs throughout North America. Visual and ecological connections to the greater bio-region and its natural history can be created through the use of managed biotic communities that have a basis in the ecology of the area. This should lead to a sense of place that is grounded in the region.

No longer isolated from nature, this landscape would become a dynamic and interesting element of suburban development and provide for a richness of experience through on-going change and a diversity of habitats. As Hough states, its design can be tied to ecological values, environmental and social health, the bond of people to nature, and the biological sustainability of life.[16]

With only a few manipulations, a very significant area was found for the alternative landscape within the current pattern of suburban development. Although these manipulations involved

[16] Hough p.179

only the movement of house or lot locations and the placing of controls on land use, the potential impact on the appearance and environmental health of the development could be significant.

Opportunity was also provided for the alternative landscape to enter the reaches of the day-to-day living spaces of each resident, strengthening connections to the greater bio-region.

Indirect benefits such as a decrease in storm water run-off from smaller driveways and approaches reduce the demand on infrastructure and may lower some construction costs.

A more holistic approach to what constitutes a suburban landscape is important as development covers more and more land in North America. Space can be made available within suburban developments for this approach to an alternative landscape.

Although this practicum was set in a Winnipeg suburb, it would appear that the principles behind it and the method used could be applied anywhere.

Bibliography

Bannister, Peter Introduction to Physiological Plant Ecology John Wiley & Sons, New York, USA, 1976

Barbour, Michael & William Billings, North American Terrestrial Vegetation Cambridge University Press, Cambridge U.K., 1988.

Barbour, Michael et.al. Terrestrial Plant Ecology 2nd Ed. Benjamin Cummings, Menlo Park, USA, 1987

Bird, Ralph D. Ecology of the Apsen Parkland Canada Dept. of Agriculture, Ottawa, 1961

Carver, Humphrey Cities in the Suburbs University of Toronto Press, Toronto, Canada, 1962

Daubenmire, Rexford Plant Geography Academic Press, New York, USA, 1978

Daubenmire, Rexford Plant Communities Harper & Row, New York, USA, 1968

Dorney, Robert S. "Re-creating the Early Ontario Landscape in a Front Yard." Landscape Architecture, October 1975, pp.420-3

Environmental Issues: A City of Winnipeg Status Report 1991

Essenburg, C.B., Dutch Elm Disease and the Vegetation Composition of Manitoba's Bottomland Forests. M.Sc. Thesis. University of Manitoba, 1991

Gilbert, O.L. The Ecology of Urban Habitats Chapman and Hall, London, UK, 1989

Grey, Gene Urban Forestry 2nd Ed. John Wiley & Sons, New York, USA, 1986

Hanson, Herbert and Ethan Churchill, The Plant Community Reinhold Corp., New York, USA, 1961

Hough, Michael City Form and Natural Process VanNostrand Reinhold, New York, USA, 1984

Hough, Michael Out of Place Yale University Press, New Haven, USA, 1990

Jackson, J.B. Landscapes: Selected Writings University of Massachusetts Press, Amherst, USA, 1980

Jakle, John The Visual Elements of Landscape University of Massachusetts Press, Amherst, USA, 1987

Lansky, Mitch Beyond the Beauty Strip Old Bridge Press, Camden East, Ontario, Canada, 1993

McHarg, Ian L. Design With Nature Doubleday/Natural History Press, Garden City, NY, USA, 1969

Moll, Gary & Sara Ebenreck, Shading Our Cities Island Press, Washington, USA, 1989

Norberg-Schulz, Christian Genius Loci Rizzoli Int. Publications, New York, USA, 1979

Odum, Eugene Fundamentals of Ecology 3rd. Ed. WB Saunders Co., Philadelphia, USA, 1971

Oosting, Henry J. The Study of Plant Communities WH Freeman & Co., San Fransisco, USA, 1948

Rapoport, Amos The Meaning of the Built Environment University of Arizona Press, Tuscon, USA, 1990

Stevenson, H.I. The Forests of Manitoba Manitoba Economic Survey Board, 1938