STRATHCONA WETLANDS:
ENGAGED ECOLOGY IN VANCOUVER'S INNER CITY

by

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Abstract

This project explores the potential to create wilderness in urban areas through design. It uses one small inner-city site to look at the larger picture of how we might bridge the gap between nature and development to create more livable cities while also enhancing the environment.

Research into past notions on the loss of nature-based experiences in cities led to a hypothesis that people need "wilderness," or "place where the wild is found," no matter where they live.

Vancouver's inner-city area known as the "Downtown Eastside" was selected for a design location as it is an urbanized district bearing the brunt of the city's social problems. It also contains an innovative community-managed park site with a "wild habitat" zone which the site's managers presently consider unsuccessful.

Analysis at the regional (city), local (district) and site (park) levels establishes the foundations on which an effective urban wilderness site might be designed. Design criteria are introduced to judge the proposed intervention, creating a template which could be applied as well to future proposals on this or other sites.

Finally, a design for the site is proposed to 1) increase the diversity and population of wildlife by enhancing and adding habitat areas including a year-round wetland 2) provide nature-based opportunities for more people by transforming areas presently used for street-involved illegal activity and 3) highlight the site's importance in a habitat link from the shoreline at False Creek through built areas of East Vancouver.

Table of Contents

List of Figures

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I am indebted for much of the progress on this project to Professor Patrick Mooney. He was generous with his time and knowledge not only in serving as the chair of my thesis committee, but in the generation of the idea itself. A single phone call to UBC in search of free advice on eco-restoration led to a conversation with Patrick on the environment, design and how landscape architecture could be used in the fight for a better world. Being able to close the circle by coming back to the same patch that had brought me into the program provided me with a satisfying suggestion of inevitability to the process, as if it were all meant to be, but it was more the kindness of faculty members such as Patrick that got me this far.

Professor William Marsh and Vancouver Park Board Planner Michel Desrochers offered invaluable advice in their capacity as thesis committee members. Together they combined the thinkers' affinity for challenging the big ideas but without ever losing touch with the ground.

Others too numerous to mention here, from the university to downtown, provided advice, criticism, ideas and more. Included in these thanks are some people I never had the pleasure of meeting but who have earned my undying gratitude for designing and building, against powerful odds, a place as uplifting as the Strathcona Community Gardens.

Chapter One

The Project: Overview

1.1 Statement of Intent

My earliest memories of attachment to an outdoor place come from the woods and waterways of a small town on Lake Ontario. Though long ago, I still draw on those dreamy summer days. The experiences I had then roaming birch groves, collecting snakes or fishing for perch still shape the world I see today.

But it was an Eden with pollution, I knew even as a child. The shoreline was covered on bad days with rotting fish, and the town limits were cynically defined by a stench from the pulp mill. When school lessons in ecology led up to the first Earth Day, I knew what side I was on, and organized classmates into cleaning up an empty lot of litter.

I've considered myself an environmentalist ever since, and supported green causes in countries from Australia to Zimbabwe. My strategy has been the mass media, working as a journalist, but this project marks a shift in tactics. The goal is the same but my approach has moved from support to participation, from commenting to creating. Landscape architecture, I'm hoping, fingers crossed, is the right vehicle for me to help in the campaign a better planet.

I intend with this thesis to explore the role of ecological design in urban place-making. But what does that mean? At ground level, if this project can contribute to helping even one species avoid local extirpation, or offer even one person the same chance to discover the world through nature as I had growing up, I'll consider it a success.

1.2 Project Goal

This project is an attempt to explore an approach to creating wilderness within cities. It involves the following objectives:

1. Design a wildlife habitat area to enhance the ecological and social fabric of life in the Strathcona neighbourhood of Vancouver's Downtown Eastside;
2. Create or highlight ecological links between the site and its surroundings to support the development of a habitat network from the Pacific Ocean at False Creek through built areas of East Vancouver;
3. Establish criteria to judge the design proposal which could be used in other urban ecological projects;
4. Create a demonstration model of urban ecological stewardship.

Fig. 1

The Strathcona Community Gardens site in 1973 (above) with False Creek in the background and in 2003 (below) with Strathcona Park's western edge along Hawks Avenue in the foreground. Dotted lines mark the Community Gardens site in both photos. Photo credits: Vancouver Park Board.

Fig. 2

1.3 Site Introduction

The Strathcona Community Gardens occupy 1.35 hectares (3.34 acres) of Vancouver Park Board land in the southeast section of the Downtown Eastside.

The community gardens began in 1985 when local residents took over an unused lot to grow organic food. In 1992 long waiting lists for the 200-plus plots led to an additional 1.4 hectares (3.46 acres)

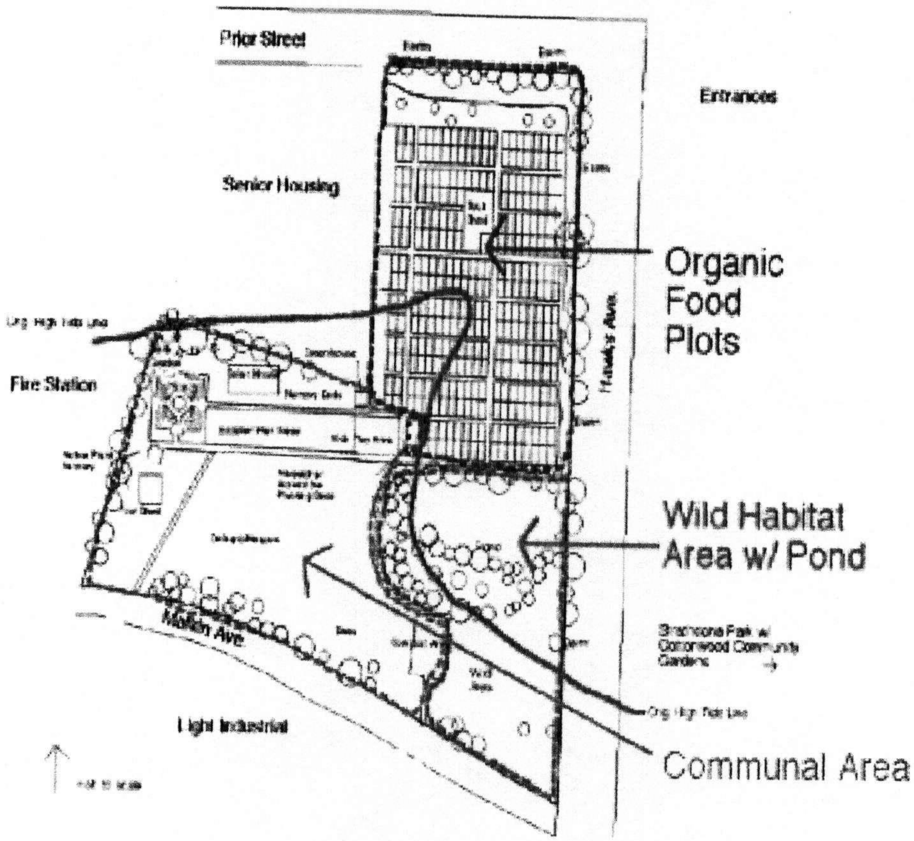


Fig. 3

from the south end of Strathcona Park being made into the Cottonwood Community Gardens. Plots in both gardens are leased from the Vancouver Board of Parks and Recreation for a nominal fee.

The Strathcona Community Gardens were designed into three roughly equal-sized zones: 1) an organic food plot area 2) a gathering area with features including a community fruit orchard, herb garden, horticulture beds and solar-powered meeting house and 3) a wild habitat area with a pond.

While the first two zones are actively visited by a variety of individuals and community groups, the wild area has been seen for years as a problem more attractive to prostitutes, substance abusers and illegal campers than to wildlife. The site design contributes to this problem by effectively limiting access to those looking for hiding places.

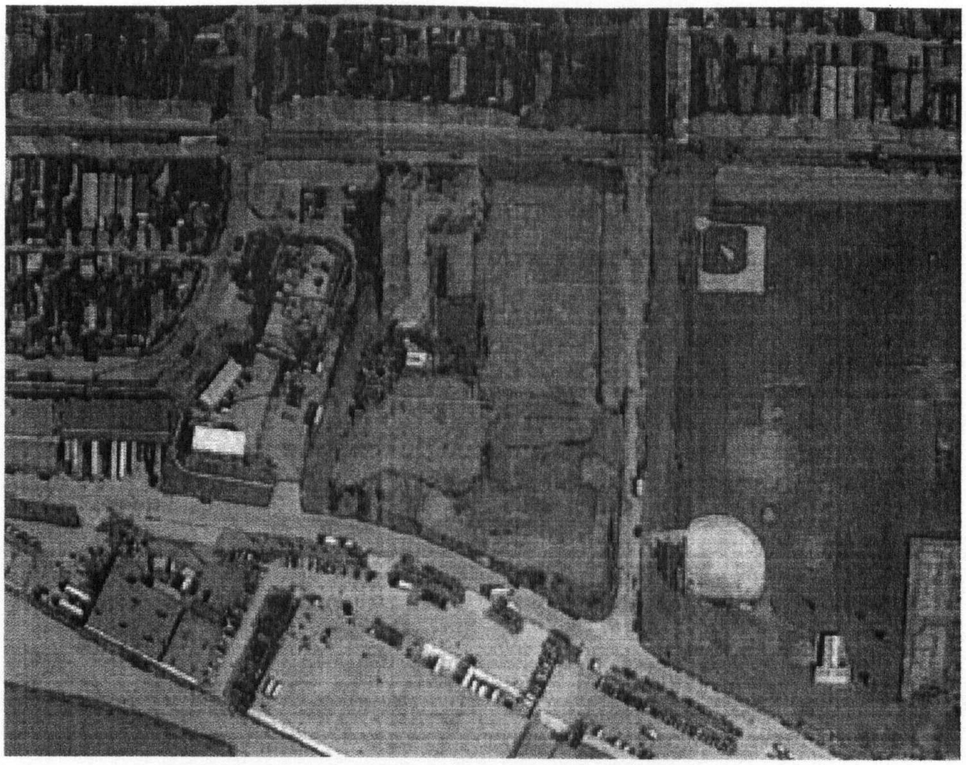


Fig. 4

Existing habitat types include linear forest street trees along Prior Street to the north, mixed forest around the present pond, an orchard meadow on the west side of the site and thicket along Hawks Avenue (above). The present pond typically dries each summer into a marsh still capable of supporting emergent vegetation.

Fig. 5

Chapter Two

The Process: Study Approach and Methods

2.1 Literature Review

My research began with a review into past ideas about the nature-culture split to understand how others have viewed the growth of cities in the Western hemisphere and what the accompanying loss of direct access to natural areas has meant for urban residents. This involved looking into a range of perspectives from the wide scope of Jared Diamond's theories on how the rise of civilizations followed favourable plant distribution to Gary Snyder's opinions on the proper role of the modern citizen in understanding and working toward the protection of one's own biosphere.

Organized attempts to heal the perceived detrimental effects of urbanization on people were explored through writers such as Henry David Thoreau, who famously looked for answers in a pond on the edge of town (Thoreau, 1854), to leaders of the 19th Century park movement such as landscape architect Frederick Law Olmsted, who saw nature as an antidote to urbanization's unhealthful effects (Olmsted, 1871). Both Thoreau and Olmsted advocated providing the civilization-besieged city-dweller with a natural alternative.

The legacy of these attitudes continues today. But a century later neither escaping to wilderness nor attempting to soften civilization's harder edges with pastoral parks has done much to produce great North American cities. For one thing, not many people can (or would want to) stay for long in the real wilderness, suggesting something closer to Thoreau's strategy of living in the woods near town. The modern version of this approach, however, has led to that cruel caricature of a happy life, the suburb. In a similar vein, modern park design based on a century-old model of providing picturesque enclaves from development continues to turn its back on the urban spaces where people live, work, etc. An unthinking acceptance of the nature-good city-bad conceptual divide has contributed to the uninspiring cities we have today. Researching current criticism of urban design included exploring writers such as James Howard Kunstler, who in The Geography of Nowhere found:

> Eighty percent of everything ever built in America has been built in the last fifty years, and most of it is depressing, brutal, ugly, unhealthy and spiritually degrading – the jive-plastic commuter tract home wastelands, the Potemkin village shopping plazas with their vast parking lagoons, the Lego-block hotel complexes, the "gourmet mansardic" junk-food joints, the Orwellian office "parks" featuring buildings sheathed in the same reflective glass as the sunglasses worn by chain-gang guards, the particle-board garden apartments rising up in every meadow and cornfield, the freeway loops around every big and little city with their clusters of discount merchandise marts, the whole destructive, wasteful, toxic, agoraphobia-inducing spectacle that politicians proudly call "growth."

The absence of an effective response to the loss of nature in cities was explored further through writers such as human ecologist Paul Shepard (Shepard, 1996), who argued that wilderness access is fundamental to the psychological development of human beings, and social ecologist Murray Bookchin (Bookchin, 1995), who described the interdependent nature of social and ecological systems and the need to involve citizens in environmental solutions.

Both writers evolved powerful concepts blending nature and culture, or people and land, by refusing to consider either alone without the other. Taken to this level, nature becomes more than something to experience on a weekend camping trip or at the end of a weed-eater. It is instead an integral part of who we are, and understanding our place in it becomes crucial to our development as a successful society. Shephard goes as far as locating true wilderness within, in our own "uncultivated" minds. He goes on to state that while there are many ways to approach ecology from from mathematics to art, "what is common among all of them is a deep sense of engagement with the landscape, with profound connections to surroundings and to natural processes central to all life" (Shepard, 1996).

This research led to a basic understanding of what is being lost in urbanization (meaningful engagement with the land through wilderness-based activity), and suggested the need to find ways to get it back. The result is presented here as a conceptual foundation which could be used to design wilderness spaces for urban settings.

2.2 Theoretical Framework

"Engaged ecology" is the term I've chosen to describe a type of design which leads the visitor to actively participate in his or her immediate environment.

This could function in some respects like eco-revelatory design (Brown et al., 1998) in furthering one's understanding of the physical forces acting upon a site, but goes beyond a didactic approach to encourage direct experience. While this could create a potentially more powerful educational tool than, say, an interpretive sign, any lessons learned would likely be intuitive. The points made would be as much about the relationship between things as the things themselves, so that one comes to see the land as a living being, and the result of many interdependent interactions of natural forces.

At the least, a site designed for engaged ecology would provide a variety of options for the user to choose from in creating one's own nature-based experience. Active involvement would help one discover a personal meaning to the land and one's role on it. This in turn could even create a bond, an affinity for the place, a valuable step in fostering a sense of ecological stewardship.

Engaged ecology is rooted in the need to preserve, enhance or create wilderness, even if in small patches in heavily urbanized areas. The opportunity to immerse one's self in a natural environment is considered here to be a birthright, and necessary to the full and healthy development of a person into a successful citizen of the world.

Because outdoor spaces based on the principle of engaged ecology would encourage users to discover the environment in ways of their own design, they should always be able to adapt to change, growth, decay and reinvention.

For the environmental designer, "engaged ecology" refers both to the result and the process, as it speaks to the level of passion needed if we're to succeed in creating the kind of world we can feel proud about passing on to the next generation.

2.3 Site Selection

The next step was to choose a site to serve as a model urban ecological design project.

Vancouver appeared to fit the selection criteria well, with several advantages beyond mere proximity. As it is relatively new, on the world scale, it has a sense of still growing up, of becoming what it was meant to be.

This was not automatically deemed beneficial. Vancouver is sometimes criticized for being little more than a pretty place, "a setting in search of a city" (Punter, 2003).

But urban designers may consider this lack of tradition an advantage, one that helps create an exciting milieu in which innovative ideas stand a better chance of making the transition from paper to dirt. Coupled with an emerging environmental understanding of how a livable city should be ordered to benefit residents now and in the future, Vancouver could become a leader in urban design with a potentially global impact.

An awareness of the need for greater access to nature for residents in the less affluent and more crowded parts of the city steered the direction east of Main Street.

Personal knowledge of the pressing ecological and social needs involved with a particular site helped complete the selection. The Strathcona Community Gardens, where I have been a volunteer gardener, arborist and administrator for four years, are found in the Downtown Eastside. This district is known as the poorest postal code zone in Canada (City of Vancouver website, 2004), a place where the urban problems of poverty, crime and addiction are evident to anyone walking the major streets at any time of day or night.

Site of the proposed new pond (left) is currently used for non-habitat-enhancement purposes, including illegal camping, prostitution and substance abuse.

Fig. 6

The community gardens have a site designated for wilderness, although it is not functioning as originally intended. Selecting the "wild habitat" area of the Strathcona Community gardens for design intervention thus offered an approximately 1.1-acre (0.4-hectare) patch which the gardens' stewards had long hoped to see become a successful ecological refuge (City of Vancouver Archives: Strathcona Community Gardeners Society meeting minutes).

2.4 Design Evaluation Criteria

The following criteria were established to gauge the design, but could serve as well for any urban ecological renovation project with similar circumstances.

The principles are listed as questions to be asked in evaluating an intervention. This is followed by several indicators the desired answer would involve.

1. **Ecological Criteria: Does it improve the ecological functioning of the site to enhance biological diversity?**

Yes, if there is:

1.a: Greater use of the site by a larger variety and number of wildlife species, particularly native species.
1.b: Increased amount and variety of native plants able to thrive naturally in the local conditions
1.c: An integrated and naturally evolving eco-system without the need for undue maintenance or alteration.

2. **Social Criteria: Does it contribute to the well-being of people?**

Yes, if there is:

2.a: An increased use of the site by a greater variety and number of people.
2.b: A decrease (or elimination) of anti-social activity, particularly crime.
2.c: An increase in the opportunities for nature-based activities.

3. **Economic/Practical Criteria: Is it feasible?**

Yes, if it is:

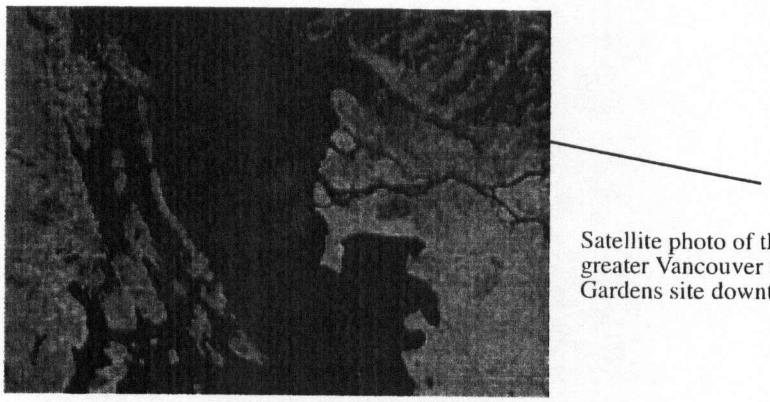
3.a: Simple and affordable enough to design and build for a variety of groups, particularly those in inner-city areas which may face financial constraints, perhaps through eligibility for grants to cover construction costs
3.b: Able to run smoothly without costly charges for regular operation, maintenance or repair.
3.c: Possible to complete within a budget proportionate to the value received in long-term benefits to the area.
3.d: Eligible for grants to support cost of construction.
3.e: Eligible for approval by government authority.

Chapter Three
The Site: Inventory and Analysis

3.1 Regional Analysis: Vancouver

Vancouver is a mid-sized North American coastal city (pop. 545,671 – 2001 census) in a larger metro region of more than 2 million people. The city has been developed over the last 150 years on fertile rainforest land which had supported Native people for generations.

The city consistently ranks on or near the top in quality of life studies of major cities, enjoying "an international reputation for achieving a generally high standard of design and for generally making the most of its superb natural setting" (Punter, 2003).



Satellite photo of the Georgia Basin showing greater Vancouver with the Strathcona Community Gardens site downtown at the arrow point.

Fig. 7

Physiography
The city is bordered on the north across Burrard Inlet by the forested Coast Mountains which continue nearly 1,000 km to the Yukon and Alaska. To the southeast the volcanic Mt. Baker presents the Cascade Mountains which run from southern British Columbia to northern California. To the east and south the Fraser Lowlands spread out in a long, broad valley mixing government-protected farmland with suburban sprawl. To the west one can look over the protected Georgia Strait to the distant mountains of Vancouver Island.

Climate
The Pacific Ocean lives up to the name in moderating the region's weather to produce cool, wet winters and warm, relatively drier summers (Demarchi, 1996). Temperatures average 3 degrees C. in January and 18 degrees C. in July (City of Vancouver website, 2004). Rainfall is common, although rarely dramatic, with precipitation totalling an average 1,219mm per year (City of Vancouver website, 2004).

Geology
The Lower Mainland area of Vancouver and nearby municipalities consists of three physiographic

elements: mountains (bedrock) of the Canadian Cordillera, uplands (ice age sediments) between 10m to 200m where most of the population lives, and lowlands (modern sediments) at the floodplain of the Fraser River and along shorelines of the Georgia Strait (Clague and Turner, 2003).

The geologic foundation of Vancouver and most of the Fraser Lowland is sandstone, mudstone and conglomerate formed about 70 to 40 million years ago (Clague and Turner). On top of this (with exceptions for outcrops such as Burnaby Mountain) is a layer of sediments up to several hundred meters thick left by receding glaciers during the last Ice Age about 12,000 years ago (Clague and Turner, 2003).

Vegetation

The Lower Mainland consists of two main biogeoclimatic zones, or areas of consistent characteristics of vegetation and associated climate, soils and animals (Mooney, 2003, quoting Krajina, 1969). These are the Coastal Western Hemlock Zone and the Wetter Maritime Coastal Douglas Fir Zone.

Mature forests of the former are often characterized by conifer trees such as Western hemlock (*Tsuga heterophylla*), Western redcedar (*Thuja plicata*), Grand fir (*Abies grandis*) and Sitka spruce (*Picea sitchensis*), and with deciduous trees such as Red alder (*Alnus rubra*), Black cottonwood (*Populus balsamifera ssp. Trichocarpa*), Bigleaf maple (*Acer macrophyllum*), Vine maple (*Acer circinatum*) and Bitter cherry (*Prunus emarginata*) (Mooney, 2003). Many of the same species are found in the Wetter Maritime Coastal Douglas Fir Zone, along with Douglas fir (*Pseudotsuga menziesii*) (Mooney, 2003).

Wildlife

Large animals typically found in this ecoprovince include mule deer, cougar and coyote, and small mammals include the Virginia opossum, marsh shrew, Trowbridge's shrew, shrew-mole, Townsend's vole and coast mole, Douglas' squirrel, eastern cottontail (introduced) and creeping vole (Demarchi, 1996).

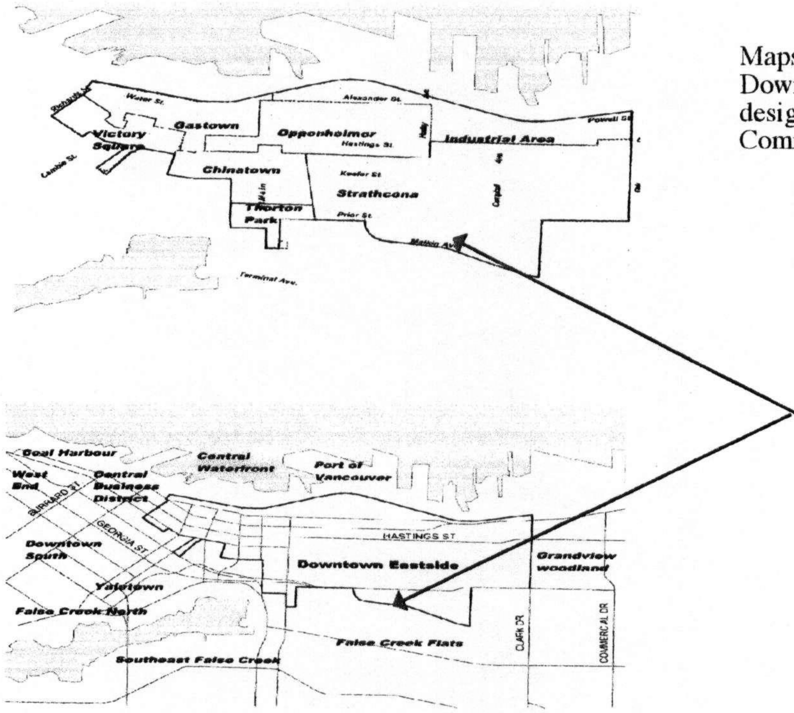
This ecoprovince's relatively small size belies its importance as a bird habitat and feeding grounds. More than 90 percent of all bird species known to occur in British Columbia are seen here, due in large part to its strategic location in the Pacific Flyway for migrating birds and because the wetlands of the Fraser Delta mark the largest single unit of wetland habitat in the province (Demarchi, 1996). Some 350 bird species visit the Lower Mainland area of greater Vancouver, with approximately 50 species commonly seen in the city itself (Schaefer et al., 2002).

Amphibians and reptiles include the Pacific tree frog, western pond turtle and sharptail snake (Demarchi, 1996). It may be worth noting here that about 10 years ago scientists began noticing a decline in amphibians, particularly frogs, in some cases with entire species disappearing (Biodiversity Branch, BC Ministry of Water, Land and Air Protection: BC Frogwatch Program website).

While the causes remain undiscovered, is understood that renovating or creating wetland habitat for threatened species can only improve their chances of survival. Even a small Lower Mainland wetland linked to an educational program for schools and community groups such as Toronto Zoo's Adopt-a-Pond could be a useful link in a future efforts worldwide to understand and promote the preservation of endangered species, particularly as urbanization continues to take up more habitat area every year.

3.2 Local Analysis: The Downtown Eastside

The typical visitor's snapshot image of Vancouver presents a clean, modern city surrounded by mountains and sea, but most residents know there's more to the picture. The most recent civic election in 2002 was fought largely over strategies to deal with the city's most troubled area, the Downtown Eastside.



Maps showing Vancouver's Downtown Eastside. Arrows designate the Strathcona Community Gardens Site.

source: City of Vancouver 2002 Downtown Eastside Community Monitoring Report

This diverse urban landscape is not large at just 205 hectares (1.8 percent of Vancouver) but is known well beyond the city limits for its visible struggles with poverty, crime, addiction and public health. Yet the area known as the poorest postal code district in Canada (City of Vancouver website, 2004) is also a site of remarkable resiliency with countless examples of dedicated community building on the part of government officials, volunteer groups and the citizens themselves. Some long-term residents find in it a sense of acceptance and social cohesiveness they could expect in no other neighbourhood in the city.

The population of 16,725 includes 80 percent of the city's "single-room occupancy" units (2002 Downtown Eastside Community Monitoring Report), the housing strategy typical of those a step above homeless. Some 68 percent of Downtown Eastside residents are considered low income, a figure more than double the citywide rate of 31 percent (City of Vancouver: 2002 Downtown Eastside Community Monitoring Report).

Though its image among outsiders typically involves a sidewalk tableau of human misery, the area actually has many faces. To the north the Port of Vancouver lands are a working zone for port loading, railway transportation, warehouse storage and industry. The east is bordered by the Grandview-Woodlands District, a mixed income housing area with some industrial area. The False Creek Flats to the south include areas for light industry such as food and retail services, as well as large unused tracts currently being eyed by speculators, planners and citizens. The northwest side is bordered by the Central Business District and the southwest by the mixed-use North False Creek area featuring high-density commercial and residential buildings, and entertainment centers such as BC Place and GM place.

Options for nature-based experiences are not abundant in a city renowned for its outdoor amenities. Many of the area's residents lack the personal space for even a small garden. The Downtown Eastside overall has 14 hectares of park space, or 1.1 percent of the city's total serving 3.2 percent of its people (City of Vancouver: 2002 Downtown Eastside Community Monitoring Report).

Examples of urban ecological park sites in and near the area include a duck pond in Crab Park on the Burrard Inlet waterfront, a naturalized shoreline at Cooper's Park on False Creek, and, further away, Trout Lake and the Hastings Park Sanctuary.

3.3 Site Analysis: The Strathcona Community Gardens

History

The Strathcona residential neighbourhood, the first in Vancouver, started in the 1860s in an area known as a native campsite called Kumkumalay, or "Big-leaf Maple Trees" (Davis, 1977). The collection of shacks and small buildings grew into a permanent residential district around Captain Edward Stamp's Hastings Mill sawmill in 1865.

The "East End" (later renamed Strathcona) was considered an entry point for immigrants who could afford the low rents, and grew to be a district of considerable cultural diversity with settlers from Russia, China, Finland, Ireland, Croatia, Japan and Greece making only a partial list (City of Vancouver: communitywebpages).

In the 1950s city officials slated the area for massive demolition and redevelopment (Davis, 1997). Although 15 blocks of character homes and row houses were cleared for institutional housing in 1967, plans to put a freeway through the neighbourhood mobilized the citizenry to save the neighbourhood. Their success in stopping the project is sometimes touted today for saving Vancouver from the freeway-splitting fate that plagued many other North American cities in the highway-happy 1970s (City of Vancouver: communitywebpages).

Two enduring legacies of that campaign are a strong sense of local pride in the neighbourhood and an abiding faith in the power of citizen activism. This community spirit was instrumental when a group of citizens decided to address a perceived lack of green space by creating a community gardens out of an unused lot of Park Board land in 1985.

The bare-dirt lot consisted of fill taken from the Grandview Cut and an area near Hastings Street at Kaslo to cover the tidal marshland of False Creek beginning in the 1910s (Rogers, 1994). Half of the lot originally lay below the high-tide line, while the other half was used variously as a city dump, hobo jungle, sewer outfall and for children's swimming holes (Rogers, 1994).

Concern about the ill effects on children of what the Vancouver Daily Province called an "evil smelling garbage dump" (August 18, 1938) fueled a civic push to turn the site into a 45-acre park and recreation space from Heatley Avenue all the way to Raymur Street. Though approved in 1940 and named False Creek Park, the project was dropped due to the Second World War and neglected for years afterwards (Rogers, 1994).

In the 1950s the Great Northern Railway sponsored the development of land to the south into a row of produce wholesalers' warehouses. The project included extending Hawks Avenue through the unused park space to connect to the industrial zone at Malkin Avenue, thereby bisecting the park (Rogers, 1994).

While the eastern portion of the park space was developed into a recreational area dominated by sports fields, the western part was left untouched. It was this lot that residents eyed for a community green space. Although getting official approval was a struggle as arduous as hauling out tons of trash and improving the clay hardpan soil, the site was eventually leased in the mid-1980s for $1 per year from the Park Board, and the Strathcona Community Gardens were officially under way.

The original garden designers created spaces for organic food plots, a community fruit orchard, a herb garden, a children's play area and a wild habitat area with pond/marsh. The success of the experiment can be measured in its popularity. When the 200-plus plots were filled, a separate 1.4-ha space about 100m away at the south end of Strathcona Park was also leased from the Park Board in 1995. Together the Strathcona and Cottonwood Community Gardens are administered by the Strathcona Community Garden Society.

All gardeners at the original Strathcona site join the Strathcona Community Gardeners Society (for $10 per year), pay an additional $5 per year for a 2.1 by 4.6m (7X15feet) plot, and agree to attend monthly work parties to complete communal chores.

Circulation

Although the Strathcona Community Garden is a public amenity open to all without restriction, many in the city and even some in the Strathcona neighbourhood do not know it exists.

A driver on the fast Prior St. connector route from downtown to East Vancouver (via the Georgia Viaduct)

Fig. 9

Seldom used and poorly maintained, Hawks Avenue bisects what could be one big park.

can pass within 5m of the site without realizing the many urban agricultural and ecological features within. A tall stand of Austrian pine (*Pinus nigra*) planted on a 1.5m berm along the street blocks visual access from vehicles and the adjoining residential district to the north, while a similar 0.75m berm topped with Himalayan blackberry (*Rubus discolor)* along Hawks Avenue has a similar effect for anyone there or in Strathcona Park beyond it.

Most garden users from the Strathcona neighbourhood enter on foot, using a narrow, winding path at the corner of Prior and Hawks Streets or a wider path not far south of the intersection off Hawks Avenue. Lesser used entrances are found at the northwest corner at the senior's housing complex parking area and at the southwest corner next to the fire hall entrance.

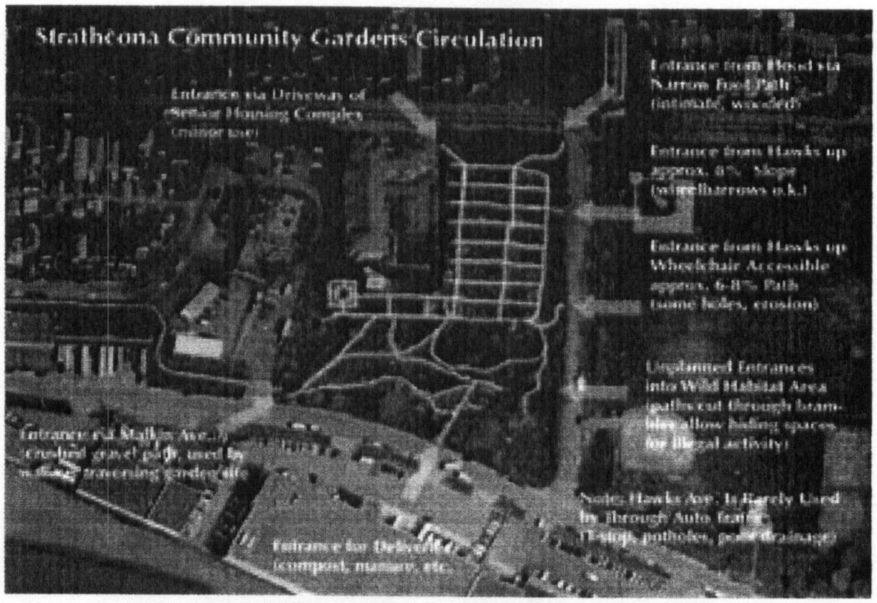


Fig. 10

A wheelchair-accessible entrance is located off Hawks Avenue approximately mid-way between Prior and Malkin Streets, if one can negotiate the heavily-eroded Hawks Avenue potholes to reach it. Once inside the garden, the path from this entrance continues to an area with wheelchair-accessible raised beds.

Signs at some of the entrances announce the gardens, or remind visitors not to steal, or dump garbage, or let dogs disturb bird nesting areas. But overall, the entrances are not prominent or generously marked, and the site cannot be considered entirely welcoming to the newcomer.

Thick vegetation along the perimeter provides an aspect of refuge for anyone on the inside. This is important for those who use the site for therapeutic relief from the urban pressures around it. On the other hand, it can create a sense of unwelcome to anyone not already familiar with the gardens.

Unintended entrances to the wild area have been a concern of the gardeners for several years (personal observation). Efforts to block impromptu paths through the blackberry brambles with logs, branches and prunings have not been successful. Evidence of street-involved use of the site includes used condoms and drug paraphernalia, garbage left by campers including beer cans, and visits even in daytime by sex trade workers and their clients.

A move by the Park Board to make the adjoining Strathcona Park more neighbourhood friendly has resulted in a partial redesign of league-use sports fields into children and youth play areas. As the $1 million renovation is already showing signs of success in attracting more area residents to the site (personal observation), opportunities arise to combine these improvements with similar moves on the Community Garden side to increase user access and enjoyment.

Hydrology

The gardens are connected to and pay for city potable water for irrigation and in the solar gathering house. Although convenient, this is not the most desirable approach for a model of an urban ecological future. It is also costly (see Water Budget Analysis in Site Design section).

An extensive search for plans of the underground network of irrigation pipes in 2003 was fruitless (personal observation), and as the original designers have moved on, the system is somewhat of a mystery to the current administrators. A leak which threatened to run the water bill up drastically in 2002 was a source of great bewilderment for months, leading to a total shut-off of the water main and a goose-chase-like hunt for the broken part (eventually discovered near the Hawks Avenue entrance where roots of a large cottonwood tree had cracked the pipe).

Original plans for the gardens called for drainage to flow naturally from the higher ground of the plot area in the north to the lower wild area in the south where it would collect to create a pond.

The scheme appears to work as expected for approximately three-fourths as winter rains typically fill the pond (personal observation). This evidently suits a pair of nesting mallards who typically produce a brood of chicks each year. The "pond" however dries most years in the early summer, exposing the chicks to people, dogs and other predators. The resulting soft-bedded area shows more evidence of visitation by street-involved users than the wildlife for which it was intended.

Topography

A gentle slope leads from the northwest corner of the site near the senior's housing complex to the lowest portion at the southeast corner in the wild habitat area (Vanmap topographical map at 2m intervals (http://www.city.vancouver.bc.ca/vanmap/).

A more detailed analysis of the wild habitat area was conducted in a topographical survey of the wild habitat done in January, 2004, with Vancouver Park Board Engineer Assistant Dougald McLardy.

Soil

A report on the proposed gardens from February, 1985, described the soil as "highly compacted" and littered with rubble and rock (Gross, 1985, "Strathcona Community Gardens: Practical Concerns in Establishing the Gardens" in Rogers, 1994).

Gardeners' accounts speak of a long and intense process turning a heavily clay-based soil into productive topsoil. This has been done through the addition of various organic materials including compost generated from tons of plant waste on the site along with organic produce trucked in each week from a retail health food store nearby.

A field observation of soil in the wild area revealed a variety of types even within a small sampling range. One handful revealed a heavy clay content which matched reports of gardeners in other parts of the gardens experiencing difficulties digging even a short distance beneath the surface, while another showed a rich loamy topsoil reaching a meter deep. This could be the result of a variety of soils contained in the fill brought to the site originally. It may also reflect the gardens' development since then with pockets of the site being planted, tended and abandoned by various volunteers over the years.

A soil test for contaminants was conducted on January 15, 2004, in the wild habitat area using a modification of the BC Ministry of Water, Land and Air Protection protocol derived from the "Technical Guidance on Contaminated Sites" section of its website (http://wlapwww.gov.bc.ca/epd/epdpa/contam_sites/guidance/technical/16.html).

Completing the full protocol was deemed beyond the financial and physical resources of this project. In addition, the wild area site is too small to produce the recommended 40mx40m quadrants from which to select test points. Furthermore, the guidelines state, "Alternative sampling approaches may also be used."

A point in the centre of the wild area was selected and used to divide the site into quadrants. Two numbers were then selected at random (nine and two) to determine the selection of two test holes, each nine meters down and two meters to the right of a quadrant line. The resulting two points were added to the third starting point to result in three sites for soil sampling.

Again choosing randomly, the three sites were dug using an Oakfield Probe and/or shovel at three different levels (soil surface, 0.5m and 1m).

The three samples were delivered to the Cantest Life Sciences Laboratory in Burnaby to test for heavy metal contaminants. The results were then checked against Schedule 5 of the provincial Contaminated Sites Regulation Matrix for Numerical Soil Standards pertaining to various heavy metals: (http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/WasteMgmt375_96/375_96sch5.htm)

None of the results were found to fall into the category of a contaminated site. As the provincial Contaminated Sites Regulation instructions state, "A site is not a contaminated site with respect to a substance if the concentration of the substance in soil, surface water or groundwater at the site does not exceed the applicable site-specific numerical standard," a conclusion was reached that digging in the wild habitat area to expand the wetland would not involve issues of contamination.

Wildlife

Anecdotes have been heard suggesting biological studies of wildlife in the community gardens and the wild area in particular were conducted (personal observation) but no actual records have been found, nor can any of the present garden administrators locate one.

Site visits confirm a frequent and noisy variety of birds use the wild habitat area, including Mallards (*Anas platyrhynchos*), Red-winged Blackbirds (*Agelaius phoeniceus*), House Sparrows (*Passer domesticus*), Black-capped Chickadees (*Parus atricapillus*), House Finch (*Carpodacus mexicanus*), Spotted Towhees (*Pipilo maculatus*), Northwestern Crows (*Corvus caurinus*), Starlings (*Sturnus vulgaris*) and many others. Raptors have been seen soaring over and near the site, including Bald Eagles (*Haliaeetus leucocephalus*), a pair of which raised an eaglet in 2003 in the cottonwood trees adjacent to the Cottonwood Community Gardens.

Amphibians are heard regularly in warm season evenings with a chorus of frog calls. An educated guess based on past observation suggests the presence at least of the Pacific tree frog (*Hylla regilla*), and perhaps other species as well. No signs of the invasive and predatory bullfrog have been seen.

Vegetation

As an apt reflection of the organic nature of the volunteer-run community gardens, vegetation is widely varied.

Woodland areas around the present pond show the characteristics of an early seral stage mixed deciduous and conifer forest dotted with an eclectic blend of introduced and colonizing species.

Site visits confirm the presence of dominant tree species Black cottonwood (*Populus trichocarpa*), Red alder (*Alnus rubra*), Pacific willow (*Salix lucida*), Western redcedar (*Thuja plicata*), Western hemlock (*Tsuga heterophylla*), Bigleaf maple (*Acer macrophyllum*) and White birch (*Betula papyrifera*). Shrubs on the site include Himalayan blackberry, Nootka rose (*Rosa nutkana*), Black twinberry (*Lonicera involucrata*), Oceanspray (*Holodiscus discolor*) and Black gooseberry (*Ribes lacustre*).

Character/views

Although some aspects of the gardens such as pathways through the plot area are laid out more or less geometrically, the gardens themselves have an organic approach to order which some find refreshing. Others may consider it unkempt, particularly in winter when most plots are left idle.

This scruffy look of the gardens are nowhere more evident than in the wild area, a place which some outsiders find disagreeably messy (personal observation). This opinion is not generally shared by gardeners, who know that nature looks messy too, but the reaction may not be so easily discounted on days when the wild area is strewn with empty beer cans, condom wrappers, burnt scrap wood and other signs of unwanted use.

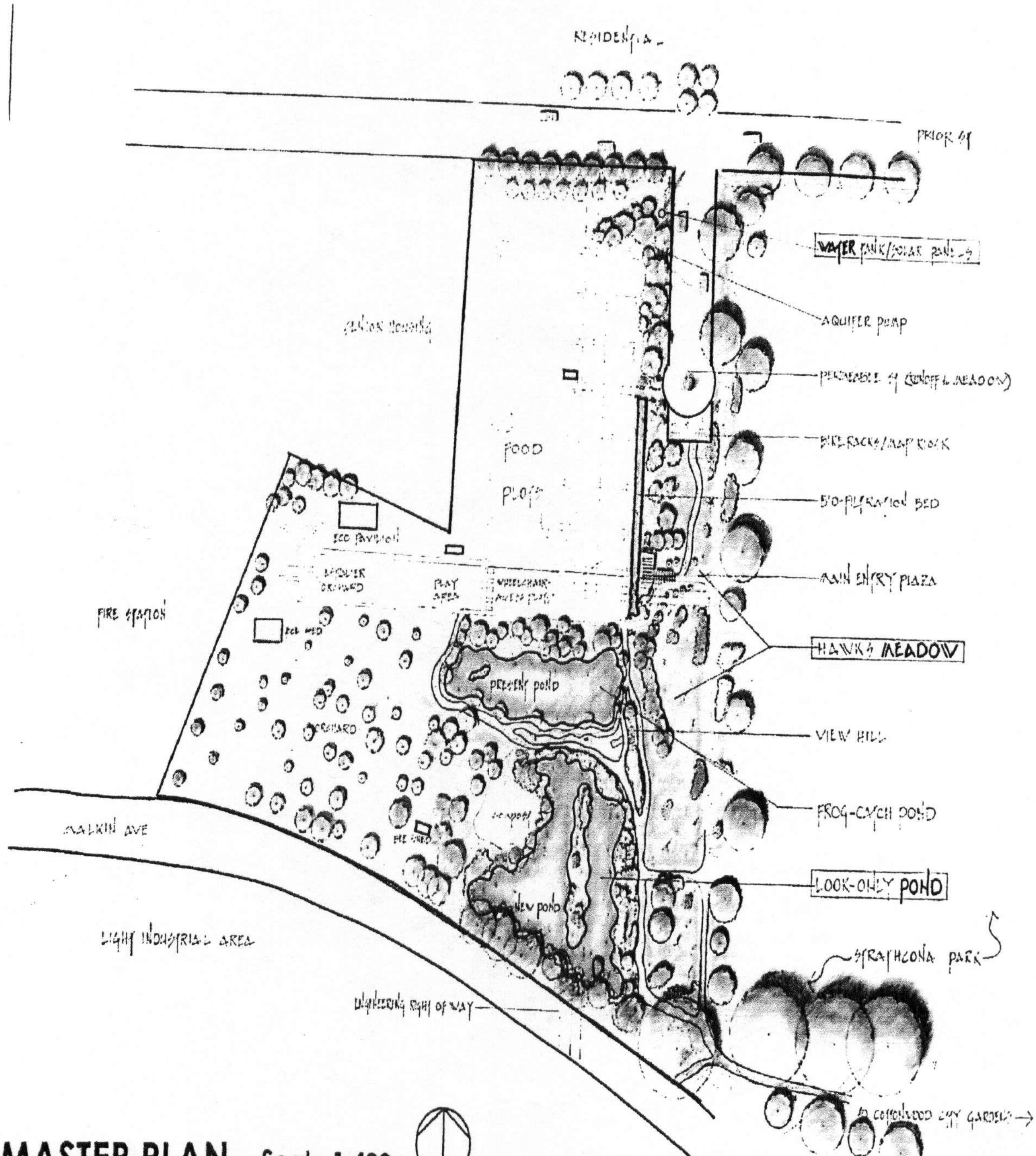
Views from the wild area are limited by the blackberry brambles to the east, effectively cutting off Strathcona Park, while similar shrubs and trees in other directions limit the range of view except for the open views of the residential condo towers at False Creek and the fire station concrete hose-drying tower.

Chapter Four

The Site Design

To meet the goal of creating a model urban ecological site which provides wilderness access to both wildlife and people, a number of design interventions are proposed.

4.1 Master Plan



MASTER PLAN Scale 1:400

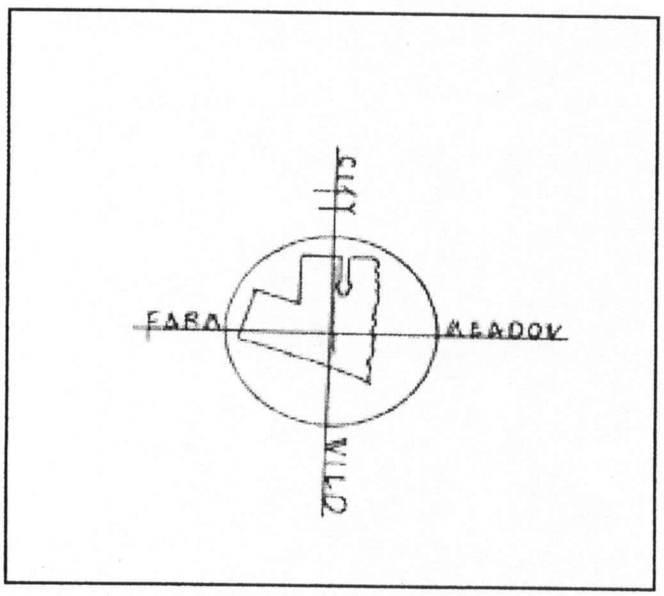
The overall design is driven by three key ideas. These respectively reflect the ecological, social and economic drivers behind the proposed solution.

Ecologically, the design is intended to enhance the habitat potential of the site. This would be done by enhancing existing habitat through the planting of more native species to increase foraging and nesting opportunities, and by creating new habitat, including a permanent (not seasonal) wetland.

Socially the design would open the site to more people by making one big park out of what is now two green spaces severed by a largely derelict Hawks Avenue. Turning Hawks Avenue into Hawks Meadow would replace auto traffic with pedestrian paths, inviting more people from the neighbourhood and beyond to both sites. Added and improved entrances to the Community Gardens, including a main entry plaza, would be used together with a more open visual access to bring a sense of safety and security to areas of the Community Gardens now rarely seen by most visitors.

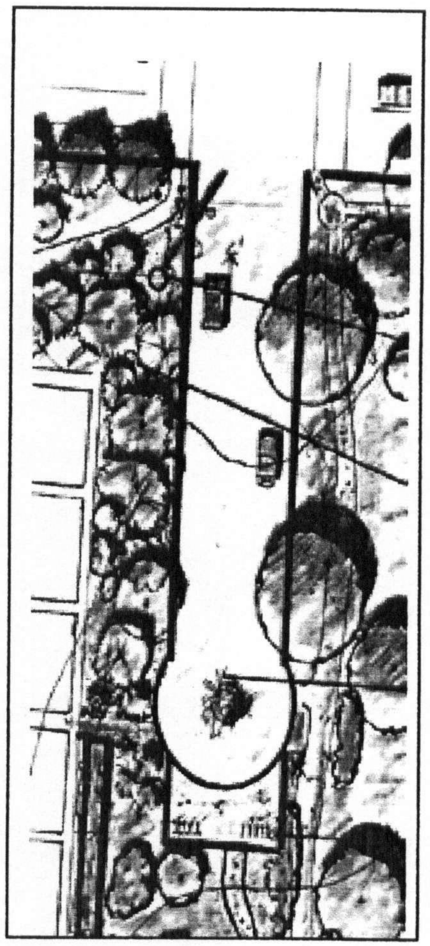
Economically, the design reflects an attempt to build on the Community Gardens' volunteer-run tradition of self-sufficiency by replacing water losses in the wetland with solar-energy-pumped groundwater. A successful solar-groundwater system could be expanded to drip-irrigate the entire Community Gardens, getting off the grid for both water and power to serve as a model of eco-autonomy.

Fig. 12



Concept diagram of site layout (above). Closing Hawks Avenue to car traffic (right) would open the site to more pedestrian use while enhancing habitat.

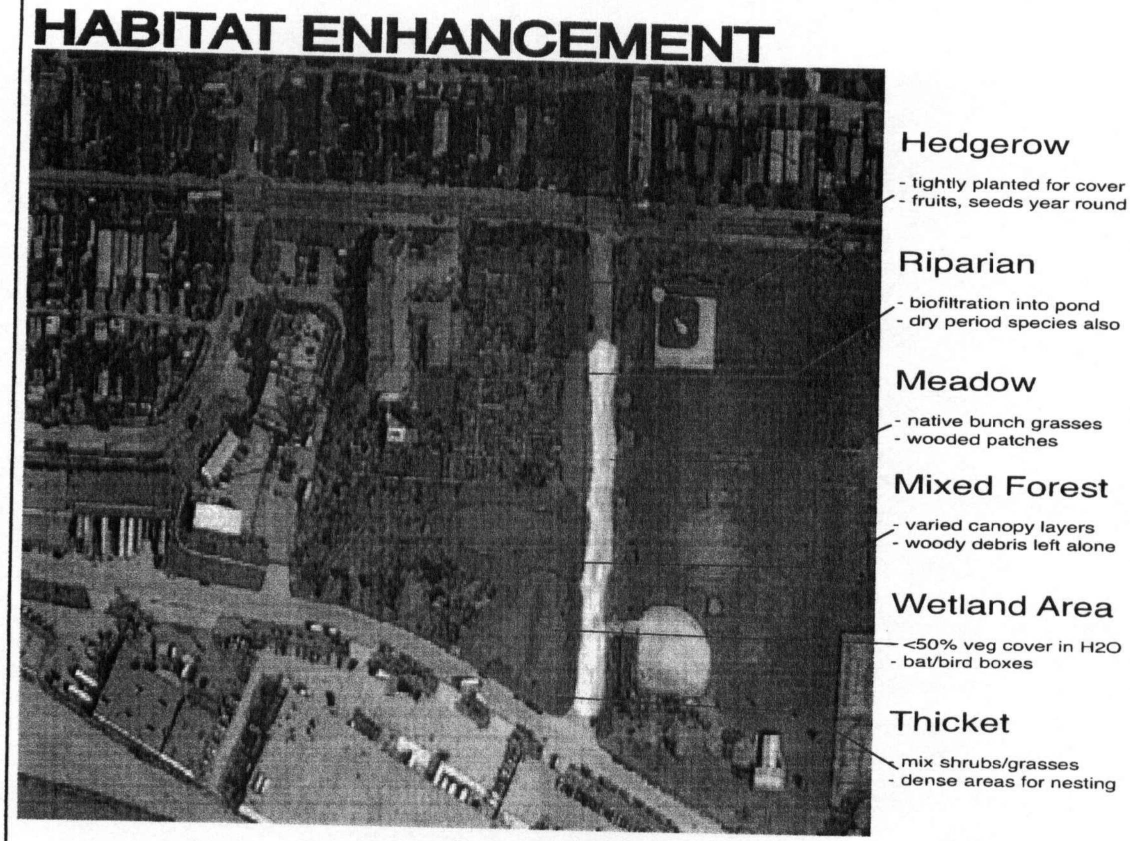
Fig. 13



4.2 Ecology

Existing habitat would be enhanced with design features aimed at increasing foraging and nesting opportunities for a variety of species from amphibians to songbirds.

Fig. 14



Sample Plant List:

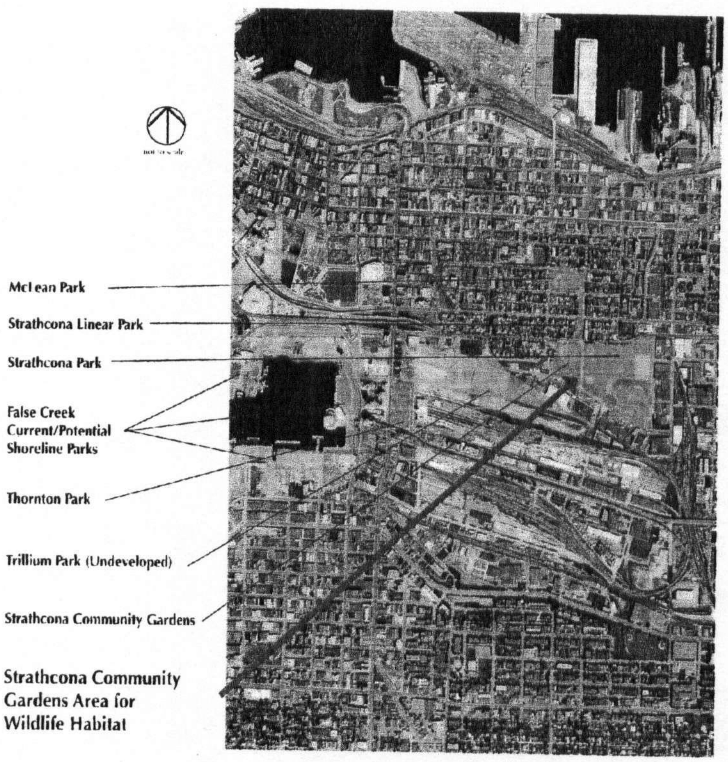
Hedgerow: Hazelnut, Vine maple, Pacific crabapple, Wild rose, Red elderberry.
Riparian: Indian plum, Cattail, Skunk cabbage, Buckbean, Slough sedge.
Meadow: Black hawthorn, Oceanspray, Blue wildrye, Bear-Grass, Chocolate lily.
Mixed Forest: Cottonwood, Red alder, Douglas fir, Vine maple, Red huckleberry.
Wetland Area: Hardstem bullrush, Spike rush, Wapato, Watershield, Sweetgrass.
Thicket: Pacific willow, Red-osier dogwood, Mock orange, Elderberry, Snowberry.

Steps to improve existing habitat areas include increasing the amount and diversity of native plants able to thrive in local conditions, establishing a naturalized setting with vertical foliage differentiation to appeal to a greater number of wildlife species and leaving dying vegetation intact to serve as natural fodder and shelter for a number of insect and animal species. Introduced amenities would include nesting boxes for bats and certain birds including Wood Ducks (*Aix sponsa*) and Tree Swallows (*Tachycineta bicolor*).

New habitat spaces would be added by creating a grassland meadow in what is now Hawks Avenue and by turning the presently blackberry-overrun "wild habitat area" in the Community Gardens into a year-round wetland.

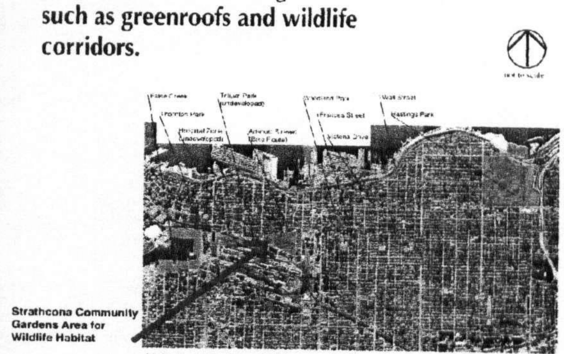
4.2a Eco-Links

No site exists in isolation; no site design can succeed without considering context. This proposal looks not only at improving the site together with the adjoining Strathcona Park, but also seeks to use it as a model guiding future habitat development from the Pacific Ocean at False Creek through areas of East Vancouver to the Sanctuary in Hastings Park.

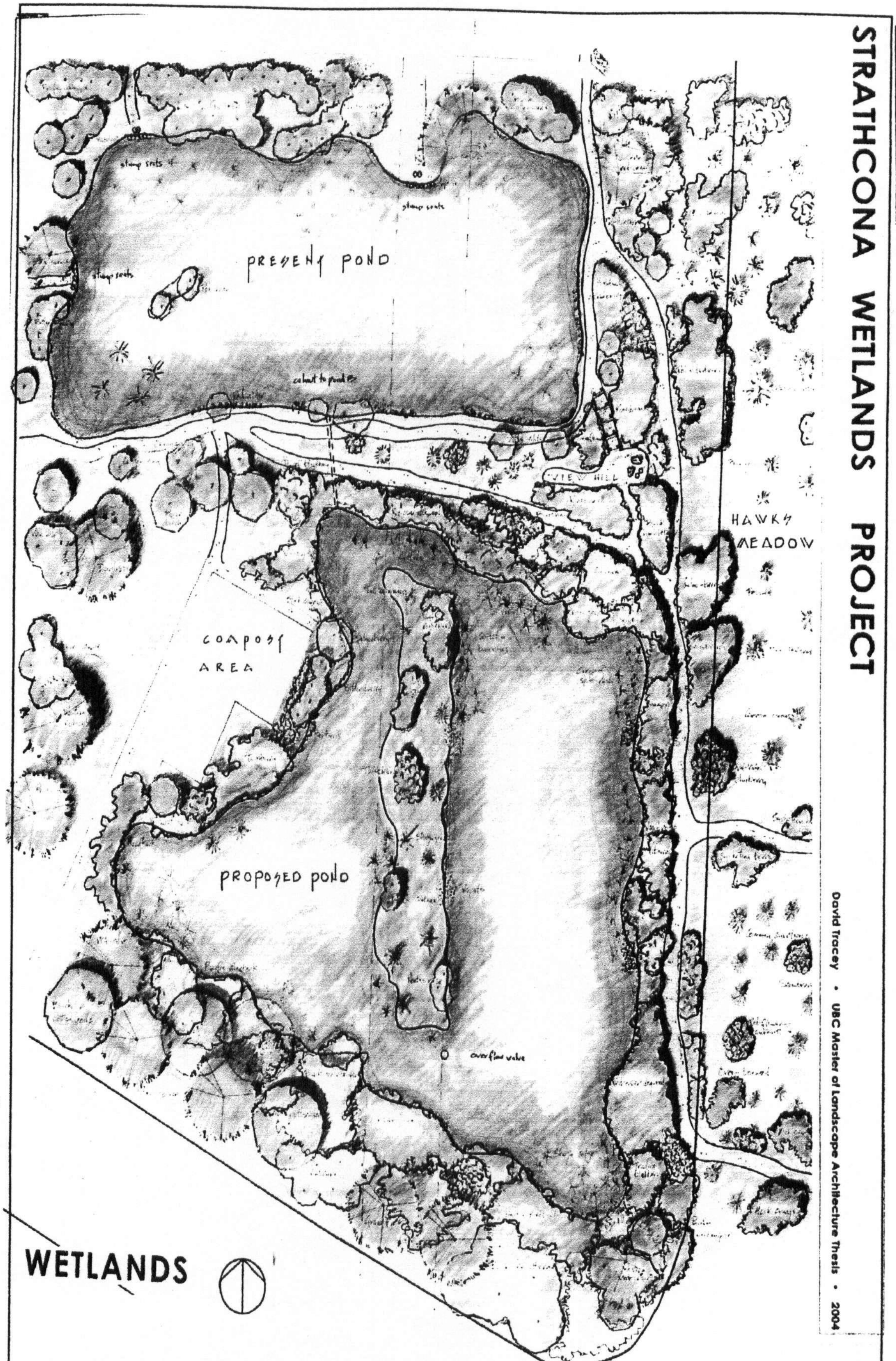


Strathcona/False Creek Ecological Links

Green areas mark current or potential habitat zones in parks, along street greenways and via innovative designs such as greenroofs and wildlife corridors.



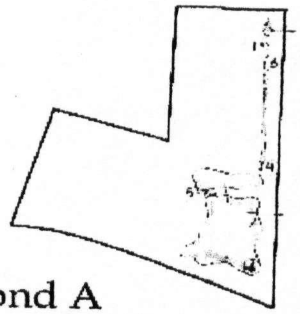
Habitat recreation corridor potential from False Creek to Hastings Park.



not to scale

Conceptual plan of wetland area showing the present (above) and proposed (below) ponds.

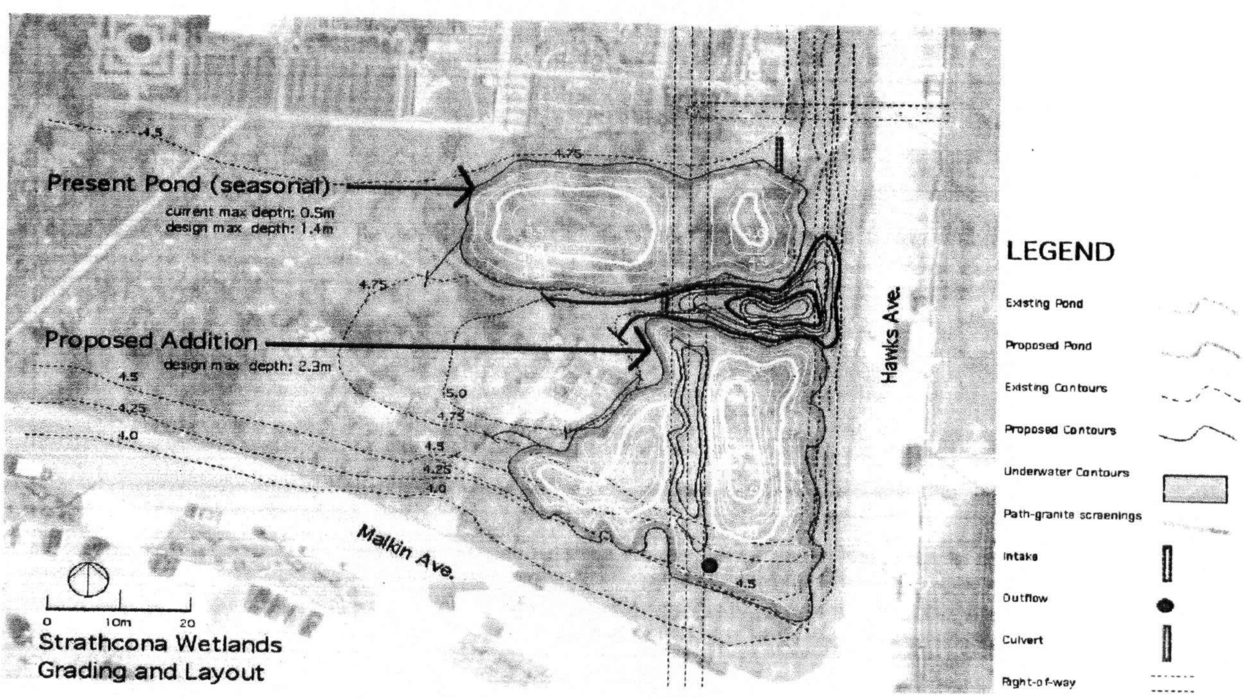
1. Groundwater well
2. Water tank w/ solar pvc panels
3. Reed bed biofiltration



4. Intake to Pond A
5. Culvert to Pond B
6. Overflow to storm sewer

Schematic plan showing water flow from underground aquifer through riparian reed bed area to wetland paonds.

Conceptual layout and grading of wetland area showing two ponds of equal water elevation connected by a culvert with overflow sent to an existing storm swere running under the site.



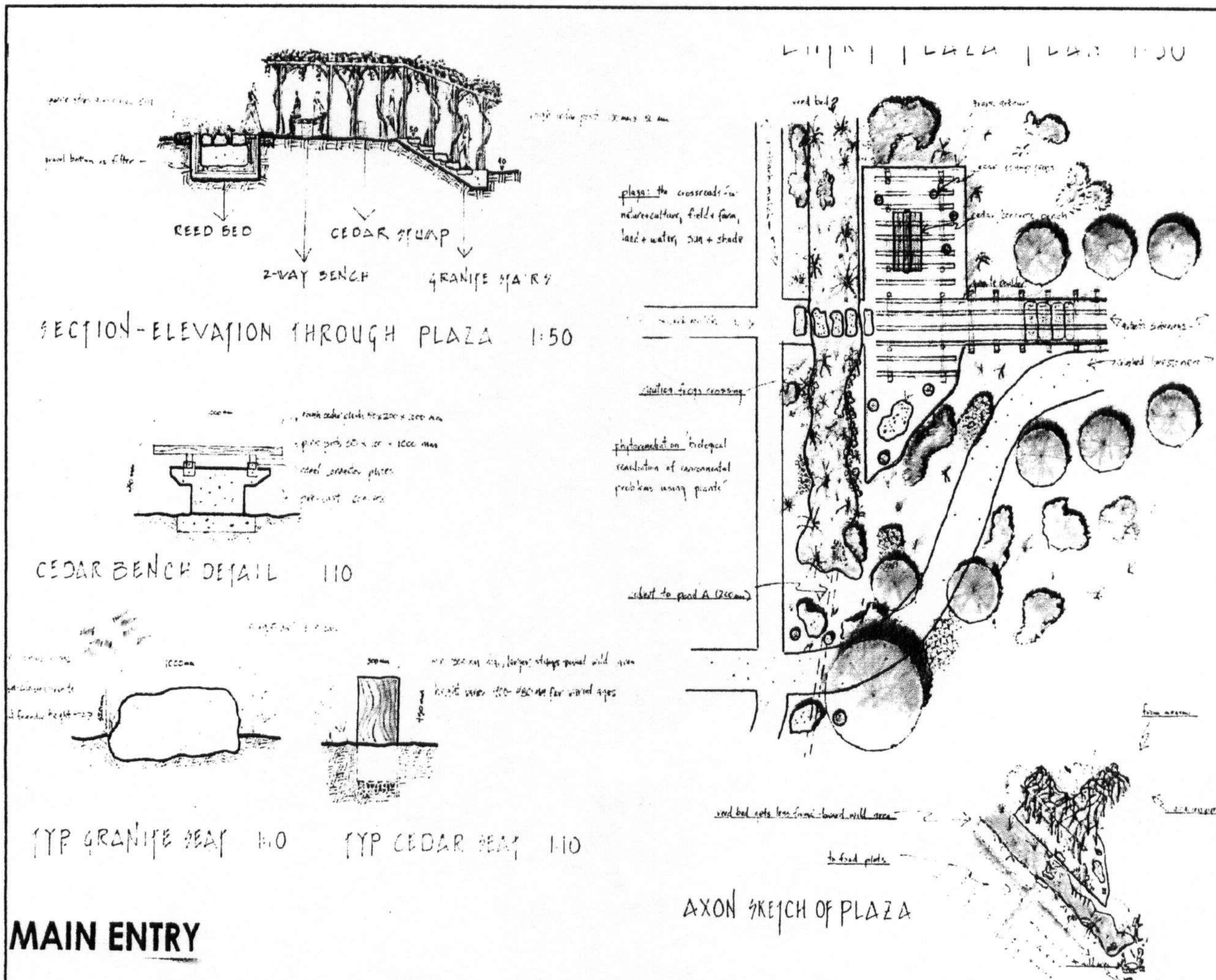
4.3. Society

The Community Gardens site would be opened up functionally and visually to improve access and circulation. Creating a more inviting aspect by improving its perimeter edges and entrances would lead to more visitors at more times, providing the "eyes and ears" to turn areas now used largely for illicit activities into safe and secure spaces welcome to all.

Closing Hawks Avenue to car traffic would diminish some of the auto-derived activities negatively effecting the site such as prostitution and theft. Providing seating on granite boulders and cedar stumps throughout the site at and near entrances will attract more users from the neighbourhood and Strathcona Park.

The new Hawks Meadow and wetland areas will provide well-marked paths to lead visitors throughout the site, but not all circulation would be controlled. While the most sensitive areas such as the perimeter of the new pond would be protected by barrier vegetation, access to other areas would be open to the visitor's own design, allowing personal engagement with the site.

Fig. 19



Views of a proposed entry plaza to enhance access to the Community Gardens and enhance connections to the neighboring Strathcona Park.

4.4 Economy

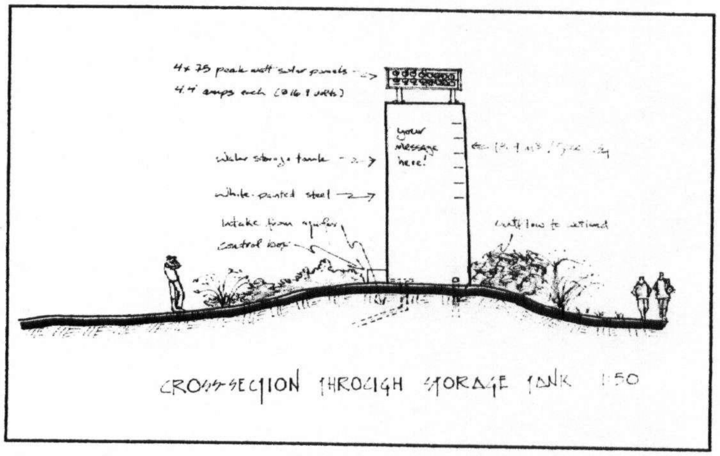
The volunteer-run Community Gardens have a long tradition of self-sufficiency, a foundational belief reflecting the gardens' origin as a citizens' movement to reclaim unused land for the public good. The Gardens have achieved self-sufficiency in electricity by powering its Eco-Pavilion with solar pvc panels and reusing all grey water from the building and refuse from its compost toilet without connections to the standard grid.

This design would further those efforts by replacing typical wetland water losses in summer not with city-supplied potable water but with groundwater pumped with solar energy. If the aquifer proves to hold a suitable amount and quality of water, the simple system could be expanded to include drip-irrigation the entire garden. This would save approximately $1,200 per year at 2004 water rates and allow the garden to get completely off the grid for both power and water.

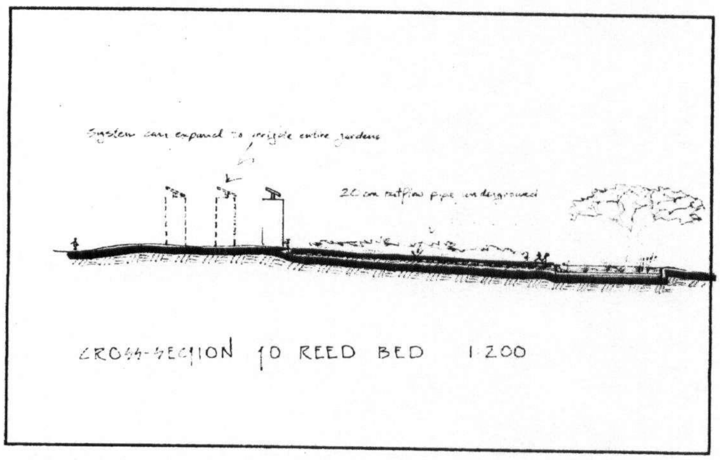
4.4a Water Budget Analysis

A wetland needs water, unless it has a natural inflow to balance losses from evapotranspiration and sub-surface seepage during the typically dry Vancouver summer months.

This natural draw-down of water levels is expected and in many cases desired. Various plant and animal



A conceptual view of the water system using a cylindical steel tank for storage before it is sent to the wetland ponds. Solar pvc panels placed atop the tank would power a submersible pump in the aquifer.



One tank 6 meters high with a 1-meter radius would hold 18.9 cubic meters of water (5,000 USG or 4,157 Imp. gallons). This would supply close to 90 percent of the total garden irrigation and wetland water loss replacement needs for an average summer day. More tanks of varying sizes and shapes could be used to expand capacity.

Fig. 20, 21

species use the transformation from water to marsh to their advantage.

In this case, however, a lack of space overall makes allotting a large portion of the wetland to marsh difficult; human and dog intruders are common where this now happens at the seasonal pond.

Keeping water levels constant year-round would mean replacing typical summer losses.
This could be done using potable city water, which the community gardens now use for irrigation, with the installation of a filtration bed to reduce concentrations of chlorine which could harm more fragile wetland organisms.

However, using city water is not only expensive (the garden's 2003 bill totalled more than $1,800), it also depletes a valuable resource which could become more precious as population growth and climate changes add to demands.

A more ecological solution was explored which would use groundwater from an aquifer beneath the site. A solar-powered pump would be used to lift this water to the surface.

Various experts in hydro-geology were consulted to determine the feasibility of the plan, particularly for the primary question of whether an ample supply of groundwater could be found under the site.

No definitive conclusions could be drawn, although of experts consulted, none thought it a bad idea and most were encouraging. Several thought the city should be supporting projects such as this, if only to ensure that Vancouver has more emergency supplies of drinking water in the event a major disaster (i.e., a big earthquake) damages the supply lines from the Coast Mountains running under the Burrard Inlet.

Estimates were made of the amount of water which would be needed to keep the wetlands permanently wet. Further calculations were done to explore the option of using groundwater to supply all irrigation to the community gardens.

This would benefit the gardens by reducing annual water costs and helping it serve as model of ecological development. It would help the city by reducing water supply needs and offering an important emergency source of water.

Water Requirements

The amount of water needed to support a permanent wetland feature through a typical Vancouver summer was calculated by estimating losses from evapotranspiration.

Pond Water Gain/Loss Estimate Using Average Precipitation/Evaporation Rates

The following calculations are based on Environment Canada data on precipitation and lake evaporation rates from Canadian Climate Normals 1971-2000 reported for Vancouver – UBC: Latitude 49 degrees 15 N. Longitude 123 degrees 15 W. Elev. 76m. Source: http://www.climate.weatheroffice.ec.gc.ca/climate_normals/results_e.html

Precipitation (mm/day):		Evaporation (mm):		Difference (mm):
Mar	121.9	1.3 (daily)	40.3 (monthly)	81.6
Apr	89.6	2.3	69.0	20.6
May	68.3	3.1	96.1	-27.8
Jun	55.5	3.6	108.0	-52.5
Jul	39.3	4.0	124.0	-84.7
Aug	48.1	3.5	108.5	-60.4
Sep	58.6	2.1	63.0	-4.4
Oct	113.3	1.0	31.0	82.3
Nov	196.1	0.6	18.0	178.1

Adding the deficit figures resulted in an estimated precipitation/evaporation water loss from a typical water body in Vancouver from May to September (153 days) of 229.8mm (1.5mm/day).

Area of present pond:	768 sq. meters
Area of additional pond:	1135 sq. meters
Total water surface area:	1,903 sq. meters

1,903 sq. meters x .2298 = 437.3 cubic meters

Total wetland evapotranspiration loss: 437.3 cubic meters

437.3 cubic metres/153 days (water deficit period) = 2.858 cubic day/day.

To meet this requirement with groundwater, the total was converted into U.S. gallons (the standard measuring rate drillers in Canada use, according to Jim Clark of Clark's Drilling Company in Langley), and rated by gallons per minute (a standard flow rate measurement for pumped groundwater).

2.858 cubic meters = 755 U.S. gallons

755 U.S. gallons/day/1440 minutes/day = 0.52 gallons per minute

Flow amount needed to replace evapotranspiration loss: 0.52 USG per minute

In groundwater flow terms, less than a gallon per minute is considered a low requirement (observations from various experts). Provided the aquifer was not surprisingly deep, this could be supplied with a simple pump system powered with solar pvc panels (Dave Malice at PSI Pump Systems Inc. in Abbotsford, B.C., says the solar-powered pumps sold by his firm can easily deliver 5 gallons per minute from as deep as 200 feet. The Kyocera Corporation advertises its SC series pumps as capable of delivering up to 43 gallons per minute with a pumping range from 0-550 feet/167 meters).

If the system were solar powered, it would of course not pump without sunshine. To generalize the requirement and make calculations easier, an average of 5 hours peak energy supply per day was used, based on the following Environment Canada figures for average peak hours of sunshine at its UBC recording station:

Vancouver peak hours of sunshine in summer:

Mar	3.66
Apr	4.49
May	5.24
Jun	5.1
Jul	5.73
Aug	5.19
Sep	4.88
Oct	3.01

At 5 hours per day, the flow rate needed to meet the wetland evapotranspiration losses would be:

755 gallons/300 minutes per day = 2.51 U.S. gallons per minute

Flow rate needed for solar-system lined wetland: 2.51 USG per minute

This estimate could be used for ponds lined with an impermeable barrier such as poly-vinyl or a virtually sealed surface such as imported bentonite clay.

If these options are rejected (for cost or other reasons), and the wetlands are instead lined with the clay-based soil now found on the site, a natural amount of seepage could be expected.

The total draw-down in this case could be estimated at 2 feet, using a figure reported by Steve Wong at the Vancouver Park Board for the dry summer of 2003 at the Hastings Park Sanctuary (which uses the naturally clay-based soil of the site topped with 1 foot of growing medium).

2 feet = 609.6mm

1,093 sq meters x .609m = 665.6 cubic meters

Total unlined wetland water loss (including seepage): 665.6 cubic meters

665.6 cubic metres/153 days = 4.35 cubic meters per day

4.35 cubic meters = 1,149 U.S. gallons/day

1,1149/1440 minutes = 0.8 gallons per minute

Flow rate (24-hour) needed to replace loss in unlined wetland: 0.8 gallons/minute

If the system were solar-powered, with an average 5 hours of peak energy supply per day, this figure would be calculated as follows:

1,149 gallons/300 minutes per day = 3.83 USG per minute

Flow rate needed for solar-system unlined wetland: 3.83 U.S. gallons per minute

Calculations were then made to determine whether solar-pumped groundwater could supply the entire community gardens as well.

Total Strathcona Community Garden Water Use
(based on '02/'03 city billing records):

2003 Apr – Dec water use: 894 units (1 unit = 2.84 cubic meters)
894 x 2.84 = (2,542 cubic meters)

2002 Apr-Dec total water use: 958 units
958 x 2.84 = (2,721 cubic meters)

Average total garden water use per year: 2,631 cubic meters

2,631cubic meters = 695,037 U.S. gallons

695,037/153 days = 4,543 U.S. gallons per day

4,543 USG/1,440 min per day = 3.15 gallons per minute

Flow rate (24-hour) needed for total garden irrigation: 3.15 gallons per minute

If solar pumps worked 5 hours per day this figure would be:

4,543 USG/300 min per day = 15.1 USG per minute

Flow rate needed for solar-system garden irrigation: 15.1 USG per minute

Estimated Garden + Wetland Total Water Requirements:

2,631 cubic meters + 665.6 cubic meters (unlined wetland) = 3296.5 cubic meters

Total garden and wetland water requirement: 3,296 cubic meters

3,296/153 days = 21.5 cubic meters per day

Average daily water requirement: 21.5 cubic meters

21.5 cubic meters = 5,680 U.S. gallons (4,729 Imperial gallons)

5,680 U.S. gallons/1440 minutes = 3.94 gallons per minute

Flow needed for total garden/wetland use: 3.94 gallons/minute

If solar pumps worked 5 hours per day this figure would be:

5,680 USG/300 min per day = 18.9 USG per day

Flow rate needed for solar-system garden and wetland: 18.9 USG per minute

Note: This figure is averaged over the total 153 days of water deficit conditions. It does not account for periods within that time when rainfall would reduce demand, nor for times of extraordinary demand (i.e. a hot and sunny Sunday when many gardeners would likely arrive to water their plots).

Estimated Reservoir Requirement for Pumped Groundwater:

1-Day Reserve: 21.5 cubic meters (5,679 U.S gallons) (4,729 Cdn gallons)
3-Day Reserve: 64.5 cubic meters (17,039 U.S. gallons)(14,188 Cdn gallons)
7-Day Reserve: 150.5 cubic meters (39,758 U.S. gallons)(33,105 Cdn gallons)

Cost analysis:

Vancouver currently charges 46.3 cents per cubic meter

Present garden average use: 2,631 cubic meters

2,631 cubic meters x 46.3 cents per cubic meter = $1,218.15

Present garden average water charges: $1,218/year

Proposed (unlined) wetland additional use: 665.6 cubic meters

665.6 cubic meters x 46.3 cents per cubic meter = $308.17

Wetland water replacement cost: $308/year

$1,218 + 308.17 = $1,526

Estimated total garden irrigation + wetland water costs: $1,526/year

Estimated equipment costs:

Well drilling (6" x 50' w/ 6+GPM capacity)	$ 4,190
Solar PVC panel and pump system	$10,000
Wetland water replacement solar system	$14,190
(Estimated additional cost for solar system drip irrigation	$22,000)

Chapter Five

5. 1 Design Evaluation Criteria Results

An evaluation of the proposed intervention's capacity to fulfil the criteria listed earlier could be as follows:

Ecological Criteria: Does it improve the ecological functioning of the site to enhance biological diversity?

1.a: Greater use of the site by a larger variety and number of wildlife species, particularly native species.

1.b: Increased amount and variety of native plants able to thrive naturally in the local conditions.

1.c: An integrated and naturally evolving eco-system without the need for undue maintenance or alteration.

A positive result to the first two questions can be anticipated based on the successful enhancement and/or introduction of improved habitat spaces relying on native plantings in naturalized settings to provide food and shelter to more wildlife species.

The third question would be harder to answer definitively at this preliminary stage. A variety of complex factors are involved in creating any "natural" ecological setting, particularly in this case where a permanent wetland is proposed in an area which does not presently support one on its own hydrological merits. While it is hoped that all would go according to plan and grow accordingly, it should not be considered a surprise if unforeseen circumstances arose which called for revisions, alterations or unforeseen maintenance.

Social Criteria: Does it contribute to the well-being of people?

2.a: An increased use of the site by a greater variety and number of people.

2.b: A decrease (or elimination) of anti-social activity, particularly crime.

2.c: An increase in the opportunities for nature-based activities.

A positive result can be predicted here as well, based on anecdotal information from the redeveloped Strathcona Park site where increasing numbers of visitors are being seen. More visitors, together with clearer entry points and better visual approaches throughout could be expected to help reduce the types of illicit activities now occurring which need hiding places. Reclaiming these spaces for all types of people of all ages, and turning them into naturalized "wilderness" areas in which options for nature-based experiences abound, would lead to a positive answer to the third question.

Economic/Practical Criteria: Is it feasible?

Yes, if it is:

3.a: Simple and affordable enough to design and build for a variety of groups, particularly those in inner-city areas which may face financial constraints, perhaps through eligibility for grants to cover construction costs

3.b: Able to run smoothly without costly charges for regular operation, maintenance or repair.

3.c: Possible to complete within a budget proportionate to the value received in long-term benefits to the area.

3.d: Eligible for grants to support cost of construction.

3.e: Eligible for approval by government authority.

While predictions on the ecological and social effects of the design can be reasonably derived from examining its physical components, actual results may vary according to conditions that go beyond the site itself. These include economic and political factors over which those implementing the design, the Community Garden managers, could have little control. Costs for solar panel power systems could rise, for example, changing the economic logic of the proposal. Or city authorities could decide that what the site really needs is not more habitat, but better parking.

The clearest test of the design's capacity to succeed and serve as an ecological model elsewhere would come through its implementation. As of this writing (April 2004) the proposal is still being considered by city authorities and several grant-providing institutions.

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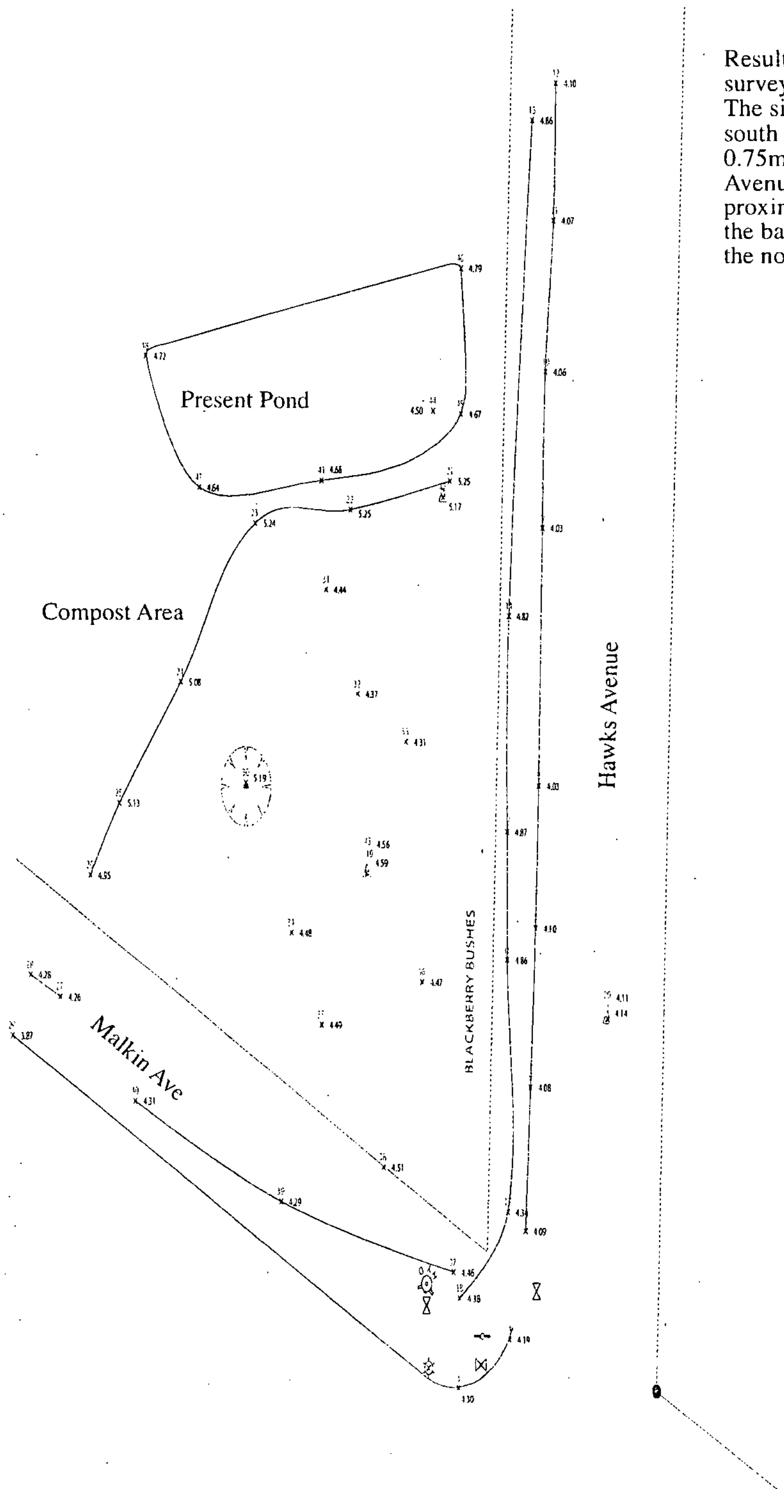
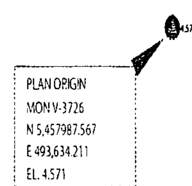
Appendix A: Topographic Survey of Wild Habitat Area

Results of the topographical survey of the wild habitat area. The site is gently sloped to the south with an approximately 0.75m berm along Hawks Avenue to the east and an approximately 0.5m rise marking the bank of the present pond to the north.





^not to scale

Fig. 22