PART V: THE SITE DESIGN MANUAL

The Design Manual is based upon practical case studies, including the Headwaters Project and other local examples of alternative development from the Greater Vancouver Regional District and other areas of North America. The manual explains innovative strategies for sustainable community design. It is intended to be used by citizens, developers, elected officials and those who plan and build new homes and communities. The manual "reintegrates" all of the pieces of the sustainable urban region, and is organized into three parts:

Part One: A review of current development trends and their effects on the interrelated components of regional landscapes (water, air and people).

Part Two: A compendium of design guidelines based upon four tenets of sustainability (green infrastructure, social infrastructure, movement and costs) and on four scales of urban design (district, corridor, block and parcel).

Part Three: Conclusions and a discussion of how the manual supports parallel efforts taking place at various levels and a suggested research framework for continuing the progress towards more sustainable communities and regions.

Following are several sample pages from the Design Manual, namely those dealing with East Clayton.

IMPLEMENTATION CHARRETTE

An implementation charrette is perhaps the most complex and time intensive charrette of the four charrette types we present. The East Clayton charrette was desinged to achieve institutional and regulatory change. This process was set in motion when the Surrey City Council authorized their planning department to use seven principles of sustainable communities as the basis for developing the new community of East Clayton and to use the process of the charrette to open up the planning process to involve designers and a diverse group of stakeholders.

East Clayton Charrette

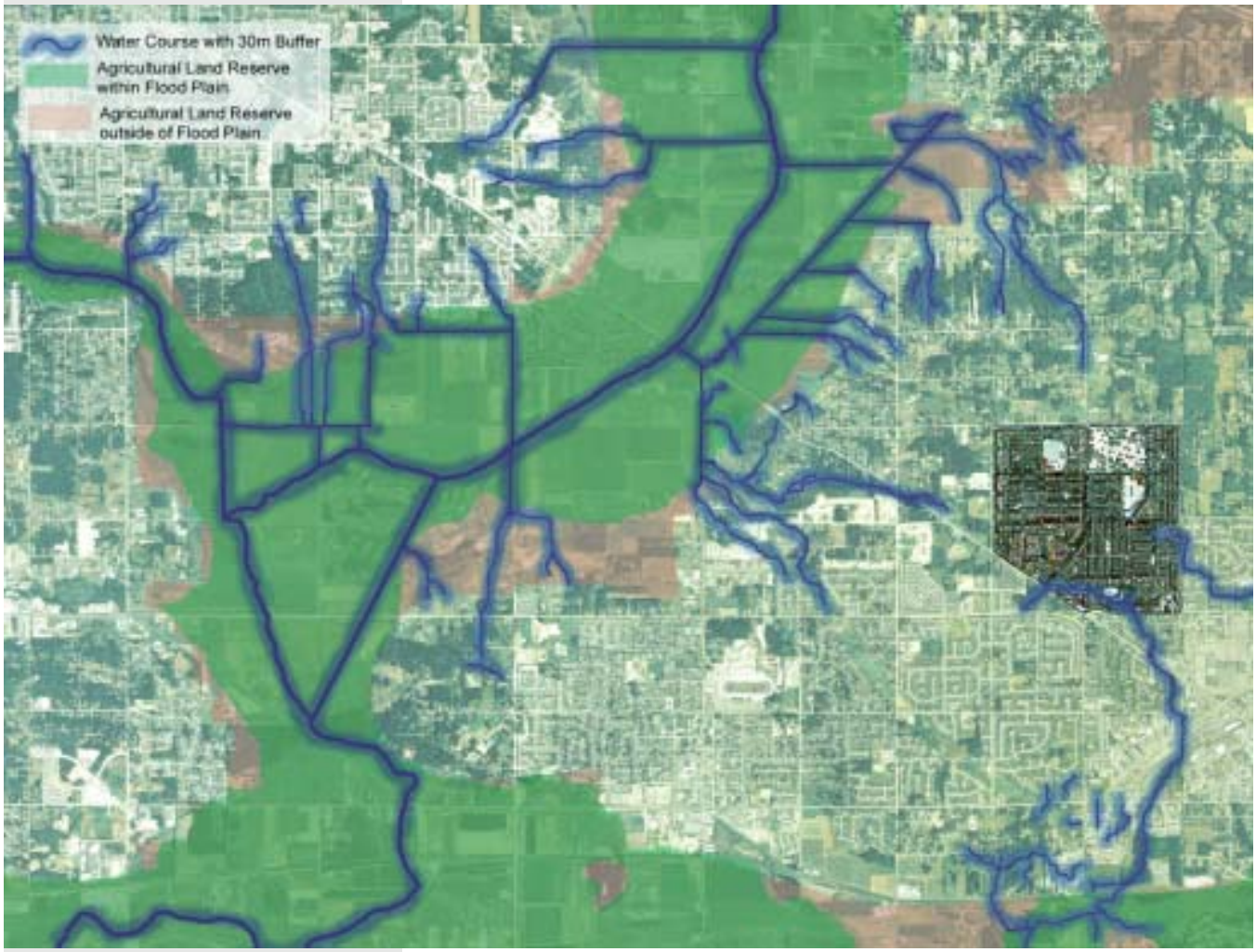
Charrette Dates
November, 1999 and February 2000

Charrette Client
City of Surrey

Charrette Type
Implementation

Charrette Participants

City of Surrey:
How Yin Leung, Wendy Whelen, Fransisco Molina (Planning); Eric Emery (Engineering)
Jean Lamontagne (Parks, Recreation and Culture)
John Strandt (Fire); Gerry McKinnon and Dale Hadden (Operations)
Department of Fisheries and Oceans:
Barry Chillibeck
Ministry of Environment, Lands, and Parks:
Erin Stoddard
BC Hydro:
Allan Grant
East Clayton Community:
Norman Alexander, Amar Bains, Elsa Watts (Citizen Advisory Committee)
Developer:
John Turner (Progressive Construction)
Engineering Consultants: Sudu Vatagotagombura, Jane Farquason (Reid Crowther Ltd.)
Designers:
Bob Worden, Doug Ramsay (Ramsay Worden Architects Ltd)
Stacy Moriarty (Moriarty/Condon Ltd.)
Patrick Condon (UBC James Taylor Chair in Landscape and Liveable Environments)
Facilitators:
John Blakney (Pacific Resources Centre Ltd.)
Jennifer Crawford (Pacific Resources Centre Ltd.)
Environmental Consultant:
Helmut Urhan (Tera Planning)



Above
The 250 hectare East Clayton site is located on the eastern border of Surrey, geographically the largest and the fastest growing municipality in the Lower Mainland Region. Situated upland of the region's Agricultural Land Reserve (shaded area), the site also drains into two of the region's most significant water bodies (the Serpentine and the Nicomekl River).

The East Clayton Neighbourhood Concept Plan, and the charrette process from which it was produced, is a crucial part of the larger Headwaters Project. The Headwaters Project was initiated in January 1999 by the City of Surrey, the UBC Chair in Landscape and Liveable Environments, and the Pacific Resources Centre, with support from a host of government and related agencies.[1] Building on the momentum of previous joint projects in the Municipality of Surrey, notably the Surrey Design Charrette (1995)[2] and the Alternative Development Standards Workshop (1997),[3] this partnership convened with the goal of building a model community that would apply sustainable planning principles and alternative development standards "on the ground." The result would be a replicable model of how to develop more sustainable communities throughout British Columbia's Lower Mainland region and (potentially) beyond. The first and most important component of the Headwaters Project is the East Clayton Neighbourhood Concept Plan (NCP). The NCP was developed over a one-and-a-half-year period through an integrated and consultative design process that involved over 150 people in fourteen different constituency groups in a process that featured over a dozen information-sharing workshops, public open houses, and a unique four-day design charrette. This process was set in motion in 1998 when Surrey's city council endorsed seven core principles to guide the NCP.

These seven principles, as approved by Surrey City Council, are:

1. *Increase density and conserve energy by designing compact walkable neighbourhoods. This will encourage pedestrian activities where basic services (e.g., schools, parks, transit, shops, etc.) are within a five- to six-minute walk of homes.*
2. *Provide different dwelling types (a mix of housing types, including a broad range of densities from single-family homes to apartment buildings) in the same neighbourhood and even on the same street.*
3. *Communities are designed for people; therefore, ensure that all dwellings present a friendly face to the street and, thus, promote social interaction.*
4. *Ensure that car storage and services are handled at the rear of dwellings.*
5. *Provide an interconnected street network, in a grid or modified grid pattern, to ensure a variety of itineraries and to disperse traffic congestion; and provide public transit to connect East Clayton with the surrounding region.*
6. *Provide narrow streets shaded by rows of trees in order to save costs and to provide a greener, friendlier environment.*
7. *Preserve the natural environment and promote natural drainage systems (in which stormwater is held on the surface and permitted to seep naturally into the ground).* (See pgs. 46-47 for a description of how these principles were incorporated into the East Clayton NCP.)

The 250 hectare East Clayton site is located on the eastern border of Surrey, abutting the northwestern edge of Langley Township. The site drains into the broad Serpentine River and Nicomekl River flood plains, which are located to the west and south, respectively. These sensitive flood plains are protected from urban encroachment by their inclusion in the Agricultural Land Reserve and are designated as protected "green zone" lands in the GVRD's *Livable Region Strategic Plan*. Given these conditions, it was especially important that the development of East Clayton should neither cause increased damage to the streams that drain the site nor increase the amount of water conveyed by those streams to flood-prone farms in the flood plain below. At the same time, the plan would need to help meet city- and region-wide demand for various types of housing, address the need for linking additional housing to local employment opportunities, and provide effective transportation and servicing links with existing urban centres (such as Langley and Cloverdale).

Guiding Policy

The seven principles that guided the NCP were strongly grounded in the following local and regional policies.

Growth Strategies Amendment Act (1995)

The Provincial Growth Strategies Statutes Amendment Act requires that all municipalities show, through a regional context statement, how their OCP is consistent with their regional growth strategy (in this case, the *Liveable Region Strategic Plan*). Accordingly, the City of Surrey recognized that it would need to accommodate growth both within the central urban core of Surrey Central as well as within other emerging urban areas of the municipality.

Livable Region Strategic Plan (1995)

The strategic plan is formulated to address the following four broad goals: (1) protecting the green zone, (2) building complete communities, (3) achieving a compact metropolitan region, and (4) increasing transportation choice. Of particular concern for this site were the protection of the green zone and the creation of a complete, compact community (development of the latter would measurably reduce the negative impacts on the former and its associated aquatic systems).

Surrey Official Community Plan (1996)

The OCP for Surrey "promotes planned community development – bringing together residents, business and city resources to guide the location and form of growth toward long term city and regional goals for complete and sustainable communities."[4] Under this broad mandate, the OCP identified East Clayton as "urban," meaning that the city would eventually serve the area with the urban infrastructure (i.e., water, sewer, roads) necessary to support urban densities (of at least six dwelling units per acre) and to supply employment opportunities for people who will live in the community.

Clayton General Land-Use Plan (1998)

The Clayton General Land-Use Plan contains the planning and implementation framework for the larger Clayton district and provides the context for the development of individual neighbourhoods within it.[5] More than half of the Clayton district was designated as "suburban," meaning that densities were to be at or below one unit per acre. East Clayton, the southeastern quadrant of the larger Clayton district, was designated urban and was to be the first portion of Clayton to be developed. The vision provided by the Clayton General Land-Use Plan includes objectives for developing a complete community – one that respects and maintains aspects of its rural character, that provides jobs close to residents, that provides a rich and varied natural environment for both human and wildlife use, and that manages change both incrementally and efficiently.

With these policies as a context, the East Clayton Land-Use Plan was developed with the following goal in mind:

To build a community in the East Clayton area of Surrey that meets local, provincial,

and federal policy objectives for sustainable development.[6]

Charrette Process

Planning for a more sustainable East Clayton community demanded an integrated planning method, and a multi-party approach to building policy and developing acceptable standards of commitment among diverse constituencies. The charrette method was chosen as the ideal format for meeting these demands. The charrette would build confidence in new ideas, provide time for reflection, and build acceptance for alternative ways of developing a community - all within a relatively short period of time.

Design professionals served to facilitate, not to lead, the charrette event itself. Since the Headwaters Project was designed to produce a replicable model for circumventing institutional barriers, it was important that those individuals typically vested with the authority to guide development be provided with new means to achieve this.

Rules of the Game

The following simple guidelines offered insight, structure, and a level playing field to all those involved in the process:

1. *Build capacity for integration through shared awareness and determination to act jointly.*
2. *Involve early on (preferably at the beginning) those people, agencies, and organizations that can influence plan policy and development standards (including their implementation).*
3. *Share information equally.*
4. *Share resources across mandates for mutual gain.*
5. *Build confidence in the process, in plan policies, and in alternative development standards.*
6. *Ensure the direct involvement of municipal staff.*
7. *Gain access to the necessary technical expertise.*
8. *Deal with issues efficiently.*

Design Brief

The most crucial part of initiating any implementation charrette process is writing the design instructions. These instructions are referred to as a *design brief* and must show stakeholder consensus. The Headwaters Project team held a series of workshops with various stakeholder groups to forge this consensus. These stakeholder groups were of several types, each constituting a "community of interest." They were: City of Surrey Planning, Engineering, Parks and Operations/Maintenance Departments; the Ministry of Agriculture; the Clayton Citizen's Advisory Committee; developers and builders; the Department of Fisheries and Oceans; the BC Ministry of Environment, Lands and Parks; the Surrey School Board; Translink; BC Hydro, fire, and safety; and the police. Each of these groups identified and/or suggested design and performance targets that, from its perspective, were the most important. The brief organized these disparate performance standards into a number of general objectives under the categories of: (1) Land and Water, (2) Community, and (3) Buildings and Energy.

1. Land and Water: Celebrate and protect the ecological performance of native habitats, hydrology, and landforms, and ensure that storm drainage systems do not alter stream systems.

- *Protect and enhance all environmentally sensitive and/or degraded areas (wetlands, watercourses, ravines, watersheds, ground water recharge areas, critical wildlife habitat areas, areas with fragile or unstable soils) maintaining and/or enhancing the ecological performance of native habitats, hydrology, and landforms.*
- *Preserve, create, and link urban and rural open space, including parks and recreation areas. Maintain and enhance public access to streams, where environmentally sustainable.*
- *Identify and enhance special recreation opportunities within the site (i.e., streams, topographic features, natural areas etc.).*
- *Protect natural habitat and improve stream flows and water quality to contribute to fish protection (as consistent with federal and provincial fish protection legislation).*
- *Create an integrated and linked system of green and open spaces that serves multiple functions.*
- *Integrate an urban forestry strategy with a water conveyance strategy. Incorporate natural drainage infrastructure that is compatible with fire protection systems.*

2. Community: Provide housing that is affordable to a range of incomes within neighbour-hoods that connect residents to their destinations in efficient, people-friendly ways.

- ***Housing Equity:*** *Provide a balance of housing types so that houses meet the needs of a range of ages and lifestyles and are affordable to groups and individuals within a wide range of incomes. At least 20% of the housing shall be for persons with family incomes in the bottom third of those region-wide.*
- ***Density and Mixed Housing:*** *Supply higher-density housing in areas close to commercial areas. Mixed housing and densities are to be blended and balanced, co-existing with extant uses (e.g., built residential areas, agricultural areas, commercial/industrial) through establishing compatible densities, housing types, lot sizes, and effective buffering.*
- ***Special Needs Housing:*** *Provide adequate special needs housing (seniors, disabled, family crisis victims, etc.).*
- ***Safety:*** *Employ proven methods of enhancing community safety and sociability.*
- ***Public Safety and Fire Systems:*** *Ensure fire equipment can be manoeuvred effectively through the streets. Set definitive service boundary for the provision of fire protection and ambulatory services.*
- ***Jobs:*** *Provide workspace in commercial, office, or light industrial facilities for the working population that are also consistent to targets set out in the Clayton General Land Use Plan.*
- ***Schools:*** *Locate schools away from major transportation corridors, within five-minute walking distances from residential units, and in quieter neighborhoods.*
- ***Integration of Land Uses:*** *Create a mix of building and land uses, integrating residences, work, shopping, and services (community, professional, commercial, and institutional).*
- ***Lane system:*** *Ensure municipal services and utility work crews can gain access to lanes by using appropriate width and surface materials. Explore the use of various permeable low-cost materials for surfacing lanes.*

3. Buildings and Energy: Maximize opportunities to reduce on-site and off-site energy use and demand.

- ***Solar Heat:*** *Reduce building energy requirements by providing optimal solar orientation for active and passive solar heating for hot water and for daylighting.*
- ***Energy Infrastructure:*** *Aim for the efficient use of utility infrastructure by considering utility system design as part of the community design. Provide as appropriate, or maintain flexibility so as to provide in the future, energy service from alternative technologies such as community-scale generating systems, district heating, and co-generation.*
- ***Design with Climate:*** *Enhance community microclimate through design response to wind, sun, vegetation, and precipitation.*

- ***Auto Trip Reduction:*** *Reduce number and length of commuter and daily-use automobile trips.*
  Auto Alternatives: *Provide safe, comfortable, barrier-free and direct pedestrian access to transit routes. Provide a multimodal community route system that gives walking and biking priority over auto travel.*

Conclusion and Lessons Learned

The lion's share of the guidelines included in the East Clayton Neighbourhood Concept Plan were developed at the four day East Clayton Charrette. The draft NCP was presented to the public in July 1999 and the land-use plan was approved in November 1999. The second phase of the Headwaters Project, now in its initial stages, involves, through a continuation of the design table structure, the coordination and design of the first development project based on the standards and guidelines contained in the NCP.

Key lessons from the East Clayton implementation charrette are:

- Implementation charrettes have the huge advantage of involving all appropriate parties in determining the exact future design for a community. All parties take ownership of the plan and, ideally, are proud of it.
- Opposition is dealt with as part of the design process, not afterwards (when it is often too late).
- The charrette team should stay together as long as possible. Difficulties and miscommunication occurs when participants go their separate ways while issues are still outstanding.
- Implementation charrettes often produce more conservative results than do visioning charrettes. This is because inevitable compromises occur as an integral part of the design process rather than during implementation of the master plan.
- The design brief is crucial to the success of the charrette as it establishes the "rules of the game," to which all parties agree in advance.
- Participants must have sufficient authority to "negotiate on the fly" and to stand behind their decisions once the projects are implemented.
- The process takes many hours and can be costly. Funds ordinarily directed to creating standard neighbourhood area plans can and should be redirected into this kind of process.

Notes:

[1]The Headwaters Project is supported by: the Affordability and Choice Today Program (Federation of Canadian Municipalities), the Canada Mortgage and Housing Corporation, the BC Agricultural Investment Program, the BC Ministry of Agriculture and Food, the BC Ministry of Municipal Affairs, Environment Canada, Fisheries and Oceans Canada, the Greater Vancouver Regional District, and the Real Estate Foundation of BC.

[2] Patrick Condon, *Sustainable Urban Landscapes: The Surrey Design Charrette* (Vancouver: UBC James Taylor Chair in Landscape and Liveable Environments, 1997).

[3]See Patrick Condon and Jacqueline Teed, *Alternative Development Standards for Sustainable Communities Workbook, Charrette* (Vancouver: UBC James Taylor Chair in Landscape and Liveable Environments, 1998).

[4]Greater Vancouver Regional District, *Liveable Region Strategic Plan* (Burnaby, BC: Greater Vancouver Regional District, 1995).

[5]City of Surrey Department of Planning and Development, City of Surrey Official Community Plan (Surrey, BC: City of Surrey, 1999).

[6]UBC James Taylor Chair in Landscape and Liveable Environments and Pacific Resources Centre, *East Clayton Design Brief* (Vancouver, BC: UBC James Taylor Chair in Landscape and Liveable Environments, 1999).

The Charrette Design Table
The design table structure for the charrette involved everyone with an interest in the East Clayton development process. Interests such as a landowner's concern over land values, a developer's hopes for a fair return on a residential development, environmentalist's desire for quality streams and a city's fear concerning its ability to cost-effectively maintain what is built, were only some of these concerns. The charrette design table structure ensured fair representation of these interests.

A Draft Land Use Plan
Guided by the charrette design brief, the design table developed the first iteration of the East Clayton Land Use Plan shown at left in four days. In these four days, the design table made crucial decisions regarding how the community would function as a sustainable unit in the larger Clayton district. Decisions regarding the site's ecological infrastructure, roads and circulation, housing densities, employment centres and community services were negotiated "on the fly".

Public buy-in
The NCP process was deliberately designed to promote awareness of the principles and concepts of a more sustainable urban community, to reinforce acceptable solutions at each stage, and to generate an acceptable plan. In May, 1999, the draft land use plan was presented at a public open house. This gave citizens of East Clayton and its envrions an opportunity to see how the principles were embodied in the plan. It also allowed those involved to measure the level of constituent buy-in. Comment sheets indicated a high level of public acceptance and allowed the process to move forward to refining the draft plan for approval.

east clayton

Outlined below are the seven principles approved by Surrey City Council to guide the NCP, accompanied by a description of how each is represented in the Land Use Plan. The NCP supports enough of a variety of land uses and residential/community types to maximize affordability, sociability, and availability of commercial services within easy walking distance for the proposed population of approximately 13,000 persons. Envisioned as a complete, mixed-use community, East Clayton is designed to promote social cohesion, local economic opportunities, and environmental stewardship while providing equitable access to housing and jobs and reducing dependence on the automobile.

1

Conserve land and energy by designing compact walkable neighbourhoods. This will encourage pedestrian activities where basic services (e.g., schools, parks, transit, shops, etc.) are within a five- to six-minute walk of their homes.
Achieving a pedestrian-oriented neighbourhood requires that homes be within a walkable distance of shops and services and that streets be interconnected to provide the widest possible choices for reaching nearby destinations. Accordingly, residential neighbourhoods are to be structured around a fine-grained modified grid of streets and lanes, with block dimensions averaging 160 metres (525 feet) by 80 metres (250 feet). They are to be considered both public corridors and neighbourhood amenities and are to accommodate automobile, pedestrian, and bicycle traffic while ensuring easy access to local destinations.

2

Drawing credit: Bob Worden, Ramsay Worden Architects, Ltd.

Provide different dwelling types (a mix of housing types, including a broad range of densities from single-family homes to apartment buildings) in the same neighbourhood and even on the same street.
The plan accommodates a wide variety of household types and tenures. A diverse and socially cohesive neighbourhood for the community population of approximately 13,000 persons is the intended result. The plan promotes integration and symbiosis between different family types and ages as a way of strengthening the larger community. Creative and economic housing options will be encouraged, such as single-family homes with a second dwelling unit available to provide a "mortgage-aid" to young families, while also serving those individuals and families in need of affordable housing.

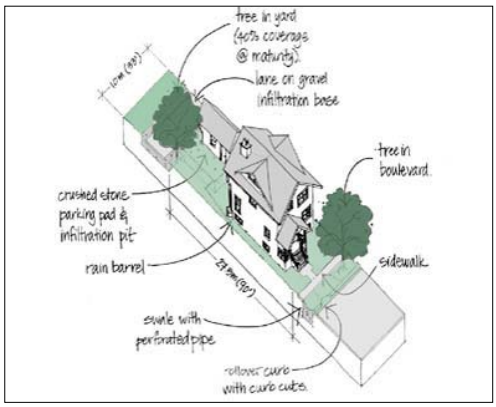
3

Drawing credit: Bob Worden, Ramsay Worden Architects, Ltd.

Communities are designed for people; therefore, all dwellings should present a friendly face to the street in order to promote social interaction.
Blocks are to be proportioned to create a fine-grained, interconnected network of streets; to reduce congestion; and to allow as many homes as possible to front directly onto public streets. Dwellings are situated closer to streets, thereby ensuring more "eyes on the street" and creating a larger backyard area for private outdoor space. Front yards will have buffers that ensure privacy and clearly distinguish between private and public space. Street trees, boulevard infiltration devices, and on-street parking will create a pleasant envelope for pedestrians and provide a buffer from passing traffic.

4

Ensure that car storage and services are handled at rear of dwellings.
The existing site conditions (i.e., topography, vegetation, road network, and parcel configuration) determined the proposed community structure and lot sizes for East Clayton. Narrow lots demand lanes so as to prevent building fronts from being consumed by garages, front yards from being consumed by concrete, and residents from being closed off from contact with activities on the street by the barrier of the garage. Lanes allow cars to gain access to units from behind, resulting in a reduct-ion of the required frontyard setback and an increase in useable backyard space. A small portion of the plan includes shallower blocks that have wider driveway access lots with no lanes.

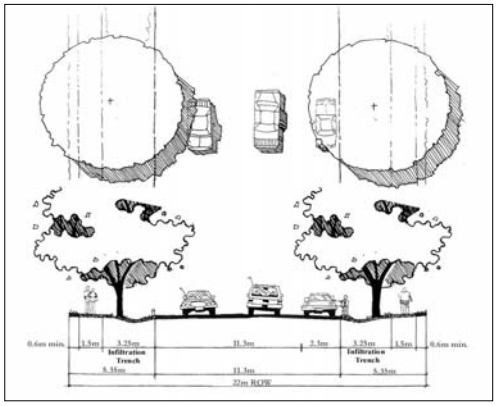


5

Provide an interconnected street network, in a grid or modified grid pattern, to ensure a variety of itineraries and to disperse traffic congestion; and provide public transit to connect East Clayton with the surrounding region.
The organization of roads, blocks, parks, parkways and riparian areas responds to the site's topography and the location of its sub-watersheds. The street network is organized around a four-part hierarchy of streets, which includes arterials, collectors, local streets, and lanes.

6

Provide narrow streets shaded by rows of trees in order to save costs and to provide a greener, friendlier environment.
Paved street widths for local and collector streets range from 6 metres to 11.3 metres. Rights-of-way for these streets range from between 17 metres (56 feet) and 22 metres (72 feet), depending on the specific infrastructure and servicing and amenity requirements (i.e., drainage, traffic volume, and urban forestry) of each individual corridor.

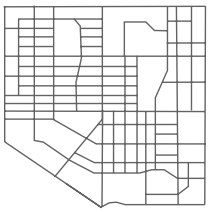


7

Preserve the natural environment and promote natural drainage systems (in which storm water is held on the surface and permitted to seep naturally into the ground).
The backbone of the plan's ecological infrastructure is its linked system of streets and open spaces, which includes local streets, major and minor parks, schools, riparian protection areas, tree preservation areas, neighbourhood parks, and buffers. This system will have many beneficial functions. It will simultaneously satisfy social, recreational, and educational demands while meeting important ecological goals (such as stream protection, stormwater management, and habitat preservation).

Drawing credit: Bill Wenk

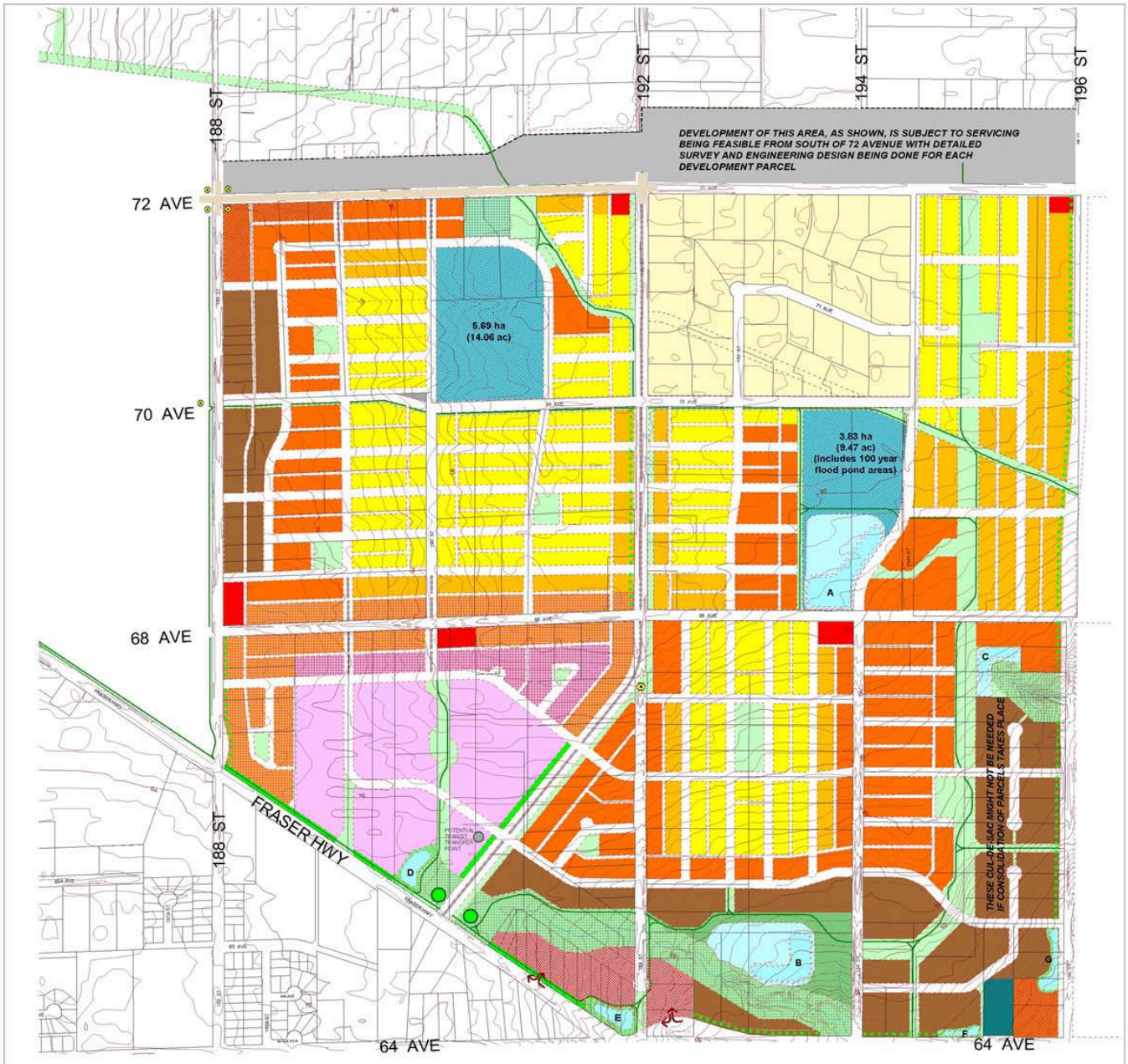
Illustrative Plan
east clayton



East Clayton Neighbourhood Concept Plan

The charrette team collaboratively produced the plan shown on these pages. They hoped that the community envisioned would ensure the protection of the East Clayton environment while supplying a variety of dwelling types at a price that average Lower Mainland families could afford. The plan calls for the production of approximately 4,500 homes, in forms ranging from single family detached, semi-detached, fee-simple row-house; coach houses; and apartments. These homes will accommodate 13,000 new residents at densities averaging twenty-five units per hectare, or ten units per acre (inclusive of park, commercial, and business park lands as well as land consumed by street rights-of-way). Land uses are highly integrated so that those living in the community can shop, work, and recreate without being forced out of the area. The focal point for this complete community would be "Clayton's Main Street" (located at the intersection of 188th Street and 72nd Avenue), where street-front commercial buildings and residences above shops will, it is hoped, provide a commercial and public centre for the residents of East Clayton (and, eventually, other communities within the larger Clayton district).

The plan is structured around a fine-grained, interconnected street/block system. This system allows easy movement by transit, car, foot, or bike. Tree-lined boulevards, infiltration devices, and on-street parking will buffer the pedestrian from passing traffic. The plan calls for lanes at the rear of most dwelling units so that trash, garages, and driveways will not deter from the friendliness of the street. Most important, the plan is designed to respond first and foremost to the ecological carrying capacity of the site, incorporating a system of streets, yards, parks, and other naturally absorptive areas in order to infiltrate runoff and, thereby, avoid stream destruction and the flooding of lower-lying agricultural areas.



SURREY CITY OF PARKS

EAST CLAYTON NCP

City of Surrey Planning & Development Department

APPROVED BY COUNCIL ON NOVEMBER 22,1999

Option C2

100 0 100 200 300 400 500 Meters

NOTE:
This plan is conceptual in nature and is intended to reflect a general land use pattern.

N

Half Acre Residential	16.74 ha	(41.36 ac)
6-10 u.p.a.	36.31 ha	(89.72 ac)
10-15 u.p.a.	16.42 ha	(40.58 ac)
15-25 u.p.a.	27.80 ha	(68.68 ac)
25-45 u.p.a.	19.28 ha	(47.65 ac)
Techno / Business Park	11.97 ha	(29.58 ac) (Incl. buffer & pond.)
Work / Live (15-25 u.p.a.)	2.86 ha	(7.06 ac)
Live / Work (15-25 u.p.a.)	7.79 ha	(19.26 ac)
Neighbourhood Commercial	1.58 ha	(3.91 ac)
Commercial / Residential	2.79ha	(6.90 ac)
Specialty Community - Oriented Commercial	3.34 ha	(8.27 ac)
Utility - Open Space	0.64 ha	(1.58 ac)
Proposed Roads		
Special Treatment of Street, Traffic Calming		

Institutional (church, schools, civic buildings, seniors housing, etc.)	0.6 ha	(1.48ac)
Storm Water Ponds (100 year flood event)	A - 2.14 ha 5.28 ac B - 1.94 ha 4.79 ac C - 0.40 ha 0.98 ac	Total 4.48 ha (11.05 ac)
Storm Water Pond on Private Property (amenity)	D = 0.32 ha (0.79 ac) E = 0.38 ha (0.93 ac) F = 0.14 ha (0.34 ac) G = 0.30 ha (0.74 ac)	Total 1.14 ha (2.81ac)
School & Park	9.53 ha	(23.54 ac) (Incl. 100 yr. flood overflow area of pond)
Riparian Protection Area	6.70 ha	(16.55 ac)
Natural Area	1.84 ha	(4.54 ac)
Open Space / Park	14.45 ha	(35.71 ac) Utility (Gas R.O.W.) 1.19 ha (2.94 ac)
Buffers (landscaped area on private property)	0.86 ha	(2.12 ac) (These areas have been incl. in the respective land use totals)

Urban Landmark / Reference Point
Neighbourhood Gateway Feature
Special Set Back & Landscaping
Neighbourhood Multi-use Pathway Network

TAXONOMY OF URBAN SITES

From the four charrette case studies featured in the previous section come virtually hundreds of design strategies that address issues pertaining to air, water, people, and affordability. As a means of organizing these strategies into a coherent and useful framework we have developed the "Taxonomy of Urban Sites" (see pp. 26-27). The taxonomy is structured, on the one hand, by scales of urban design (district, corridor, block, and parcel) and, on the other, by sustainable design performance categories (ecological infrastructure, social infrastructure, movement, and cost). In this way, the charrette design strategies can be understood in terms of (1) the degree to which they address the specific sustainability challenges of air, water, people, and affordability, and (2) the scale, or unit of development, to which they are most applicable.

Drawing Credit: Bob Worden, Ramsay Worden Architects, Ltd.

PART TWO
A Design Method

In producing this manual, we poured over the results of work done here in British Columbia as well as in other parts of North America. We were looking for a way to organize and distill the vast number of sustainable design strategies into a logical and useful framework. At the same time, we wanted a framework that would be relevant to a variety of site situations and that would encompass the broad range of issues that bear on sustainable site design. For this reason, we chose to feature the case study results of the four charrette projects described in Part One.

What emerged from each of the four charrettes were clear and practical ideas for making our communities more sustainable. These design strategies are not new; they are grounded in years of research and public policy. They include designing mixed-use, compact communities around transit; designing interconnected streets to encourage walking and to reduce dependence on the car; and providing affordable and appropriate housing in a mix of forms and at a mix of densities. They also include a strong imperative to protect aquatic systems and their green infrastructure tributaries (i.e., the streets themselves).

Taxonomy of Urban Sites

In the process of distilling the charrette outcomes into a useful framework, we ran the risk of repeating the same failure we had identified in previous efforts: disintegrating the very thing we wanted to preserve - the whole cloth of sustainable urban communities. Consequently we have taken pains NOT to organize this work according to functional categories such as transportation, housing, stormwater systems, green space, and so on.

What we offer instead is a two-tier taxonomy that is organized, on the one hand, by the **urban design scales** of *the district, the corridor, the block,* and *the parcel,* and, on the other hand, by the **sustainable design categories** of *green infrastructure, social infrastructure, movement, and cost*. The principles embedded in these four categories were distilled from seven principles outlined in the East Clayton Neighbourhood Concept Plan (2000) (see pp. 46-47).

taxonomy of urban sites

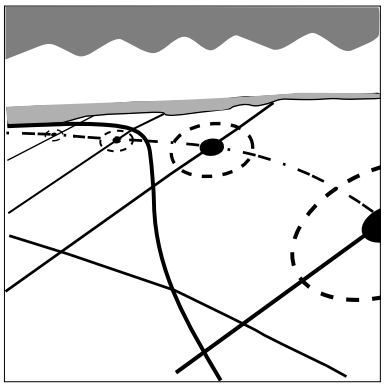
The district, corridor, block and parcel taxonomy is based on functional principles, rather than on formulaic patterns, of urban design. As such, districts, blocks, corridors and parcels can be organized in many ways to produce either more or less sustainable results. Orthogonal blocks that form gridiron street patterns are one type of block, polygonal blocks that form radial webs are another, and green centered large blocks that allow natural landscapes to penetrate deeply into the fabric of the community are a third. In this and other respects, application of functional principles overrides adherence to any one stylistic urban design pattern.

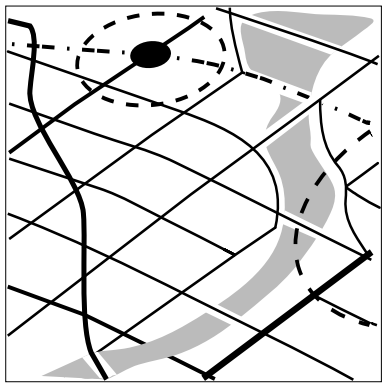
District

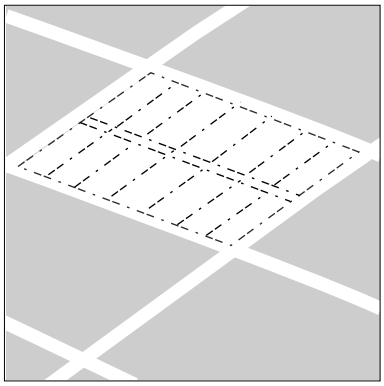
Districts are the geographic and social units that collectively comprise our urban regions. They are the places where we live, work, play, and exchange. They often represent the most local level of government (e.g., electoral wards). How districts are shaped and function can affect the entire region. Districts that concentrate services, housing, transit, and other activities of daily life within a walkable distance of residences benefit the region by reducing auto use and by distributing services evenly.

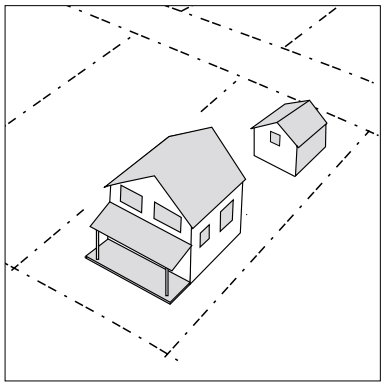
Corridor

Corridors are the conduits for moving materials, energy, and resources within and between neighbourhoods, districts, and regions. Be they streets, lanes, boulevards, pathways, or streams, corridors need to reflect their unique and specific functions. Regional transit corridors should be designed to coordinate and concentrate growth where it is most appropriate. Local corridors should be designed to be walkable and to connect residents to commercial services, transit stops, and natural areas. Laid over the urban fabric, a system of interconnected transportation corridors can and should yield to natural stream corridors without unduly compromising street interconnectivity.









Block

Blocks are the chunks of developable land that are available after a street pattern is imposed. Smaller blocks result from a more integrated (or net-like) street system, while large, super blocks are the result of a disintegrated dendritic (or tree-like) street system. The smaller the block, the finer the grain of development and the more permeable the neighbourhood.

Parcel

The parcel is the smallest increment of development. However, what happens at the scale of the individual house and yard has important social, economic, and environmental implications for the rest of the district. The post-1950s emphasis on the automobile has resulted in a whole new set of dimensions that demand ever-wider parcels to accommodate driveways and garages. Wider individual parcels mean less density in the aggregate, translating into more expensive infrastructure per individual parcel serviced. It also translates into a context that becomes, over time, so car-dependent that even the simplest of everyday needs cannot be satisfied without an automobile.

FURTHER RESEARCH

The concept of "green infrastructure" is becoming more widely accepted for maintaining the ecology, economy, and affordability of new and retrofitted communities, for minimizing maintenance costs of systems over the long term, and for eliminating a site's downstream impact on streams and natural areas. For further research into this topic, please see:

Moffat, "City Green: A Guide to Green Infrastructure for Canadian Municipalities."

taxonomy of urban sites

While the word sustainability defies absolute definition, it has commonly come to represent that which balances social, ecological, and economic imperatives. When we apply sustainable thinking to problems of urban design, these imperatives translate into the interrelated categories of ecological infrastructure, movement, social infrastructure and cost. It should be emphasized that these four categories were derived from an original set of seven principles outlined in the East Clayton Neighbourhood Concept Plan, 2000 (see pgs. 46-47).

Green infrastructure
Green infrastructure refers to the ways in which natural systems are integrated into the structure of a community. Green infrastructure can mean using the naturally absorptive areas of the streets, forests, and open areas to allow rainwater to infiltrate the ground. It can also mean integrating stream systems with large natural areas (such as park and school sites) with greenways, as well as with bike and pedestrian trails, in ways that preserve and enhance their ecological function.

Movement
Organisms need a constant and efficient flow of materials and energy in order to survive. When this flow is interrupted, or smothered, the organism's health is compromised. So too with communities. Communities designed with an interconnected network of green streets, lanes, pathways, and streams provide ways to travel, provide rainwater with an opportunity to be dispersed and absorbed in many locations, and provide streams with the protection and nutrients needed to support essential fish and wildlife habitat.

Social infrastructure
Communities with a healthy social infrastructure are complete communities. Healthy social infrastructure means that housing, jobs, and services are clustered and that residents can walk to a transit stop or to a corner store. It means that housing is available and affordable for a variety of income groups and family circumstances within the same neighbourhood and even on the same street. It also means that public spaces are enriching and add quality, identity, and meaning to the fabric of a community. A healthy social infrastructure creates a community in which people want to remain.

Cost
Sustainable communities are affordable communities. This means that they contain homes that citizens can afford; provide an equitable and reliable distribution of services; provide a reasonable return on their investment over the long term; and minimize the cost of restoring the environment, tax rates for citizens, and future capital costs to local governments.

FURTHER RESEARCH
Several North American urban design theorists use this framework of physical spaces as the key organizing principle for functioning communities. Please see:

Duany and Plater Zyberk and Company, Version 2.0. *The Lexicon of the New Urbanism.*

Calthorpe, *The Next American Metrolopolis: Ecology, Community, and the American Dream.*

CHARRETTE STRATEGIES

The charrette strategies in this section are organized according to a common format that corresponds to the two-tiered "Taxonomy of Urban Sites" (outlined on pgs. 52-53). Each page outlines four strategies for addressing sustainability at the scale of either the District, Corridor, Block, or Parcel with a fourfold focus on the categories of Green Infrastructure, Movement, Social Infrastructure and Cost.

Charrette Strategy ID

Urban Design Scale
This identifies the urban design scale at which the charrette strategies apply.

Charrette Name

Charrette Icon

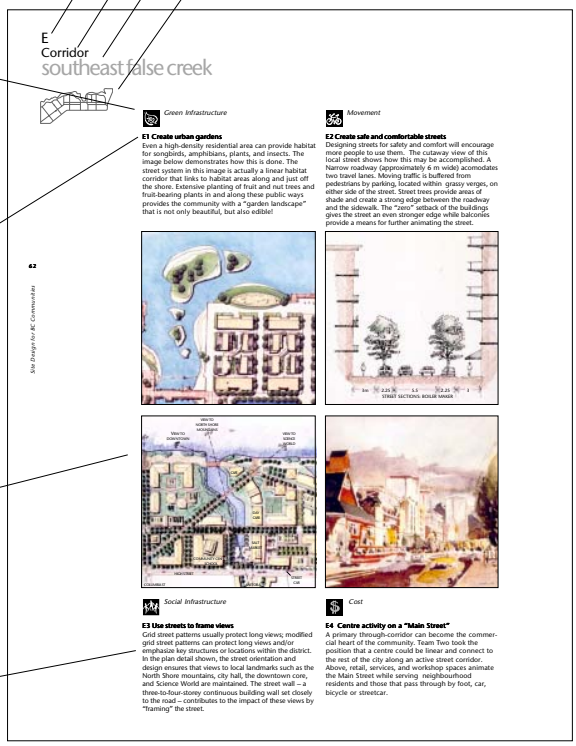
Sustainability Category
This identifies the sustainability category addressed by the strategy.

green infrastructure / movement
social infrastructure / cost

Charrette Strategy
This identifies a specific strategy for addressing the sustainable design category.

Illustration
This illustrates visually how the category was addressed.

Description
This describes why the strategy meets the sustainable design performance standard and how it was achieved.


E
Corridor
southeast false creek

Green Infrastructure

E1 Create urban gardens
Even a high-density residential area can provide habitat for songbirds, amphibians, plants, and insects. The image below demonstrates how this is done. The street system in this image is actually a linear habitat corridor that links to habitat areas along and just off the shore. Extensive planting of fruit and nut trees and fruit-bearing plants in and along these public ways provides the community with a "garden landscape" that is not only beautiful, but also edible!

Movement

E2 Create safe and comfortable streets
Designing streets for safety and comfort will encourage more people to use them. The cutaway view of this local street shows how this may be accomplished. A Narrow roadway (approximately 6 m wide) acomodates two travel lanes. Moving traffic is buffered from pedestrians by parking, located within grassy verges, on either side of the street. Street trees provide areas of shade and create a strong edge between the roadway and the sidewalk. The "zero" setback of the buildings gives the street an even stronger edge while balconies provide a means for further animating the street.

STREET SECTIONS: ROLLER SKATER

Social Infrastructure

E3 Use streets to frame views
Grid street patterns usually protect long views; modified grid street patterns can protect long views and/or emphasize key structures or locations within the district. In the plan detail shown, the street orientation and design ensures that views to local landmarks such as the North Shore mountains, city hall, the downtown core, and Science World are maintained. The street wall – a three-to-four-storey continuous building wall set closely to the road – contributes to the impact of these views by "framing" the street.

Cost

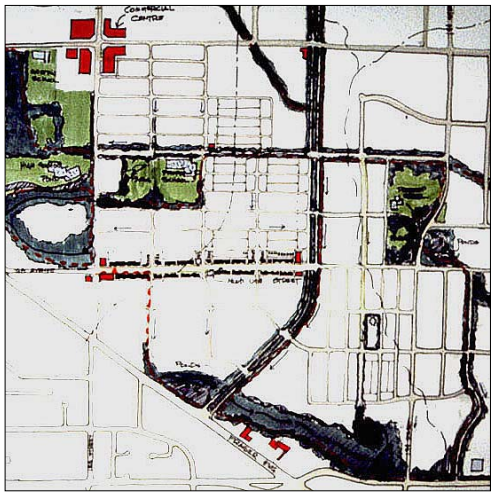
E4 Centre activity on a "Main Street"
A primary through-corridor can become the commercial heart of the community. Team Two took the position that a centre could be linear and connect to the rest of the city along an active street corridor. Above, retail, services, and workshop spaces animate the Main Street while serving neighbourhood residents and those that pass through by foot, car, bicycle or streetcar.

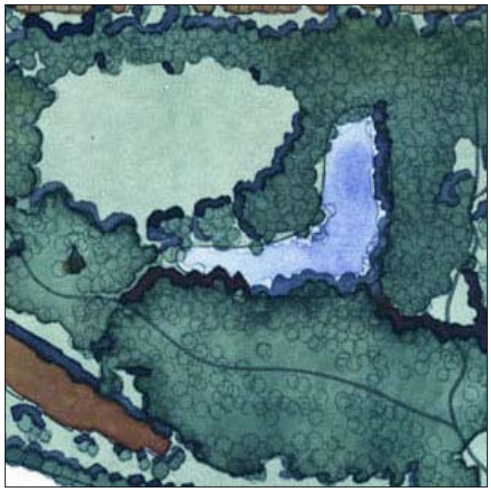
Green Infrastructure

D1 Use high points carefully
A stream begins at its headwaters. By protecting the origin of the stream, we ensure a healthier downstream environment and a healthier watershed. The concept sketch below (completed during the second day of the four-day charrette) illustrates how the charrette team responded to the inherent ecological capabilities of the site when making its first and most basic decisions.

Movement

D2 Design streets and streams as one system
Communities, like all living organisms, require a constant flow of materials and energy. In East Clayton, the streets are designed to work with the natural hydrological conditions of the site. Most rain that falls on the site will be absorbed within the street right-of-way itself, and what can't be absorbed is directed, through the integrated street network, to large natural areas where it can slowly replenish the water table.





Social Infrastructure

D3 Centre every neighbourhood around a social space
Single-use zoning creates reliance on cars and discourages walking. This is because destinations – those associated with satisfying basic needs (e.g., buying a litre of milk or going to play a game of frisbee) – are beyond walking distance. In the image above, a small cluster of commercial services placed at a corner gives people in the neighbourhood easy access to their daily needs. Distributed within a five-minute walk of all homes, these clusters create small hubs of activity where residents can do small errands while socializing with their neighbours.

Cost

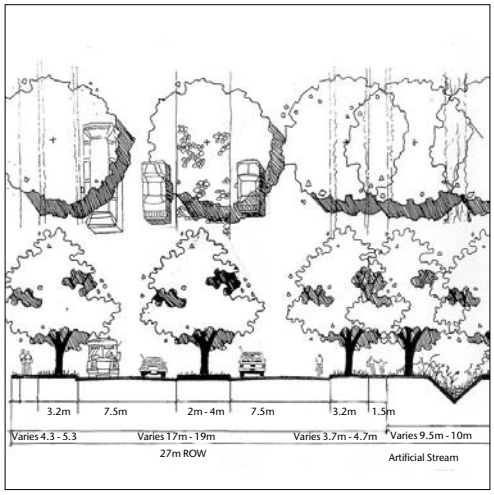
D4 Layer functions in open space
Typically, suburban parks and stormwater infrastructure are designed and serviced separately. This increases the total cost to the community and uses land inefficiently. In an alternative development pattern, parks and stormwater management are integrated so that the functions provided by one system support and benefit those provided by the other. Combining these systems reduces costs and land waste, ensuring maximum benefit for each dollar spent.

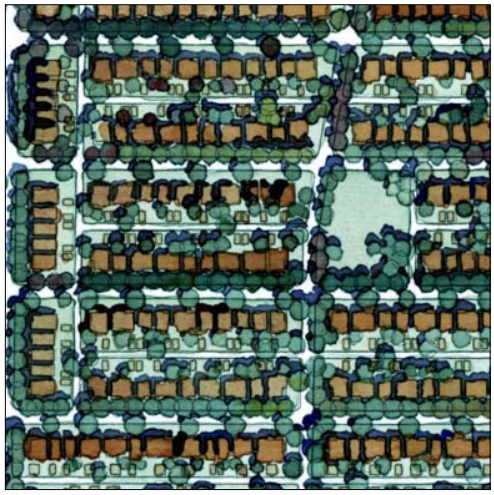
Green Infrastructure

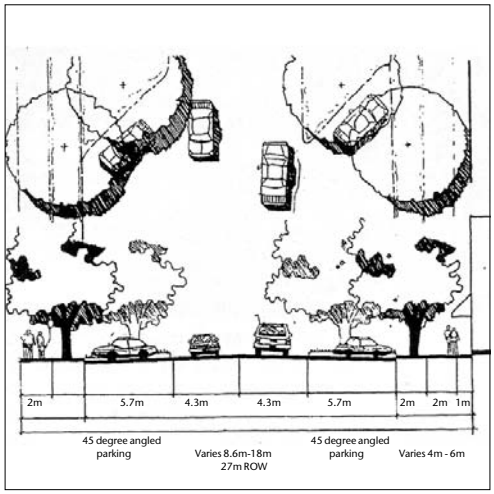
H1 Create an urban forest
Streets and other corridors are ideal locations for reestablishing forest and hydrological systems lost to development. On this "riparian parkway," a mix of trees provides a canopy large enough to cover 60 percent of the roadway. This linear forest becomes a habitat corridor for birds and gives shade to the sidewalk and the adjacent artificial stream.

Movement

H2 Design a network of interconnecting streets
East Clayton uses an interconnected system of streets, in a modified grid pattern, not only to disperse the flow of traffic, but also to ensure that many different needs are satisfied in the most efficient and healthy way possible. This includes the movement of water, fish, wildlife and people.







Social Infrastructure

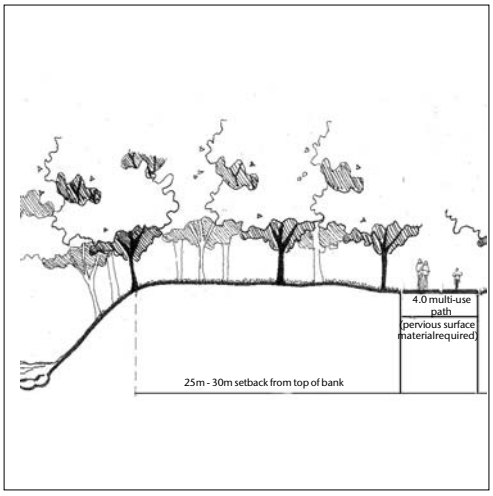
H3 Provide parking wisely
Nothing is less interesting and more exposed than a sidewalk lined with parking lots. Dedicated parking lots in East Clayton are located behind, not in front of, commercial buildings. Parking on the street, on the other hand, is abundant. Angled parking, as shown above, creates a shield between pedestrians and passing cars. Lots of trees planted on parking islands and along the street edge ensure that the majority of the parking surface is shaded and that the perceived width of the street is dramatically reduced.

Cost

H4 Create a key location
When you concentrate stores, offices, and community services along a central corridor, it provides a focus for activity and provides enough customers to keep shops lively. "Main Streets", like the one shown above, have offices and residences above the stores, ensuring life on the street even after the stores are closed. The building is set snugly against the sidewalk so that pedestrians can see into shop windows, while overhangs and canopies provide protection from the rain.

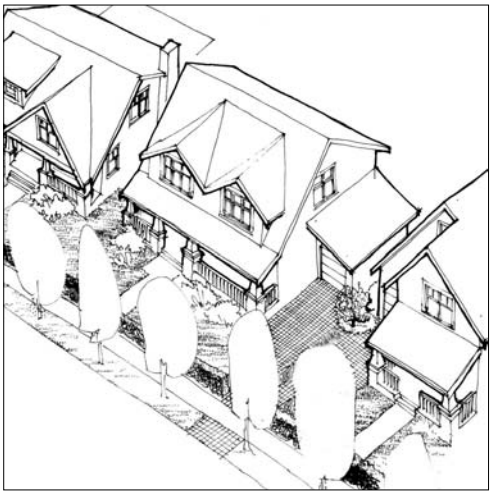
Green Infrastructure

L1 Wrap blocks around natural features
Development should respect the ecological structure and function of important aquatic systems, for their importance to fish and wildlife, and for their intrinsic value. Blocks should form around these features but should also allow people to connect with, and enjoy their special attributes. Access routes should impose as little disturbance as possible, be set back an appropriate distance from the top of bank, and be paved with a material that allows for natural infiltration.



Movement

L2 Make continuous sidewalks
Sidewalks are the connective tissue between blocks in a neighbourhood and between neighbourhoods and the district. Driveway entries are a considerable barrier to pedestrian comfort and connectivity. For this reason, rear lanes are ideal for maximizing pedestrian connectivity along the public street. Where front driveways are necessary, their impact can be limited by narrowing their entry at curbside and by pushing the garage back from the house facade, as shown below.



Social Infrastructure

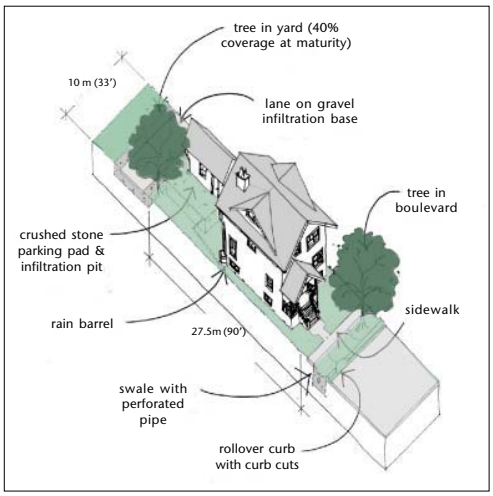
L3 Layer public space into the block
How we structure neighbourhoods says a lot about what we value. Combining schools, parks, and stormwater retention areas within the centre of a community underlines their importance to residents and creates a venue for environmental learning. Designed appropriately, these large central community spaces can accommodate district-scale alternative energy and wastewater systems.

Cost

L4 Add density at the corners
Corner parcels are ideal places to add density as two sides of the unit will face a street. In the example above, a rental coach-house unit above and beside the garage provides an alternative to apartment living (or a less expensive owner-occupied home), thus enhancing the diversity of incomes and family types within a single block. The coach house on this corner provides an additional residential unit on the block without detracting from the single-family character of the neighbourhood.

Green Infrastructure

P1 Design smart parcels
Individual lawns and backyards in East Clayton will be like small sponges, capable of absorbing all the rain that drains off roofs, parking surfaces, and pathways during typical rain events. Pervious pavers, or crushed stone-surfaced walkways, and parking pads absorb water near where it falls. Splash pads and grading quickly direct roof water to underground infiltration chambers. These make the backyard soil "sponge" even more absorbent while ensuring that yard surfaces stay walkable.



Movement

P2 Maintain flow through large parcels
In many suburban areas, buildings and parking areas associated with commercial and industrial uses cover between 80% and 100% of the surface area. This means that the majority of rain falling on these sites cannot be absorbed naturally, but must be conveyed off-site. It also means that a single large building mass dominates the urban landscape. Breaking buildings into smaller envelopes as shown, allows for the healthier movement of water, air and people on the parcel.

Drawing credit: Bob Worden, Ramsay Worden Architects, Ltd.

Social Infrastructure

P3 Create organic unity
Creating organic unity means accomodating variation and change while maintaining the elements that make a community special. This allows people to connect with the past and feel more comfortable with the processes of change. On this residential street, a great diversity of housing and tenure types is masked by a powerful sense of unity. Peaked roof forms and people-friendly (as opposed to merely car-friendly) front facades maintain the "single-family feel" despite the fact that density is almost twice that of conventional suburban developments.

Cost

P4 Layer living and working
Layering living and working space within a single unit increases the diversity of a neighbourhood and provides affordable space for small businesses — businesses that might otherwise have to locate outside the neighbourhood. The live/work unit shown above has ground-floor office/retail space and a residence located on the upper floors.

PART VI: BACKGROUND REPORT: OVERALL LESSONS LEARNED

What is Needed to Achieve Sustainable Development in Surrey?
Surrey City Council has expressed a clear desire to promote more sustainable development and create the highest quality living environment for Surrey residents. In light of the resistance by many parties to implement "what has to be done", the East Clayton experience has proven to be invaluable for identifying the barriers and providing insight. Some of the lessons learned and recommendations on how to achieve more sustainable communities identified through the East Clayton experience are:
- A partnership approach with a developer on a small-scale demonstration project is needed with stronger and more direct involvement by the developer.
- All partners must share the risk (financial assistance to reduce the risks) thereby enabling a first project to proceed.
- The experience should be documented to ensure that barriers and inefficiencies could be overcome and not repeated.
- Homebuyers/consumers need to be educated about the sustainable components of the product and the neighbourhood.
- Community stewardship must be fostered and maintained.
- Senior levels of government and agencies need to provide financial assistance to make the project viable by allowing design to proceed and reducing risk to the initial development projects.

Developer Needs versus More Sustainable Development
Faced with the reality of market conditions, untested consumer demand and levels of risk, along with the expressed desire to create a more sustainable neighbourhood in East Clayton, the City embarked on an analysis of the options available to address the reluctance of the first developer to undertake a "fully" sustainable demonstration development project. Three options, namely: the status quo; full sustainability; and a more flexible approach to sustainability were explored. A report on these options was considered by City Council to gain direction and to confirm Council's thoughts and support for the implementation of the NCP and the demonstration project. Comments and some of the implications associated with these options are outlined below:

The Status Quo
This option involved conventional lot sizes, homes, infrastructure and homogenous land uses involving some cul de sacs. These types of projects and neighbourhoods are the norm throughout most of the Lower Mainland. In some cases, because they are a "known" commodity and easily built and sold, development companies prefer the conventional "tested and true" product. Some implications of the "status quo" in the context of East Clayton are:
- May (depending on downstream drainage conditions) allow development to proceed immediately.
- Would likely be welcomed by some developers under the current condition of the market.
- "Business as usual" approach to land development.
- Ignores previously attained public support and expectations associated with the East Clayton NCP.
- May require the entire NCP to be revisited in terms of road locations, densities, servicing, amenities, etc.

- No innovation or additional contributions to environmental objectives.
- Reduces neighbourhood choices in Surrey.
- All the efforts in achieving sustainable development in Surrey would be wasted.

"Full" Sustainability
This option involved the pure application of the principles and subdivision design outlined in the NCP. It includes full adherence to the 100% lane concept, swale systems and high/mixed densities (to achieve the maximum population range). Some implications of the "fully sustainable" option in the East Clayton context are:
- It is consistent with public planning process and expectations of plan participants and governments.
- Reinforces Surrey's role as a leader in innovation and as a responsible planning authority.
- Will contribute to the betterment of society as a whole.
- Cost benefits of more sustainable infrastructure are foreseeable (in the medium/long term).
- Resistance from some developers.
- May incur delays due to new standards and design development.
- First projects may be more costly due to requirement to incorporate "risk" factor.
- First projects will require monitoring (i.e., to determine success) which needs funding.
- The City may incur some extra costs to engage special expertise.
- Costs benefits resulting from alternative infrastructure, higher densities, etc. may not be visible in the immediate short term.

A Flexible Approach
This option involves a negotiated approach but also reasonable adherence to the sustainability principles and to the NCP. This project would not meet targets such as 100% lanes and high/mixed densities (i.e., the highest population range identified in the NCP), but would gain significant improvements over the status quo approach. Alternatives and innovation would be considered as long as the basic objectives of the NCP are met. Some of the implications of this option in the context of the East Clayton NCP are:
- Some improvements and alternatives to conventional development will accrue.
- May be more palatable to some developers.
- May accommodate development sooner.
- Partial benefits may be realized.
- Experience will be gained from the first project.
- Full implementation of sustainability is likely in the future.
- Difficult to conceptualize or measure the idea of "partially" or "somewhat" sustainable.
- Cost/benefit issues need to be confirmed.
- Opens up NCP to wide negotiations and uncertainty.
- Undermines perceived commitment by Surrey to principles and implementation.

After considering the options, Council confirmed its commitment to implementing the NCP and a demonstration project, and accordingly directed that:
- The initial developments within the East Clayton Neighbourhood Concept Plan area include the sustainable aspects previously endorsed by Council.

- Staff is to work with the proponents of the initial development proposal(s) to implement the principles to the highest degree possible.
- Staff is to expedite a "pilot project" in East Clayton in conjunction with a willing developer provided that sufficient assistance from appropriate government agencies is secured to adequately reduce the risks to the City and the developer in implementing the project and monitoring its feasibility.

Ongoing Challenges

Above all, the demonstration development project and the entire East Clayton experience has revealed that there are many challenges to overcome before sustainable development becomes a "mainstream" phenomena. In attempting to implement the innovative proposals in East Clayton, challenges and barriers arose throughout the process. Some of the challenges faced by the various participants are outlined below:

Challenges for all Participants

The challenges faced in pursuing the sustainability objectives and the demonstration project were not only presented to the City, but to the development industry and other government agencies. As evidenced by the demonstration development project, facilitating developer "buy-in" to the sustainable initiatives continues to be a challenge – it is a challenge for developers to design, build and market innovative, un-tested, and yet profitable products, and to evaluate the risk and confirm the costs in an unknown market. There were considerable challenges for the City - especially in its endeavours to implement effective infrastructure with manageable operation and maintenance as well as monitoring the performance of infrastructure to reduce the safety factor (or risk) in the future. Senior governments must support local initiatives like East Clayton so that society's overall quality of life is improved through sustainable development on the regional and national scale.

Site Specific Challenges

Some of the challenges were related specifically to the site or the current market (demand and supply) conditions in 2000 and 2001. The challenges identified through the process include: soil conditions, the remote location of East Clayton and lack of existing services and infrastructure and fragmented land ownership (resulting in coordination difficulties). In addition, there is a surplus of areas designated for residential development in Surrey. The 2000 review of the OCP revealed that under a moderate growth scenario (i.e., 3,000 dwelling units per year), the City has enough development capacity in existing and new urban areas to accommodate the projected residential growth for the next 7 to 12 years. Lower than projected growth over the past three years will potentially extend the amount of time it takes to reach capacity within the City's planned growth areas.

Unfavourable Economic and Market Conditions (Timing)

The poor market conditions may contribute, to a large extent, to the reluctance of developers taking the risks to try innovative products to lead the market. Surrey's existing NCP areas are expected to provide for over 16,000 housing units. Therefore there is no need to open up another NCP in East Clayton until the market condition is improved when new housing and development ideas may be more easily accepted by the market.

Specialization in the Development Industry

The demonstration project contains residential development only and involves mainly single family subdivisions. Density and building type diversification would be difficult to achieve where developers generally

specialize in certain types of development. An alternative is to encourage developers with different experience and expertise to participate. Other development companies support and have expressed interest in pursuing sustainability, but as is the case in many new urban areas, the usual off-site costs combined with a slow market are prohibitive.

Institutionalizing Alternative Planning and Design Processes
It was recognized that there was a need to bring the participants in both the NCP and the development project together as often as possible. This was to ensure that all were aware of the ideas and new standards and also to give time for contemplation and review. An ongoing challenge is how to maintain a review and approval process that accommodates the new ideas and new servicing standards and to accomplish timely approvals.

Citizen and Consumer Expectations
Making communities sustainable means changing some of the ways cities provide services. Changing the level of service for citizens is always problematic, even when it can be shown that a changed level of service is, in fact, an improved level of service. To achieve sustainability, public services and expectations need to change. Engineering services (drainage, roads, sewage, energy), land uses (compact, mixed use communities) and financing for infrastructure (through development cost charges) must work together and be affordable for both the developer and the City.

Lack of Precedent
Another challenge involves the lack of local precedents (or built) sustainable neighbourhoods. The residents that move into the first development project will not have local services and will be dependent on their automobiles. The developer of the first project may face costs and pressure to market and build the services and other amenities envisioned by the approved plan and project. Incentives to the first developer could be considered to help reduce the risk associated with up-fronting the demonstration project. Also, the City is pressured to be diligent in requiring strict adherence to the Plan or a precedent may be set for other development projects in East Clayton.