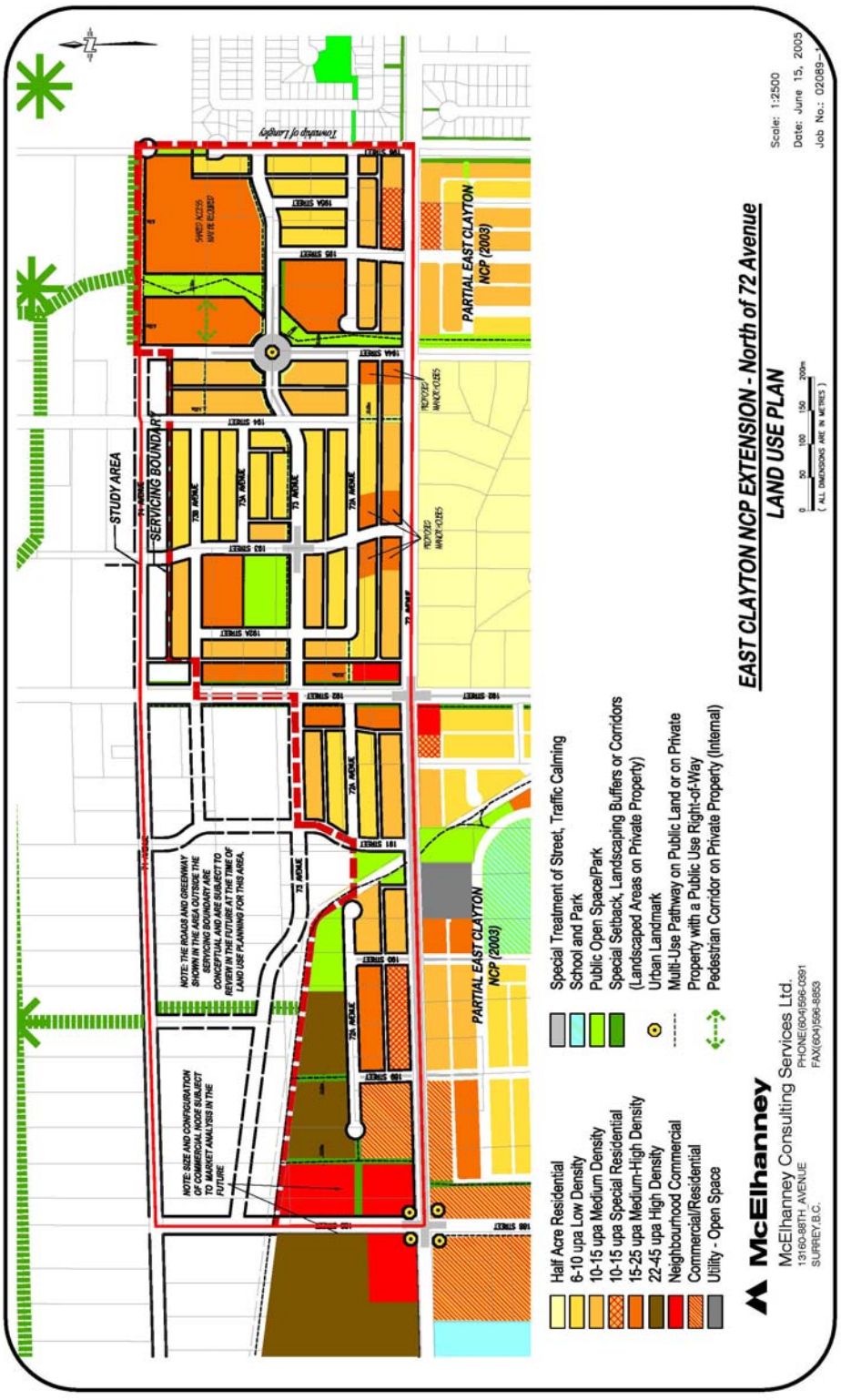
Land Use Plan
East Clayton Neighbourhood Concept Plan Extension North of 72 Avenue
Approved – June 27, 2005



REPORT TO

CITY OF SURREY

FOR

EAST CLAYTON
NEIGHBOURHOOD CONCEPT PLAN EXTENSION NORTH OF 72 AVENUE

STAGE II
NCP REPORT

2111 02089-1

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June 2005

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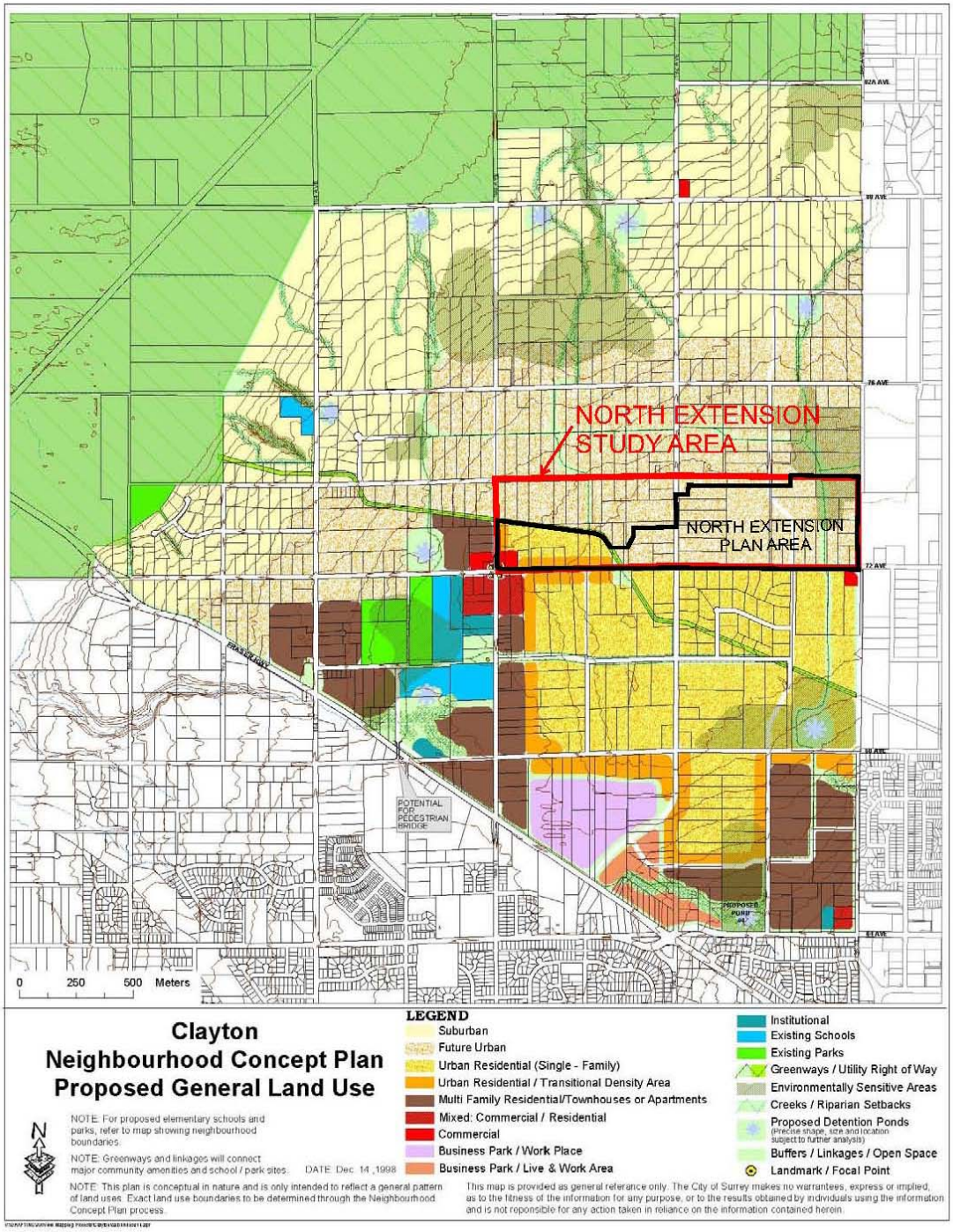
Figure 1.1
Clayton Area General Land Use Plan and North Extension Study Area



Part I Background

Context

The Neighbourhood Concept Plan (NCP) for the Extension of the East Clayton Neighbourhood to the North of 72 Avenue (East Clayton North Extension) is prepared within the context of the General Land Use Plan for Clayton approved in 1999, and the East Clayton NCP approved in 2003.

Preparation of a Clayton Area General Land Use Plan commenced in June 1996 and concluded in early 1999 after an extensive public process that included numerous information meetings, workshops and substantial stakeholder consultation. Located at the eastern boundary of the City, the Clayton plan area includes over 800 hectares (2,000 acres) of land area, primarily designated for future suburban residential, urban and business uses.

Within the framework of the City of Surrey's Official Community Plan (OCP) adopted in October 1996, the Clayton area was identified as a "Suburban" area with the east portion of Clayton identified as a new "Urban" neighbourhood. The General Land Use Plan (Figure 1.1) served to rationalize the "suburban/urban" delineation and to provide a basic land use structure for the overall area, including identification of neighbourhood boundaries and nodes, transportation (vehicular and pedestrian) networks and open space/park opportunities and a general servicing strategy. The East Clayton NCP, approved in 2003, provided the detailed land use, planning and servicing framework for the urban neighbourhood east of 188 Street and south of 72 Avenue.

The East Clayton North Extension plan represents the area north of 72 Avenue between 188 Street and 196 Street (Surrey / Langley border). Its northerly boundary is established on the basis of the extension area being able to be serviced by gravity to existing / proposed servicing infrastructure on the south side of 72 Avenue. In order to establish a context for future land use and transportation opportunities / constraints, a larger "study" area boundary was established with its northernmost limit set at 74 Avenue.

The East Clayton North Extension contains approximately 43 hectares (107 acres). Figure 1.2 identifies the Study Area, which is larger than the actual proposed Plan Area. The existing land uses within the study area are comprised predominantly of single, detached housing on large acreage parcels. Several 'hobby farm' uses are noted to also operate within the study area. The area to the north and west share a similar pattern of development / land use.

The study area and adjacent lands to the north and west are designated in the City's Official Community Plan (OCP) as "Suburban" with a majority of parcels presently zoned for acreage residential (RA Zone) or General Agricultural (A-1 Zone) uses. The general topography of the lands within and outside the East Clayton North Extension study area

is typified by gently sloping upland regions of the Serpentine River eastern basin. The extreme western and northern areas of this portion of Clayton are characterized by steep sloping conditions and a greater prevalence of watercourses which drain to the Latimer and Serpentine hydrological basins.

As a part of the review of environmentally sensitive / significant features with the East Clayton North Extension study area, an independent environmental review was undertaken on behalf of the City of Surrey to review the significance of a major wood lot between 74 and 76 Avenue west of 196 Street.

The study, prepared by ECL Envirowest Consultants Ltd., concluded that the wood lot area is not considered of significant value to red or blue-list species for breeding potential and may be rated as “low value” from an environmentally significant area (ESA) standpoint. This report is appended as Appendix I.

Also, following the preparation of Stage 1 of the NCP, a study was undertaken by Phoenix Environmental Services on behalf of a private property owner to confirm whether a creek exists on a property to the northwest of 73 Avenue and 191 Street, just outside of this study area. The Phoenix study concluded that no such creek exists and through discussions with the Department of Fisheries, this is being removed from the base mapping.

On January 25, 1999 Council granted approval of the Clayton General Land Use Plan and with it, a set of seven principles of sustainable development that were to shape and guide future planning and implementation in the neighbourhood. The seven principles of sustainability are as follows:

Principle No. 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.

Principle No. 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.

Principle No. 3
Communities are designed for people; therefore, all dwellings should present a friendly face to the street in order to promote social interaction.

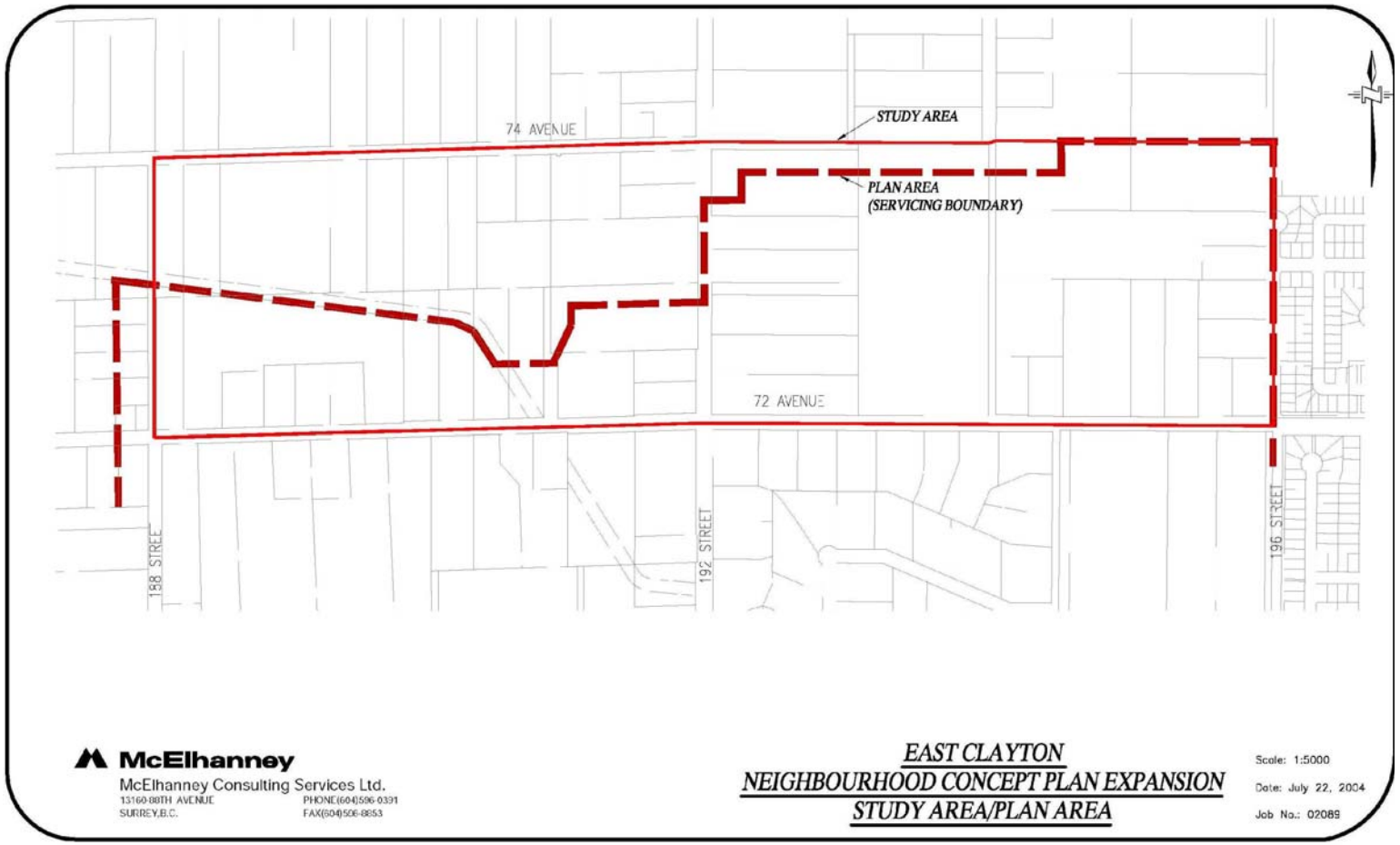
Principle No. 4
Ensure that car storage and services are handled at the rear of dwellings.

Principle No. 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.

Principle No. 6
Provide narrow streets shaded by rows of trees in order to save costs and to provide a greener, friendlier environment.

Principle No. 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).*

Figure1.2
The Plan and Study Areas



The Plan and Study Areas

As a first step, a study boundary was established for the East Clayton North Extension north of 72 Avenue. The study area was delineated by 72 and 74 Avenue at the south and north, and by 196 and 188 Street at the east and west (Figure 1.2).

The Study area involves approximately 65 hectares (160 acres) of land. The Plan area includes only the lands that are serviceable by gravity sewer to the south, encompassing approximately 43 hectares (107 acres) of land. Based on information available, there are no identified watercourses within the study or plan areas.

Why an Expanded NCP for East Clayton?

On February 9, 2004, Surrey Council endorsed a process and Terms of Reference to develop a Neighbourhood Concept Plan extension for those lands north of 72 Avenue that could be serviced to the south as part of the existing and/or planned 2003 East Clayton NCP servicing infrastructure. These lands are shown on Figure 1.2.

Given that the intent of the approved 2003 East Clayton NCP was to provide for the development of serviceable areas north of 72 Avenue as part of the development south of 72 Avenue, a process was needed to determine the exact extent of servicing catchments and to develop an appropriate land use plan within the servicing catchment boundaries. Consideration of the extension of the 2003 East Clayton NCP is driven by a faster than anticipated build out within the approved Clayton NCP area.

Additionally, the objective of the East Clayton North Extension is to re-evaluate servicing / financial details identified as a part of the approved East Clayton NCP and to assess the impact of the proposed north extension on this established servicing structure.

In keeping with the Council approved Terms of Reference, the land use pattern for the "Expanded NCP Area" is to be similar and complementary to that within the approved NCP and is to reflect the development framework and sustainability principles identified within the 2003 East Clayton NCP.

Opportunities and Constraints

As a critical first step in the planning/servicing design of the East Clayton North Extension area, establishment of the servicing catchment boundaries was completed by undertaking topographic mapping, downstream capacity analysis, and servicing profiles.

4.1 Topographic Mapping

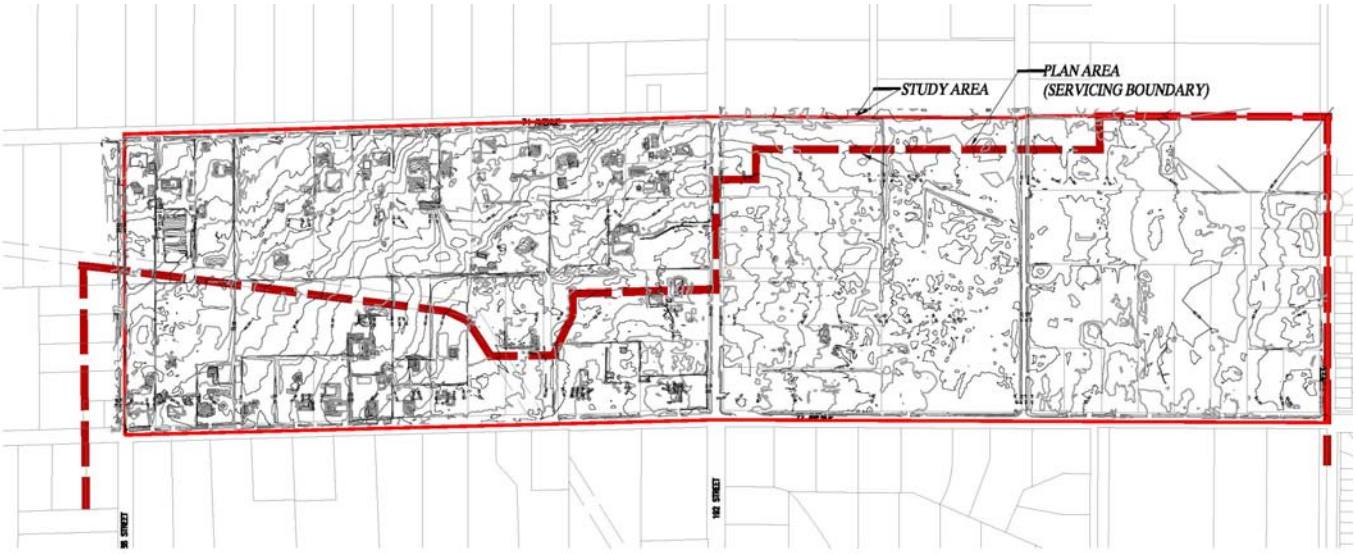
The study area generally slopes from south to north and from east to west. The eastern portion of the study area has gently sloped to almost flat topographic characteristics

while lands located north of the Terasen Gas Right-of-way and on the west side of 188 Street slope away from 72 Avenue. A topographical map is shown in Figure 1.3.

Topographical mapping for the Study Area was prepared using air photo data to prepare a three-dimensional topographical model of the area. Field-review of random spots was conducted to verify the integrity of the topographical model.

The results of the topographical model revealed that the study area slopes gently in a northwesterly manor. Total elevation change from 72 Avenue to 74 Avenue at the center part of the study area was approximately 2.5 metres (8.2 ft). Complete field topographical surveys will be required in conjunction with preliminary lot grading analysis and detailed engineering design undertaken with individual development applications.

Figure 1.3
Topographical Plan



4.2 Downstream Capacity Analysis

- The potential addition of approximately 65 hectares (160 acres) of land to the 2003 East Clayton NCP would place significant additional demands on the existing and proposed infrastructure. The impact of the added demand was evaluated for sanitary, stormwater and water services. As development of lands within the 2003 East Clayton NCP is at various stages of review, the following assumptions regarding capacity and demand were made:
  - Approved Development - Actual yield / density was used to calculate servicing "demand";
  - Preliminary Approval - (PLA / Third Reading granted) Proposed yield / density was used to calculate servicing demand; and
  - Pre-Approval / Not Under Application – Base or median yield density assigned to single family detached designated lands. Maximum yield / density was used for all other land use designations. This includes all the lands within the East Clayton North Extension servicing boundary.

Based on these assumptions and technical parameters an analysis of downstream servicing capacities (sanitary, storm and water) was carried out. According to the analysis, lands within the East Clayton North Extension Plan area can be served by existing and planned infrastructure south of 72 Avenue.

4.3 Servicing Profiles

The determination of servicing catchment boundaries for the East Clayton Extension North of 72 Avenue is based upon several key factors including:

1. Maximum permitted depth of services: the maximum depth (invert elevation) of services is set at 5.0 metres (16.4 ft) from finished grade. This maximum depth was set by factors such as depth of existing services and installation and maintenance requirements.

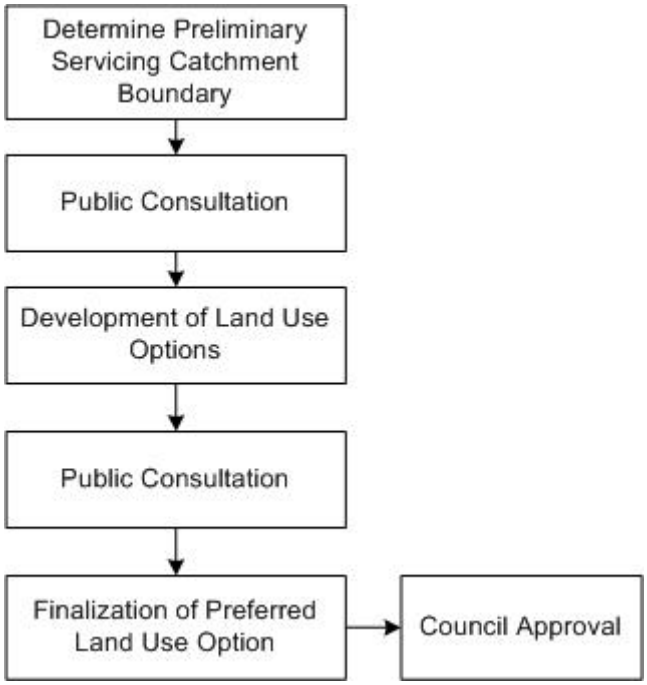
2. Maximum depth of imported fill on lots: City policy establishes a maximum of 1.2 metres (4 ft) of imported fill to achieve site servicing and/or in-ground basements.

3. Minimum profile of servicing infrastructure: City policy and in accordance with "good engineering practices".

The determination of the study area's servicing boundaries is based on City standards and policies.

The Planning Process

Based on the Council-endorsed Terms of Reference, the following process was established for the preparation of a Plan for the East Clayton North Extension area:



Preparation of the East Clayton North Extension Plan involved the combined efforts of various City Departments, Engineering, Planning and Environmental Consultants. Public consultation included three public Open House meetings as well as other stakeholder meetings at various stages throughout the plan development process.

Public Consultation Process

The three Public Open Houses, numerous "stakeholder" meetings, and meetings with property owners, individually and in groups, from the Study Area and adjacent areas, were held to deal with specific issues as they arose throughout the plan preparation process.

The three Public Open Houses were held on April 7th, May 5th and July 6th of 2004 at Clayton Community Centre.

Public Open House No. 1 (April 7th, 2004)

At the first Open House, information was presented regarding the proposed planning process, Clayton General Land Use Plan, 2003 East Clayton NCP and preliminary servicing boundaries and catchments within the study area.

Approximately 90 people attended the first Open House meeting. Representatives from the City of Surrey and the project consultant were in attendance to answer questions. Information was presented on the preliminary servicing boundaries for the extension. A questionnaire seeking preliminary public input was provided with

10 completed questionnaires returned to the City of Surrey. As general comments on the Plan preparation were sought, input received appeared to be generally supportive of the proposed inclusion of lands north of 72 Avenue within the East Clayton Planning and Servicing Area. There were several specific questions related to the establishment of the servicing boundaries and the extent of the land proposed to be included in the study area.

Public Open House No. 2 (May 5th, 2004)

The second Open House meeting was held on May 5, 2004, which approximately 200 people attended. City staff and the project consultant were present to answer questions.

Two draft land use options were presented, both based on the same servicing boundaries, but each showing different land use and road pattern arrangements. In addition to the two draft land use options, preliminary development yield and land use statistics were presented.

36 completed questionnaires were returned. While there appeared to be a general level of support for the overall concept of development of the East Clayton North Extension lands based on the Sustainability Concepts, several issues or themes were apparent in residents' comments including:

- The amount of land allocated to roads / lanes;
- The extent / amount of multiple residential (high density) uses designated in the plan options;
- The need for greater amounts of parks / open space; and
- The need for traffic management.

Public Open House No. 3 (July 6th, 2004)

Based on public input on the two draft Land Use Options, staff and the consultants developed a draft final land use plan for the East Clayton Neighbourhood Extension Area.

Key changes and additions to the two preliminary concepts included the following:

- Reconfiguration of the north / south greenway system located east of 194A Street;
- Re-alignment of 194A Street to separate internal neighbourhood traffic and to realign some roads in light of the existing ownership patterns;
- Addition of new pedestrian connections to enhance connectivity;
- Extended use of special pavement treatment to improve pedestrian safety; and
- The addition of a "roundabout" at 194A Street and 73A Avenue for improved traffic management and traffic calming along 73 / 73A Avenue, the main east – west collector road in the new neighbourhood.

The third Public Open House was attended by approximately 100 people. The draft Preferred Land Use Option and draft final servicing plans were presented, and further details were provided regarding servicing concepts, and the East Clayton North Extension financial strategy. Information was provided on draft monetary contributions expected from new developments in the plan area towards amenities such as new parks and additional fire, police and library services.

Questionnaires and copies of the draft preferred land use plan were provided to all attendees. A total of 14 completed questionnaires were returned to the City staff. Approximately 80% of the respondents supported the draft preferred land use option.

The general consensus of opinion expressed in the returned questionnaires indicated neighbourhood support for the draft preferred land use option.

After the open house, a number of property owners to the north of 74 Avenue outside of the study area submitted a petition to the City Council questioning the engineering rationale for the establishment of the study area and requested that their lands also be included in the study area. At the request of Council, they submitted a brief outlining their concerns. Staff reviewed this submission and confirmed that the engineering rationale for the study area was valid based on the topographic information and servicing constraints and that no changes to the study area and servicing boundaries were warranted.

Two land use issues were identified through the public input received at the third Public Open House.

1. Location / configuration of the open space corridor at the east side of 194A Street between 72 and 73 Avenues; and

2. Location / size and configuration of the open space corridor at approximately 195 Street between 73 and 74 Avenues.

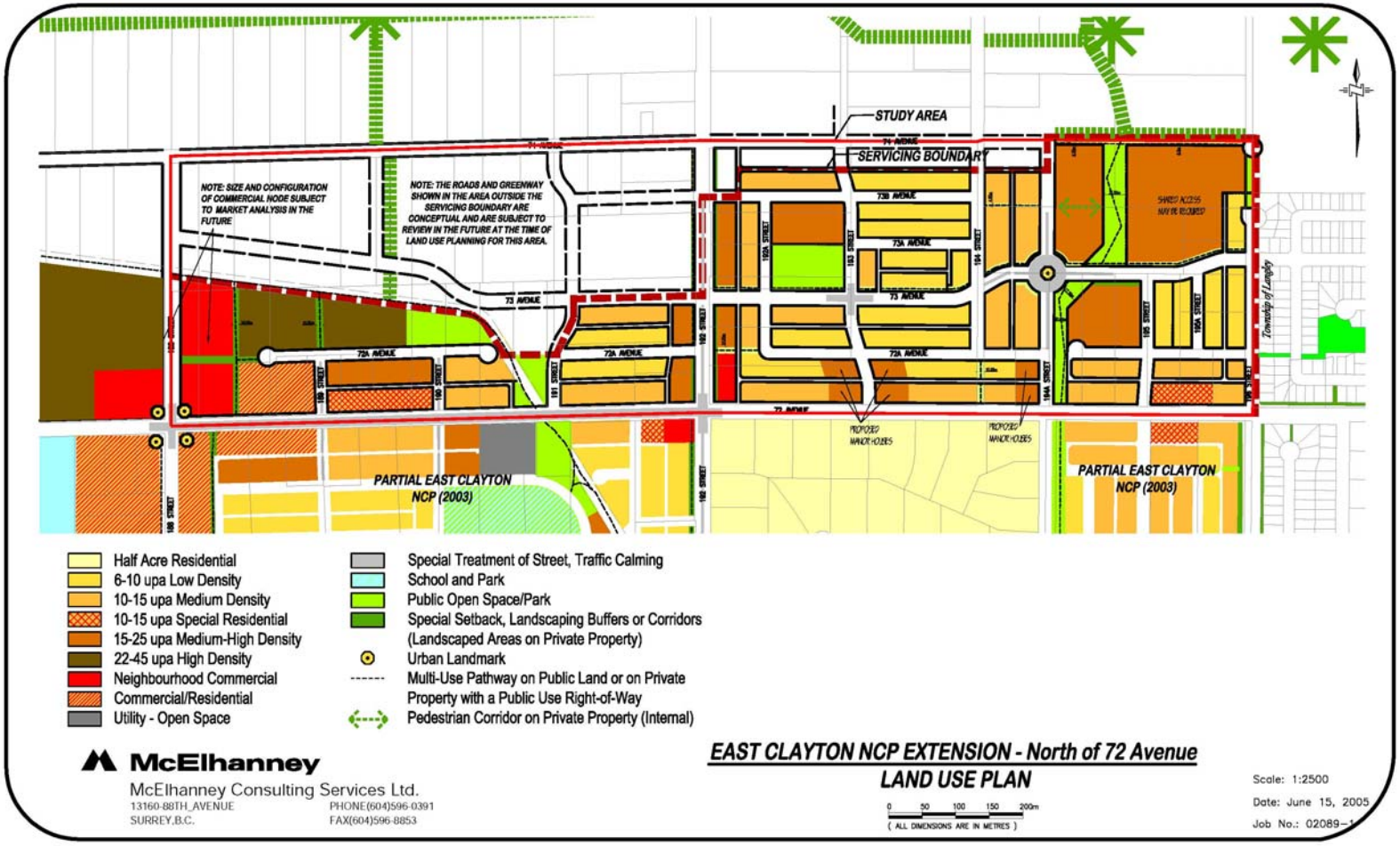
Additional meetings were held with affected land owners and the following adjustments have been made to resolve the two outstanding land use issues:

- The width of the line on greenway between 72 Avenue and 73 Avenues at the east side of proposed 194A Street has been adjusted from 40 metres to 20 metres, to reduce the impact of greenspace on properties with the NCP Extension area, while meeting the City's objectives for the provision of greenways.
- The width and configuration of the greenway extension north of proposed 73 Avenue; the greenway has been adjusted to provide for a more efficient use of land without compromising the pedestrian / greenspace connectivity.

Additionally, the 10-metre wide multi-use corridor between 73B Avenue and 194A Street that was shown in the draft land use plan is changed to a 4-metre wide pathway centered between the adjacent properties;

The above-noted issues were resolved through consultation with affected property owners. The final Land Use Plan for the East Clayton North Extension reflects the resolution of these issues.

Figure 2.1
East Clayton North Extension NCP Land Use Plan



Part II Planning Objectives, Land Use Plan and Policies

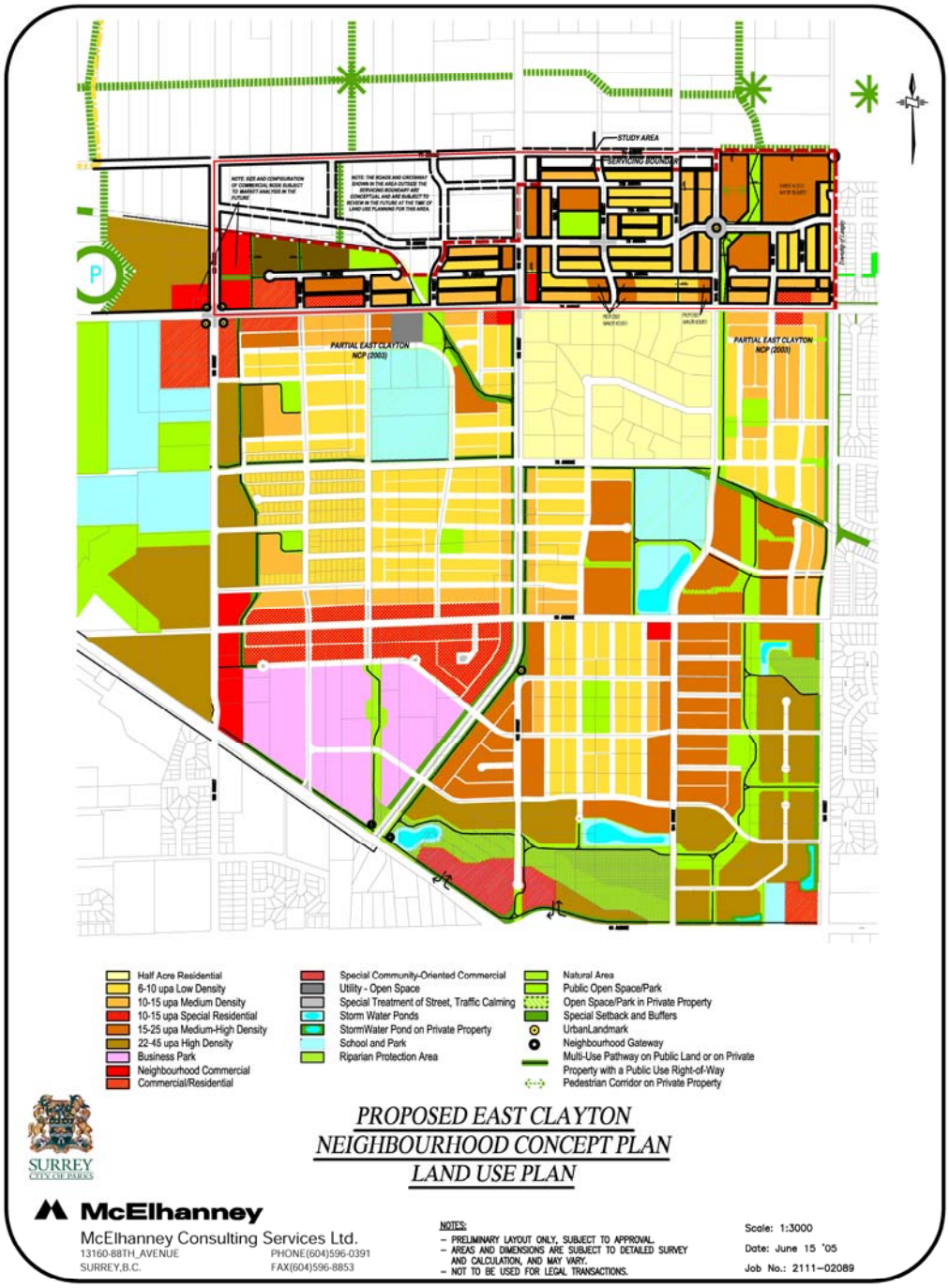
Planning Objectives

As an expansion of the approved 2003 East Clayton NCP, the East Clayton North Extension is similarly envisioned as a complete, mixed use neighbourhood designed to promote social cohesion, economic opportunities, environmental stewardship and access to a range of housing options while reducing automobile dependence. The Land Use Plan for the East Clayton North Extension is shown as Figure 2.1 and a composite plan of the North Extension and East Clayton NCP is shown as Figure 2.2.

The seven principles of sustainability described in Section 1.1 apply to the East Clayton North Extension Neighbourhood. A full description of the seven sustainability principles including performance objectives may be found in the 2003 East Clayton NCP Report (March 2003) in Sections 2.1 and 2.1.1.

The East Clayton North Extension area was originally contemplated as a future phase of the 2003 East Clayton NCP, subject to establishing the limits of gravity servicing. This extension now reconciles the planned land use boundaries with the servicing boundaries in this part of East Clayton.

Figure 2.2
2003 East Clayton NCP and North Extension



East Clayton North Extension and Principles of Sustainable Development

The 2003 East Clayton NCP encompasses approximately 250 hectares (560 acres) and has been planned as a "complete" community, characterized by a broad range of urban housing forms/densities. The planning of East Clayton calls for an identifiable mixed-use node forming part of the future 'village centre' for Clayton, neighbourhood commercial nodes dispersed to ensure that homes will be within 5-6 minute walking distance of at least one such node, a major business park area and substantial open spaces. The 'fabric' of this community is based on a modified grid-pattern road network that serves to enhance neighbourhood interconnectivity, pedestrian movement and traffic management. Mixed-use (commercial/residential) designations, a Special Residential designation to accommodate small-scale businesses within the houses, and provision for 'coach-houses' in all single-family residential areas, expand upon the City's traditional land use / zoning policies and provisions.

In addition to Land Use / Density and road pattern elements, the 2003 East Clayton NCP includes a variety of alternative engineering servicing approaches.

The 2003 East Clayton NCP area is expected to accommodate approximately 6,000 dwelling units and over 12,000 new residents. Serving the anticipated residents are two new elementary schools, 14.3 hectares of proposed business park development, 8.6 hectares of commercial lands and 23.8 hectares of Open Space area. A further 12.7 hectares of land is included with the Terasen Gas Right-of-way that is planned to include a pedestrian multi-use pathway system ultimately connecting the greater Clayton NCP area (Figure 2.2) with areas adjacent.

A notation on the approved 2003 East Clayton NCP Land Use Plan Map outlines the general location of the Northern Extension Study area and states:

> "Development of this area a shown is subject to servicing being feasible from south of 72 Avenue with detailed survey and engineering design being done for each development parcel."

The East Clayton North Extension Plan is consistent with this statement and provides land use / servicing details for the serviceable area north of 72 Avenue.

The Land Use Plan and Policies

The designated land allocation pattern follows the pattern established within the approved 2003 East Clayton NCP in terms of land use type (e.g. Medium Density Residential vs. High Density Residential) and general locational criteria. Notwithstanding the similarities with the 2003 East Clayton NCP, a new land use designation is introduced in the East Clayton North Extension; that of the "Manor House". This is proposed as a sub-category of the Medium-High Density Residential Land use designation, which permits four-plexes as a built form.

The following section provides a brief description of each land use type within the East Clayton North Extension Plan area. Statistics identifying proposed land use allocation, estimated yields (low, medium, and high) and population are included in Table 2. The characteristics of developments under these designations will be in keeping with the characteristics described for similar designations in the East Clayton NCP.

The Land Use Plan for the East Clayton North Extension area is shown in Figure 2.1.

4.1 Residential

Approximately 35.5 hectares (87.6 acres) of the area are proposed for residential uses. A wide variety of residential forms, tenures and densities are proposed to provide a diversity of housing types, which are located within a 5 – 6 minute walking distance to amenities and services in a walkable neighbourhood format, including:

Low Density Residential (6 – 10 upa)

Includes single family homes with or without ancillary secondary suites or coach house units on lots ranging primarily from 320 square metres to 560 square metres (3,445 to 6,000 sq. ft.) in area. Consistent with the 2003 East Clayton NCP, a majority of these lots will have lane access. Duplexes will also be permitted.

Medium Density Residential (10 to 15 upa)

This designation would permit the development of primarily single-family homes with or without ancillary secondary suites or coach house units on narrow-deep lots. The narrow-deep lots would range in area primarily from 220 square metres 275 sq m (2,368 to 2,960 sq ft) and wide-shallow lots from 270 square metres to 285 square metres (2,905 to 3,068 sq. ft) with lane access.

Side-by-side duplexes (semi-detached dwellings) will also be permitted on lots ranging in area from 200 square metres to 226 square metres (2,150 to 2,430 sq. ft).

Medium-High Density Residential (15 – 25 upa)

Fee Simple Row Housing, duplexes, stacked townhouse and side-by-side duplexes (semi-detached dwellings) would be permitted under this designation.

"Manor Houses"

The Land Use Plan makes provision for four-plexes in the form of "manor houses" under the Medium-High Density Residential designation at specific locations. Manor houses, as a unique multiple residential building form, would resemble larger houses on fee simple lots with lane access and each lot having a minimum area of 555 square metres (5,975 sq ft). Each manor house would contain a maximum of four ground-oriented units. The intent of this form of

housing is to provide for increases in residential densities and housing options at appropriate locations such as on corner lots or along major roads such as 72 Avenue or where the built form of manor houses would be compatible with the character of the existing single family detached houses. As well, the scale and massing of the manor houses would be compatible with those of the existing houses on large lots to the south of 72 Avenue. The form and character of manor houses will be regulated through development permits and, in general, will be based on the design guidelines in the Official Community Plan for ground-oriented multiple residential buildings and supplementary guidelines contained in the East Clayton NCP.

Manor houses will generally incorporate the following characteristics:

- Each dwelling is directly and independently accessible from the street. Dwelling entries are dominant components of the building facades, contributing to the overall neighbourhood character and reinforcing a pedestrian-friendly streetscape.
- Porches and/or verandas are provided at all dwelling main entries.
- Gable roof forms and dormers are incorporated, as appropriate, within the overall design. Steep roof pitches of approximately 8:12 or more dominate building massing.
- Building and roofing materials are generally reflective of the regional heritage and climate and other secondary exterior materials are well integrated into the overall design.
- Any fencing provided along the street frontages, if considered necessary, will be designed to minimize visual impact on streetscapes and to allow surveillance of the street from the yards and dwellings.

High Density Residential (22 – 45 upa)

Row housing on small fee simple lots ranging in area from 165 square metres to 226 sq m (1,776 sq.ft. to 2,430 sq.ft.), stacked townhomes and apartments would represent the range of housing forms anticipated under this designation.

Mixed Use Commercial / Residential

The intent of this designation is to allow for residential units above ground floor commercial uses as an option for housing in the village center. The intent is to increase the viability of the commercial uses and to contribute to the vitality of the village centre. This designation is limited to a small area along 72 Avenue. The residential density is expected to be in the range of 25 to 45 units per acre (upa) within the context of a mixed use development.

4.2 Commercial

A total of 3.4 hectares (8.3 acres) of the East Clayton North Extension Plan area is designated for two types of commercial uses:

Mixed Use Commercial / Residential

The "main street" commercial centre located at 188 Street and 72 Avenue was identified in the 2003 East Clayton NCP as the key entry point to the neighbourhood and as the village centre of the future Clayton Community. Within the East Clayton North Extension Plan, this critical neighbourhood node is reinforced by the expansion of commercially designated lands at the northeast corner of the 188 Street and 72 Avenue intersection and by the location of high density residential uses nearby.

As described above, the mixed use commercial / residential designation is intended to support street-oriented commercial uses that are compatible with upper-story residential units to contribute to the intensity and activity of the village centre node.

Neighbourhood Commercial Uses

Two locations within the East Clayton North Extension Plan area are designated for this use: the "main street" commercial centre at 188 Street and a smaller centre at 192 Street on 72 Avenue. Additionally, small-scale commercial uses are also permitted in the Special Residential designations. The two commercial centres and the Special Residential designation are situated such that all residences are within a 5 to 6 minute walk of at least one commercial location. In recognition of the importance of the 196 Street / 72 Avenue intersection and to reinforce the commercial function of the Special Residential designation at 195 Street, a redesignation at 196 Street would be favourably considered to permit neighbourhood commercial.

The "main street" commercial centre at 188 Street and 72 Avenue will function both as a neighbourhood commercial centre and as the village centre of the greater Clayton community. The size and configuration of this commercial node will be subject of further review and further market analysis.

Form and character of commercial and multi-residential development will be regulated through development permits.

4.3 Special Residential

Special Residential (10 – 15 upa)

This designation allows ancillary low impact commercial uses to be accommodated within the residential units. It is proposed along 72 Avenue in two specific locations:

- Next to the village centre node at 188 Street to reinforce the mixed-use residential / commercial activities nearby; and
- At 195 Street to complement a similar designation to the south of 72 Avenue and to allow for small-scale businesses within the area to the east of 194A Street in support of the sustainable development principle that

commercial services should be available with a 5 to 6 minute walking distance of residences.

The commercial component will be permitted as an optional accessory use occupying a small part of a residential unit, built in the form of a townhouse, row house or a small single family detached house on a small lot. On-street parking, either within a right-of-way on private properties or as an additional road dedication, will be required for commercial customers.

4.4 Parks and Open Space

The East Clayton North Extension allocates a further 3.16 hectares (7.8 acres) of public open space to the overall, integrated East Clayton Neighbourhood. The components of the open space system serve a variety of amenity and green infrastructure purposes and build upon the existing and planned open space systems located south of 72 Avenue (e.g. the Terasen Gas Walkway, and the 194 Street Greenway Corridor, etc.). The following parks and open spaces are proposed on the East Clayton North Extension Land Use Plan:

1. Pocket park at 73 Avenue and 193 Street.

2. Neighbourhood park at 72A Avenue and 190 Street.

3. North-south linear park, east of 194A Street between 72 Avenue and 74 Avenue; and

4. Clayton Greenway located within the Terasen Gas Right-of-way.

4.5 Schools

The proposed size of the plan area's projected population may be sufficient to trigger the need for an additional school site; however, the School District has advised that there will be sufficient interim capacity available at the planned and existing school facilities south of 72 Avenue in the 2003 East Clayton NCP area. It is anticipated that any new school sites would be located further to the north of the East Clayton North Extension plan area.

Based on the estimated development yields, the Surrey School District anticipates approximately 350 elementary and 150 secondary students. The estimated impact on enrollment is based on the 'mid-range' development yield projections.

4.6 Circulation

Two significant public pedestrian / cyclist corridors are incorporated into the East Clayton North Extension Plan.

- The westerly corridor is combined with the Terasen Gas Right-of-Way, which transects the plan area in a north-westerly manner. At 20.0 m (65 ft.) in width, this corridor will accommodate a 4.0 m (12 ft.) multi-use pathway for pedestrians and cyclists. It will function as a core bicycle route for commuters, linking Clayton with Fleetwood and Surrey City Centre; and
- The easterly corridor is located within the north-south greenway to the east of 194A Street and extends through the plan area. This corridor varies from 20 m (66 ft.) to 35 m (115 ft.) in width and will be designed to accommodate pedestrians and cyclists as well as some neighbourhood park space.

Both of these major corridors are extensions of the multi-use pathway network identified within the 2003 East Clayton NCP. In addition to the major corridors the following linkages will assist in providing a fine-grained pedestrian network through the East Clayton neighbourhood. Also, in keeping with the 2003 East Clayton NCP objective of achieving a walkable community, all roads will accommodate sidewalks to assist pedestrian circulation.

1. 3-metre wide pathway along the north side of 73 Avenue to be located within the road dedication;

2. 3-metre wide pathway along the east side of 192 Street to be located within the road dedication;

3. 10-metre wide north-south corridors within private properties: one to the east of the Neighbourhood Commercial designation along 188 Street and the other north of and in line with 189 Street. These corridors will incorporate a 4-metre wide paved pathway with landscaping on each side of the pathway. Public rights-of-passage will need to be registered over these corridors to ensure public access.

4. 10-metre wide east-west corridor between 188 Street and the west-end of 72A Avenue. The corridor will be located on private properties. This will comprise a 4-metre wide paved path with landscaping on each side in the remaining area of the corridor. Alternatively, the portion of the corridor within the Neighbourhood Commercial designation could be designed as an integrated interior component of the commercial building (e.g. lobby, atrium, etc.). In this case, the requirement for a 4-metre path with landscaping on each side in that portion of the corridor need not apply, provided that the visual and functional continuity of public access is maintained in the design. A public right-of-passage will need to be registered over the entire corridor between 188 Street and 72A Avenue including over the portion of the corridor integrated as a component of the commercial building.

5. Pathway corridors are located in the area to the east of 192 Street. These pathways are described as follows:

   - The pathway corridor between 194 Street and 194A Street north of 73 Avenue will be a 4-metre wide dedicated walkway;

- The pathway corridor between 72 Avenue and 72A Avenue, located in line with the south end of 194 Street, will be within the existing 10-metre wide dedicated road corridor. It will comprise a minimum 4-metre wide paved path with grass in the remaining space within the corridor.
- The pathway corridor between 192 Street and 192A Street, located to the north of 72 Avenue, is envisioned to have 10 metres of overall width. This will comprise a 4-metre wide paved path with grass in the remaining area on each side of the path. This pathway could be either dedicated as a walkway to the City with consent of the City's Engineering Department, or held as private property with a public right-of-passage registered over it to ensure public access.
- The pathway corridor between 194A Street and 196 Street located at the east end of and in line with 74 Avenue. This pathway, to be located on private properties, will be at least 6 metre wide and comprise of a minimum 3 metre wide paved path with landscaping in the remaining space. From the pedestrian safety perspective, however, it is essential that due to the length of this corridor the 6-metre width is "visually" expanded by locating buildings at a minimum of 7.5 metres setback from the south line of the corridor and that no fence or structure is located closer than 4 metres from the corridor. It is envisioned that a total width of at least 20 metres for this corridor will be achieved in the future when an NCP is prepared for the area to the north.
- The pathway corridor located at the north end of 196 Street. This will be a 10-metre wide corridor comprising a 4-metre paved path with grass in the remaining width. In consideration of the existing residential lots on the Langley side, the location of the paved path within the corridor will be determined at the time of a development application in consultation with the City's Engineering Department.
- The pathway corridor between 194A Street and the north-south linear park to the east. This is envisioned as an internal pathway within the private development to facilitate access to 194A Street and the linear park for residents of the development. A public right-of-passage, therefore, is not necessary.

Summary of Land Use Statistics

The East Clayton North Extension Plan area contains approximately 43 hectares (107 acres) of land. Accounting for approximately 82% of land base allocation, residential use is the predominant land use type, followed by Park use at 10% and commercial use at 8%. Within the Residential category, there is a variety of land use designations to allow opportunities for a range of built form, density and tenure options in recognition of the East Clayton Principles of sustainability. In total, it is estimated that the residential development yield for the East Clayton North Extension will be approximately 1,300 units resulting a population of 3,700. Table 1 identifies the land use statistics for the East Clayton North Extension Plan.

Table 1
Land Use Statistics

Land Use	Area			Total No. Units						Total Net Area	Estimated Population
Residential	*Hectares*	*Acres*		*Low Density Range*	*# of Units*	*Base Density for Amenity Purposes*	*# of Units*	*High Density Range*	*# of Units*	*Percentage*	*(Average 2.8 persons/unit, based on low/mid range)*
Low Density (6 - 10 upa)	10.28	25.40		6	152	8	203	10	254	23.8%	569
Medium Density (10 - 15 upa)	11.09	27.40		10	274	12	329	15	411	25.7%	921
Medium-High Density (15 - 25 upa)	10.26	25.35		15	380	20	507	25	634	23.7%	1,420
High Density (22 - 45 upa)	2.17	5.36		22	118	30	161	45	241	5.0%	450
Mixed-Use (25 - 45 upa)	1.22	3.01		25	75	30	90	45	136	2.8%	253
Special Residential (10 - 15 upa)	1.37	3.39		10	34	10	34	15	51	3.2%	95
Total Residential	**36.39**	**89.92**			**1,034**		**1,324**		**1,727**	**84.2%**	**3,708**
Commercial			*FAR*				*Total (sq.m)*		*Total (sq.ft.)*	*Percentage*	
Mixed-Use Commercial	1.22	3.01	0.5				6,100		65,660	2.8%	
Neighbourhood Commercial	2.30	5.68	0.5				11,500		123,785	5.3%	
Total Commercial	**3.52**	**8.70**					**17,600**		**189,445**	**8.1%**	
Schools, Parks, Greenways and Riparian Areas											
Parks and Linear Open Space	2.92	7.22								6.8%	
192 Street Greenway	0.24	0.59								0.6%	
Total Schools, Parks, Greenways and Riparian Areas	**3.16**	**7.81**								**7.3%**	
Gas Right of way	**0.16**	**0.40**								**0.4%**	
Total	**43**	**107**								**100%**	

Part III Implementation

Amenity Contributions

Consistent with Surrey Council's policy regarding new urban areas, the amenity needs of the proposed East Clayton North Extension neighbourhood are to be addressed through monetary contributions payable at the time of rezoning, subdivision approvals or building permit issuance, whichever comes first. The monetary contribution is necessary to fund capital requirements for the provision of additional police service, fire protection and library services as well as the development of new park and open space facilities. The monetary contribution towards police, fire and library materials are required to offset capital costs of providing these services and are applied on a standardized basis throughout all Surrey NCPs. Monetary contributions toward park development are specifically derived by the specific open space needs of the plan area. The costs are divided among residential units or on the basis of acreage (for non-residential uses) to ensure an equitable contribution arrangement. Non-residential uses are exempted from contributing towards park amenities and library materials because these uses have minimal impact on these services.

4.1 Parkland Development

The estimated cost of developing parks and related amenities within the East Clayton North Extension area is approximately $1.28 million. The amenity contributions on a per unit basis is calculated at $964.00. A summary of the estimated park development costs is included as Table 2. This amount will be applied towards the development of:

- Major north / south linear park space to the east of 194 Street between 72 Avenue and 74 Avenue;
- Clayton Greenway (Terasen Gas right-of-way corridor);
- Neighbourhood active park at 72A Avenue and 190 Street;
- Pocket park at 73 Avenue and 193 Street;
- Natural Area management, where required; and
- Contribution to village centre amenities.

Table 2
Summary of Estimated Costs

CAPITAL COST ESTIMATE
EAST CLAYTON NORTH EXPANSION CONCEPT PLAN
PARK SITES, LINEAR PARK, GREENWAY, VILLAGE CENTRE

PARK WORKS

ITEM	DESCRIPTION	UNIT	EST. QTY.	UNIT PRICE	TOTAL
1	**POCKET PARK 73 AVE AT 193 ST**				
	design and construction of landscaping and walkways, tot lot	ls	1	$182,620.00	$182,620.00
	TOTAL - POCKET PARK SITE	***$182,620.00***			
2	**NEIGHBOURHOOD ACTIVE PARK 72A AVE AT 190 ST**				
	design and construction, neighbourhood amenities	ls	1	$282,750.00	$282,750.00
	TOTAL - PANORAMA	***$282,750.00***			
3	**LINEAR PARK 194A TO 74 AVE**				
	landscaping, pathway, fencing,	ls	1	$357,900.00	$357,900.00
	TOTAL - LINEAR PARK	***$357,900.00***			
4	**CLAYTON GREENWAY (GAS ROW)**				
	grading, seeding, multi-use pathway, fencing, planting	ls	1	$175,700.00	$175,700.00
	TOTAL - CLAYTON GREENWAY	***$175,700.00***			
5	**NATURAL AREA MANAGEMENT**				
	tree work and restoration where required	ls	1	$33,900.00	$33,900.00
	TOTAL - NATURAL AREA MANAGEMENT	***$33,900.00***			
6	**CONTRIBUTION TO VILLAGE CENTRE**				
	as per East Clatyon NCP (south)	ls	1	$77,000.00	$77,000.00
	TOTAL - VILLAGE CENTRE	***$77,000.00***			
				SUBTOTAL	$1,109,870.00
				15% CONTINGENCY	$166,480.50
				TOTAL	***$1,276,350.50***

The Land Use Plan proposes an Urban "landmark" within the round-about at 194A Street / 73 Avenue intersection. This is intended to be a public art feature. Its cost is not included in the park amenity cost estimate. Therefore, it will need to be provided through City's public art or capital construction programs, or through private section sponsorship.

4.2 Library Materials

The amenity contribution on a per unit basis (non-residential uses are exempt) is $127.30 resulting in an estimated total contribution of approximately $168,545 from this neighbourhood toward books, computers, CDs, etc. This amount is consistent with the 2003 East Clayton NCP.

4.3 Fire and Police Protection

The contribution for fire protection is $245.63 per residential unit and $982.85 per non-residential acre. Similarly, a contribution of $56.66 per dwelling unit and $227.48 per acre (non-residential use) will be required for Police Protection services. Based on estimated yields, the anticipated revenue would be approximately $333,765 and $76,997 for fire and police protection respectively.

4.4 Summary of Funding Arrangements

A summary of the applicable amenity contributions (per dwelling unit or hectare / acre) and the estimated revenue the City can expect to receive from the East Clayton North Extension Neighbourhood Concept Plan area is illustrated in Table 3. The amounts are calculated in 2005 dollars.

Surrey City Council's policy is to require each new neighbourhood to contribute toward the provision of amenities in the neighbourhood. The proposed amenity contributions for the East Clayton North Extension area will be collected for each new dwelling unit or lot and for each new commercial and institutional development on a per acre basis. The money will be used toward park development and upgrading of fire, police and library services.

Table 3
East Clayton North Extension Amenity Contributions

Amenity	Residential Contribution (Per Dwelling unit) (± 1324 units)	Non-Residential Contribution (Per Acre) (± 8.70 acres)
Parks and Greenway (BC Gas R.O.W.)	$964.00	N/A
Police Protection	$56.66	$227.48
Fire Protection	$245.63	$982.85
Library Materials	$127.30	N/A
Total	**$1,393.59** **Per unit**	**$1,210.33** **Per acre**

The above-noted per unit amenity contributions are derived from estimated base densities in the residential designations and the number of dwelling units (excluding any coach houses and secondary suites) anticipated (Table 2 in Part II). The estimated costs of the various amenities are distributed evenly to each dwelling unit. Similarly to the 2003 East Clayton NCP, should the number of dwelling units in a proposed development be lower than anticipated, the applicant would be expected to pay the amenity fees based on the number of the dwelling units anticipated to ensure that there is no shortfall in the funding for the proposed amenities.

OCP and Zoning Bylaw Amendments

4.5 Amendments to the Official Community Plan (OCP)

Where amendments to the Official Community Plan are required to implement this Plan (e.g. redesignation from Suburban to Multiple Residential), they should occur on a site-by-site basis in conjunction with the related development application review process to ensure that the redesignated area conforms to the actual site.

4.6 Neighbourhood Concept Plan Amendments

Any proposed minor and major amendments to the East Clayton North Extension Neighbourhood Concept Plan will be undertaken in accordance with the policy to amend secondary plans contained in Part 5, Division A of the Official Community Plan.

4.7 Amendments to Surrey's Zoning Bylaw (No. 12000)

Pursuant to Sections 496 and 904 of the Local Government Act, most zones in Surrey's Zoning Bylaw, 1993 No. 1200 stipulate a maximum density, which may be increased to a higher prescribed density if amenity contributions identified in an approved Neighbourhood Concept Plan and incorporated into the Zoning By-law are made by the applicant. Accordingly, an amendment bylaw is necessary to incorporate the recommended amenity contributions for the East Clayton North Extension NCP.

Development Permit Area Guidelines

The Development Permit guidelines contained in the City of Surrey OCP will apply to all proposed Multiple Residential and Commercial Development within the East Clayton North Extension. Additionally, the policy guidelines for manor houses contained within Part II of this document and all applicable guidelines in Part 3 of the 2003 East Clayton NCP will supplement the OCP Development Permit Guidelines.

4. Green Performance Standards

Part 4.0 of the 2003 East Clayton NCP describes green infrastructure performance standards and guidelines for the following:

- Urban forestry on building sites;
- Stormwater shallow infiltration Best Management Practices (BMPs);
- Soil preservation;
- Urban forestry with road right-of-ways; and
- Pedestrian / cyclist corridors.

As an extension of the 2003 East Clayton NCP, developments in the NCP Extension north of 72 Avenue are required to follow the performance standards and guidelines described in the 2003 East Clayton NCP.

5. Servicing, Phasing and Financing

5.1 Future Development North and/or West of Servicing Boundary

As described in Section 1.4, there are physical and technical limitations that determine the serviceability of lands from existing / planned infrastructure south of 72 Avenue. On the basis of available information there are no anticipated changes to the servicing boundary. However, detailed engineering design required at the time of development will be used to confirm servicing catchment boundaries.

Land situated beyond the service boundary identified with the East Clayton North Extension NCP represent a different sanitary catchment area and stormwater drainage basin which flow generally north and west of the East Clayton North Extension area.

Though some of these lands are designated within the Clayton General Land Use Plan as “Future Urban”, the development of these lands will require a new and complete Neighbourhood Concept Plan to determine land use and a servicing strategy within the context of an appropriate public consultation process.

Part IV Servicing Plan

This engineering servicing analysis reviews and describes the impact of the proposed East Clayton Expansion to the North of 72 Avenue (the study area) on the original 2003 East Clayton NCP engineering servicing concepts, including proposed recommendations for servicing upgrades and amendments and an analysis of the cost implications associated with the proposed changes.

The 2003 East Clayton NCP engineering servicing plan prepared by Earth Tech Canada Inc. was developed and adopted by the City of Surrey in March, 2003. This engineering servicing plan was developed to support the 2003 East Clayton NCP Land Use Plan and to provide engineering design guidelines for the development of the proposed neighbourhood expansion.

Sanitary Sewer

4.1 Background

The 2003 East Clayton NCP area is to be serviced by two existing sanitary sewer systems that eventually discharge flows westward into the existing GVS & DD regional trunk sewer located along 56 Avenue as shown in Figure 7.3.1 prepared by Earth Tech Canada Inc.

The eastern region of the NCP, Catchment A (187 ha) can drain south via the proposed 194 Street and 196 Street sanitary sewers, which will convey sewerage flows south of 64 Avenue at 196 Street to the existing GVRD regional trunk sewer.

The western region of the NCP, Catchment B (114 ha) conveys sanitary sewer flows into the existing 68 Avenue trunk sewer located west of 188 Street. This existing trunk sewer discharges flows to an existing interim pump station located at 176 Street. Sewerage flows are pumped south via an existing forcemain from the interim pump station to the GVS & DD regional trunk sewer.

It should be noted that the interim pump station located at 176 Street has a capacity of 68 l/s and will be upgraded, in the future, to an ultimate capacity of 400 l/s.

The study area, west of 192 Street north of 72 Avenue, is to be serviced by the existing sanitary sewer system on 188 Street and 68 Avenue and the study area east of 192 Street is to be serviced by the proposed NCP sanitary sewers on 194 Street, 194A Street and 195 Street and 196 Street, as shown in *Figure 4.1.1* and *Figure 4.1.4*.

Ultimate and existing flows for the existing sanitary sewers on 196 Street from 64 Avenue to 52 Avenue for the east catchment and for the existing sanitary sewers on 188 Street from 70 Avenue to 68 Avenue and 64 Avenue from 188 Street to 176 Street /

68 Avenue pump station were calculated. The capacity of these existing sanitary sewers were re-calculated based upon current land use and actual build-out densities including the additional sewerage flows from the proposed study area north of 72 Avenue. *Table 4.1.1* summarizes the maximum capacity of both existing sanitary sewer systems and compares them to the original NCP ultimate flows, as a result of the proposed expansion of the NCP area to the north of 72 Avenue.

Table 4.1.1 – Existing Trunk Sewer Capacity

Catchment	Sewer Section	Original NCP Ultimate Flows (L/s)	Revised NCP Ultimate Flows (L/s)	Max. Proposed Pipe Capacity 70% full (L/s)*
East	196 St (64 Ave to Fraser Hwy)	182	190	213
	196 St (Fraser Hwy to Langley By-Pass	199	207	213
	196 St. (Langley By-Pass to 54 Ave)	203	211	361
West	188 St (70 Ave to 68 Ave)	69	69	105
	68 Ave (188 St to 184 St)	138	110	125
	68 Ave (184 St to 176 St P/S)	250	250	250
	176 St Pump Station Upgrade	400	400	400

- Pipe capacity based upon 70% pipe depth flow

As shown in this table, the existing 68 Avenue trunk sanitary sewer can accommodate additional flows from the NCP area including the proposed expansion area north of 72 Avenue without the need for upgrading. However, the existing section of 300 mm diameter sanitary sewer at 188 Street between 70 Avenue and 68 Avenue will require upgrading as originally proposed by the 2003 East Clayton NCP.

The sanitary sewers on 196 Street between 64 Avenue and 54 Avenue still require upgrading as originally proposed by the 2003 East Clayton NCP.

It should be noted that there is a small increase of 2 L/sec in ultimate flows from the east catchment at 64 Avenue and 196 Street as a result of the NCP expansion north of 72 Avenue.

4.2 Design

The sizing of the proposed and existing sewers for the study area is based upon the City of Surrey 2004 Design Criteria and land use design populations.

It should be noted that the City of Surrey Design Criteria includes school land use within the institutional land use category utilizing an equivalent design population of 50 persons/hectare. This equivalent design population has been used for the proposed elementary and secondary schools located within the 2003 East Clayton NCP area and not the projected student populations.

The original 2003 East Clayton NCP sanitary sewer servicing report prepared by Earth Tech Canada Inc. included a detailed sanitary sewer sizing analysis based upon the original proposed East Clayton Land Use Plan, which was adopted in March 2003. In June 2004 McElhanney Consulting Services Ltd. prepared a revised sanitary sewer catchment plan and detailed sanitary sewer capacity analysis for both the west and east catchment regions of the NCP including the proposed expansion study area north of 72 Avenue. The purpose of the analysis was to analyze boundary and zoning changes that had occurred since March 2003, based upon constructed developments and development applications in process with the City. The boundary changes to the west catchment area included the addition of the 2003 East Clayton NCP expansion area north of 72 Avenue west of 192 Street, the East Clayton expansion area west of 188 Street and the BFW Development Ltd. single family subdivision area located at the northwest corner of 68 Avenue and 192 Street, all as shown in *Figure 4.1.2*. The boundary changes to the east catchment area included the addition of 2003 East Clayton NCP expansion area to the north of 72 Avenue east of 192 Street and the deletion of the BFW Developments Ltd. single family subdivision area. In addition, to the above there are internal routing changes, within the east catchment area that specifically addresses routing around the 194A Street gore and re-routing of sewers on 192 Street north of the major gas line crossing to avoid conflicts and excessively deep sewers, all as shown on *Figure 4.1.3*. These changes in land use, catchment boundary line locations and routing alignment changes resulted in adjustments to population calculations and sewerage flows. The design population calculations were based upon the actual units, lots built or land use designation for properties that have not yet applied for development using the following reproduced tables from the 2003 East Clayton NCP (Table 7.3.2 and Table 7.3.3).

2003 East Clayton NCP Table 7.3.2

Land Use	Maximum Units (per acre)	Design Population (Capita per unit)	Design Population (Capita per ha)
Work/Live	25	2.8	173
Live/Work	25	2.8	173
100 ft Frontage Lots	7	3.2	55
6-10 u.p.a.	10	3.2	79
10-15 u.p.a.	15	3.2	119
15-25 u.p.a.	25	2.8	173
25-45 u.p.a.	45	2.0	222

Land Use	Maximum Units (per acre)	Design Population (Capita per unit)	Design Population (Capita per ha)
Special Community	15	2.0	74
Commercial/Residential	15	2.0	74
Neighbourhood Comm.	15	2.0	74
Techno/ Business Park	18	2.0	89
Institutional	10	2.0	50

2003 East Clayton NCP Table 7.3.3

Type of School	Population (pupils per school)	Approximate Area (ha)	Equiv. Land Use (population/ha)
Elementary	500	4.3	50
Secondary	1200	8.0	50

The servicing concept for the 2003 East Clayton NCP expansion north of 72 Avenue was developed taking into consideration the topography of the area, 5.0 meter maximum deep sewers along 72 Avenue and 194A Street, major pipe crossings and receiving capacity of off-site and downstream trunk sewers. Services will be designed to accommodate basements and basements will be serviced through gravity sewers as per the design criteria.

The recommended layout of local collector sewers for the proposed expansion north of 72 Avenue is shown on *Figure 4.1.1*. The design population by land use designation was used to re-calculate the individual sub-catchment populations for both west and east catchment areas for the entire NCP. The revised population calculation for the each region including the study area population is shown in the following tables:

East Catchment Area Population Table

Area #	Area (ha)	Area (acres)	Zoning	Lots or Units	Population per unit or lot	Population Increment	Total Area Population
1	9.84	24.30	RF-9/RF-12	81*	3.2	259	
1		9.20	15 - 25 upa	230	2.8	644	903
2	19.10	47.18	RF9/RF-12	277*	3.2	886	
2		1.20	20 upa	24	2.8	67	
2		4.60	15 - 25 upa	115	2.8	322	1276
3	9.02	22.28	RF-9/RF-12	101*	3.2	323	

Area #	Area (ha)	Area (acres)	Zoning	Lots or Units	Population per unit or lot	Population Increment	Total Area Population
3		1.38	15 - 25 upa	35	2.8	97	
3		0.87	Com15 upa	13	2.0	26	446
4	13.86	34.23	RF-9/RF-12	235*	3.2	752	752
5	1.92	4.74	RF-9/RF12	35*	3.2	112	112
6	4.44	10.97	RF-9/RF-12	12*	3.2	38	
6			15 – 25 upa	144*	2.8	403	442
7	18.20	44.95	RH	64*	3.2	205	205
7A	2.35	5.80	RH	8*	3.2	26	26
8A	6.00	14.82	RF-9/RF-12	48*	3.2	154	
8A		5.35	15 – 25 upa	134	2.8	375	528
8B	1.87	4.62	RF-9/RF-12	31*	3.2	99	99
8C	0.47	1.16	RF-9/RF-12	10*	3.2	32	32
8D	1.68	4.15	15 – 25 upa	74*	2.8	207	207
9	5.03	12.42	RF-9/RF12	80*	3.2	256	256
10	7.37	18.2	School/Park	7.37	50	331	331
11	5.45	13.46	15 – 25 upa	98*	2.8	274	274
12	4.11	10.15	RF-9/RF-12	15*	3.2	48	
12			15 – 25 upa	112*	2.8	314	
12		1.00	15 – 25 upa	25	2.8	70	432
13	19.82	48.96	RF-9/RF-12	89*	3.2	285	
13		35.46	Tech. Park	638	2.0	1277	1561
14		9.00	15 – 25 upa	225	2.8	630	
14		4.40	25 – 45 upa	198	2.0	396	1026
15	9.84	24.30	RF-9/RF-12	98*	3.2	314	
15		4.44	15 – 25 upa	111	2.8	311	
15		0.89	25 – 45 upa	40	2.0	80	705
16	13.94	34.43	RF-9/RF-12	117*	3.2	374	
16		4.44	15 – 25 upa	111	2.8	311	
16		0.89	25 – 45 upa	40	2.0	80	765
17	4.65	11.49	RF-9/RF-12	60*	3.2	192	
17		2.32	25 – 45 upa	58	2.8	162	354
18		8.00	15 – 25 upa	200	2.8	560	560
19		6.60	15 – 25 upa	165	3.8	627	627
20		3.80	15 –25 upa	95	2.8	266	
20		3.40	25 45 upa	153	2.0	306	572

Area #	Area (ha)	Area (acres)	Zoning	Lots or Units	Population per unit or lot	Population Increment	Total Area Population
21		9.00	25 45 upa	405	2.0	810	810
22		2.00	Com 15 upa	30	2.0	60	60
23		4.58	25 –45 upa	206	2.0	412	
23		2.00	Com 15 upa	30	2.0	60	472
24	4.02	9.93	RF-9/RF-12	40*	3.2	128	
24		2.95	15 – 25 upa	74	2.8	207	335
25		1.80	15 - 25	45	2.8	126	335
							14,293

* denotes actual number of units or lots built or under application

West Catchment Area Population Table

Area #	Area (ha)	Area (ac)	Zoning	Lots or Units	Population per unit or lot	Population Increment	Total Area Population
1	10.82		RF-9	42*	3.2	134	
1		12.33	10-25 upa	308	2.8	863	
1		3.36	Com 15 upa	50	2.0	101	1098
2	1.97		RF-9	31*	3.2	99	99
3	4.30		School		50	194	
3			RF-9/RF-12	53*	3.2	170	364
4	3.86		RF-9/RF-12	63*	3.2	202	202
5	5.70		RF-9/RF-12	103*	3.2	330	
5		1.07	10-25 upa	27	2.8	75	405
6	4.30		RF-9/RF-12	54*	3.2	173	173
7	9.54		RF-9/RF-12	134*	3.2	429	429
8	4.98		RF-9/RF-12	59*	3.2	189	
8		3.50	10-25 upa	81*	2.8	227	416
9	1.68		RF-9/RF-12	20*	3.2	64	
9		0.65	10-25 upa	13*	2.8	36	100
10	10.24		RF-9/RF-12	171*	3.2	547	547
11	2.30		RF-9/RF-12	45*	3.2	144	144
12	8.02		RF-9/RF-12	36*	3.2	115	
12			10-25 upa	35*	2.8	98	
12		7.7	Com 15 upa	116	2.0	232	444
13		1.98	Com 15 upa	30	2.0	60	60
14A	3.19		10-25 upa	164*	2.8	459	459
14B	1.62		25-45 upa	96*	2.0	192	192

Area #	Area (ha)	Area (ac)	Zoning	Lots or Units	Population per unit or lot	Population Increment	Total Area Population
15	6.2		School		45	279	
15		1.32	10-25 upa	33	2.8	92	371
16		3.01	10-25 upa	75	2.8	211	
16		9.04	Com 15 upa	136	2.0	271	
16		6.21	Inst 10 upa	62	2.0	124	
16		4.10	Park	0	0	0	606
17	2.63		RF-9/RF-12	50*	3.2	160	160
18		7.16	Com 15 upa	107	2.0	214	214
19		3.61	Com 15 upa	54	2.0	108	108
20		0.52	Com 15 upa	8	2.0	16	
20		7.30	Inst 10 upa	73	2.0	146	
20		8.11	Pond Area	0	0	0	162
21		20.00	Park	0	0	0	
21		7.96	25-45 upa	318	2.0	637	637
Total							7442

* denotes actual number of units or lots built or under application

The above sub-catchment populations were used to generate the detailed sanitary sewer capacity analysis, as shown on *Table 4.1.2* and *Table 4.1.3*.

4.3 Local Sanitary Sewers

Development of the 2003 East Clayton NCP expansion area north of 72 Avenue will be serviced by local sewer systems draining to trunk sewers that were proposed by the original NCP, with the exception of some new additional downstream trunk sewers generated by the increase in flows from the east catchment of the NCP expansion area north of 72 Avenue. *Table 4.1.2* and *Table 4.1.3* summarize peak flows for local and trunk sewers for each sub-catchment for both the west and east catchment areas.

It should be noted that the northerly servicing boundary was set by limiting the depth of the proposed gravity sewer to a maximum of 5.0 meters deep at the intersection of 72 Avenue and 195A Street and the intersection of 72 Avenue and 194A Street. In addition other factors that determined the limit of the servicing boundary included the topographical constraints where the area contours plateau above 72 Avenue and begin to fall away to the north at 74 Avenue. The servicing boundary west of 191 Street is limited by the existing 1050 mm diameter and 450 mm diameter major trunk gas lines that prevent the crossing of a proposed sanitary sewer and storm sewer pipes. Profiles of 188 Street, 192 Street and 194A Street showing the existing ground line, proposed ground line and proposed sanitary/storm sewer grades are shown in *Figure 4.1.5, Figure 4.1.6 and Figure 4.1.7*.

4.4 Impact on East Clayton Trunk Sanitary Sewers

(a) Internal NCP Trunk Sewers

The original 2003 East Clayton NCP identified the following seven gravity trunk sewer sections inside the NCP boundaries:

- 68 Avenue from 193 Street to 194 Street;
- 194 Street from 68 Avenue to 64 Avenue;
- 64 Avenue from 194 Street to 196 Street;
- 65 Avenue from 192 Street to 194 Street;
- 196 Street from 65 Avenue to 64 Avenue;
- 188 Street from 70 Avenue to 68 Avenue; and
- 68 Avenue west from 188 Street.

The impact of the proposed NCP area expansion north of 72 Avenue on the original NCP infrastructure servicing and these seven sections of trunk sewer is described in the following sections.

1. West Catchment

The original 2003 East Clayton NCP recommended that one section of existing 300 mm diameter trunk sanitary sewer on 188 Street between manhole nodes B27 and B26, as shown on *Figure 4.1.2*, will be marginally undersized for maximum peak flows and require upsizing. In addition, the NCP also recommended that three sections of existing 375 mm diameter sanitary sewer on 68 Avenue between manhole nodes B22 to B25, as shown on *Figure 4.1.4*, will be undersized for maximum peak flows and require upsizing.

Based upon the revised sanitary sewer study prepared by McElhanney, it was confirmed that that the section of sanitary sewer on 188 Street between manhole nodes B27 and B26 will be marginally undersized for maximum peak flows, as shown on *Figure 4.1.4*. However, due to a zoning discrepancy with the original Earth Tech calculations, it was determined that the three existing sections of 375 mm diameter sanitary sewer on 68 Avenue between manhole nodes B22 to B25 were not undersized and do not require upsizing.

2. East Catchment

The original 2003 East Clayton NCP recommended the construction of six internal trunk sewer sections to service the west catchment to 64 Avenue at 196 Street. Based upon the addition of the proposed expansion area north of 72 Avenue and

some recommended additional re-routing. It should be noted that the total revised population for the east catchment area including the proposed NCP expansion area north of 72 Avenue was calculated to be 14,293 compared to the original NCP calculated population of 14,453 to avoid increases in ultimate downstream sewerage flows via off-site trunk sewers. The impact on the original NCP sanitary sewer system is as follows:

- Addition of a 300 mm diameter trunk sewer on 196 Street from 68 Avenue to 65 Avenue due to increased flows;
- Reconstruction of existing local sewers on 194A Street from 72 Avenue to 70 Avenue;
- Increased pipe depth on 195 Street from 72 Avenue to 70 Avenue.

It should be noted that the reconstruction of the existing section of the local sanitary sewer on 194A Street is required to provide deeper sewers accommodate the proposed catchment area north of 72 Avenue.

(b) Off-Site Trunk Sewers

Based upon the proposed revised sanitary service plan and original 2003 East Clayton NCP the impact of developing the proposed study area will have no adverse impact on the original 2003 East Clayton NCP servicing off-site trunk sewers since proposed ultimate sewerage flows can be accommodated within the downstream trunk sewers as shown in *Table 4.1.1*.

Figure 4.1.1
Sanitary Sewer Servicing Plan

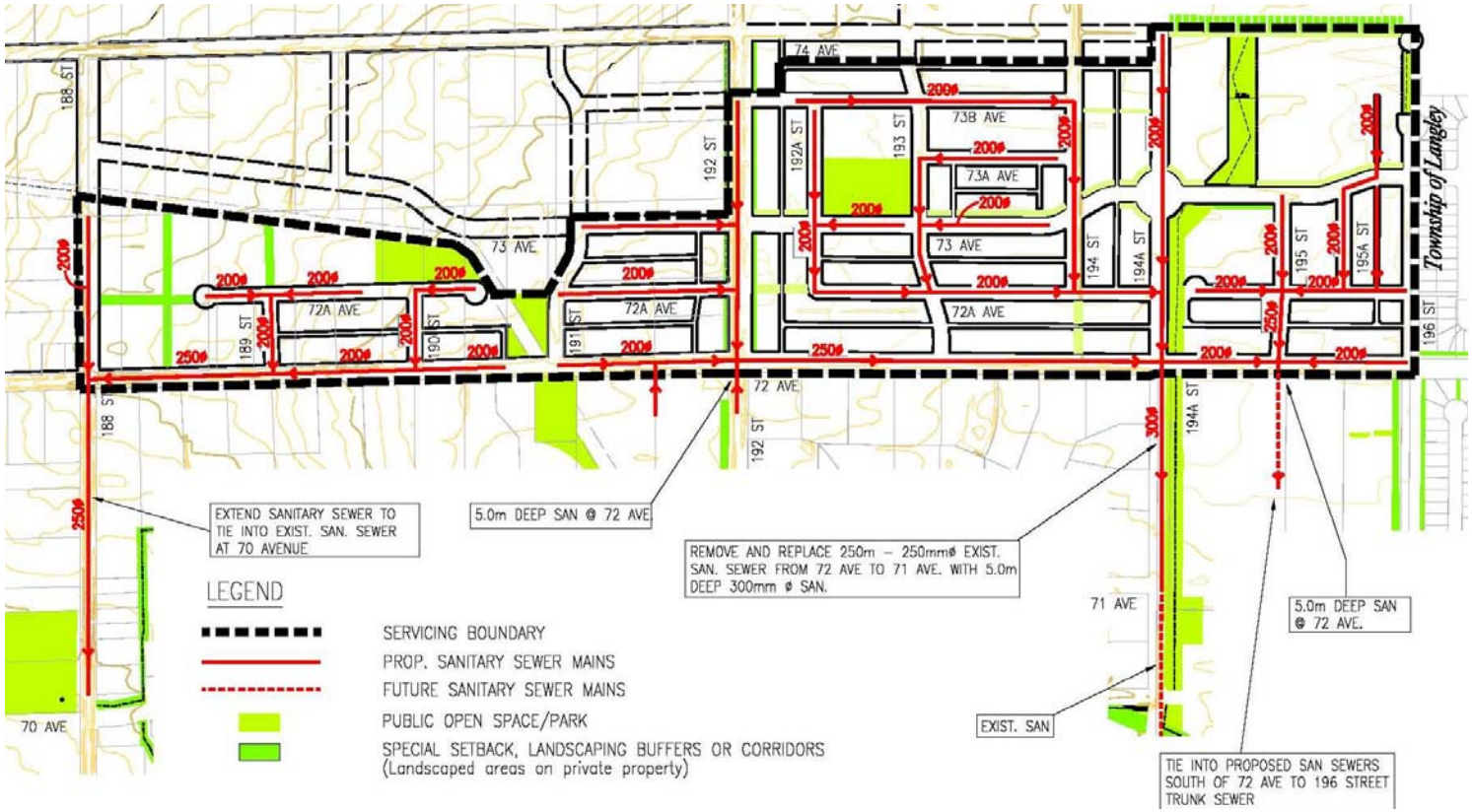


Figure 4.1.2
Sanitary Sewer Boundary – West Catchment

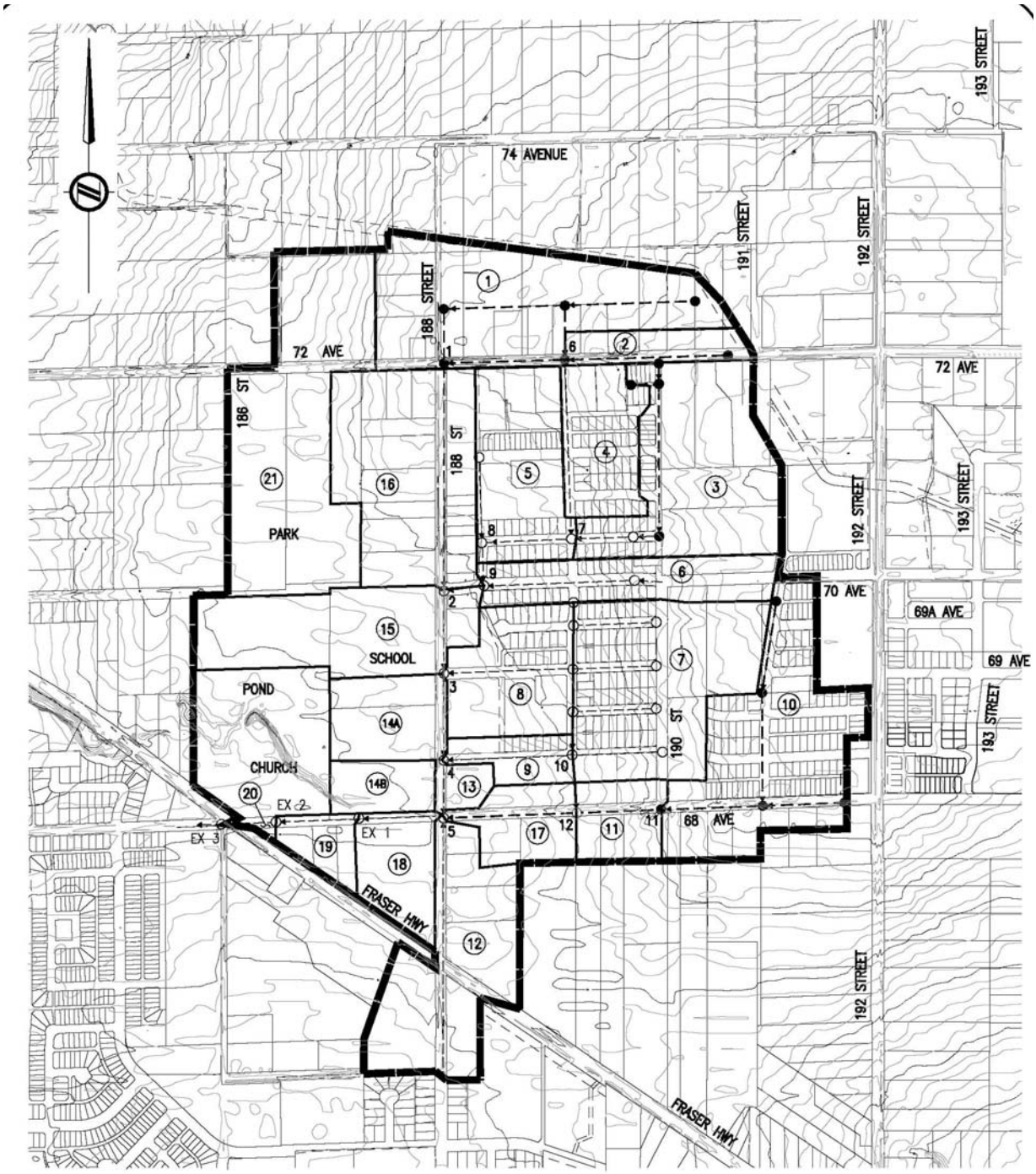


Table 4.1.2
Sanitary Sewer Capacity Analysis – West Catchment

ULTIMATE SANITARY CATCHMENT SYSTEM DESIGN – CALCULATION SHEET

PROJECT No.: 2111-02089-1 | SHEET: 1 of 1 | Date: Feb., 2005 | PREPARED BY: R.S. | CHECKED BY: F.S.

Location			Area		Population		Design Flow	Pipe Data						Design Checks
Area #	From MH	To MH	Increment Area (ha)	Total Area (ha)	Increment Population	Total Population	Design Flow (l/s)	Pipe Capacity (100% Full) (l/s)	Friction Factor n	Pipe Slope (%)	Pipe Diameter (m)	Pipe Length (m)	Depth Flow (%)	Full Velocity (m/s)
2	START	S6	1.97	1.97	99	99	1.96	31.115	0.013	0.90%	0.200	224	15%	0.99
1	S6	S1	10.82	12.79	1098	1197	19.83	42.050	0.013	0.50%	0.250	100	44%	0.86
16	S1	S2	9.50	22.29	607	1804	29.35	88.628	0.013	0.84%	0.300	409	40%	1.25
15	S2	S3	7.16	52.51	402	3425	53.88	114.826	0.013	1.41%	0.300	151	48%	1.62
	S3	S4	0.00	57.49	0	3841	59.56	68.378	0.013	0.50%	0.300	155	72%	0.97
13, 14A	S4	S5	3.99	63.16	602	4543	68.61	68.378	0.013	0.50%	0.300	99	82%	0.97
14B, 18	S5	EX1	4.52	100.41	407	6674	97.55	121.472	0.013	0.48%	0.375	150	68%	1.10
19	EX1	EX2	1.46	101.87	108	6782	98.92	130.028	0.013	0.55%	0.375	151	65%	1.18
20	EX2	EX3	3.16	105.03	163	6945	101.11	125.211	0.013	0.51%	0.375	152	68%	1.13
21	EX3	EX4	11.76	116.79	637	7582	109.52	181.363	0.013	1.07%	0.375	106	56%	1.64
4	START	S7	3.86	3.86	202	202	3.89	23.192	0.013	0.50%	0.200	100	25%	0.74
5	S7	S8	5.70	18.76	459	1046	18.48	32.798	0.013	1.00%	0.200	100	53%	1.04
	S8	S9		18.76	0	1046	18.48	25.406	0.013	0.60%	0.200	77	61%	0.81
6	S9	S2	4.30	23.06	173	1219	21.47	29.336	0.013	0.80%	0.200	76	62%	0.93
3	START	S7	9.20	9.20	385	385	7.48	23.192	0.013	0.50%	0.200	100	35%	0.74
8	START	S3	4.98	4.98	416	416	7.41	20.744	0.013	0.40%	0.200	218	45%	0.66
10	START	S11	10.24	10.24	547	547	10.09	51.859	0.013	2.50%	0.200	180	30%	1.65
11	S11	S12	2.30	12.54	144	691	12.54	55.854	0.013	2.90%	0.200	153	33%	1.78
17	S12	S5	2.63	24.71	160	1280	22.54	50.811	0.013	2.40%	0.200	243	45%	1.62
7	START	S10	9.54	9.54	429	429	8.20	32.798	0.013	1.00%	0.200	100	33%	1.04
	S10	S12	0.00	9.54	0	429	8.20	46.384	0.013	2.00%	0.200	100	28%	1.48
12	START	S5	8.02	8.02	444	444	8.23	23.192	0.013	0.50%	0.200	450	40%	0.74
9	START	S4	1.68	1.68	100	100	1.94	59.467	0.013	1.00%	0.250	100	20%	1.21

Figure 4.1.3
Sanitary Sewer Boundary – East Catchment

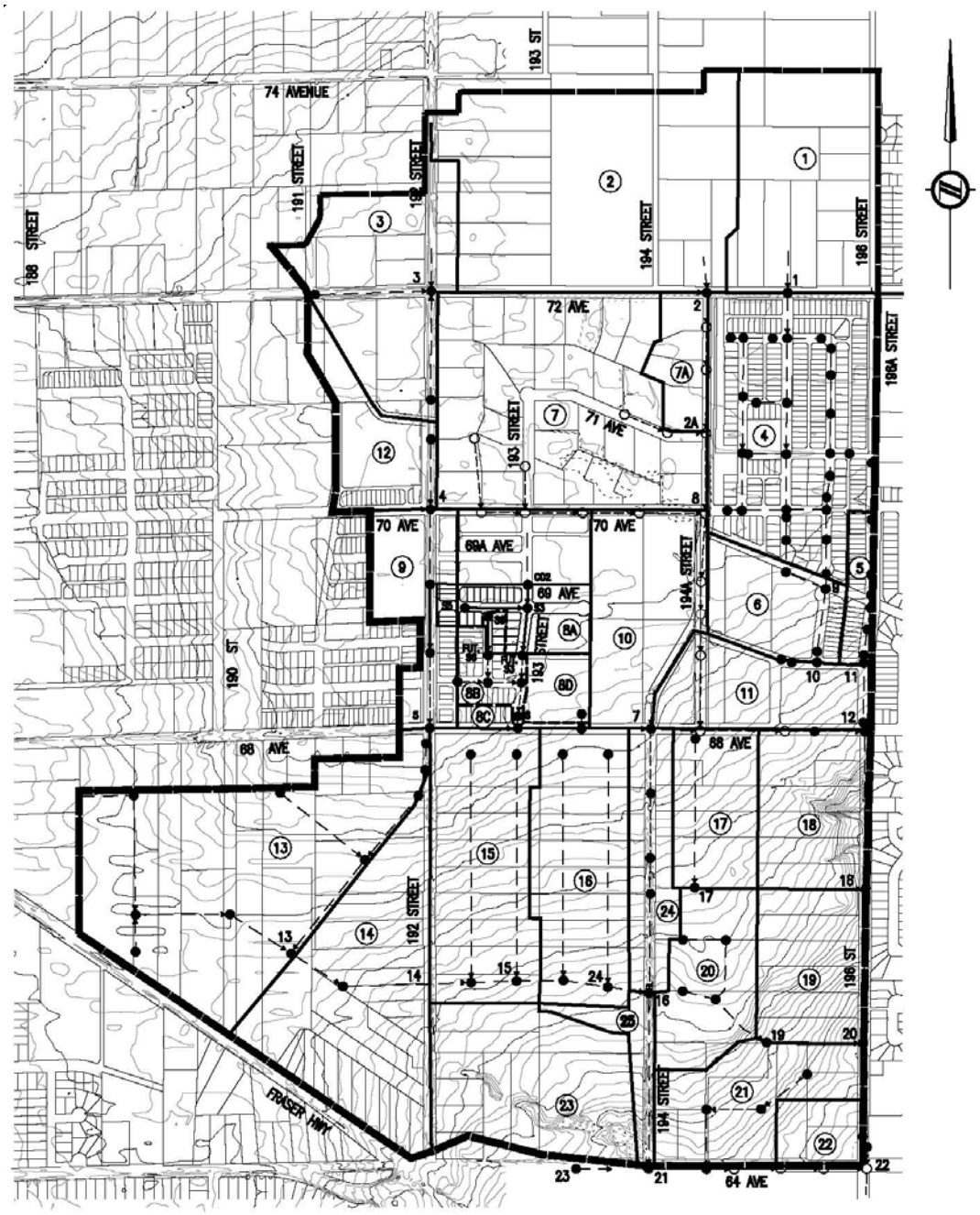


Table 4.1.3
Sanitary Sewer Capacity Analysis – East Catchment

ULTIMATE SANITARY CATCHMENT SYSTEM DESIGN - CALCULATION SHEET

PROJECT No.: 7803-0166-00														SHEET: 1 of 1
PROJECT DESCRIPTION: 29 Lot Subdivision														Date: June, 2004
DEVELOPER: PLATINUM ENTERPRISES LTD.														PREPARED BY: R.S.
PROJECT LOCATION: North of 69 Avenue, West of 192 Street														CHECKED BY: F.S.
Location			Area		Population		Design Flow	Pipe Data						Design Checks
Area #	From MH	To MH	Increment Area (ha)	Total Area (ha)	Increment Population	Total Population	Design Flow (l/s)	Pipe Capacity (100% Full) (l/s)	Friction Factor n	Pipe Slope (%)	Pipe Diameter (m)	Pipe Length (m)	Depth Flow (%)	Actual Velocity (m/s)
12	START	4	4.11	4.11	432	432	7.54	23.192	0.013	0.50%	0.200	400	40%	0.67
9	4	5	5.03	9.14	256	688	12.05	32.572	0.013	0.30%	0.250	408	40%	0.60
8C	5	6	0.47	9.61	32	720	12.58	84.100	0.013	2.00%	0.250	164	26%	1.23
8D	6	7	1.68	19.16	207	1554	25.58	57.962	0.013	0.95%	0.250	274	46%	1.14
24	7	16	4.02	79.22	335	4173	66.34	136.755	0.013	2.00%	0.300	490	49%	1.92
25	16	21	1.87	137.84	126	8356	120.49	244.835	0.013	1.95%	0.375	320	50%	2.21
21	21	22	6.38	153.81	810	9638	135.92	255.006	0.013	0.80%	0.450	100	52%	1.63
	22	FINISH		213.06	0	14294	189.71	337.342	0.013	1.40%	0.450	100	54%	2.18
3	START	3	9.02	9.02	446	446	8.39	19.404	0.013	0.35%	0.200	100	45%	0.60
2	3	2	19.10	28.12	1276	1722	29.00	68.378	0.013	0.50%	0.300	511	45%	0.92
7A	2	2A	2.35	30.47	26	1748	29.66	64.144	0.013	0.44%	0.300	267	47%	0.88
7	2A	8	18.20	48.67	205	1953	34.74	68.378	0.013	0.50%	0.300	146	49%	0.96
10	8	7	7.37	56.04	331	2284	40.02	77.963	0.013	0.65%	0.300	426	49%	1.10
1	START	1	9.84	9.84	903	903	15.28	42.050	0.013	0.50%	0.250	100	42%	0.79
4	1	9	13.86	23.70	752	1655	27.53	68.378	0.013	0.50%	0.300	623	43%	0.91
6	9	10	4.44	28.14	442	2097	33.97	172.983	0.013	3.20%	0.300	143	30%	1.90
	10	11		28.14	0	2097	33.97	96.701	0.013	1.00%	0.300	93	41%	1.25
11	11	12	5.45	35.51	274	2483	39.92	198.177	0.013	4.20%	0.300	120	30%	2.18
18	12	18	6.01	41.52	560	3043	47.75	136.755	0.013	2.00%	0.300	295	41%	1.78
19	18	20	5.68	51.85	627	4024	61.02	136.755	0.013	2.00%	0.300	285	47%	1.88
22	20	22	1.96	59.25	60	4656	69.42	156.820	0.013	0.80%	0.375	226	47%	1.38
5	START	11	1.92	1.92	112	112	2.17	46.384	0.013	2.00%	0.200	688	15%	0.76
13	START	13	19.82	19.82	1561	1561	25.76	47.944	0.013	0.65%	0.250	100	52%	0.99
14	13	14	13.15	32.97	1026	2587	40.91	88.204	0.013	2.20%	0.250	265	47%	1.75
15	14	15	9.84	42.81	705	3292	50.99	94.026	0.013	2.50%	0.250	205	52%	1.94
16	15	24	13.94	56.75	765	4057	62.05	74.277	0.013	0.59%	0.300	190	70%	1.18
	24	16		56.75	0	4057	62.05	74.277	0.013	0.59%	0.300	100	70%	1.18
23	START	23	9.59	9.59	472	472	8.87	23.192	0.013	0.50%	0.200	100	43%	0.69
	23	21		9.59	0	472	8.87	23.192	0.013	0.50%	0.200	100	43%	0.69
17	START	17	4.65	4.65	354	354	6.41	32.798	0.013	1.00%	0.200	100	30%	0.81
	17	18		4.65	0	354	6.41	82.974	0.013	6.40%	0.200	198	19%	1.55
20	START	19	5.44	5.44	572	572	9.84	32.798	0.013	1.00%	0.200	100	38%	0.91
	19	20		5.44	0	572	9.84	81.667	0.013	6.20%	0.200	200	23%	1.71
8A	S3	FUTS3	6.00	6.00	528	528	9.25	23.192	0.013	0.50%	0.200	100	45%	0.70
8B	FUTS3	S6	1.87	7.87	99	627	10.98	23.192	0.013	0.50%	0.200	101	48%	0.72

Figure 4.1.4
Impact on Original NCP Servicing Plan

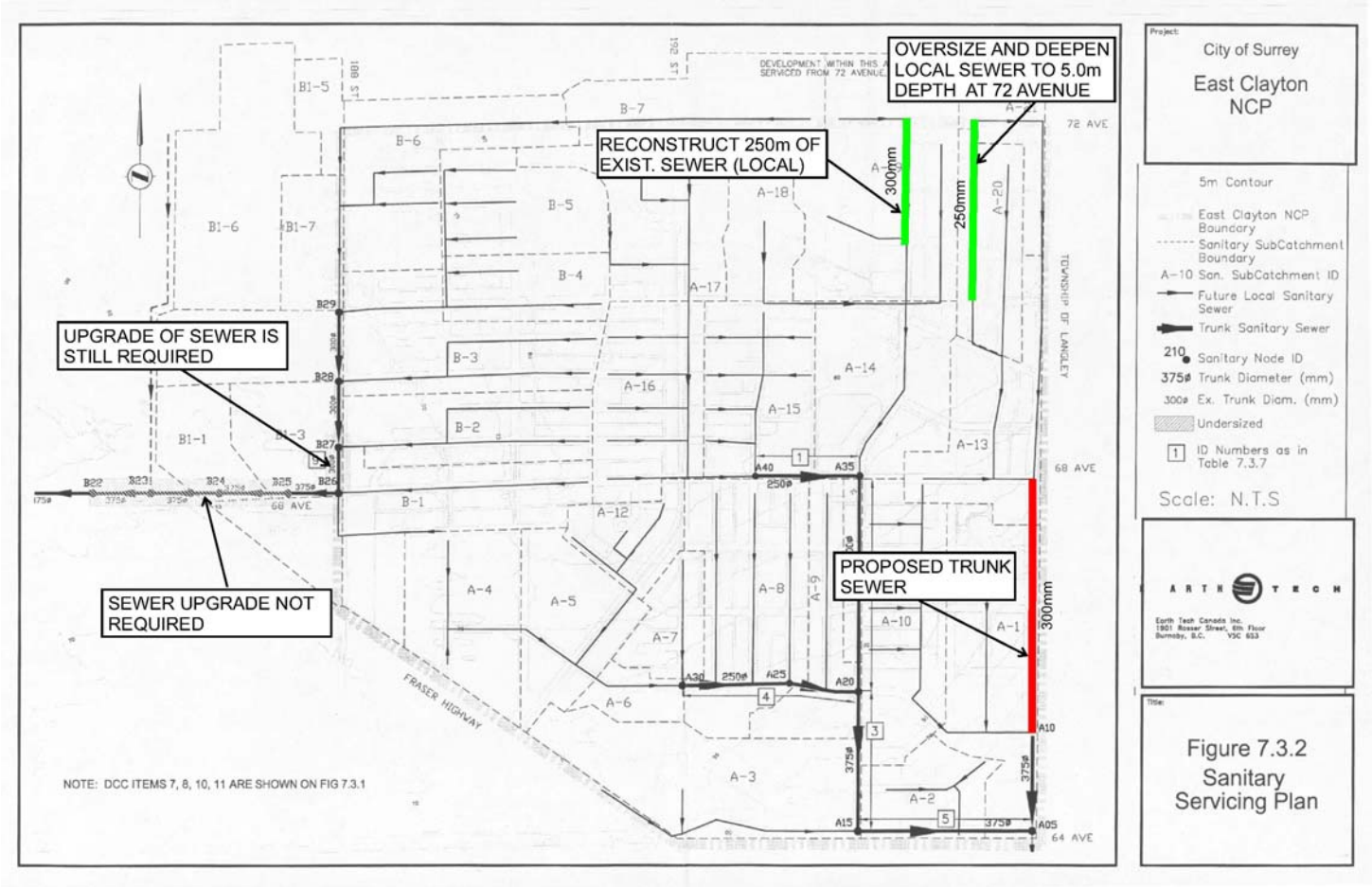


Figure 4.1.5
188 Street Profile

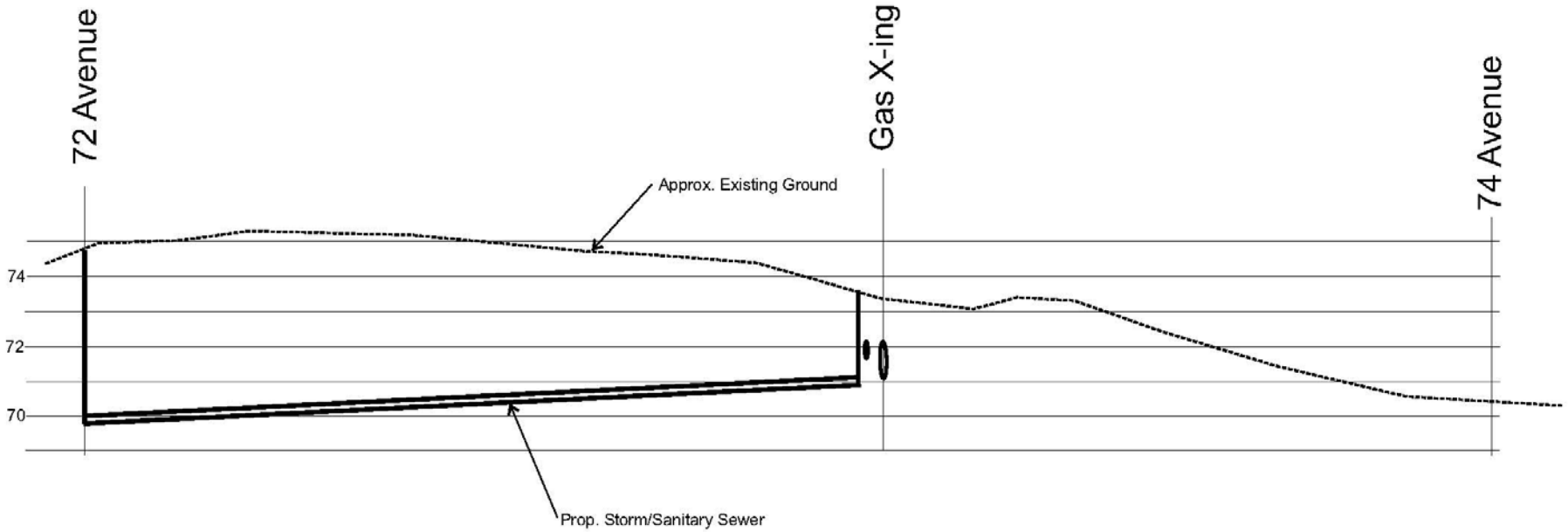


Figure 4.1.6
192 Street Profile

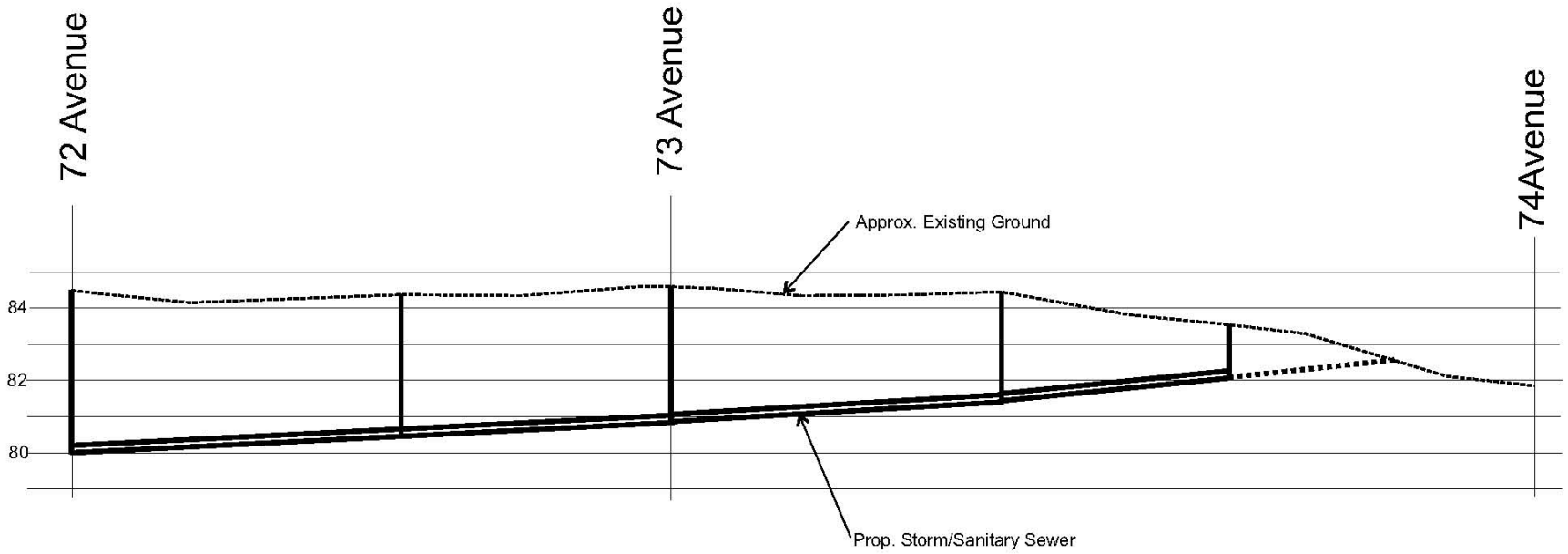
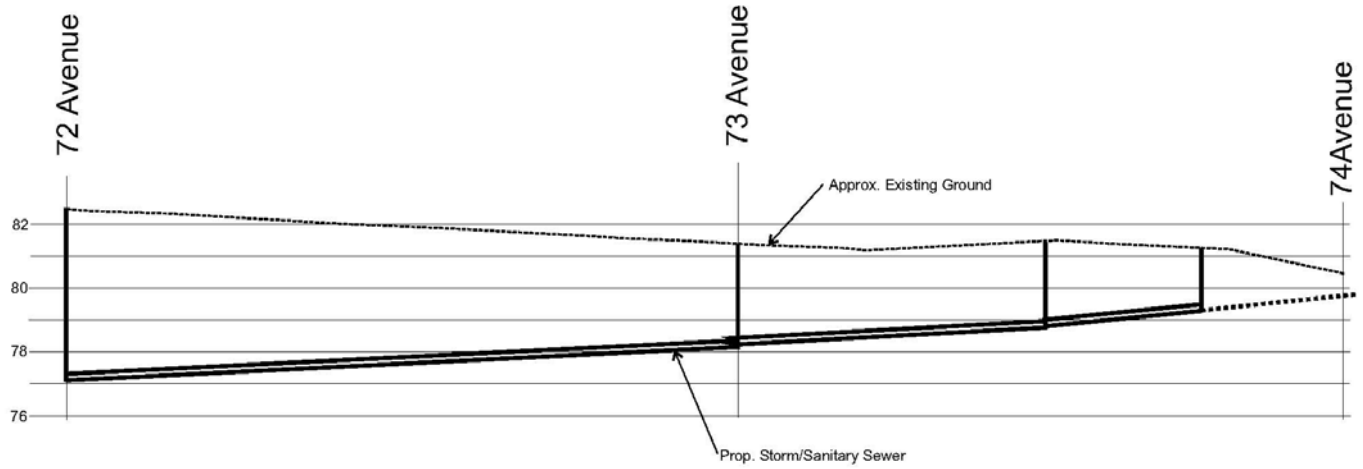


Figure 4.1.7
194A Street Profile



Financing

Developers will be eligible for DCC contribution for upsizing of the proposed trunk sewers or 100% of the cost of off-site trunk sanitary sewer upgrades as per the revised East Clayton Trunk Sewer DCC Item *Table 4.1.4*.

In addition, it should be noted that the reconstruction of local sanitary sewers on 194A Street and the deepening of 195 Street sanitary from 3.5 meter to 5.0 meters deep to accommodate the proposed NCP expansion is not eligible for DCC contribution and will be paid for by the developers.

The estimated additional DCC sanitary sewer contributions generated by the proposed NCP expansion area north of 72 Avenue will be approximately $666,309.00 and the proposed expenditures for DCC component costs total $193,000. Refer to Infrastructure Financing Section for the detailed financial analysis of the infrastructure categories on DCC funding and cost sharing.

Table 4.1.4
Trunk Sewer DCC Items

ITEM No	LOCATION	LENGTH & SIZE	TOTAL COST	DCC COMPONENT COST (Oversizing)	DEV'S BASE SIZE COST (Latecomer)
1	196 St: 68 Ave – 65 Ave	600 m – 300 mm Ø	$174,000	$15,000	$159,000
2	188 St: Upgrade	200 m – 375 mm Ø	$65,000	$65,000	$0
	Totals		$239,000	$80,000	$159,000

Note: Cost estimates are based upon 2005 construction costs.

Drainage

4.5 Background

Surface drainage from the 2003 East Clayton NCP area flows to two major catchment areas:

- Catchment A is the eastern and southern area and comprises approximately 190 hectares of land. The catchment slopes southeasterly, while partially draining into McLellan Creek (with an outfall across 64 Avenue) and partially to the east into the Township of Langley storm sewer system (through culverts across 196 Street); and
- Catchment B is the western area and comprises approximately 93 hectares of land. The catchment slopes in a westerly direction and drains to North Cloverdale Creek, that outfalls west across 188 Street at 68 Avenue.

The proposed NCP expansion area is located north of 72 between 188 Street and 196 Street and forms part of both 2003 East Clayton NCP, Catchments A and B, as shown on *Original East Clayton Drainage Plan Figure 4.2.1* and *Final Amended 2003 East Clayton NCP Drainage Plan Figure 4.2.2*.

Catchment B includes approximately 9.23 hectares of land north of 72 Avenue between 188 Street and the twin gas pipe crossing of 72 Avenue, west of 192 Street for a total drainage catchment area of 102.23 hectares. Stormwater runoff from drainage Catchment B, including the proposed NCP expansion area north of 72 Avenue, is to be conveyed via storm sewers to community detention pond E.

Catchment A includes approximately 34.83 hectares of land north of 72 Avenue between the twin gas pipe crossing west of 192 Street and 196 Street. The drainage area of the proposed NCP expansion area north of 72 Avenue within Catchment A can be further subdivided into two sub-catchment areas, one area approximately 25.05 hectares west of 194A Street and the second area approximately 9.78 hectares east of 174A Street. Catchment A includes a total of four (4) separate sub-catchment drainage areas, each sub-catchment area having an individual detention pond for a total of four (4) ponds A,B,C and D, all as shown on *Figure 4.2.2*. Stormwater run-off from the 25.05 hectare drainage sub-catchment area west of 194 Street, north of 72 Avenue, is to be conveyed via storm sewers to community detention pond A and stormwater run-off from 9.78 hectare drainage sub-catchment area east of 194 Street, north of 72 Avenue, is to be conveyed via storm sewers to community detention pond C.

4.6 Design

The proposed layout and sizing of the storm sewer system for the proposed NCP expansion area north of 72 Avenue is based upon the City of Surrey 2004 Design Criteria including a detailed analysis of the original proposed downstream trunk sewers and applicable detention pond sizes and capacities to account for changes in storm sewer routing and drainage boundaries. The detailed design of the system will follow the applicable design criteria at the time of development.

In accordance with the original 2003 East Clayton NCP the drainage servicing strategy is to convey the minor (1:5 year) stormwater run-off via storm sewers to a series of detention ponds that discharge to three existing watercourses. The original proposed downstream detention ponds are to provide storage and flow control structures to control the increase in flows for the major developed run-off events (1:100 year).

Developers have expressed a desire to develop dwellings with finished basements. In order to permit finished basements, the 1:100 year hydraulic grade line must be below the proposed minimum basement elevation in accordance with the City design criteria.

4.7 Storm Sewer Network

The proposed storm sewer network for the 2003 East Clayton NCP area has undergone some changes in storm sewer routing, drainage boundary changes and changes in locations and sizing of detention ponds since the original 2003 East Clayton NCP was adopted in March 2003. This NCP expansion report will address these changes in context with the impact of proposed NCP expansion north of 72 Avenue. The storm sewer network system can be separated into the following two sections:

(a) NCP Expansion Area North of 72 Avenue

The proposed storm sewer network for the proposed NCP expansion area north of 72 Avenue is shown in *Storm Sewer Servicing Plan Figure 4.2.4.*and is based upon sewer depths to accommodate basement homes and 100 year flood protection for the proposed area. It should be note that the northerly servicing boundary was set by limiting the depth of the proposed gravity sewer to a maximum of 5.0 meters deep at the intersection of 72 Avenue and 195A Street and the intersection of 72 Avenue and 194A Street. In addition other factors that determined the limit of the servicing boundary included the topographical constraints where the area contours plateau above 72 Avenue and begin to fall away to the north at 74 Avenue. The servicing boundary west of 191 Street is limited by the existing 1050 mm diameter and 450 mm diameter major trunk gas lines that prevent the crossing of a proposed storm sewer and sanitary sewer pipes. Profiles of 188 Street, 192 Street and 194A Street showing the existing ground line, proposed ground line and proposed sanitary/storm sewer grades are shown in *Figure 4.1.5, Figure 4.1.6, Figure 4.1.7* and *Figure 4.1.8*.

Although developers may convey the 1:100 year flows in a pipe system, a safe overland flow path must be provided for all drainage catchments.

The stormwater flows from drainage catchment area north of 72 Avenue, west of 191 Street are located within Catchment B and are to be conveyed by a proposed storm sewer on 72 Avenue west to 188 Street and a proposed storm sewer south on 188 Street from 72 Avenue to the existing storm sewer at 70 Avenue. These storm sewers do not convey a drainage catchment area greater than 20 hectares and are not considered to be trunk storm sewers. Existing downstream sewers on 188 Street that convey stormwater flows to community detention pond E have been sized to accommodate the proposed NCP expansion area.

The stormwater flows from the drainage area north of 72 Avenue, east of the 191 Street are located within Catchment B are to be conveyed by a proposed storm sewer on 72 Avenue east to 194A Street and south on 194A Street to pond A. Approximately 520 meters of existing storm sewers on 194A Street south of 72 Avenue are undersized for the proposed drainage area and will require replacement. The proposed storm sewer pipes on 72 Avenue from 193 Street to 194A Street and on 194A Street to community detention pond A convey stormwater flows from a catchment area greater than 20 hectares and are considered to be trunk storm sewers.

The stormwater flows from the drainage area north of 72 Avenue, east of 194A Street to 196 Street located within Catchment B are to be conveyed by a proposed storm sewer on 72 Avenue east from 194A Street to 195 Street and a proposed storm sewer on 72 Avenue west from 196 Street to 195 Street to tie into a proposed storm sewer south on 195 Street. The proposed storm sewer on 195 Street is to convey flows via a proposed storm sewer system to the proposed community detention pond C located at 196 Street and 68 Avenue. The proposed storm sewer pipes on 72 Avenue from 194A Street to 196 Street do not convey stormwater flows from a catchment area greater than 20 hectares and are not considered to be trunk storm sewers. However, sections of storm sewer pipes located south of 72 Avenue are considered to be trunk sewers and are discussed in the next section.

(b) 2003 East Clayton NCP Storm Sewer Changes

The following storm sewer routing, drainage boundary changes and community detention pond locations to the original 2003 East Clayton NCP have occurred and/or are being considered by the City. These changes have been taken into account for the servicing of the proposed NCP expansion north of 72 Avenue. In addition, these downstream changes to the original NCP have impacted the infrastructure finance plan and these impacts have been reviewed and addressed in the finance section of this report.

- Addition of BFW Developments subdivision at 68 Avenue west of 192 Street into drainage Catchment B. The community detention pond Stage 2 and 168 Street trunk storm sewer are currently under construction and have been designed to accommodate this drainage boundary change together with the proposed 188 West NCP expansion and proposed NCP expansion north of 72 Avenue.
- The re-routing of storm sewers north of the 192 Street twin gas pipe crossing located at 7100 block of 192 Street. In accordance with the original 2003 East Clayton NCP, the proposed storm sewers on 192 Street were originally to be routed south to the proposed community pond A, however; it was discovered during detailed design for a development application that the crossing of the existing twin gas pipes would result in excessively deep sewers. The proposed storm sewer north of the existing twin gas pipes are to be routed north to the proposed 72 Avenue storm sewer system. The proposed storm sewer change does not affect the overall drainage catchment since this routing conveys the drainage flows to the proposed community detention pond from 194A Street.
- The elimination of original East Clayton drainage area A-11 from community pond A, as shown on the *Original 2003 East Clayton NCP Drainage Plan Figure 4.2.1*. This area was eliminated due to the discovery of a legal bust (gore) along the 194A Street corridor, which resulted in the entire area east of 194A Street to be re-planned and subsequent amending of the 2003 East Clayton NCP servicing concept. The proposed storm sewer design for the revised area east of 194A Street is currently being undertaken by McElhanney for various developers, and these proposed storm sewer designs have taken into account the drainage areas and stormwater flows from the proposed NCP expansion north of 72 Avenue.

- The location of the proposed community detention pond C has been relocated from the south side of 68 Avenue, west of 196 Street to the northwest corner of 196 Street and 68 Avenue due to the following environmental, financial and economical considerations. The location of the original pond C on Lot 46 (#6765 – 196 Street) at the head of Logan/Horner Creek which discharges flows west across 196 Street into the Township of Langley assumed that the pond could be constructed within the ravine area without environmental setbacks. However, the environmental approving agencies now require 15 meter minimum landscaped setbacks. The impact of this requirement results in the purchase of additional private property that was designated for townhouse development and the loss of 35 units and subsequent DCCs. The relocation of the pond C to the northwest corner of 196 Street and 68 Avenue results in the purchase of single family designated land at a lower cost per acre than townhouse designated property. The proposed new location is shown on the *Revised Catchment A Drainage Boundary Plan Figure 4.2.3*. It is recommended that the revised location for the proposed community detention pond be adopted in conjunction with this NCP amendment. The proposed design of community detention pond C is to include flows from the revised drainage boundaries including the proposed NCP expansion north of 72 Avenue. In accordance with the original 2003 East Clayton NCP the community detention shall be designed to provide storage capacity to limit the 100 year storm discharge flows to the Township of Langley from this pond to a maximum of 1.70 cms and to limit the 5 year storm discharge flows to 0.80 cms. The conceptual design for the downstream trunk storm sewers are shown in *Table 4.2.1* and developers will confirm the sewer sizes at the time of development to conform to the current City Design Criteria. *Figure 4.2.5* shows the additional trunk storm sewers and impacts on the original NCP storm servicing plan.

Storm sewers that service areas greater than 20 hectares are deemed to be trunk storm sewers and are eligible for DCC rebates as per the current City of Surrey eligibility criteria.

Table 4.2.1 Trunk Storm Sewer Capacities

Location	Area (Ha)	100 Yr Design Flow cms	Slope %	Dia mm	Length m	Pipe Capacity cms
West Catchment						
68 Ave: 188 St – Pond E ROW	24.20	1.210	0.10	1200	193	1.233
68 Ave – Pond E	24.20	1.210	0.20	1200	22	1.744
East Catchment						
72 Ave: 194 St – 194A St	24.70	1.235	0.50	1050	97	1.931
194A St: 72 Ave – 71 Ave	32.57	1.629	0.55	1050	268	2.025
194A St: 71 Ave – 70 Ave	43.47	2.174	0.80	1050	140	2.442

Location	Area (Ha)	100 Yr Design Flow cms	Slope %	Dia mm	Length m	Pipe Capacity cms
194A St: 70 Ave – 69 Ave	54.17	2.709	1.10	1050	130	2.864
194A St: 69 Ave – Pond A	54.17	2.709	1.10	1050	170	2.864
195A St: 70 Ave - Greenway	21.9	1.536	1.20	900	148	1.273
195A St: Greenway – 68A Ave	23.01	1.609	3.2	900	134	3.238
68A Ave: 195A St – 196 St	27.2	1.930	2.40	900	84	2.805
196 St: 68A Ave – Pond C	29.61	2.113	5.00	900	93	4.048

Community Detention Ponds

There are no proposed community detention ponds located in the proposed NCP expansion area north of 72 Avenue. The stormwater flows from the proposed NCP expansion drainage area are to be routed via storm sewer systems to proposed community detention ponds A, C and E. *Table 4.2.2* summarizes the relevant drainage sub-catchment and approximate storage requirements for the 1:100 year storm events for each of the ponds A, C and E to determine the percentage increase in costs that are to be attributed to the proposed NCP expansion area north of 72 Avenue.

Table 4.2.2 – Estimated Stormwater Pond Costs

Pond	Total Pond Catchment Area (Ha)	Catchment Area North of 72 Ave. (Ha)	% Attrib. to Area North of 72 Ave. (Ha)	Total Pond Site Area (Ha)	Total Excavation (cm)	100 Yr Storage (cm)	100 Yr Surface Area (sm)
A	78.27	25.05	32.00	2.00	45,400	13,000	7,000
C	38.58	9.78	25.35	0.80	16,000	2,600	2,750
E	102.23	9.23	9.03	2.90	64,800	32,500	24,500

Development within a catchment area may proceed with interim detention only when the land for the ultimate ponds has been secured. These detention ponds are DCC eligible items. It should be noted that the lands upon which the community detention ponds A and E are located have already been purchased by the City. Land for community detention pond C has yet to be secured.

4.8 Impact on East Clayton Drainage System

(a) Internal NCP Trunk Sewers

The original 2003 East Clayton NCP identified the following two trunk sewer sections that convey stormwater flows from the proposed NCP expansion area north of 72 Avenue to community ponds A and E:

1. 1050 mm diameter pipe from 188 St. west to pond E; and

2. 600 mm diameter pipe on 194A Ave: 68A Ave. to pond A.

The impact of the proposed NCP expansion area north of 72 Avenue on the above original NCP trunk sewers is described in the following section.

The 1050 mm diameter trunk sewer from 188 Street to pond E has been constructed and has sufficient capacity to accommodate the additional 9.23 hectare drainage area north of 72 Avenue without the need for upgrading.

The original proposed 600 mm diameter trunk sewer on 194 Street from 68A Avenue to pond does not have sufficient capacity to convey the additional 25.05 hectare drainage north of 72 Avenue and requires upgrading to a 1050 mm diameter trunk sewer.

A new 1050 mm diameter trunk sewer will be required on 72 Avenue from 194 Street including the replacement of the existing storm sewers on 194A Street with a 1050 mm diameter trunk sewer from 72 Avenue to 68A Avenue.

In addition to the above, the changes in the original NCP drainage catchment boundaries for pond C will result in the need for a new 900 mm diameter trunk sewer system on 195A Street from 70 Avenue to pond C to accommodate the stormwater flows from the total catchment area including the additional 9.78 hectare drainage area north of 72 Avenue. It should be noted that the size of the proposed trunk sewer for this drainage catchment area excluding the additional 9.78 hectare drainage area north of 72 Avenue has been calculated to be 750 mm diameter. In order to service the proposed NCP expansion area the local storm sewer pipes on 154A Street from 72 Avenue to 70 Avenue are required to be constructed to 5.0 meters deep over the total length and the storm sewer pipes require oversizing from 375mm, 450mm and 525mm diameter respectively to 900 mm diameter.

It should be further noted that the proposed 750 mm diameter trunk sewer discharge pipe from pond C to the Township of Langley outfall on 196 Street south of 68 Avenue is a reconstruction of the existing 750 mm diameter storm sewer on 196 street that is required due to the proposed lowering of the 196 street intersection to meet the ultimate arterial road design road grades. The reconstruction of this existing storm sewer would have been a requirement of the original 2003 East Clayton NCP plan and the addition of the proposed NCP expansion drainage area will not impact the storm sewer sizing since the Township of Langley has fixed the release rate of flows for this outfall. The increase

in drainage flows from the proposed expansion area will be accommodated by additional storage in pond C.

The impacts on the original 2003 East Clayton NCP drainage plan are shown on *Figure 4.2.5.*

(b) Community Detention Ponds

The impact of the proposed NCP expansion area on the original and amended NCP community detention ponds A, C and E are described in the following sections.

1. Pond A

   The City of Surrey secured the acquisition of 2.0 hectare pond/park site prior to the application for the proposed NCP expansion area north of 72 Avenue. The amount of land secured for the ultimate pond design is sufficient to accommodate the impact of including the additional proposed NCP expansion area and no additional lands need to be secured.

   The impact of the proposed NCP expansion north of 72 Avenue on pond A storage volumes, excavation volumes and surface area can be quantified by the percent increase in drainage catchment area that is attributable to the expansion area. This percentage has been calculated to be 32 percent of the total drainage area as shown in *Table 4.2.2*.

2. Pond C

   The City of Surrey has not secured the proposed 0.80 hectare pond site located at 68 Avenue and 196 Street. It should be noted that the land required for the construction of pond C excluding the drainage catchment area for the proposed NCP expansion area has been calculated to be approximately 0.60 hectare resulting in the addition acquisition of approximately 0.20 hectares of land.

   The impact of the proposed NCP expansion north of 72 Avenue on pond C storage volumes, excavation volumes and surface area can be quantified by the percent increase in drainage catchment area that is attributable to the expansion area. This percentage has been calculated to be 25.35 percent of the total drainage area as shown in *Table 4.2.2*.

3. Pond E

   The City of Surrey secured the acquisition of 2.9 hectare pond site prior to the application for the proposed NCP expansion area north of 72 Avenue. The amount of land secured for the ultimate pond design is sufficient to accommodate the impact of including the additional proposed NCP expansion area and no additional lands need to be secured.

The impact of the proposed NCP expansion north of 72 Avenue on pond E storage volumes, excavation volumes and surface area can be quantified by the percent increase in drainage catchment area that is attributable to the expansion area. This percentage has been calculated to be 9.03 percent of the total drainage area as shown in *Table 4.2.2*.

The impacts of the proposed NCP expansion area north of 72 Avenue is further quantified in construction costs and DCC component as shown in *Table 4.2.3.*

Figure 4.2.1
Original 2003 East Clayton NCP Drainage Plan

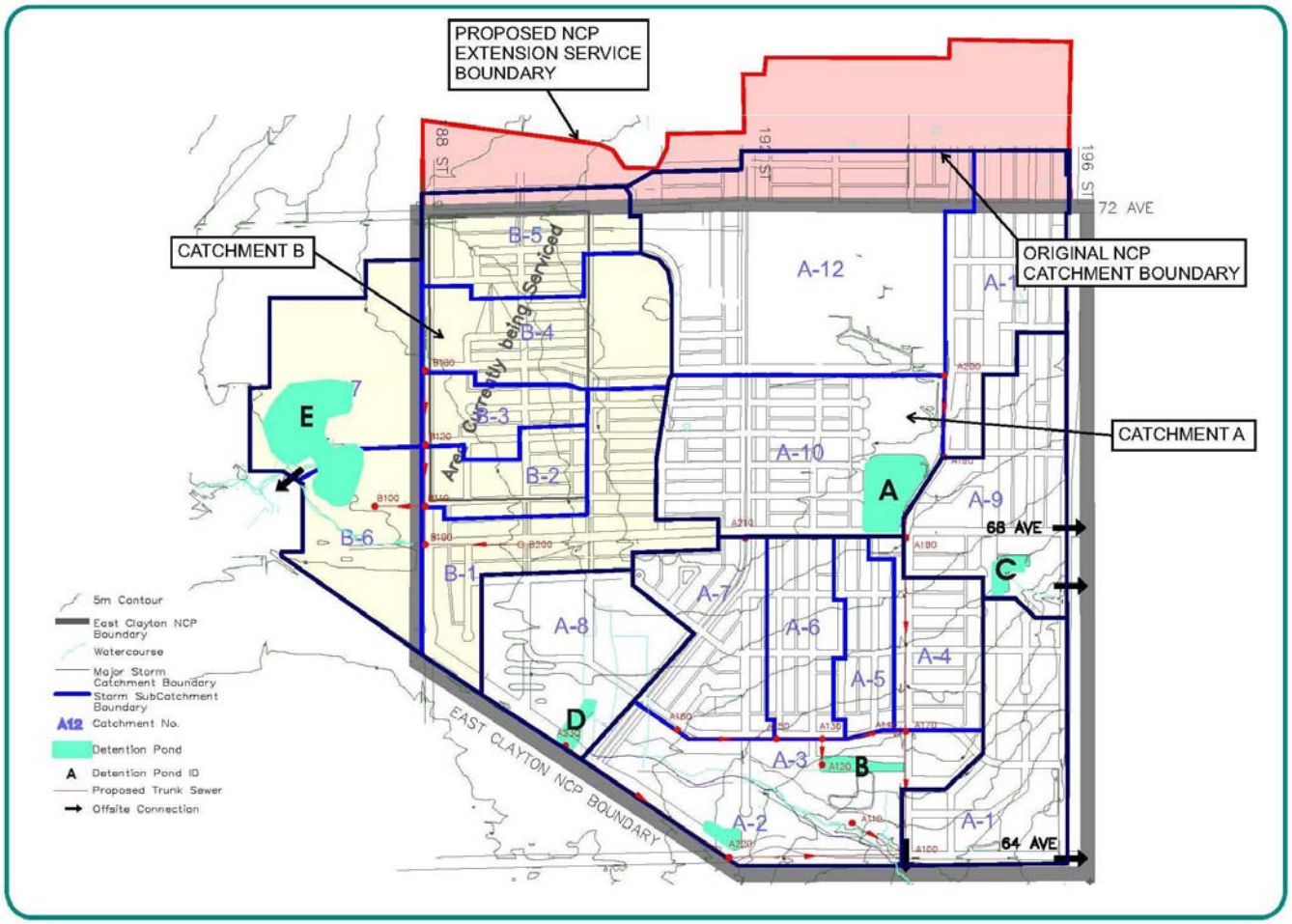


Figure 4.2.2
Final Amended East Clayton Drainage Plan

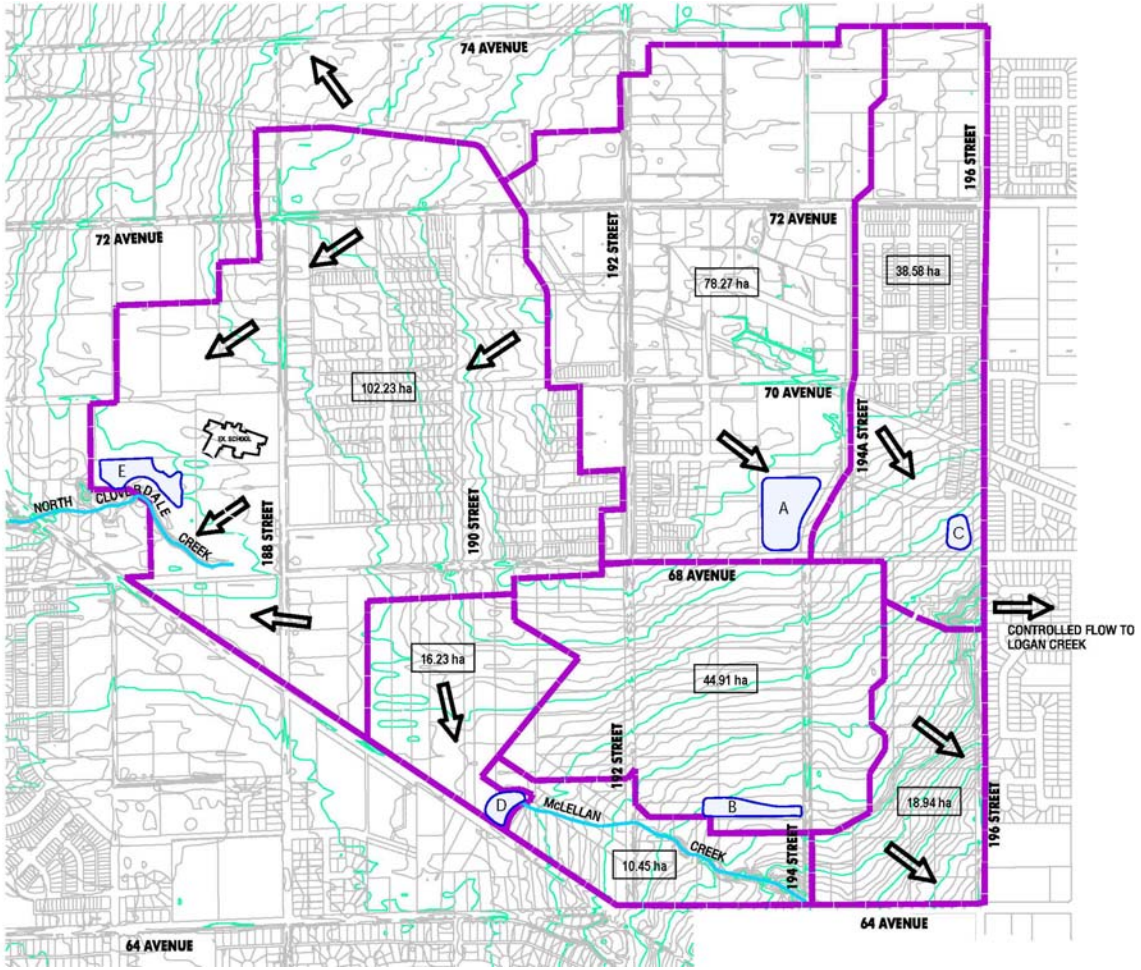


Figure 4.2.3

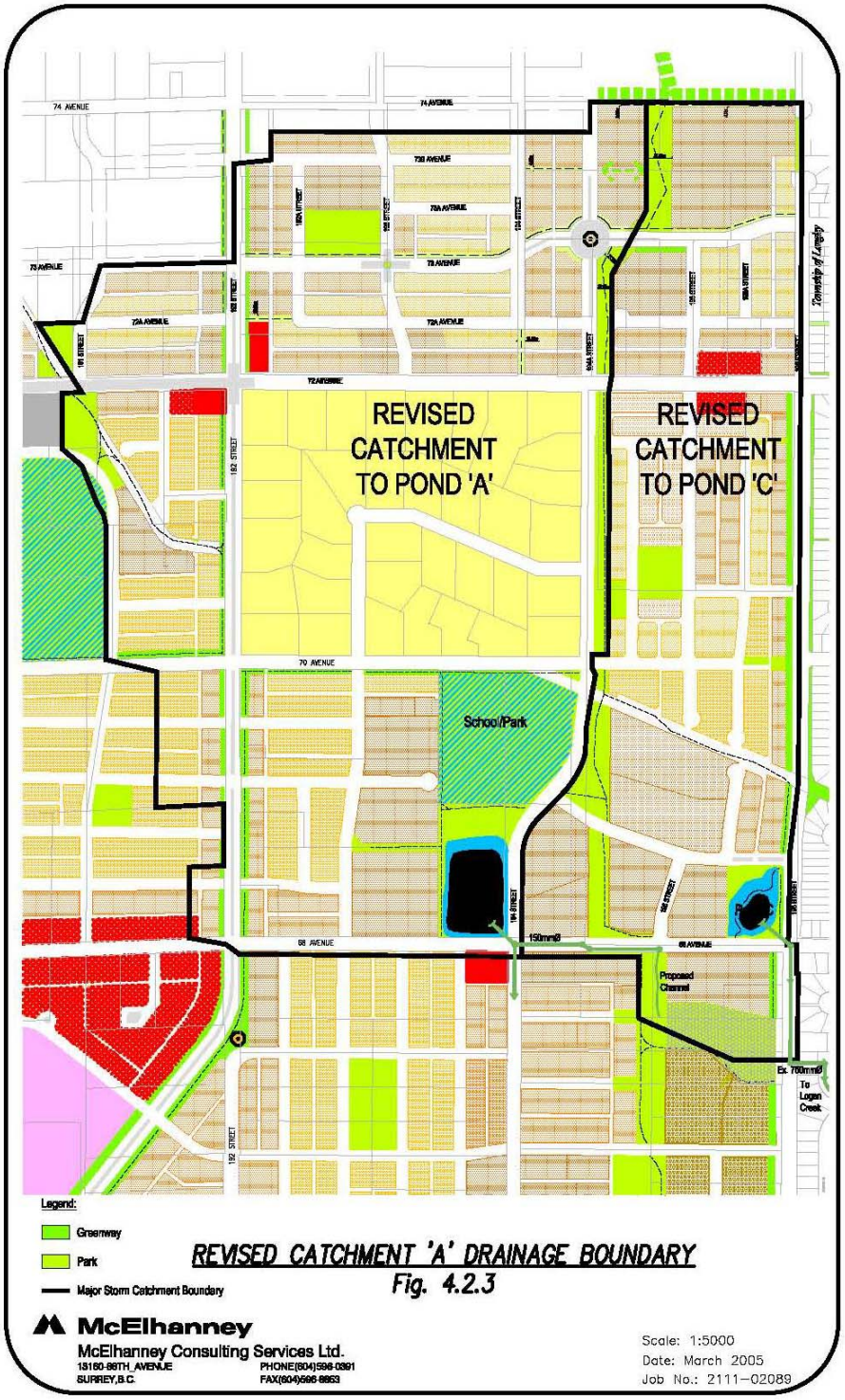

REVISED CATCHMENT TO POND 'A'
REVISED CATCHMENT TO POND 'C'
School/Park
Proposed Channel
To Logan Creek
Legend:
Greenway
Park
Major Storm Catchment Boundary
REVISED CATCHMENT 'A' DRAINAGE BOUNDARY
Fig. 4.2.3
McElhanney
McElhanney Consulting Services Ltd.
13160-96TH AVENUE
SURREY, B.C.
PHONE(604)596-0391
FAX(604)596-8853
Scale: 1:5000
Date: March 2005
Job No.: 2111-02089

Figure 4.2.4
Storm Sewer Servicing Plan

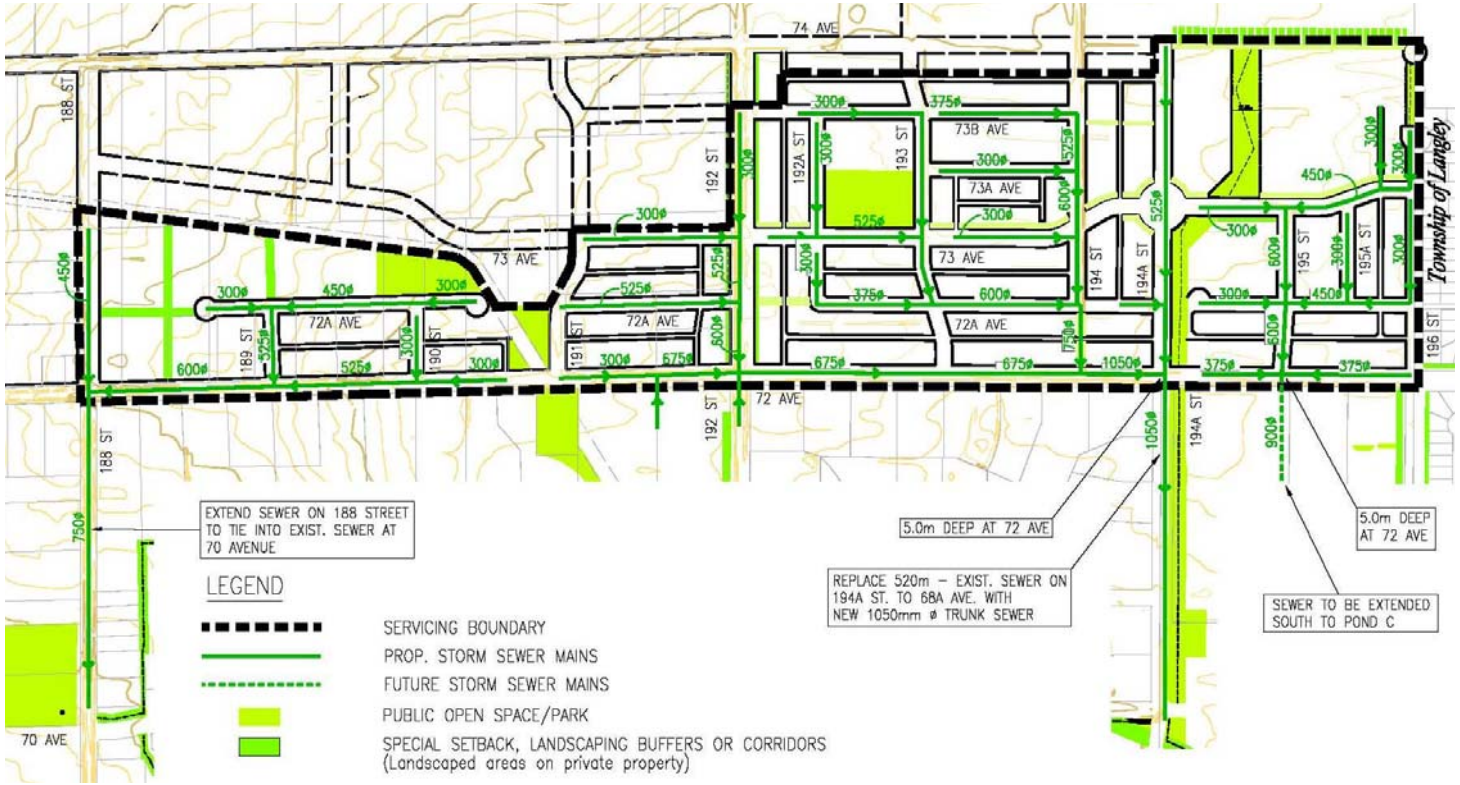


Figure 4.2.5
Impact on Original Servicing Plan

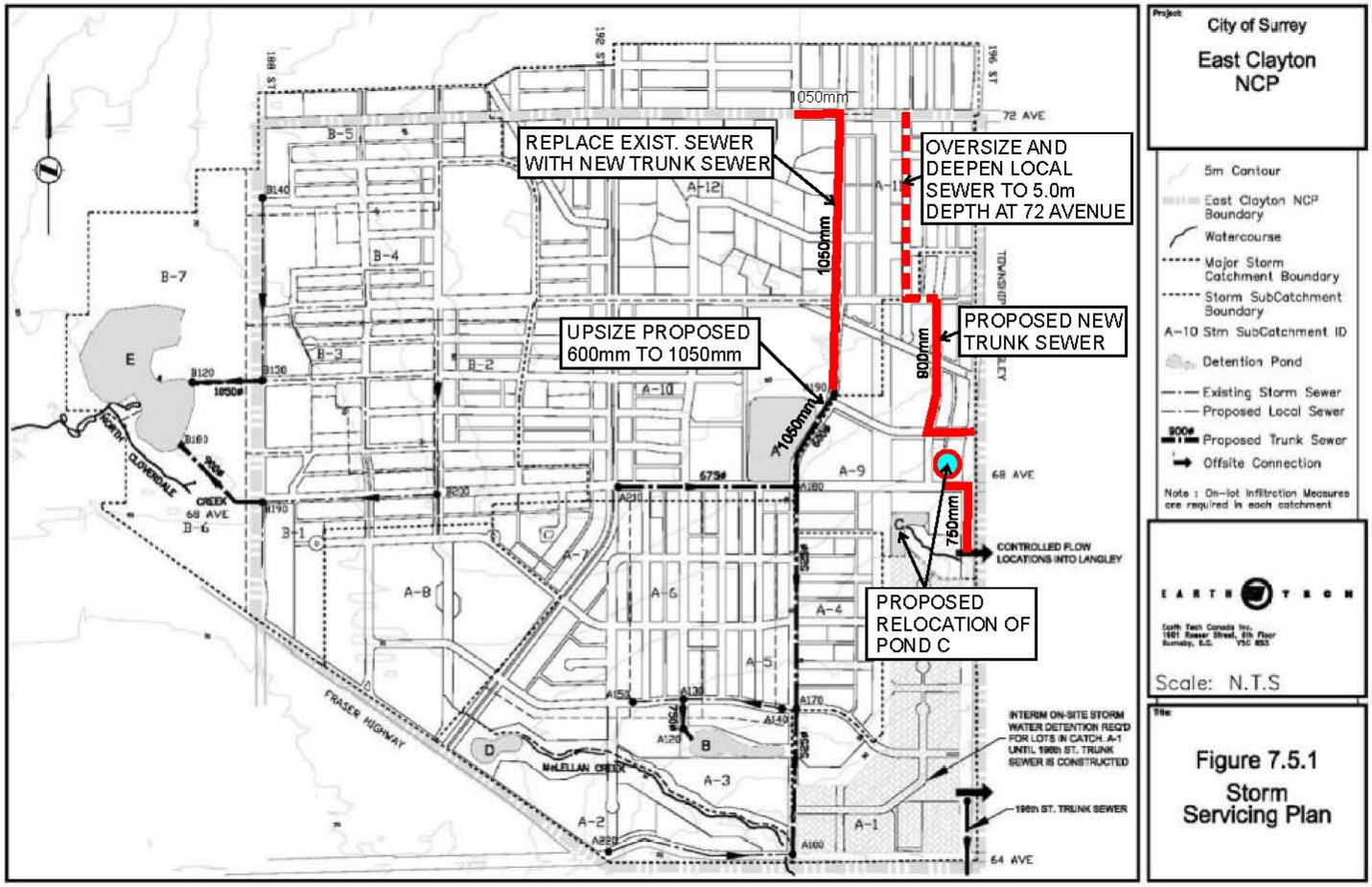
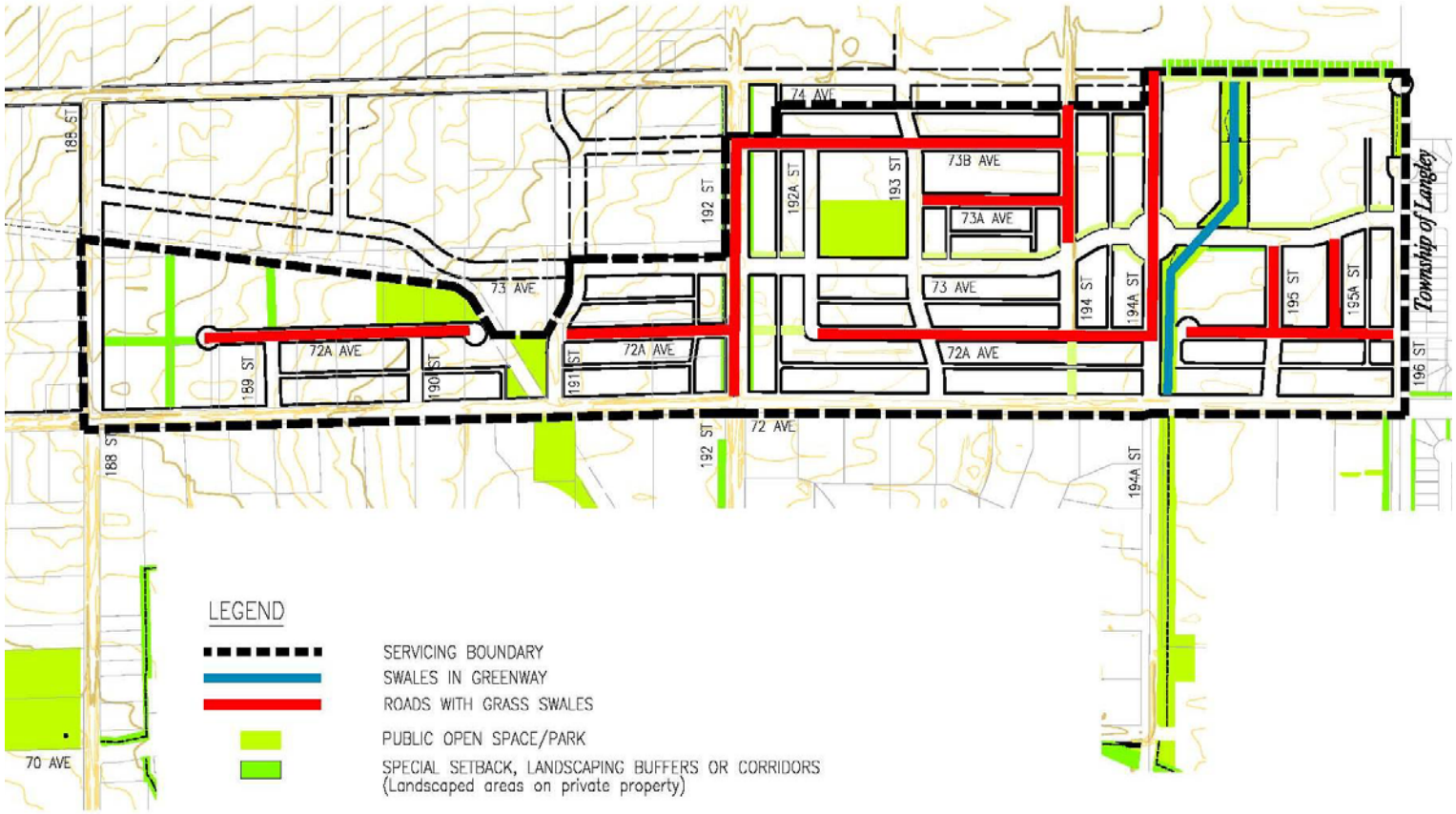


Figure 4.2.6
Sustainability Features



Watercourses

There are no watercourses identified or located within the proposed NCP expansion area north of 72 Avenue.

However, due to the presence of existing downstream creeks, all proposed developments shall meet the required land development guideline for water quality preservation through the use of appropriate Best Management Practices through all stages of the development in accordance with the "Land Development Guidelines for the Protection of Aquatic Habitat" and City of Surrey Design Criteria and Standard Specifications.

4.9 Sustainable Engineering

The 2003 East Clayton NCP endorses the use and implementation of "*Green Infrastructure Performance Standards and Guidelines*" for maintaining and enhancing the natural drainage systems in East Clayton.

The objectives to preserve the natural environment and promote natural drainage systems for the study area will include the following:

- Re-use all existing topsoil from the development areas to increase topsoil depth around building clusters to promote soil absorption;
- Provide a minimum 450 mm thick layer of topsoil over all pervious areas within the study area;
- Provide double row tree canopy along the west side of 188 Street and on-site landscaping to facilitate evapo-transpiration; and
- Provide boulevard infiltration trenches as per *2003 East Clayton NCP Sustainability Features Figure 4.2.6* and details shown on typical road cross section for 192 Street and two way queuing local residential streets.

In addition to the above percolation tests will be performed for every 10 residential lots with a minimum of 2 tests per development. Percolation test will be conducted by a geotechnical consultant in accordance with the methods outlined in the "Ministry of Health Responsible for Seniors" PERCOLATION TEST PROCEDURE document.

Infiltration devices with the following minimum characteristics will be installed for every 100 square meters (1,075 sq.ft.) of development.

Single Family Infiltration Device

Minimum contact area 4.7 square metres (50 sq.ft.)

Minimum storage volume 1.6 cu.m. (56 cu.ft.)

Multi – Family

Minimum contact area 6.3 square metres (68 sq.ft.)

Minimum storage volume 2 cu.m. (70 cu.ft.)

Devices with the above characteristics have been found to meet infiltration targets for soils with percolation rates of 1 mm/hr. The City will consider alternative designs if the developer can demonstrate that the alternate designs meet or exceed the criteria of 12 to 24 mm/day.

Commercial Sites will complete percolation tests for every 5000 square metres (53,800 sq.ft.) of development or a minimum of two percolation tests for each site to determine the soil infiltration capacity.

Infiltration devices with the following minimum characteristics will be installed for every 100 sq. m. (1,075 sq.ft.) of development.

Commercial

Minimum contact area 6.3 square metres (68 sq.ft.)

Minimum storage volume 2.0 square metres (70 cu.ft.)

4.10 Financing

Figure 4.2.5 shows the DCC eligible infrastructure of community detention ponds and trunk storm sewers. The costs of the various elements are listed in *Table 4.2.3*.

It should be noted that the oversizing and deepening of the local storm sewers on 195 Street from 72 Avenue to 70 Avenue to service the drainage area north of 72 Avenue as shown in Figure 4.2.5 is not eligible for DCC contribution and will be paid for by the developers.

It should be noted that the addition drainage DCC revenues generated by the proposed NCP expansion north of 72 Avenue have been estimated at approximately $1,571,291.00.

Refer to Infrastructure Financing Section for the financial analysis of the infrastructure categories on DCC funding and cost sharing.

Table 4.2.3 – DCC Eligible Items

Item No.	Location	Description	Total Cost Attrib. to NCP Expansion	DCC Component Cost
	72 Ave: 194 St – 194A St	100m – 1050 mm Ø	$85,000	$85,000
	194A St: 72 Ave –69 Ave	520m – 1050 mm Ø	$442,000	$442,000
	194 St: 69 Ave – 68 Ave (Oversizing only)	235m – 1050 mm Ø	$71,000	$71,000
	195A St: 70 Ave – Pond C (Oversizing only)	440m – 900 mm Ø	$40,000	$40,000
	Pond A Construction Cost (32% of 2.0 Ha)	6,400 s.m. @ $100 s.m.	$640,000	$64,000
	Pond C Construction Cost (25.35% of 0.8 Ha)	2,028 s.m. @ $100 s.m.	$203,000	$203,000
	Pond E Construction Cost (9.03% of 2.9 Ha)	2,619 s.m. @ 100 s.m.	$262,000	$262,000
	Pond C Land Cost (25.35% of 0.8 Ha))	2,028 s.m. @ 135 s.m.	$274,000	$274,000
		TOTALS	**$2,017,00**	**$2,017,000**

Water

4.11 Background

The Proposed East Clayton NCP Expansion Area North of 72 Avenue is located in the 115 m pressure zone. Water supply to this pressure zone is provided by the GVWD's Whalley / Clayton 900 mm diameter watermain, which feeds the Clayton Reservoir at 72 Avenue and 190 Street. During lower demand winter months the GVWD's Whalley / Clayton main operates between 125 m and 139 m static head and the 115 m Clayton pressure zone is fed directly from the GVWD main via PRV stations at 72 Avenue and 184 Street and at the Clayton Reservoir. During the higher demand periods throughout the summer, the HGL in the Whalley / Clayton main drops below 115 m static head and all water supply to the Clayton zone must be pumped from the Clayton Pump Station, which is located immediately adjacent to the reservoir.

The City of Surrey is currently implementing the following improvements:

- Change the settings on the 15 minor PRVs to an HGL of 85 m to maximize the retention of water in the Clayton pressure zone;
- Consider using all four (4) existing pumps as duty pumps and the immediate purchase of an additional pump as a "shelf spare"; and
- Initiate design and construction of the new pump station.

4.12 Design

The water demand for the residential areas within the study area have been calculated based upon an average daily allowance of 500 l/capita/day, a maximum day allowance of 1,000 l/capita/day and a peak hour demand of 2,000 l/capita/day, in accordance with the City's design criteria.

For all other land uses (i.e. commercial, institutional, etc.) the City of Surrey Design Criteria Manual was used as a guide.

An analysis of the distribution network was completed using a WaterCad model of the study area to determine sizing for a proposed watermain distribution system for the proposed NCP expansion area. The peak demand for the proposed NCP expansion area was determined to be 76.6 l/s. The proposed water supply and distribution system is shown in *Figure 4.3.2*. It should be noted that a new feeder main on 72 Avenue from 188 Street to the pump station will be required to supply the proposed expansion area. The proposed new 72 Avenue feeder main will be sized to provide capacity for all new development within the Clayton area (115 m HGL pressure zone). The size of proposed new 72 Avenue feeder main has been tentatively sized to be approximately 750 mm diameter subject to confirmation by further study. In addition to the 72 Avenue feeder main it is proposed to install a 450 mm diameter feeder mains on 188 Street north of 72 Avenue, a 450 mm diameter main on 191 Street and a 300 mm diameter main on 194A Street. The balance of the internal distribution system for the proposed NCP expansion area will comprise of 200 mm diameter mains.

Impact on 2003 East Clayton NCP Water Supply System

Based upon the 2003 East Clayton NCP engineering servicing report and pump station upgrade recommendations the addition of the proposed study area will create an extra water supply demand on the original system and require the installation of a new 72 Avenue major feeder main together with two 450 mm diameter feeder mains and an additional 300 mm diameter grid main. In addition to the above the additional peak demand of 76.6 l/s required by the proposed NCP expansion area accounts for approximately 12.5% of the new pump station costs.

Figure 4.3.1
Original NCP Water Supply Service Plan

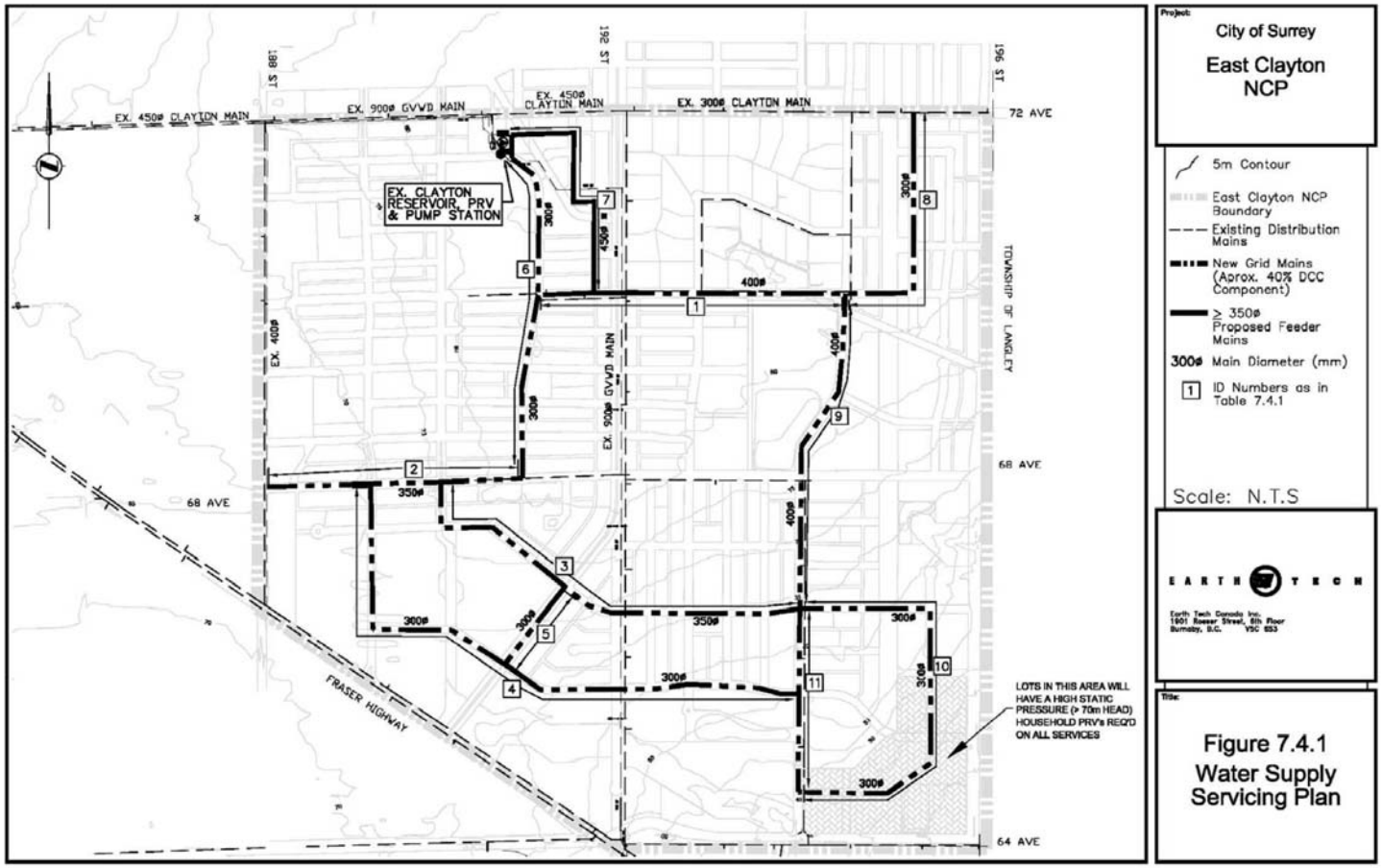
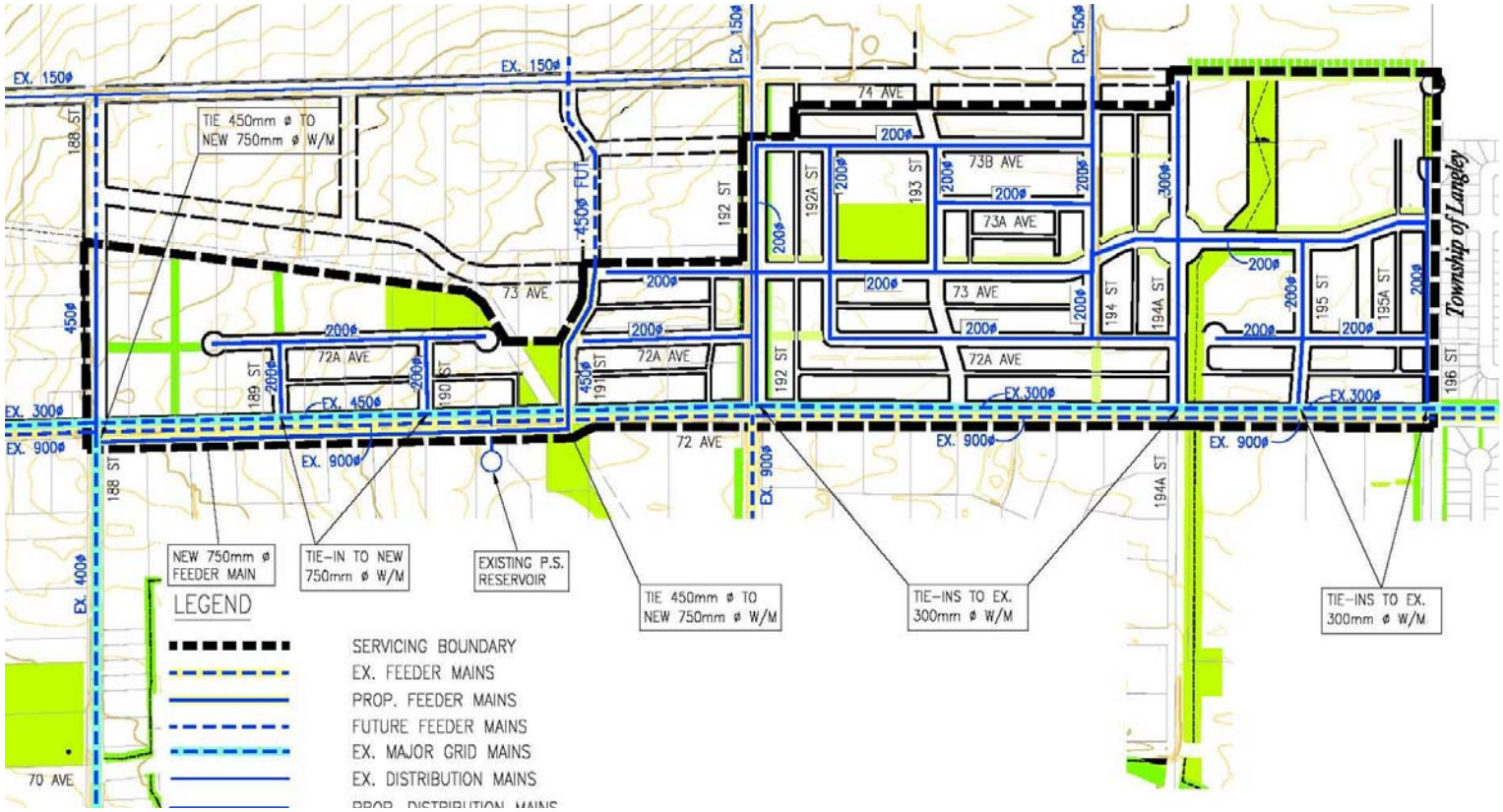


Figure 4.3.2
Water Supply Servicing Plan



4.13 Financing

The DCC eligible infrastructure elements for the proposed East Clayton Expansion Area North of 72 Avenue, their projected capital costs of construction in 2005 dollars and DCC eligible component costs are summarized in *Table 4.3.1*

It should be noted that water DCC revenues generated by the study area will be approximately $777,080.00.

Refer to Infrastructure Financing section for the financial analysis of the infrastructure categories on DCC funding and cost sharing.

Table 4.3.1
DCC Eligible Items

Item No.	Location	Length & Size	Total Cost	% Attrib. to NCP Expansion	Cost Attrib. to NCP Expansion	DCC Component Cost (Oversizing)	Non DCC Component Cost
1	188 St: 72 – 73 Ave	220 m - 450 mm Ø	$154,000	20.0	$31,000	$31,000	$0.00
2	191 St: 72 – 73 Ave	200 m – 450 mm Ø	$140,000	30.0	$42,000	$42,000	$0.00
3	194A St: 72 – 74 Ave	400 m – 300 mm Ø	$224,000	50.0	$112,000	$28,000	$84,000
4	72 Ave: PS – 188 St	600 m – 750 mm Ø	$720,000	25.0	$180,000	$180,000	$0.00
5	Clayton PS		$4,000,000	12.5	$500,000	$500,000	$0.00
	TOTALS		$5,238,000		$865,000	$781,000	$84,000

1. Cost estimate of Clayton PS is $4,000,000 based upon a capacity of 625 l/s.

2. Peak demand of NCP expansion area is 76.6 l/s, approx. 12.5% of PS capacity.

3. Pipe sizing subject to confirmation by further study.

Transportation

4.14 Introduction

A comprehensive traffic impact study was carried out to determine the impacts of the ultimate development of the North Extension of the 2003 East Clayton NCP. This study also includes an analysis of the original 2003 East Clayton NCP referred to as the original NCP.

The main purpose of this traffic impact study was to determine the number of trips generated by the north extension; the traffic distribution pattern; review the impact on the

surrounding road system; and as a consequence, recommend road improvements that will ensure acceptable traffic operations to meet the traffic demands projected for the 10 year horizon (build-out).

The traffic analysis for the North Extension requires special attention to the following locations specified in the terms of reference:

- Each of the road intersections with 72 Avenue and 192 Street along the site including 188 Street, 192 Street and 196 Street;
- 196 Street at 64 Avenue;
- 192 Street at Fraser Highway; and
- 188 Street at Fraser Highway.

In addition, the following locations within the original NCP have been selected for more detailed evaluation:

- 188 Street at 68 Avenue;
- 192 Street at 68 Avenue;
- 194 Street at 64 Avenue;
- Fraser Highway & 64 Avenue

Traffic analyses have been based on the City of Surrey's "Terms of Reference for Traffic Impact Studies", and the general guidelines of the "Recommended Practice for a Traffic Access and Impact Studies for Site Development" as published by the Institute of Transportation Engineers.

4.15 Proposed NCP Area

Location

The East Clayton north extension encompasses an area bounded by 188 Street to the west, 196 Street to the east, 72 Avenue to the south and 74 Avenue to the north, for a total acreage of approximately 64 hectares. The site location is shown on Figure 2.2.

NCP Description

The proposed NCP expansion is based on a Land Use Concept (see Figure 2.2) as developed by McElhanney. The proposed land use concept as shown in Table 1, consists of 82% of residential developments, 8% commercial, and the remaining 10% is dedicated to parks, and utility open spaces. Neighbourhood commercial and high density residential developments are located on the west side of the north expansion along 74 Avenue & 188 Street. Low and medium density residential developments will be mainly located on the east side of the NCP area.

4.16 Area Conditions

Study Area

The study area includes the quadrant bounded by Fraser Highway / 64 Avenue to the south, 74 Avenue to the north, 196 Street to the east and 188 Street to the west. The study area is shown on Figure 1.2.

Study Area Land Use

The existing neighbourhood is partially undeveloped and semi-rural in nature with large single family lots. Lands to the north, east and west exhibit similar characteristics. However, the adjacent residential neighbourhood south of Fraser Highway is being developed. The following is a description of the elements of the arterial and collector road network which services this area. It should be noted that at the time of the writing of this NCP, East Clayton was at 70% build-out and that the road network is incomplete, in areas.

Site Accessibility

The functional classification of major roadways within the study area is as follows:

- Fraser Highway — Major Arterial
- 188 Street — Collector
- 72 Avenue — Arterial
- 68 Avenue — Collector
- 64 Avenue — Arterial
- 192 Street — Arterial

Fraser Highway

Fraser Highway is a primary link between the Langley and Surrey / Delta area, and serves as a key commercial corridor. Within the study area, Fraser Highway features a basic two lane cross-section with signalized intersections at 64 Avenue and 188 Street. This road will be upgraded by implementing an ultimate 6-lane cross section widening which includes a dedicated transit lane. Fraser Highway has a posted speed of 60 km/h through the study area and is part of TransLink's MRN (major road network).

188 Street

188 Street is a collector road and currently provides access to the existing single lot residential developments, and has one through lane in each direction. South of

68 Avenue, 188 Street will be 4-laned to accommodate turn lanes related to future commercial development and to capacity requirements at the intersection of 188 Street and Fraser Highway. This road will become one of the major accesses to the East Clayton area from Fraser Highway and will eventually connect to Harvie Road and the future South Port Kells development area.

72 Avenue

72 Avenue stretches from west of 182 Street to the west, to Glover Road to the east in the Township of Langley. Within the study area, 72 Avenue features a two lane cross section with ultimate widening to four lanes between 196 Street and 184 Street, as per the City's arterial standard. In the current R91, west of 184 Street, 72 Avenue is a local road. This review considers the option of extending the 72 Avenue arterial section to Fraser Highway in order to provide relief to the Fraser Highway intersections from 188 Street and 64 Avenue.

68 Avenue

Within the study area, only a small portion of this road has been constructed just west of 192 Street. However, with the East Clayton development in place, this road will become a collector stretching from Fraser Highway (new intersection) to 200 Street in Langley. Roundabouts at the 188 Street, 190 Street and 194 Street intersections with 68 Avenue are alternative traffic control measures.

64 Avenue

This arterial road provides an alternate route to the Langley Bypass stretching from Glover Road to Fraser Highway. In addition, 64 Avenue features a four lane cross section with a posted speed limit of 50 km/h.

192 Street

This arterial road provides a main link between the study area, South Port Kells and the industrial area located north of Highway 1, via 192 Street overpass. This road currently intersects 64 Avenue just east of the Fraser Highway / 64 Avenue intersection and has a relatively low volume, at this time. Due to the significant increase of traffic, the existing connection to Fraser Highway / 64 Avenue will be relocated to Fraser Highway between 188 Street and 64 Avenue intersections (see Figure 1.2). With development in the NCP areas, 192 Street will be built to a major parkway standard and will carry significantly more traffic. To ensure safe and efficient connectivity with Fraser Highway, the 192 Street intersection with Fraser Highway will be moved approximately 400 m west of its current alignment.

Existing Conditions

Existing Traffic Volumes

Traffic volumes were obtained from various sources:

1. City of Surrey

2. Intersection traffic counts conducted by McElhanney Consulting Services Ltd.

3. Miscellaneous traffic reports, including the *Clayton Generalized NCP Transportation Planning* prepared by Reid Crowder in 1997.

Typical existing Weekday PM peak hour volumes at various locations are shown in Table 4.

Table 4
Existing Weekday PM Peak Hour Traffic Volumes

Roadway	Location	Year	Direction	Hourly Volumes
Fraser Highway	East of 188 Street	2003	Eb	798
			Wb	968
188 Street	North of Fraser Highway	2003	Nb	163
			Sb	146
192 Avenue	South of 72 Avenue	2002	Nb	468
			Sb	246
72 Avenue	West of 188 Avenue	2002	Eb	147
			Wb	252

Of note, traffic volumes on existing roadways within the East Clayton neighbourhood are very low, reflecting the low density of current development at the time of the counts.

Truck Volumes

The truck percentage was contained in the existing traffic volumes documentation. Based on this information, along Fraser Highway the truck percentage is approximately 2%, whereas on other arterial and collector roads such as 188 Street and 192 Street, the truck percentage is in the order of 5%. The cause of a higher truck percentage within the neighbourhood roads may be related to the current total low traffic volumes, and the local construction of houses in the area. Once the neighbourhood development is completed, the expected truck percentages outside of Fraser Highway will be minimal.

4.17 Projected Traffic

To fully understand the traffic patterns in the North Expansion area, the current and ultimate traffic patterns in the approved East Clayton NCP area south of 72 Avenue were projected and considered to be background traffic. The traffic analysis conducted herein focused on the build-out horizon of 2014, PM peak hour volumes, as this period is the expected high volume time for both commercial, Business Park and residential uses. The projected background traffic volumes were estimated based on a regional growth of the existing volumes plus the traffic generated by the Original NCP, and the commercial / residential developments west of 188 Street.

The following two different network scenarios were used for the analysis of the projected 2014 traffic volumes:

- Extension of 72 Avenue to intersect Fraser Highway; and
- 72 Avenue not intersecting Fraser Highway

The option of connecting 72 Avenue to Fraser Highway would provide congestion relief along Fraser Highway between 184 Street and 64 Avenue. In the East Clayton NCP, however, 72 Avenue is a minor arterial between 188 Street and 196 Street, with the section between 184 Street and 192 Street designated as a Main Street of the village centre in the East Clayton NCP.

Therefore, a decision on the status of 72 Avenue will require further public consultation, in light of the East Clayton objectives.

Regional Growth

To account for the growth of traffic outside of the NCP areas but traveling through the NCP area, the current traffic volumes were projected by using an annual growth rate of 2%. A small portion of the existing traffic corresponding to traffic generated by existing developments, was removed as these developments will be replaced by the proposed NCP.

Original NCP Traffic Volumes (Background Traffic)

A significant component of the projected traffic volumes is attributed to the Original NCP. The base density scenario for this development includes a total of 4,400 residential units, plus 400,000 sq.ft for commercial use and a 1.1 million sq ft for a business park. The scope of this development is summarized in Table 5 and illustrated in Figure 2.1.

Table 5
Original NCP Scope of Development

Land-Use	**Area**			**Total No. Units**						**Total Net Area**	**Estimated Population**
Residential	***Hectares***	***Acres***		***Low Density Range***	***# of Units***	***Base Density for Amenity Purposes***	***# of Units***	***High Density Range***	***# of Units***	***Percentage***	***(Average 2.8 persons/unit, based on low/mid range)***
Future Half Acre Residential	17.58	43.43		2	87	2.5	109	4	174	9.3%	304
Low Density (6 - 10 upa)	32.59	80.52		6	483	8	644	10	805	17.2%	1,804
Medium Density (10 - 15 upa)	12.90	31.87		10	319	12	382	15	478	6.8%	1,071
Medium-High Density (15 - 25 upa)	22.02	54.41		15	816	20	1,088	25	1,360	11.6%	3,047
High Density (22 - 45 upa)	23.85	58.93		22	1296	30	1,768	45	2,652	12.6%	4,950
Mixed-Use (25 - 45 upa)	2.24	5.53		25	138	30	166	45	249	1.2%	465
Special Residential (10 - 15 upa)	8.62	21.30		10	213	10	213	15	320	4.5%	596
Total Residential	**119.80**	**295.99**			**3,353**		**4,370**		**6,037**	**63.1%**	**12,236**
Commercial			***FAR***				***Total (sq.m)***		***Total (sq.ft.)***	***Percentage***	
Mixed-Use Commercial	2.24	5.53	0.5				11,200		120,557	1.2%	
Neighbourhood Commercial	2.84	7.02	0.3				8,520		91,709	1.5%	
Specialty Community-Oriented Commercial	3.50	8.65	0.5				17,500		188,370	1.8%	
Total Commercial	**8.58**	**21.20**					**37,220**		**400,636**	**4.5%**	
Business Park	**14.31**	**35.36**	0.75				107,325		**1,155,290**	**7.5%**	
Institutional Except Schools	**0.60**	**1.48**								**0.3%**	
Schools, Parks, Greenways and Riparian Areas											
School / Park Sites	9.90	24.46								5.2%	
Storm Water Pond (Public property)	4.11	10.15								2.2%	
Riparian Protection Area	5.93	14.65								3.1%	
Parks and Linear Open Space	10.21	25.22								5.4%	
Natural Area (adjacent to Riparian Greenway)	2.91	7.19								1.5%	
Utility Open Space	0.64	1.58								0.3%	
Total Schools, Parks, Greenways and Riparian Areas	**33.70**	**83.25**								**17.8%**	
Gas Right of way	**12.73**	**31.45**								**6.7%**	
Total	**190**	**469**								**100%**	

Projected PM peak hour traffic volumes from the Original NCP were calculated based on the methodology outlined in Section 4.2. This development is expected to generate approximately 5,500 trips per hour during the afternoon peak period. A 10% reduction of external trips is expected due to a 30% component of internal trips within the development (e.g. mainly trips between commercial and residential developments). Table 6 summarizes the expected PM peak hour volumes generated by the Original NCP development.

Table 6
Original NCP Scope Generated PM Peak Hour Volumes

Residential	Units	Trip Generation Rate		Outbound %	Generated Trips Volumes		
		Source	Rate		In	Out	Total
Future Half Acre Residential (units)	109	ITE (210)	1.02	36%	71	40	111
Low Density (units)	644	ITE (210)	1.02	36%	420	237	657
Medium Density (units)	382	ITE (210)	1.02	36%	250	140	390
Medium-High Density (units)	1,088	ITE (230)	0.52	36%	362	204	566
High Density (units)	1,768	ITE (230)	0.52	36%	588	331	919
Mixed-Use (units)	166	ITE (221)	0.62	36%	66	37	103
Special Residential (units)	213	ITE (210)	1.02	36%	139	78	217
Total Residential	**4,370**				**1,896**	**1,067**	**2,963**
Commercial							
Mixed-Use Commercial (1000 sq ft)	121	ITE (814)	2.71	56%	144	184	328
Neighbourhood Commercial (1000 sq ft)	92	ITE (820)	3.75	52%	166	179	345
Specialty Community-Oriented Commercial (1000 sq ft)	188	ITE (820)	3.75	52%	338	367	705
Total Commercial					**648**	**730**	**1,378**
Business Park (1000 sq ft)	**1,155**	**ITE (110)**	**0.98**	**88%**	**136**	**996**	**1,132**
School (Elementary) / Park Sites (Students)	**700**	**ITE (520)**	**-**	**-**	**-**	**-**	**-**
TOTAL					**2,680**	**2,793**	**5,473**

Trip Generation

The Institute of Transportation Engineers' (ITE) *Trip Generation Manual* is a commonly accepted source of trip generation rates for various specific types of land uses. These trip generation rates are based on numerous empirical studies and provide a guide as to the range of rate of vehicles expected to enter and exit a site. The rates applied in this study have been generally based on this manual, and supplemented with MoT *Parking and Trip Generation Manual* data where appropriate.

The total anticipated weekday PM peak hour trips generated within the North Extension neighbourhood are shown on Table 7.

Table 7
North Expansion Trip Generation PM Peak Hour Volumes

Residential	Units	Trip Generation Rate		Outbound (%)	Generated Trips Volumes		
		Source	Rate		In	Out	Total
Low Density (units)	203	ITE (210)	1.02	36%	132	75	207
Medium Density (units)	307	ITE (210)	1.02	36%	200	113	313
Medium-High Density (units)	505	ITE (230)	0.52	36%	168	95	263
High Density (units)	155	ITE (230)	0.52	36%	51	29	80
Mixed-Use (units)	88	ITE (221)	0.62	36%	35	19	54
Special Residential (units)	34	ITE (210)	1.02	36%	22	13	35
Total Residential	**1,291**				**608**	**344**	**952**
Commercial							
Mixed-Use Commercial (1000 sq ft)	64	ITE (814)	2.71	56%	76	97	173
Neighbourhood Commercial 1 (1000 sq ft)	105	ITE (820)	3.75	52%	189	205	394
Neighbourhood Commercial 2 (1000 sq ft)	13	ITE (820)	3.75	52%	24	25	49
Total Commercial	**182**				**289**	**327**	**616**
Total					**897**	**671**	**1,568**

The trip generation analysis indicates that approximately 1,600 trips will be generated during the weekday PM peak hour period. Similarly to the original NCP, a 12% reduction of external trips is expected due to a 30% component of internal trips within the development.

Trip Distribution and Assignment

In order to assign the development traffic to the road network, its distribution was established by reviewing projected 2014 travel patterns indicated in the City of Surrey EMME/2 model prepared by TSI Consultants. These travel patterns were slightly modified to reflect the connection of 72 Avenue to Fraser Highway and the upgrade of 68 Avenue to a collector road extending between Fraser Highway and 200 Street. The directional distribution (origin/destination) adopted for both the Original NCP and the North extension area was as follows:

Table 8
Directional Distribution of East Clayton & East Clayton Expansion NCP Areas

Origin/Destination	Proportion (%)	
	With 72 Av Connection	Without 72 Ave Connection
Fraser Hwy west of 188 St	6%	13%
68 Ave west of 188 St	6%	12%
72 Ave west of 188 St	21%	6%
192 St north of 74 Ave	7%	7%
72 Ave east of 196 St	10%	10%

Origin/Destination	Proportion (%)	
	With 72 Av Connection	**Without 72 Ave Connection**
68 Ave east of 196 St	10%	10%
64 Ave east of 196 St	10%	10%
Fraser Hwy east of 64 Ave	15%	15%
64 Ave west of Fraser Hwy	5%	5%
188 St south of Fraser Hwy	10%	12%
Total	**100%**	**100%**

Road Network Considerations

Trips were assigned to the road network assuming right-in, right-out only at the accesses of the commercial developments and Business Park fronting Fraser Highway, therefore the outbound left turn trips into Fraser Highway will be conducted at 188 Street and 192 Street intersections. Based on the analysis, signalization was recommended at the following locations:

- Fraser Highway / 68 Avenue (new intersection);
- Fraser Highway / 188 Street;
- Fraser Highway / 192 Street (new intersection);
- Fraser Highway / 64 Avenue;
- 64 Avenue / 194 Street;
- 64 Avenue / 196 Street;
- 68 Avenue / 188 Street (will operate as a roundabout as per the West Expansion NCP);
- 68 Avenue / 192 Street;
- 72 Avenue / 188 Street; and
- 72 Avenue 192 Street.

Figures 4.1 and 4.2 show the distribution of the larger East Clayton trips and regional background trips. Figures 4.3 and 4.4 show the distribution of the trips generated by the North Expansion area, only.

Figure 4.1
2014 PM Background Peak Hour Volumes, With Extension of 72 Avenue

Figure 4.2
2014 PM Background Peak Hour Volumes, Without Extension of 72 Avenue

Projected 2014 weekday PM peak hour background traffic volumes with and without 72 Avenue intersecting Fraser Highway are illustrated in Figures 4.3 and 4.4.

Figure 4.3
2014 PM North Expansion Peak Hour Volumes, With Extension of 72 Avenue

Figure 4.4
2014 PM North Expansion Peak Hour Volumes, Without Extension of 72 Avenue

Total Traffic

Development trips were combined with the 2014 East Clayton background trips to arrive at the total combined traffic volumes shown on Figures 4.5 and 4.6 with and without 72 Avenue extension, respectively. The proportion of total trips at key intersections is shown in Table 9.

Table 9
Directional Distribution

Intersection	With 72 Ave extension	Without 72 Ave extension
Fraser Hwy / 68 Ave	8%	6%
Fraser Hwy / 188 St	8%	11%
Fraser Hwy /192 St	11%	12%
Fraser Hwy /64 Ave	7%	8%
64 Ave / 194 St	7%	9%
64 Ave / 196 St	9%	10%
68 Ave / 188 St	15%	14%
68 Ave / 192 St	11%	12%
68 Ave / 194 St	13%	12%
72 Ave / 188 St	30%	45%
72 Ave 192 St	28%	34%

The above Table indicates that south of 72 Avenue, the additional traffic created by the expansion area ranges from 6% to 15%, which is considered moderate. However, with the 72 Avenue extension the impact on Fraser Highway / 188 Street intersection is reduced from 11% to 8%, thus denoting a relief in traffic congestion at this location.

Along 72 Avenue the impact of the development is in the order of 30% to 45%, depending upon whether 72 Avenue is an arterial to Fraser Highway.

Figure 4.5
Total PM Peak Hour Volumes, With 72 Avenue Extension

Figure 4.6
Total PM Peak Hour Volumes, Without 72 Avenue Extension

4.18 Traffic Analysis

Road Classification

The following is the road classification within the North Extension Area

- Arterial Roads: 72 Avenue and 192 Street (major parkway)
- Collector Roads: 188 Avenue, 73 Avenue, and 194A Street
- Local Roads: All other roads

Intersection Performance

The Level of Service (LOS) is a commonly used measure of the quality of traffic conditions experienced along a roadway or at an intersection. The Level of Service is typically measured as a function of the delay and defined as indicated in Table 10. The critical LOS at unsignalized intersections is generally a function of the delay experienced by minor road left turn movements.

Table 10
Level of Service and Delay Criteria

LOS	Delay Criteria (sec/veh)		Description
	Signalized	Unsignalized	
A	<10	<10	Excellent
B	>10 and <20	>10 and <15	Very Good
C	>20 and < 35	>15 and <25	Good
D	>35 and <55	>25 and <35	Acceptable
E	>55 and <80	>35 and <50	Approaching Capacity
F	>80	>50	Poor

The LOS ranges from A to F, with a LOS 'D' generally considered as the minimum acceptable condition for urban areas.

Key intersections were analyzed in detail using Synchro version 6.0 which incorporates the 2000 Highway Capacity Manual (HCM) methodologies. A summary of the results is shown in Table 11.

Table 11
Capacity Analysis Summary

Intersection	LOS	
	With 72 Ave Extension	Without 72 Ave Extension
Fraser Hwy / 188 St	E	**F**
Fraser Hwy / 192 St	C	D
Fraser Hwy / 64 Ave	**F**	**F**
64 Ave / 194 St	B	B
64 Ave / 196 St	B	B
68 Ave / Fraser Hwy	C	E
68 Ave / 188 St	B	C
68 Ave / 192 St	C	C
68 Ave / 194 St*	**F/F**	**F/F**
68 Ave / 196 St*	**F/F**	**F**/E
72 Ave / 188 St	B	B
72 Ave / 192 St	B	C
72 Ave / 194 St*	**F**/C	**F**/C
72 Ave / 196 St*	C	C
74 Ave / 192 St*	D/C	D/D
73 Ave / 192 St*	C/E	D/E

* Unsignalized intersection. LOS at stop controlled approaches

The capacity analysis indicated that all internal roads within the neighbourhood (both the original NCP and the North Extension) are expected to operate at acceptable LOS with the road proposed road improvements. The LOS “F” at the stop controlled approaches along 72 Avenue and 68 Avenue affects a relatively small amount of traffic. This poor LOS can be improved with the gap created by the adjacent traffic signals.

The LOS analysis at the intersections of Fraser Highway between 68 Avenue and 192 Street indicate that with the 72 Avenue extension, traffic conditions are significantly improved at these three locations (e.g. “E” vs “F”, “C” vs “D”, and “C” vs “E”) thus supporting the extension of 72 Avenue to Fraser Highway.

According to Table 11, with build-out, the intersection Fraser Highway / 64 Avenue is expected to operate over capacity. This poor LOS is mainly due to the significantly high traffic volumes generated by the Business Park and the Commercial Development located along Fraser Highway. However, the North Extension traffic will only add 6% to 9% of new traffic.

Proposed Road Improvements

By analyzing the total volumes summarized in Figures 4.5 and 4.6, a number of conclusions can be drawn about the necessary road upgrades. Extending 72 Avenue to Fraser Highway will provide a faster alternative link to the proposed NCP and adjacent areas located north of 68 Avenue. If 72 Avenue is not extended to Fraser Highway, the access to the north extension from the west will be concentrated on Fraser Highway at the intersections of 188 Street and 192 Street, thus increasing the traffic pressure at the locations adjacent which will already be handling traffic bound for business park and commercial areas.

The following are the proposed road characteristics to better accommodate the projected traffic volumes throughout the study area.

- *Fraser Highway:* For Synchro analysis purposes, a four lane cross section operation (excluding the proposed rapid transit lanes) with single left turn lanes at 68 Avenue and 188 Street is proposed for this road . Dual left turn lanes will be needed at the 192 Street and 64 Avenue intersections. Dedicated westbound right turn lanes are proposed at 188 Street and 192 Street intersections
- *64 Avenue:* Four lane cross section with left turn lanes at Fraser Highway, 194 Street and 196 Street intersection. In addition, dedicated eastbound, northbound and southbound right turn lanes are proposed at Fraser Highway intersection.
- *68 Avenue:* Two lane cross section with left turn lanes at Fraser Highway, 192 Street and 194 Street, and a roundabout at 188 Street.
- *72 Avenue:* If 72 Avenue is not extended to Fraser Highway, a two lane cross section will suffice to accommodate the expected traffic volumes, as a significant portion of the traffic will make use of Fraser Highway. In addition, left turn lanes would be required at 188 Street, 192 Street, 194A Street and 196 Street. With the extension of 72 Avenue to Fraser Highway, a four lane cross section west of 192 Street will be required as well as a dedicated eastbound right turn lane at the 192 Street intersection.
- *73 Avenue*: Two lane cross section with dedicated left turn lanes at the intersection of 192 Street without bicycle lanes.
- *74 Avenue*: Two lane cross section with no dedicated turning lanes.
- *188 Street*: Four lane cross section south of 68 Avenue, with single left turn lanes at 72 Avenue, 68 Avenue and Fraser Highway (northbound only). In addition, dual left turn lanes will be required at the southbound approach of the Fraser Highway intersection, in order to accommodate the additional traffic generated by the west NCP extension and a proposed commercial/residential development west of 188 Street (Avondale). North of 68 Avenue, 188 Street features a 2 lane cross section with dedicated left turn lanes at 72 Avenue intersection.
- *192 Street*: Four lane cross section with left turn lanes at 68 Avenue, 72 Avenue, 73 Avenue and 74 Avenue. A 70 metre storage dual left turn lane is proposed at the

southbound approach at Fraser Highway to handle the expected high volume of traffic.

- *194 Street*: Two lane cross section with left turn lanes at 64 Avenue and 68 Avenue.
- *194A Street*: Two lane cross section with bicycle lanes and a roundabout at 73 Avenue.
- *196 Street*: Two lane cross section with left turn lanes at 64 Avenue only.

4.19 NCP Expansion Road Network

Figure 4.4.5 summarizes the proposed network plan for the proposed NCP expansion area north of 72 Avenue. The "Cross Section Codes refer to the various street cross section types included in Appendix III. Street types without a Cross Section Code are included in the City of Surrey Supplemental Standard Document.

Proposed Local road access to Arterials and Major Collectors are more frequent in East Clayton than that typically found in other more conventional suburban neighbourhoods in Surrey. This feature is intended to continue the "open" grid network concept established by the original 2003 East Clayton NCP to disperse traffic along multiple routes.

While the Arterial and Collector designations and alignments are well defined, refinements to the Local street system shown on this figure would be considered.

Figure 4.4.5
Road Network Plan

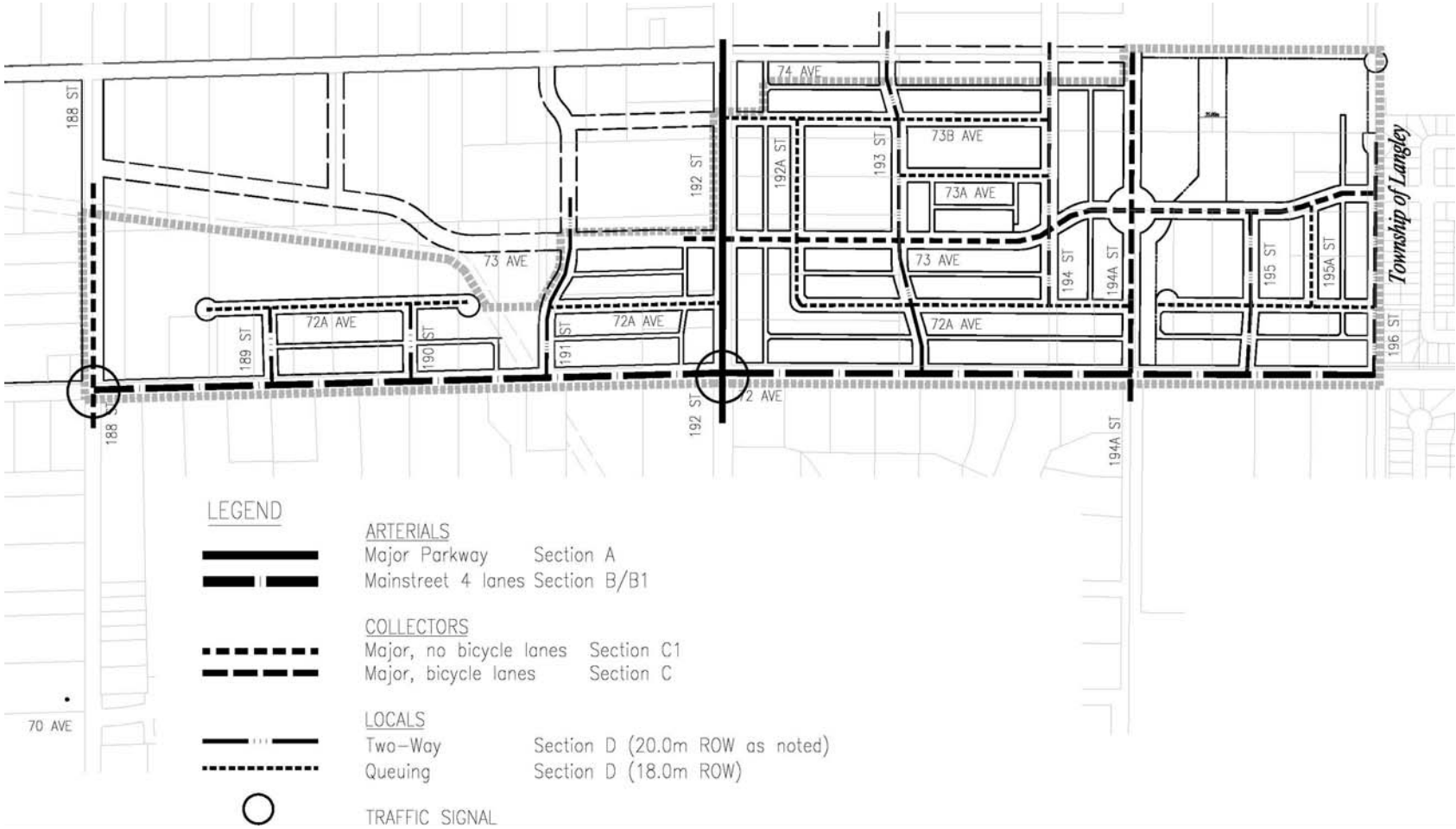
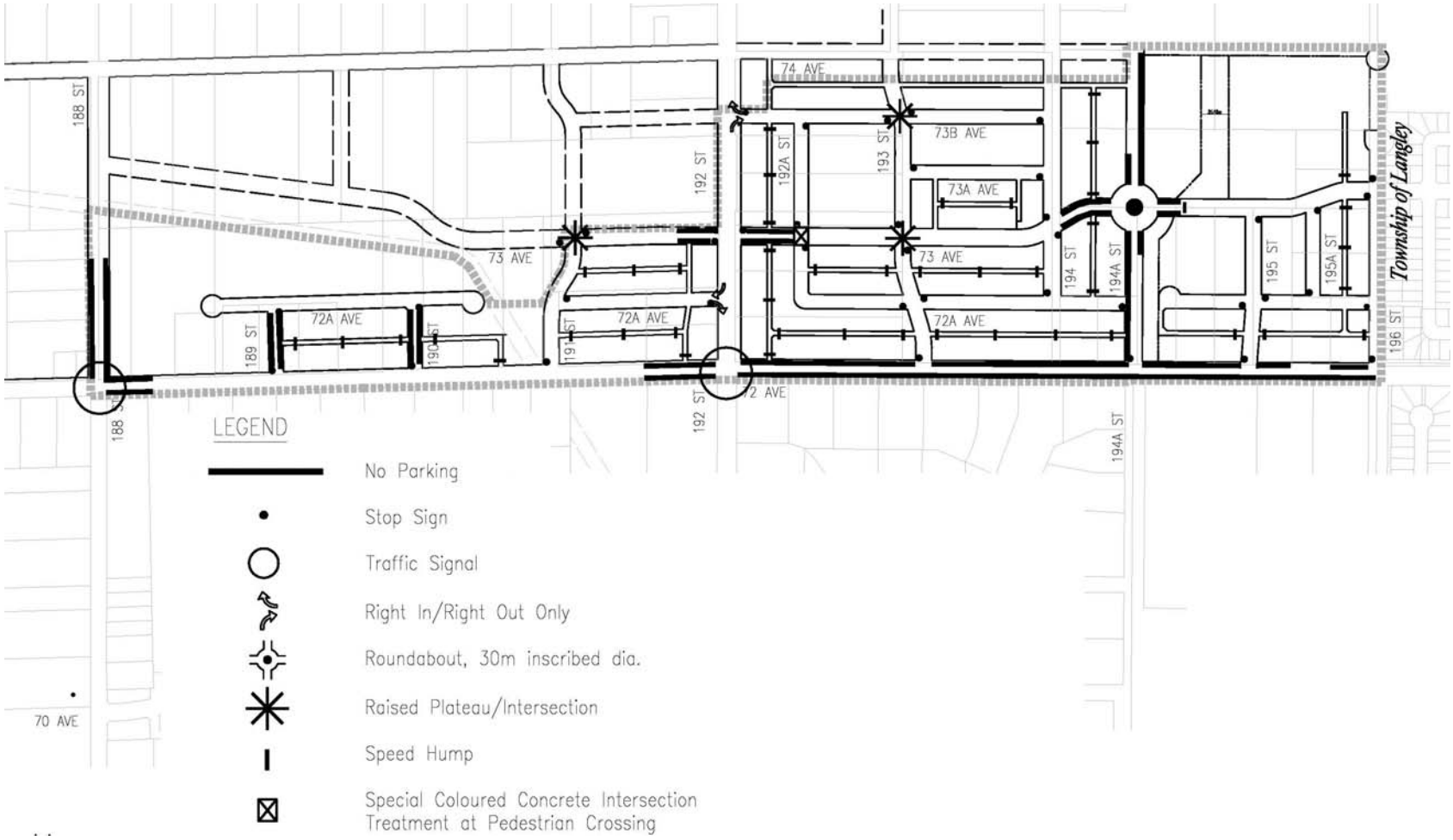


Figure 4.4.6
Traffic Control Plan



4.20 NCP Expansion Traffic Control Plan

Figure 4.4.6 identifies the intersection control, left turn lanes and parking restrictions. The following sections provide additional detail on these elements including road access, driveways and traffic calming.

4.7.1 Intersection Control

(a) Arterial Roads

- Specific intersections will be restricted to right-in / right-out as identified in *Figure 4.4.6*.
- Left turn lanes will ultimately be required at all other intersections with the exception of the "Main Street" section of 72 Avenue. The storage length will typically be 40 m to 50 m long.

(b) Collector Roads

- No left turn restrictions.
- Left turn lane required at key intersections identified in *Figure 4.4.6* (no left turn lane from collectors identified on Figure 4.4.6).

(c) Local Roads

- Most intersections will ultimately be restricted to right-in / right-out at Arterial Roads (through the use of raised medians) as identified in *Figure 4.4.6.*

(d) Lanes

- Right-in / right-out only at all arterials.
- No left turn lanes.
- Curb returns will be utilized at connections to arterial roads.
- Driveway letdowns will be utilized at connections to local and collector roads.

4.7.2 Parking

The on-street parking concepts developed for the original 2003 East Clayton NCP will be promoted in the proposed NCP expansion area north of 72 Avenue to narrow the effective width of pavements and contribute to traffic calming. Figure 4.4.6 identifies the location of on-street parking restrictions based upon the following rationale:

- No parking on both sides of local and collector roads at key intersection locations where left turn lanes are required.
- No parking on both sides of some local and collector roads to facilitate special median treatment at specific neighbourhood entry points.

- No parking along one side of 188 Street and 194 Street as per the standard major collector treatment in order to provide bicycle lanes.

4.7.3 Driveways / Access

(a) Single Family Residential

Lane Access

Where lane access is available, driveways must be to the lane, as they will not be permitted to the street.

Street Access

Where rear lanes are not possible due to topography or existing subdivision constraints, driveways to non-arterial roads will be permitted. Regardless of road classification, all lands with R-9 use will have driveways to rear lanes.

To reduce the impact of driveways on the overall "sustainability" concept, single family (all zones) driveway requirements are:

- Paired with adjacent properties, offset 2.0 m from the side property line.
- 4.5 m width plus letdown flare between the sidewalk and curb, and
- May be widened to 5.25 m wide within private property to suit garage widths and facilitate parking on driveways.
- On corner lots, driveways will be to the lesser road within the street hierarchy.

(b) Multi Family Residential

Multi-family driveways must be between 6 m and 7.3 m wide and must be curb letdown style with 200 mm concrete as per SSD-R.42.

Arterial and Major Collector Road Access

Driveway access to arterial roads is not permitted for safety and operational considerations, and to avoid impact to multi-use pathways and drainage/landscape corridors.

Local Road / Lane Access

On collector roads, driveways must be a minimum of 25 m from the near side of an intersection and other driveways. On local roads, driveways can be spaced at 9 m.

(c) Commercial / Mixed Use / Institutional

Driveway widths are governed by the City of Surrey Design Criteria Manual. Permissible access locations discussed below are illustrated on *Figure 4.4.6*.

4.7.4 Traffic Calming

2003 East Clayton NCP utilizes two traffic calming methods that will also be used in the proposed NCP expansion area north of 72 Avenue and are described as follows:

Roundabout

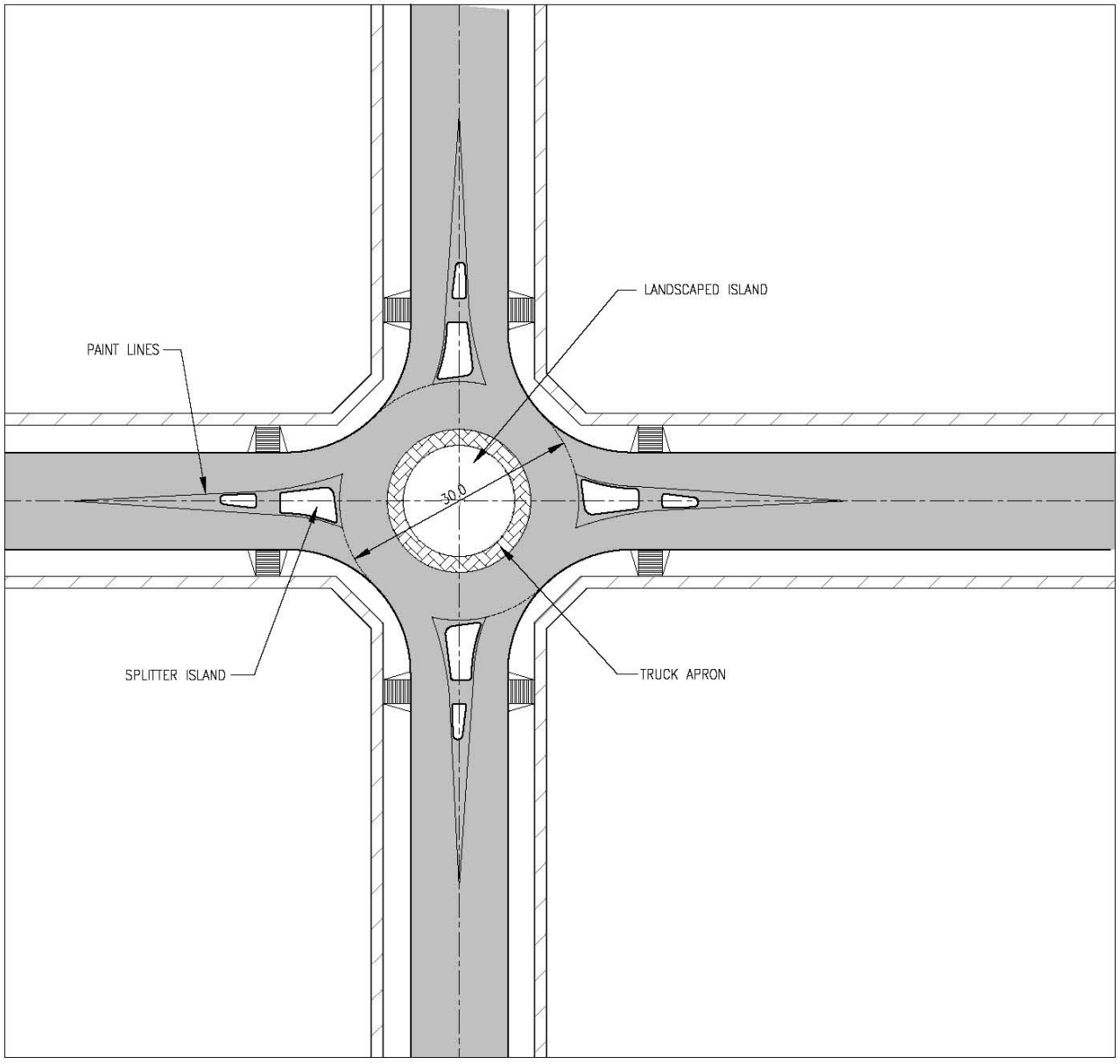
A roundabout will be required at the intersection of 194A Street and 73 Avenue to encourage traffic to use 72 Avenue and avoid short cutting along 73 Avenue.

The traffic circle design must meet the following criteria:

- Minimum 30 m inscribed circle diameter;
- Truck apron;
- Landscaped island;
- Splitter approach islands;
- Painted median tapers, yield lines and crosswalks (a raised crosswalk east of the roundabout to provide safer connectivity within the linear park);
- Minimum 5 m x 5 m corner cuts; and
- Signage.

An example of a roundabout is illustrated in Figure 4.4.7.

Figure 4.4.7
Roundabout Detail



Curb Extensions / Parking Pockets

Curb extensions will be utilized on:

- One side of all 8.5 m wide (queuing) local roads;
- Both sides of all 10.5 m wide (two-way local roads; and
- One side of all collector roads, except where left turn lanes are required.

Mid-block curb extensions must be included where blocks are greater than 120 m long. This limits the length of parking pockets to the recommended 8 – 10 stalls or 55 m to 70 m, which significantly enhances traffic calming benefit of parking pockets.

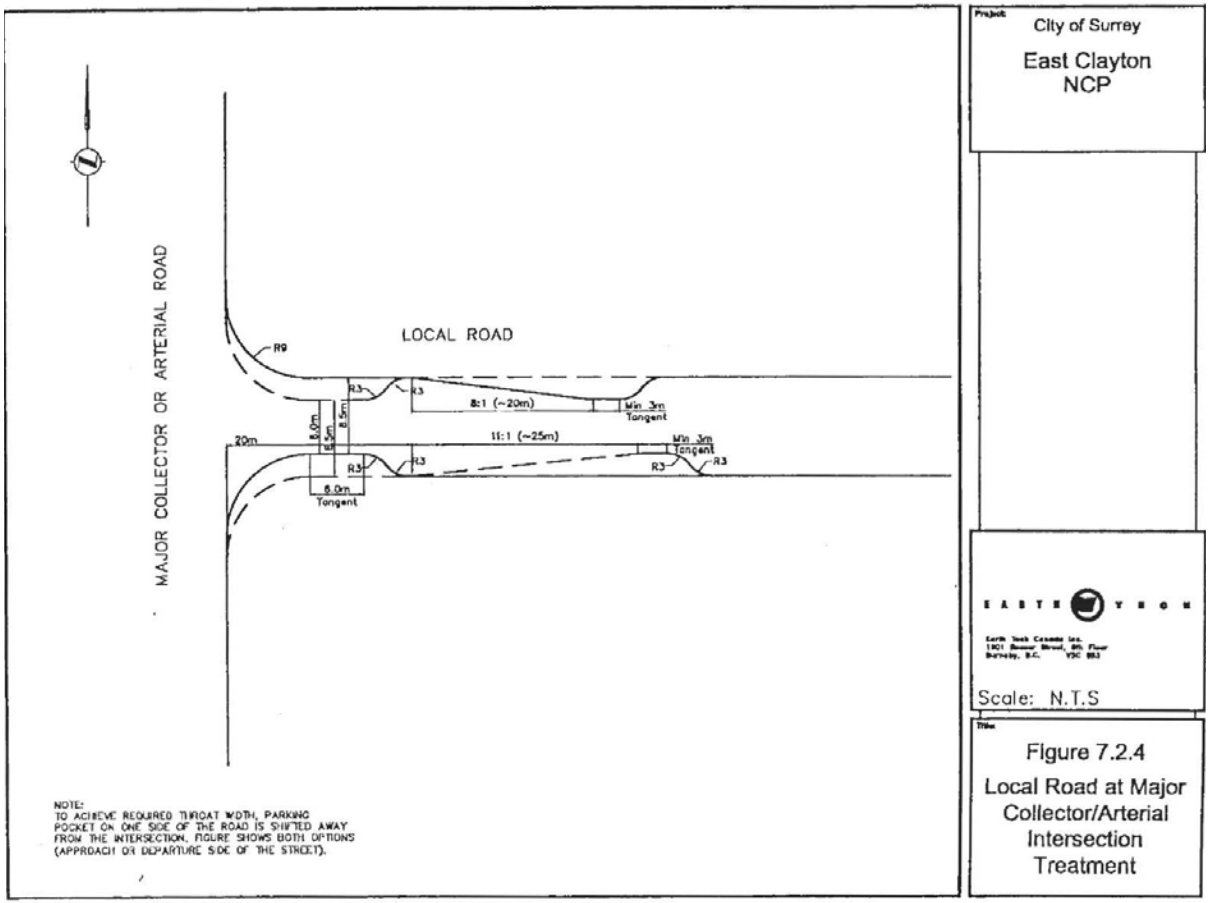
The design of curb extensions /parking pockets must meet the following criteria:

- 2.25 m deep parking pockets;
- 9 m radius curb return at intersections;
- 3 m radius reverse curb returns for start/end of the parking pocket; and
- Typically 6 m long (min. 3 m long) tangent narrowed road section between the curb returns for intersection and midblock locations. Where driveway access has to be from the street, the tangent length must be adjusted to avoid a transition across the driveway.

Local roads must have 8.5 m clear width for a length of 20 m from the curb face of an intersecting Major Collector or Arterial Road. This is necessary to accommodate the turning movement of single unit trucks from Major Collector or Arterial Roads when a vehicle is waiting at the Local Road stop sign. This must be achieved using the following criteria and illustrated in *Figure 4.4.8*.

- Curb extension/parking pocket on one side of the Local Road must be shifted back from the intersection;
- If the shifted parking pocket is on the intersection approach side of the Road, taper out the curb extension at 8:1 (approximately 20 m long taper),
- If the shifted parking pocket is on the intersection departure side of the road, the pavement should be narrowed with a curb taper of 11:1 or 10:1 (approximately 25 m long taper); and
- Minimum 3.0 m tangent required between the end/start of taper and parking pocket introduction /termination.

Figure 4.4.8
Local Road at Major Collector/Arterial Intersection Treatment



Speed Humps

Speed humps will be utilized for the mid block local road crossings of the multi-use pathways at locations identified in *Figure 4.4.6* and within lanes.

The design of the speed humps must meet Transportation Association of Canada's Canadian Guide to Neighbourhood Traffic Calming Specifications. These specifications include the 80 mm raise, pavement markings and signage. However, the following modifications and additional criteria shall govern:

- Approach and departure ramp length to be reduced to 1.0 m;
- Minimum raised plateau length of 4 m;
- If adjacent to an intersection (lane or road), the raised plateau must be extended through the intersection; and
- Asphalt surface must be stamped in the herringbone pattern.

Speed humps in residential lanes should be designed utilizing the following guidelines at locations identified in *Figure 4.4.6*.

- Single speed humps are to be utilized;
- Dimensions to be 3.0 m longitudinally with a 80 mm horizontal rise (with a sinusoidal profile);
- To be installed a minimum of 15 m from the closest perpendicular extension of an intersecting street, lane or 90 degree bend;
- To be installed at approximate 60 to 80 m spacing (centre to centre);
- Should not be installed at driveways;
- Should not be installed where they conflict with drainage catch basins / manholes; and
- Should not be installed on small radius horizontal curves and at other locations with limited sight distance.

Sinusoidal profile and typical speed hump details are shown on City of Surrey standard drawing SSD-PM.32.

Raised Intersections and other Intersection Treatments

Special coloured concrete surface pavement will be provided at the intersection of 73 Avenue with 192A Street to identify pedestrian crossings in the vicinity of the pocket park. Raised intersections will be provided at three locations: 73 Avenue at 193 and 191 Streets and at 73B Avenue and 193 Street to discourage shortcutting on 193 and 191 Streets.

4.21 NCP Expansion Street Cross Section Elements

Appendix III contains the figures that illustrate the unique Arterial, Collector and Local Road cross-section details for the proposed NCP expansion area north of 72 Avenue. The cross-section details that have been used in the original 2003 East Clayton NCP have been refined to reflect specific transportational and land use needs of the East Clayton North Extension. Cross-section elements and codes are also shown in *Table 4.4.13.*

Table 4.4.13 East Clayton NCP Expansion Cross-Section Elements

Class	Type	Description	Dedicated ROW Width	Paved Width	Cross Section Code
Arterials	Major	Parkway (192 Street)	34.0m	19.0m	A
	Major	Main Street (72 Avenue)	28.0m	12.2m	B
Collectors	Major 194A St	Parking on one side, bicycle lanes both sides	22.0m	12.2m	C
	Major 73 Avenue	Parking on both sides, 3 m wide multi-use pathway on north side, no bicycle lanes	22.0m	10.5m	C1
Local	Two-Way	Parking both sides	20.0m	10.5m	D
Local	Queuing	Parking both sides	18.0m	8.5m	D

Notes:

1) Arterial and Major Collector roads are eligible for Road Development Cost Charge Reimbursements;

2) Paved width includes parking pockets, where applicable;

3) "Cross Section Code" refers to street cross-section type shown in appendix III;

4) Parkway (192 Street) cross-section requires an additional 0.5 m statutory right-of-way (SRW) each side;

5) Main Street (72 Avenue) will require 28.0 m wide right-of-way to accommodate parking on both sides of the street, where required for streetfront commercial development; and

6) Additional 0.5 m statutory right-of-way (SRW) required each side of residential roads where sidewalk is present.

4.8.1 Cross-Section Issues

The following issues will require careful attention and/or additional analysis during development and detailed road design.

Local & Minor Collector Median Treatments

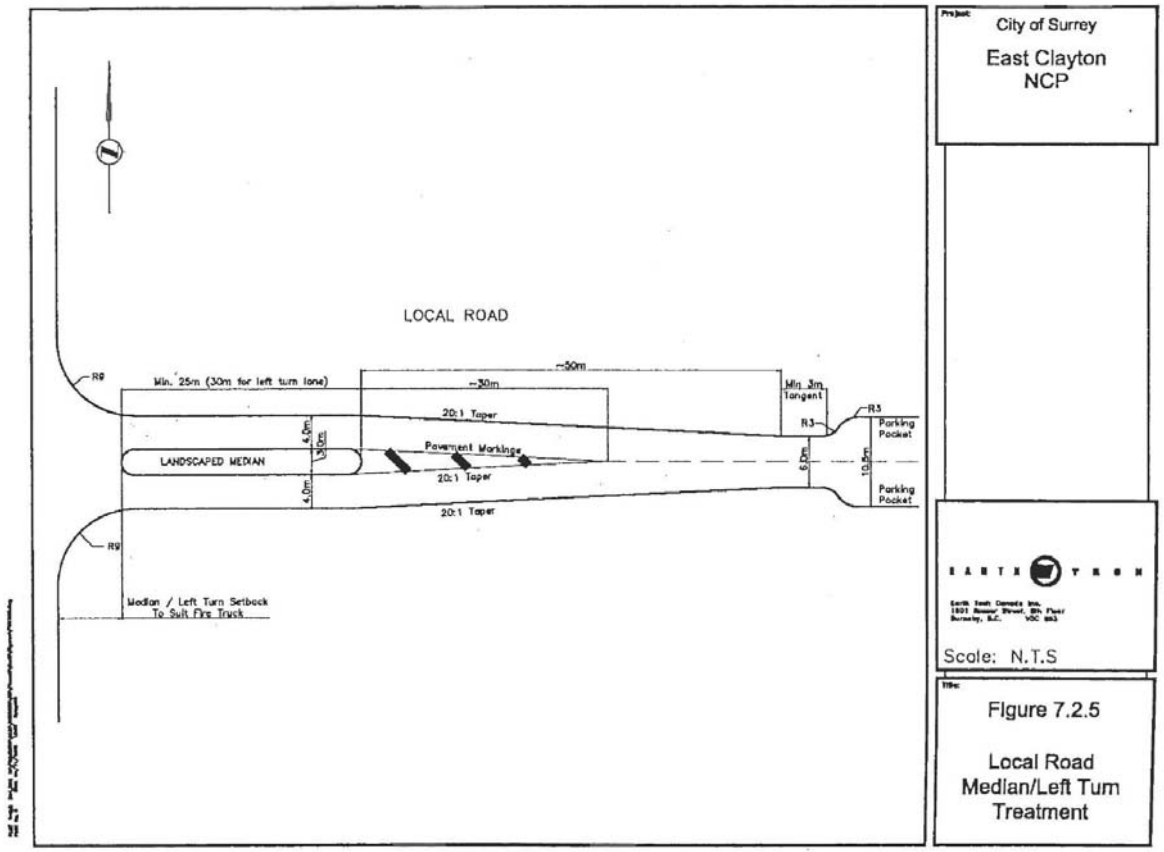
The following locations will have medians on the local road;

- 189 Street at 72 Avenue;
- 190 Street at 72 Avenue

Parking is banned on both sides of the roads at these locations in order to achieve a 3.0 m wide landscaped median. The following criteria will apply (example sketch is shown in *Figure 4.4.9*).

- The 10.5 m wide pavement for local roads will have to be widened to 11.0 m to achieve 4.0 m wide lanes either side of the median;
- Median stop bar setback from intersections to be established to suit fire truck turning movements;
- Full medians to extend from the main cross street to the adjacent lane or a minimum of 25 m.
- Medians to taper out at approximately 20:1.Curb extensions are to be achieved by the next cross street.
- Minimum 3.0 m tangent required between end/start of taper and parking pocket introduction/termination.

Figure 4.4.9
Local Road Median/Left Turn Treatment

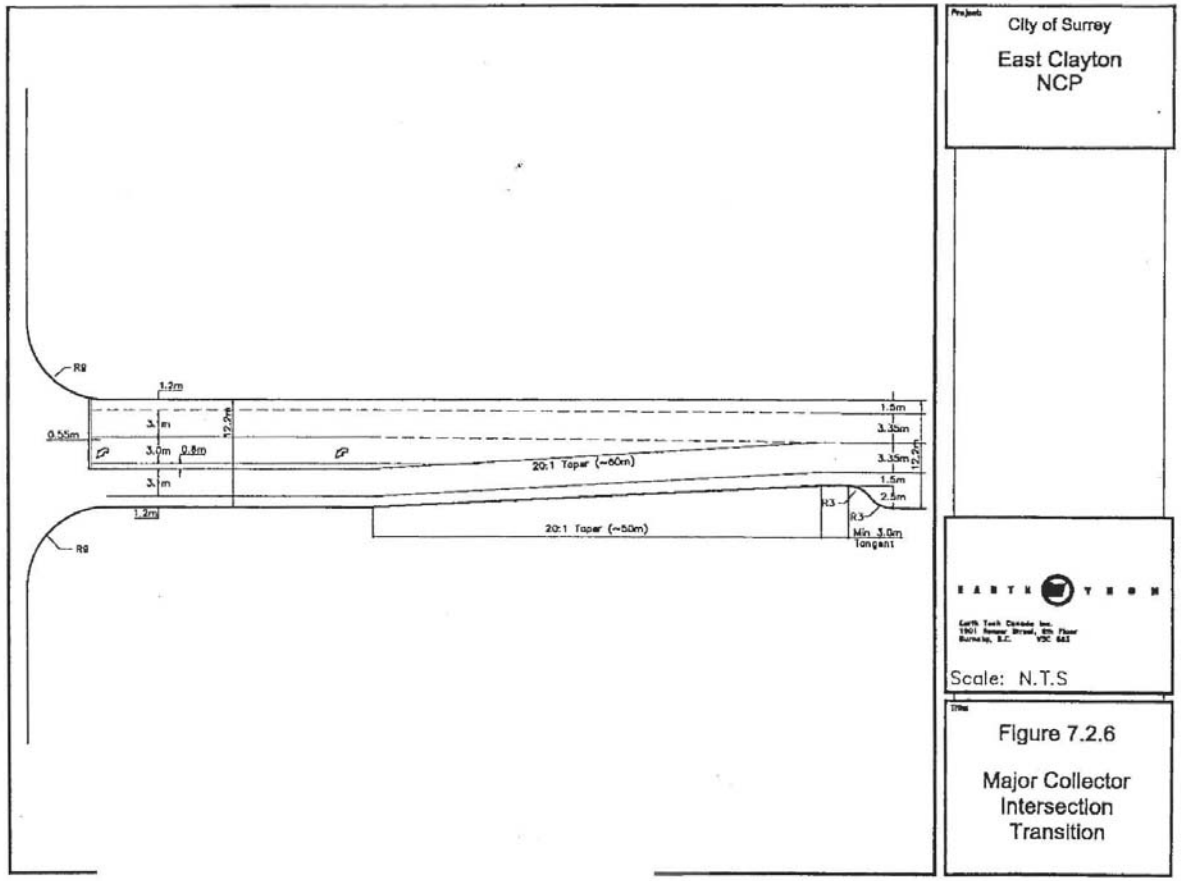


194A Street and 73 Avenue Transitions from Parking Pockets to Left Turn Lane

Each of these Major Collector roads has areas of parking on one or both sides of the street. The following criteria apply for the transition areas (example sketch shown in *Figure 4.4.10.*

- Minimum 20:1 lane/curb tapers; and
- Minimum 3.0 m tangent required between end/start of taper and parking pocket introduction/termination.

Figure 4.4.10
Major Collector Intersection Transition



Main Street (72 Avenue) Cross-Section

Possible interim and ultimate cross sections for 72 Avenue are included in Appendix II. The design of the portion designated as Main Street in the East Clayton NCP will be developed in keeping with the East Clayton NCP's objectives for the village centre, in consultation with the Planning and Development Department.

4.8.2 Drainage

Barrier curbs and gutters will be used on all roads; excepting that 192 Street and all local roads with lanes will direct runoff to grass swales via side inlet grates rather than using conventional storm sewer systems. General layout of the swales can be seen in the applicable cross-sections in *Appendix III*.

To meet the 2003 East Clayton NCP objectives for infiltration and streetscape, at a minimum, all of the swales identified in *Figure 2.4.6* must be continuous between streets/lanes.

Designs for conventional street storm sewer systems are included in the City of Surrey Supplemental Standard Drawings and Design Criteria Manual.

4.8.3 Lanes

Rear lanes have been utilized to achieve the sustainability principles and character for East Clayton. The benefits include:

- Ability to achieve infiltration with a low maintenance swale drainage system that enhances the urban landscape;
- Enables planting of greater number of trees along streets which improves drainage sustainability;
- Substantial increase in on-street parking supply, which is critical in East Clayton due to lot density, coach houses and secondary suites; and
- Ability for narrower lots that are not dominated by front garages.

Lanes will be constructed to the width and standards specified in the City of Surrey Supplementary Standard Drawings and Design Criteria Manual.

4.8.4 Street Lighting

Street lighting standards shall be the standard Cobra style with flat lenses. Pole types are described in *Table 4.4.14.*

Table 4.4.14 Required Street Lighting Pole Types

Pole Type	Height	Options and Comments	Suggested Pole Spacing for the required uniformity ratio
Octagonal Tapered	9.1m (30 ft)	One piece pole	35 – 40 m (roadway)
Octagonal Tapered	9.1 m (30 ft)	Two piece pole with mounting plate for secondary pedestrian lighting arm (3-4 m height)	35 – 40 m Roadway and 20 – 25 m (multi-use pathway)

Pole colour for all of 2003 East Clayton NCP Expansion Area North of 72 Avenue shall be:

- Tiger Brand RAL 6016 Dark Green Powder Coating Finish or equivalent.

Roadway lighting levels are determined by zoning and road classification, as detailed by zoning and road classification, as detailed in the City of Surrey Design Criteria Manual. Pedestrian/multi-use pathway lighting levels are based on IESNA Criteria.

4.8.5 Bicycle and Pedestrian Network

In keeping with the sustainability principles of East Clayton, the network of cyclist and pedestrian routes is much more extensive than is typically found elsewhere in Surrey.

Three types of routes will be used in East Clayton: on-street, next-to-street and off-street. These are defined as follows:

- Off-street routes are asphalt multi-use pathways used by cyclists, pedestrians, wheelchairs and other modes, such as rollerblades. These routes are typically used for recreational purposes, as they do not follow road alignments. They typically occur along power or Gas Right-of-way Corridors and greenways and are 4.0 m wide. This width also facilitates emergency and maintenance vehicle access. The pathways may meander (subject to TAC bicycle guidelines for 30 km/h design speed) within the total width of the multi-use corridor without compromising safety and function.
- Next-to-street routes are also multi-use pathways that replace or augment sidewalks and are used for recreational purposes and for commuting by users not comfortable with on-street routes. These routes follow street alignments and can be fully asphalt or a combination of asphalt and concrete sidewalk. Routes designated as part of the commuter network must have a total width of 4.0 m. Other routes typically have a total width of 4.0 m, but where this is not feasible, the width can be reduced to a minimum of 3.0 m.
- On-street routes are oriented towards “commuter” cyclists. These routes can take the form of 1.5 m wide painted bicycle lanes or 4.3 m wide shared use lanes on Major Collector and Arterial Roads.

Bicycle Facilities

Figure 4.4.11 shows the Clayton GNCP Commuter Bicycle Network Plan, which includes this proposed East Clayton NCP Expansion area north of 72 Avenue. The off-street and next-to-street routes shown with the NCP expansion area would be eligible for funding through Road Development Cost Charges (DCCs). The other recreational and/or Greenway routes planned for NCP expansion area are shown in Figure 2.1 but, as these are not considered major commuter routes, they are not eligible for DCC rebates.

Special facilities for cyclists on Minor Collectors and Local Roads are not required, since the traffic speeds and volumes of vehicular traffic are expected to be low.

Bollards must be utilized at all pathway connections to roads and lanes to prevent vehicle access. Log rail fencing is required wherever the pathway is immediately adjacent to roads or lanes.

Bicycle racks, lockers and change rooms will be required of the developers as per the guidelines in the Bicycle Blueprint.

Pedestrian Facilities

The pedestrian network in the NCP expansion area will be comprised of 1.5 m wide sidewalks on each side of all roads and the multi-use pathway system shown in Figure 2.10.

The road sections for the NCP expansion area provide wide landscaped boulevards between the sidewalks and the curbs to maximize pedestrian level of service.

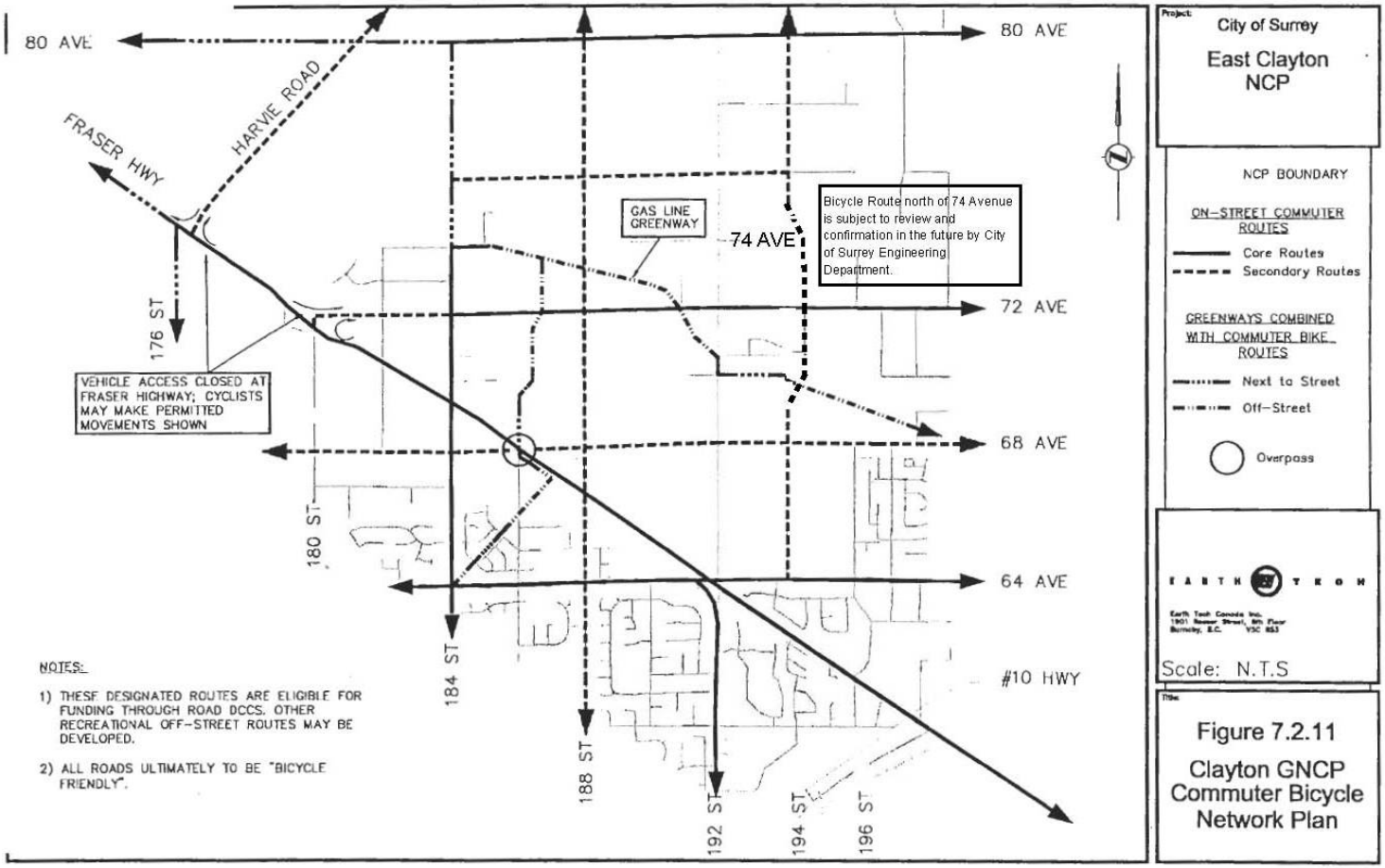
Curb extensions are required at virtually all intersections to minimize pedestrian crossing distances.

Red brick coloured concrete will be used to define other important pedestrian intersection crossings where identified in Figure 4.2.6. Coloured asphalt is not acceptable as the City of Surrey has found that it wears too quickly.

To provide safe pedestrian / cyclist crossing of lanes from multi-use pathways, the following provisions are required:

- A 1.0 m (along pathway) x 15.0 m (along lane) corner cut dedication, as measured from the edge of the asphalt pathway. This is to provide safe stopping sight distance. Where a pathway corridor is wider than the asphalt pathway, the additional corner cut dedication would be reduced accordingly;
- Baffle gates are required to ensure cyclists stop at the lane; and
- Speed humps located at the crossing.

Figure 4.4.11
Bicycle Network Plan



4.22 NCP Expansion Financing

All Arterials and Major Collector road elements in East Clayton Expansion Area North of 72 Avenue will be eligible for DCC funding in accordance with City practice and policy. The costs of Local and Minor Collector road elements will be borne by the developers.

The DCC eligible infrastructure Arterial and Major Collector road elements for the proposed East Clayton Expansion Area North of 72 Avenue, their projected capital costs of construction in 2005 dollars and DCC eligible component costs are summarized in *Table 4.4.15* and *Table 4.4.16.*

It should be noted that the Arterial and Major Collector DCC revenues generated by the study area will be approximately $4,027,793 for Arterial roads and $1,015,583 for Major Collector roads.

Table 4.4.15 Arterial Road DCC Elements

Location	Scope of Work	Notes	Total Cost	DCC Component
72 Ave: 188 - 196 St.	Upgrade to Arterial	50% to NCP Expansion	$4,000,000	$2,000,000
192 St: 72 – 73B St.	New Arterial	100% to NCP Expansion	$800,000	$800,000
Traffic Signals	72 Ave (3 sets)	50% to NCP Expansion	$700,000	$350,000
Totals			**$5,500,000**	**$3,150,000**

Table 4.4.16 Major Collector Road DCC Elements

Location	Scope of Work	Notes	Total Cost	DCC Component
188 St: 72 – 73 Ave	Upgrade to Major Collector	50% to NCP Expansion	$264,000	$132,000
73 Ave: 191 – 196 St	New Major Collector	100% to NCP Expansion	$960,000	$960,000
194A St: 72 – 74 Ave	New Major Collector including roundabout	100% to NCP Expansion	$480,000	$480,000
Totals			**$1,704,000**	**$1,572,000**

Refer to Infrastructure Financing for the detailed financial analysis of the infrastructure categories on DCC funding and cost sharing.

Funding Impacts and Strategies

4.23 Financial Analysis

The financial analysis of the five infrastructure categories on DCC funding and cost sharing for the proposed NCP expansion north of 72 Avenue was based upon the Land Use Plan, population projections and the infrastructure designs presented in this report.

The Full Build-Out condition was used to design the component sizing of each infrastructure category and each applicable component is listed in each section of this Servicing Report.

In order to analyze the impact of the proposed 2003 East Clayton NCP Expansion North of 72 Avenue, DCC revenues were calculated based upon current DCC Rates (July 2002 Bylaw #14650) for the proposed expansion area to determine the revenues for the six DCC categories (arterial roads, collector roads, sanitary sewers, water, storm sewers and parks). *Table 4.5.1* summarizes the resulting additional potential DCC revenues for the six DCC categories.

The DCC eligible infrastructure elements for the proposed East Clayton Expansion Area North of 72, their projected capital costs of construction and DCC eligible costs were estimated. These estimated costs are summarized in Tables and shown in Figures in each applicable section of the Servicing Plan.

A comparison of the estimated revenues and costs were carried out and a summary of the projected variance between DCC revenues and the DCC eligible expenditures for the five infrastructure categories is shown in *Table 4.5.2*. This comparison shows that there would be DCC revenue shortfalls in the drainage and major collector roads component, with a surplus in all other infrastructure components for an overall surplus of approximately $260,295.

In conclusion, an overall surplus in DCC is projected and balanced financing for the 2003 East Clayton NCP and proposed amendments can be achieved.

4.24 Funding Methods

The following is a summary of various methods and mechanisms available, based upon the current City of Surrey Servicing Standards, Policies and Bylaws:

- DCC Rebates;
- Development Coordinated Works (DCW);
- Upsizing reimbursement;
- Frontage Latecomer Agreements;
- Area Latecomer or Development Works Agreement; and

- Developer Coordinated Levies.

The applicability of each of the above funding methods must be reviewed for each project in accordance with the current City of Surrey Servicing Standards, Policies and Bylaws.

Table 4.5.1
2003 East Clayton NCP Expansion North of 72 Ave. DCC Revenue Projection

Land Use	**Units**		**Sanitary**		**Water**		**Storm**		**Arterial**		**Major Collector**		**Parks**
		Rate	Revenue	Rate	Revenue	Rate	Revenue	Rate	Revenue	Rate	Revenue	Rate	Revenue
RF-12	169	$820	$138,580	$951	$160,719	$2,618	$442,442	$5,517	$932,373	$1,394	$235,586	$5,575	$942,175
RF-9	329	$745	$245,105	$865	$284,585	$1,545	$508,305	$5,020	$1,651,580	$1,269	$417,501	$5,575	$1,834,175
25-45 upa	512	$0.46	$282,624	$0.54	$331,776	$1.01	$620,544	$2.35	$1,443,840	$0.59	$362,496	$5.11	$3,139,584
Totals			**$666,309**		**$777,080**		**$1,571,530**		**$4,027,793**		**$1,015,583**		**$5,915,934**

Note: 25 – 45 upa land use assumes average unit size of 1200 sq.ft.

Table 4.5.2
2003 East Clayton NCP Expansion West of 188 Street DCC Revenue Projection

Infrastructure Category	Projected Total DCC Revenue	Projected Total DCC Expenditures	Balance (Revenue – Cost)
Arterial Roads	$4,027,793	$3,150,000	$877,793
Major Collector Roads	$1,015,583	$1,572,000	-$556,417
Sanitary Sewers	$666,309	$80,000	$586,309
Water	$777,080	$781,000	-$3,920
Drainage	$1,571,530	$2,017,000	-$445,470
Totals	$8,058,295	$7,798,000	$458,295

Notes:

All DCC expenditures are based upon current 2005 construction costs.

Part V Appendices

APPENDIX I

ECL ENVIROWEST Consultants Ltd. Report dated May 31, 2004

envirowest environmental resource professionals

May 31, 2004

Wendy L. Whelen
Planning & Development Department
City of Surrey
7452-132nd Street
Surrey, BC V3W 4M7

Dear Ms. Whelen,

RE: CLAYTON WOODLOT REVIEW

The City of Surrey (City) proposes to develop a large woodlot in Surrey, BC located in the Clayton Neighbourhood between 74th and 76th Avenue at 196th Street adjacent to the Surrey/Langley border (Property). In 1997 Dillon Consulting identified ten habitats in the Clayton Area Neighbourhood Concept Plan as having "High Value" to wildlife. The Property was identified as one of those areas (Area 2). As part of the City's due diligence it retained ECL Envirowest Consultants Limited (Envirowest) to conduct an overview terrestrial wildlife review of the Property and assess its potential to provide breeding habitat for any provincial and/or federal species of concern.

Envirowest performed a survey of the Property on May 19, 2004. Transects through the Property were conducted according to protocols outlined in the British Columbia Standards of the Resource Inventory Standards Committee (RISC), Standard Inventory Methodologies for Raptors (Version 1.1) (RISC, 2001).

Since no watercourses are present on the Property the focus was on its significance to terrestrial animals. Presence and or potential breeding habitat for listed rare or threatened vertebrate animal species (species of concern) listed by:

1. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in November 2003;
2. Schedules 1 and 2 of the federal Species at Risk Act (SARA); and
3. The British Columbia Conservation Data Center's (CDC) Animal Tracking List for the Chilliwack Forest District (April 2004) were reviewed.

ECL ENVIROWEST CONSULTANTS LIMITED
Suite 130 - 3700 North Fraser Way
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www.ecl-envirowest.bc.ca

HABITAT

The Property lies within the very dry maritime subzone of the Coastal Western Hemlock (CWHxm1) biogeoclimatic zone. This zone extends from sea level to approximately 700 metres elevation, and is located generally north of the drier Coastal Douglas Fir biogeoclimatic zone. Climate within the CWHxm1 is typified by warm dry summers and moist mild winters with little snowfall (Meidinger and Pojar, 1991). The forest canopies of zonal sites are dominated by Douglas fir (*Pseudotsuga menziesii*); western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) are less prevalent. Major shrub species include salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), and red huckleberry (*Vaccinium parvifolium*). Less common ground cover species include vanilla-leaf (*Achlys triphylla*), sword fern (*Polystichum munitum*), twinflower (*Linnaea borealis*), and bracken (*Pteridium aquilinum*). Step moss (*Hylocomium splendens*) and Oregon beaked moss (*Kindbergia oregana*) are the common moss species (Green and Klinka, 1994).

A habitat/vegetation survey of the property was performed during the field assessment and data was recorded, in part, according to methods outlined in the BC MWLAP and the BC Ministry of Forests 'Field manual for describing ecosystems. Land Management Handbook No. 25' (MOF and MELP, 1998) and the Ministry of Forests 'A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region. Land Management Handbook Number 28.' (Green and Klinka, 1994).

The woodlot contains structural stage 5 (pole/sapling) and 6 (mature forest) trees. The forest floor is hummocky and trees grow from the crests of hummocks. The spaces between the roots are opportune denning locations for small mammals such as shrews, mice and voles. The soil is rich in sections composed of loose soil and deep leaf litter. Coarse woody debris fragments consist of hard intact round branches from fallen trees 3-10 cm diameter to hard, large pieces (up to 40 cm) exhibiting some decay with sap rot. Stumps or decaying stumps from fallen trees were very limited in number. The shrub understorey is dense throughout and sometimes impenetrable.

Single family dwellings surround the woodlot along the north, south and west. The eastern border abuts the Surrey/Langley border. The woodlot along the Langley/Surrey border in 1997 was connected and provided a corridor for wildlife travel but it has since been cleared. At present the cleared area is composed of dominant sapling black cottonwood (*Populus trichocarpa*), and red alder (*Alnus rubra*) trees.

The trees of the Property are older along its southeastern edge but gradually become younger forming a pole stage in the interior. It is composed of a monoculture of red alder. The greatest diversity is found along the first 30 m of the forest edge in the east. Species consist of bigleaf maple (*Acer marcophyllum*), red alder, paper birch (*Betula papyrifera*), and black cottonwood while stands of Douglas fir and western hemlock are mostly found in islands and areas of older forest growth.

The shrubs are dense along the edges of the woodlot, sometimes forming impenetrable thickets. Along the entire edge of the forest thick impermeable mats of Himalayan blackberry (*Rubus discolor*), salmonberry (*Rubus spectabilis*) and evergreen blackberry (*Rubus laciniatus*) persist. The interior of the woodlot is dominated by salmonberry. Sections where older trees are found a diverse mix of beaked hazelnut (*Corylus cornuta*), red elderberry (*Sambucus racemosa*), vine maple (*Acer circinatum*), Indian plum (*Oemleria cerasiformis*), red huckleberry, hardhack (*Spirea douglasii*) and trailing raspberry (*Rubus pedatus*) can be found.

The woodlot ground cover is dominated by leaf litter, especially in sections where younger trees dominate and the shrub cover is dense. Common flowering herbaceous plants at the time of survey included miterwort (*Mitella diphylla*), large-leaved avens (*Geum macrophyllum*), pacific bleeding heart (*Dicentra formosa*), Herb Robert (*Geranium robertianum*), sword fern (*Polystichum munitum*), false lilly-of-the valley (*Maianthemum dilatatum*), foamflower (*Tiarella cordifolia*) and western buttercup (*Ranunculus occidentalis*).

Potential Rare Species Utilization

A review of habitat requirements (Nagorsen and Brigham, 1996; Campbell *et al.*, 1990; Green and Campbell, 1992; Licht, 1970; Chapman and Feldhammer, 1982; Knopf, 1981; Cannings and Cannings, 1998; Cannings, 2002; Walker, 1953; Corbet, 1999) of rare vertebrate and invertebrate species (i.e. species of concern) was completed as part of this assessment. It was determined that the woodlot and environments in close proximity (200 metres) to the Property contained sufficient habitat requirements to potentially provide breeding habitat for two (2) blue-listed[1] rare vertebrate species (Table 1).

Table 1 Rare Species Potentially Occurring or Potentially Breeding on the Property

Species Common Name	Species Latin Name	Provincial Status	Project Status
Trowbridge's shrew	*Sorex trowbridgii*	Blue	Breeding
red-legged frog	*Rana aurora*	Blue	Migration Route

[1] Species and or populations considered to be vulnerable or sensitive to human activities or natural events in the province.

Trowbridge's Shrew (*Sorex trowbridgii*)

This shrew is provincially blue-listed but it is not listed by COSEWIC. On the coast, the Trowbridge's shrew is most common in dry, mixed forests with a rich soil and decaying leaf litter with coarse woody debris (Nagorsen, 1996). It is somewhat of an opportunist and can be found in wet forests, riparian habitats and ravines, but it generally avoids damp marshy areas with saturated soils. It prefers dry loose soil and deep litter avoiding areas with a high water table (George, 1989). It burrows in the organic surface layer of the soil and requires organic debris for foraging (van Zyll de Jong 1983). In the southern coastal area of BC and into the US, the Trowbridge's shrew has been captured mostly in mixed forests of red alder, Western hemlock, Western redcedar and big-leaf maple. Historical captures in all these forests have been in various aged categories with extensive canopy cover (Nagorsen, 1996). The food of the shrew consists primarily of centipedes, spiders, slugs, snails, beetles, and other larval insects. They also consume plant material such as fungi and plant seeds from Douglas-fir trees (Whitaker and Maser, 1976).

Based on the habitat structure the shrew may theoretically be a breeder in the woodlot, primarily associated with the older forest community along the east and southeast.

Red-legged Frog (*Rana aurora*)

This frog is provincially blue-listed and listed Special Concern[2] by COSEWIC. While this frog requires water that is >1 metre deep for breeding (Licht, 1970) outside of its breeding season (April-January; Licht, 1970), it is highly terrestrial and can be found in forests far from standing water (Bulger *et al.*, 2003). They are occasionally found inside decayed logs and live in coniferous or deciduous forests (*ibid.*). It is not a potential breeder on the Property but it may use the woodlot as a travel corridor in search of breeding grounds.

CONCLUSIONS

Dillon Consulting identified the Property as having a high significance in their 1997 study when it was connected to a larger forest corridor system. Notwithstanding that, the woodlot was connected to a larger tract of forest that provided access to Langley. It formed a larger corridor allowing wildlife to traverse the landscape. Since this east-west corridor has been fragmented on the Langley side and there is no continuous corridor joining the Property from the north, west and south it has become isolated in the landscape, its significance to any red, blue-listed species for breeding may be rated at best low value.

[2] A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.

envirowest

I trust the information presented in this letter is satisfactory for your current needs. Please do not hesitate to call the undersigned should you have any questions/concerns at 604-451-0505.

Sincerely,
ECL Envirowest Consultants Limited

Libor Michalak, R.P.Bio.
Wildlife Biologist

REFERNCES

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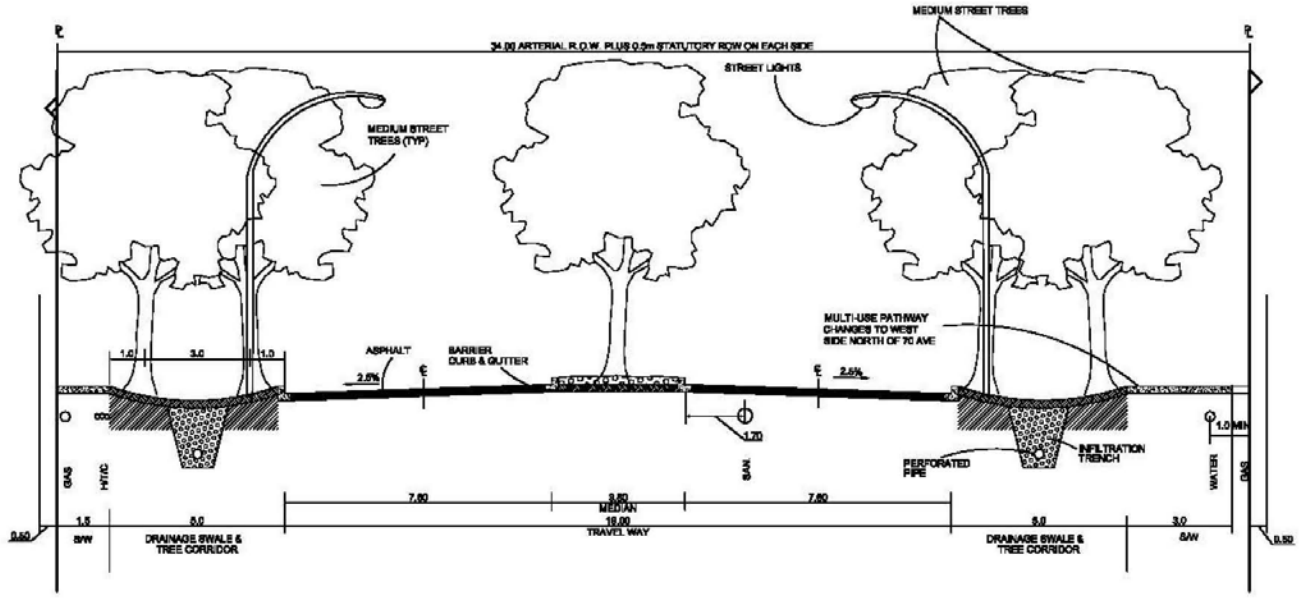
APPENDIX II –

TYPICAL ROAD CROSS SECTIONS

192 STREET	ARTERIAL	PARKWAY

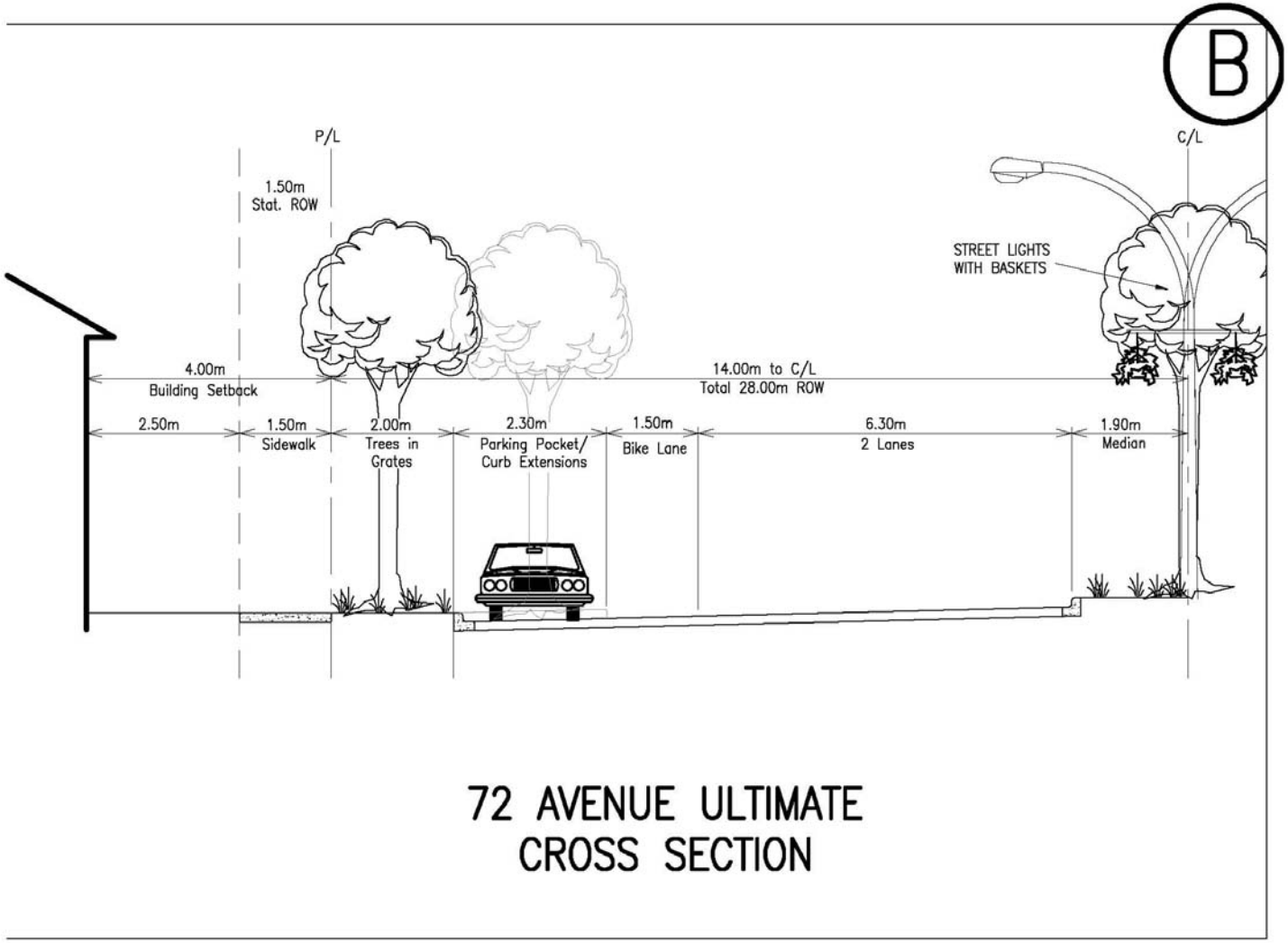
A

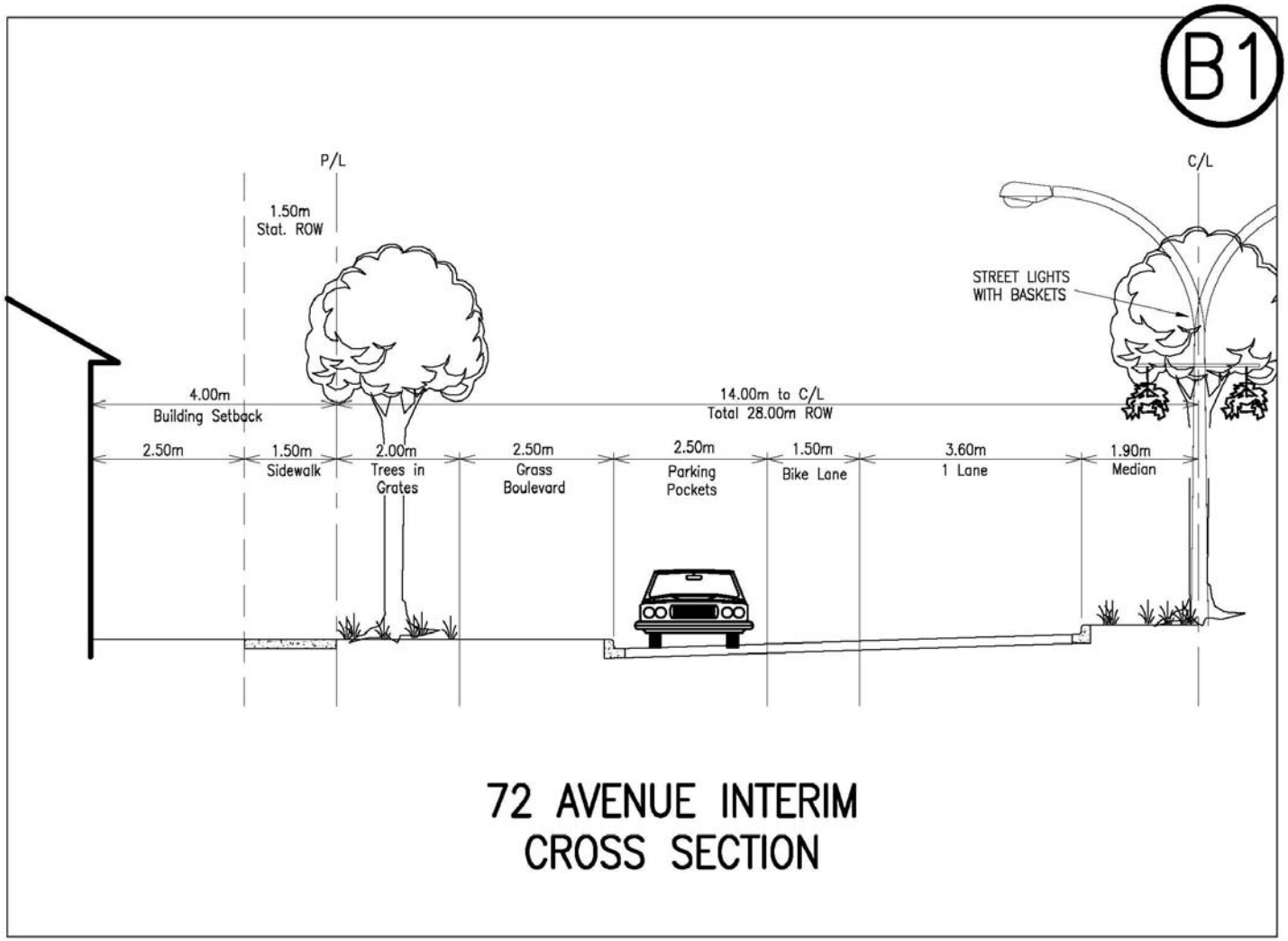


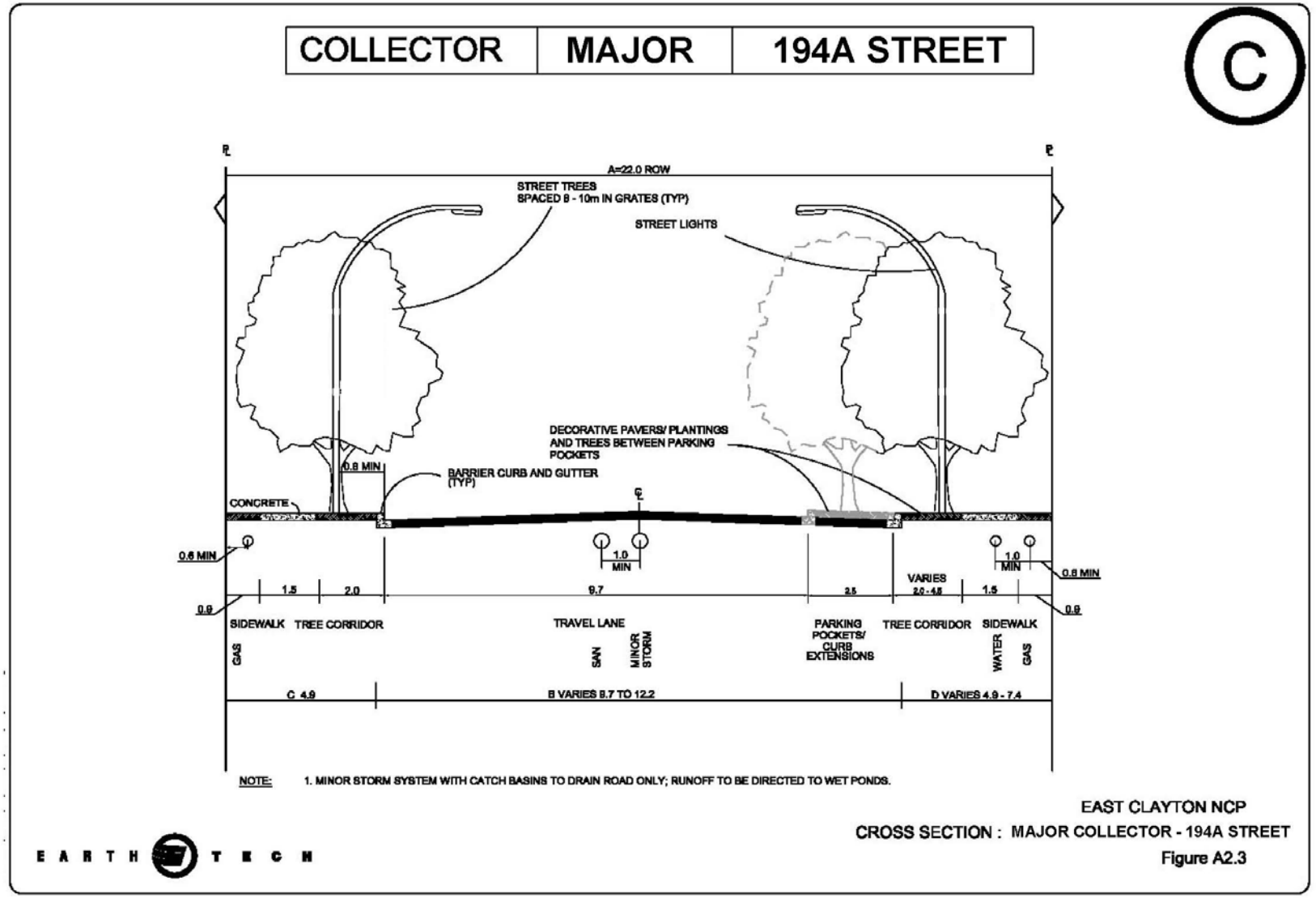
NOTE: 1. ULTIMATE MAJOR PARKWAY HAS 4 TRAVEL LANES, INTERIM PARKWAY HAS 2 TRAVEL LANES

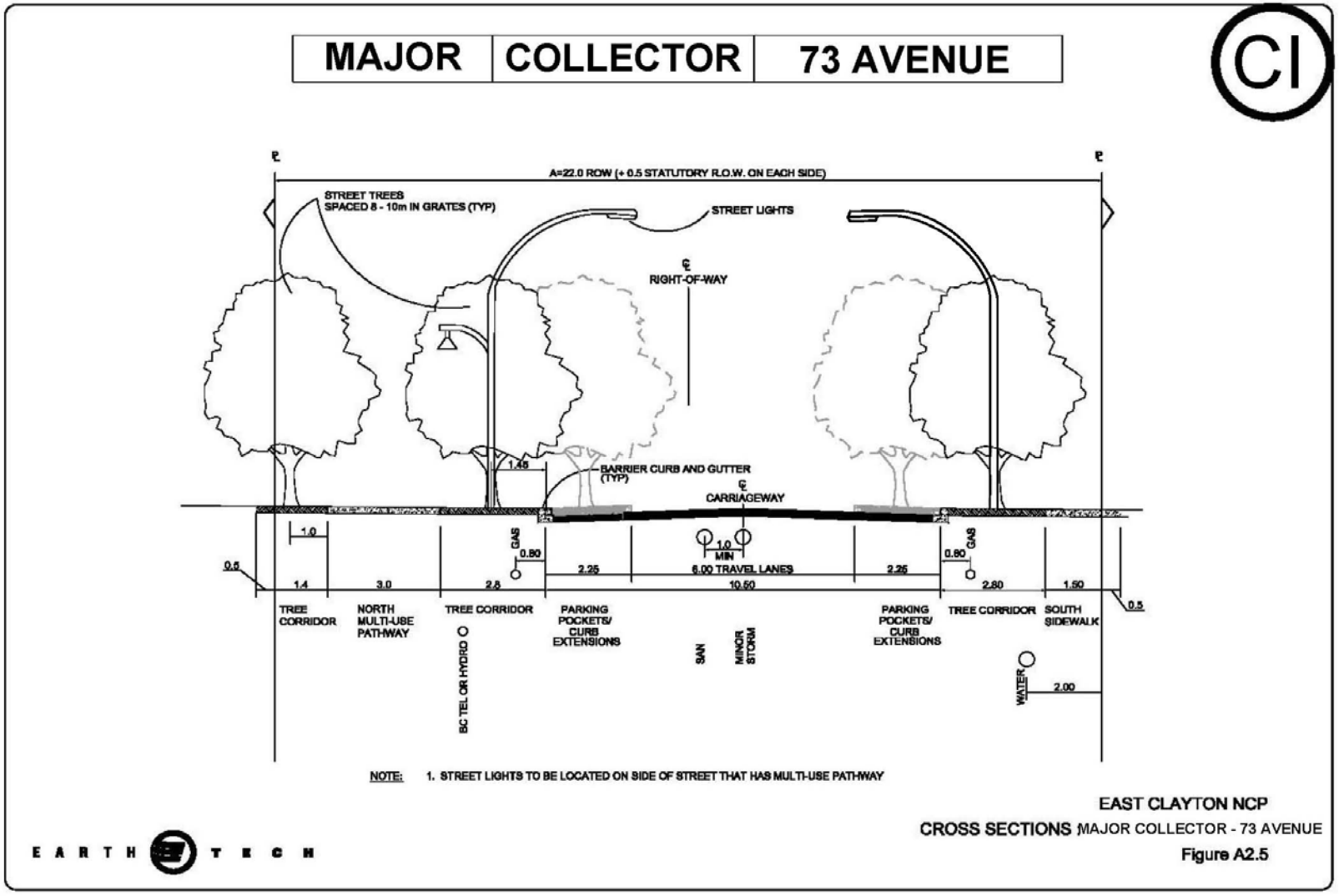
EARTH TECH

EAST CLAYTON NCP
CROSS SECTIONS : ARTERIAL PARKWAY
Figure A2.1


B
P/L
C/L
1.50m
Stat. ROW
STREET LIGHTS
WITH BASKETS
4.00m
Building Setback
14.00m to C/L
Total 28.00m ROW
2.50m
1.50m
Sidewalk
2.00m
Trees in
Grates
2.30m
Parking Pocket/
Curb Extensions
1.50m
Bike Lane
6.30m
2 Lanes
1.90m
Median
72 AVENUE ULTIMATE
CROSS SECTION

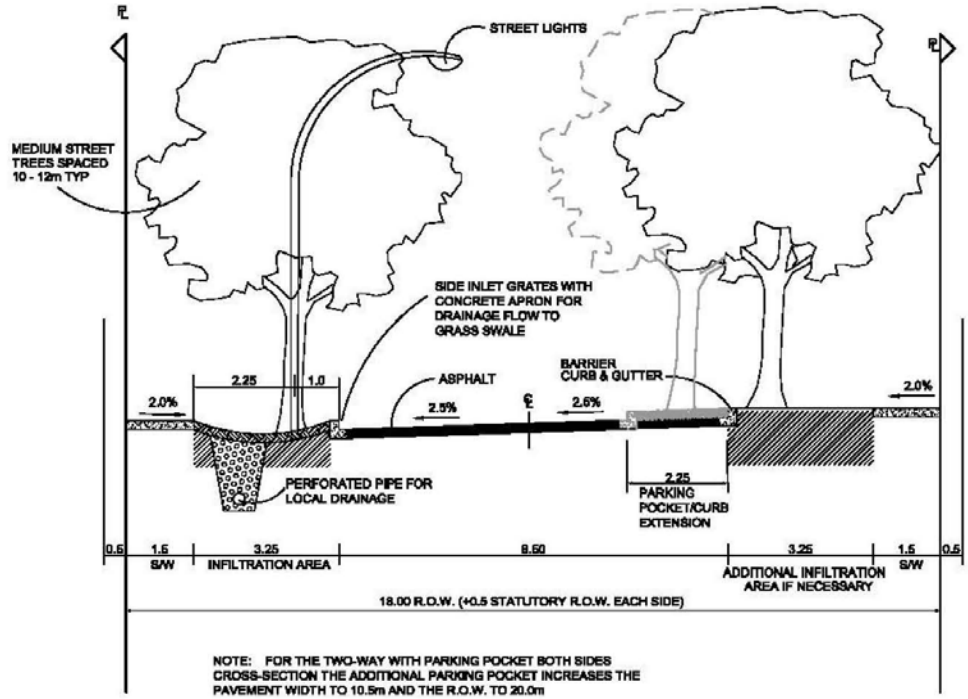

B1
P/L
C/L
1.50m
Stat. ROW
STREET LIGHTS
WITH BASKETS
4.00m
Building Setback
14.00m to C/L
Total 28.00m ROW
2.50m
1.50m
Sidewalk
2.00m
Trees in
Grates
2.50m
Grass
Boulevard
2.50m
Parking
Pockets
1.50m
Bike Lane
3.60m
1 Lane
1.90m
Median
72 AVENUE INTERIM
CROSS SECTION


COLLECTOR
MAJOR
194A STREET
C
A=22.0 ROW
STREET TREES SPACED 8 - 10m IN GRATES (TYP)
STREET LIGHTS
DECORATIVE PAVERS/ PLANTINGS AND TREES BETWEEN PARKING POCKETS
0.6 MIN
BARRIER CURB AND GUTTER (TYP)
CONCRETE
0.6 MIN
1.0 MIN
1.0 MIN
0.6 MIN
VARIES 2.0 - 4.5
1.5
2.0
9.7
2.5
1.5
0.9
0.9
SIDEWALK
TREE CORRIDOR
TRAVEL LANE
PARKING POCKETS/ CURB EXTENSIONS
TREE CORRIDOR
SIDEWALK
GAS
SAN
MINOR STORM
WATER
GAS
C 4.9
B VARIES 9.7 TO 12.2
D VARIES 4.9 - 7.4
NOTE: 1. MINOR STORM SYSTEM WITH CATCH BASINS TO DRAIN ROAD ONLY; RUNOFF TO BE DIRECTED TO WET PONDS.
EAST CLAYTON NCP
CROSS SECTION : MAJOR COLLECTOR - 194A STREET
Figure A2.3
EARTH TECH


MAJOR
COLLECTOR
73 AVENUE
C1
A=22.0 ROW (+ 0.5 STATUTORY R.O.W. ON EACH SIDE)
STREET TREES
SPACED 8 - 10m IN GRATES (TYP)
STREET LIGHTS
RIGHT-OF-WAY
BARRIER CURB AND GUTTER
(TYP)
CARRIAGEWAY
1.45
1.0
0.5
1.4
3.0
2.8
GAS
0.80
2.25
1.0
MIN
6.00 TRAVEL LANES
10.50
TREE
CORRIDOR
NORTH
MULTI-USE
PATHWAY
TREE CORRIDOR
PARKING
POCKETS/
CURB
EXTENSIONS
BC TEL OR HYDRO
SAN
MINOR
STORM
PARKING
POCKETS/
CURB
EXTENSIONS
TREE CORRIDOR
SOUTH
SIDEWALK
WATER
2.00
2.80
1.50
0.5
NOTE: 1. STREET LIGHTS TO BE LOCATED ON SIDE OF STREET THAT HAS MULTI-USE PATHWAY
EAST CLAYTON NCP
CROSS SECTIONS MAJOR COLLECTOR - 73 AVENUE
Figure A2.5
EARTH TECH

LOCAL	RESIDENTIAL	TWO WAY QUEUEING

D



EAST CLAYTON NCP
CROSS SECTIONS : RESIDENTIAL LOCALS
Figure A2.4

EARTH TECH

APPENDIX III

Council Resolution; and
Corporate Report: East Clayton NCP Extension North of 72 Avenue Stage 2 Report

Minutes
Regular Council - Public hearing
Monday, June 27, 2005

Item No. C011 Neighbourhood Concept Plan - East Clayton Extension North of 72 Avenue (East Clayton North Extension) - Stage 2 Report
File: 6520-20 (East Clayton North)

It was Moved by Councillor Watts
Seconded by Councillor Hunt
That Council:

1. Receive this report as information;

2. Approve the final and complete East Clayton North Extension Neighbourhood Concept Plan ("NCP"), contained in Appendix "A" of this report, as a means to manage development and to provide services, amenities and facilities for this neighbourhood;

3. Authorize the City Clerk to bring forward for the required readings and, where necessary, to set a date for the Public Hearing for the following by-laws:

   (a) Amendment to the Surrey Official Community Plan By-law 1996, No. 12900 (the "OCP By-law"), as documented in Appendix "B" of this report, to add the East Clayton North Extension area to Figure 27 entitled "Map Showing Recently Approved Secondary Plans";

   (b) Amendment to Surrey Zoning By-law, 1993, No. 12000, as amended, (the "Zoning By-law"), as documented in Appendix "C", to require amenity contributions for the East Clayton North Extension, based upon the density bonus concept; and

   (c) Amendment to the Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631 (the "Fees Imposition By-law"), as documented in Appendix

"D" of this report, to require the payment of additional application fees to recover a portion of the costs of preparing the NCP for the East Clayton North Extension; and

4. Instruct staff to bring forward, on a site-by-site basis, concurrently with the related site-specific rezoning application, any necessary OCP land use designation amendments in the area covered by the East Clayton North Extension NCP.

RES.R05-1589 Carried

SURREY
CITY OF PARKS

Corporate Report

NO: C011

COUNCIL DATE: June 20, 2005

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	DATE:	**June 17, 2005**
FROM:	**General Manager, Planning and Development**	FILE:	**6520-20 (East Clayton North)**

SUBJECT: **Neighbourhood Concept Plan - East Clayton Extension North of 72 Avenue (East Clayton North Extension) - Stage 2 Report**

RECOMMENDATION

It is recommended that Council:

1. Receive this report as information;

2. Approve the final and complete East Clayton North Extension Neighbourhood Concept Plan ("NCP"), contained in Appendix "A" of this report, as a means to manage development and to provide services, amenities and facilities for this neighbourhood;

3. Authorize the City Clerk to bring forward for the required readings and, where necessary, to set a date for the Public Hearing for the following by-laws:

   (a) Amendment to the Surrey Official Community Plan By-law 1996, No. 12900 (the "OCP By-law"), as documented in Appendix "B" of this report, to add the East Clayton North Extension area to Figure 27 entitled "Map Showing Recently Approved Secondary Plans";

(b) Amendment to Surrey Zoning By-law, 1993, No. 12000, as amended, (the "Zoning By-law"), as documented in Appendix "C", to require amenity contributions for the East Clayton North Extension, based upon the density bonus concept; and

(c) Amendment to the Surrey Land Use and Development Application Fees Imposition By-law, 1993, No. 11631 (the "Fees Imposition By-law"), as documented in Appendix "D" of this report, to require the payment of additional application fees to recover a portion of the costs of preparing the NCP for the East Clayton North Extension; and

4. Instruct staff to bring forward, on a site-by-site basis, concurrently with the related site-specific rezoning application, any necessary OCP land use designation amendments in the area covered by the East Clayton North Extension NCP.

INTENT

The purpose of this report is to:

- Provide information to Council about the final and complete NCP for the extension of East Clayton to the North of 72 Avenue; and
- To seek Council approval of the NCP and authorization to bring forward the necessary by-laws that will act to recognize this NCP within the OCP and to implement amenity contribution requirements and NCP preparation charges.

BACKGROUND

This East Clayton North Extension is located to the north of the East Clayton neighbourhood, the NCP for which was approved in March of 2003. The area covered by the East Clayton North Extension is bounded by 72 Avenue to the south, 188 Street to the west and 196 Street (Surrey-Langley border) to the east. The northerly boundary follows the limit of the area determined by that area where underground engineering services can flow by gravity to the south of 72 Avenue (see attached Appendix "E"). The NCP area comprises approximately 43 hectares (106 acres) of land, currently designated Suburban in the OCP and designated Future Urban in the 1999 Clayton General Land Use Plan.

On July 28, 2004, Council considered Corporate Report No. L009 and approved the Stage 1 Land Use Concept for the East Clayton North Extension NCP (attached as Appendix "F"). At that time, Council also instructed staff to complete the Stage 2 component of the NCP, which includes the resolution of outstanding land use issues and the preparation of servicing strategies, financing strategies, phasing and community amenities. Additionally, Council authorized staff to accept and process development applications in the East Clayton North Extension area on the basis of the

Stage 1 Plan, with final approval of the applications being withheld pending completion and approval of the Stage 2 component. Staff has received a number of inquiries for development in this NCP area, with one application, No. 7905-0003-00, to the northeast of 72 Avenue and 193 Street, having been submitted to date.

DISCUSSION

The East Clayton North Extension NCP - Land Use Plan

The East Clayton North Extension NCP is based on the sustainable development principles that formed the basis of the East Clayton NCP. These principles are intended to guide the development of a complete, mixed-use pedestrian-oriented neighbourhood. This neighbourhood will offer a range of residential housing types and the plan includes a comprehensive strategy to reduce the impacts of development on the natural environment.

Consistent with the East Clayton NCP, the residential designations range from Low Density Residential at 6 to 10 units per acre, to High Density Residential at 22 to 45 units per acre. The Land Use Plan map is attached as Appendix "E" to this report. One new residential housing type, that has been included in this Plan, is manor houses that will allow fourplexes at specific locations within the medium-high residential density designation.

Approximately 35.5 hectares (88 acres) of land are designated for residential development, covering 82% of the East Clayton North Extension area. At build-out, assuming densities in the middle of the density ranges, the East Clayton North Extension area will provide for approximately 1,324 residential units and a population of approximately 3,700.

The principle of small-scale commercial uses, within a five to six minute walking distance of homes, is continued north of 72 Avenue. Neighbourhood Commercial is proposed on 72 Avenue at 188 Street and at 192 Street. The main commercial centre will be at 72 Avenue and 188 Street. It is noted in the NCP that the ultimate size and configuration of this commercial core will be subject to further study and market analysis.

Mirroring the land use to the south of 72 Avenue, Special Residential is proposed at 195 Street, to provide for low-impact business uses to be accommodated as part of the residential units. The NCP contains policies to provide for the consideration of neighbourhood commercial uses at 196 Street and 72 Avenue, provided any impacts of such redesignation are addressed.

The land designated for commercial uses (excluding Special Residential) is approximately 3.4 hectares (8 acres) covering 8% of the area.

The NCP designates two parks:

- A pocket park to the east of 192 Street; and
- A neighbourhood park to the west of 192 Street.

The north-south greenway to the east of 194A Street, will provide a connection from 72 Avenue to the north of 74 Avenue. The wider portion between 73 Avenue and 74 Avenue will also function as a park for the people living in the area to the east of 194A Street. The total amount of land designated for park purposes, including the greenway within the Terasen Gas right-of-way, is approximately 4.5 hectares (11 acres), which is about 10% of the extension area.

It is estimated that the new growth will generate approximately 350 new elementary students and 150 secondary students. The Surrey School District has advised that the new neighbourhood is not large enough to require new schools. The existing schools will accommodate the new students from this area. To address the school needs, based on the anticipated student projections in the East Clayton area, two new school sites have been purchased and a new elementary school is planned for opening by 2007 - 2008 to relieve overcrowding at the existing schools. The School District also owns a fourth elementary school site that is being considered for construction budget approval for 2008. It is anticipated that a new secondary school site will be approved for purchase this year, with approval for construction anticipated for 2008.

The road pattern in the East Clayton North Extension area, similar to the road pattern in the East Clayton NCP, is based on the principles of providing connectivity, creating pedestrian-friendly streetscapes and supporting the natural drainage infrastructure. Where street connectivity cannot be maintained due to property constraints or traffic concerns, the continuity of the pedestrian circulation is provided by way of pathways.

Resolution of Outstanding Land Use Issues

Two outstanding land use issues were identified at the time of the approval of the Stage 1 component of the NCP. The issues (shown circled on the Stage 1 Land Use Plan that is included in Corporate Report No. L009, attached as Appendix "F") and the recommended resolution are discussed below:

1. **Greenway at the North-East Corner of 72 Avenue and 194A Stree**t

   The Stage 1 Land Use Plan showed an approximately 38 metre (125 foot) wide greenway occupying almost the entire property abutting the east side of 194A Street (19471 - 72 Avenue). This greenway width was comparable to the greenway to the south of 72 Avenue in the East Clayton NCP, which

showed a 40-metre wide north-south greenway to support storm drainage, a multi-use pathway and outdoor recreation space and to provide physical separation between adjacent multi-family residential sites. The greenway to the south of 72 Avenue was subsequently reduced in width and relocated to address site-specific issues that arose in conjunction with the rezoning applications to the south of 72 Avenue. The greenway in the East Clayton North Extension area was located abutting 194A Street to provide continuity in relation to the greenway to the south of 72 Avenue, as shown on the current East Clayton NCP.

The owners of the land at 19471 - 72 Avenue requested that the greenway be relocated, as the proposed location would not allow them to develop their property.

Resolution of the Issue

Staff developed a number of options for greenway locations, which were discussed with all potentially affected landowners. On the basis of these discussions, staff reviewed the function of the greenway and determined that its width could be reduced to 20 metres (66 feet), while maintaining its location adjacent to 194A Street, as shown on Stage 1 Plan. The 20-metre width will be sufficient to maintain its function as a multi-use pathway connection between the greenway south of 72 Avenue and the open space/greenway north of 73 Avenue. In combination with the width of 194A Street, the visual perception of a wide linear space will be maintained. As a consequence of this change, the layout of the remaining land to the east, up to 195 Street, has been modified. This has resulted in a reduction to the area covered by the Medium-High Density Residential (15-25 upa) designation and an increase in the area covered by the Medium Density residential (10-15 upa) designation. These two designations will be separated by 72A Avenue. When a development application is received for the subject lands, the City will work with the property owners to achieve the greenway.

2. **Greenway to the North-East of 73 Avenue and 194A Street**

The owners of the two properties affected by the location and design of this section of the greenway raised concerns about the impact of the proposed 40-metre (132 foot) width of the greenway and the proposed "flaring" at the southerly end of this section. The 40-metre width, as proposed in the East Clayton NCP, is the only open space to the east of 194A Street and is designed with wider "pockets", to accommodate active recreation (such as children's play areas) within the greenway, while maintaining a multi-use pathway function. This width also provides privacy and separation between residential buildings across the greenway and between the multi-use pathway and the adjacent buildings. The "flaring" at 73 Avenue was proposed as a

means to maintain visual connection with the greenway to the south, due to the offset that occurs at 73 Avenue and to assist in surveillance of the open space in keeping with the CPTED principles.

Resolution of the Issue:

Staff reviewed the proposed greenway north of 73 Avenue in view of the owners' concerns. It has been determined that its width can be reduced from 40 metres (132 feet) to 35 metres (115 feet) and the flaring, on the east side at 73 Avenue, be removed, while maintaining the proposed configuration to the west. The reduced width is still considered sufficient to allow the greenway to function as a multi-use pathway and open space for outdoor recreation purposes, as well as providing privacy separation between multiple residential buildings on adjacent sites. The "flaring" to the west is required to maintain visual connectivity with the greenway to the south and allow surveillance of the greenway from the street.

The greenway locations, as discussed above, have been incorporated into the final plan. The final Land Use Plan (Appendix "E") is consistent with the Stage 1 Land Use Plan in all other respects.

In the Stage I Land Use Plan, a riparian area was shown north of the future 73 Avenue and west of the future 191 Street. This is outside of the current NCP area, but shown on the general context mapping. This creek designation was based on the available information when the Stage 1 Plan was being prepared. Subsequently, based on an environmental report provided by the owners, the Federal Department of Oceans and Fisheries ("DFO") has advised that this creek no longer exists. The base mapping has been amended to remove this designation.

Public Consultation

Opportunities were provided for public input and comment on the NCP through three public open houses held on April 7, May 5 and July 6, 2004. Questionnaires and comment sheets inviting comments on various aspects of the NCP were distributed at the open houses. Total attendance at these open houses was approximately 390 people. There were 60 comment sheets completed and returned, in total.

At Open House #1, background information was presented on the NCP process, Clayton General Land Use Plan, East Clayton NCP and engineering servicing. General comments on land use preferences were sought from the public. At Open House #2, two draft land use concept plan options and preliminary servicing boundary maps were presented. At Open House #3, the preferred land use concept plan and additional information on engineering servicing plans were presented.

Of approximately 100 people who attended the last open house, 14 individuals completed comment sheets. Approximately 80% of the respondents supported the draft preferred land use concept plan.

In addition to the open houses, City staff and consultants met with a number of individual property owners during the course of the plan preparation process to address concerns that were specific to individual properties.

During the last open house, some of the owners of the properties outside of the NCP area, to the north of 74 Avenue, questioned the planning process and the engineering assumptions and rationale used to establish the northerly limit of the NCP area. They requested that their lands be included in the NCP area and appeared as a delegation to Council-in-Committee on July 26, 2004, prior to Council's consideration of the Corporate Report on Stage 1 NCP and again on May 30, 2005. A copy of the written submission from the delegation is attached to a Corporate Report on the Regular Council agenda (June 13, 2005). Staff has reviewed these concerns and has confirmed that the rationale used to establish the NCP area boundaries is valid, based on valid topographic information and servicing constraints. The planning process, including the public consultation process followed in preparing the NCP, was thorough and consistent with the City's procedures for NCP preparation. The issues raised by the delegation at the Council-in Committee meeting of May 30, 2005 is addressed in more detail in a separate Corporate Report on the Regular Council agenda (June 13, 2005).

Amenity Requirements

To address the impact of the anticipated growth on neighbourhood amenities, monetary contributions are required towards park development, for police and fire protection and for library materials. These amounts were identified during the Stage 1 process in 2004 and have been confirmed during the Stage 2 process and adjusted to 2005 dollars. The contributions required for the police and fire protection and library materials are the standard rates used in all NCP areas. The following park developments were identified for this NCP and will be funded from the park amenity contributions:

- Major north/south linear park space to the east of 194A Street, between 72 Avenue and 74 Avenue;

- Clayton Greenway (Terasen Gas right-of-way corridor);

- Neighbourhood active park at 72A Avenue and 190 Street;

- Pocket park at 73 Avenue and 193 Street;

- Natural Area management, where required; and

- Contributions to village centre amenities.

The following is the summary of the amenity contribution requirements and anticipated revenue that the City can expect to receive under full build-out of the NCP.

East Clayton Extension Neighbourhood Concept Plan Amenity Contributions (2005 Dollars)			
	Residential Per Unit contribution *(Based on 1,324 new dwelling units)*	**Non-Residential Per Acre Contribution** *(Based on 8.70 acres)*	**Anticipated Revenue at Build-out** *(approximate)*
Police Protection	$56.66	$227.48	$76,996.90
Fire Protection	$245.63	$982.85	$333,764.90
Parks and Greenway Development	$964.00	n/a	$1,276,336.00
Library Materials	$127.30	n/a	$168,545.20
Total	**$1,393.59 Per new unit/lot**	**$1,210.33 Per acre**	**$1,855,643.00**

Servicing

Detailed servicing, phasing and financing plans and strategies have been prepared to support and allow reasonable implementation of the East Clayton North Extension NCP. These plans and strategies are described in a separate Corporate Report from the Engineering Department that will be on the same Council agenda as this report.

Implementation

1. **Amendments to the OCP and NCP**

   Subject to Council approval of the East Clayton North Extension NCP, the OCP will need to be amended to reflect this new NCP. The necessary OCP amendment is documented in Appendix "B".
   In keeping with the practice followed for other NCPs, OCP land use designation amendments required to implement the final Land Use Plan (e.g. from Suburban to Multiple Residential, Commercial or Urban) will be

processed on a site-by-site basis concurrently with site-specific rezoning applications.

Any amendments to the NCP that are proposed after the NCP is approved will be considered in accordance with the OCP policy related to amendments to secondary plans.

2. **Zoning By-law Amendment for Amenity Contributions**

The Zoning By-law will need to be amended to add the East Clayton North Extension NCP to the list of NCPs within which amenity contributions are required. The proposed amendments to Schedules F and G of the Zoning By-law are documented in Appendix "C".

3. **Form and Character of New Development**

Drawing from the experience associated with the a recent manor house proposal in North Cloverdale, design guidelines have been included in the East Clayton North Extension NCP for "manor houses". New developments in the East Clayton North Extension NCP will be required to comply with the extensive performance standards and guidelines regarding urban forestry on building sites and within road right-of-ways, stormwater infiltration and management, soil preservation and pedestrian and bicycle corridors.

4. **Recovery of NCP Preparation Costs**

A consultant was retained by the City to assist with the preparation of this NCP. The cost of planning and engineering consultant services to the City was $82,410. It is recommended that the Fees Imposition By-law be amended to recoup the NCP preparation costs through the payment of application surcharge fees.

The surcharge fee per unit will be based on the anticipated 1,324 units at the mid-range density, and would result in a per unit fee of approximately $60. Should the actual number of proposed units fall below the number anticipated on a site, the applicant will be required to make up the shortfall in the surcharge fee to ensure that the NCP costs are fully recovered. For non-residential development, similar to other NCPs, the equivalent application surcharge fee will be based on the lot area at a rate of 10 units per hectare (4 units per acre).

CONCLUSION

The East Clayton North Extension NCP is based on the sustainable development principles applied to the East Clayton NCP. Developments within this NCP will be required to follow the standards and guidelines established in the East Clayton NCP. Guidelines for manor houses, not specifically included as a land use in the East Clayton NCP, have been included in this NCP. Amenity contributions have been identified to fund the various amenity needs of the new neighbourhood. Based on the discussion in this report, it is recommended that Council:

1. Approve the final and complete East Clayton North Extension NCP, contained in Appendix "A" of this report, as a means to manage development and to provide services, amenities and facilities for the area covered by the covered by the NCP;

2. Authorize the City Clerk to bring forward for the required readings and, where necessary, to set a date for the Public Hearing, the following by-laws:

   (a) Amendment to the OCP By-law, as documented in Appendix "B" of this report, to add the East Clayton North Extension area to Figure 27 entitled "Map Showing Recently Approved Secondary Plans";

   (b) Amendment to the Zoning By-law, as documented in Appendix "C", to require amenity contributions for the East Clayton North Extension, based upon the density bonus concept; and

   (c) Amendment to the Fees Imposition By-law, as documented in Appendix "D" of this report, to require the payment of additional application fees to recover a portion of the costs of preparing the NCP for the East Clayton North Extension; and

3. Instruct staff to bring forward, on a site-by-site basis, concurrently with the related site-specific rezoning application, any necessary OCP land use designation amendments in the area covered by the East Clayton North Extension NCP.

Murray Dinwoodie
General Manager
Planning and Development

BP/kms/saw
Attachments:
Appendix "A" - Final and Complete NCP
Appendix "B" - Surrey OCP By-law Amendment to Figure 27 Map
Appendix "C" - Surrey Zoning By-law Amendments to Schedules F and G

Appendix "D" - Surrey Land Use and Development Fee Imposition By-law Amendment
Appendix "E" - Final Land Use Plan – Stage II
Appendix "F" - Corporate Report No. C009 - East Clayton Expansion NCP - Stage 1 Component (with only Appendix VI attached)

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APPENDIX IV

Council Resolution; and
Corporate Report: East Clayton NCP Extension North of 72 Avenue Engineering Servicing Plan - Stage 2 Report

Minutes
Regular Council - Public hearing
Monday, June 27, 2005

Item No. C011A East Clayton Neighbourhood Concept Plan (NCP)
Extension North of 72 Avenue - Engineering Servicing Plan
File: 6520-20 (EC); 4804-704

It was Moved by Councillor Watts
Seconded by Councillor Hunt
That Council:

1. Adopt the engineering servicing and financial strategies as outlined in this report and as specified in the East Clayton NCP North Extension – Stage II NCP Report.

2. Continue to endorse the sustainability objectives as outlined in the original East Clayton NCP and associated reports to Council.

RES.R05-1590 Carried

SURREY
CITY OF PARKS

Corporate Report

NO: R156

COUNCIL DATE: June 27, 2005

REGULAR COUNCIL

TO:	**Mayor and Council**	DATE:	**June 10, 2005**
FROM:	**General Manager, Engineering**	FILE:	**6520-20 (EC)/ 4804-704**

SUBJECT: **East Clayton Neighbourhood Concept Plan (NCP)**
Extension North of 72 Avenue – Engineering Servicing Plan

RECOMMENDATIONS

It is recommended that Council:

1. Adopt the engineering servicing and financial strategies as outlined in this report and as specified in the East Clayton NCP North Extension – Stage II NCP Report.

2. Continue to endorse the sustainability objectives as outlined in the original East Clayton NCP and associated reports to Council.

INTENT

The purpose of this report is to provide Council with an overview of the engineering servicing and financial strategy for the East Clayton NCP East Extension.

BACKGROUND

The Proposed Land Use Concept Plan for the Extension Study area is being presented for approval in a separate Corporate Report from the General Manager of the Planning and Development Department.

DISCUSSION

The engineering services discussed in this report relates to major community infrastructure and how the subject area can be serviced within the original East Clayton NCP context. Only infrastructure which is presently in or could be added to the 10 Year Plan and funded through Development Cost Charge (DCC) program is discussed in detail. Local servicing requirements of individual developments have been considered, but as they will be provided and funded by development, they are not addressed in the overall financial aspects of this report.
The original East Clayton NCP had a number of unique features and challenges that have been reviewed in this extension, including:

- Extensive sustainable development initiatives throughout the NCP;
- Significant downstream drainage constraints;
- Two main servicing catchment areas defined by topography; and
- Until recently, limited existing servicing due to the rural nature of previous land uses.

Since large portions of the original East Clayton NCP have been developed or are currently being developed, some of the servicing upgrades have been completed and present servicing opportunities for this North Extension.

Servicing Profile

As a critical first step in the planning/servicing design of the East Clayton North Extension area, the storm and sanitary sewer servicing catchment boundaries were established using updated topographic mapping and a review of downstream capacity and servicing profiles. Profiles along 188 Street, 192 Street and 194A Street (shown as figures 4.1.5, 4.1.6 and 4.1.7) were used to define the northern limit of servicing depicted in Figure 1.3. The objective was to maximize the area and extend these gravity services as far north as possible. Council has received delegations from residents north of the servicing boundary that want the area extended further north. Unfortunately, this is not possible due to topography.

Sanitary Sewer

The East Clayton North Extension area is to be serviced by two distinct sanitary sewer systems.

- The study area, <u>west</u> of 192 Street north of 72 Avenue is to be serviced by the existing sanitary sewer system on 188 Street and 68 Avenue and ultimately to an existing pump station located at 176 Street. Sewerage flows are pumped south via

an existing forcemain from the pump station to the GVS&DD regional trunk sewer.

- The study area east of 192 Street is to be serviced by the proposed NCP sanitary sewers on 194A Street, 195 Street and 196 Street which eventually convey flows south of 64 Avenue at 196 Street to the existing GVS&DD regional trunk.

Ultimate and existing flows for the existing sanitary sewers in the area were calculated based upon current land use and actual build-out densities including the additional sewerage flows from the proposed extension areas north of 72 Avenue and west of 188 Street.

The reconstruction of existing local sewers on 194A Street from 72 Avenue to 70 Avenue is required to provide sufficiently deep sewers to accommodate the proposed catchment area north of 72 Avenue. The cost of this reconstruction is allowed for in the servicing costs for this NCP extension.

There will be no adverse impact on the original East Clayton NCP servicing concept or downstream infrastructure for sanitary sewers.

Drainage

The NCP extension area lies within the East (Catchment A) and West (Catchment B) catchments of the original East Clayton NCP. Catchment A slopes in a southerly direction to discharge at specific points into Langley near 68 Avenue and 64 Avenue (and eventually to Logan Creek) or into McLelland Creek at Fraser Highway or into existing and proposed trunks south of 64 Avenue. All of Catchment A is tributary to the Nicomekl River. Catchment B slopes in a west-by-south-westerly direction and drains to North Cloverdale Creek which is tributary to the Serpentine River via the Fry's Corner pump station.

Stormwater management is a cornerstone of the ecological sustainability strategy of the East Clayton NCP and this extension must meet the same objectives. The requirements for infiltration systems and landscaping are outlined in the “Green Infrastructure Performance Standards and Guidelines” provided in the original NCP. It is proposed that the same requirements be incorporated in this extension area. The infiltration and low impact development strategies proposed in the NCP deal with small frequent rain events to protect ecological features but are not designed to deal with the large less frequent storms that lead to flooding. In order to meet our servicing requirements of protecting life and property for these less frequent larger events, a conventional conveyance and detention system is required. Some minor changes to the sub-catchment boundaries originally proposed in the 2003 East Clayton NCP are recommended in the current report based on the detailed

development planning currently underway within East Clayton. Impacts to the recommended East Clayton Drainage System are detailed in the Engineering Servicing Plan, and involve changes to the proposed trunk system and increases in detention pond requirements. Total incremental drainage infrastructure costs associated with developing the extension area is provided in Table 1.
In some cases the required ponds are currently under construction or their lands are currently secured. The ultimate ponds must be completed before the extension can proceed. In cases were lands for the ultimate pond have been secured interim detention may be considered.

Water

Due to the high development rate in East Clayton, the existing Clayton Pump Station is near its full capacity (i.e., all pumps running without standby unit during summer months). A replacement pump station is scheduled to be complete in 2006.
Last year, in order to extend the servicing life of the existing station, we had made adjustment to our water system and were successful in reducing the demand on the station by 15%. This will allow the existing pump station be able to meet the demand in 2005 and 2006. We are continuing our effort to further reduce the demand on the station this summer; however, we will not know the result until this fall.
Therefore, there is some uncertainty of whether the existing pump station will be able to meet the demand in the summer of 2006, and still provide good water pressure to the higher elevation areas. The following outlines the different scenarios, and the likely consequence if the new pump station is not operational by summer 2006:

- If the summer in 2006 is very hot and dry – There will be reduced water pressure during sprinkling hours. There will be adequate fire flow for commercial and all residential zones. This scenario may cause some inconvenience to the residents during the two month period.

- In the rare occurrence that one of the pumps fails, since wider current demands all pumps in the station are required, the pump station will not be able to meet the peak demand when the failed pump is being repaired or the on-the-shelf pump is being installed (approximately two days). During that period, there will be reduce water pressure during sprinkling hours and part of the day. Adequate fire flow will be still available for commercial and residential areas.

A more cautious approach would be to stop all approvals of commercial and higher density residential land uses (fire flow higher than 120 l/s). However, the risk of having one of the pumps fail, and at the same time a fire event in a high density zone is low, and the City has never experienced such a situation before. We therefore propose to allow development to continue as we are in the process of purchasing a replacement unit to minimize the down time should one of the existing pumps fail.

The extension area is located in the 115 m pressure zone and is fed by the existing GVRD's Whalley/Clayton 900mm diameter water main on 72 Avenue, and the Clayton Reservoir and Pump Station located at 72 Avenue and 190 Street. The water demand for the residential areas within the extension area have been calculated in accordance with the City's design criteria. The additional water demands are being added to the City's network model to confirm the capacity of the existing feeder water mains in the area.

The proposed feeder mains and distribution network are described in detail in the Engineering Servicing Plan. Based upon the 2003 East Clayton NCP engineering servicing report and pump station upgrade recommendations, the addition of the proposed extension area will create an extra water supply demand on the original system and require the installation of a new 72 Avenue major feeder main together with two 450 mm diameter feeder mains and an additional 300 mm diameter grid main. The additional demand attributed to the NCP extension accounts for approximately 12.5% of the new pump station costs.

Transportation

All roads in the area will require upgrading from the existing rural cross-sections to urban standards. The neighbourhood traffic analyses undertaken as part of this extension focused on impacts at the following locations and access provisions:

- Each of the road intersections with 72 Avenue and 192 Street along the site;
- 188 Street, 192 Street and 196 Street at 72 Avenue;
- 196 Street at 64 Avenue;
- 192 Street at Fraser Highway;
- 188 Street at Fraser Highway;
- 188 Street at 68 Avenue;
- 192 Street at 68 Avenue;
- 194 Street at 64 Avenue; and
- Fraser Highway at 64 Avenue.

In order to maintain a four-lane cross-section at Fraser Highway, the extension of 72 Avenue to Fraser Highway is recommended by 2016. 72 Avenue would also be a four-lane facility west of 192 Street. Detailed intersection and cross-section requirements corresponding to the 2016 recommendations are listed in the report and must be implemented as development progresses. These are consistent with the recommendations made in the original NCP. The proposed local road access to Arterials and Major Collectors are more frequent in East Clayton than that typically found in other more conventional suburban neighbourhoods in Surrey. Interconnectivity through grid network was one of the seven sustainability principles.

This will continue the "Open" grid network concept established by the original 2003 East Clayton NCP to disperse traffic along multiple routes.
Traffic control issues such as intersection control, parking, driveway accesses, and traffic calming are addressed in the plan. Typical road cross-sections consistent with the original East Clayton NCP are also provided.

Financing

A detailed financial analysis is included in the engineering servicing report available in the Engineering Department. The following table summarizes the projected DCC revenues and construction costs for each engineering service at full build-out for the north extension. The DCC revenues in this table are based on the current DCC rates.

TABLE 1

Services	**Projected DCC Revenues**	**Projected DCC Expenditures**	**Surplus/(Deficit) Balance (Extension)**
Sanitary Sewer	$666,000	$80,000	$586,000
Drainage	$1,572,000	$2,020,000	($448,000)
Water	$777,000	$781,000	($4,000)
Major Collector Rd	$1,016,000	$1,572,000	($556,000)

As illustrated by the above table, there are some surpluses and deficits in the different services for this extension. Although the developer-pay principle and requiring each NCP to be financially self-sufficient is not fully met, DCC's are collected on a city wide basis not an NCP basis, thus while a surplus or deficit is demonstrated in some services, these funds will either offset shortfalls elsewhere in the City or be offset by surpluses elsewhere depending on the service involved.

Development Phasing

Development has proceeded quickly to date in the East Clayton NCP. Development within this extension can progress as local infrastructure is provided by others or by the subject developers. Also, verification of major regional infrastructure (water supply and sanitary pump stations) will continue to ensure development does not out pace upgrades listed above. Ultimately, as in other NCP areas, the market will determine the actual development patterns and phasings.

CONCLUSION

A comprehensive servicing and financial plan has been developed for the North Extension to the East Clayton NCP. The report demonstrates that the NCP extension

is not fully self funding. Development of the extension will help to offset DCC shortfalls in the rest of City for sanitary sewer and arterial roads while it will draw from surpluses for drainage and major collector roads. As a result of this Extension to the NCP, a number of modifications to the 10-year plan will be made. Based on this plan, development within the extension area can proceed in accordance with the overall objectives of the original East Clayton NCP.

Paul Ham, P.Eng.
General Manager, Engineering

PH/VL/RD/brb:rdd

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APPENDIX V

Council Resolution; and
East Clayton NCP Extension North of 72 Avenue – Stage 1 Report

Minutes
Special (Regular) Council
Wednesday, July 28, 2004

Item No. C009 East Clayton Expansion Neighbourhood Concept Plan – Stage I Component
File: 6520-20 (East Clayton Expansion)

It was Moved by Councillor Higginbotham
Seconded by Councillor Tymoschuk
That Council:

1. Receive this Report as information;

2. Approve the proposed East Clayton Expansion area Land Use Concept Plan, as shown in Appendix I, which is the Stage I component of this Neighbourhood Concept Plan ("NCP");

3. Instruct staff to complete the Stage II component of the East Clayton Expansion NCP including:

   - Resolution of outstanding land use issues, as described in this report; and

   - An engineering servicing strategy and a comprehensive financial strategy to provide adequate funding for servicing infrastructure, phasing and community amenities; and

4. Authorize staff to accept and process development applications in the NCP area on the basis of conformity with the proposed Stage I Land Use Concept Plan, with the final approval of any such applications to be withheld pending completion and Council approval of the Stage II component of the NCP.

RES.R04-2237 Carried

SURREY
CITY OF PARKS

Corporate Report

NO: C009

COUNCIL DATE: July 26, 2005

COUNCIL-IN-COMMITTEE

TO:	**Mayor & Council**	**DATE:**	**July 22, 2004**
FROM:	**General Manager, Planning and Development**	**FILE:**	**6520-20 (East Clayton Expansion)**

SUBJECT: East Clayton Expansion Neighbourhood Concept Plan - Stage I Component

RECOMMENDATION

It is recommended that Council:

1. Receive this Report as information;

2. Approve the proposed East Clayton Expansion area Land Use Concept Plan, as shown in Appendix I, which is the Stage I component of this Neighbourhood Concept Plan ("NCP");

3. Instruct staff to complete the Stage II component of the East Clayton Expansion NCP including:

   - Resolution of outstanding land use issues, as described in this report; and
   - An engineering servicing strategy and a comprehensive financial strategy to provide adequate funding for servicing infrastructure, phasing and community amenities; and

4. Authorize staff to accept and process development applications in the NCP area on the basis of conformity with the proposed Stage I Land Use Concept Plan, with the final approval of any such applications to be withheld pending completion and Council approval of the Stage II component of the NCP.

INTENT

The purpose of this report is to:

1. Provide an overview of the proposed Stage I component of the East Clayton Expansion NCP and to inform Council of the planning and public consultation process followed in preparing the proposed Land Use Concept Plan; and

2. Obtain Council approval of the proposed Land Use Concept Plan for the East Clayton Expansion NCP (Stage I) as the basis for more detailed planning to complete Stage II of the NCP.

BACKGROUND

The East Clayton NCP was approved by Council in March, 2003. In recent months, staff has received inquiries related to lands to the north of 72 Avenue, directly north of the approved East Clayton NCP. The approved East Clayton NCP made reference to these lands in general, indicating that, "development within this area is subject to servicing being feasible from south of 72 Avenue with detailed survey and engineering design being done for each development parcel". The intent was that the area to the immediate north of 72 Avenue could be developed as part of the approved East Clayton NCP to the extent of the gravity catchment boundaries for engineering services.

On February 9, 2004, staff advised Council, through Corporate Report No. L002, of the status of development in the East Clayton NCP area and of the growing interest expressed by several property owners and the development community in developing the area north of 72 Avenue. After considering the report, Council endorsed a Terms of Reference for the planning and public consultation process for the expansion of the East Clayton NCP to the north of 72 Avenue.

DISCUSSION

Study Area and Plan Area

Pursuant to the Terms of Reference, planning and engineering consultants were retained by the City to assist staff in the preparation of the expansion to the East Clayton NCP. The study area was identified as that area bounded by 72 Avenue, 188 Street, 74 Avenue and 196 Street comprising an area of 65 hectares (160 acres).

To establish the boundaries of the Plan area, a detailed engineering analysis was undertaken to delineate the area that could be serviced by gravity sanitary sewers

extended north from the area south of 72 Avenue. The Plan area, excluding the BC Gas right-of-way, was ultimately established as an area of approximately 43 hectares (107 acres). The preliminary boundary of the Plan area was established, based on a maximum depth of sanitary sewers of 5 metres (16.4 feet) and on downstream capacities of the services. The precise limits of the Plan area will be confirmed upon completion of detailed engineering studies to be finalized as part of the Stage II Plan, in keeping with the normal NCP process.

The study area and the Plan area are shown in Appendix II.

Context

The study area is designated Suburban in the Official Community Plan (the "OCP"), and is designated Future Urban in the Clayton General Land Use Plan approved by Council in January of 1999 (Appendix III). It is made up of several large and partially developed parcels, with a number of residential properties on septic fields located primarily along the major roads. The study area is immediately to the north of the developing East Clayton Community. To the east of 196 Street, in Langley Township, the land has recently been subdivided into single family urban lots, but is not yet fully built and occupied. Lands to the north and west of the study area remain in suburban and rural use, with some on-going agricultural activity.

There are clusters of existing mature trees within the study area. The large forested area to the west of 196 Street and extending to the north and south of the 74 Avenue alignment was designated as an Environmentally Sensitive Area on the Clayton General Land Use Concept Plan that was approved in 1999. This designation was based on a 1997 study. An environmental consultant was retained by staff to provide an update on the status of this area. The consultant’s report found that, as a result of development in Langley Township, this area is no longer connected to a larger forest corridor system. Due to the fragmentation of the connection on the Langley side, the area has become isolated and its environmental sensitivity rating is now classified as low.

Guiding Principles

Based on the approved Terms of Reference, this area is to be considered as an extension of the existing East Clayton NCP. It is intended that the land use pattern will be consistent with and complimentary to, that south of 72 Avenue and should reflect the development framework identified in the East Clayton NCP. The sustainable planning principles that guided the preparation of the East Clayton NCP, including the land use and subdivision patterns, form the basis of the land use plan for the expanded East Clayton area.

Public Consultation

The input from residents and property owners in and adjacent to the study area was solicited through a series of public open houses, which were held on April 7, May 5 and July 6, 2004. In addition, during the course of preparing the plan, staff and consultants met a number of property owners, individually and in groups, with regard to specific issues.

In keeping with Council's February 9, 2004 direction to inform the public and developers about the principles and attributes of the sustainability in East Clayton, staff produced a newsletter at the beginning of the planning process to inform the public about the commencement of the NCP planning process for the expanded East Clayton area and the sustainable development principles that will form the plan objectives. This newsletter was mailed to all residents and property owners in the Clayton area, including East Clayton and was distributed at the public open houses.

Public Open House #1 - April 7, 2004

The first open house introduced the proposed planning and public consultation process. Information provided to the public included the rationale for initiating this planning process, an overview of the seven principles for sustainable development that will form the basis of the Plan for the expanded East Clayton area, the 1999 General Clayton Land Use Concept Plan, conceptual servicing maps, types of land uses that might be considered in the land use options and the status of development in East Clayton. A comment sheet was distributed for the public to provide written comments to staff on the current development in East Clayton, proposed expansion of East Clayton and on the types of land uses that should be considered in the Plan.

Approximately 90 people attended the open house. Ten completed comment sheets were returned.

Public Open House #2 - May 5, 2004

Two draft land use options and the preliminary servicing boundary maps were presented for public review and input. Comments were solicited on the various features of the two land use options.

Approximately 197 people attended the second open house. Thirty-six completed comment sheets were received. Based on the feedback received, there was no clear preference between to the two land use options. Specific comments included concerns about the location of some of the roads and lanes and about the location and amount of open space.

Public Open House #3 - July 6, 2004

The public was invited to view and comment on a preferred land use option, which was prepared, based on the comments received at previous open houses as well as on discussions with individual property owners who had specific concerns with elements of the earlier options. Based on this input, significant adjustments were made to better align roads and designations with existing property boundaries, including the re-alignment of 194A Street, reconfiguration of park and greenway areas, inclusion of traffic circles for traffic calming and provision of improved pedestrian connections.

Approximately 100 people attended this open house. Fourteen comment sheets were returned. Apart from certain site specific issues, over 80% of the respondents expressed support for the draft-preferred option.

Several owners of property north of the Plan area have questioned the engineering assumptions and rationale used to establish the northerly limit of the Plan area. They have advised that their lands should also be included in the Plan area and if this is not possible, the Plan should not proceed at this time.

Proposed Land Use Concept Plan

Plan Objectives

The proposed Land Use Concept Plan is illustrated in Appendix I. It was developed in consideration of the following seven principles of sustainable development:

- Creation of compact, walkable neighbourhoods, with basic services located within a five to six minute walking distance from most homes;
- Provision of a range of dwelling types and densities to provide housing options in the same neighbourhood and even on the same street;
- Designing communities for people (i.e. dwellings to present a friendly face to the street) in order to promote social interaction;
- Locating car storage and services at the rear of dwellings;
- Provision of an interconnected street network, in a grid or modified grid pattern, to ensure a variety of itineraries and to disperse traffic congestion;
- Provision of narrow, tree-shaded streets to save costs and provide a greener, friendlier environment; and

- Preservation of the natural environment and promotion of natural drainage systems.

Land Use Pattern

Residential

The types of land uses proposed for the East Clayton expansion NCP area are similar to the land uses in the East Clayton NCP (Appendix IV). The Plan includes a variety of residential designations to provide a range of housing options, ranging from low density residential at 6-10 units per acre to High Density residential at 22-45 units per acre. The higher density residential designations are strategically located to support the village centre node at 188 Street and 72 Avenue and benefit from the proximity of the open spaces. Higher density designations are also located along 192 Street to reinforce the parkway role of the street and shield the single family residential from the traffic.

The Plan introduces the concept of manor houses on 193 Street and 194A Street between 72 Avenue and 72A Avenue. Manor houses will contain up to four dwelling units and be approximately 420 square metres (4,500 square feet) in floor area. The driveway access for manor houses will be from a rear lane. Council has recently considered a rezoning application for this form of residential development in North Cloverdale. The scale and massing of the manor houses is compatible with those of the existing houses in Aloha Estates, south of 72 Avenue and are appropriate at the intersections as entrances to the residential neighbourhood east of 192 Street.

The Plan also proposes Special Residential uses at 10-15 units per acre, similar to the East Clayton NCP. Special Residential designated property allows the option of using part of the main floor or basement of the dwelling unit for a small-scale personal service use and other similar business uses. This designation is proposed along 72 Avenue and is located such that on-street parking will be available to support the optional commercial uses.

Commercial

This Plan proposes to strengthen the village centre at the intersection of 72 Avenue and 188 Street by expanding the Commercial designation included in the 1999 General Clayton Land use Concept Plan (Appendix III). The Commercial designation includes Neighbourhood Commercial, as well as mixed-use Commercial/Residential uses, which were not shown on the General Clayton Plan. These commercial uses are supported by the Special Residential designation that also allows some small scale commercial uses.

The expanded village centre will serve the local commercial needs of the East Clayton population and the future population of the larger Clayton area. Its convenient central location will make it a focus of the community and will reduce the need for driving longer distances to Cloverdale and Langley for daily needs. Its expanded capacity and the opportunity for a variety of smaller scale and more pedestrian-oriented commercial uses are intended to attract a more localized market and serve to complement the proposed shopping centre at Fraser Highway and 188 Street (i.e., the triangle site).

The size of the commercial node is approximately 3 hectares (7.40 acres), which will accommodate approximately 15,000 square metres (161,465 square feet) of commercial floor, although the ultimate size and scale of this node will be more accurately defined through additional retail/market studies for the larger Clayton community. A study of the commercial market in the Clayton area is being undertaken to confirm the amount of land that should ultimately be designated for commercial uses.

The Plan also proposes a local commercial node at the intersection of 192 Street and 72 Avenue to serve the population to the east of 192 Street in keeping with the principle of providing basic daily services within a five to six minute walking distance of most homes. The lands designated Special Residential near the intersection of 196 Street, which reflects a similar designation to the south of 72 Avenue, will also enhance the opportunities available for the provision of basic services to serve the local community needs.

Parks and Greenways

The proposed Plan shows two pocket parks to the east and west of 192 Street. The park to the east of 192 Street, at 73 Avenue, is just under 0.8 hectares (2 acres) in area and the park on the west side of 192 Street at 72A Avenue is approximately 1 hectare (2.5 acres) in area. These parks are slightly larger than the two pocket parks to the south of 72 Avenue, at 189 Street in the East Clayton area.

Two greenways are proposed:

- A north-south greenway, to the east of 194A Street, is proposed in keeping with the General Clayton Plan. This greenway is a recreational corridor that will provide a continuous linkage through East Clayton to the future park north of 74 Avenue. The initial proposal is that this greenway be 40 metres (130 feet) wide in keeping with the greenway as originally planned to the south of 72 Avenue in the East Clayton NCP. A number of the property owners in the area have expressed concern with this proposed width; and

- The BC Gas right-of-way is proposed to be a greenway to maintain continuity of the greenway on this right-of-way in the East Clayton Plan to the south of 72 Avenue.

Roads and Pedestrian Network

The road network, as planned, is based on the principle of creating an interconnected grid of roads to allow multiple routes for travel by foot, bike or by car. Rear lanes are proposed for the majority of the single family lots in the Plan in keeping with the principle creating pedestrian friendly streets. In certain locations where road continuity cannot be maintained, due to the potential impact of the traffic on properties, the Plan shows pathways to maintain pedestrian and bike circulation. Pedestrian/bike pathways are also proposed within the village centre to provide connections to the BC Gas Greenway from 72 and 72A Avenues.

73rd Avenue is designed to provide an east-west connection between the areas to the east and west of 192 Street. It connects the parks and the greenway. It will accommodate a multi-use pathway on the north side ("sunny" side) and is envisioned to have the same character as 70 Avenue in the East Clayton NCP area to the south.

For traffic calming purposes, traffic circles are proposed at the intersections of 73 Avenue with 193 Street and 194A Street. The traffic circle at 194A Street will be larger in recognition of the proximity of the greenway and to create a visual landmark.

Schools

The Surrey School District was consulted during of the planning process with respect to planning for school sites within the Plan area. The School District advised that the extension area is not large enough to warrant any new schools. The students generated from the new growth in the East Clayton expansion area will be accommodated by the schools to the south of 72 Avenue in the East Clayton area until a larger area to the north of 74 Avenue is developed, in the future, that will generate a requirement for new schools to the north of 74 Avenue.

Plan Statistics

The draft land use concept plan is expected to generate an estimated 1,000 dwelling units at the lower end of the density ranges to approximately 1,680 dwelling units at the higher end of the density ranges. The build-out population, assuming an average between the lower density and higher density, is estimated at 3,615 people. The build-out commercial building floor area is estimated to be approximately 16,850 square metres (181,380 square feet). The total area of the proposed parks and

greenways is approximately 4.45 hectares (11 acres). A summary of the land use statistics is contained in Appendix V.

Outstanding Land Use Issues

The Plan is generally supported by a majority of the people who attended the open houses and responded to the requests for comments.

Two issues, raised by property owners that have not yet been fully resolved and will be addressed prior to the completion of the Stage II NCP report to Council, are discussed below. Appendix VI illustrates the locations of these land use issues.

1. **Greenway Design at the North-East Corner of 72 Avenue and 194A Street**

   The proposed greenway, east of 194A Street, will require the acquisition of the entire property abutting 194A Street and part of the adjacent property. The area beyond the greenway, up to 195 Street, is proposed for a medium-high density residential development (e.g. townhouses). The owners of the affected properties object to this greenway designation, as they would prefer to develop their property in keeping with the residential designations of East Clayton. The owners purchased the property with the intent of residential development at a time when the General Clayton Plan showed the greenway further to the east and feel that it should be relocated as illustrated on the Clayton General Land Use Plan. Staff has presented five different land use and greenway scenarios to the property owners between 194A Street and 195 Street in an attempt to resolve the issue. The property owners have indicated that they require more time to study the options and have requested that this issue be noted as an outstanding issue for resolution at the time of the Stage II Plan.

2. **Greenway to the North-East of 73 Avenue and 194A Street**

   The owners of the two properties affected by the location and design of this section of the greenway have raised concerns about the impact of the proposed 40-metre width of the greenway and the proposed "flaring" at the southerly end of this section. The 40-metre width, as proposed in the East Clayton NCP, is the only open space to the east of 194A Street and is designed with pockets to accommodate active recreation (such as play areas) within the greenway while maintaining a multi-use pathway function. This width also provides privacy separation between residential buildings across the greenway and between the multi-use pathway and the adjacent buildings. The "flaring"

is proposed to maintain visual connection from the greenway to the south and provide a visual connection to the greenway at the end of 195 Street.

This concern was raised relatively, recently and, as such, staff has not had sufficient time to develop alternative scenarios for discussion with the owners. This issue will be addressed as part of the Stage II component of the NCP.

Servicing

The proposed servicing boundary for the NCP area will be confirmed in Stage II after the completion of a detailed engineering report. It is not expected to change dramatically as a result of this more detailed report.

CONCLUSION

Pursuant to Council's authorization on February 9, 2004, staff has prepared a Land Use Concept Plan for the East Clayton Expansion NCP, being the Stage I component of the NCP. It is recommended that Council:

1. Receive this Report as information;

2. Approve the proposed East Clayton Expansion Land Use Concept Plan, as shown in Appendix I, which is the Stage I component of this NCP;

3. Instruct staff to complete the Stage II component of the East Clayton Expansion NCP, including:

   (i) Resolution of outstanding land use issues as described in this report; and

   (ii) An engineering servicing strategy and a comprehensive financial strategy to provide adequate funding for servicing infrastructure, phasing and community amenities; and

4. Authorize staff to accept and process development applications in the NCP area on the basis of conformity with the proposed Stage I Land Use Concept Plan, with

the final approval of any such applications to be withheld pending completion and Council approval of the Stage II component of the NCP.

Murray Dinwoodie
General Manager
Planning and Development

BP/kms/saw

Attachments

Appendix I	Proposed East Clayton Expansion Land Use Concept Plan – Stage I NCP
Appendix II	NCP Expansion Study Area/Plan Area
Appendix III	1999 General Land Use Concept Plan - Clayton
Appendix IV	East Clayton Land Use Plan
Appendix V	Summary of Land Use Plan Statistics
Appendix VI	NCP Expansion - Land Issues

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