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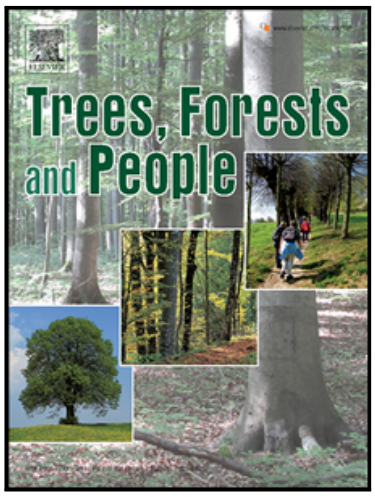

What do they like about trees? Adding local voices to urban forest design and planning

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Highlights

- Local voices should inform future urban forest design
- Multiple methods are used to elicit local preferences and priorities for trees
- The existing local urban forest does not match residents' stated preferences
- Residents preferred mature and iconic trees and a less formal aesthetic
- Both near-home greenspace and access to natural spaces were important

Title. What do they like about trees? Adding local voices to urban forest design and planning.

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Key words: Urban forests, Urban trees, Local preferences

Abstract

Local preferences and priorities for trees and greenspaces are important considerations when planning and designing a community's urban forest. Local residents can provide insight into place-specific contexts such as local aesthetic preferences, social systems, cultures, and attitudes to inform appropriate design responses. Residents also inform researchers of key local issues that may impact urban forest configurations, and may differ from expert opinions. This paper reports on a case study from a suburban community in Canada that used a combination of methods to reveal new, place-based information to inform more contextual design for a community's future urban forest. Results reveal that the current urban forest in the community does not reflect the participants' preferences and differs from experts' priorities. The findings suggest issues that should be considered in future urban forest design and planning processes.

1.0 Introduction

Urban and suburban trees are important place-makers in our towns and cities, yet few studies deeply understand the local, subjective relationships between residents and their arboreal

neighbours. Trees have played an important role in culture, identity and placemaking through history (Cloke et al., 2002). In a study of trees in private gardens, Pearce et al. argue that trees are "active participants in the fabric of urban life" (Pearce et al., 2015, p.1). Following Hurricane Hugo in Charleston NC, 30 percent of residents identified a natural object, and 17 percent mentioned street and yard trees specifically, as important features that were damaged by the hurricane (Hull IV et al., 1994, p.112). While studies across disciplines have investigated public responses to trees, the diversity of disciplines and methods challenges synthesis of knowledge into usable directions or advice for decision-makers (Jones et al., 2013). This is further compounded by local and regional differences in preferences for trees and greenspaces more generally (Byrne, 2012; Fraser & Kenney, 2000). People value trees in their community and their preferences are local and subjective, drawing on cultural and personal experiences that may not be apparent to practitioners and decision-makers.

There is therefore a gap between the science and citizen's knowledge in our understanding of urban forestry. Nassauer and Opdam argue that "if science is not attentive to stakeholder knowledge, research may lack legitimacy because it appears to be irrelevant to place-specific landscape issues" (Nassauer & Opdam, 2008, p. 635). This highlights the need for a more integrated human-natural systems approach in both research and practice; urban forest planning and design should be informed not only by scientific research and local expertise, but also by the concerns and priorities of local citizens (Beckley et al., 2006; Janse & Konijnendijk, 2007; Wolf & Kruger, 2010). Understanding local place-making issues and identities surrounding greenspaces could facilitate the creation of urban forests that better respond to local community needs. Local residents can provide insights into place-specific issues such as local

aesthetic preferences, social systems, cultures, and attitudes to inform appropriate design responses.

However it is challenging to engage with local knowledge in many urban design and management endeavors (Aronson et al., 2017). Engagement fatigue is a well-known phenomenon and local residents may feel they don't have enough time or resources to participate in research or other community consultation initiatives (Attree et al., 2011), even though there is evidence that engaging local stakeholders increases positive feelings and a sense of ownership of local parks (Kaplan, 1980). Additionally, ties between humans and trees may be different for different cultures (Byrne, 2012; Fraser & Kenney, 2000), gender (Tyrväinen et al., 2006; Wolch et al., 2014), and socio-economic status (Boone et al., 2010; Byrne et al., 2009; Wolch et al., 2014). It is known that local governments responsible for urban trees often underestimate the value that local residents place on community trees (Jones et al., 2013). To avoid this problem, the City of Melbourne, through broad and diverse stakeholder involvement in its Urban Forest Strategy, has legitimized local knowledge, facilitated co-production of knowledge, and fostered green placemaking (Gulsrud et al., 2018). Sheppard et al. (2017) advocate using a suite of tools and approaches to implement engagement successfully. However, while local ties to trees and greenspaces are important, eliciting local knowledge to build this into urban forest design can be a complex and lengthy process for practitioners (Sheppard & Meitner, 2005), especially those unfamiliar with appropriate methods.

The aim of our study was to explore the interactions and important relationships between residents of a new suburban community and their recently planted urban forest. We sought to do this through a single case study, using mixed methods to engage with local knowledge to understand community preferences and allow for deeper exploration of perceived local issues

that could be important in further design and planning. Our fundamental question was: what preferences and priorities do case study residents hold that: 1) relate to current or potential urban forestry configurations in informing future design to improve existing communities?; and 2) reflect or contrast with the views of experts who represent those responsible for design, planning and management of the urban forest. Ultimately, the hope is that the case study findings can provide pointers to better processes for engaging local voices in urban forest design and planning.

2.0 Materials and Methods

2.1 Case Study Context

Case studies are used in many disciplines to apply generalization or theories to concrete, applied projects or places (Francis, 2001). As defined by Francis, a case study is "a well-documented and systematic examination of the process, decision-making and outcomes of a project, which is undertaken for the purpose of informing future practice, policy, theory, and/or education" (Francis, 2001, p.16). The overall approach used in this case study allows for ground-truthing of a palette of primarily qualitative methods to uncover resident preferences for trees within a suburban landscape. Marshall and Rossman argue that qualitative research gets closer to understanding causality through rich description and deeper perspective (Marshall & Rossman, 2016).

Our study used a single case study approach with a focus on the community of East Clayton, Surrey, BC, Canada. The site is a North American suburb that was a pioneer in densifying suburban form. In 2003, the City of Surrey implemented a visionary land use concept plan for a new higher density neighborhood for East Clayton (Surrey, 2003). The community

was planned to be home to over 13,000 people on 240 hectares (Surrey, 2003). The community is a fast-growing family neighbourhood, primarily of middle-income status, with average income of $103,177 (Statistics Canada, 2016). Few residents take transit to work (6%), and 21% of the community rents their homes (Statistics Canada, 2016). The original neighborhood concept plan has design features that intended to minimize ecological impacts, such as low impact storm water management techniques and urban forest targets (Surrey, 2003). The community is now mostly built out and occupied and it is possible to observe and analyse successes and failures to inform the design and policy options for similar future communities. At the beginning of our study (2011), much of the area was newly constructed with trees less than 10 years old, with very few pre-existing mature trees retained during development.

The community development has met with some criticism. A post-occupancy survey of neighbourhood satisfaction in East Clayton conducted between March 25 and April 11, 2011 by the City of Surrey had 264 respondents (City of Surrey, 2011). The survey found that 43% of the residents disagreed with the statement that the number and type of trees in their neighbourhood created a pleasant, green environment (City of Surrey, 2011). This sentiment is reflected in a newspaper article at the time, where a resident criticizes that "Surrey was content to count 'little narrow strips' such as boulevards alongside streets to achieve its quota of green space. So much for animal habitat" (Boei, 2003, p.C4). However, not all post-occupancy evaluation has been negative. A study on place attachment in the neighbourhood found that East Clayton scored moderately high in Buckner's Neighbourhood Cohesion Index, which suggests the neighbourhood residents have high individual and collective senses of community and a strong place attachment (Youssef, 2015, p.14). None of the above surveys or studies focused

specifically on the parks or urban forest of East Clayton, or provide strong evidence to guide future design or management strategies.

Methods used in our study include sidewalk interviews, participant observation, focus group, and a survey (Figure 1). The methods were chosen based on: the amount of resources required to complete the method, the realistic sample size achievable, and the depth of data acquired. For example, a focus group was chosen to unpack more detailed qualitative data about trees within the community with a smaller sample size. A survey was chosen because a broad range of people could be included, but the data collected was less detailed than the focus group. Similarly, participant observation had a large sample size with less detailed data. The sidewalk interviews were used as an initial pilot study to identify issues and inform further engagement efforts, using few resources (one researcher over a few hours) but yielding fairly detailed data with a small sample size. Ethics approval following UBC's human research protocols was obtained for all methods.

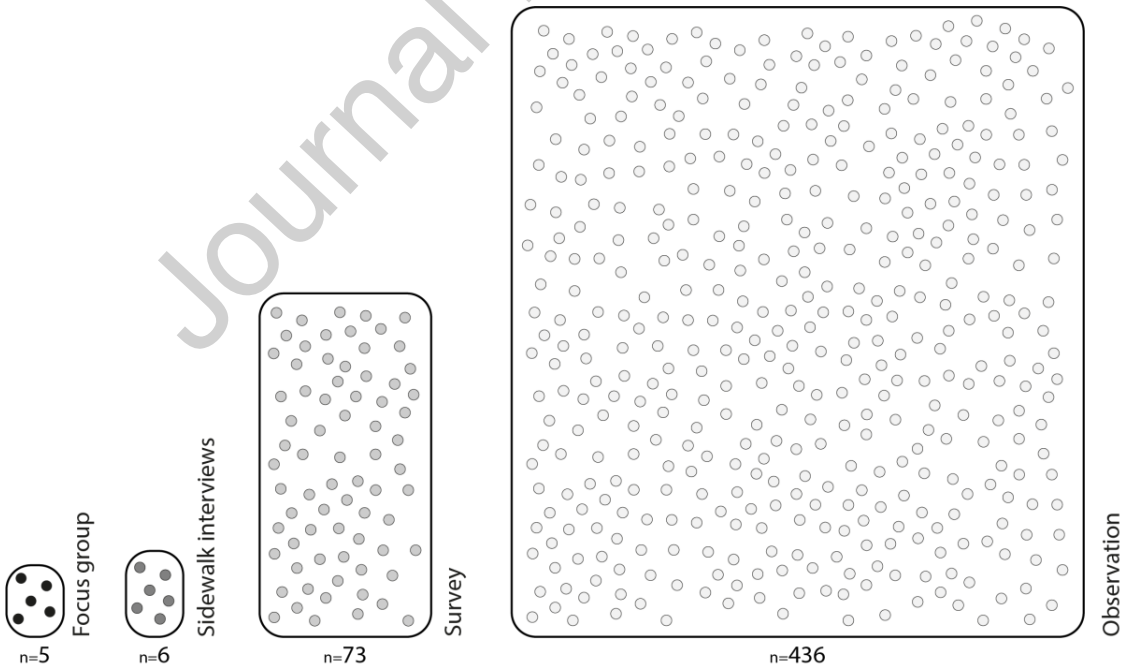

Figure 1. Conceptual diagram of study design and social science methods used. Dots represent the actual number of participants sampled in each study. Shade of fill for each dot represents detail of data, from highly iterative in-depth data in the focus group (filled black dots) to simple counts of activities within parks (hollow circle).

To understand East Clayton residents' views of parks and greenspaces, representative parks were selected to facilitate participant observation and survey dissemination. Figure 2a shows the distribution of parks throughout the community and the range of park sizes selected. Two parks were observed during an initial pilot study and three additional parks were observed once methods were refined. It is recognized that urban forests comprise more than public parks, hence the use of other methods to address wider areas of the community and urban forest conditions.

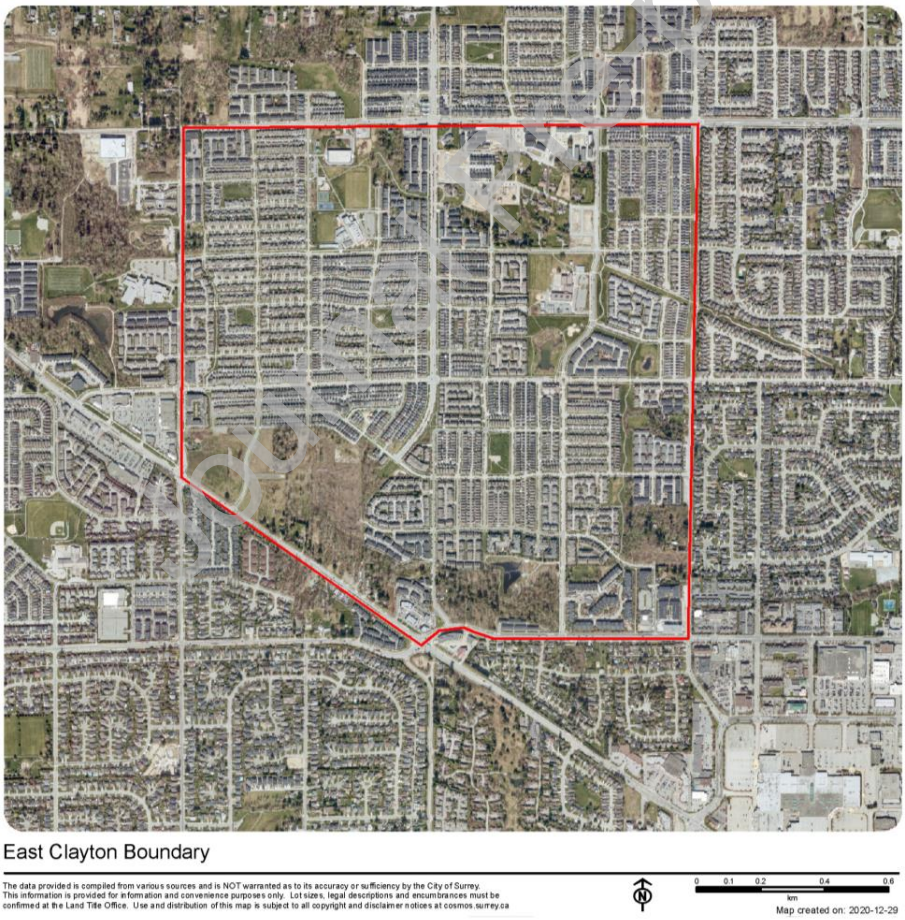

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Figure 2a. The Neighbourhood of East Clayton, Surrey, British Columbia, Canada. The five parks surveyed were Clayton Off-leash Dog Park (1), Wade Park (2), Hazelgrove Park (3), Katzie Park (4) and Starr Park (5).

Wade Park | Clayton Off-leash Dog Park | Hazelgrove Park | Katzie Park | Starr Park

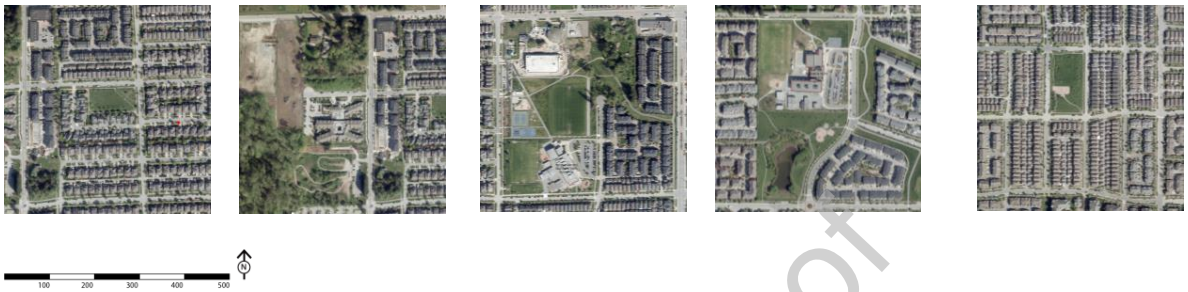

Figure 2b. Close-up images of the five parks observed. A range of facilities, sizes, and vegetation cover are reflected in the parks. See Table 1 for additional details.

Park	Dominant tree species	Park size (ha)	Park amenities
Wade Park	*Acer platanoides* *Fagus sylvatica* *Quercus rubra*	0.46	Bench, mailboxes, pergola
Clayton Off-leash Dog Park	*Thuja plicata* *Acer macrophyllum* *Alnus rubra*	1.48	Walking loop, water fountain, fenced areas
Hazelgrove Park	*Platanus ×acerifolia* *Quercus rubra* *Fraxinus americana*	4.5	Playground, walking loop, sports arena (basketball, soccer, basketball, tennis courts), waterpark
Katzie Park	*Ulmus americana* *Zelkova serrata* *Pinus contorta*	2.8	Pond, playground, walking path, Little Library
Starr Park	*Acer platanoides* *Quercus rubra* *Catalpa bignonoides*	0.84	Playground, walking loop

Table 1. Details on each park's dominant tree species, park size, and park amenities.

2.2 Sidewalk interviews

Informal 'sidewalk' interviews were undertaken along sidewalks throughout the neighbourhood during the month of October in 2014. They were conducted to both obtain initial information about community priorities and guide development of later focus group and survey questions. The interviews followed methods for sidewalk interception surveys described by Ordóñez et al. (2017) to gain quick insights into local preferences. These interviews were semi-structured (see Appendix A for questions) and participants were asked about their (1) favorite trees, (2) favorite parks, (3) favorite landscapes, and (4) community concerns. The questions were simple and straightforward to assist in making participants feel comfortable. At this stage of the study, the aim was to get a sense of basic priorities and preferences, such as whether residents cared about trees at all. The interviews were open-ended to allow for deeper discussion if the interviewee was agreeable. Six open-ended interviews were conducted, ranging from five to forty minutes with participants ranged from 17 to 65 years. Results were recorded as notes during and after the interview, and tabulated through a simple content analysis by question.

2.3 Participant Observation.

Participant observation was undertaken to understand how and when residents use local greenspaces. During visits, researchers observed who was using the park, where they were using the park, and what they were doing, following guidelines for Post Occupancy Evaluation suggested by Marcus and Francis (Marcus & Francis, 1997). Participant observation took place in two phases: Phase One observed Clayton Off-leash Dog park and Wade park over two days to test the method and inform the focus group and survey questions. The method followed included a total of five one-hour observations of each of the two parks during the day from 10 am – 2 pm two weekdays, and 11 am – 1pm Saturday in October, 2014. The weather was cool and sunny

during the observation periods. Four people were observed using Wade park during these times, and 35 were observed using the Clayton Off-leash Dog park.

Phase Two was initiated to increase the range of parks observed and enlarge the sample of participants. Hazelgrove, Katzie, and Starr parks were observed over two days in July 2019, including five one-hour observations of each of the three parks during the day from 11 am – 12 pm and 5:30 – 6:30 pm on a Thursday, and 11 am – 3 pm on a Saturday in July 2019. The weather was hot and sunny during the observation periods. 128 people were observed at Hazelgrove Park, 136 at Katzie Park, and 133 at Starr Park over the two days. Data was entered into a spreadsheet by each researcher and collated by the lead researcher. Individual researchers also mapped the areas being used by residents on a simple map.

2.4 Focus Group

A focus group was convened in 2015 to gain a deeper understanding of community preferences and priorities following the interviews and observation. The focus group method was used because of its encouragement of knowledge exchange between participants and moderators; deep discussion and rich understanding between all involved; time for clarification of details; group dynamics to explain points or jog memories; and the ability to observe body language and tone (D. L. Morgan & Krueger, 1997). A focus group allows for collective thinking that can help elucidate values being discussed (Ordóñez et al., 2017).

Focus group participants were recruited by email using snowball sampling from community contacts, websites of local community groups, and a message placed on the local residents' Facebook group. Nine people expressed interest in participation and five ultimately attended the focus group. Participants ages ranged from 25 – 65. The session was conducted in the local library from 10 am to 11 am on Saturday, December 12, 2015. Eighteen questions were

prepared to guide the conversation (Appendix B). Participants were asked the questions in the order prepared and allowed to elaborate or deviate from the questions. The next question was posed as conversation stalled. The focus group was recorded, a transcript was made, and a simple content analysis was conducted.

2.5 Survey

Following the focus group and after difficulty in recruiting a broad range of participants, a community-wide survey was created to enable the community to more easily share their opinions and preferences. A copy of the survey is included in Appendix C. The survey was available both online and in-person. Following a flyer promotion and targeted mailbox drop, the online survey was completed by six participants. In-person surveys were conducted by four student researchers who approached residents in the three parks: Hazelgrove, Katzie, and Starr Park (Figure 2b) and 67 surveys were completed this way. Participants ranged in age from 19 – 60 years old. A subset of the survey questions relevant to the treed landscape are analyzed in this paper.

3.0 Results

3.1 Sidewalk Interviews

Results of the sidewalk interviews are presented in Table 2 below. The preferences emerged from summaries of each interview, and are not presented as a summary of each question. In response to the question “What is your favorite tree?” the results revealed a local preference for native tree species with five out of six interviewees mentioning that native trees provided important connections to place at some point in the interview. Favorite parks within the

neighbourhood included the off-leash dog park and neighbourhood greenways, that mostly consist of naturalized plantings. When asked "Do you have any favorite spaces in the neighbourhood?", all mentioned elements of informal landscapes: diversity in colour, texture, and planting arrangements. Four out of six participants expressed a preference for "clumps' of trees over "lollipop" street trees.

Emerging Preferences	Issues raised during sidewalk interviews
Native Trees	Favorite species were primarily native Local species elicit a sense of place
Mature Trees	Symbol of established neighbourhood habitat Sense of loss when mature trees removed
Privacy	trees for screening are good trees for refuge are good
Natural Views	views of nature preferred views of small street trees less favourable preference expressed for naturalized groupings
Aesthetics	prefer: seasonality, colours, olours diversity
Other priorities	(only mentioned by one or two participants)
Maintenance	some trees problematic for maintenance perceived safety issues with falling limbs
Play	climbing trees necessary private yards versus public parks

Table 2: Urban forest preferences emerging from sidewalk interviews (n=6).

3.2 Participant Observation

Five different park types were compared to observe patterns of use, including age category of visitors, numbers of visitors, activities during use (Table 3), and location of activity (Figure 3).

Park Name	Total Number of Users (n = 436)	Age of users	Activities	Features used
Wade Park	4	Youth and adults	Sat on bench Shortcut played with dog	Bench walking path
Clayton Off-leash Dog Park	35	Adults	Walk/play with dog/chat with friends	Walking path open space near entrance
Hazelgrove Park	128	Children and adults	Walk/run/exercise use playground/sports equipment	Walking path field/grass
Katzie Park	136	Children and adults	Use playground/sports equipment walk/run/exercise	Playground walking path field/grass
Starr Park	133	Children and adults	Walk/run/exercise use playground/sports equipment	Walking path Playground field/grass

Table 3: Participants and Activities observed during park observation. The activities do not directly pair with the features used.

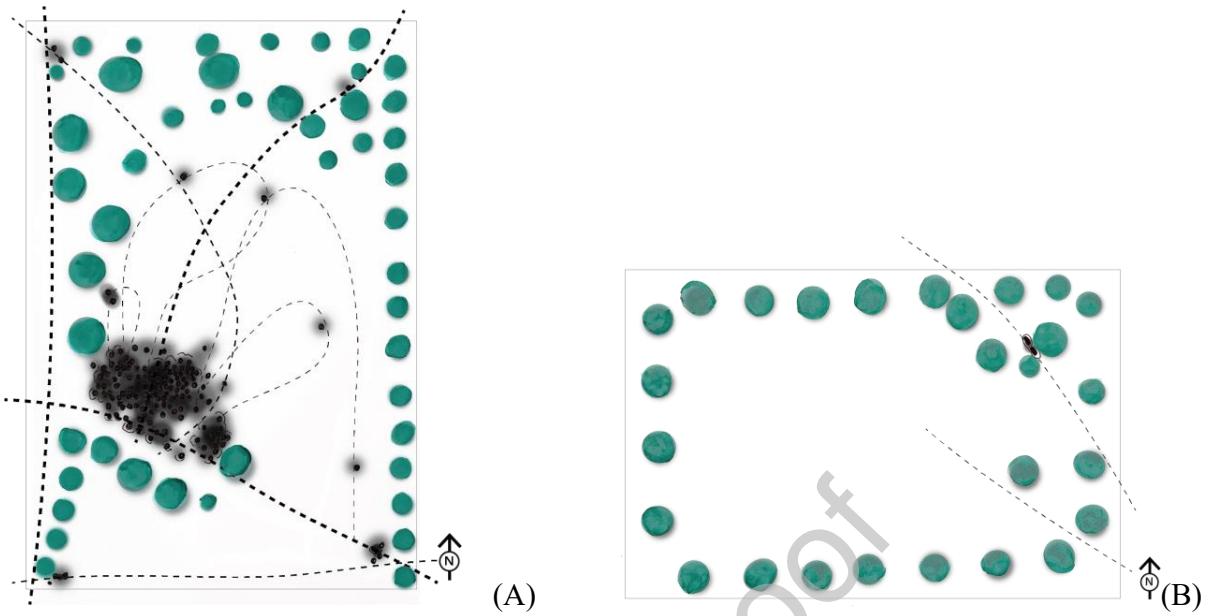

Figure 3: Map of Starr Park (A) and Wade Park (B) observations. Green dots are park trees. Dotted lines represent observed movement through each park, heavier lines indicating more heavily used routes. Black dots represent visitors who stayed in the park for longer than 10 minutes. Grey shaded zones represent areas where many people lingered.

3.3 Focus Group Results

As an icebreaker, focus group participants were asked to describe their favorite outdoor space in or near the neighbourhood. The group expressed a preference for more natural greenspaces, with three of the five participants referring to the large natural area adjacent to the neighbourhood as an example of their favorite outdoor space. Reasons for choosing this space included its walking trails, established trees, space to get away from people, and natural character. As one participant expressed “you just feel like you are in the bush and it’s beautiful, absolutely beautiful” (Participant A). Another said “I like the tree forest to get away from all the people” (Participant D). All participants specifically mentioned the established trees as one reason why they chose this space as their favorite.

Including the above icebreaker, the focus group conversation elicited six main discussion priorities, as shown in Table 4.

Local priorities	Local preferences
1. Access to natural spaces	Provision of privacy/buffer (5), sense of refuge from city life (4), established trees (8), natural/informal aesthetic (9), sensory: smell, sound (4)
2. Near home greenspace	Provision of privacy/buffer (5), feeling of space when looking at distant trees (4), greenspace connectivity (8), yards (3)
3. Social aspects of greenspace	Sense of community (7), social interaction (9), knowing neighbours (4)
4. Greenspace aesthetics	Natural/messy aesthetic (9), colours (4), seasonality (3), psychological impact (2), place attachment (7), poetic moments (2), visual diversity (2)
5. Mature and iconic trees	Tree size (9), local species (6), canopy coverage (3)
6. General neighbourhood characteristics, including lack of space for parking	parking issues (8), connectivity (4), walkability (3), convenience (2), affordability (2)

Table 4. Urban forest priorities from focus group (n=5). These are listed by number of mentions (in brackets) and length of discussion on the topic, with related preferences grouped into local priorities. It should be noted that some preferences related to multiple priorities.

3.3.1 Access to Natural Spaces

Access to natural spaces included both physical and visual access. Views of trees within the neighbourhood (mentioned 4 times), and from homes and schools (mentioned 9 times), were together mentioned 13 times. Important factors in tree views were cited by participants: the provision of privacy (mentioned 5 times), a sense of refuge from city life (mentioned 4 times), and a feeling of space when looking at distant trees (mentioned 4 times). Being able to closely access more ‘natural’ greenspaces was a key priority for the focus group participants.

3.3.2 Near-home Greenspace

In its various forms, greenspace was noted as providing both space to retreat from, and space to connect with, the larger community. Connectivity to greenspaces was mentioned ten

times. Two out of the five participants chose the greenspace adjacent to their home as a favourite space. In one case, this was an undeveloped road right-of-way, and in the other, it was a natural area. One participant mentioned that they chose their home because it was adjacent to the unopened road allowance:

> *The green space between half of the townhouse complex that I live in and my neighbours to the south, effectively gives . . . a sense of having much more space, like having a big backyard . . . even though you are in a townhome complex* (Focus group participant B).

One other participant mentioned near-home greenspace as a priority, speaking about a big open space with big trees near their home. In both cases, the green space mentioned was primarily chosen because it gave a sense of extent when looking out from their home.

3.3.3 Social Aspects of Local Greenspaces

In addition to the sense of refuge and isolation provided by local greenspaces, participants also acknowledged the role of parks in social cohesion. One participant spoke about local parks increasing feelings of community within the neighbourhood. She said "it's just kind of fun in the summertime, to see families out there. You are more inclined to go outside if you recognize that your neighbours use it as well" (Focus group participant C).

3.3.4 Aesthetics

Participants' use of words such as "beautiful", "unique", and "focal point" pointed to a high appreciation for the aesthetic benefits of the urban forest. There were six conversations centering on aesthetics throughout the session. Words describing colours, tree shape, or other aesthetic characteristics were used ten times. When discussing favourite aspects of trees, participants noted colours, psychological impact, and the unique spaces trees create. While not explicitly discussed, sense of place created by trees was alluded to in conversations about

memories and attachments the participants felt to treed landscapes. Participants in the focus group mentioned the positive impact of mature canopy, an appreciation of seasonal interest from fall colour and spring blossoms, and trees as both focal points and buffers in dense residential environments.

Connected to these conversations were other sensory features of trees. The smell of poplars and the sound of birch trees in the wind, for example, were mentioned as important aspects of the urban forest. The sense of quiet and peace provided in a forested setting was also appreciated by the focus group participants.

3.3.5 Mature and Iconic Trees

During conversation, local residents mentioned tree maturity 25 times. The group came to the most consensus when describing the characteristics of favorite outdoor spaces outside of the neighbourhood – all of them spoke with passion about a mature treed landscape. Four of these favorite spaces were groups of mature trees in urban settings, and five were in more rural settings. One resident exclaimed that "you know you have made it, you have arrived" when you live in a community with mature trees (Focus group participant A). Later in the conversation, the same participant noted that "money can't even buy those trees, time buys those trees" (Focus group participant A).

Participants also mentioned lost iconic trees, such as a Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco) at the elementary school, or an iconic magnolia in a local park. One participant noted western redcedar trees as an icon of the west coast. Participants preferred variability in height, look, and species, or the "poetic moments" created by natural forested landscapes (Focus group participant A). For example, vine maples (*Acer circinatum* Pursh) within a conifer forest provide a visual diversity that one participant "hoped to see" within the

neighbourhood, but which wasn't provided by the current urban forest (Focus group participant C). Additionally, a side conversation about a treed landscape in "The Sound of Music" movie which created emotional and positive energy from all participants as they spoke about its avenue of mature trees.

3.3.6 Neighbourhood Characteristics

Local priorities about the neighbourhood yielded important data. When asked what they would choose as their top five positive aspects of East Clayton, participants mentioned connectivity and walkability, convenience, sense of community, relative affordability, street design, parks and trees, convenient geographic location within the region, and availability of local shops and services. While not directly addressed within this study, car parking has relevance as it occupies interstitial space that could be used for future tree planting. The focus group was unanimous that parking was the most pressing community issue. One participant argued that "most residents would choose parking over trees" (Focus group participant B). Focus group participants cited a recent decision to widen a road allowance to give space for trees that was met with opposition from local residents who wanted that space for parking. The focus group participants themselves indicated that they would prefer trees. Understanding this tension is critical to the success of the future forest. Without local input, design and planning could have proceeded without attention to this critical and contentious issue within the community.

3.4 Survey

The neighbourhood survey asked residents several questions about tree and park preferences (Appendix A). The survey included both Likert scale questions and opportunities for longer answer responses if the participants chose to elaborate. Figure 4 shows that the highest rated greenspace service was for both psychological well-being and exercise. The second was for

views and seasonal changes, and the third was for a connection to the local landscape. Specifically linking the sense of place to local trees, one survey participant was upset about a recent park development that cut down trees to create a water park: "they just cut down all the trees here recently, why? For a park attachment. Well, you should have just left them that way then!" (Survey participant C.)

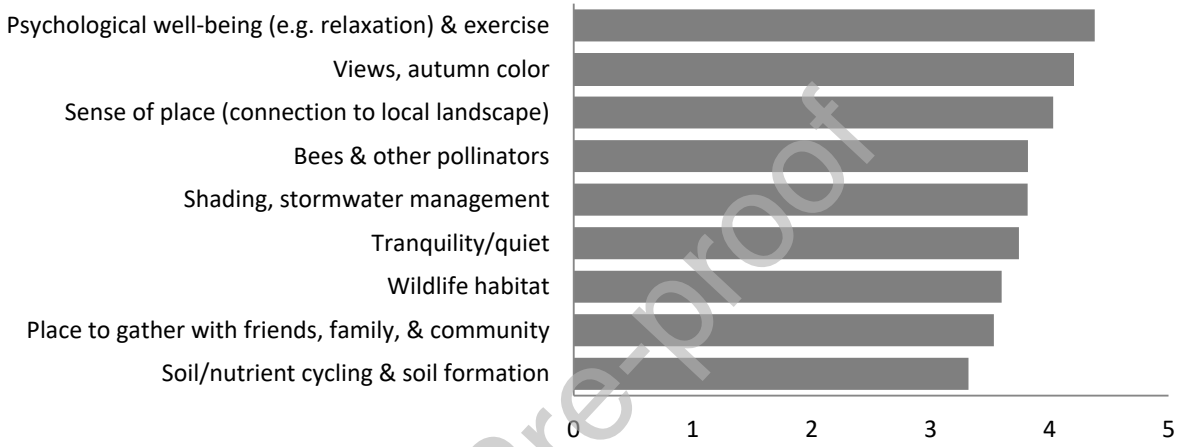

Figure 4. Greenspace services rated by survey participants (n=73). 0 = not important, 5 = very important.

Separate questions that asked about the services of trees in parks highlighted a desire for increased shade. As one participant stated: "there's absolutely no shade over the playground. It would be nice if more trees were planted, or if there was a tarp over the playground. I know that's impossible, but this park does need shade" (Survey participant A). While this is an expected response during a hot sunny day, another participant noted that the desire for shade was not limited to summer months: "in autumn and winter, there are no leaves for shade because the leaves have fallen. More trees that provide autumn shade and evening shade to block sunlight" (Survey participant B). Finally, one participant mentioned the need for larger trees: "we need

more big trees" (Survey participant D) was said 3 times in one conversation with gentleman who has been living in area for more than 10 years.

4.0 Discussion

Eliciting resident preferences and priorities using a variety of basic qualitative methods reveals important, place-based information that can inform urban forest design and planning. Our study used a mixed method approach to solicit preferences and priorities from residents at a range of levels of detail. This section discusses general patterns of preference found in relation to existing conditions (4.1), comparison of these preferences with expert opinions in a related urban forestry study (4.2), evidence supporting the importance of listening to local voices in urban forest design and planning (4.3), implications for practice (4.4), and limitations of the study (4.5).

4.1 Local Preferences for Urban Forestry Characteristics and Existing Conditions

In the case study community, preferences for urban forest characteristics, drawn from across the various datasets gathered by this research, included: access to natural spaces, near home greenspace, social aspects of greenspace, aesthetics, and mature and iconic trees.

In a dense residential neighbourhood, residents appreciated the accessibility of nearby greenspaces and the screening aspects of greenspaces. Participants who had access to screening vegetation mentioned that it helped them cope with a more dense residential environment. In the sidewalk interviews, focus group and survey, participants all expressed the role of vegetation in creating a sense of place. For example, a key learning from the sidewalk interviews was the preference residents had for mature trees, natural plantings and native species. The impact of

mature trees on neighbourhood self-identity and resident satisfaction was a clear message from the focus group. This was supported in the sidewalk interviews with local residents, three of which specifically mentioned mature trees as an important neighbourhood feature. Survey results point to a desire for views and a sense of place to be facilitated through plantings within local parks.

Balancing the need for refuge in dense residential environments with the desire for spaces for social interaction presents an interesting design challenge for future urban forests. Phase One participant observation and the focus group conversation indicated the more naturalized areas adjacent to the neighbourhood were more heavily used than the more formal parks located within the community, with the exception of parks with playground facilities that were heavily used by young families. While no participant directly mentioned why, the pilot study and focus group conversation suggests an aesthetic preference for naturalistic landscapes, which could be a factor in park use. Participating residents in this study preferred mature and natural landscapes that were mostly absent from their immediate surroundings. Both the quantity and quality of the green spaces left room for improvement, according to the City of Surrey survey as well as the sentiments expressed by participants in our study. While technically difficult and expensive to retain mature trees, it is interesting to find that at least some local residents in new neighbourhoods without mature trees feel as if they are less important than residents of neighbourhoods with mature trees. This is a powerful argument for design and planning to attempt to retain at least some large trees during development. Another related priority that emerged was resident's preference for natural landscapes, landscapes almost entirely absent in the resulting community. Some degree of 'naturalness' or 'messiness' may not be appreciated by all members of society (J. Nassauer, 2013), but those interviewed, observed, and

surveyed in this research indicated a preference for inclusion of some natural areas in the community.

Gobster et al. argue that "understanding how people perceive and experience the beauty of all landscapes is central to achieving public support of, and compliance with, ecologically motivated landscape change" (Gobster et al., 2007, p.961). This research found that the green spaces as built in the new community did not correspond strongly with the original concept design or residents' preferences as captured during this study. While the community was designed as a model higher density suburban neighbourhood, residents are not completely aware of this, or satisfied with the landscape of the neighbourhood. The next step in designing and planning the future urban forest for this community is to connect these findings to other forms of input, such as expert opinion and scientific data, and retrofit the community to meet resident needs using the latest science and technical knowledge.

4.2 Linking Local Voices to Expert Opinions

Local residents' views on urban forest preferences and priorities are briefly compared with those of experts in the field to compare differences and areas of overlap. McDonnell and Kendal argue "numerous studies have shown that attitudes and values of experts differ from those of the public" (Peh et al., 2015, p.630). This section of the paper attempts to briefly compare attitudes and preferences between groups.

In a related study, academic and practitioners were asked to rank and refine a set of urban forest indicators as inputs for developing future scenarios (Authors, 2016). This indicator study can be used to compare how expert prioritize aspects of the urban forest versus how local residents' express priorities. During the indicator selection process, both academics and practitioners highly ranked tree diversity (Authors, 2016). Local residents did not explicitly

mention this as a priority. Key priorities for residents that emerged during this study were missed by the expert groups, notably social priorities of greenspace and specific aesthetic qualities. The residents were able to speak of the lived experience of the community, and how it impacted their preferences for trees. The expert group was speaking from a more abstract and knowledge-based perspective of indicator prioritization, with less reflection on lived experiences. The expert group prioritized wildlife habitat, for example. This was alluded to by local residents in their discussions of preferences for native trees and natural plantings, but not discussed as an important service of the urban forest. Residents may have expressed preference for local natural landscapes, but none specifically mentioned its value for non-human species.

Social and aesthetic attributes, including intimate experiences of their urban forest, were important and lively discussion points during the focus group. Sounds, smells, aesthetics, seasonality, and the space-making qualities of trees all influence their experience of the landscape. These preferences were not prioritized by experts, in part perhaps due to the different directions and questions given to participants, but also in part because the citizen experiences are highly local and personal. The experts were prioritizing indicators based on their own knowledge of academic research and practice, while local residents were reflecting on their own lived experiences. As one academic noted during the indicator selection process: “the issue of place identity / place attachment is an important one and relates to uniqueness of urban trees or urban forest elements, linkages between local communities and their urban forests. But this aspect is difficult to capture in an indicator” (Participant One). The focus group participants were able to connect these preferences with real, on-the-ground spaces in their community, while the expert group was responding from a more abstract perspective of indicator prioritization. Future

research could follow-up with practitioners and academics to ask them to prioritize the indicators based on their own local context.

It is also worth noting key issues that were not explicitly prioritized by any group (residents or expert), notably the important role of urban greenspace in future climate change adaptation (e.g., cooling, offsetting more extreme weather), climate change mitigation (e.g., reducing energy costs, sequestering carbon, source of bioenergy), specific health benefits, and disbenefits of greenspace and trees (Lyytimäki, 2017; Nesbitt et al., 2017). Though some of these factors were briefly mentioned, particularly by the expert group, these aspects appear not to be prioritized, particularly in public consciousness, despite the research evidence on their importance.

4.3 The Importance of Including Resident Voices

Local voices can inspire the details that will ground future designs and plans. For example, knowing that Douglas-fir trees are important and iconic species, and incorporating them into the future urban forest will ground them in the reality of the East Clayton community. Local knowledge is unique and important to include in urban forest development, but that the process is complicated and complex (Al-Kodmany, 1999; Condon, 2012; Sheppard & Meitner, 2005; Tress & Tress, 2003). Across disciplines, researchers have been endeavoring to include local, place-based knowledge in design, policy, and management decisions (Janse & Konijnendijk, 2007; Reed et al., 2013; Shaw et al., 2009). This type of knowledge does not fit neatly into categories. A simple ranking or ordering of criteria, preferences, or priorities does not capture the richness and complexity of the place and conditions being studied.

Without listening to local voices, expert-based design and planning will likely miss key local concerns and preferences that could enhance the use and appreciation by the community of

its trees and greenspaces. The inclusion of this information should increase the social acceptance of resulting policy or design directions in the local community and gain trust in the process. The focus group conversation, supported by informal interviews and participant observation, captured issues such as the importance of mature trees and natural landscapes, local aesthetics, and social spaces. The combination of methods used in our study supported each other, scaffolding the level of detail for each preference mentioned. The outcomes of our study have reasonable sample sizes (observation and survey) while also including detailed information from the focus groups and interviews. The findings are also supported in the literature. Other researchers have also uncovered local resident's valuation of mature and natural landscapes (Mäkinen & Tyrväinen, 2008), while other studies have found preferences for smaller tree size at maturity (Dilley & Wolf, 2013). The focus group supported document analysis findings about parking space issues within the community. This was included in the findings because future designs might look to interstitial spaces, including those currently used as informal parking spaces, to increase the size of future forests. Having a sense of current community concerns about parking will inform decision making. The inclusion of local knowledge and opinion informs a more holistic understanding and provides a better fit between local desires and potential policy and management options.

4.4 Challenges and implications for engaging local voices in urban forestry

As mentioned in the introduction, engagement fatigue and busy modern lifestyles can lead to low participation rates in engagement programs. Our study was designed to use and test participation across a range of methods to understand the detail of data and the sample sizes that could realistically be achieved within a community. Low participation rates were noted for the

more time-consuming endeavors, such as the focus group. While the focus group yielded highly detailed data, the sample size was too low to draw definitive conclusions or generalize to the wider population.. When coupled with other methods that had higher sample sizes, though less detailed data, it was encouraging to note many instances of convergence of preferences. This overlapping of mixed methods was able to draw out a range of detail across a reasonably large community sample (though see next section on voices that were still left out by the research).

As noted in the Introduction, there are many reasons why public engagement in urban forestry practice is challenging, including both constraints on citizens and on the practitioners who might be considering conducting an engagement program. This case study demonstrates that despite these challenges, a mixed methods approach can be effective in yielding important new information to supplement and balance standard sources of expert information on urban forest planning priorities. It is therefore recommended that urban forest designers and planners give serious consideration to such methods and seek to integrate local voices in their decision-making process, as argued by many other researchers (eg. Beckley et al., 2007).

4.5 Study Limitations and Missing Voices

The weaknesses in the study included low resident participation rates with some methods and a possible pro-green bias in results, through recruiting those with highest levels of interest in urban forest issues. This is particularly true for the focus group. Preferences and priorities of those who were not observed or interviewed were not captured. Greater participation (requiring commitment of more substantial resources) would increase the accuracy and generalizability of the local perspective on urban forestry issues and transferability of result trends to other

communities. It could also help galvanize wider support from more local residents for future urban forest retrofits.

The voice of children and youth was missing in the focus group conversation and surveys. This is a concern given that researchers have found that "attachments formed in childhood, if a person lives in one place, are often stronger than those formed with new environments later in life" (P. Morgan, 2010, p.12). A better understanding of their preferences could help create meaningful spaces that foster a deeper sense of attachment to natural landscapes. First Nations voices were not included in this process. The community of East Clayton lies within the unceded territories of the Semiahmoo, Katzie, Kwikwetlem, Kwantlen, and Tsawwassen First Nations. Better recruitment techniques, more accessible methods , and a longer period to build trust and exposure within these community groups would likely increase levels and diversity of participation. Future research could include targeted efforts to engage the above groups combined with tools that appeal to a broader audience.

Further studies using comparable methods in different suburban forms (eg. less dense or older neighbourhoods) are advisable to improve our understanding of preference patterns and effectiveness of the mixed methods approach.

5.0 Conclusion

Dwyer et al. argue that "the psychological ties between people and trees defy easy quantification, yet few would deny their existence or their profound implications for urban forest management" (Dwyer et al., 1994, p.138). Including local voices in urban forest planning and design is a complex process. This paper examines some approaches to meaningfully understand

and include the voices of local residents. Methods included: sidewalk interviews, participant observation, a focus group, and a community survey. Despite various challenges, the combination of methods was able to identify a fairly consistent set of preferences for local residents, relevant to urban forest design and planning, but differing significantly from the priorities of experts in urban forestry.

We know from this and other research that additional trees of diverse types can prepare neighbourhoods for resilient futures. What we don't know is where and what to plant to create unique healthy environments that allow local residents to thrive physically, socially, and emotionally. This paper demonstrates the importance of understanding local resident preferences to add depth and nuance to urban forest design and planning. Without listening to local voices, the community's future urban forest may not have prioritized the iconic tree species that local participants cherish. The study discovered for example that local residents interviewed are drawn to 'poetic moments' created by natural plantings, but are dissatisfied with some aspects of their current urban forest. These, and other inputs, add local preferences and sense of place as important drivers to integrated future forest design processes. Including local voices is critical for comprehensive and inclusive plans and designs for urban and suburban forests. The methodologies described in this paper can be used in many projects seeking to inform urban forest decision making. The nuances added through the addition of local voices can and should ground urban forest designs in the reality of their place.

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Appendix A: Sidewalk Interview, Focus Group and Survey Questions

A.1 Sidewalk interview questions

What is your favorite type of tree?

How long have you lived in the neighbourhood?

Why did you move to East Clayton?

Why?

Do you have any trees in your yard?

Did you plant them?

How did you choose it/them?

Where do you like to see trees planted in your neighbourhood? Why?

Do you have any strong memories or attachments with a particular treed landscape, either from here, on vacation, or living elsewhere? Please describe.

Do you have any favorite spaces in the neighbourhood?

Can you tell me anything else about your neighbourhood?

Appendix B Focus group questions

Initial short demographic survey:

Do you live in East Clayton?

If so, how long have you lived here?

Why did you choose this neighbourhood?

Do you work nearby?

Focus group questions to guide conversation:

Describe your favorite outdoor place in or near your neighbourhood.

What is your favorite type of tree? (If you don't know it's name, please describe the tree in enough detail to help identify the tree – describe the leaves, is it green year-round, what shape is it, how tall is it, what colour does it turn in fall, does it have flowers, fruit, nuts, etc?)

What do you like about this tree?

Are there other, similar kinds of trees that would be a suitable substitute, or is this particular tree not substitutable?

If you have a yard, were there one or more trees there when you moved in?

If yes, are they still there?

If trees were removed, why did you remove them?

If you have a yard, did you plant a tree there?

If yes, why?

If no, why not?

What type of tree did you plant?

Why did you choose this tree?

Why do you think this tree would be appropriate for your neighbourhood?

Where do you like to see trees planted in your neighbourhood? Why?

Do you have any strong memories or attachments with a particular treed landscape, either from here, on vacation, or living elsewhere? Please describe.

Are neighbourhood trees important to you?

If yes, why?

If no, why not?

How knowledgeable do you feel about the benefits or nuisances associated with neighbourhood trees?

Please elaborate on the benefits of trees

Please elaborate on their potential nuisances.

How knowledgeable do you feel about the effects that climate change/global warming may have in your local area? Can you list any effects?

What are the top 5 positive aspects of this neighbourhood?

What are the top 5 issues?

In a survey of East Clayton residents, neighbours were very satisfied with the neighbourhood. Two key issues of concern were lack of parking, and lack of street tree growth. Do you agree?

These amenities compete for space, which would you choose to prioritize?

Appendix C: Survey questions

Survey on East Clayton Parks and Trees

Park surveyed (for administrator).

Hartnell ◯ Hazelgrove ◯ Katzie ◯ Magee ◯ Pickard ◯ Starr ◯ Wade ◯ Unsure ◯

Are you a resident of East Clayton neighbourhood and 19 years or older? Please see the map on page 3 for East Clayton boundary.

- ◯ Yes, I am a resident of East Clayton and am 19 years or older.
- ◯ I am 19 years or older but not a resident of the East Clayton neighbourhood.
- ◯ No, I am not 19 years or older.

Have you completed this survey before with one of our researchers in the park? If yes, you do not need to fill this form!

Yes ◯ No, I have not completed the survey before ◯

Part 1. Thoughts and feelings on this park - 4 questions

1. How often do you visit this park?

Never ◯ About once a year ◯ About once a month ◯ Weekly ◯ Daily ◯

2. Which features do you use in this park?

	Often	Sometimes	Very rarely	I have never used this	Not applicable
Benches	◯	◯	◯	◯	◯
Open space	◯	◯	◯	◯	◯
Tree shade (sitting under a tree...)	◯	◯	◯	◯	◯
Playground/water park	◯	◯	◯	◯	◯
Sport facilities (basketball/tennis/ soccer fields...)	◯	◯	◯	◯	◯
Paths for walking/running	◯	◯	◯	◯	◯
Host or attend events	◯	◯	◯	◯	◯
Dog walks/dog parks	◯	◯	◯	◯	◯
Natural areas (native vegetation, etc)	◯	◯	◯	◯	◯
Other: please specify	◯	◯	◯	◯	◯

3. Please rate how important this park is to you in terms of the following phrases:

	Very important	Important	Moderately important	Slightly important	Not at all important	Not applicable
Wildlife habitat	◯	◯	◯	◯	◯	◯
Bees & other pollinators	◯	◯	◯	◯	◯	◯
Shading, stormwater management	◯	◯	◯	◯	◯	◯
Views, flowers, fall tree color	◯	◯	◯	◯	◯	◯
Psychological well-being & exercise	◯	◯	◯	◯	◯	◯
Tranquility/quiet	◯	◯	◯	◯	◯	◯
Sense of place (connection to local landscape)	◯	◯	◯	◯	◯	◯
Soil/nutrient cycling	◯	◯	◯	◯	◯	◯
Soil formation	◯	◯	◯	◯	◯	◯
Other: please specify	◯	◯	◯	◯	◯	◯

4. How important is this park to you overall?

	1	2	3	4	5	
Not at all important	◯	◯	◯	◯	◯	Very important

Part 2. Thoughts and feelings on trees in this park - 7 questions

5. How important are trees in this park to you?

	1	2	3	4	5	
Not at all important	◯	◯	◯	◯	◯	Very important

6. Please complete the statement: This park needs _____ trees.

more ◯ the same amount ◯ less ◯ don't know ◯

Briefly explain:

7. If more trees were planted in this park, what tree features would you prefer (pick at most 3)?

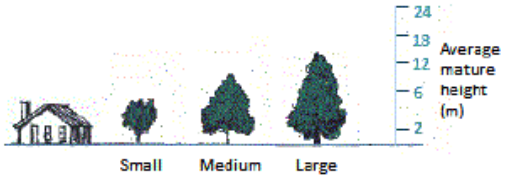
- ☐ More canopy cover
- ☐ Tall trees or mature trees
- ☐ More shade
- ☐ Fall colour
- ☐ Year round colour (e.g. purple or multi-colored leaves)
- ☐ Evergreen trees
- ☐ Flowering trees
- ☐ Fruit or edible nut trees
- ☐ Wildlife habitat (e.g. for birds)
- ☐ Native tree species
- ☐ Other: please specify _____

Could you briefly mention why you chose the above as your top 3?

8. Is there a tree size you prefer in this park? Refer to the image below for sizes.

Large trees (more than 15 m tall) ◯ Medium sized trees (10-15 m tall) ◯ Small trees (less than 10 m tall) ◯ No preference - any size is fine ◯

If you have a tree size preference, could you briefly explain why you chose that size? If not, put N/A.



Survey on East Clayton Parks and Trees - ctnd

9 . Are there features you do NOT like about the trees in this park (pick at most 3)?

- ☐ Sticky honeydew from aphids
- ☐ Tree leaves/flowers create a mess
- ☐ Attract unwanted animals/insects
- ☐ Allergies from pollen
- ☐ Root damage to pathways or grassy areas
- ☐ Hazards from falling branches
- ☐ Creates unsafe areas for criminal activity
- ☐ The trees create too much shade/block light
- ☐ Blocks views
- ☐ New non-native trees displace native trees
- ☐ Other _____
- ☐ No, there are no tree features I dislike in this park

10. How important is it for you to be able to see trees from your home?

	1	2	3	4	5	
Not at all important	◯	◯	◯	◯	◯	Very important

11. How important is physical access to trees and treed areas from your home (within a 5 minute walking distance)?

	1	2	3	4	5	
Not at all important	◯	◯	◯	◯	◯	Very important

Part 3. Your use of parks in East Clayton - 1 question

12. Are there other parks within the East Clayton boundary that you use? Don't put the same park twice. Please pick the 3 parks you use the most.

- ☐ Hartnell
- ☐ Hazelgrove
- ☐ Katzie
- ☐ Magee
- ☐ Pickard
- ☐ Starr
- ☐ Wade
- ☐ Other: please specify _____
- ☐ I don't use Surrey parks

Why do you visit the parks mentioned in Question 12?

_____

_____

_____

Part 4. Demographics

14. What is your age?

18-20	21-29	30-39	40-49	50-59	60 or older
◯	◯	◯	◯	◯	◯

15. What is your gender?

Male	Female	Other: _____	Prefer not to say
◯	◯	◯	◯

16. If you live in East Clayton, use the map on the next page to locate the area where you live.

I live outside the East Clayton boundaries	Write the number below - please see the next page for the map!
◯	