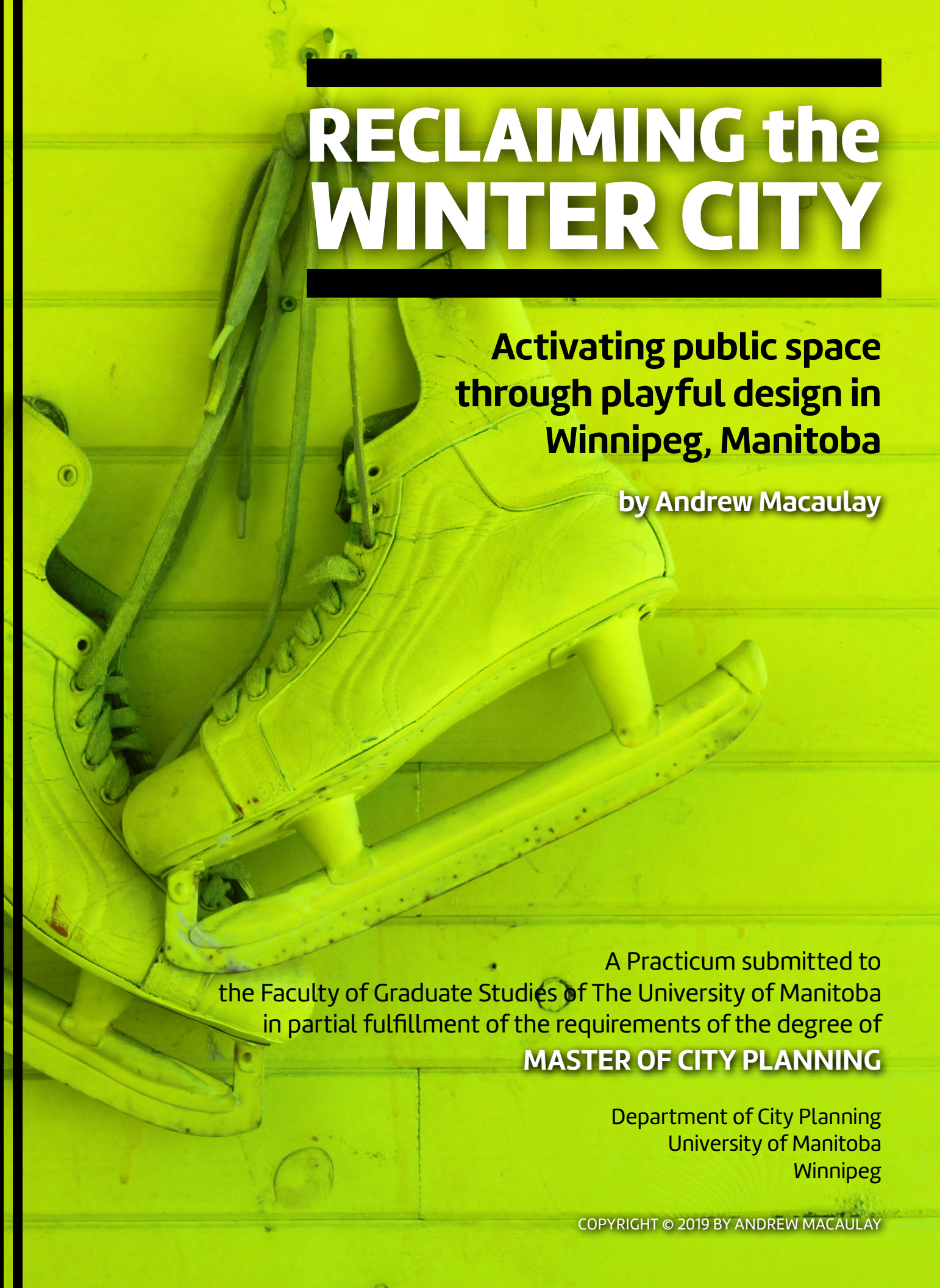

RECLAIMING the WINTER CITY

Activating public space through playful design in Winnipeg, Manitoba

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ABSTRACT

Winter presents a number of barriers that discourage urban residents from spending time outdoors, with detrimental implications for physical and mental health. This research explores the potential for playful, or ludic, design interventions to activate public space in winter cities as a means to encourage outdoor physical and social recreation. Using Winnipeg's Red River Mutual Trail as a case study, and the design interventions known locally as "Warming Huts," this practicum identifies playful design elements and examines their success at inspiring playful behaviour and generating pedestrian activity. First-hand data collected through naturalistic observation techniques and secondary academic and contextual data inform this study. Synthesis of these materials includes a review of the relevant academic literature; investigation of local demographics, land use, and planning context; statistical analysis of pedestrian count trends and weather data; tracing and behavioural mapping analysis using a framework of activation metrics; and the application of a ludic design typology. Finally, lessons drawn from the analysis of the Red River Mutual Trail are used to create a set of recommendations and strategies for winter cities to help guide planning and implementation of public space initiatives in the future or improve upon existing ones.

Keywords: [activation] [design strategies] [ludic] [ludic cities] [pedestrian activation] [play] [playful design] [public art] [public space] [urban design] [urban intervention] [winter] [winter cities]

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CHAPTER 1 | INTRODUCTION

For most of my life, winter consisted of the long gloomy months of ever-present cloud cover and the dreary, dripping damp of the rainy Canadian west coast. Every winter I would wait out the rain inside my Vancouver home as my usual sunny mood grew dim with the darkening skies outside. It took me many years before I noticed a pattern emerge; how my life would look just a little less rosy and getting out of bed would feel just a little more difficult with the onset of another rainy winter. I also came to learn this is the experience of many in Vancouver, and for those living in higher latitude cities in general, where winters are typically long, cold, and dark. Of course, this reality should have been plain to see, as the sidewalks, parks, and waterfront would surge with pedestrian activity on the first sunny spring day and everyone would look a little more cheerful and be a little more eager to engage strangers with a passing smile, as if acknowledging a shared bond – an end to their mutual suffering.

A decade into my adulthood, I had the opportunity to move to Winnipeg. While no one I had talked to at home had anything positive to say about Winnipeg winters, I found myself looking forward to the experience. The opportunity to finally participate in a "true Canadian winter," complete with snow and below-freezing temperatures, had a certain appeal. It was this desire to embrace my adopted hometown's quintessential characteristic – it is not known as "Winterpeg" for nothing – that inspired me to study winter in more detail. Like the constant rain of Vancouver, Winnipeg has its own barriers to getting outside in the winter and so I remained curious as to how to beat the "winter blues" within this new context.

Despite loving urbanism and all that cities have to offer, in Vancouver I always felt there was not enough to do when it was raining, not enough to compel me to get outside or implore me to push back against the gloom. Therefore, this research is my attempt to better understand how to get people more engaged with their own cities year-round; how to change their perspectives of

winter; and how to enhance our urban environments to make the most of underused spaces at underused times.

This study seeks to provide recommendations for planners, designers, and policy developers, which I hope will allow them to make the most of winter in their own cities, to give people a reason to get outside, to explore, to be a tourist in their own town, and, in the process, stimulate the physical, mental, social, cultural, and economic health of a neighbourhood or an entire city. However, it is also my hope that through the mere process of reviewing this study, the reader will be inspired to get outside and find the fun in winter, regardless of the potential absence of engaging initiatives in one's hometown.

1.1 Purpose

Through a case study of Winnipeg's Red River Mutual Trail, this practicum explores the potential for playful design initiatives to activate public space in winter cities, which can be described as high-latitude cities with winters characterized by the presence of snow, ice, chilling wind, extended periods of darkness, and below-freezing temperatures. For the purposes of this exploration, public space can be defined as any publicly- or privately-owned space to which people have physical and visual access that provides opportunities for shared social and civic use, activity, meeting, and exchange (De Magalhães, 2010; Tibbalds, 2012). In particular, this practicum examines the playful design interventions known as "Warming Huts" - a set of temporary structures or installations that are part art, part architecture - and their impact on pedestrian activity along the Trail.

The literature on winter cities highlights the barriers winter elements pose to walkability, thereby discouraging outdoor participation in physical and social recreation in urban public spaces. However, there is a wealth of evidence tying physical and social activity to positive physical and mental health outcomes (Nezlek, Imbrie, & Shean, 1994; Paluska & Schwenk,

2000; Umberson & Karas Montez, 2010). Compounding the issue for higher latitude cities, a lack of sunlight during winter can take a further toll on health, as it can increase the risk of physical and mental illnesses, such as Multiple Sclerosis and Seasonal Affective Disorder (Hayes, 2000; Saeed & Bruce, 1998). While still relatively rare, more winter cities, including Canadian cities outside of Winnipeg, are therefore exploring options for encouraging physical recreation and social behaviour in the cold winter months through initiatives aimed at increasing pedestrian activity, adding vitality to public spaces, and expanding opportunities for face-to-face interaction. The City of Edmonton's *WinterCity Strategy* (2012), outlining various actions to help the city embrace winter, and Toronto's annual "Winter Stations" design competition (Winter Stations, 2019), producing temporary beachfront public art interventions centered around lifeguard stations, are amongst the examples of these efforts.

The literature on play and ludic design highlights the potential of integrating playful principles into the design of public spaces to generate pedestrian activity and stimulate social interaction. However, there is currently a lack of literature on playful design in the winter context, including a lack of resources for guiding the implementation of new strategies. Therefore, this practicum attempts to address some of these gaps. It can serve as a resource for planning practitioners to help inform policy development and implementation of playful winter strategies, thereby encouraging more physical and social recreational participation, plus improving the health of urban residents.

This is first achieved through a review of existing literature on concepts surrounding playful design, the role of public art in the city, the benefits of public space, and design for winter cities. This is followed by a review of the Red River Mutual Trail's geographic, demographic, and planning contexts; statistical analysis of secondary pedestrian count and weather data; study site comparisons using tracing and behavioural mapping analyses against a

pedestrian activation framework; and a detailed design review of the Warming Huts and application of Donoff's (2014) ludic design typology. Finally, lessons drawn from the literature and analysis of the Red River Mutual Trail are used to develop a set of recommendations for winter cities, to help guide planning and implementation of future initiatives or adjustments to existing ones. These recommendations include strategies specific to playful design interventions, as well as broader public space strategies to further support their effectiveness.

In addition to secondary sources, this study is informed by tens of hours of fieldwork data collected through first-hand naturalistic observation of the Red River Mutual Trail and Warming Huts. These observations provided the data analyzed in Chapters 5 and 6 and lend further support to analysis and findings throughout the practicum.

1.2 Research Questions

This practicum's efforts to better understand the potential for playful design to activate public space in winter cities, particularly in the Canadian context, will be guided by exploring the following three key questions:

1) How can the underlying principles of playful design be used to activate public space in winter cities?
2) In what ways do Winnipeg's Warming Huts successfully incorporate principles of playful design?
3) What lessons does Winnipeg's Warming Huts initiative have for public spaces in winter cities?

1.3 Research Methods Overview

The overarching research strategy employed by this practicum is a case study of Winnipeg's Red River Mutual Trail. Yin (1994) describes case studies as "an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the

boundaries between phenomenon and context are not clearly evident" (p. 13). For this practicum, the phenomenon is playful design for winter cities, of which the Warming Huts are one example, and the real-life context is Winnipeg, or, more specifically, the Red River Mutual Trail. Case studies are commonly used in city planning research and are most appropriate when "how" or "why" questions are being posed, the researcher has little control over behavioural events, and the focus is on a set of contemporary, as opposed to historical, events within some real-life context (Yin, 1996, p. 1). Case studies are also considered a valuable strategy for addressing exploratory "what" questions and for dealing with "a full variety of evidence," or data collection and analysis methods (Yin, 1996, pp. 7-8). However, one of the criticisms of case studies is the question of whether, or to what degree, "obtained interpretations can be generalized to a larger population or to different situations" (Yin, 1996, p. 20). Yin (1996) suggests this criticism is unwarranted, as with case studies "the investigator is striving to generalize a particular set of results to some broader theory," known as *analytical* generalization, while "critics are implicitly contrasting the situation to survey research," which relies on *statistical* generalization to a larger population (p. 36).

As a research strategy, case studies are "an all-encompassing method… incorporating specific approaches to data collection and to data analysis" and "can be based on any mix of quantitative and qualitative evidence" (Yin, 1994, pp. 13-14). Therefore, to answer the three research questions, this practicum integrates primary qualitative research and analysis with the analysis of secondary quantitative data. A literature review of relevant topics, including playful design, public art, public space, and winter cities, informs (1) "How can the underlying principles of playful design be used to activate public space in winter cities?" A comprehensive visual analysis of Warming Hut design features and their comparison with a ludic design typology (Donoff, 2014) addresses design considerations for (2) "In what ways do Winnipeg's

Warming Huts successfully incorporate principles of playful design?" Analysis of pedestrian count data, tracing maps, behavioural maps, and naturalistic observations address to what extent the Warming Huts activate public space and elicit playful behaviour, further informing (2) and providing answers for (3) "What lessons does Winnipeg's Warming Huts initiative have for public spaces in winter cities?" The latter methods also complement the literature review, by creating a more complete picture of playful design use, further addressing question (1). A more thorough description of each method is included in its respective chapter.

The lessons derived from the above research methods inform the final set of recommendations. These include a set of suggestions specific to implementing playful design principles and features in winter cities particularly as well as a second, broader set, which serve to enhance public space in additional ways that support and contribute to the success of the first set.

1.4 Ethics

The proposed research did not seek out interviews with Trail users, Trail administrators, or other community stakeholders, so an ethics review was not required. Furthermore, the methods that were used by this practicum, such as naturalistic observation in public spaces and analysis of secondary pedestrian data, were not subject to ethics review. While interviews may have provided additional insights into Trail planning and/or use, forgoing interviews ensured fieldwork could be carried out in time for the 2016 season, rather than delaying another year. This decision does not preclude interviews from being carried out as part of future research efforts looking to build upon the findings contained herein.

1.5 Significance of Study

Quentin Stevens (2004), a prominent author and planning professor in the field of play and cities, states, “in public settings, most people remain strangers, maintaining a civil distance and becoming only loosely engaged with each other” (p. 152). This lack of engagement reduces opportunities for social interaction, minimizing the exchange and creation of ideas and potentially exacerbating mental health issues, such as depression, which can stem from social isolation. One solution for increasing the vitality of public space and improving people’s quality of life is to encourage greater social interaction through play. Many authors and scholars, such as De Luca and Bertolo (2012), believe integrating elements of play into cities “could modify the link between the city and its inhabitants, making it richer, more interesting and more involving” (p. 71). Play provides people the opportunity to break from mundane social norms, form new relationships, creatively express themselves, and just have fun. All of these opportunities can be beneficial to wellbeing, and considering that cities, serving as our social, cultural, and economic engines, are where the majority of Canadians live, implementing design strategies to increase opportunities for play can undoubtedly bring ancillary benefits to cities as a whole.

Given the geographic reality and stark winter conditions faced by residents in the majority of Canadian cities, it is particularly important to understand and apply such strategies within the winter context. This research contributes to the field of planning by filling a gap in the scholarly understanding of playful design in the context of winter cities, Canadian cities, and Winnipeg in particular. There is also a limited record on the evaluation of specific ludic design interventions in general, but especially within these contexts. It is the intent of this practicum to inform the design, planning, or reimagining of public spaces in winter cities and highlight the benefits of play for their year-round vitality.

1.6 Document Structure

Chapter 1 introduced the practicum topic, including the purpose and significance of the research. The guiding research questions were outlined and an overview of the methods used to answer them was presented.

Chapter 2 provides a review of academic literature on themes relevant to the research topic. These include playful design, public art's role in the city, the benefits of public space, and design for winter cities, with a focus on how aspects of the built environment and design features influence pedestrian behaviour.

Chapter 3 introduces the study area and provides additional geographic, demographic, and planning context, as well as an overview of key stakeholders.

Chapters 4 through 6 cover the research, analysis, and insights afforded by the methods described in Section 1.3. The individual research methods are described in greater detail and key findings are presented.

Chapter 4 delves into detailed pedestrian traffic data recorded and contributed by The Forks Renewal Corporation to provide greater understanding of broad trends in pedestrian volume and behaviour over time and in different weather conditions at three distinct locations along the Red River Mutual Trail.

Chapter 5 compares trends in pedestrian movement, distribution, and behaviour at two study sites along the Red River Mutual Trail, one with Warming Huts and one without. Tracing and behavioural maps are analyzed against an activation framework to explore comparative degrees of pedestrian activity at the two sites.

Chapter 6 provides a review of Warming Hut design features and compares them against a ludic design typology to assess how much they incorporate principles of playful design and to

determine whether they make use of design or implementation strategies not identified by the typology.

Chapter 7 synthesizes naturalistic observations collected during fieldwork and key findings from Chapters 2 through 6 and develops recommendations and strategies to aid in the planning and design of active public spaces for winter cities. The intent is to provide a resource for planners, designers, and policy makers.

Chapter 8 provides a concluding summary, answers the research questions, outlines the assumptions and limitations of the research, shares implications of the research for planning practice, and offers directions for further study, as well as several final reflections.

CHAPTER 2 | LITERATURE REVIEW

In order to provide "a firm foundation for advancing knowledge" and to give initial direction for exploring the research questions, a review of pertinent academic literature was a first step of this practicum as it "facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed" (Webster & Watson, 2002, p. xiii). The following chapter highlights themes emerging from the literature to identify gaps in knowledge and derive useful principles and design elements of urban play, public art, public space, and winter walkability that can be incorporated by planners, designers, and policy makers to encourage greater use and animation of public space in winter cities.

2.1 Playful Design

The literature suggests there is significant tension underlying the psychology of play behaviour, much of which is a result of the interplay between societal pressure to conform to established behavioural norms and an innate human desire to break free from them. This tension can inspire playful moods in people, motivate playful behaviour, and be exploited in the design of public spaces to encourage play. Therefore, the literature is organized below into three themes that best describe how play can be utilized to activate public spaces: motivators of play, elements of playful design, and elicited behaviour.

Motivators of Play

In order to understand how play can activate public space, it is necessary to begin by identifying the sorts of opportunities that potentially motivate people to engage in play.

There are many reasons that people play. Stevens (2007) identifies a number of broad categories of motivations that can serve to encourage playful behaviour, including competition, sensory stimulation, surprise, exploration of the unfamiliar, and whimsy. Stevens (2004) further

describes how displaying to others, testing one's own bodily skills, escaping into fantasy, pleasure of the bodily experience, and even confrontation can inspire a playful spirit.

Kerr and Apter (1991) note there are a "tremendous variety of devices, stratagems and techniques which people can use to obtain the pleasures of play" (p. 18). These can include exposure to loud sounds, rhythmic music, bright colours, or novel sites. Specific shapes, symbols, and colours can even inspire a playful mood. For example, colours at the red end of the colour spectrum have been associated with high arousal-seeking behaviour, as is seen during play, while colours at the blue end have been associated with calmer states (Kerr & Apter, 1991, pp. 142-143). Acting out or even simply observing fiction and narrative can be a playful experience as people empathize with characters' challenges and emotional struggles. Therefore, reading an engaging book or watching theatre, film, and television can be seen as forms of play. Exploration of new territory, either literal or metaphorical, can lead to "surprising, novel or unexpected events" and the associated knowledge that one is taking a risk can "heighten the emotions and make one feel more alive" (Kerr & Apter, 1991, p. 19). One particularly intriguing motivator for play, suggested by Kerr and Apter (1991), is facing danger (p. 20). Although somewhat counterintuitive, it is clear to anyone that has ridden a roller coaster or visited a haunted house that facing their fears can be a strong motivator that many people revel in. However, facing fear is undoubtedly a less attractive form of fun for many people, which draws attention to the diversity that exists amongst individual preference when it comes to inspiring playful behaviour.

Challenge, the difficulties and frustrations that arise from it, and even deliberate rule-breaking, having a component of risk, can spur playful behaviour. Conversely, Kerr and Apter (1991) note that when challenging aspects of play become too easy, the challenge begins to border on boredom and "winning too easily is experienced as a kind of 'let-down' " (p. 19). An

interesting point to consider is how what is seen as easy for one, particularly skilled, person may not be easy for another. Again, this highlights the wide variety of individual variation involved in play motivation.

Health benefits are a growing form of motivation for play, particularly amongst older adults seeking to keep their minds active. With an ageing population in many parts of the world, promoting play for health reasons will only become more important. Not only is having fun beneficial for one's emotional wellbeing, but it can help keep common geriatric disorders, such as dementia, at bay. A study by Nimrod (2011) looked at the "fun culture" in seniors' online communities. The fun activities that seniors participated in were observed to provide a number of benefits, including meaningful play (fostering connectedness and cultivation of one's self), liminality (a state of relaxed social constraints), communitas (a sense of community), opportunities to demonstrate and practice skills, and a means for coping with ageing (Nimrod, 2011, p. 226). These benefits were derived through games that challenged general knowledge, required collaboration, allowed for creative expression, and provided opportunities for humour (Nimrod, 2011).

Related to issues of mental health, De Luca and Bertolo (2012) emphasize learning as a "highly motivational play-factor" (p. 79). They point to a project called *Dead Drop* as an example, where USB flash drives were installed in urban spaces around New York City in objects such as brick walls, encouraging people to connect their devices, share random information, and learn new things in the process. The popularity of the *Dead Drop* concept has led to it spreading worldwide.

In addition to mental health benefits, there are many physical health benefits that can encourage people to participate in play. Kerr and Apter (1991) point out the popularity of sport as a form of play. Sport is widely acknowledged to encourage physical activity and many find it

a fun alternative to more formal forms of exercise. However, Huizinga (1950) points out the decreasing appreciation of play in sport and argues that the element of play in modern sport has been almost lost entirely. In the highly competitive world of professional sports, where players go to such lengths as using performance enhancing drugs just to win, it is clear there is a disconnect between personal enjoyment and the task of winning. Huizinga (1950) blames this disconnect on the increasing seriousness of sport, the elaboration of strict rules, and the formal recognition of professionals over amateurs: "The spirit of the professional is no longer the true play-spirit; it is lacking in spontaneity and carelessness" (p. 13). Surely this holds even truer today than at the time of Huizinga's observations.

Elements of Playful Design

In *Homo Ludens*, his landmark book on play, Johan Huizinga (1950) describes how play should be spatially separated from ordinary life, and that a closed space should be "marked out for it, either materially or ideally, hedged off from the everyday surroundings" (p. 19). Stevens appears to agree with this sentiment when stating, "Play often occurs within physical boundaries and follows special rules that define 'a place apart' " (2004, p. 139). Stevens (2006) further lends support to this notion through his observation that playful use of public space is more successful when separated from automobile traffic, as it "allows users to forget the practicalities of watching out for traffic and to focus on the various other sensations available," suggesting that design strategies could benefit from the delineation of physical play space from other activities (p. 807).

In 1960, Kevin Lynch created his now oft-cited model of perceptions of urban space that included paths, nodes, edges, landmarks and districts. Stevens (2006), drawing on Lynch's framework, proposes an alternative set of elements that shape human behaviour in public spaces. These include paths, intersections, boundaries, districts, landmarks, props, and thresholds.

According to Stevens (2006), people like to test themselves against boundaries, "pushing against them or attempting to move beyond or see beyond them" (p. 808). An example of a boundary that provides opportunities for playful interaction is an opening in a building façade, such as a doorway. Props are objects that are "employed in a variety of social acts and… performances for the benefit of others," and "make possible and… stimulate a variety of non-instrumental, exploratory, and risky forms of movement" (Stevens, 2006, p. 811). Props include urban details such as street furniture, play equipment, and public art.

In contrast to Huizinga and Stevens, Lefaivre and Döll (2007) suggest that play should be an interwoven and seamless component of the urban fabric rather than separated from other uses and users. They propose a system of play networks that connect together visually and functionally by play routes from one place to another, effectively integrating otherwise standalone play areas. Their proposed play networks consist of three design principles: interstitial, polycentric, and multidimensional (Lefaivre & Döll, 2007, p. 124). *Interstitial* involves play spaces seamlessly integrated into in-between places, the transitional areas between public and private, such as the spaces between houses or street-front gardens (Lefaivre & Döll, 2007, p. 123). *Polycentric* involves transforming in-between places into a high-density "fine-meshed network of small niches" that allow for step-by-step neighbourhood discovery (Lefaivre & Döll, 2007, p. 123). *Multidimensional* consists of a multi-layered, multi-functional network that includes space for informal games and a larger space set up for certain lifestyles and play styles, bringing people of different ages and backgrounds together (Lefaivre & Döll, 2007, p. 123).

Similarly, Burnham (2010) also highlights an element of design that is most effective when integrated seamlessly into the urban fabric: public art can have a significant role as an element of play and amusement in the urban realm. Burnham (2010) points out the opportunity

playful public art provides in drawing attention to the otherwise mundane and every day, filling gaps in formal urban design, and generating creative re-use of underutilized urban spaces. One such example Burnham (2010) references is a project by artist Mark Jenkins where a lifelike female figure was strategically placed on top of a disused billboard to appear as though she was asleep. This type of art can "create moments of confusion, humour or at times unease… creating a spectacle where a former eyesore once stood" (Burnham, 2010, p. 138). Another example of Mark Jenkins' work, where human legs and feet stick out from beneath a traffic cone at an otherwise inconspicuous roadwork site, confuses and bemuses passersby and provides an opportunity for "anonymous bits of the city [to] gain a second life" (Burnham, 2010, p. 138). Through urban interventions like Mark Jenkins', Burnham (2010) feels "what is emerging is not only a new form of urban art, but also a move towards open source urban design" (p. 139).

Stevens (2004) describes an instance where space that is otherwise set aside for more functional daily uses, such as a street full of car commuters on their way home, can become repurposed for play. 'Critical Mass' is a recurring event where hundreds of cyclists takeover city streets and ride together through the centre of the city during rush hour (Stevens, 2004, p. 142). While the riders engage in playful activity, such as ringing bells, lifting bikes in the air, and chatting amongst each other, cars are displaced from the street, transforming it from a functional people-moving corridor to a playground (Stevens, 2004). A similar, and more common, example of repurposing streets for playful activities would take place during celebrative street parades. Although Stevens (2004) would at first seem to be suggesting that Critical Mass is an example of play integrated into the urban fabric in a seamless way, he stresses that such an act "temporarily alters the structure of use of that space" and the "behaviour through which the cyclists find freedom occurs at others' expense" (p. 143). In other words, the very act of using the street for play thereby transforms it into a symbolically separate arena for play at the exclusion of other

uses and users. In this way, Stevens retains the stance proposed earlier by Huizinga (1950) that a space for play should be physically or figuratively separate from other uses.

Despite attempts at separating out spaces for play or defining and categorizing design components, Stevens (2006) reminds us:

> Play suggests that not all human action seeks to be efficient or to serve one narrow instrumental purpose. The ways in which people experience the environment surrounding them are not merely instrumental; they are often exploratory, whimsical, unsystematic, and wasteful of energy. Hence there is no overriding normative reason for urban structure to always be legible or for city image to be fixed. (p. 820)

In other words, organized structures, well-defined elements, and pre-determined networks may not always be conducive to the spontaneous and unpredictable nature of play. Flexible, ill-defined opportunities for play may, at times, be preferable to deliberate interventions.

Elicited Behaviour

According to Caillois (1961), play behaviour can be defined as one of four types: competition, simulation, chance, and vertigo. Each provides a different form of escape from the strict social conventions imposed by society. In competition, which involves tests of strength and skill, people are able to explore a unique personal facet, while in simulation one disguises or forgets oneself by creating other identities and situations (Stevens, 2004, p. 140). Chance involves spontaneity, novelty, abandonment to the unpredictable, and escape from predetermined courses of action (Stevens, 2004, p. 140). Vertigo consists of "an attempt to momentarily destroy the stability of perception and inflict a kind of voluptuous panic upon an otherwise lucid mind" (Caillois, 1961, p. 23).

Stevens (2004) notes, "a diversity of unfamiliar people, objects, meanings, and opportunities for action in urban public spaces stimulates a wide range of behaviours" (p. 139). While in Melbourne, Australia, Stevens (2004) observed a number of unique behaviours elicited in people interacting with playful elements in their surroundings. He categorized them according

to Caillois' four types of play behaviour. In one example, he observed people playing with life-size bronze statues depicting a set of three "tense, harried, expectant" businessmen (Stevens, 2004, p. 144). People were seen standing arm-in-arm with the statues, hugging them, imitating their posture and facial expressions, shaking their hands, picking their noses, and patting them on the belly; one statue was given a warm hat in winter, and another had a lit cigarette put in its mouth (Stevens, 2004, p. 144). Stevens (2004) categorized this form of play as simulation (p. 143).

In another example, Stevens (2004) observed two men playing chess on a giant board set up in a small plaza. The two men, testing their mental skill, provide themselves "an intellectual escape" (Stevens, 2004, p. 141). Stevens (2004) notes how "being on public display heightens the tension… pushing the players to excel" and classifies this as an example of competition (pp. 140-141). Related to this behaviour, Caillois (1961) notes, "Possessors of the same toys congregate in an accustomed or convenient place where they test their skill" (p. 38). In Stevens' (2004) example of the men playing chess in Melbourne, the toy is publicly provided but they congregate in an accustomed or convenient place just the same. This suggests one way to have people engage in play behaviour in public spaces is to simply provide a designated place for play where some form of convenience is provided, such as the toy itself in Stevens example, compelling at least particular subsets of the public to regularly make use of the space.

Kerr and Apter (1991) draw attention to a unique set of adult play behaviours: those of a sexual nature. Typically, most kinds of sexual behaviour would be an uncommon sight in public places, but a subset, one that could be called romantic behaviour, is quite common by contrast. Acts of affection like hugging, kissing, flirting, and dancing can all be considered romantic playful behaviour common to public spaces. These behaviours can be observed in reaction to such stimuli as moving music, scenic views, attractive water features, or inspiring public art.

Interestingly, Nimrod (2011) observed sex to be a dominant theme during his study of the fun culture of senior's online communities; another popular topic of discussion was alcohol. Nimrod (2011) suggested that the "anonymity, invisibility, and status neutralization" the online forum provided, afforded "humor and liminality… which may not be appropriate in other contexts of participants' lives" (p. 234). Nimrod's observations seem to suggest there is demand in contemporary society for a means to playfully express oneself in ways that might normally be considered inappropriate in face-to-face public places. Undoubtedly, the tradition of Carnival, of which New Orleans' Mardi Gras is one well-known example, has historically provided such an outlet in urban public spaces. Many of these types of street parties involve costumes, providing an element of anonymity, and are used as an opportunity to partake in forms of playful debauchery.

Stevens (2004) brings attention to how spectators can also benefit from play despite not being directly involved in playing themselves. In his example of the men playing chess in Melbourne, a crowd is drawn by the mere entertainment value. According to Stevens (2004), people can even "move between the roles of audience and participant" as he observed how people would "comment to their companions or even step forward to offer advice to the players" (p. 141). In this way, playful elements not only help to animate public spaces but they can serve as an attractive element themselves, drawing a greater number of users to these spaces, if not to participate in play then to act as spectators. This can further fuel play behaviour in people that relish an audience.

Similarly, Burnham (2010) points out how the simple visual engagement of pedestrians with playful imagery can inspire people to take a closer look at their surroundings and engage with objects and spaces they would otherwise overlook in passing. Also, by heightening people's awareness of their relationship with their environment, a unique behaviour can result: some

people react by attempting to reclaim or redefine the spaces around them. Burnham (2010) provides an example of a project where the trash littering a neglected alley was transformed into the figure of a woman, complete with discarded mattresses for a body and a lone fire hydrant as a medallion at the end of a gold chain (p. 142). The result was the rebirth of a formerly avoided space into one that invites people to come in and explore. In this case it is an artist that is the user of public space engaging in playful behaviour. Although we often think of artists as producers that are somehow separate from the general public, any individual can engage in this form of playful behaviour, and many do. This "creative play between the artist and the physical city" is a growing urban trend, what Burnham calls "DIY urban design" or what is more frequently being referred to as "guerilla urbanism" (Burnham, 2010, p. 137; Hou, 2010).

Topic Summary

The literature shows there are a number of principles of playful design that can activate public spaces, and it similarly provides a wealth of specific examples of how this can be achieved. The literature describes a wide array of psychological motivators that inspire playful behaviour, including opportunities for humour, competition, creativity, escapism, and facing danger. These same factors can be implemented into aspects of design through the use of elements such as designated play areas, props, public art, and play networks. The end results, or rather the behaviours produced, have been shown to include anything from making a statue smoke and playing a game of chess, to street parties and actively redefining urban spaces. What these all have in common is that they help to animate users within a public space and can serve as an attractive element for gathering other users as spectators.

Despite the wealth of useful information in the literature regarding play in urban settings, there is a noticeable gap in regards to incorporating natural elements, such as weather, into urban

play. Similarly, the literature provides no guidance on how this could be achieved in the winter context, such as with the added elements of snow and ice.

2.2 Public Art's Role in the City

Often situated in prominent public spaces, public art installations are a common spectacle that many people are exposed to on a daily basis, especially in large cities. According to the literature, public art, whether formally sanctioned or not, can play a number of roles with a broad range of impacts on city life. Schuermans et al. (2012) highlight the frequent claims made about the "economic, social, cultural, and political... impacts of art in public spaces" (p. 676). However, despite the broad impacts public art can have, the literature suggests the roles it plays can be summarized more succinctly.

One frequently discussed role in the literature is the regenerative power of public art to transform and renew urban spaces. Another is the role of art in creating a sense of place, or placemaking, in cities. A third common focus of the literature is the role of public art as a promotional tool, for political, marketing, and city branding purposes. Therefore, the literature can be organized into three distinct, though interrelated, themes: placemaking, promotion, and urban regeneration.

Public Art as Placemaking

Pollock and Paddison (2014) describe placemaking as a means to "materially and imaginatively" reinvent a city or neighbourhood to "cultivate civic identity, create meaningful spaces and develop senses of community and place" (pp. 85-86). They argue that public art is "integral to place-making... affording cohesion to otherwise disaffected and disillusioned communities and distinctiveness to reformed places" (p. 85).

Schuermans et al. (2012) add to this understanding, suggesting placemaking through art is "a 'socio-political' process operating through fine-grained cultural processes which guide our way of thinking and acting" (p. 679).

Green (2017) describes a placemaking effort in Detroit, Michigan, led by nonprofits in the area "engaging in community problem-solving" through their financial support of Detroit artists to help them "enhance and reclaim neighbourhoods through creative placemaking" (p. 8). One installation funded by these efforts, *Growing Together*, is a 10-foot marble sculpture of three faces surrounded by landscaping and a circular path and is meant to represent "the idea of unity and collaboration" (Green, 2017, p. 8). According to one Detroit non-profit representative, "true power and potential comes from marrying art and placemaking, which connects people with their public spaces and increases the likelihood they'll want to stay committed to the place, invest in the place and build a future in the place" (Green, 2017, p. 8).

Lanzl (2009) describes a similar placemaking effort in Berlin, Germany, but one that uses public art as a tool within a broader public space design strategy, a strategy that involves "a unique coalescence of official urban redevelopment combined with herculean private and grassroots initiatives at all levels of society, commerce, and culture" (p. 76). She suggests placemaking is a key component of "employing the right tools [to] activate public space" and that a successful public realm is "often measured by how busy a place is with people, both local and from elsewhere, and whether a *sense of place* can be discerned" (Lanzl, 2009, p. 76). Lanzl (2009) describes how public art features are a key piece that enhance Berlin's quality of life and the experience of its public spaces, which have made it a "vibrant cosmopolitan centre," attracting visitors, new residents, artists, and cultural outlets (pp. 76-77). In this way, Berlin's emphasis on art, culture, and quality public space have not just provided placemaking to discrete

spaces or neighbourhoods, but rather given the entire city a cultural vibrancy and thriving creative economy (Lanzl, 2009, p. 77).

In addition to highlighting the impact public art and placemaking can have on a city at different scales, the examples provided by Green (2017) and Lanzl (2009) also stress how placemaking through public art is best achieved through collaboration between varied disciplines and interest groups. As Lanzl (2009) describes it:

> Placemaking necessarily transcends the traditional disciplines of urban planning, architecture, landscape architecture, public art, and so on. Rather, placemaking requires sensitivity to the existing and/or historic environment and an interdisciplinary dialogue of all design professions – and stakeholders! – to arrive at an *integrated* public realm. (p. 76).

Public Art as Promotion

Through the creation of iconic imagery, public art can be used as a tool to promote almost anything, including spreading awareness of a political movement, an initiative, or, like Lanzl's (2009) description of Berlin, an entire city.

Smith (2015) points to the way public art can be used as a diagnostic tool to assess prevailing class, gender, and political tensions. According to Smith (2015), when presented in public space "art is endowed with the possibility of becoming a powerful tool for social and political advocacy" (p. 23). During her research on the 2011 uprisings in Cairo, Egypt, Smith found a number of examples where public art was used as a tool for making political statements. In one example, artists claimed the walls of Tahrir Square with scribbles, graffiti, and murals, only to have it painted over by soldiers of the then ruling Supreme Council of Armed Forces (Smith, 2015, p. 28). In an attempt to make a statement to the ruling government, artists painted new images to reclaim the space, "mirroring the larger social struggle" taking place at the time (Smith, 2015, p. 28). In contrast, Smith (2015) also points to past examples of public art being

used to promote the political ideology of the ruling government, such as Gustav Klucis' propaganda art, which "celebrated industrialization under Stalin" (p. 23).

Public art can also be used to promote a wide array of initiatives. One initiative described by Kilaru et al. (2014) used public art "to draw attention to automated external defibrillators" (p. 1634). According to Kilaru et al. (2014), these devices "can be used by untrained laypersons, and have proliferated in public spaces, such as airports, offices and schools," however "despite their lifesaving potential, the devices often go unnoticed and unused" (p. 1634). Through the Defibrillator Design Challenge, "attention-grabbing images," such as a mural of a superhero, were installed to draw attention to these lifesaving devices in public space (Kilaru et al., 2014, pp. 1633-1634).

In addition to marketing independent initiatives, public art can be used to promote entire cities. Zavattaro (2010) argues that public art is one of six "promotional and image-generation" tactics used by municipalities to "sell themselves to diverse audience bases" and increase the "consumption of goods and services" taking place within them (p. 191). The other five tactics include "branding, media relations, in-house publications, use of outside organizations and volunteers as PR tools, ...and built environment via sustainability" (Zavattaro, 2010, p. 194). According to Zavattaro (2010), public art and public art programs are used as a "selling point or value added to attract residents, businesses, and tourists" (p. 202). For example, in Detroit, a public art installation titled *The Heidelberg Project* has been cited as "one of the city's top tourist attractions," generating tourism revenue and helping to change the city's image (Zavattaro, 2010, p. 203). By choosing the art pieces to be displayed, a city can reflect whatever image it wants to project (Zavattaro, 2010, p. 203).

Public Art as Urban Regeneration

There are numerous examples in the literature where public art has been considered a useful tool for urban renewal and neighbourhood regeneration. The two aforementioned concepts of placemaking and city branding are also interrelated components of public-art-oriented renewal strategies, as both initiatives are believed to help attract tourists and investors (Schuermans et al., 2012, pp. 675-676). Detroit's *The Heidelberg Project* installation, as described by Zayattaro (2010), would be one example contributing to this economy-boosting belief (p. 203).

Reynolds (2012) provides a more detailed example of the regenerative power of public art in Los Angeles' Hollywood neighbourhood, as part of the "multi-billion dollar" Hollywood Redevelopment Project (HRP) started in 1986 (p. 101). Despite the famous neighbourhood's reputation for wealth and celebrity, in reality it was an area where porn theatres, sex shops, strip joints, and beggars operated within close proximity to its better-known attractions, such as Grauman's Chinese Theatre (Reynolds, 2012, p. 101). The HRP used public art as a way to rebrand the surrounding urban area as glamorous by "reinforcing the city's historical connection to the film industry" (Reynolds, 2012, p. 102). Reynolds (2012) research focuses on a particular art project, collectively called *Hooray for Hollywood*, installed outside and within a corner subway station completed in the 1990s (p. 102). The installation included such things as bus shelters in the form of a theatre marquee, benches shaped like classic cars, and film reels fixed to the station ceiling (Reynolds, 2012, pp. 103-107).

With the surrounding area having seen significant investment and redevelopment since the HRP was initiated, the overarching project and its public art components are considered to have been a success. However, Reynolds (2012) brings attention to the downside of this well-funded top-down form of neighbourhood regeneration: the displacement of "communities, individuals, and activities that exist along the neighbourhood's social periphery" (p. 102). Since

its successful renewal, the "carnival-like environment" of Hollywood Boulevard, with its "Chinatown punks," "Boyle Heights lowriders," and "Slauson rappers," have given way to sterile redevelopment (Reynolds, 2012, p. 111). Reynolds (2012) also points out how the *Hooray for Hollywood* art installation ironically became a victim of its own success, as the bus shelters were eventually torn down when an upscale boutique hotel was built in their place (p. 103).

In contrast, Schuermans et al. (2012) suggest that not all public-art-driven renewal is accomplished through "conspicuous flaghship projects with huge budgets" (p. 676). The authors point to the growing trend of small-scale grassroots community art projects aimed at neighbourhood regeneration efforts, which are advanced by "city councils, activist groups, and local associations for social and cultural reasons rather than economic" (Schuermans et al., 2012, p. 676). The goals behind these renewal initiatives can be to "instill civic pride, foster social interaction, promote a sense of community, contribute to local identity, and tackle social exclusion" (Schuermans et al., 2012, p. 676).

Topic Summary

A review of the literature shows there are a number of roles that public art plays in the city. It is an integral component of urban placemaking, helping to provide a sense of identity, meaning, and community to neighbourhoods. Public art is a well-used tool to promote ideas, initiatives, and places, and is also a popular component of urban regeneration strategies, which can include costly top-down projects or grassroots community-led renewal.

However, despite the many roles and potential socioeconomic impacts discussed in the literature, any connection between public art and winter cities is conspicuously absent. The extent of existing literature on art and winter pertain to winter art educational programs and means of creating winter art projects, but not as they pertain to their relationship with the city and public space (Jokela, 2007). There is no mention in the literature regarding placemaking in

the winter context, public art as a strategy for renewal in winter cities, or public art as a means for the branding and marketing of winter cities.

Additionally, the literature suggests further research is needed into how public art and users of public space interact with one another. This is echoed by Schuermans et al. (2012) who suggest, “the way art and artists interact with audiences and public remains a black box” (p. 676).

2.3 The Benefits of Public Space

Changing societal trends over the last century have transformed many people’s lifestyles in terms of how they use and travel through public space. People now live further from their work places; walk less frequently to get around; and drive automobiles out of necessity, out of convenience, and in order to more readily meet their busy schedules. Increasing incidences of certain health issues, such as obesity, heart disease, and anxiety disorders, have occurred in tandem with these trends.

Researchers now know the appropriate provision and design of public spaces can provide an “aesthetic place for social and recreational opportunities, which encourages physical activity, enhances social ties and promotes mental and physical recuperation” (Nutsford, Pearson, & Kingham, 2013, p. 1006).

As an important and ubiquitous component of the urban landscape, urban decision makers have an opportunity to learn from research on public space to implement change and positively impact the health of cities and their residents. In order to better explore how public space can protect and enhance the health of city dwellers, the exploration of this topic area aims to gain insight on how the provision and design of public spaces, such as parks, plazas, and streets, can best benefit societal health and wellbeing.

The literature suggests there are at least three aspects of public space to consider that can encourage greater use and enhance potential health benefits. The first is the ease of access or exposure, which is improved through greater quantity, and therefore proximity, of public space in a given area. The second is the unique design or functional characteristics that differentiate the level of quality of a public space. The third is user perceptions of public space, which can influence how and how often they are used. Therefore, the literature has been organized into the following three themes: proximity and quantity of public space, quality of public space, and perceptions of public space.

Proximity and Quantity of Public Space

William Whyte (1980) was one of the earliest figures to examine how people interacted in and with public spaces in a methodical and thorough manner. Spending countless hours directly observing, recording, and analyzing, he learned much about how people carried out their day-to-day activities in New York's public spaces, including small parks and plazas. Although Whyte (1980) did not focus on health implications, he did discover how even just the sight of a lively and inviting public space could bring a smile to a passerby's face (p. 57). He considered this an important behavioural phenomenon that he referred to as "secondary enjoyment" (Whyte, 1980, p. 57). He even conceived of a "smile index" to measure a public space's success at producing this secondary enjoyment, although he never tested this idea in practice (Whyte, 1980, p. 57).

The fact a mere glance at a public space can bring a smile to one's face, elevating one's mood, strongly suggests how the presence of public space in a neighbourhood can bring mental health benefits to residents, whether they make direct use of them or not.

Nutsford, Pearson, and Kingham (2013) directly studied whether there was a relationship between proximity to urban green space and human mental health. For the purposes of their

study, urban green spaces referred to "an integrated area comprising natural, semi natural, or artificial green land" (Nutsford et al., 2013, p. 1006). Through Geographic Information Systems (GIS) techniques and analysis of mental health treatment across three age groups in Auckland, New Zealand, they found that shorter distances to useable green space and a greater quantity of green space in a neighbourhood were associated with a decreased frequency of treatment for anxiety and mood disorders (Nutsford et al., 2013). Supporting Whyte's (1980) concept of secondary enjoyment, Nutsford et al.'s (2013) findings also suggested that mental health benefits increased, not just with *use* of green space, but also with the amount of *observable* green space in a neighbourhood (p. 1005).

Similarly, a study by Francis, Wood, Knuiman, and Giles-Corti (2012a) showed how residents of Perth, Australia, benefitted from lower psychological distress when they lived in neighbourhoods with high quality public open space, regardless of whether or not they used it. For their research, public open space included "parks, recreational grounds, sports fields, commons, esplanades and bushland/wilderness" (Francis et al., 2012a, p. 1570).

Research by Astell-Burt, Feng, and Kolt (2013) showed that "middle-to-older age" adults in New South Wales, Australia, were more physically active with increased proximity and quantity of neighbourhood green space, suggesting that a greater presence of green space in a neighbourhood encourages greater use and levels of exercise (p. 601). They also found that those in the greenest neighbourhoods were at a "lower risk of psychological distress" than those in the least green neighbourhoods (Astell-Burt et al., 2013, p. 601). However, in contradiction to the latter two studies, Astell-Burt et al. (2013) showed that neighbourhood green space provided no mental health benefits to physically *inactive* adults over the age of 45, therefore the increased mental health benefits were attributed only to higher rates of physical activity, or direct use of green spaces (Astell-Burt et al., 2013, p. 601).

Despite this conclusion, Astell-Burt et al. (2013) do acknowledge how their findings contrast with other general population studies that suggest people's health does benefit from green space even when physically inactive (pp. 601-602). The authors speculate there may be some "systematic differences" in how different age groups experience these spaces (Astell-Burt et al., 2013, p. 601). They point to other contributing factors, such as how social interactions have a tendency to "decline as we age" and the increased likelihood for aging adults to contract debilitating health issues (Astell-Burt et al., 2013, p. 602). The authors suggest these factors may increase "the impact of social isolation on mental health" for adults as they age, countering many of the indirect mental health benefits of public space (Astell-Burt et al., 2013, p. 602).

Quality of Public Space

While there is ample evidence to show how proximity and quantity of public space can bring health benefits to residents, research also suggests that *quality* plays an important role.

In their Perth study, Francis et al. (2012a) compared attributes of quality and quantity in public open space and determined that residents of new housing developments in neighbourhoods with high quality public open space "had higher odds of low psychological distress" than of those in neighbourhoods with low quality public open space (Francis et al., 2012a, p. 1570). They also found the quantity of neighbourhood public open space to be "not associated with low psychological distress," suggesting quality of public space is a more important consideration than quantity (Francis et al., 2012a, p. 1570). For the purposes of their study, public open spaces deemed to be of high quality were determined by survey participants, who subjectively ranked a space by such factors as "atmosphere, comfort, safety, attractiveness and maintenance, the variety of things to do, and the presence of adequate seating, public art and other people (including those known to the participant)" (Francis et al., 2012a, p. 1572).

A second study comparing attributes of quality and quantity, by de Vries, van Dillen, Groenewegen, and Spreeuwenberg (2013), support the findings of Francis et al. (2012a). The study by de Vries et al. (2013) looked at the impact streetscape greenery had on reducing stress, inspiring physical activity, and facilitating social cohesion. In addition to finding that "relationships were generally stronger for quality than for quantity," the authors found a correlation for stress and social cohesion with quality and quantity of greenery, but not for physical activity (Vries et al., 2013, p. 26).

Another aspect of quality that has been investigated, is the comparative health responses of residents to "urban blue" open spaces versus "urban green" open spaces (Völker & Kistemann, 2015). A lack of research on the effect of surface water on city resident's health and wellbeing led Völker and Kistemann (2015) to study self-reported dimensions of mental health in high-density areas of inner city Dusseldorf and Cologne, Germany. Using a framework of the four "conceptual therapeutic landscape dimensions" of experienced space, symbolic space, social space, and activity space, they found "enhanced contemplation, emotional bonding, participation, and physical activity" were prominent for urban blue spaces in comparison to urban green spaces (Völker & Kistemann, 2015, p. 196). For their study, the chosen blue spaces were city centre promenades along the Rhine River, which flows through both cities, and the chosen green spaces were two city centre parks, the Innerer Grüngürtel in Cologne and the Volksgarten in Dusseldorf (Völker & Kistemann, 2015, p. 198). The researchers found panoramic views, passing watercraft, the visual interaction of water and sky, and increased opportunities to interact with a greater diversity of people were most often reported by users as valuable qualities of both urban blue spaces (Völker & Kistemann, 2015, pp. 201-203). They also assert how blue urban features, such as rivers, can provide "linear structure elements," an important component for carrying out physical activities in cities (Völker & Kistemann, 2015, p. 204).

Enhancing qualities of public space that encourage people to live less sedentary lives and participate in physical activity is a key goal behind the work of Jan Gehl, a well-known proponent, planner, and designer of attractive and well-used public spaces. Just as planners realized in the early 20th century how including green space in housing areas could reduce infectious diseases by providing additional light and fresh air, Gehl and Svarre (2013) suggest there is a new societal health challenge needing to be addressed through the design and provision of high-quality public spaces: "lifestyle diseases" (p. 46). According to Gehl and Svarre (2013):

> Lifestyle diseases such as stress, diabetes and cardiac disease affected more and more people in the second half of the 20th century, making it relevant to study how and where we move about, and perhaps even more crucial, why we do not move about on a daily basis. (p. 47)

Public spaces, especially ones that are designed to be inviting, walkable, and human-scaled, can inspire people to be more physically active and encourage healthier forms of transportation, as was the case for middle-to-older age adults in Astell-Burt et al.'s (2013) study. For Gehl and Svarre (2013), one solution to solving the problems of lifestyle diseases is "to build with a mixture of functions so that people can walk or bike on a daily basis instead of taking the car" (p. 46).

In addition to encouraging physical activity, a second study by Francis et al. (2012b), found the quality of public space to have a strong correlation with residents' sense of community. More specifically, through GIS analysis, a public open space audit, and a survey of residents of new housing developments in Perth, the researchers assessed the relationship between sense of community and four public spaces: open space, community centers, schools, and shops (Francis et al., 2012b, p. 401). They found that the perceived quality of neighbourhood public open space and shops "significantly and positively" increased residents' sense of community, and this remained true regardless of how frequently residents used the spaces (Francis et al., 2012b, p. 401). These findings have significant implications for societal health, as

sense of community has been associated with "improved wellbeing, increased feelings of safety and security, participation in community affairs and civic responsibility" (Francis et al., 2012b, p. 401). Their findings also suggest how not only open spaces, such as parks and promenades, can provide health benefits, but the quality of shops along retail-oriented streets can improve wellbeing too.

Perceptions of Public Space

The previously described study by Francis et al. (2012b) highlights the important role of perceptions in realizing some of the health benefits of public space, regardless of their accuracy. One aspect of perception in particular can have a significant negative impact on use and exposure to public space, reducing its benefits: public safety.

An actual lack of safety and security in public spaces could lead to bodily harm and mental health risks. However, even if a space is relatively safe and secure, having the perception that it is not can still cause people to avoid these spaces out of fear. Avoiding public spaces reduces people's opportunities for physical exercise, social interaction, and enjoyment, negatively affecting physical and mental health.

One of the most frequently cited authors to contribute to designing for and altering perceptions of safety in public space is Oscar Newman and his work on "defensible space" (1972). The concepts of defensible space provide a means of designing public or shared spaces that discourage undesirable people and behaviours while avoiding the need for excessive or costly security features, which may ultimately be ineffective or contribute to negative perceptions of safety in the long-term. According to Newman (1972), natural surveillance is one of several factors that contribute to a successful defensible space by increasing the likelihood that unsafe conduct will be witnessed and reported. There are a number of design strategies to enhance natural surveillance according to Newman (1972):

> Designers can position units, windows, and entries, and prescribe paths of movement and areas of activity so as to provide inhabitants with continuous natural surveillance of the street and project grounds. (p. 15)

Whyte (1980) was also concerned with how the design of a public space altered its perceptions of safety, and how those perceptions determined how a public space was used. He believed many of the measures intended to improve the safety of public spaces instead served to make them less inviting, such as making benches too short to sleep on and putting spikes on ledges to prevent people from loitering. According to Whyte (1980), "places designed with distrust get what they [are] looking for and it is in them, ironically, that you will most likely find a wino" (p. 61). Ultimately, Whyte (1980) believed that successful public space is "self-policing" and was confident in this assessment, saying:

> The best way to handle the problem of undesirables is to make a place attractive to everyone else. The record is overwhelmingly positive on this score. With few exceptions, plazas and smaller parks in most central business districts are probably as safe a place as you can find during the times that people use them. (p. 63)

Gehl and Svarre (2013), in agreement with Whyte's evaluation, refer to the work of Jane Jacob's (1961) when they suggest "having 'eyes on the street' and interest in the life of the neighbourhood can help prevent crime" (p. 73).

More recent research has shown other ways perceptions influence use and the potential health benefits of public space.

Peschardt and Stigsdotter (2012) studied the characteristics, or "perceived sensory dimensions" (PSDs), that users associated most with the perceived mental restorativeness of small public urban green spaces (SPUGS) (p. 26). They found that the average user most valued the PSDs of 'social' and 'serene' for perceived restorativeness of SPUGS, while the most stressed users found 'nature' to be an important dimension (Peschardt & Stigsdotter, 2012, p. 38). Their findings suggest public spaces designed to improve opportunities for social interaction

and tranquility may provide the broadest mental health benefits to users, while designing spaces to better reflect aspects of nature may help those users who are under the greatest mental stress.

Topic Summary

The literature shows there are a number of ways that public spaces can best benefit societal health. The greater the quantity of attractive public space there is in a given area, the more readily residents can access it and the greater likelihood their health will benefit. Increased proximity and access to public spaces tends to encourage higher levels of use, greater physical activity, and decreased psychological distress. The literature also describes how simply observing public spaces in passing can provide secondary enjoyment and stress-reducing benefits.

The quality of a public space plays an important role in user health as well. Higher quality spaces have been shown to provide greater health benefits to surrounding residents, and certain characteristics or functions of a public space can encourage greater levels of physical activity or enhance different social and mental needs. Factors such as atmosphere, comfort, safety, adequate seating, the provision of bike infrastructure, and the ratio of water elements to vegetation should be considered in the design of all public spaces.

Lastly, perceptions of public space can have a significant impact on the behaviour of users. Managing these perceptions through appropriate considerations, such as designing spaces that provide opportunities for natural surveillance, are attractive to all users; provoke social interaction, serenity, and exposure to natural elements; and can improve a space's degree of success.

Despite a strong history and growing body of research on the relationship between health and public spaces, there remain gaps in the literature where further research is needed. Much of the current literature focuses on the benefits of green public space, such as parks, while other

forms, such as plazas and streetscapes, are underrepresented. The benefits of water features in public space has only just begun to be explored, and there remains an opportunity to study how seasonal variation, such as wintery weather conditions, in public spaces may affect health benefits. Given how much of public space in cities is devoted to streets and sidewalks, more research is needed on how to increase the health benefits of these areas, such as discovering the more specific aspects of shops that add to their perception of quality public space.

2.4 Design for Winter Cities

Much of the existing literature on winter cities relates to identifying pedestrian barriers unique to the winter context and developing urban design strategies to improve the comfort and accessibility of public spaces. These issues typically fall under the broader concept of walkability, which can be defined as "the quality of walking conditions, including factors such as the existence of walking facilities and the degree of walking safety, comfort, and convenience," and is a necessary component to designing attractive and pedestrian-friendly public spaces at any time of year (Litman, 2003, p. 5).

Incorporating aspects of good walkability in cities is important for many reasons. It encourages physical activity, increases opportunities for face-to-face social interaction, adds eyes on the street for improved neighbourhood safety, and makes for a more lively and vibrant community. Similarly, a lack of opportunities for walking can lead to reduced social interaction and exercise, resulting in negative physical and mental health outcomes and implications for government health spending.

Winter brings weather conditions that reduce walkability and can therefore exacerbate the health impacts associated with reduced outdoor recreation. This can discourage people, especially those with mobility issues, from going outside altogether, resulting in isolation and feelings of depression. This is particularly relevant to older members of the population, who are

more likely to face mobility issues as they age. For this reason, much of the research surrounding design for winter cities focuses on age-friendly issues and implications for older adults.

Pedestrian-friendly Design

There are a number of subjective characteristics identified as conducive to a more pedestrian-friendly, or walkable, environment. These include characteristics capable of reinforcing a sense of safety, such as clean surroundings free of litter and graffiti, higher pedestrian traffic, lower levels of vehicular traffic and noise, and pleasant aesthetics, which include attractive natural and built environments. There are also many beneficial physical features, such as well-maintained and level sidewalks or paths, the presence of retail amenities, good path connectivity, high-visibility wayfinding elements, and accessibility features like curb ramps and railings (Brown, Werner, Amburgey, & Szalay, 2007).

Multiple studies highlight how a dense, mixed-use built form has a positive impact on the walkability of an area (Brown et al., 2007; Meng & Setoguchi, 2010; Ripat, Redmond, & Grabowecky, 2010; Wennberg, Ståhl, & Hydén, 2009). One advantage of a compact built form, which is particularly relevant in winter, is the benefit of having a convenient mix of indoor meeting places, such as coffee shops and libraries, within close proximity to each other and housing.

Seating is another important consideration as it provides opportunities for resting when walking long distances, waiting for transit, or simply enjoying a local park. This is particularly essential for older adults and people with mobility issues. One Edmonton study highlighted the importance of constructing seating out of materials that are not too cold in the winter, are positioned at a convenient height, and have handrails for assistance in sitting down and standing up (Garvin, Nykiforuk, & Johnson, 2012).

Winter Barriers for Pedestrians

Year-round physical impediments to walkability include narrow walkways, poor pedestrian crossing infrastructure, high curbs, uneven and slippery surfaces, a lack of handrails on stairs, and a lack of adequate lighting (Muraleetharan, Meguro, Adachi, Hagiwara, & Kagaya, 2005; Wennberg, Ståhl, & Hydén, 2009). Winter elements, such as cold, snow, wind, and darkness, can exacerbate these impediments while serving as unique barriers of their own.

A study in Changsha, China, revealed how thermal comfort was the most important factor when people selected an outdoor public space and, therefore, the unique outdoor microclimate provided by a given public space has a significant influence on its use (Liu, Zhang, & Deng, 2016). Comparing use of public spaces throughout the year against four microclimate parameters, the study found thermal radiation, defined as a combination of direct solar radiation and heat radiated from surrounding surfaces, to provide the highest contribution to thermal comfort in winter, followed by air temperature, wind speed, and humidity (Liu et al., 2016, pp. 192-193).

Additional studies point to wind as a major source of discomfort that discourages pedestrian activity in winter. A Montreal study concluded that daily on-street pedestrian flows were more negatively impacted by wind speed and precipitation than temperature during winter months (Miranda-Moreno & Lahti, 2013). A study in Shenyang, China, also acknowledges the significant impact that wind has on discouraging walking and the use of public space in winter (Meng & Setoguchi, 2010).

Other studies show that thermal comfort alone does not significantly discourage people from walking outdoors in the winter, but rather the physical presence of snow and ice have the largest impact. A Toronto study of individuals aged 18 to 85 found that 82% of subjects went outside at least once daily in winter weeks when there was no snow or ice on the ground, yet

only 66% went outside at least once daily in weeks when there was snow or ice on the ground (Li, Hsu, & Fernie, 2012).

Commonly cited physical winter barriers include the potential for slipping on icy surfaces, snow accumulation hindering access at bus stops and pedestrian crossings, and obstructive puddles forming at street crossings and curb ramps (Li et al., 2012; Wennberg et al., 2009). A Winnipeg walkability study found a number of physical winter barriers, including snowbanks reducing path width, causing detours, and creating visibility problems for pedestrians and drivers (Curtis, 2017). The study also found the smoothness of a sidewalk or path, due to variations in deposition and compaction of snow, ice, and grit, to have an impact on walkability and observed pedestrians "cautiously adapting their natural gait along questionable stretches" in response to conditions (Curtis, 2017, p. 58). A study from Sapporo, Japan, showed that the state of surface clearing even has an impact on people's walking route choice (Muraleetharan et al., 2005).

An emerging winter barrier, of particular relevance in this age of ever-present "smart" personal electronic devices, is highlighted in a Finnish study by Ylipulli, Luusua, Kukka, and Ojala (2014). Ylipulli et al. (2014) argue for the need to design more cold-weather-resistant information and communication technologies, as cold temperatures can have adverse effects on personal devices and, therefore, discourage people from going outside, as they attempt to keep their devices, and digital communication channels, operating normally.

Strategies for Reducing Winter Barriers

Pihlak (1994) highlights how "inexpensive energy costs have allowed cities as different climatically as Edmonton, Alberta, and Phoenix, Arizona, to develop more or less in the same manner," ignoring their "unique climate and thus any potential to capitalize on their unique characteristics" (p. 73). Therefore, he suggests the urban environment should incorporate "site

design principles [that] maximize the positive aspects and minimize the negative aspects" of a city's respective climate type (Pihlak, 1994, p. 73).

In order to reduce the impact of chilling winds, Pihlak (1994) describes how adding vegetation or structural wind barriers to spaces can favourably alter wind flow in one of four ways: obstruction, filtration, guidance, or deflection (p. 86). Respectively, obstruction and filtration can provide major and minor decreases in wind velocity, while guidance and deflection can redirect wind laterally or vertically (Pihlak, 1994, p. 86). To take advantage of solar radiation, Pihlak (1994) suggests public spaces should be oriented to the south, with nearby buildings or other structures limited in height or positioned so as to not cast shade on the site during the winter months (p. 89). Furthermore, Pihlak (1994) recommends using design materials that are dark in colour, non-reflective, and "maximize heat storage and re-radiation," such as bricks and stone (p. 90).

The Shenyang study looked at the ways built form can influence street-level wind speed, particularly in areas with higher density building massing (Meng & Setoguchi, 2010). Specifically, it looked at different configurations of podium form in wind tunnels, and found certain forms reduced street-level wind speed while others exacerbated it. The findings suggested that terraced podiums, or podiums with upper level setbacks, reduced wind as did podiums with mid-block plazas or "pocket spaces" cut out of the sides (Meng & Setoguchi, 2010, p. 361).

To reduce physical barriers, a host of snow-clearing techniques and practices is suggested by a Winnipeg study on winter walkability that involved older adult participants (Ripat, Redmond, & Grabowecky, 2010, p. 10). These suggestions included:

> ...sanding sidewalks in conjunction with ploughing, lowering the blades on snow-clearing equipment, making snow clearing mandatory for private business owners, continuing to plough even later in the season, and removing the snow more promptly in areas where more seniors and pedestrians use the sidewalks. (Ripat, Redmond, & Grabowecky, 2010, p. 10)

A more novel, yet effective, approach is the use of snowmelt systems to heat sidewalks and pavement to keep them clear of snow and ice. There are a number of variations to these systems in terms of methods, materials, and energy sources. Systems supplied by geothermal energy are common around the world, including in the US, Argentina, Japan, and Europe (Lund, 2010). However, geothermal is not an option for all winter cities, and snowmelt systems may prove financially unfeasible for some. The city of Klamath Falls, Oregon, installed a snowmelt system in the 1990's and has found several benefits including reduced snow removal costs, reduced risk of injury from slips, less mess from sand, salt, and slush, and eliminated freeze-thaw damage to sidewalks and pavers (Brown, 1995).

A small body of literature recommends incorporating more opportunities for play to help overcome some of winter's physical barriers while providing psychological motivation to spend more time outside.

A study on designing child-friendly public spaces by Derr and Tarantini (2016) suggests children go "out in their community less in winter weather" as the days get "colder, darker and snowier," which may contribute to feelings of having poorer access to play spaces and being less welcome in public spaces at this time of year (pp. 18-19). The study highlights the importance of having play opportunities in public spaces to create more inclusive spaces for children in cities, and implies playful design strategies could encourage greater activation of public spaces from this particular demographic in winter (Derr & Tarantini, 2016).

Olsson, Väänänen-Vainio-Mattila, Saari, Lucero, and Arrasvuori (2013) describe a case study where postgraduate students developed design concepts for interactive products that use playful experiences to address "the challenges that winter causes in moving and navigating" (p. 166). The design concepts included a "smart" jacket that used "tactile guidance" and "gesture-based input" to help its wearer navigate and interact with their environment; a winter hat with a

built-in audio device that “encourages users to exercise outdoors” through an “audiobook-like interactive story;” and a winter glove with a built-in camera and screen that uses “augmented reality” and hand gestures to guide the user in a real-world social scavenger hunt (Olsson et al, 2013, pp. 168-169). While the study did not test physical prototypes to determine their effectiveness, it does identify a number of digital playful strategies with the potential to encourage outdoor winter activity. Additionally, the study suggests more ubiquitous technological products, such as smartphones, could be a useful platform for delivering creative playful experiences that aid pedestrian movement and navigation in the winter context.

A case study by Grønbæk, Kortbek, Møller, Nielsen, and Stenfeldt (2012), describes the installation of a playful intervention, *SwingScape*, at a winter festival in Roskilde, Denmark, and how some of its design features successfully addressed winter elements. The authors noted SwingScape helped to overcome the “long dark hours during the Scandinavian winters” by “using light as a form of expression” (Grønbæk et al. 2012, p. 235). They found this also served to make it a landmark in the darkness, even from a distance, and “bring safety to the urban space” by mitigating darkness-induced feelings of insecurity, thereby enhancing “the motivation for using the installation” (Grønbæk et al. 2012, p. 235). They also described how covering the floor of the installation in “green turf” brought “warm associations to summertime,” and could conceivably reduce the risk of slippery snow and ice (Grønbæk et al. 2012, p. 236).

Topic Summary

A pedestrian-friendly public realm is a quality that all communities should work towards for the benefit of their citizens. There are a variety of physical and perceptual factors that contribute to a pedestrian-friendly environment, such as wide pathways and clean surroundings, and cities should strive to incorporate as many encouraging attributes as possible.

Winter weather brings many unique barriers in the form of cold temperatures, snow and ice accumulation, reduced daylight, and chilling wind, but there are several strategies for reducing these. Using materials and siting orientation to maximize sunlight and solar gain, implementing wind reduction techniques into the built form, comprehensive mechanical snow-clearing practices, and heated pavement snowmelt systems can go a long way to alleviate these barriers, but are by no means an exhaustive list of the measures that can be taken.

The literature barely acknowledges playful design as a potential strategy for winter cities, but suggests opportunities for play could motivate people to get outside more in winter. It also suggests that combining playful principles with more traditional winter mitigation strategies could be particularly effective, simultaneously providing psychological motivation while removing physical barriers. The literature also highlights the potential for new technologies to assist in overcoming winter barriers, but does not provide practical guidance on how to best apply it.

2.5 Summary

This chapter provided an overview of the academic literature on four broad topics relevant to this practicum: playful design, public art's role in the city, the benefits of public space, and design for winter cities. The literature highlights a wealth of existing knowledge on motivators of play; playful design elements; elicited play behaviours; public art's potential for placemaking, promotion, and urban revitalization; how proximity, quantity, quality, and perceptions of public space influence use and user health; and pedestrian barriers and mitigation strategies in winter cities.

The literature suggests substantial physical and mental health benefits can be derived from spending time in public space and that playful design strategies can be very successful at generating pedestrian activity and attracting people to such areas. It also suggests using public art

installations as a vehicle for playful design interventions could be an excellent way to promote public space initiatives and bring the added benefit of placemaking and renewal to underutilized spaces. Given winter weather creates physical and psychological barriers that discourage people from spending time outdoors, strategies that combine techniques and principles of playful design, public art, and winter design could be highly effective at mitigating both types of barriers, thereby adding vibrancy to winter cities and improving health outcomes for residents.

However, there is a lack of literature on such a strategy for winter cities and, therefore, a lack of resources to help guide planners, designers, and policy makers on how to plan and implement it. It is this gap in knowledge the following chapters endeavour to fill through a case study of Winnipeg's Red River Mutual Trail. In addition to informing the direction of inquiry of this practicum, the findings from the literature will also inform the final recommendations in Chapter 7.

CHAPTER 3 | SITE CONTEXT

This chapter provides greater detail and additional context on the study area, the Red River Mutual Trail in Winnipeg, Manitoba, Canada. Included is a more detailed description of the study area and fieldwork research sites; the rationale for choosing the study area, the research sites, and a focus on Warming Huts; and an overview of the surrounding neighbourhoods, land uses, demographics, key stakeholders, and policy and regulatory contexts. At the end of the chapter is a list of key considerations that highlight notable findings, which inform the final recommendations in Chapter 7.

Once named the longest naturally-frozen skating trail in the world by the Guinness Book of World Records ("Guinness gives," 2008), the Red River Mutual Trail is one of the largest outdoor public spaces in an urban setting that is specifically established for pedestrian-oriented winter use. With the presence of the Warming Huts, this site provides a unique opportunity to study interactive behaviour between pedestrians and playful design elements in an urban winter setting, contributing significant insight into all three key research questions in a way that few other locations can.

3.1 Study Area

The Red River Mutual Trail, the principal focus and study area of this practicum, is an annually reoccurring manicured skating trail and pedestrian path along the frozen surface of the Assiniboine and Red Rivers in the city of Winnipeg, Manitoba. Figures 3.1 and 3.2 show a typical section of the Trail study area during winter and summer months. The Trail regularly opens in January, once the surface ice is sufficiently frozen, and closes in March, when temperatures warm, the ice thins, and the Trail becomes potentially unstable and unsafe for users. The operation and maintenance of the Red River Mutual Trail is carried out by The Forks Renewal Corporation, the organization responsible for managing The Forks, a popular market

and entertainment area for locals and tourists, which is located adjacent to downtown Winnipeg and close to the junction of the Assiniboine and Red Rivers.

Figure 3.1: Red River Mutual Trail study area in February

Figure 3.2: Red River Mutual Trail study area in September

The Trail is typically composed of an 8 m to 14 m wide ice sheet, which is regularly resurfaced by a Zamboni, and a 4 m wide walking path made of compacted snow running parallel to it down the center of the river. The two maintained surfaces are separated by a 2 m to 12 m wide expanse of piled or unmanicured snow with discarded Christmas trees installed along the inside edge of the ice sheet at roughly 12 m intervals. The Warming Huts are installed on the outside edge of the walking path in areas where the path and ice sheet are close together and between the path and ice sheet in areas where the two are further apart. Figures 3.7 and 3.8 show two typical configurations for the surface of the Red River Mutual Trail.

The specific operation dates, length, and routing of the Trail can change from year to year depending on seasonal weather trends and ice conditions. In 2016, the year this practicum's fieldwork was carried out, the Trail officially opened on Thursday, January 21, and closed on Sunday, March 6. The Trail's northern terminus was located on the Assiniboine River adjacent to The Forks and its southern terminus was located 6 km south on the Red River adjacent to the St. Vital Bridge, as shown in Figure 3.3. In other years, the majority of the Trail can instead run west from The Forks along the Assiniboine River.

Figure 3.3: 2016 Red River Mutual Trail route

In 2016, there were several access points over the course of the 6 km Trail, the most prominent being at The Forks Historic Port on the Assiniboine River. Other prominent public access points were located along the Red River at the Norwood Bridge, Lyndale Drive Park, the Manitoba Canoe and Kayak Centre, and Churchill Drive Park near the St. Vital Bridge (see Figure 3.4). While these were the most heavily used access points, it was clear from tracks left in the snow that people accessed the Trail from countless points along its entire length, including from the backyards of individual homes along the river bank, per Figure 3.5.

Figure 3.4: Major access points

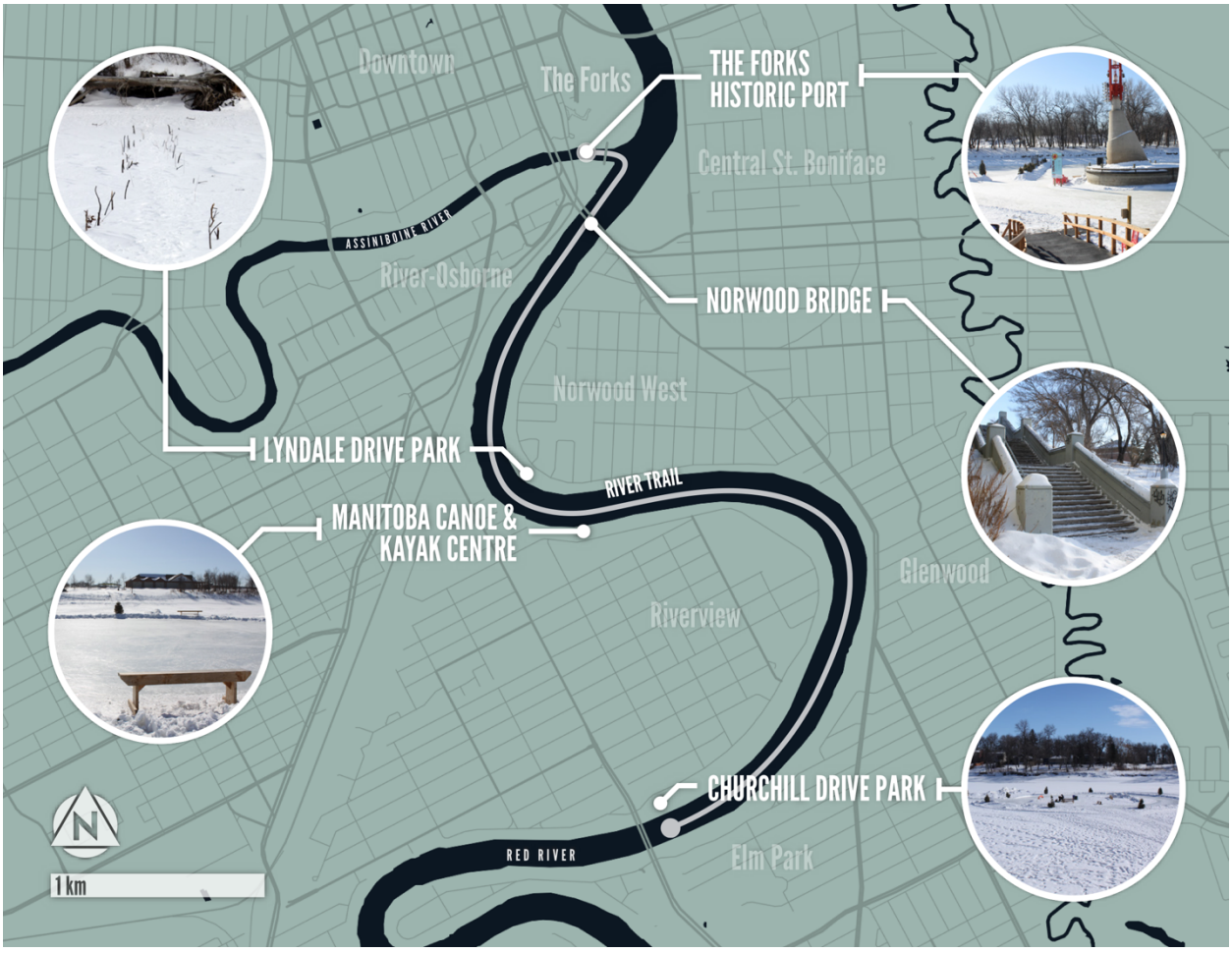
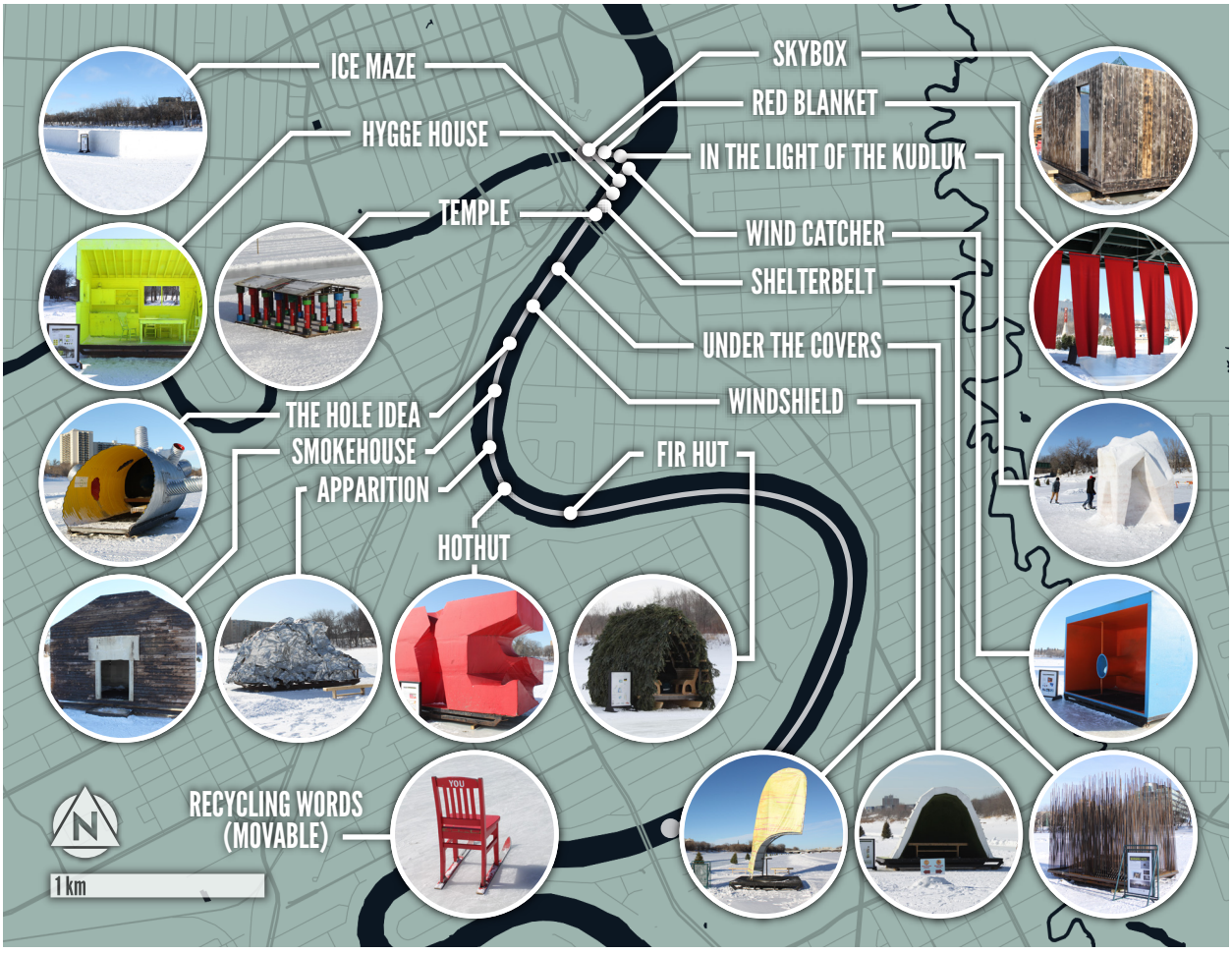


Figure 3.5: Signs of access to the Red River Mutual Trail from private yards

The Warming Huts, the outcome of "an art and architecture competition on ice," are now a regular component of the Red River Mutual Trail and have become a more common sight in other areas of the city as well (The Forks, 2015, Programming section, para. 2). With numerous submissions from local and international designers, competition organizers encourage the three winning Warming Hut designs chosen each year to reflect "creativity in use of materials, [efficacy in] providing shelter, poetics of assembly and form, integration with the landscape, and ease of construction" (Warming Huts, 2016a, Call for Proposals, para. 1). The resulting Warming Huts tend to be small, temporary structures of unique and varied design that serve as novel spectacles at regular intervals along the Trail. However, not all installations could be categorized as structures and, despite their name, many do not provide a means for warming oneself. Falling more within the realm of temporary public art than permanent architecture, the Warming Huts make for a particularly valuable form of playful design intervention to study due to being, arguably, a more transportable, adaptable, and affordable vehicle for implementing playful design principles elsewhere. Figure 3.6 shows the locations and designs of all the Warming Huts installed along the surface of the Trail during the 2016 season, including *Recycling Words*, which features a series of movable red chairs on skis. Not included in Figure 3.6 are the few Warming Huts that were installed off of the Trail at The Forks, such as *Fabrigami*, which was located on The Forks Historic Rail Bridge.

Figure 3.6: Locations of Warming Huts installed along the 2016 Red River Mutual Trail



In addition to the Warming Huts competition, other programming and events take place on or adjacent to the Trail. During the 2016 season, notable events included the *Ironman Outdoor Curling Bonspiel* on the Red River, the *Great Ice Show* at The Forks, the *Post – Gallery* outdoor art display under the Norwood Bridge, and several small events that were part of *Rendez-Vous on Ice*, a satellite program associated with Winnipeg's annual *Festival du Voyageur*.

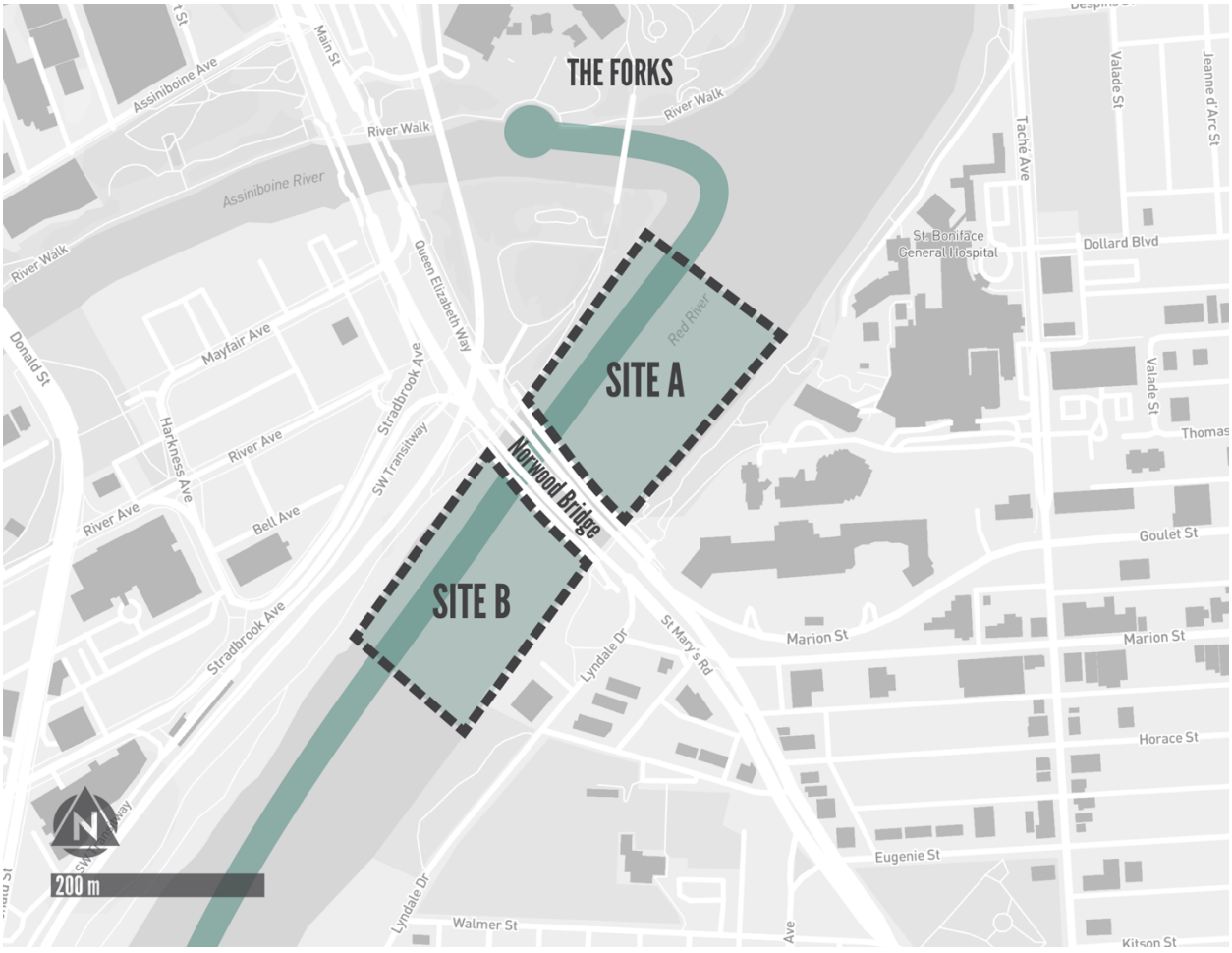
While this practicum's fieldwork included observations of the entire Red River Mutual Trail, it focused on two specific sections of the Trail, herein referred to as 'Site A' and 'Site B', for certain types of observations and data collection, which are described in more detail in

Chapter 5. The two study sites are shown in Figures 3.7 and 3.8 below. The sites are in close proximity to The Forks and comprise 220 m stretches of trail immediately to the north (Site A) and south (Site B) of the Norwood Bridge, as outlined in Figure 3.9. By concentrating observations on these particular sites, fieldwork could be kept more manageable, with the added benefit of providing useful elevated vantage points on the bridge deck that overlooked both areas. This allowed observations and photography to be carried out with clear sightlines over the entire area and the elevated angle proved advantageous for mapping purposes. These sites also provided an opportunity to compare two different scenarios: how users behaved in a stretch of the Trail containing a concentration of Warming Huts (Site A), and how they behaved in a stretch containing no Warming Huts (Site B).

Figure 3.7: Site A study area

Figure 3.8: Site B study area

Figure 3.9: Map of study sites in relation to The Forks



3.2 Land Use

The neighbourhoods surrounding the Red River Mutual Trail are identified as “mature communities” by the City of Winnipeg (2011a), which means they were mostly developed prior to the 1950s, have a grid road network, are well-serviced by public transit, and are characterized by an older housing stock and more “complete” and “finer” mix of land uses (p. 82). These neighbourhoods include The Forks, Central St. Boniface, River-Osborne, Norwood West, Riverview, Glenwood, and Elm Park, as defined by the City of Winnipeg and depicted in Figure 3.10 (City of Winnipeg, 2016).

Figure 3.10: Surrounding neighbourhoods

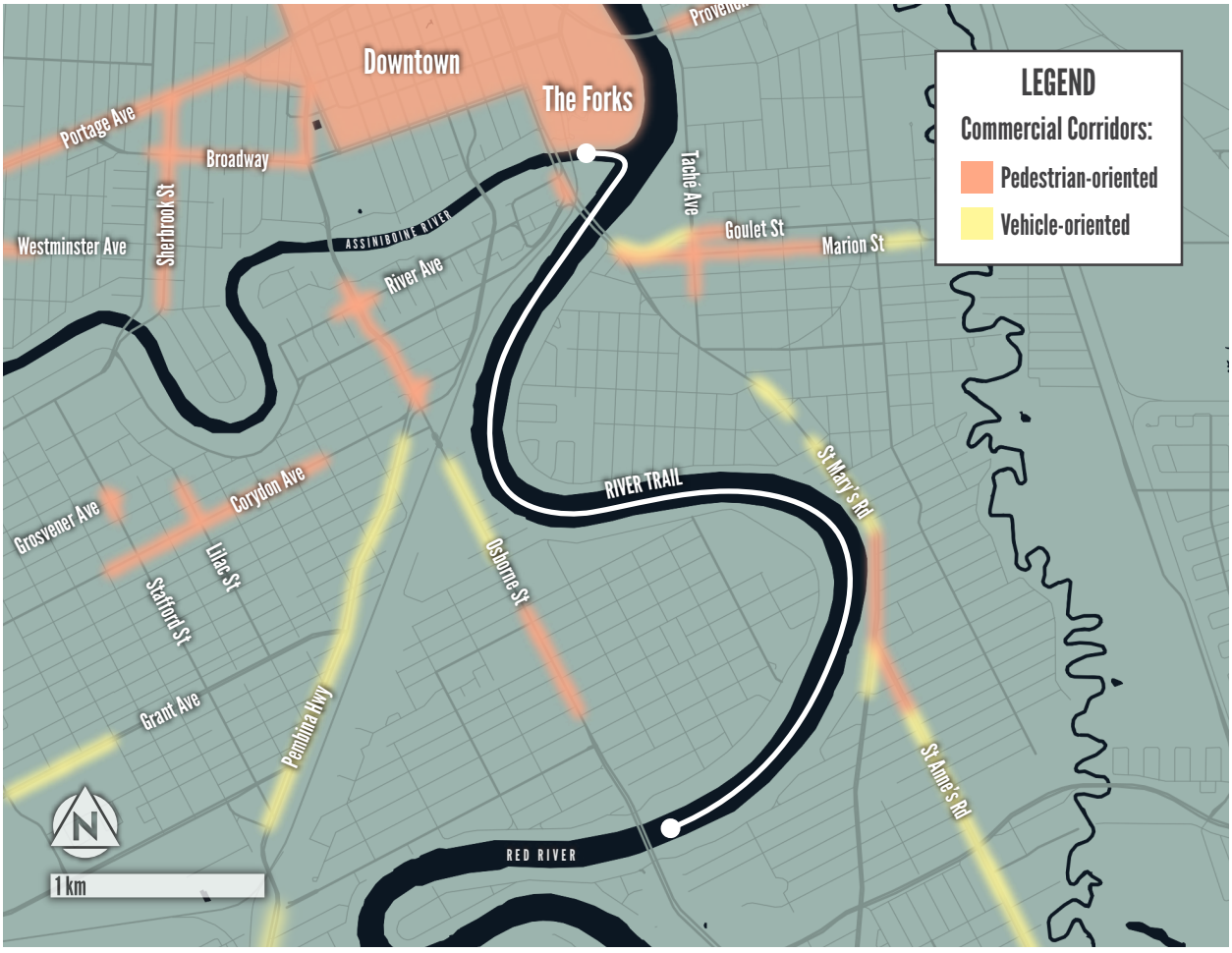
The Forks is a unique neighbourhood within Winnipeg as a former industrial site that underwent a period of renewal in the 1980s to become the city's largest commercial, cultural, and entertainment hub. A designated National Historic Site with no residential land uses, The Forks contains the greatest concentration of landmarks and amenities of any neighbourhood surrounding the Trail, including numerous shops and restaurants at The Forks Market, public art installations, an outdoor amphitheatre, the Inn at the Forks hotel, the Canadian Museum for Human Rights, the Manitoba Children's Museum, the Winnipeg Railway Museum, Variety Heritage Adventure Park, Union Station train station, Shaw Park baseball stadium, the Manitoba Theatre for Young People, The Plaza skate park, the architecturally prominent Esplanade Riel

pedestrian bridge to St. Boniface, and ample green space and trails, including the waterfront River Walk pathway.

By contrast, Central St. Boniface, River-Osborne, Norwood West, Riverview, Glenwood, and Elm Park are predominantly residential neighbourhoods with varying degrees of other land uses, including commercial, institutional, and parks. Central St. Boniface and River-Osborne have a greater share of multi-family residential relative to the latter four, which are largely characterized by single-family homes. This is evidenced by their relative population densities, as shown in Table 3.1. However, all neighbourhoods, including the latter four, tend to have a significant share of their multi-family development located along the banks of the Red River.

Aside from The Forks, commercial uses tend to be located away from the Red River along corridors such as Osborne Street, River Avenue, and Marion Street, as shown in Figure 3.11. Notable exceptions include commercial clusters on either side of the Norwood Bridge in Central St. Boniface and River-Osborne, and adjacent to the Red River along St. Mary's Road in Glenwood.

Figure 3.11: Major commercial corridors



Other notable points of interest along the Trail are highlighted in Figure 3.12, and include three bridges, seven parks, two major health centres, and several community facilities, such as the Winnipeg Rowing Club and Riverview Community Centre. A detailed breakdown of generalized land uses along the Trail are shown in Figure 3.13.

Figure 3.12: Points of interest

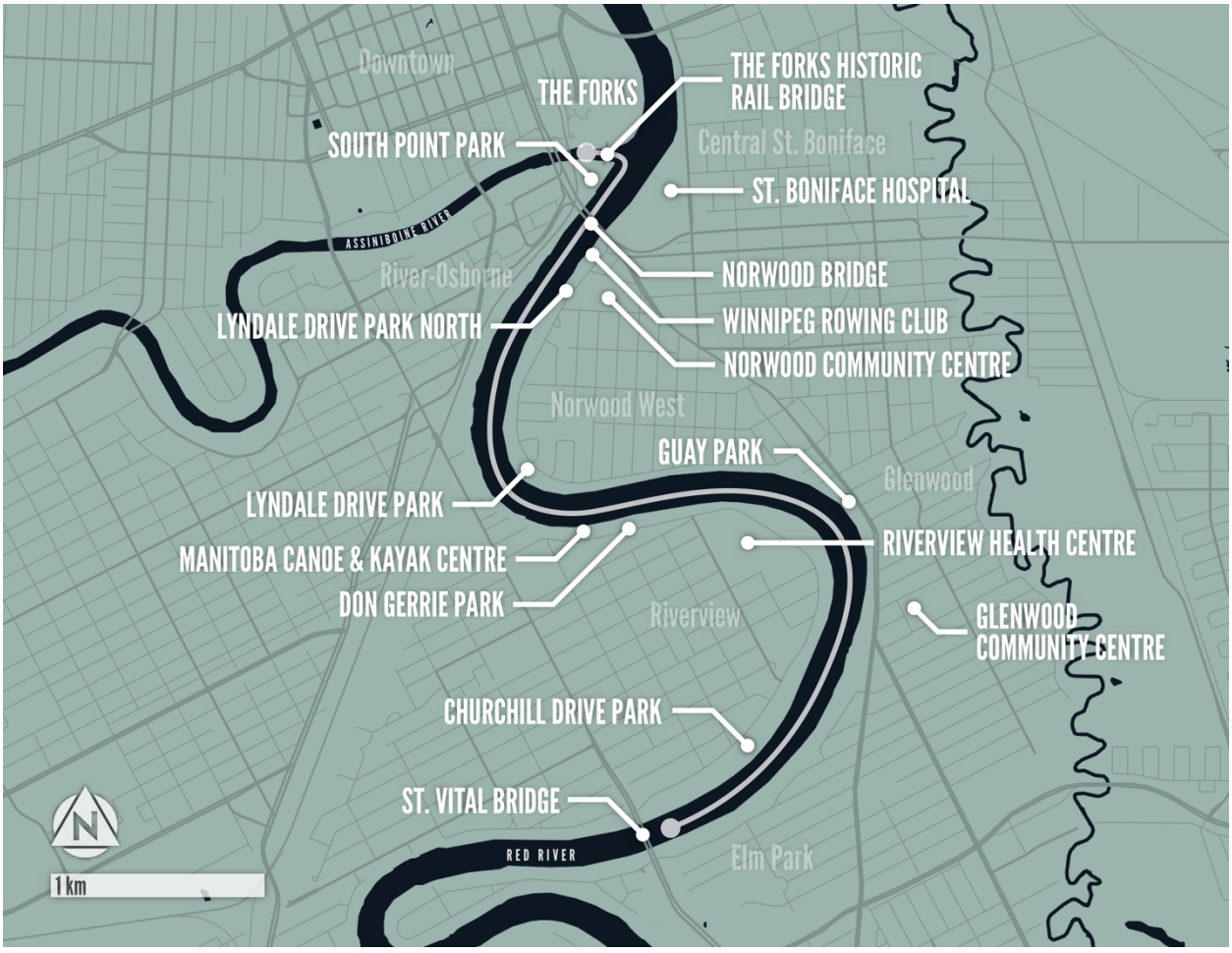
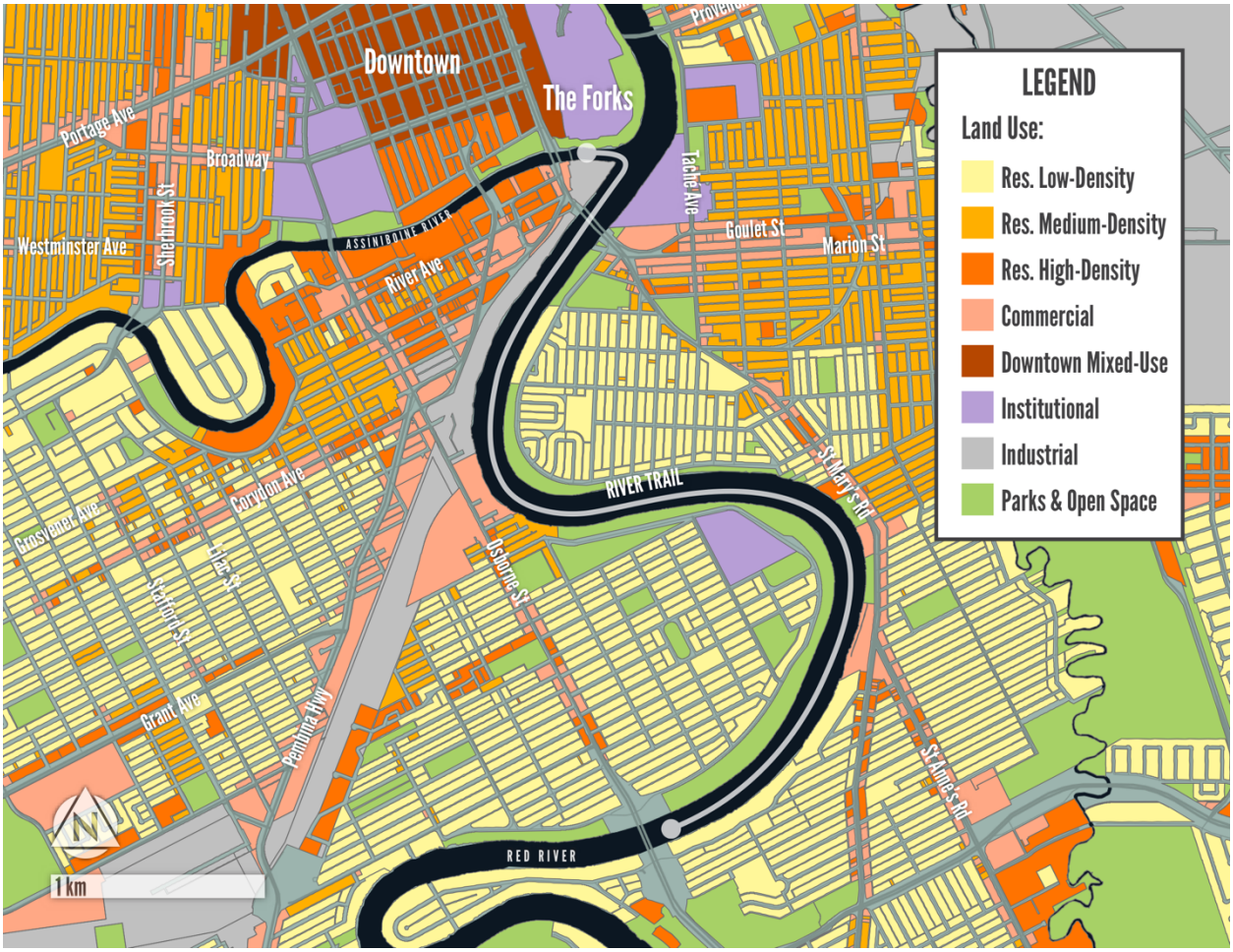


Figure 3.13: Generalized Land Use



3.3 Demographics

Although the City provides a wide range of demographic details at the neighbourhood level, individual neighbourhood data is currently only available for the 2011 Census period. Therefore, the following demographic summary will use 2011 data for the neighbourhoods surrounding the Red River Mutual Trail and for the city as a whole.

Additionally, there is no census data available for The Forks neighbourhood as it does not contain any measureable residential land uses, despite receiving over 4 million visitors annually (The Forks North Portage Partnership, 2016, p. 3). In an attempt to provide a more meaningful comparison, the following summary will use demographics for the broader Downtown

Community Area, which includes The Forks, as defined by the City of Winnipeg ("Community Area Profiles," 2011b).

Population

As of the 2011 Census, which the following analysis uses as the reference year, the City of Winnipeg had a total population of 663,617, up 4.8% from a 2006 population of 633,451 ("Census Profiles," 2011c). The neighbourhoods bordering the Trail composed 3.7% of the city's total population, or 13.8% when including the Downtown Community Area, with a five-year growth rate of 3.3%, or about one-third lower than the city average of 4.8%. Individual neighbourhood population, growth, and density are shown in Table 3.1.

Table 3.1: Population characteristics of surrounding neighbourhoods

Population (2011)				
Neighbourhood	Population	Share	Growth ('06-'11)	Density (people/km^2)
Downtown CA	66,980	10.1%	3.3%	4,103
Central St. Boniface	6,960	1.0%	12.0%	3,532
River-Osborne	4,780	0.7%	-2.0%	5,469
Norwood West	2,920	0.4%	-4.4%	2,191
Riverview	4,645	0.7%	6.8%	1,902
Glenwood	3,660	0.6%	0.3%	2,248
Elm Park	1,685	0.3%	-1.5%	1,810
Total Area	91,630	13.8%	3.3%	3,036
Less Downtown CA	24,650	3.7%	3.3%	2,859
Winnipeg	663,617	100.0%	4.8%	1,397

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

Age

As shown in Table 3.2, age structure varied considerably from one neighbourhood to the next, with some having a high proportion of seniors, such as Central St. Boniface and Riverview, with nearly one-third and one-fifth of their respective populations being over the age of 65, and others having a high proportion of young adults, such as the Downtown Community Area and Glenwood with over one-quarter of their populations being aged 20 to 34. Even more notable is

River-Osborne where nearly half of the population was aged 20 to 34 in 2011. Overall, the surrounding neighbourhoods had fewer children and more working-age adults than the city average. The surrounding neighbourhoods also had a higher than average proportion of seniors than the rest of the city; however, when including the Downtown Community Area the proportion of seniors decreases to be less than the city average.

Table 3.2: Age characteristics of surrounding neighbourhoods

Age (2011)				
Neighbourhood	Under 15	15-65	20-34	65+
Downtown CA	16.4%	72.5%	27.3%	11.1%
Central St. Boniface	9.9%	60.4%	22.1%	29.7%
River-Osborne	10.0%	81.1%	48.2%	8.9%
Norwood West	15.5%	75.3%	21.0%	9.3%
Riverview	13.9%	67.2%	19.8%	18.9%
Glenwood	13.3%	76.3%	27.1%	10.4%
Elm Park	17.7%	73.1%	20.1%	9.3%
Total Area	15.3%	72.0%	27.3%	12.7%
Less Downtown CA	12.4%	70.7%	27.2%	17.0%
Winnipeg	16.9%	68.7%	21.2%	14.4%

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

Immigration

Given that many international immigrants to Canada are from regions that would experience little to no winter weather, a lack of familiarity with winter activities, such as ice skating, may make the Trail less of an attraction for such residents. However, the opposite could also be argued, wherein winter weather and the Trail serve as novelties that draw curious newcomers outdoors. Regardless, as seen in Table 3.3, in the surrounding neighbourhoods, with the exception of the Downtown Community Area, only 7.5% of residents are immigrants, roughly one-third as many as the city-wide figure of 21.7%. Additionally, a significant share of immigrants in these neighbourhoods come from countries that would be more familiar with winter weather and activities, such as the United States, the United Kingdom, the Netherlands,

Poland, and Ukraine. However, immigrants compose a 33.1% share of residents in the Downtown Community Area, with nearly half of these originating from the Philippines.

Table 3.3: Immigration characteristics of surrounding neighbourhoods

Immigration (2011)				
Neighbourhood	Immigrants	Source Country #1	Source Country #2	Source Country #3
Downtown CA	33.1%	Philippines	Vietnam	Portugal
Central St. Boniface	8.7%	Mexico	Vietnam	United States
River-Osborne	9.6%	Philippines	United Kingdom	Poland
Norwood West	4.6%	United Kingdom	United States	Netherlands
Riverview	6.8%	United Kingdom	Philippines	Italy
Glenwood	6.7%	Philippines	Ukraine	Vietnam
Elm Park	5.3%	United Kingdom	Philippines	Other
Total Area	26.2%	Philippines	Vietnam	Portugal
Less Downtown CA	7.5%	United Kingdom	Philippines	Mexico
Winnipeg	21.7%	Philippines	India	United Kingdom

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

Household and Families

The surrounding neighbourhoods, with the exception of Elm Park, had smaller household sizes (2.1 persons per household) than the city average (2.4 persons). This is consistent with other household and family data that shows there are fewer families and fewer children in these neighbourhoods compared to the city as a whole. As shown in Table 3.4, on average, just over 50% of households in the surrounding area contain families, compared to a city-wide figure of 63%, with an average of 1.0 children per household in comparison to a city-wide figure of 1.1 children. The only neighbourhood with a greater than average number of children per household is the Downtown Community Area with 1.2 children. These trends are likely influenced by the increased density and greater number of apartments within Winnipeg's core neighbourhoods, which attract a greater number of renters, retirees, and single individuals, whereas neighbourhoods with more single-family homes tend to attract a greater share of families. This

trend is also observable within the neighbourhoods surrounding the Trail, as there are generally a lower number of families in those with higher population density closest to Downtown.

Table 3.4: Household and family characteristics of surrounding neighbourhoods

Household and Families (2011)				
Neighbourhood	Persons per Household	Non-Family Households	Persons per Family	Children per Family
Downtown CA	2.1	54.8%	2.9	1.2
Central St. Boniface	1.7	63.2%	2.7	0.9
River-Osborne	1.6	72.1%	2.5	0.8
Norwood West	2.3	35.9%	2.9	1.0
Riverview	2.2	39.1%	2.8	1.0
Glenwood	2.1	42.9%	2.7	0.9
Elm Park	2.4	33.8%	2.9	1.1
Total Area (average)	2.1	48.8%	2.8	1.0
Less Downtown CA	2.1	47.8%	2.8	1.0
Winnipeg	2.4	37.1%	2.9	1.1

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

Education and Income

The average level of educational attainment tends to be higher in the neighbourhoods surrounding the Trail than the Winnipeg average. As shown in Table 3.5, the surrounding neighbourhoods have over 33% higher rates of people attaining a bachelor's degree, and nearly 20% higher rates of people attaining a level greater than a bachelor's degree. Norwood West, Riverview, and Elm Park have especially high rates of educational attainment, with over 33% of their total populations having a bachelor's degree or higher. Similarly, these three neighbourhoods also have the highest median household income, and are the only surrounding neighbourhoods higher than the Winnipeg average of $57,925. As household income tends to decrease with increased proximity to the Downtown Community Area, the average median household income for the surrounding neighbourhoods is $55,637, slightly less than the

Winnipeg average. Again, this may be due to the greater number of renters, retirees, and single individuals living in these higher density neighbourhoods.

Table 3.5: Education and income characteristics of surrounding neighbourhoods

Education and Income (2011)				
Neighbourhood	High School Diploma	Bachelor's Degree	Above Bachelor's Degree	Median Household Income
Downtown CA	26.6%	16.3%	7.5%	$36,298
Central St. Boniface	26.1%	14.5%	5.8%	$35,813
River-Osborne	32.9%	18.6%	9.6%	$35,907
Norwood West	30.6%	22.9%	14.7%	$71,224
Riverview	24.3%	23.4%	11.7%	$61,571
Glenwood	26.7%	20.2%	5.7%	$57,268
Elm Park	23.6%	25.5%	8.2%	$72,036
Total Area (average)	27.3%	20.2%	9.0%	$52,874
Less Downtown CA	27.4%	20.9%	9.3%	$55,637
Winnipeg	28.6%	15.0%	7.7%	$57,925

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

Employment and Labour

As per Table 3.6, the average unemployment rate for the area, at 6.1%, is near the Winnipeg average of 5.9%, with Elm Park having the lowest rate, at 4.2%, and the Downtown Community Area having the highest, at 7.9%. Health care and social assistance is the largest labour industry in the area, making up 14.6% of the labour force, slightly higher than the city average of 13.7%. This is greatest in Central St. Boniface, at 19.7%, which is home to one of the city's major hospitals and numerous medical offices. Other industries with notably higher rates of employment in comparison to the Winnipeg average include educational services; construction; professional, scientific, and technical services; and information and cultural industries. Industries with notably lower rates of employment include retail trade, manufacturing, and transportation and warehousing; however, retail trade still remains the third-largest labour industry for the area.

Table 3.6: Employment and labour characteristics of surrounding neighbourhoods

Employment and Labour (2011)				
Neighbourhood	Unemployment Rate	Industry #1	Industry #2	Industry #3
Downtown CA	7.9%	Health & social	Manufacturing	Retail
Central St. Boniface	5.5%	Health & social	Public admin.	Retail
River-Osborne	8.0%	Health & social	Accom. & food	Retail
Norwood West	5.8%	Health & social	Education	Accom. & food
Riverview	6.2%	Health & social	Education	Retail
Glenwood	5.2%	Health & social	Public admin.	Construction
Elm Park	4.2%	Education	Retail	Health & social
Total Area (average)	6.1%	Health & social	Education	Retail
Less Downtown CA	5.8%	Health & social	Education	Retail
Winnipeg	5.9%	Health & social	Retail	Manufacturing

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

Transportation

As shown in Table 3.7, transportation use in the surrounding area is predominantly automobile-oriented, with an average of 64.3% of surrounding residents using a car for commuting purposes, either as a driver or passenger. However, this is significantly lower than the Winnipeg average of 76.4%. Conversely, active forms of transportation, including walking and cycling, are over twice as popular, with 16.1% of residents in the surrounding area using these modes of transportation in comparison to a city average of 7.6%. Amongst the surrounding neighbourhoods, car use generally decreases with greater proximity to Downtown.

Table 3.7: Transportation mode share of surrounding neighbourhoods

Transportation Mode (2011)					
Neighbourhood	Private Vehicle	Public Transit	Walked	Bicycle	Other
Downtown CA	52.7%	24.6%	15.7%	5.7%	1.5%
Central St. Boniface	57.0%	16.2%	19.6%	4.3%	3.1%
River-Osborne	47.4%	25.9%	17.3%	7.1%	2.4%
Norwood West	72.9%	12.9%	7.4%	4.3%	2.5%
Riverview	70.1%	14.6%	9.0%	5.5%	0.9%
Glenwood	74.5%	15.1%	4.5%	2.6%	3.2%
Elm Park	75.4%	14.7%	7.9%	2.1%	0.0%
Total Area (average)	64.3%	17.7%	11.6%	4.5%	1.9%
Less Downtown CA	66.2%	16.6%	11.0%	4.3%	2.0%
Winnipeg	76.4%	14.6%	5.5%	2.1%	1.4%

Source: City of Winnipeg – 2011 Census ("Neighbourhood Profiles," 2011d)

3.4 Stakeholders

The organization with the largest role in planning and managing operations at The Forks, including the Red River Mutual Trail, is The Forks Renewal Corporation, which is a subsidiary of the North Portage Development Corporation and is equally owned by the Federal Government of Canada, the Province of Manitoba, and the City of Winnipeg (The Forks, "Partnership," 2017). The joint operations of the two corporations form The Forks North Portage Partnership. The City of Winnipeg is also responsible for the planning and regulation of land use in the areas surrounding the Trail.

Major funding providers for the Trail include the Province of Manitoba and the Red River Mutual insurance company, which has been the Trail's title sponsor since the 2013-2014 season (Red River Mutual, "Proud to Announce," 2013). A number of other organizations are involved in the annual Warming Huts design competition, with their members regularly representing event organizers, judges, and participants, including the University of Manitoba and local architecture and design firms.

There are also several organizations with a vested interest in the surrounding area that could play a greater role in supporting Trail use. These include a number of residents' associations, such as the Downtown Neighbourhood Association, Old St. Boniface Residents' Association, South St. Boniface Residents' Association, and South Osborne Residents' Group, and several business improvement zones (BIZs), including Downtown Winnipeg, Provencher, Osborne Village, Norwood Grove, South Osborne, and Old St. Vital. Through improved cooperation and partnership with the City of Winnipeg and The Forks Renewal Corporation these organizations could leverage the popularity of the Trail, such as through related events and promotions, to generate greater community participation and vibrancy in their respective neighbourhoods. By playing a greater role in planning, decision making, and programming for the Trail, these organizations could initiate improvements for the betterment of all Trail users in addition to their area residents and businesses.

3.5 Planning Context

Many planning documents are used to influence the form and potential impacts of growth and development in the City of Winnipeg, and there are several that include goals, policies, strategies, regulations, and/or recommendations that may inform future decision making and initiatives for the Trail.

OurWinnipeg, the City of Winnipeg's (2011e) overarching policy document for guiding land use and development, declares, "Winnipeg is a prairie city, a winter city, a sunshine city and a river city" (p. 6). Despite highlighting these winter and river city qualities, *OurWinnipeg* does not contain any policies regarding winter, rivers, or the Trail, and refers to rivers as "natural community boundaries," which may serve as a mental barrier to initiatives seeking to enhance community connectivity with the city's rivers (City of Winnipeg, 2011e, p. 96). However, there is a "direction" under the Environment section that encourages the City to "promote the use of

rivers and riverbanks" and that points to *A Sustainable Winnipeg*, a companion document to *OurWinnipeg*, regarding further direction on this topic (2011e, p. 68). Additionally, *OurWinnipeg*, makes numerous references to making Winnipeg a community where people can "live, work, and play," but only contains one direction under the Recreation section that explicitly addresses play, encouraging the City to "create play areas that embrace inclusion by ensuring surfaces and structures are designed with everyone in mind" (2011e, p. 58). However, this reads more as an accessibility strategy for recreational areas than one about playful principles.

There are three "enabling strategies" contained within *A Sustainable Winnipeg* relevant to use of the city's rivers, which include:

- Develop a city-wide natural network connecting neighbourhoods, communities and the river system, providing ecological, recreational and transport benefits.
- Facilitate public access to rivers and riverbank lands.
- Encourage the use of Winnipeg rivers for transportation and recreation through the provision of boat launches, docks and other accessibility improvements. (City of Winnipeg, 2011f, pp. 38-40)

These strategies promote greater use, access, and connectivity between the city's river system and surrounding neighbourhoods, which support the types of land uses and initiatives currently seen along the Trail.

Complete Communities, another companion document to *OurWinnipeg*, devotes an introductory page to explain how Winnipeg's cold weather climate is not a barrier to making "complete" communities, which are compact communities with work places and amenities in close proximity to homes that support active transportation and increased opportunities for social interaction and community participation (City of Winnipeg, 2011a, p. 5). Despite this, there are no specific policies or strategies regarding winter. However, under the directions regarding Downtown, there is an enabling strategy to "ensure that the river system continues to be incorporated in connectivity options within, to and from Downtown year round" (City of

Winnipeg, 2011a, p.31). There is no language to support this enabling strategy in the City of Winnipeg's *Sustainable Transportation* (2011g) companion document or the *Transportation Master Plan* (2011h).

The *Winnipeg Zoning Bylaw No. 200/2006* (City of Winnipeg, 2008) is the principle document for regulating land use in the city. While the majority of regulations contained within the bylaw refer to uses unrelated to the Trail, it does contain a Parks and Recreation (PR1) zone, which "typically occur[s] in a residential neighbourhood or riverbank context" (City of Winnipeg, 2008, p. 48). There are no regulations specific to the Trail, but the PR1 zone permits uses supportive of pedestrian activity along river corridors, including recreation, transportation, and cultural facilities, such as playgrounds, boat docks, public plazas, galleries, museums, and special events, although certain conditions apply to some of these uses (City of Winnipeg, 2008, pp. 66-79). Similarly, the *Downtown Zoning Bylaw No.100/2004*, which specifically regulates land use in Winnipeg's Downtown, contains a Riverbank Sector zone that covers a majority of Downtown's waterfront lands and permits the same uses as the PR1 zone, but also permits restaurants as an accessory use (City of Winnipeg, 2004). The Riverbank Sector zone is intended "primarily for the use and enjoyment of the public" and encourages uses "supportive of and accessory to a continuous linear parkway and public gathering nodes" (City of Winnipeg, 2004, p. 69). The *Downtown Zoning Bylaw No.100/2004* also requires all "development proposed within public rights-of-way and rivers [to] be subject to urban design review" to ensure a high-quality built form (City of Winnipeg, 2004, p. 3).

Dozens of neighbourhood-level planning documents have been produced for the city, including three plans for neighbourhoods in close proximity to the Trail. These include the City of Winnipeg's *Corydon-Osborne Neighbourhood Plan* (2014), the *Osborne Village Neighbourhood Plan* (2006), and the *North St. Boniface Secondary Plan* (1975). All three have

policies regarding enhancing river access and use, such as the *Corydon-Osborne Neighbourhood Plan*, which states "the community should offer frequent access to the Assiniboine and Red Rivers both physically and visually through riverfront trails, protection of riverfront views and linking pedestrian routes and parks to the riverfront" (City of Winnipeg, 2014, p. 28). However, only the *Osborne Village Neighbourhood Plan* has policies specifically related to the Trail and seasonal use. These include policies to "provide additional facilities for winter use of the rivers, such as ski and skating trails, open ice skating areas, warming huts, and benches" and to "provide safe seasonal access to the rivers at existing and future access points" (City of Winnipeg, 2006, p. 30).

The document that best addresses the Trail is *Go… to the Waterfront* (2015), a planning study by The Forks North Portage Partnership and the City of Winnipeg focused on the Downtown waterfront. The study suggests a number of potential initiatives that could enhance use and activity along the Trail, including specific winter path alignments and shoreline access points, opportunities for mixed-use waterfront infill development, and various enhancement projects for riverfront public spaces. Additionally, the study provides numerous maps and conceptual renderings that showcase its 20-year vision for the area.

3.6 Summary

This chapter introduced the study area, the specific research sites, and additional context on land use, demographics, stakeholders, and planning policy. The Red River Mutual Trail was selected for study due to its large scale, pedestrian-oriented winter-specific uses, abundance of playful design interventions, and urban setting. The surrounding land uses and demographics suggest there is a diversity of ages, ethnicities, household compositions, socio-economic conditions, and services in the area, and the proximity of the Trail to the core of the city, with its higher population densities, is more conducive to alternative forms of transportation to single-

occupancy vehicles. Future planning for the Trail will have to consider a broad range of user groups, acknowledge its unique potential as an active transportation corridor, explore ways of enhancing connectivity with the surrounding neighbourhoods, and anticipate ongoing demographic shifts. A review of the key stakeholders and the planning context suggests more integrated land use planning and formal partnerships could provide opportunities for area stakeholders, and the city as a whole, to derive greater mutual benefit from this unique asset. The conditions outlined in this chapter will be taken into consideration with the analysis detailed in the following chapters to produce the final recommendations in Chapter 7.

3.7 Key Considerations

- The Red River Mutual Trail is seasonal, existing only as long as the river is sufficiently frozen.
- Trail operation dates, routing, and length can change from one year to the next depending on weather and ice conditions; this practicum focuses on the 2016 iteration.
- The Trail is anchored by The Forks, Winnipeg's premiere commercial, cultural, and entertainment hub.
- With an ice sheet and manicured path of compacted snow, the Trail allows for multiple forms of transportation, including ice skating, walking, cycling, sledding, and skiing.
- The Trail is one of the largest outdoor public spaces in an urban setting specifically established for pedestrian-oriented winter use in the world.
- There are several prominent access points along the 6 km Trail, but signs of access from countless other locations along its length, including from private residences.
- Warming Huts are only installed on the northern half of the Trail, with the greatest concentration located near The Forks.

- Most of the Trail is surrounded by low-density residential land uses and park space.
- There are no residential uses at The Forks.
- The Trail runs near to a number of major employment areas, including Downtown, The Forks, St. Boniface Hospital, Riverview Health Centre, and the St. Mary's Road Business Improvement Zone.
- The Trail runs near a number of schools, community centres, and other community amenities.
- Surrounding neighbourhood density increases with proximity to The Forks and Downtown.
- There are fewer families and fewer children living in the surrounding neighbourhoods than the city average.
- The surrounding neighbourhoods include areas with a high share of seniors and a high share of young adults.
- Active transportation rates are, on average, twice as high in the surrounding neighbourhoods than the city average.
- There are a number of stakeholder groups in the surrounding area that could derive greater benefit for themselves and their neighbourhoods from a stronger formal partnership with Trail organizers.
- The Trail is not referenced in the City of Winnipeg's official plan, *OurWinnipeg*, or any major transportation planning documents, but is addressed in one Downtown waterfront planning study, *Go… to the Waterfront*.
- None of the City of Winnipeg's planning documents reference playful principles or playful design.

CHAPTER 4 | PEDESTRIAN COUNT ANALYSIS

This chapter introduces the first research method: statistical analysis of pedestrian count data from three sites distributed along the full length of the Red River Mutual Trail. More specifically, this analysis makes use of descriptive statistics, linear regression, and chi-square tests to uncover trends in pedestrian counts collected from February to March of 2016. The following section provides a more comprehensive description of the method with support from academic sources. Subsequently, a detailed analysis of the pedestrian count data is provided along with the resulting findings. Reflections on and potential implications of these findings are also included and help identify key considerations that inform final recommendations and reflections at the end of this paper.

Given this practicum explores the success of playful design interventions in generating pedestrian activity, analyzing overall pedestrian traffic patterns along the Trail can provide valuable insight into broader pedestrian tendencies and contribute a greater understanding of influencing factors. Exploring such high-level trends gives additional context to public space use in winter cities, can help to differentiate external factors from more site-specific influences, and inform potential strategies for generating greater pedestrian activity.

4.1 Methods

The pedestrian count data used for this analysis is secondary data provided by The Forks Renewal Corporation, the organization responsible for managing The Forks, including the operation and maintenance of the Red River Mutual Trail. The winter of 2015-16 was the first time the Corporation used pedestrian counters to collect traffic data along the Trail. They used electronic counters supplied by Eco-Counter, which recorded and fed traffic data to their online analysis software platform, Eco-Visio (2016), for every quarter hour interval throughout the day.

After a representative of the Corporation provided access to their online platform, I was able to download the raw data for more detailed analysis.

Statistical analysis in the form of descriptive statistics, linear regression, and chi-square tests was the primary method for analyzing the raw pedestrian count data. Statistical analysis software, Wizard (Version 1.9.7; Miller, 2016), was used to carry out linear regression and chi-square tests to calculate p-values, a measure of statistical significance. A 95% confidence level was used for all statistical tests for significance.

Descriptive statistics were used to reveal broad trends between traffic volume and both spatial and temporal variables, such as day of the week and time of day. As defined by Peatman (1947), descriptive statistics are "the organization and summarization of collections of numerical data, including data arrived at by the simple method of enumerating instances" and include "the reduction of groups or masses of data by means of tables, graphs, and numerical measures such as percentages... [and] averages" (p. 13).

Linear regression was used to determine whether there was any relationship between certain meteorological observations and pedestrian traffic volume, as it is a method best used for determining correlation between two numerical variables. The meteorological variables analyzed through linear regression included temperature, wind speed, wind chill, and visibility. Peatman (1947) describes linear regression as a method to "denote the degree of correlation" between two variables represented by a "bivariate distribution" (e.g., a scatter plot) using a "regression line," or line of best fit, to "describe the nature of the relationship" (p. 209).

Chi-square tests were used to compare pedestrian count observations with categorical meteorological data, which encompassed non-numerical weather data, such as if conditions were cloudy, clear, or snowing. Peatman (1947) suggests chi-square tests are "a statistical method for

the testing of hypotheses concerning distributions of frequencies," and are especially useful for frequencies of "categories or classes" (p. 424).

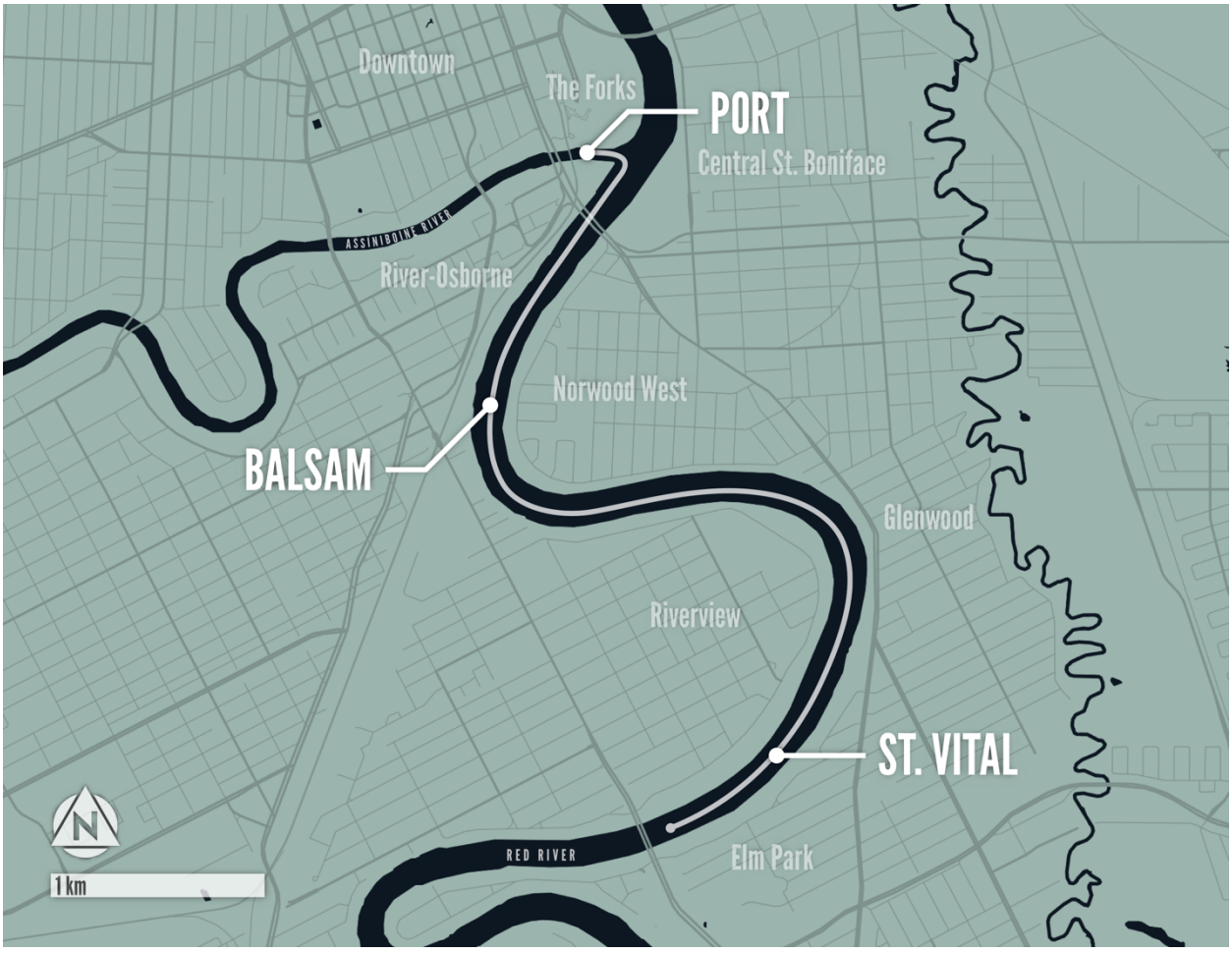
Overall, statistical analysis proved to be a valuable means of determining relationships and trends between pedestrian traffic flow and the broad environmental factors described above.

4.2 Analysis and Findings

Figure 4.1: Eco-Counter pedestrian counter

For this first year of recording pedestrian traffic, The Forks Renewal Corporation installed automated pedestrian counters at three points along the full length of the Trail. One was installed at The Forks Historic Port on a set of temporary steps serving as the main pedestrian connection between The Forks Market and the frozen river surface, which constituted the northern terminus of the Trail. The second was placed along a section of the Red River due east of Winnipeg's landmark "Confusion Corner" intersection and west from the foot of Balsam Place in the Norwood West neighbourhood, approximately one-third of the Trail's length from the northern terminus. The third counter was installed towards the St. Vital Bridge at the southern terminus of the Trail, approximately aligned with the foot of Mabel Street in the Riverview neighbourhood. For the purpose of this analysis, the three will be referred to as the Port, Balsam, and St. Vital counters, respectively. Figure 4.2 depicts the relative locations of the counters along the Trail, and Figure 4.1 shows the counter equipment used at the Balsam location. Figures 4.3, 4.4, and 4.5 provide a visual account of the conditions at each installation site.

Figure 4.2: Pedestrian counter locations



The counters began operation on Tuesday, February 2, 2016, and continued collecting data beyond the Trail's official closing on Sunday, March 6, 2016. The data used for the following analysis covers the four-week period from Friday, February 5, to Thursday, March 3. This period was chosen in order to exclude the first few days of operation, which had inconsistencies and gaps in the data, as well as the last few days before the Trail's official close, as removal of the Warming Huts began the afternoon of March 3. These four weeks also coincide with the period when fieldwork and site observations were carried out.

Figure 4.3: Port pedestrian counter site

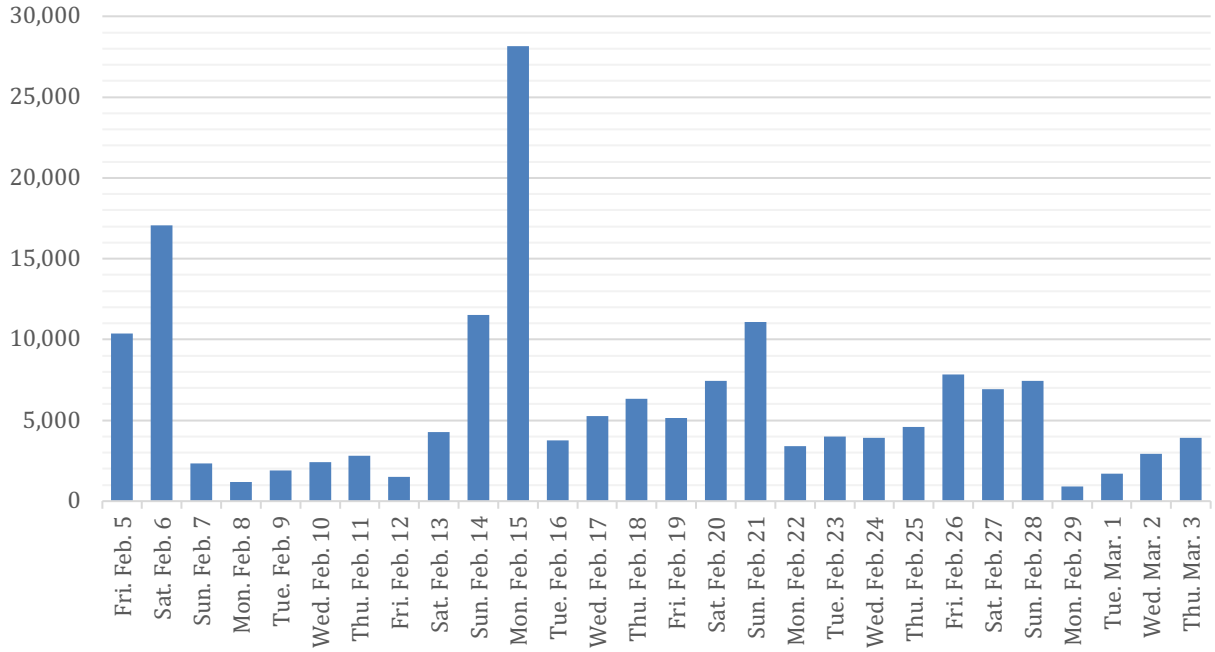
Figure 4.4: Balsam pedestrian counter site

Figure 4.5: St. Vital pedestrian counter site

High-Level Trends

Combining the data collected at all three counter locations, pedestrian traffic counts totaled 170,154 over the four-week study period, with a daily average of 6,077, hourly average of 253, and per minute average of 4.2. Figure 4.6 charts the daily totals for the study period.

Figure 4.6: Total daily pedestrian counts



The busiest week over the study period was the seven days from Sunday, February 14, to Saturday February 20, which included the busiest Sunday, Monday, Wednesday, and Thursday recorded over the study period. Monday, February 15, was Louis Riel Day, a statutory holiday, and was the busiest single day observed on the Trail with 28,138 pedestrian counts, compared to 8,508 for the average non-holiday weekend day. This single day accounted for 16.5% of total recorded traffic over the four-week study period.

Including the long weekend holiday, average daily weekend traffic for the study period was 10,689 and daily weekday traffic was 3,892. As shown in Figure 4.7, the busiest day of the week was typically Saturday, followed by Sunday, Friday, Thursday, Wednesday, Tuesday, and Monday. However, as shown in Figure 4.8, this ranking was slightly different for the Balsam and St. Vital locations.

Figure 4.7: Average daily traffic (excluding holiday Monday)

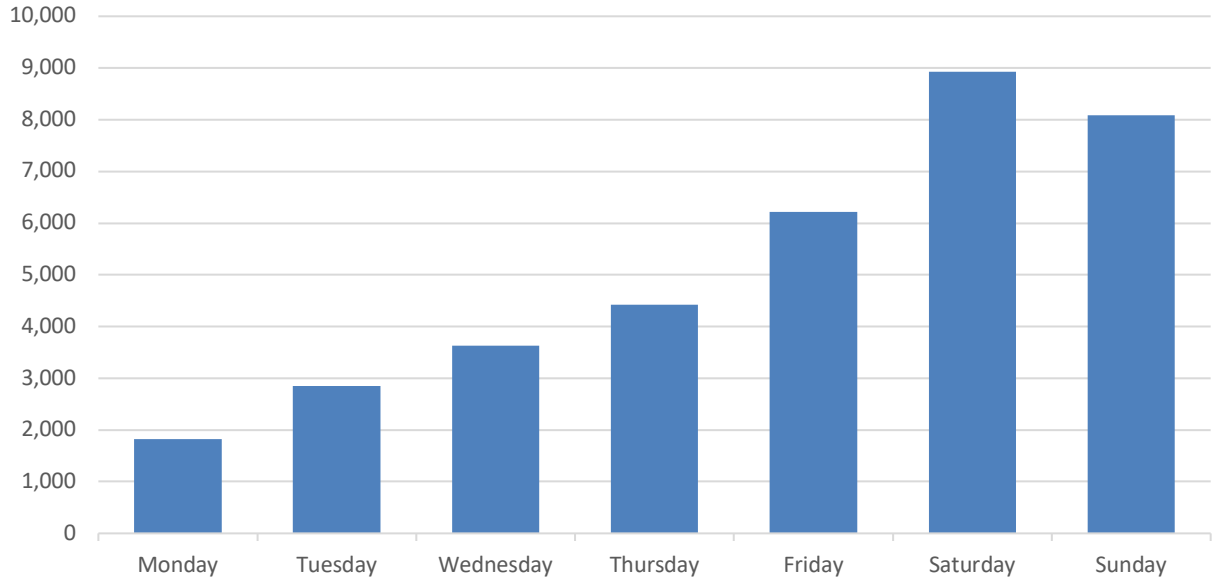
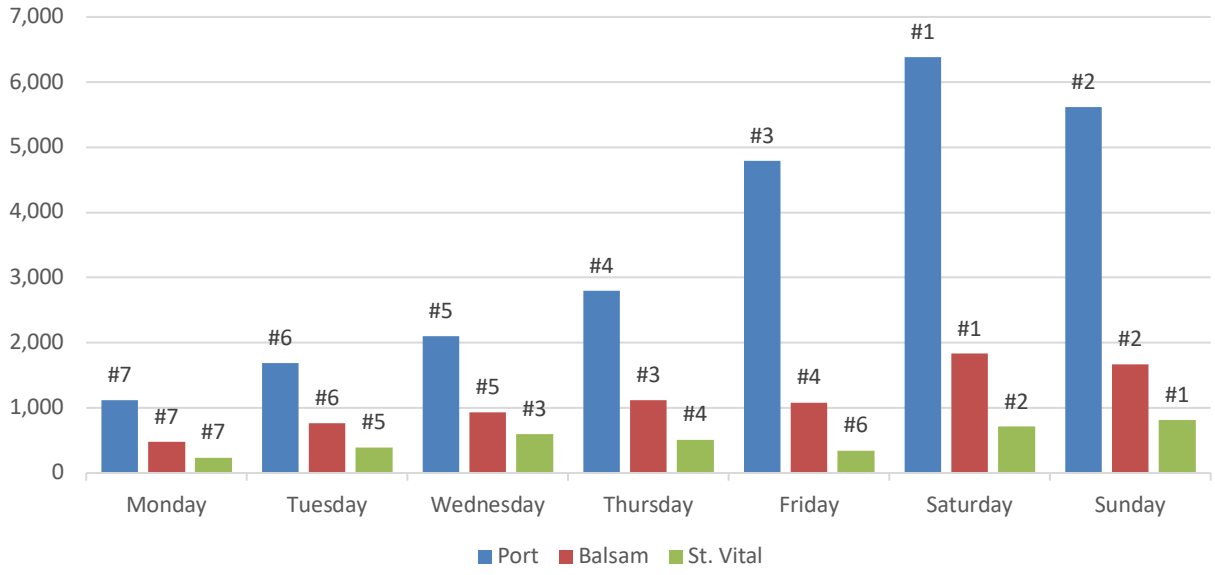
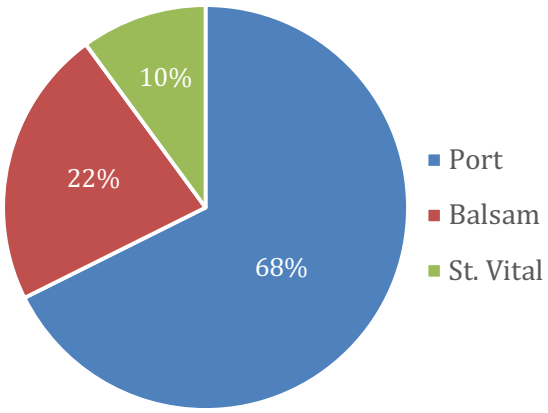


Figure 4.8: Average daily traffic by site (excluding holiday Monday)



Spatial Trends

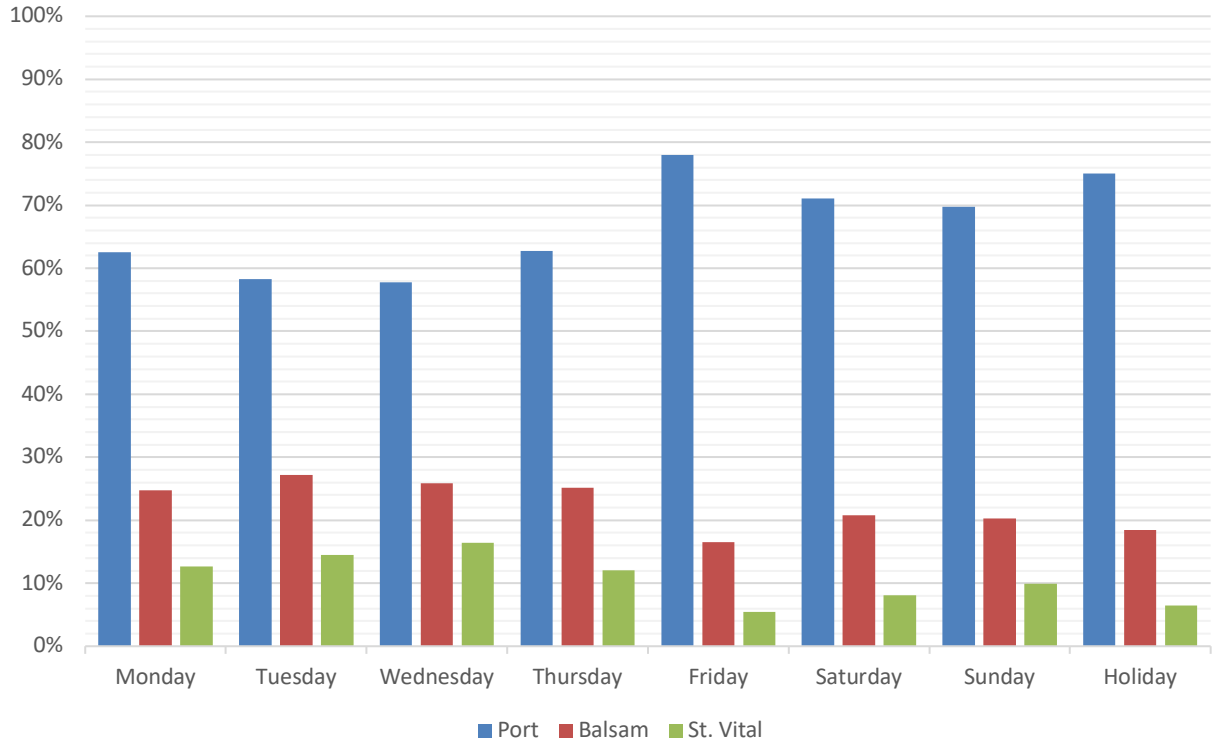
Figure 4.9: Total traffic share by site



With three locations recording pedestrian traffic along the Trail, additional spatial trends are readily apparent in the data. The clearest trend is the significantly different traffic volumes recorded at each site over the course of the study period. The Port, registering nearly triple the traffic counted at the next highest site, recorded a total of 115,082, followed by Balsam with 37,923, and St. Vital with 17,149. The total traffic share for each site over the study period is shown in Figure 4.9.

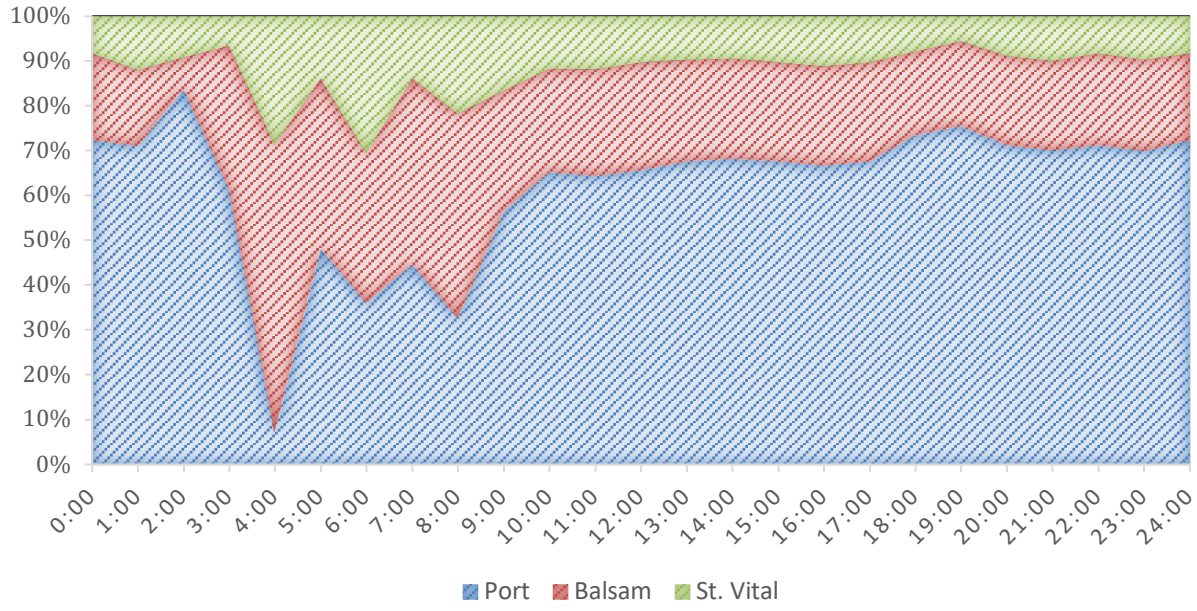
Similarly, there were also differences in *proportional* traffic volume between the three sites depending on the day of the week. Traffic at the Port was proportionally highest on Fridays, followed by Saturdays and Sundays, with the lowest proportion of traffic observed on Tuesdays and Wednesdays. Inversely, St. Vital traffic was proportionally highest on Wednesdays, followed closely by Tuesdays, and lowest on Fridays and Saturdays. The Balsam location was proportionally highest on Tuesdays, followed by Wednesdays, and lowest on Fridays and Sundays. Figure 4.10 shows the average daily proportional share of traffic recorded at each site over the study period.

Figure 4.10: Average daily proportional share of traffic by site



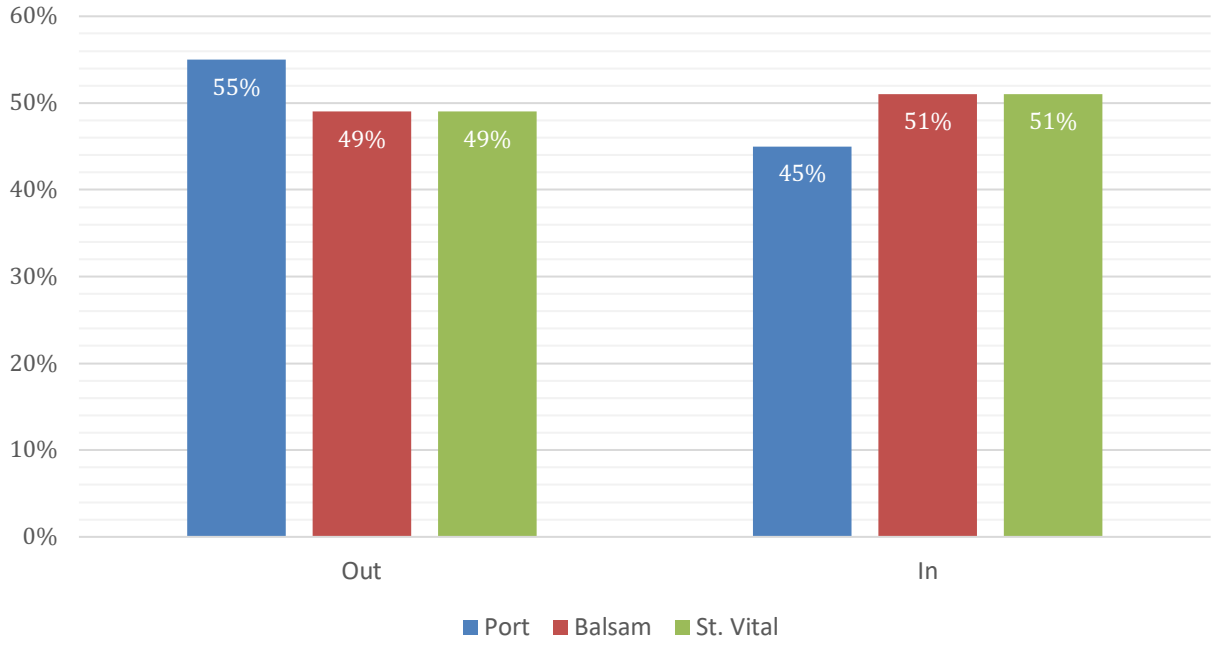
Additional differences between the three sites could be observed depending on the time of day. Typically, the least busy period of the day, 4:00 am to 5:00 am, saw the lowest traffic for all three sites and was relatively balanced between them. From 5:00 am to 9:00 am, overall traffic increased and the Balsam and St. Vital locations saw their largest proportional shares of the day, about 40% and 20% of overall traffic, respectively, with Balsam accounting for 45.7% of total Trail traffic from 8:00 am to 9:00 am. By 10:00 am, the Port's share increased to approximately two-thirds of total Trail traffic, with a peak of 75% between 5:00 pm to 8:00 pm. The Port's share of traffic remained at or above 70% for the remainder of the evening, peaking at 84% between 2:00 am and 3:00 am. Figure 4.11 shows the hourly proportional share of traffic recorded at each site over the course of an average day. These broad trends were generally consistent regardless of the day of the week.

Figure 4.11: Average hourly proportional share of traffic by site



Pedestrian counts were also collected in two directions: 'in' for people moving north towards The Forks, and 'out' for people moving south, or away from The Forks. Analysis of this data shows the two directions of travel are generally balanced at the Balsam and St. Vital locations, with 51% of recorded trail users travelling towards The Forks and 49% away from The Forks at both sites. In contrast, data collected at the Port showed significantly more users were counted heading away from The Forks than coming in, with 55% of traffic heading 'out' and 45% heading 'in'. See Figure 4.12 for a summary of directional trends over the four-week study period.

Figure 4.12: Proportion of 'in' and 'out' counts at each site



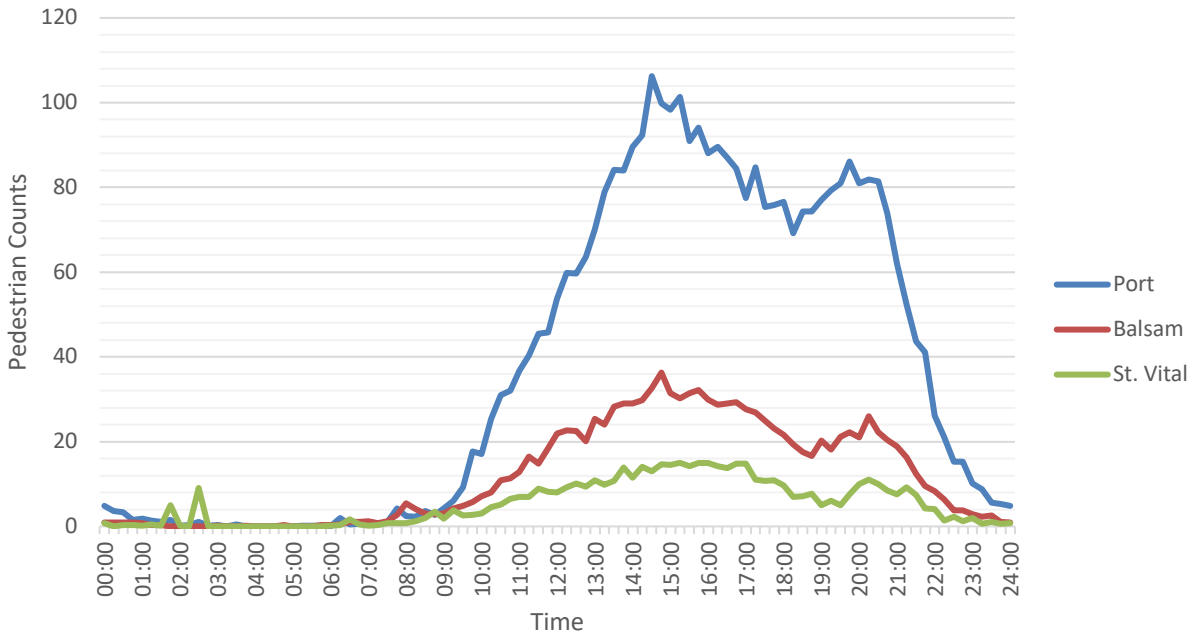
For the remaining analysis, the overall totals for each site, containing both 'in' and 'out' counts, are used to extrapolate broader trends in Trail user traffic.

Temporal Trends

Despite the significant difference in overall pedestrian volume at the three counter locations, user patterns for each show a strong positive correlation with one another as the timing of daily peaks and lulls in traffic are generally consistent across all three sites throughout any given day. In other words, external factors, such as time of day, had similar influences on users across all three locations. Figure 4.13 shows how the average daily traffic pattern for the three locations generally mirror one another, despite their differences in total user volume. For all three sites, average daily traffic typically peaked between 2:30 pm and 2:45 pm, with a lower secondary evening peak between 7:45 pm and 8:15 pm. A relative lull would occur around 6:30 pm, between the afternoon and evening peaks. Regular traffic, a count of at least one person per 15-minute interval, would typically start at 6:15 am in the morning and end around 1:45 am.

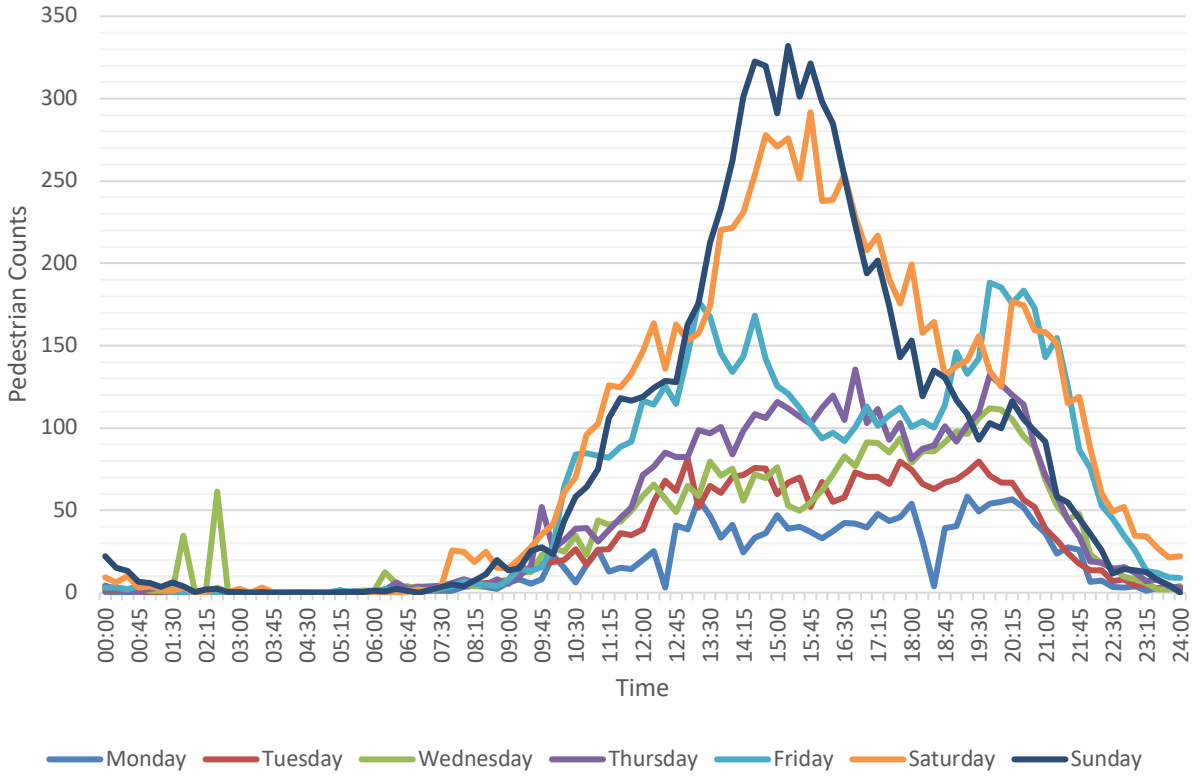
Sunrise and sunset times, which fell between 7:00 am to 8:00 am and 5:30 pm to 6:15 pm, respectively, had no direct impact on user traffic over the study period, except that hours with daylight typically saw about twice as much traffic as hours with darkness.

Figure 4.13: Average daily traffic count per 15-minute interval (excluding holiday Monday)



Excluding holidays, the four most popular times of the week, in order, were Sunday afternoons, Saturday afternoons, Friday evenings, and Saturday evenings. As shown in Figure 4.14, evening traffic was busiest on Fridays, followed by Saturdays, Thursdays, Sundays, Wednesdays, Tuesdays, and Mondays.

Figure 4.14: Average daily traffic by day of week (excluding holiday Monday)



Looking at the data in more detail, unique traffic patterns emerge for each day of the week:

<u>Mondays</u>

Start of Regular Traffic: 5:45 am | End of Regular Traffic: 12:45 am [Tuesday Morning]

Afternoon Peak: 1:15 pm | Evening Peak: 7:15 - 8:15 pm

Not including the February 15 holiday, a typical Monday saw the least pedestrian traffic of any day of the week, with an average total daily count of 1,827. Regular morning traffic started around 5:45 am with a more significant increase beginning around 10:00 am. Mondays, unlike most other days of the week, had relatively consistent levels of traffic throughout the day, with only minor peaks and lulls. Between 12:00 pm and 9:45 pm traffic fluctuated within 20 to 58 pedestrian counts per 15-minute interval, or 1.9 to 3.4 per minute, with peaks of 57 to 58 pedestrians occurring at 1:15 pm, 7:15 pm, and 8:15 pm. The lowest point in traffic between the

afternoon and evening peaks occurred at 6:15 pm. Mondays had one of the shortest periods of late-night traffic, with regular pedestrian counts ending after 12:45 am on the following Tuesday mornings.

Tuesdays

Start of Regular Traffic: 6:15 am | End of Regular Traffic: 2:00 am [Wednesday Morning]

Afternoon Peak: 1:00 pm / 5:45 pm | Evening Peak: 7:30 pm

Tuesdays saw the second-least pedestrian traffic of any day of the week, with an average count of 2,849, or 56% higher than Monday traffic. Similar to Mondays, Tuesdays had generally consistent, but low, traffic throughout the day, with no significant peaks or lulls. Regular morning traffic started around 6:15 am, increasing more substantially around 9:15 am, and ended by 2:00 am the following Wednesday morning with peaks of 80 to 81 pedestrians occurring at 1:00 pm, 5:45 pm, and 7:30 pm. The lowest point in traffic between the afternoon and evening peaks occurred at 6:30 pm.

Wednesdays

Start of Regular Traffic: 5:45 am | End of Regular Traffic: 1:45 am [Thursday Morning]

Afternoon Peak: 1:30 pm | Evening Peak: 7:45 pm

Wednesdays had a similar traffic pattern as Tuesdays, but saw 42% higher volume from 4:15 pm to 11:15 pm, with a more prominent evening peak period. Wednesdays saw an early afternoon peak of 80 pedestrians at 1:30 pm, a late afternoon peak of 94 at 5:45 pm, and an evening peak of 112 at 7:45 pm. A slight lull occurred between the late-afternoon and evening peaks at 6:00 pm. Overall, Wednesdays saw 27% greater traffic than Tuesdays, with an average daily total count of 3,631. In Figure 4.14, two spikes in traffic are visible at 1:45 am and 2:30 am. These spikes correspond to a rare occurrence in the early morning of February 17 where traffic at the St. Vital site dramatically increased to 134 and 242 pedestrian counts at the

aforementioned times, respectively. Regardless of whether these were the result of a rare organized late-night event, a counter malfunction, or potential wildlife interactions with the counter, these occurrences are highly inconsistent with typical traffic levels recorded at the St. Vital site, which rarely surpass 30 pedestrian counts per 15-minute interval at peak times, let alone during what is typically the least busy period of the day. These outliers in the data have been disregarded in all descriptions of *typical* trends in Trail traffic, but were included in all numerical analysis.

Thursdays

Start of Regular Traffic: 6:00 am | End of Regular Traffic: 1:30 am [Friday Morning]

Afternoon Peak: 4:45 pm | Evening Peak: 7:45 pm

Thursday mornings were not significantly different from other weekdays, with regular traffic starting around 6:00 am and a noticeable increase in volume around 9:15 am. Thursday traffic was substantially higher than earlier weekdays between 12:00 pm and 8:30 pm, with more prominent afternoon and evening peak periods. Thursdays had the busiest late afternoon of any weekday, peaking at 136 pedestrians around 4:45 pm, and the second busiest evenings, with a peak of 132 at 7:45 pm. Compared with earlier days in the week, Thursdays had the most prominent early evening lull in traffic, which reached its lowest level at 6:00 pm. Total daily traffic for Thursdays averaged 4,424, a 22% increase over Wednesdays.

Fridays

Start of Regular Traffic: 6:15 am | End of Regular Traffic: 1:45 am [Saturday Morning]

Afternoon Peak: 1:15 - 2:45 pm | Evening Peak: 7:45 - 8:30 pm

Fridays had early mornings similar to other weekdays, but with considerably higher traffic starting after 10:00 am that culminated in the busiest early afternoon period for any weekday with peaks of 177 at 1:15 pm and 168 at 2:30 pm. Fridays would see a relative slow

period from 3:30 pm to 6:45 pm, however, this period was only 5% lower in traffic volume than the Thursday late afternoon peak period. The busiest period of the day occurred from 7:45 pm to 8:30 pm with 176 to 188 pedestrians. This was also the busiest period of any weekday and the busiest evening of the entire week. Despite having the busiest evenings, regular late-night traffic ceased after 1:45 am, a similar time as other weeknights, although with two to three times more traffic persisting past midnight into the following Saturday morning. Overall, Fridays saw 40% greater traffic than Thursdays, with an average daily total count of 6,214.

Saturdays

Start of Regular Traffic: 6:30 am | End of Regular Traffic: 2:30 am [Sunday Morning]

Afternoon Peak: 2:45 - 3:45 pm | Evening Peak: 8:15 - 9:15 pm

Regular early morning traffic on Saturdays started later than any other day, around 6:30 am, but increased significantly after 7:30 am, with 7:45 am to 10:00 am being busier than any other morning. From 10:00 am to 1:00 pm, Saturdays had a comparable amount of traffic as Fridays and Sundays. The busiest period of the day was from 1:30 pm to 6:00 pm, which was the second busiest period of the week, after Sunday afternoons. The Saturday afternoon peak, with a high of 292 pedestrians at 3:45 pm, was about 60% greater than the Friday afternoon peak. A prominent early evening lull is present on Saturdays but is shifted later than other evenings, with two lows at 6:45 pm and 8:00 pm. The evening peak saw 39% less traffic than the afternoon peak despite being the second busiest evening of the week and fourth busiest period of the week overall. Evening traffic peaked at 8:15 pm, with Saturdays experiencing a greater number of users persisting past midnight than any other night of the week. Saturday evenings also saw the latest end to regular traffic, which occurred around 2:30 am the following Sunday morning. Total daily traffic for Saturdays averaged 8,926, a 44% increase over Fridays.

Sundays

Start of Regular Traffic: 5:30 am | End of Regular Traffic: 11:00 pm

Afternoon Peak: 2:30 - 3:45 pm | Evening Peak: 8:15 pm

Sundays had the earliest start to regular traffic, around 5:30 am, and the second-busiest early mornings. Traffic increased sharply after 10:00 am, similar to Fridays and Saturdays, and steadily grew until peaking between 2:30 pm and 3:45 pm, with a maximum of 332 pedestrians reached at 3:15 pm. The Sunday afternoon peak was the busiest period of the week, despite Saturdays seeing overall greater traffic throughout the course of the day. Sunday evenings were typically much less busy than Friday and Saturday evenings and were more comparable to Wednesday and Thursday evenings. An early evening lull, which reached its lowest point at 7:30 pm, was also apparent on Sundays, but was less pronounced than on Thursdays through Saturdays. Sundays had the least busy late nights of any day of the week, with regular traffic coming to an end by 11:00 pm. Overall, Sundays saw 9% less traffic than Saturdays but 30% greater traffic than Fridays, with an average daily total count of 8,090.

Holiday

Start of Regular Traffic: 7:15 am | End of Regular Traffic: 12:15 am [Tuesday Morning]

Afternoon Peak: 2:15 – 3:15 pm | Evening Peak: 7:30 pm

Louis Riel Day on Monday, February 15, trended much like a Sunday with a large peak in the mid-afternoon and a relatively minor evening peak. However, the mid-afternoon peak was over three times higher than a typical Saturday or Sunday afternoon, reaching a count of 1,098 at 3:45 pm and 4:00 pm. The evening, despite having one-third as much traffic as the afternoon, reached a peak of 347 at 7:30 pm, more than a typical weekend afternoon peak. There was a very minor early evening lull at 7:15 pm, and regular traffic ended by 12:15 am the following Tuesday morning. Total daily traffic for the holiday Monday was 28,138, or 215% higher than

the average Saturday, which was typically the busiest day of the week. The holiday also appeared to have an impact on the days that preceded it, with slightly higher than typical late night traffic observed on Sunday, February 14. However, this was a level more comparable in volume to Mondays through Thursdays rather than a typical Friday or Saturday night. This preceding Sunday was also the busiest Sunday during the entire study period while the preceding Friday and Saturday, February 12 and 13, were the least busy. This particular Friday saw such little traffic that it was the third lowest recorded day along the Trail for the entire 28-day study period. However, other factors, such as weather conditions, may have contributed to the extreme highs and lows in traffic observed over the holiday weekend.

Meteorological Trends

Various weather variables also proved to have a statistically significant impact on pedestrian traffic volume over the course of the study period.

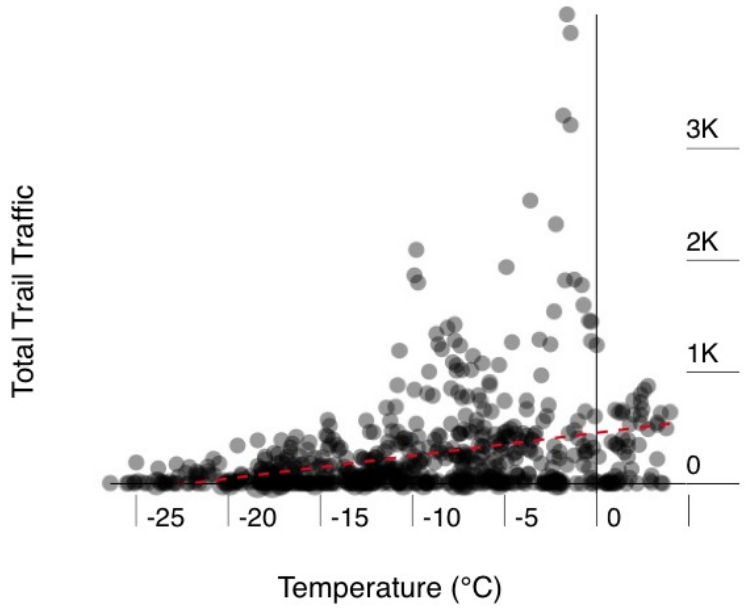
Weather data, provided by Environment Canada (2016), included temperature, wind, and wind chill measurements recorded at The Forks, as well as cloud cover, precipitation, and visibility conditions recorded at James Armstrong Richardson International Airport, located approximately 7 km west of The Forks. Weather conditions were also recorded at the Trail during fieldwork and were generally consistent with the data collected by Environment Canada.

Temperature

Over the four-week study period, recorded temperatures at The Forks varied between a high of 4°C, observed on the afternoon of Friday, February 26, and a low of -26.4°C, observed on the morning of Saturday, February 13. As shown in Figure 4.15, overall pedestrian traffic volume had a strong positive correlation with temperature, which is to say that pedestrian traffic tended to increase when temperature increased. This remained true when disregarding overnight periods, when both temperature and pedestrian traffic are typically at their lowest and more

likely to suggest a false positive correlation. In other words, the data was analyzed with the overnight period disregarded since overnight traffic most likely decreases because people go home to sleep, not because they are trying to escape the cold.

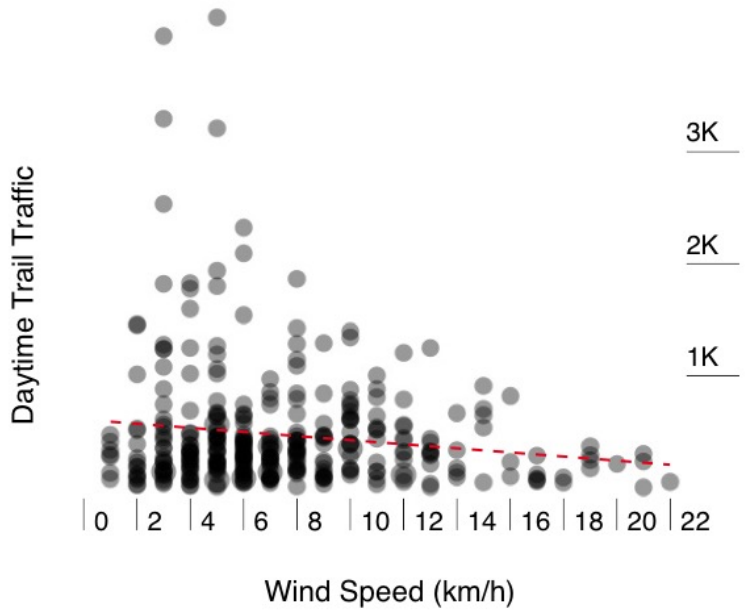
Figure 4.15: Scatterplot analysis of trail traffic versus temperature (°C)



Wind Speed

Wind speed was recorded as varying between 0 and 23 km/h. Analysis through linear regression revealed that traffic volume at the Balsam and St. Vital sites had a negative correlation with wind speed. In other words, traffic tended to increase as wind speed decreased. Despite this, traffic at the Port, which was found to have a near statistically significant negative correlation with wind speed, was just below the threshold for formal significance. However, disregarding overnight periods, when pedestrian traffic is low and correlation is more difficult to ascertain, all three sites showed a statistically significant negative correlation with wind speed during daytime periods.

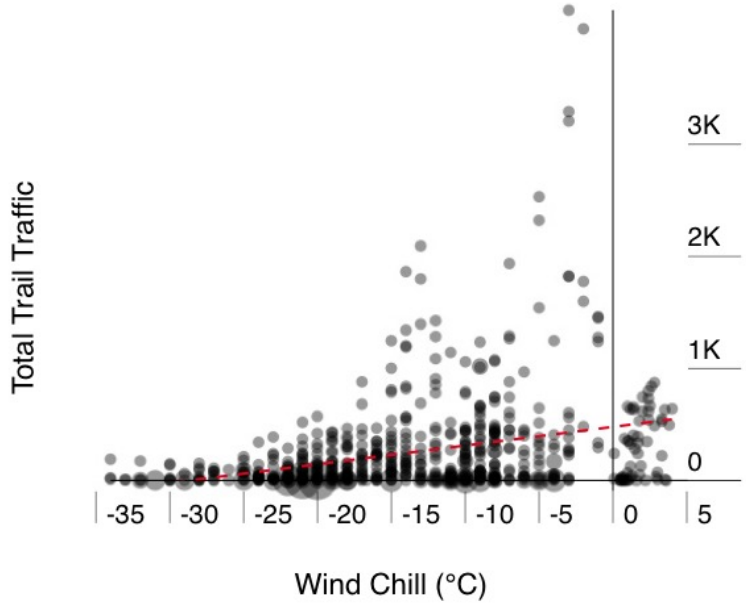
Figure 4.16: Scatterplot analysis of daytime trail traffic versus wind speed (km/h)



Wind Chill

Wind chill temperature is equivalent in value to regular temperature on days above 0°C, regardless of wind speed, but reached a low of -34°C on Friday, February 12. Given the above stated relationship of traffic volume with temperature and wind, it was not unexpected to find that traffic at all three sites also had a positive correlation with wind chill, which is to say that traffic tended to increase as wind chill temperature increased, as shown in Figure 4.17.

Figure 4.17: Scatterplot analysis of trail traffic versus wind chill temperature (°C)



Cloud Cover

Cloud cover conditions recorded by Environment Canada (2016) included *clear*, *mainly clear*, *mostly cloudy*, and *cloudy*. When compared against pedestrian traffic data, it was found that traffic tended to be higher when the weather was cloudy and lower when the weather was clear and sunny. Although one might expect sunshine to encourage outdoor activity, this finding is consistent with the observation that traffic increased as temperature increased. Linear regression analysis of temperature data with cloud cover conditions revealed that temperature tended to decrease when the sky was clear, and, conversely, that temperature tended to increase with increased cloud cover.

Precipitation

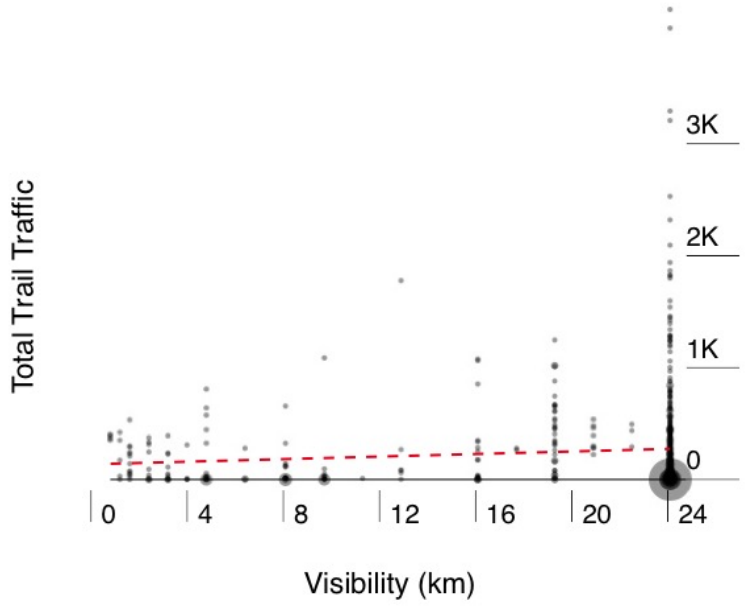
Environment Canada (2016) recorded various forms of precipitation over the study period, including *snow*, *blowing snow*, *snow showers*, *drizzle*, *freezing drizzle*, and *ice crystals*. Individually, only freezing drizzle had a correlation with overall site traffic; however, this was a positive correlation, which meant traffic was more likely to increase with instances of freezing

drizzle. This is likely due to freezing drizzle occurring more frequently at warmer temperatures. However, when all forms of precipitation are analyzed together, there is a weak, but statistically significant, negative correlation between total Trail traffic and precipitation, meaning that traffic was typically lower during periods with measureable precipitation.

Visibility

Visibility was recorded in kilometers and ranged from 0.8 km to 24.1 km over the study period. Unsurprisingly, visibility was negatively correlated with recorded instances of fog and snow, meaning visibility was typically reduced under these weather conditions. Visibility was also negatively correlated with temperature, meaning visibility typically improved as temperature decreased, such as on a cold sunny day. When compared against traffic data, it was found that traffic had a positive correlation with visibility, meaning traffic generally increased with improved visibility, as shown in Figure 4.18.

Figure 4.18: Scatterplot analysis of trail traffic versus visibility (km)



Taking all meteorological variables into consideration, temperature had the most significant correlation and therefore the greatest impact on traffic, followed by wind chill, degree

of cloud cover, wind speed, visibility, and precipitation. Table 4.1 summarizes the degree of statistical significance, or p-values, for each variable analyzed, organized from the strongest correlated variables to the weakest. A p-value less than or equal to 0.050 represents a statistically significant correlation between variables, with a lower p-value indicating greater significance.

Table 4.1: Strength of correlation (p-values) between traffic and analyzed variables

Daily (24h)					
Variable	**Port**	**Balsam**	**St. Vital**	**Total**	**Relationship**
Time of Day	< 0.001	< 0.001	< 0.001	**< 0.001**	Dependent
Temperature (°C)	< 0.001	< 0.001	< 0.001	**< 0.001**	Positive
Wind Chill (°C)	< 0.001	< 0.001	< 0.001	**< 0.001**	Positive
Day of Week	< 0.001	< 0.001	0.002	**< 0.001**	Dependent
Cloud Cover	-	-	-	-	-
Cloudy	< 0.001	< 0.001	< 0.001	**< 0.001**	Positive
Mostly Cloudy	0.017	0.011	0.063	**0.015**	Positive
Mainly Clear	0.072	0.281	0.851	**0.147**	None
Clear	< 0.001	0.004	0.232	**< 0.001**	Negative
Wind Speed (km/h)	0.100	0.023	0.012	**0.053**	Negative
Visibility (km)	0.094	< 0.001	< 0.001	**0.021**	Positive
Precipitation	0.165	0.005	0.001	**0.050**	Negative

Daytime (12h)					
Variable	**Port**	**Balsam**	**St. Vital**	**Total**	**Relationship**
Time of Day	< 0.001	< 0.001	< 0.001	**< 0.001**	Dependent
Temperature (°C)	< 0.001	< 0.001	< 0.001	**< 0.001**	Positive
Wind Chill (°C)	< 0.001	< 0.001	< 0.001	**< 0.001**	Positive
Day of Week	< 0.001	< 0.001	< 0.001	**< 0.001**	Dependent
Cloud Cover	-	-	-	-	-
Cloudy	< 0.001	< 0.001	< 0.001	**< 0.001**	Positive
Mostly Cloudy	0.445	0.325	0.566	**0.413**	None
Mainly Clear	< 0.001	0.007	0.248	**0.001**	Negative
Clear	0.013	0.124	0.593	**0.035**	Negative
Wind Speed (km/h)	0.019	0.004	0.006	**0.010**	Negative
Visibility (km)	0.289	0.004	0.003	**0.083**	Positive
Precipitation	0.728	0.071	0.034	**0.359**	Negative

= Significant = Nearly Significant = Not Significant

4.3 Reflections

The following reflections provide further interpretation and synthesis of the above observations and contribute to the key considerations listed at the end of this chapter.

High-Level Trends

While total Trail traffic varied from week-to-week and day-to-day, there was a statistically significant decline in traffic over the course of the study period, with the second half experiencing a 28% decrease in total traffic over the first half. Without comparable data from previous years it cannot be determined whether this is a commonly occurring trend or a random occurrence, but given the positive correlation between temperature and traffic, one might assume the opposite would occur, with traffic increasing as the calendar approached spring and, presumably, warmer temperatures.

The factor that likely contributed most to this counterintuitive trend is that the busiest week and busiest single day fell within the earlier half of the study period. Louis Riel Day (a statutory holiday), Valentine's Day, and 'reading week' (a week-long break from classes at local universities) all occurred over this period. It is clear from the traffic data that holidays have a significant impact on Trail traffic, as Valentine's Day coincided with the busiest Sunday over the study period and Louis Riel Day saw an explosion in Trail traffic that vastly exceeded any other day, despite falling on a Monday, which was typically the quietest day of the week for traffic.

Despite occurring in the earlier half of the study period, a closer look at this busiest week reveals how warmer temperatures may have been a major contributing factor after all.

Meteorological Trends

Likely contributing to the exceptionally high numbers observed on the Louis Riel Day holiday was the fact it was one of the warmest Mondays over the study period and came after a relatively cold week that saw lower than average traffic up to and including the preceding

Saturday. This preceding cold snap may have contributed to the surge in traffic on the Sunday and the much warmer holiday Monday, as people had been keeping themselves indoors more often during the week while waiting for warmer weather and the opportunity to get outside once again.

Similarly, the very low traffic seen during the Friday and Saturday of the long weekend was likely due to these being two of the coldest days over the study period, with wind chill reaching a low of -34°C on the Friday, rather than being a temporal characteristic of long weekends. Fridays and Saturdays are typically amongst the busiest days of the week for pedestrian traffic, yet these two days were not only the least busy Friday and Saturday recorded, but were amongst the least busy days of the entire four-week study period.

These observations are consistent with the significant influence temperature had on traffic, as shown through statistical analysis, which revealed a strong positive correlation between these variables.

Taking a closer look at other variables reveals further nuances regarding the impact weather had on traffic.

The weather and traffic data revealed how cloudy days saw higher traffic than clear days. However, given that cloud cover was more likely to coincide with periods of warmer temperatures, and given that temperature had a stronger positive correlation with traffic than cloud cover, this trend most likely has more to do with warm temperatures being desirable to Trail users than users finding cloudy skies to be desirable. Supporting this notion, higher traffic observed on the rare warm and clear days suggests that clear skies and sunshine were indeed a more desirable combination than warm days with cloud cover. For example, Friday, February 26, saw an afternoon high of 3.8°C and was clear for much of the day, while Friday, February 19,

also saw an afternoon high above freezing (1.8°C) but was cloudy and foggy throughout the entire day. February 26 saw 52% greater traffic than February 19.

Other nuances in the weather data reveal additional key factors that may be at play as well.

As shown in Table 4.1 above, traffic at the Port had a relatively weak correlation with wind speed and no statistically significant correlation at all with visibility or precipitation, despite traffic at the other two locations having a strong correlation with all of these variables. This may be due to unique environmental characteristics of the Port providing a microclimate with slightly better conditions over those experienced at the other two counter sites. For example, the Port counter's location on the Assiniboine River, which is narrower and more densely developed along, may provide more shelter from wind and precipitation than the Red River, which is wider, more open, and more exposed to the elements. The narrower river surface and more developed surroundings result in the Port site being sandwiched between two bridges, steep river banks, and a number of buildings and other structures located at The Forks, which may help reduce the severity of wind and precipitation. The close proximity of these surrounding elements likely also mitigates the negative impacts of poor site visibility. The higher concentration of Warming Huts installed near the Port may also serve to counter the negative impacts of certain weather conditions by providing Trail users physical shelter from wind and precipitation, and, with their relatively close spacing, providing higher visibility attractions and wayfinding features on poor-visibility days.

In addition to being in a potentially more sheltered location, the multi-use nature of The Forks likely provides additional draws for traffic that may serve to counter the negative impacts of weather.

Spatial Trends: The Forks Effect

As a popular, mixed-use, and centrally-located attraction for shopping, amusement, and entertainment, The Forks, where the Port pedestrian counter was installed, draws significant pedestrian traffic year-round, and during the winter months this appears to hold true for the nearby portion of the Red River Mutual Trail as well. The Forks' role as a major Winnipeg attraction most likely accounts for the large discrepancy in overall traffic volume between the three counter sites, as the Balsam and St. Vital counters are located adjacent to single-family residential neighbourhoods located further from Downtown. In fact, the observed gradual decrease in traffic levels as one gets further from The Forks also corresponds with surrounding neighbourhood population density, as shown in Table 3.1 in Chapter 3.

However, it is worth noting that traffic volume along the Trail also corresponds to the density of installed Warming Huts. As shown in Figure 3.6 in Chapter 3, the highest concentration of Warming Huts are installed adjacent to the Port, followed by a sparser arrangement of Warming Huts in the area around the Balsam counter, and a complete lack of Warming Huts in the area surrounding the St. Vital counter.

It is difficult to say, based on the pedestrian count data alone, the degree to which these factors may individually influence overall traffic, but these same factors may also account for the greater share of evening and weekend traffic observed at the Port.

Temporal Trends

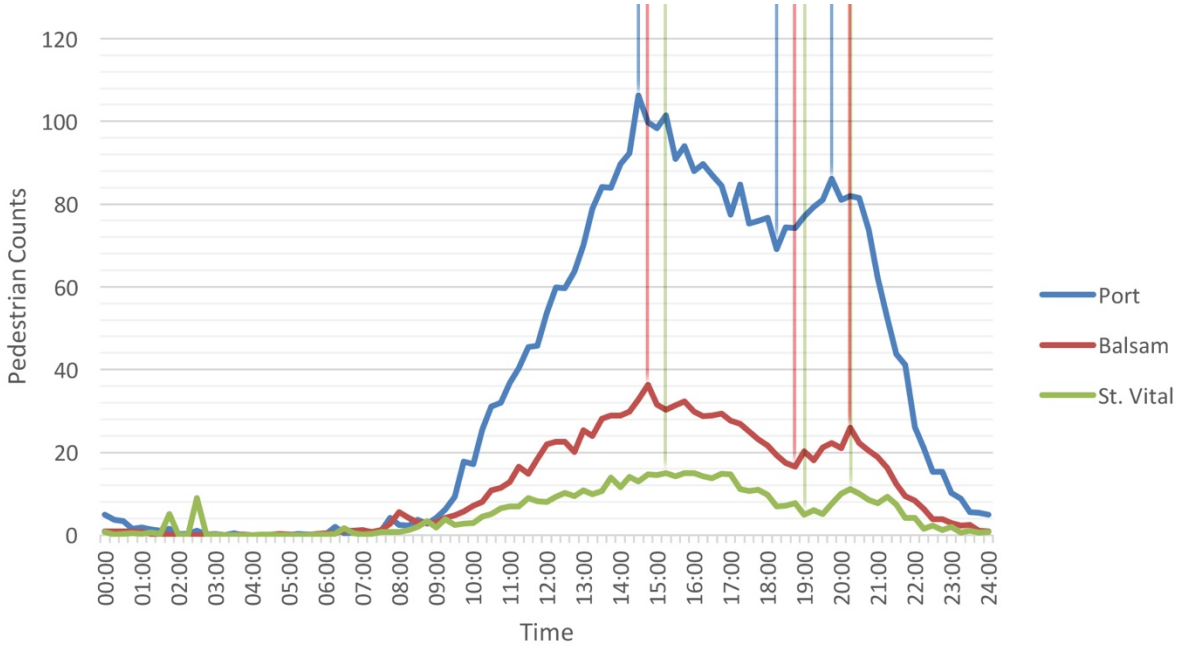
While the Port saw a greater share of evening and weekend traffic, the Balsam and St. Vital locations saw a greater share of early morning traffic, particularly between 8:00 am and 9:00 am, when Balsam traffic alone accounted for nearly half (44.7%) of total Trail traffic. After 9:00 am proportional traffic sharply decreased at the Balsam and St. Vital locations while the share correspondingly increased at the Port location. This consistent early morning shift of users

from Balsam and St. Vital to the Port suggests a significant portion of early morning users may have used the Trail for their daily commute downtown, as 8:00 am to 9:00 am coincides with the busiest hour of Winnipeg's morning peak commute time (TomTom Traffic Index, 2016). This trend was less pronounced for St. Vital than for Balsam, which may be due to a lower population density around the St. Vital counter resulting in fewer commuters coming from that area, or due to the area being a greater distance from Downtown and therefore discouraging a greater number of potential commuters from using the Trail.

Pointing to an alternative explanation, this same pattern was also observed on weekends, suggesting there may be more than commuter trends at play. Regardless, both the weekend and weekday data suggest an early morning wave of users accessing the Trail from the south and making their way north towards The Forks and Downtown, whether it be for work, shopping, or even as part of an early morning exercise routine.

Another potential wave-like movement of users across the Trail is suggested by an observed delay in afternoon and evening peaks at the Balsam and St. Vital sites relative to the Port site, from about 15 minutes in the afternoon to 30 minutes in the evening. As seen in Figure 4.19, this delay suggests more users accessed the Trail starting at the Port before moving south along the Trail to the other counter locations. Assuming a large number of these trips are one way, this behaviour would be consistent with the observed imbalance of 55% of total users heading out onto the Trail from the Port location versus 45% recorded heading into the Port over the course of the study period. This 10% imbalance between 'in' and 'out' traffic suggests The Forks is more popular as a starting point than as either a returning point or a final destination for users starting elsewhere.

Figure 4.19: Peaks and lulls in average daily traffic count highlighted for each site



This may even suggest that a significant share of regular users head north from St. Vital and Balsam, leave the Trail at an access point other than the Port, perhaps in order to take a more direct route to their place of work Downtown, in St. Boniface, or in Osborne Village, and then come home via the Port, perhaps after having a drink, eating dinner, or running an errand at The Forks. Such a scenario could explain the greater share of users leaving the Port than coming in, while accounting for the more balanced 'in' and 'out' numbers for the other two more residential-oriented locations. In other words, many users might leave and return to their homes via the same southern access point, but their intervening destination, while further north along the Trail, isn't always The Forks.

It is also possible this trend was a result of some people commuting downtown in the morning by other means, such as taking transit, but then using the Trail to get home, via the Port, as a way to inject some fun and recreation into their evening commute when they are feeling less pressured about getting to work on time.

This trend towards after work visits to The Forks is also supported by the traffic data, as 5:00 pm to 8:00 pm is when the Port would regularly see its greatest share (75.5%) of daily Trail traffic, and coincides with the busiest weekday peak period at the Port.

Despite having the greatest share of Trail traffic at this time, the Port, along with the Balsam and St. Vital locations, typically saw an early-evening lull in traffic around 6:00 pm to 6:30 pm on weekdays and 6:45 pm to 8:00 pm on weekends. This is most likely due to people leaving the Trail in order to access and eat dinner. The larger share of traffic at the Port suggests that, in addition to drawing more skaters during this time, The Forks may also draw more people looking to eat out for dinner.

4.4 Summary

This chapter provided an in-depth statistical analysis of pedestrian count data recorded by The Forks Renewal Corporation, including a study of the impacts that broad external factors, such as time of day and weather conditions, have on pedestrian traffic patterns. Where possible, additional influencing factors and potential implications behind the observed trends were described. These findings will be considered with the mapping and design analyses detailed in the following chapters, which together will inform the final recommendations in Chapter 7.

4.5 Key Considerations

- Traffic increases with closer proximity to The Forks.
- Traffic increases with an increased concentration of Warming Huts.
- Traffic increases with an increase in surrounding residential population density.
- Statutory holidays have a significant positive impact on traffic, while other holidays and break periods, such as Valentine's Day and academic reading week, may make lesser contributions to traffic.
- Each day of the week has a unique and predictable traffic pattern.

- Weekend days typically see over twice as much traffic as weekdays.
- The four busiest days for pedestrian traffic, in order, are Saturday, Sunday, Friday, and Thursday.
- The four busiest times of the week for pedestrian traffic, in order, are Sunday afternoon, Saturday afternoon, Friday night, and Saturday night.
- Weekend traffic typically sees the greatest peak occurring in the afternoon with a secondary peak in the evening, while weekdays typically see the greatest peak in the evening with a secondary peak in the afternoon.
- The Forks sees a greater share of weekend and evening traffic.
- The southern half of the Trail had its greatest share of users during the morning peak commute time, suggesting suburban residents used the Trail to commute to their jobs in the inner city.
- The Forks attracted the greatest share of after-work and dinnertime traffic.
- There is typically a lull in traffic across the entire Trail that coincides with dinnertime.
- The Trail sees the least traffic between 1:45 am and 6:15 am.
- Sunrise and sunset times had no direct or immediate impact on traffic levels.
- Late night traffic rarely persists past 2:00 am, even on the busiest night of the week.
- Early mornings are busier on weekends than weekdays.
- Time of day is the most significant predictor of traffic volume.
- Temperature has the greatest impact on traffic volume of any weather condition.
- Cloud cover had a positive correlation with temperature and with traffic, meaning cloudy days tended to be warmer and busier.
- Visibility, precipitation, and wind speed were all shown to influence traffic volume.

- The Trail's northern terminus at The Forks may have unique features that mitigate the impacts of detrimental weather conditions, including having the highest concentration of Warming Huts.
- A lag time in daily peaks and lulls between the three pedestrian counter sites suggests a large share of users start at The Forks and move to a final destination further south along the Trail.
- A greater share of Trail users leave from the Port location than arrive there from other locations.

CHAPTER 5 | TRACING AND BEHAVIOURAL MAPS

This chapter introduces two mapping techniques, tracing and behavioural mapping, to determine how users move through and behave on two sections of the Red River Mutual Trail – one containing three stationary Warming Huts and the other containing none. These sections of Trail, defined as Site A and Site B, respectively, are the two study sites introduced in Section 3.1 and shown again in Figures 5.1 and 5.2.

In comparison to the pedestrian count findings presented in Chapter 4, the following observations and mapping analysis provide a finer level of insight into the spatial behaviour of trail users and the site-specific factors, such as the presence of playful design interventions, that influence them. Revealing how the Warming Huts contribute to the level of pedestrian activity at Site A, this analysis helps to answer research question (1). This analysis also identifies additional considerations that may inform strategies for generating pedestrian activity in other winter cities, contributing to the understanding of research question (3).

The study sites, data collection methods, and analysis techniques are described in greater detail in Section 5.1. This is followed by an outline of six metrics used to define pedestrian activation, which provide a framework for the mapping analysis and findings. A summary of key considerations is presented at the end of the chapter.

5.1 Methods

Study Sites

The study sites were deliberately chosen to provide a comparison of two similarly sized and situated stretches of Trail with one major difference between them – one site would contain a concentration of Warming Huts and the other site would contain none. The intent of this comparison is to isolate the presence of playful design interventions, in the form of Warming Huts, as a potential contributing variable to pedestrian activity, or site activation. With this

variable isolated, it becomes easier to observe and measure the impact playful design has on site activation.

Site A, located immediately north of the Norwood Bridge, contains three Warming Huts: *Hygge House*, *Shelterbelt*, and *Temple*. Site B, located immediately south of the Norwood Bridge, contains no Warming Huts within the observation area, but is bookended by the *Post – Gallery* outdoor art display beneath the bridge to the north of the site and one Warming Hut installation, *Under the Covers*, to the south of the site. *Recycling Words*, a Warming Hut intervention comprised of free-floating red chairs affixed to skis, makes intermittent appearances at both sites as users push them around the Trail. The dimensions of each study site are approximately 220 m long by 150 m wide. The 220 m length of Trail covered by each site is comparable to the city block length found in the adjacent neighbourhoods of Central St. Boniface and River-Osborne, and the 150 m width spans the frozen surface of the Red River from one bank to the other.

Figure 5.1: Site A study area

Figure 5.2: Site B study area

Naturalistic Observation

The fieldwork carried out at the study sites used naturalistic observation techniques to collect data. For the creation of tracing and behavioural maps, this primarily included comprehensive time-lapse photography taken from elevated vantage points offering all-inclusive views of the study sites, a technique prominently employed by William H. Whyte (1980) in his studies of public space in New York City. The automated time-lapse camera apparatus took one photo per second over a series of 30-minute intervals. Figures 5.3 and 5.4 show the typical camera setup and a sample time-lapse sequence for these observations. Time-lapse data was collected at both study sites for different times of day, different days of the week, and under different weather conditions. To provide additional detail in support of the time-lapse data, first-hand observational notes were made concurrently with a voice recorder. In combination, these techniques provided substantial detail on Trail conditions and user characteristics, such as gender, age, behaviour, and relationship to other users.

Figure 5.3: Time-lapse camera apparatus and placement for Site B observations

Figure 5.4: Example of time-lapse photography sequence

The observational data ultimately used for the mapping analyses was collected on Thursday and Saturday mornings and afternoons. The observation schedules for each map type is provided in Tables 5.1 and 5.2. Evening data was not used in the analyses as site conditions were too dark for time-lapse photography to be technically feasible.

Tracing

Recording how users move through a site with tracing can provide insight into movement-related behaviour, such as common travel patterns and whether users choose to pass through a site or linger. Tracing can also identify corridors of high traffic, areas of low traffic, site features of interest, and, when paired with accurate time-keeping, the amount of time spent by users within a given site. Gehl and Svarre (2013) provide the following description of this technique:

> Tracing means drawing lines of movement on a plan. People's movements are watched in a given space in full view of the observer. The observer draws the movements as lines on a plan of the area during a specific time period, such as 10 minutes or half an hour. (p. 28)

A total of eight tracing maps were produced, recording four 10-minute intervals for each site, including a morning and afternoon interval for one weekday and one weekend day. The eight maps can be found in Appendix A and one overview map for each site is presented in Section 5.3. The latter combine the data "layer on layer" for each of the four observation periods

to produce maps that present all the tracing data collected for that site, a technique that "provides a clearer picture of the general pattern of… activities" (Gehl & Svarre, 2013, p. 26).

Observation periods were chosen to compare similar days of the week and times of day for both sites. Even though the observations were not always registered on the same calendar day for both sites, Gehl and Svarre (2013) suggest it is usually not a problem to use data collected across different days (p. 23). The specific times, dates, weather conditions, and overall daily Trail attendance counts for the tracing observation periods are summarized in Table 5.1 below.

Table 5.1: Tracing observation schedule and site conditions

Site A					
Date	Time	Weather	Temp. (°C)	Wind Chill (°C)	Total Day Ped. Count
Thu. Feb. 11, 2016	10:31 – 10:41 am	Cloudy	-14.6	-18.0	2,827
Thu. Feb. 11, 2016	2:22 – 2:32 pm	Cloudy	-12.1	-15.5	2,827
Sat. Feb. 20, 2016	10:36 – 10:46 am	Cloudy	-6.3	-12.0	7,460
Sat. Feb. 20, 2016	2:30 – 2:40 pm	Cloudy	-6.6	-10.5	7,460
Site B					
Date	Time	Weather	Temp. (°C)	Wind Chill (°C)	Total Day Ped. Count
Thu. Mar. 3, 2016	10:44 – 10:54 am	Sunny	-10.0	-11.0	3,925
Thu. Mar. 3, 2016	2:11 – 2:21 pm	Sunny	-7.8	-10.0	3,925
Sat. Feb. 20, 2016	10:56 – 11:06 am	Cloudy	-6.1	-12.0	7,460
Sat. Feb. 20, 2016	2:52 – 3:01 pm	Cloudy	-6.7	-11.0	7,460

Source: Environment Canada (2016); The Forks Renewal Corporation (2016)

Behavioural Mapping

To further analyze the data gathered through naturalistic observations, a series of behavioural maps were produced for both sites to reveal additional trends in user distribution and activity during the different observation periods. Behavioural mapping provides a deeper level of detail on user activities and behaviour than tracing and is a common method used in site-specific behavioural research (Gehl & Svarre, 2013; Whyte, 1980; Zeisel, 1984).

As described by Gehl and Svarre (2013), behavioural mapping is "simply mapping what happens on a plan of the space or area being investigated" and "provides a picture of a moment in a given place," like "an aerial photo that fast-freezes a situation" (p. 26). While annotation can be included on a behavioural map to provide more detail on the behaviours or activities being carried out, each recorded individual is typically represented by a single point or simple symbol on the map. For the following analysis, rather than providing detailed annotation on the maps, which could be visually cluttering and difficult to interpret, the specific behaviours and activities captured by the behavioural mapping process are represented through a series of activity graphs, which are a common means of describing and analyzing behavioural map data (Gehl & Svarre, 2013; Zeisel, 1984).

As it is "essential to register several samples in the form of momentary 'pictures' in the course of a day," a total of 16 behavioural maps were produced, which record eight snapshots in time for each site, including two morning and two afternoon instances for one weekday and one weekend day (Gehl & Svarre, 2013, p. 26). The 16 individual maps can be found in Appendix B, and one overview map for each site, which overlays all the behavioural data collected, are presented in Section 5.3.

In order to provide the greatest wealth of behavioural data, observation periods were chosen to coincide with instances of higher user traffic, where possible. The specific times, dates, weather conditions, and total registered daily Trail pedestrian counts for the behavioural mapping observation periods are summarized in Table 5.2 below.

Table 5.2: Behavioural mapping observation schedule and site conditions

Site A					
Date	**Time**	**Weather**	**Temp. (°C)**	**Wind Chill (°C)**	**Total Day Ped. Count**
Thu. Feb. 11, 2016	10:07 am	Cloudy	-15.0	-19.0	2,827
Thu. Feb. 11, 2016	10:38 am	Cloudy	-14.6	-18.0	2,827
Thu. Feb. 11, 2016	2:08 pm	Cloudy	-12.2	-15.0	2,827
Thu. Feb. 11, 2016	2:32 pm	Cloudy	-12.1	-15.5	2,827
Sat. Feb. 20, 2016	10:17 am	Cloudy	-6.6	-12.0	7,460
Sat. Feb. 20, 2016	10:45 am	Cloudy	-6.1	-12.0	7,460
Sat. Feb. 20, 2016	2:06 pm	Cloudy	-6.4	-10.0	7,460
Sat. Feb. 20, 2016	2:36 pm	Cloudy	-6.6	-10.5	7,460
Site B					
Date	**Time**	**Weather**	**Temp. (°C)**	**Wind Chill (°C)**	**Total Day Ped. Count**
Thu. Mar. 3, 2016	10:30 am	Sunny	-11.7	-13.0	3,925
Thu. Mar. 3, 2016	10:51 am	Sunny	-10.0	-11.0	3,925
Thu. Mar. 3, 2016	1:53 pm	Sunny	-7.8	-10.0	3,925
Thu. Mar. 3, 2016	2:20 pm	Sunny	-7.6	-11.0	3,925
Sat. Feb. 20, 2016	10:58 am	Cloudy	-6.1	-12.0	7,460
Sat. Feb. 20, 2016	11:29 am	Cloudy	-6.2	-11.5	7,460
Sat. Feb. 20, 2016	2:50 pm	Cloudy	-6.7	-11.0	7,460
Sat. Feb. 20, 2016	3:22 pm	Cloudy	-7.9	-13.0	7,460

Source: Environment Canada (2016); The Forks Renewal Corporation (2016)

Descriptive Statistics

The primary means of analyzing the map data is through descriptive statistics, including graphing user characteristics and activity, to reveal trends in user demographics and behaviour during the different observation periods. This is a commonly used form of analysis in conjunction with tracing and behavioural mapping (Gehl & Svarre, 2013; Whyte, 1980; Zeisel, 1984).

5.2 Defining Activation

The intent of the tracing and behavioural mapping analysis is to objectively determine how activated, or bustling with pedestrian activity, the study sites are, and whether the presence of Warming Huts contributes to this activity. For the purpose of this analysis, *pedestrian* refers to

any person, or what will more frequently be referred to as a Trail *user*, observed within the study sites, which can include people on skates, sleds, or bikes. To help define and measure activation, this analysis relies on a framework of six activation metrics, which draw from literature on public space studies and are outlined below.

User Volume

Given an area with 10 pedestrians has more pedestrian activity than an area with zero pedestrians, it follows that an area with 100 pedestrians should have more pedestrian activity than an area with 10. Therefore, this metric assumes the more people there are using a site, the more activated it is.

According to Gehl and Svarre (2013), asking how many people are present in an area is a fundamental question in studies of public space and can help to reveal environmental influences (p. 13). For example, "if we know *how many* people are staying in a square, and we then improve the square and count the number of people again, we can evaluate the success of the renewal project" (Gehl & Svarre, 2013, p. 13). This before-and-after strategy of comparing pedestrian volume is employed in the following analysis; however, the seasonal nature of the Trail precludes the ability to measure pedestrian volume prior to winter "improvements" when the site is a flowing river. Therefore, Site A was chosen to represent an "after" state, which has been "improved" with playful design interventions, and Site B was chosen to represent a comparable "before" or intervention-less state.

User Diversity

Knowing more about *who* uses a public space can provide insight into how successful the space is at attracting different user groups. Gehl and Svarre (2013) suggest it is useful to investigate some general user characteristics, such as gender and age (p. 14). Taking the

characteristics of gender and age into account, this metric assumes a site that attracts the broadest range, or greatest diversity, of users is better activated than a site that attracts a narrow range.

Given the challenges in determining an individual's specific age from a brief observation, it is necessary to allow "for a certain degree of inaccuracy in making a subjective evaluation of age group" (Gehl & Svarre, 2013, p. 14). Determining an individual's gender from direct observation can be a similarly subjective and inaccurate process, one which relies on characterizing a number of culturally biased attributes, such as clothing style and colour, hair style, and/or physical build and gait. This can be especially challenging at a time of year when people are bundled up, hidden under hats and layers of warm clothing. Additionally, while "almost all of the policy-relevant empirical literature relies on data-sets that distinguish between male and female," it presents a simplistic and decidedly non-diverse dichotomy that "may be problematic for people otherwise identified" (Chetkovich, 2019, p. 246). However, more inclusive gender categorization would be that much more challenging, if not impossible, to accurately capture through direct observation alone, and potential policy implications "can be made more complicated as a result" (Chetkovich, 2019, p. 246). While precluding more nuanced findings, a simplified approach keeps the analysis more manageable and minimizes the potential for misinterpretation. Therefore, in addition to characterizing site users as *male* or *female*, this metric also characterizes site users under one of two broad age categories: *youth* or *adult*, with a youth defined as anyone appearing to be under the age of 18.

Behavioural Diversity

Similar to user diversity, the behavioural diversity metric assumes a site yielding a greater diversity of observed behaviours is better activated than a site yielding a narrower range of behaviours. Gehl and Svarre (2013) note there is a typical set of "primary activities" that can be observed in public space, such as walking, standing, and sitting, but that "it is often most

meaningful to note several types of activities at the same time" (p. 17). For this reason, the behavioural diversity metric considers a set of *primary* activities tailored to the Trail context, such as walking, standing, and skating, and a more detailed set of *secondary* activities, such as conversing, playing hockey, and people watching. Secondary activities are typically carried out in addition to and at the same time as a primary activity. Furthermore, this metric will consider the diversity of movement patterns or path types made by Trail users to account for trends in spatial behaviour.

Social Interaction

According to Gehl and Svarre (2013), "it is important for public life studies to define and record social activities in order to support the function of public space as meeting place" (p. 17). Given the important social function of public spaces, this metric assumes the more social interaction a site yields the more activated it is. Since social activities are "conditional on the presence of others," and include such examples as "children playing, greetings and conversations," this metric considers the number of social behaviours, such as conversing and holding hands, along with the group compositions observed at each site (Gehl & Svarre, 2013, p. 17). In other words, a site with more social activities and more groups and couples is considered more socially activated than a site with fewer social activities and more solitary users.

Time Spent on Site

As described by Gehl and Svarre (2013), "the amount of time spent staying can provide information about the quality of physical frameworks" as "it is often the case that people walk slower and stay longer in places relative to the qualities and pleasures offered" (p. 19). Given that higher quality physical environments are better at holding user attention and retaining a pedestrian presence for longer periods than less stimulating environments, this metric assumes the longer people spend within a site, on average, the more activated the site is.

Site Area Usage

Studying where pedestrian paths and places to stay occur and do not occur can highlight corridors of pedestrian flow, identify gathering places, and uncover barriers to pedestrian activity (Gehl & Svarre, 2013, p. 15). This suggests a site with fewer barriers and more supportive pedestrian elements is likely to have a greater portion of the site area used by pedestrians than a site with more barriers and fewer supportive elements. Therefore, this metric considers the area of each site that sees pedestrian activity in comparison to its total area, in square meters, and assumes a site with greater pedestrian coverage is more activated than a site with lesser pedestrian coverage.

5.3 Analysis and Findings

This section summarizes the tracing and behavioural mapping analyses and findings from the two study sites. The findings are organized below by the six activation metrics and compare the results for each study site.

Both types of mapping analysis contribute to the overall understanding of the metrics, but each to differing degrees depending on the specific metric. Some metrics can only be addressed by one form of analysis, such as *time spent on site*, which only the data from tracing analysis lends itself to. For other metrics, such as *user volume*, both forms of analysis provide findings, but tracing may provide more reliable data given the longer observation periods used compared to behavioural mapping observations, which specifically targeted peak user periods and may therefore skew the results. However, in such instances, behavioural mapping findings will still be included to speak to broader trends and complement the tracing analysis where possible.

Figures 5.5 to 5.8 present the tracing and behavioural maps produced for each study site. These maps overlay the data from all the observation periods detailed in Tables 5.1 and 5.2. The eight tracing and 16 behavioural maps produced for each individual observation period can be found in Appendix A and B, respectively.

Figure 5.5: Tracing map for Site A overlaying data from all four observation periods

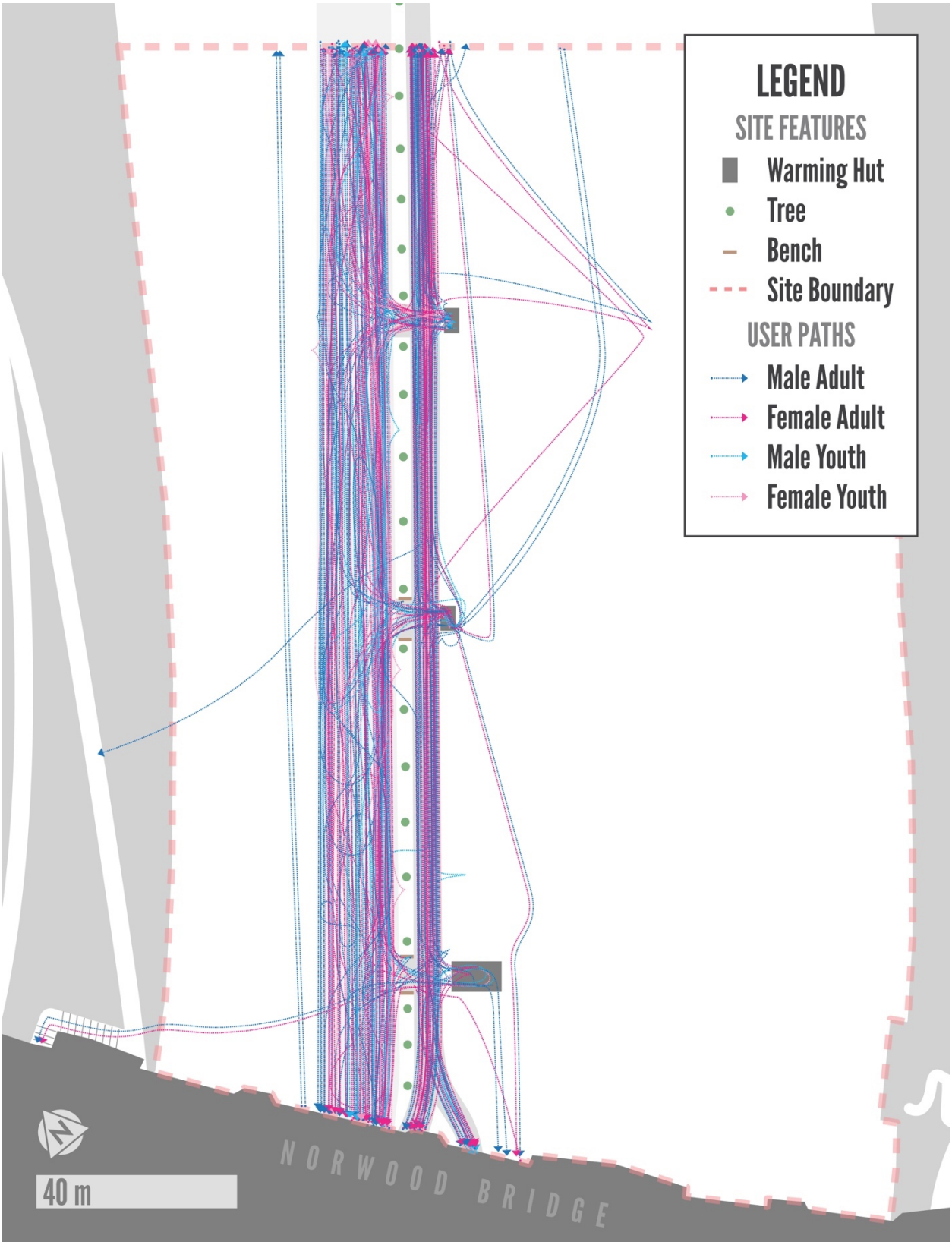


Figure 5.6: Tracing map for Site B overlaying data from all four observation periods

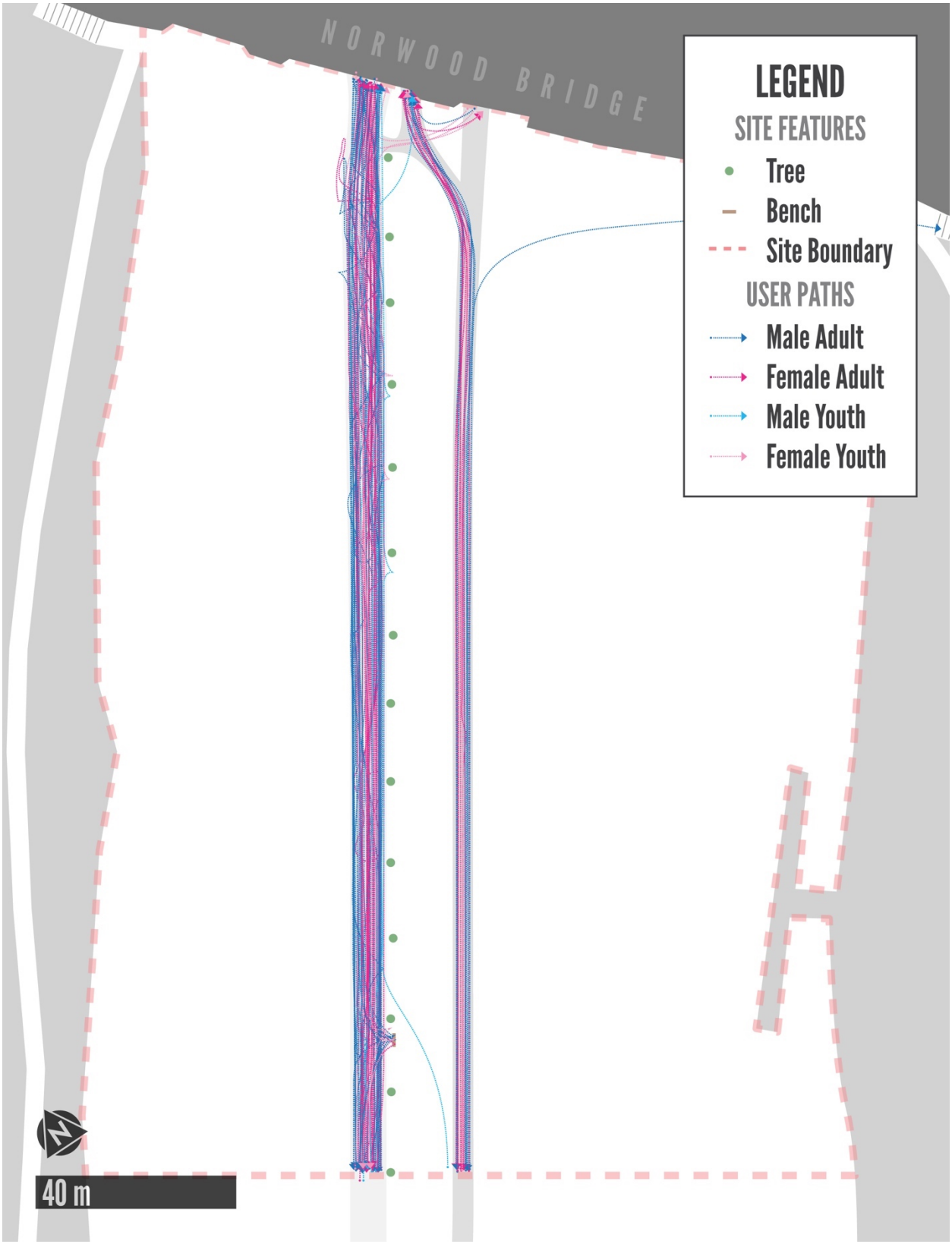


Figure 5.7: Behavioural map for Site A overlaying data from all eight observation periods

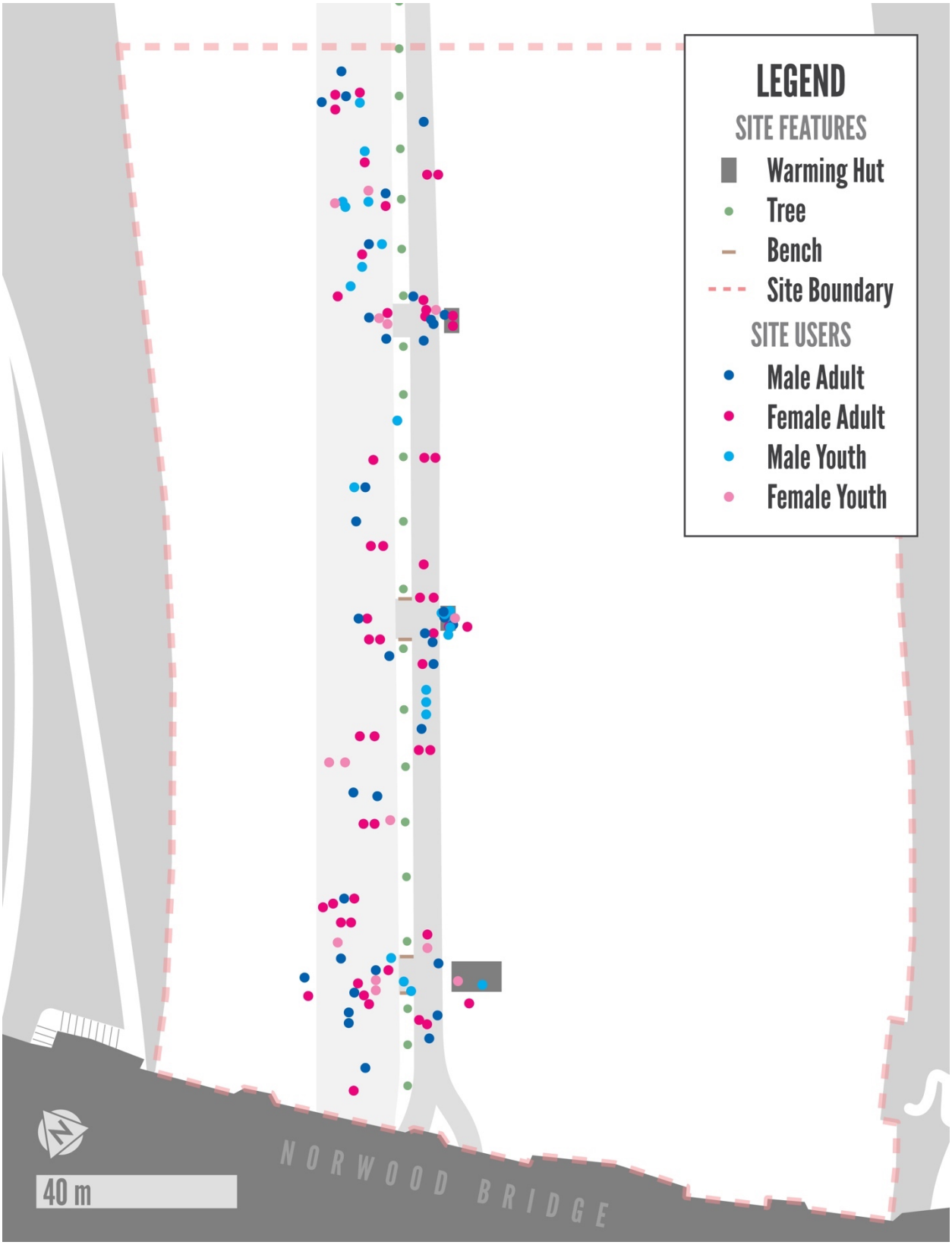
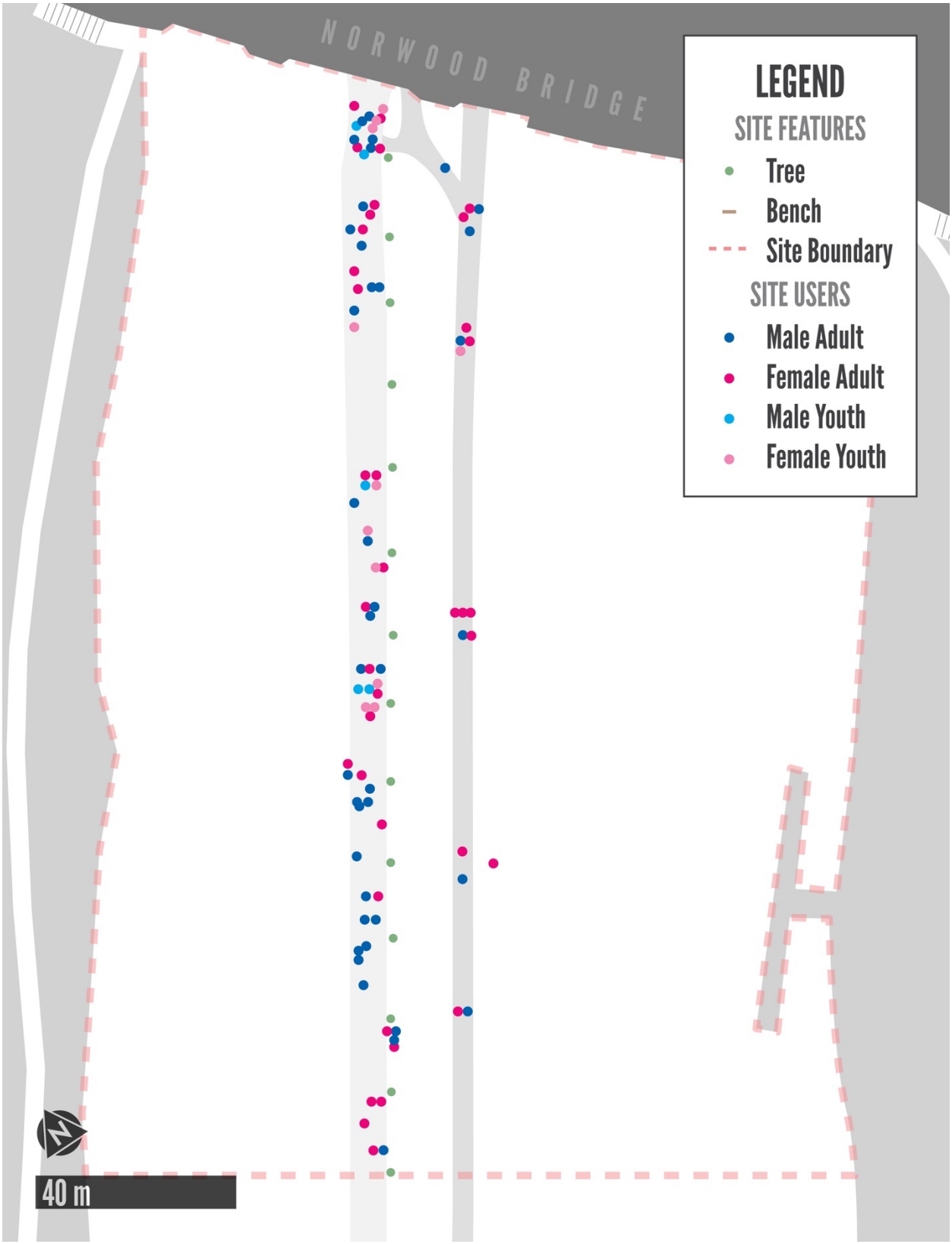


Figure 5.8: Behavioural map for Site B overlaying data from all eight observation periods



User Volume

As shown in Figure 5.9, tracing analysis found Site A typically had twice as much user traffic as Site B for each 10-minute observation period, except for the weekend (Saturday) morning, where traffic was the same at both sites. Accordingly, Site A overall had twice as much (202%) user traffic as Site B for the total 40 minutes of observation for each site, which resulted in an average user traffic rate of 4.4 per minute for Site A and 2.2 per minute for Site B. Consistent with the traffic count analysis presented in Chapter 4, weekend afternoon traffic was the highest observed period for both sites.

Figure 5.9: Tracing - user volume observed over four 10-minute intervals at each site

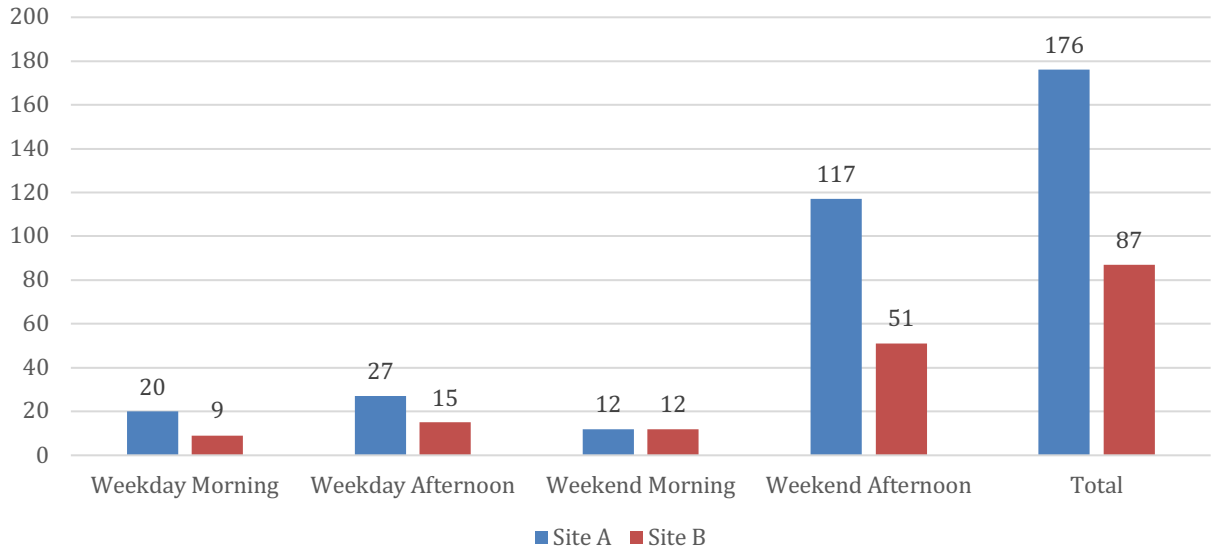
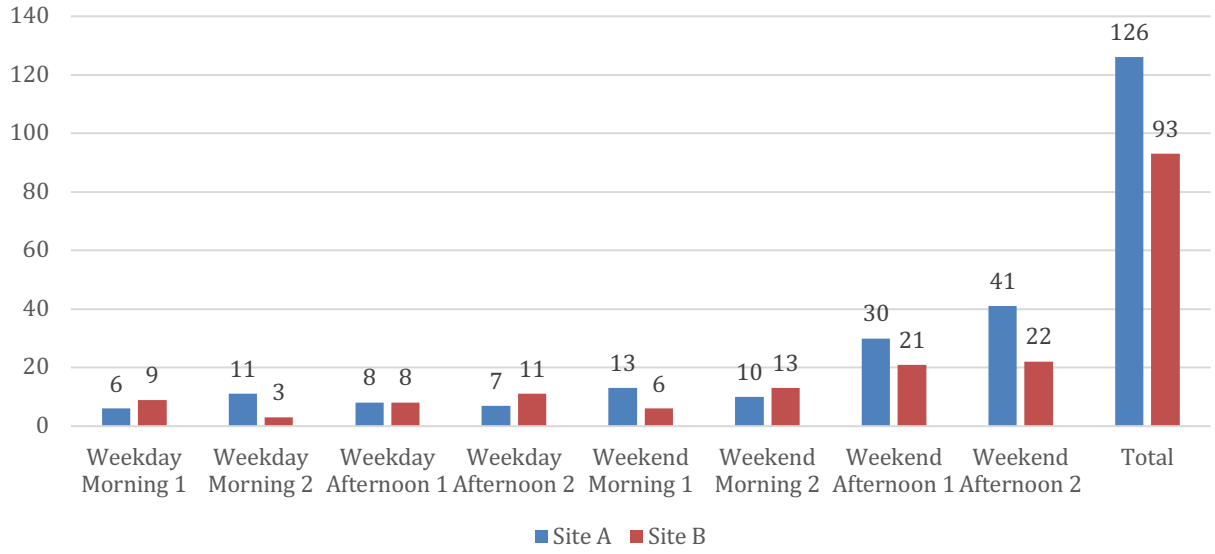


Figure 5.10: Behavioural mapping - user volume observed at eight peak period snapshots



As shown in Figure 5.10, behavioural mapping analysis found considerable variation in user volume occurring over the eight individual observation periods for each site. However, consistent with the tracing analysis, total observed Site A traffic was found to be higher, albeit by a smaller margin, than Site B, with peak periods seeing 35% more users at Site A.

Overall, the user volume findings strongly suggest Site A is the more active of the two sites. Adding to the strength of these findings, Site A was shown to have higher traffic volumes on average despite Site B observations being taken on days with a higher combined total daily Trail traffic count.

User Diversity

Tracing analysis found user diversity to be higher at Site A than Site B across all observation periods, with a more even distribution of user characteristics between the two age and gender categories. While the proportion of male (53%) to female (47%) users was comparable for each site, the proportion of youths at Site A (27%) was nearly twice that of Site B (15%). The largest user group at both sites was adult males; however, this group represented nearly half the users at Site B (47%) compared to just over one-third the users at Site A (38%).

Figure 5.11: Tracing - user characteristics observed at each study site

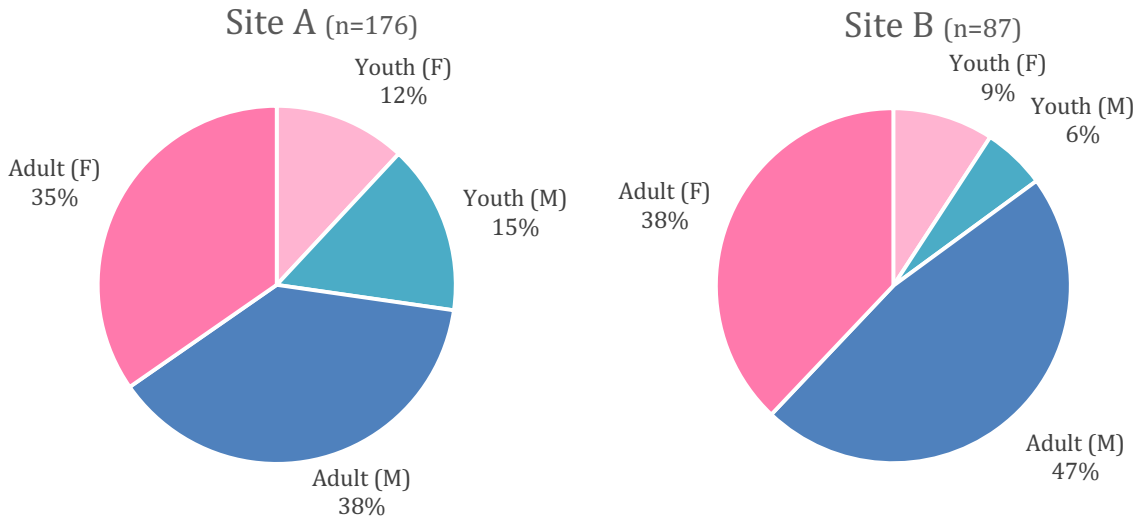
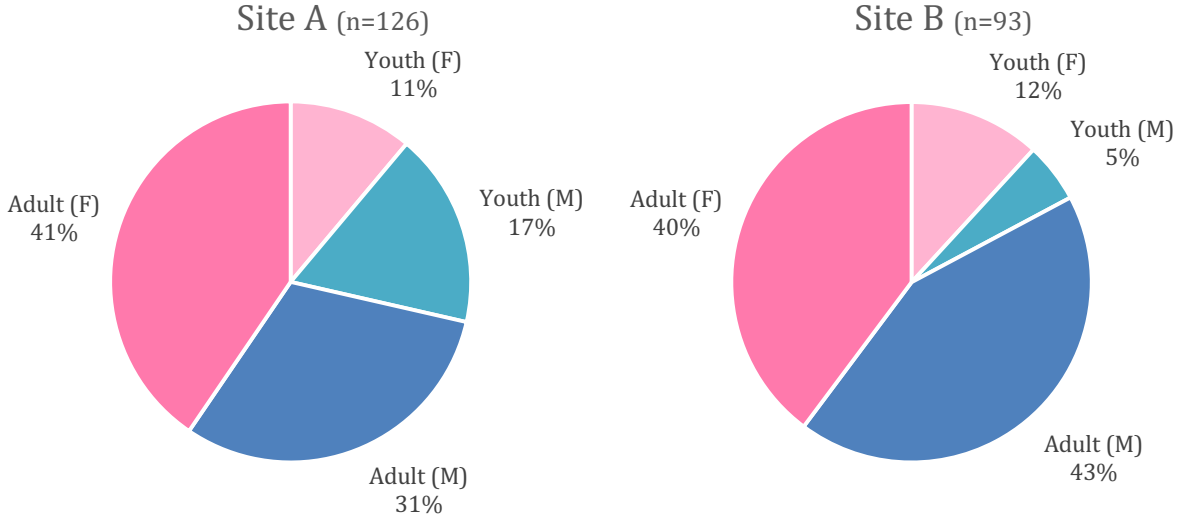


Figure 5.12: Behavioural mapping - user characteristics observed at each study site



Behavioural mapping analysis resulted in similar user demographic compositions to tracing at the observed peak periods, with Site A showing overall greater diversity than Site B. Like the tracing findings, behaviour mapping found the same proportion of males (48%) to females (52%) at both sites, but nearly twice as many youths at Site A (29%) than Site B (17%). The largest difference between the two analyses were the number of adult females, which was

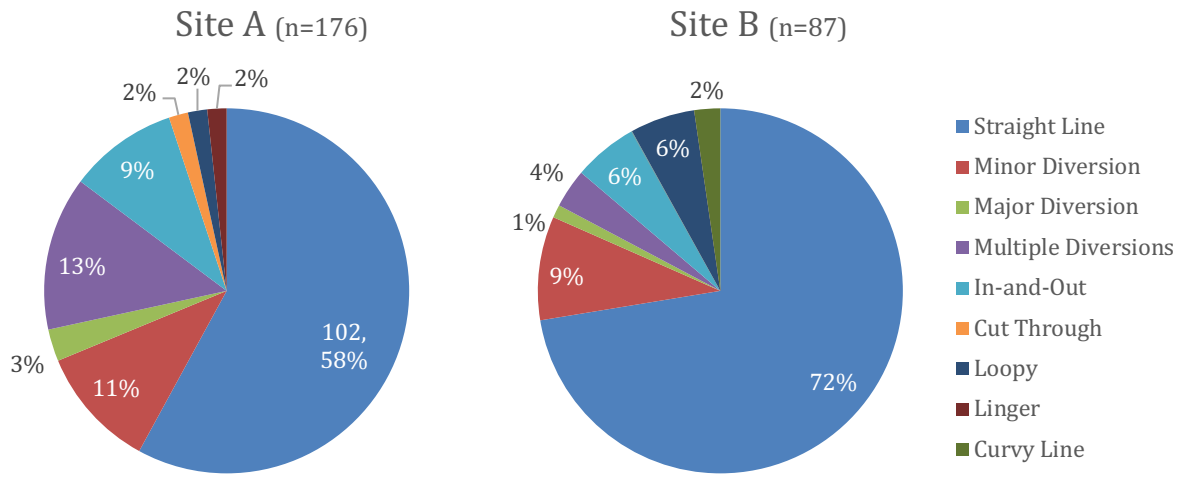
higher at both sites for behavioural mapping, comprising the largest user demographic at Site A (41%) compared to Site B, where adult males (43%) remained the largest demographic.

Overall, the user diversity findings suggest Site A is better activated than Site B, which attracts a large share of adult males in comparison to the more even distribution of demographics observed at Site A. In particular, the findings suggest Site A was more successful at attracting youths and families with young children.

Behavioural Diversity

Tracing analysis included a characterization of users' primary activities as well as path types to provide behavioural insights. As shown in Figure 5.13, a wide variety of path types, or ways in which people moved through the sites, were observed. For both Site A (58%) and Site B (72%), a majority of users passed through the site travelling in a relative straight line, either skating along the ice sheet or walking along the adjacent packed snow pathway from one end of the site to the other. However, Site A had many more users that diverted from their otherwise straight line of travel through the site, with 27% of users showing a single minor (11%) or major (3%) diversion or multiple (13%) diversions as their attention was drawn to various site features. About half as many site users displayed a diversion (14%) at Site B, with most of those being minor (9%). Site A also experienced users that lingered (2%), or spent long periods of stationary activity on site, which was not observed at Site B, where most people treated the site as a recreational thoroughfare. However, more Site B users were observed travelling in meandering loopy (6%) or curvy (2%) paths as they skated through the site.

Figure 5.13: Tracing - path types observed at each study site



The primary activities observed during tracing observation periods included walking, skating, sitting, running, cycling, and snowmobiling. As shown in Figure 5.14, a majority of users at both sites were observed to be skating, comprising just over half (55%) of users at Site A compared with over three quarters (77%) of users at Site B. Site A had about twice as many users walking (37% vs 19%) and sitting (4% vs 2%) as Site B, as well as more users registered cycling (2% vs 1%) and snowmobiling (1% vs 0%). However, for the latter two activities these same users would have also passed through Site B, but were not present during the Site B observation periods.

Figure 5.14: Tracing - primary activities observed at each study site

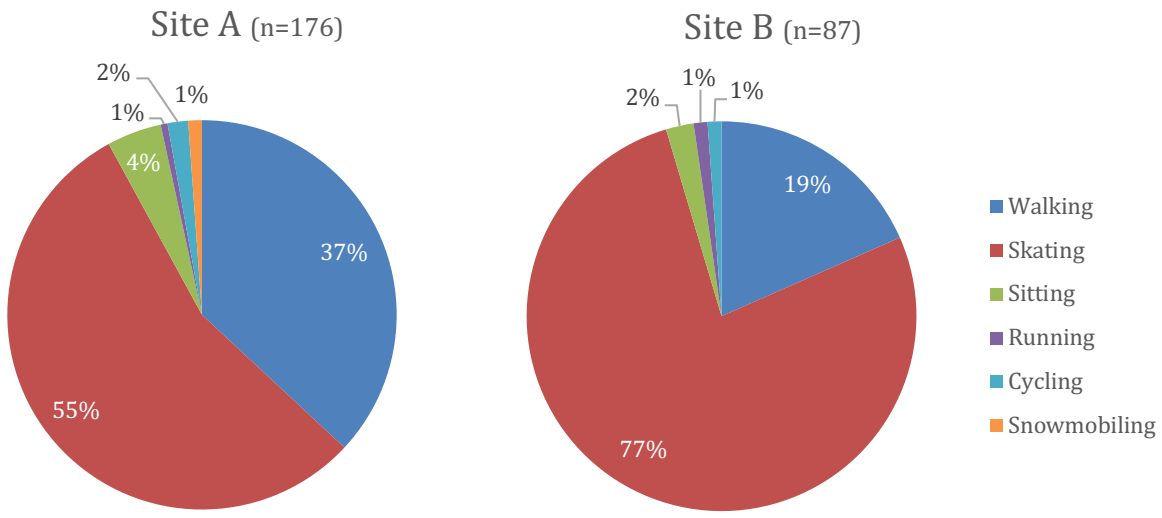
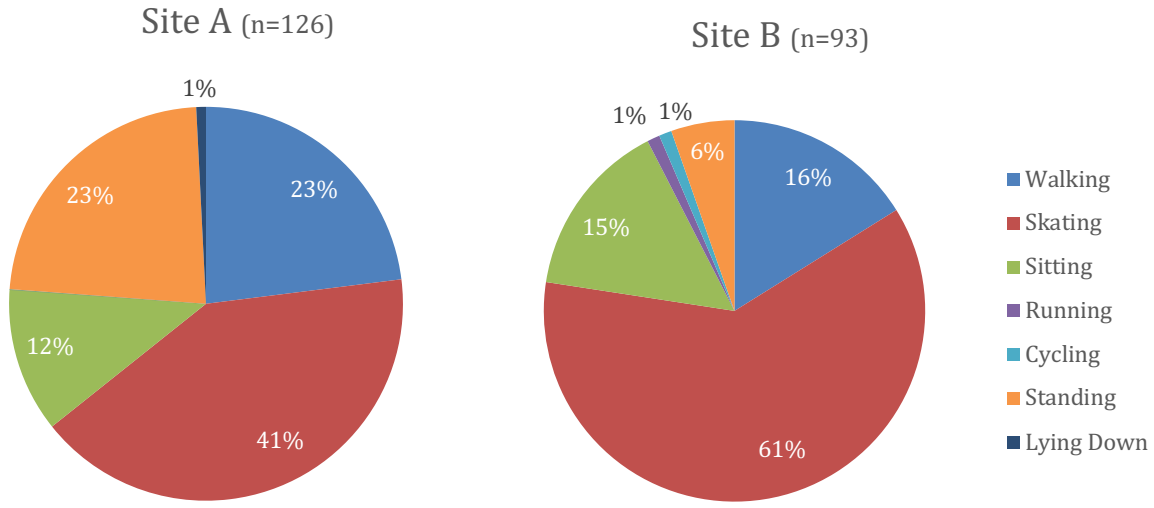


Figure 5.15: Behavioural mapping - primary activities observed at each study site



The primary activities observed during behavioural mapping periods included walking, skating, sitting, running, cycling, standing, and lying down. Similar to tracing, the largest share of users at both sites were observed to be skating, comprising 41% of users at Site A and 61% of users at Site B. However, with one-third fewer users skating, Site A had a larger share of users walking (23% vs 16%) and, most notably, standing (23% vs 6%) than Site B. Overall, Site A

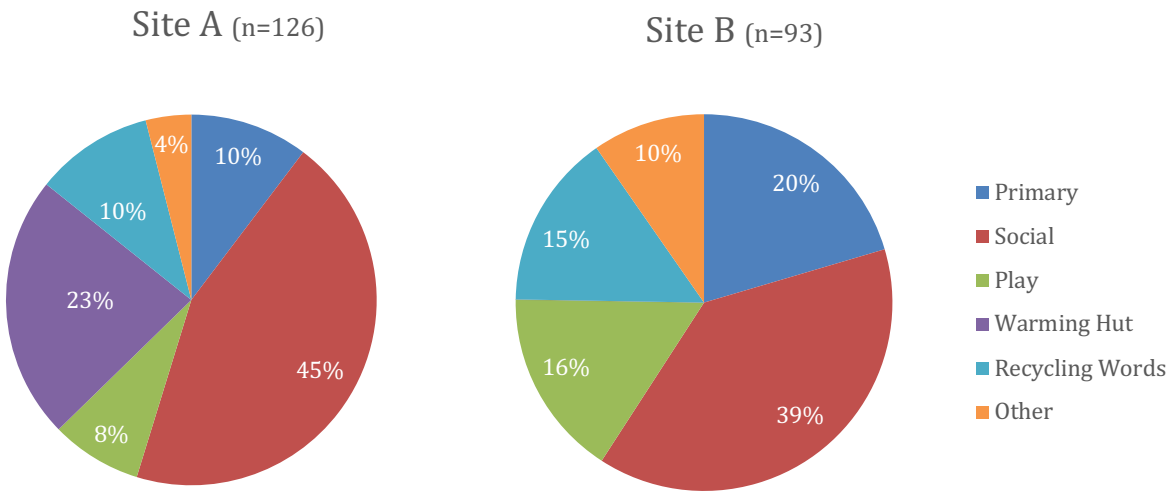
(36%) had a much greater share of stationary activities, including standing, sitting, and lying down, than Site B (20%), suggesting people took more time to stop and interact with the site and other users.

The secondary activities shown in Figure 5.16 indicate activities that were carried out by Trail users concurrent to their primary activities. Where a user was not observed doing anything other than their primary activity, the primary activity is repeated in the list of secondary activities. Repeated primary activities, including walking, skating, running and lying down, accounted for 10% of all behaviour observed at Site A and 20% at Site B, with skating composing 80% of the repeated primary activities at both sites. For secondary activities, the largest share of users at both sites participated in social activities, which included talking, holding hands, and people watching, making up 45% of users at Site A and 39% of users at Site B.

Play activities, which were separated from activities involving interaction with Warming Huts for analysis purposes, include playing hockey and sledding. These activities were carried out by 8% of users at Site A and 16% of users at Site B. Warming-Hut-related interactions, which included physically interacting with Warming Huts, looking at them from a short distance, taking photos of them, and reading about them on adjacent signage, made up almost a quarter (23%) of all activity observed at Site A. No interactions with Warming Huts were observed at Site B given the site was chosen to exclude them. However, one of the Warming Hut installations, *Recycling Words*, which is composed of a series of free-floating red chairs affixed to skis, had an intermittent presence at both sites as users pushed them up and down the Trail. Interactions with *Recycling Words*, including pushing or being pushed while sitting in the chairs, made up 10% of secondary activities at Site A and 15% at Site B. Other activities, such as

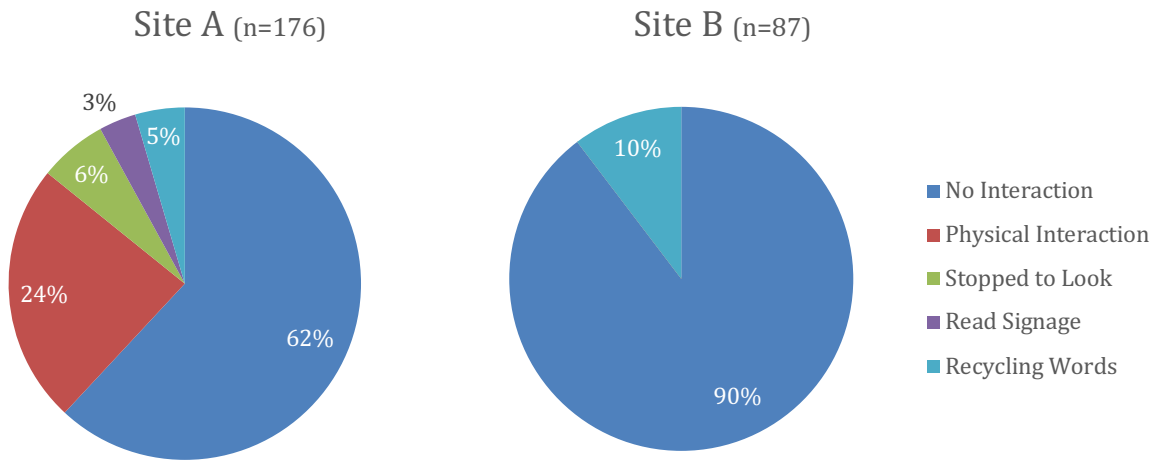
walking dogs, looking at phones, fixing skates, and pushing strollers, made up 4% of Site A and 10% of Site B activities.

Figure 5.16: Behavioural mapping - secondary activities observed at each study site



Additional tracing analysis characterized user interaction with the Warming Huts, which included physically interacting with Warming Huts, such as going inside or touching the outside; pausing to look at them from a short distance; or reading about them on adjacent signage. All users observed taking photos of them also physically interacted with them, so they were not included in a separate category. Figure 5.17, which includes the share of users observed at each site interacting with the red *Recycling Words* chairs, either pushing or sitting in one, shows that 38% of users at Site A were observed interacting with Warming Hut installations compared with 10% of users at Site B observed interacting with *Recycling Words*.

Figure 5.17: Tracing - Warming Hut interactions observed at each study site



Overall, the behavioural diversity findings suggest Site A is better activated than Site B, with more users there moving in exploratory path types, participating in a more even distribution of primary activities, participating in more stationary primary activities, participating in secondary activities at a higher rate, and interacting more with site features and other users.

Social Interaction

Tracing and behavioural mapping analysis included a characterization of social group composition of Trail users as individuals, couples, or groups of three or more. As shown in Figure 5.18, couples, which could include any two friends, family members, or romantic partners visiting a site together, were the most common social composition of users during tracing observations, making up roughly half of all users at Site A (49%) and Site B (51%). However, more users were part of a social group of three or more at Site A (40%) than observed at Site B (31%). Conversely, there were significantly fewer solitary individuals observed at Site A (11%) than Site B (18%).

Figure 5.18: Tracing - group composition observed at each study site

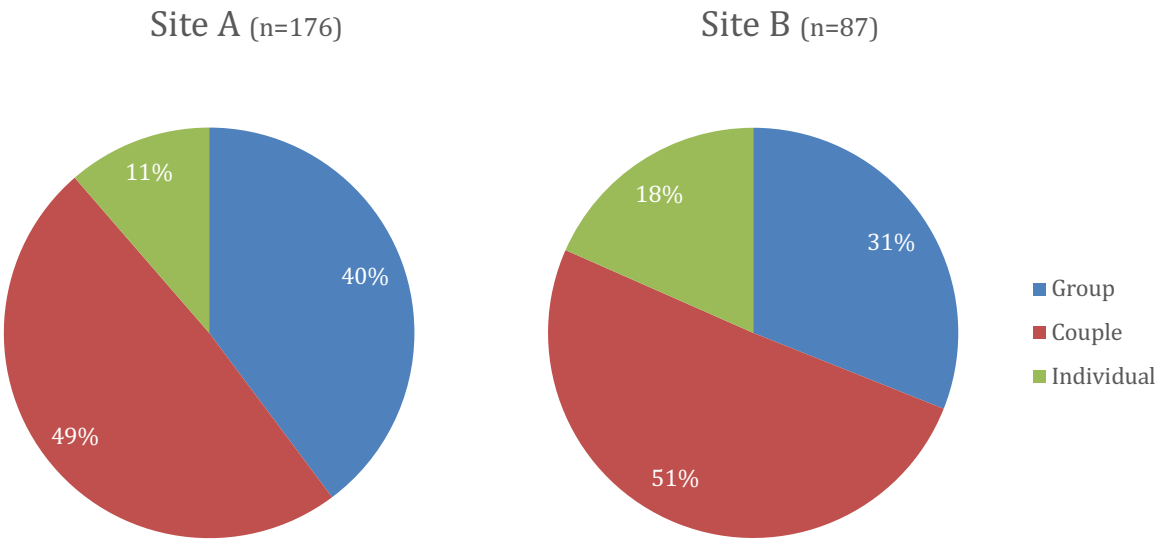
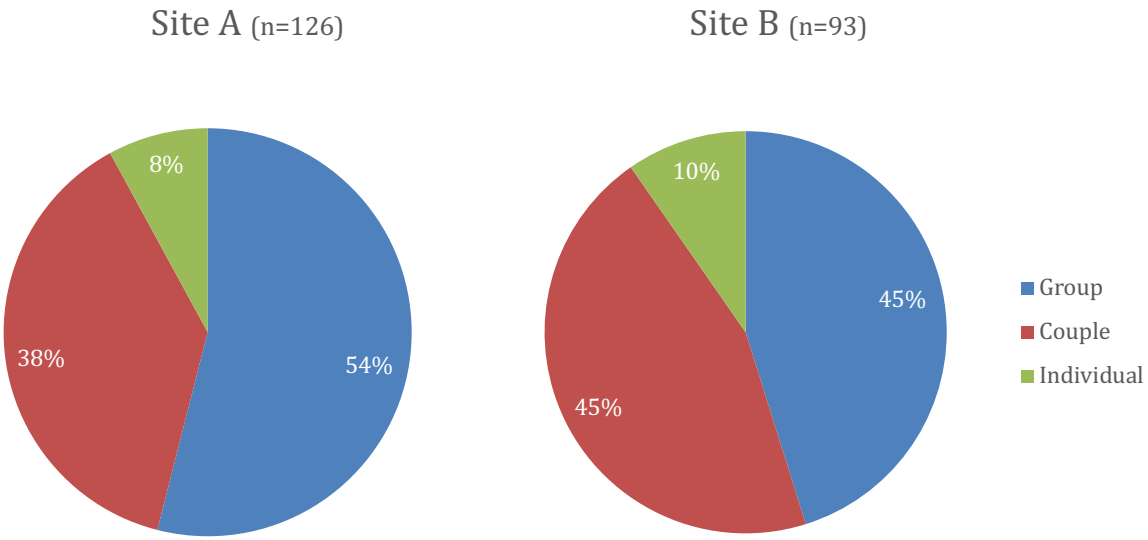


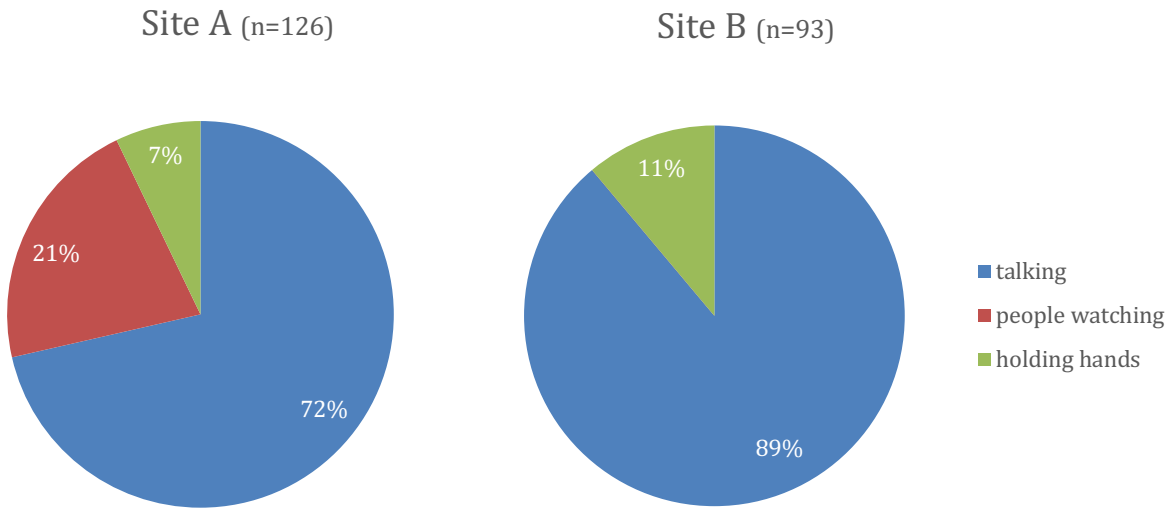
Figure 5.19: Behavioural mapping - group composition observed at each study site



As shown in Figure 5.19, during peak period behavioural mapping observations, there were a larger share of groups, with both Site A (54%) and Site B (45%) seeing a 14% increase at the expense of both individuals and couples.

As previously mentioned, social activities, including talking, people watching, and holding hands, comprised 45% of all activities observed at Site A and 39% at Site B. Talking comprised about one-third of all secondary activities observed at both Site A (32%) and Site B (34%). People watching was another major activity observed at Site A, comprising 10% of all secondary activities. By comparison, Site B had no recorded people watching.

Figure 5.20: Behavioural mapping - social activities observed at each study site



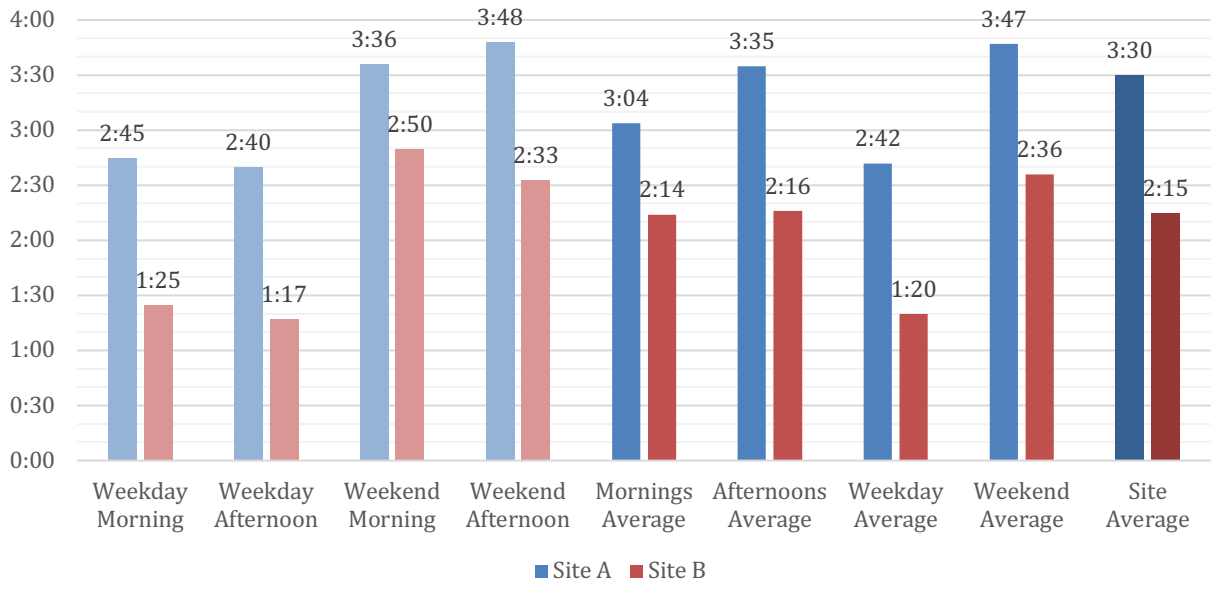
Attracting more large groups, supporting more social activities, and fostering more people watching opportunities, the data suggests Site A generated greater social interaction and was therefore better activated along this metric than Site B.

Time Spent on Site

As shown in Figure 5.21, tracing analysis found Trail users typically spent an extra minute and 15 seconds, or over 50% longer, at Site A (3:30) than Site B (2:15) on average. The discrepancy in duration was most notable on weekdays, with user duration being twice as long at Site A than Site B. For both sites, users took more time on weekends than weekdays, with Site A weekend durations being 40% longer than on weekdays and Site B durations being almost twice

as long on weekends. The analysis suggested users spent the least time at both sites on weekday afternoons, but only slightly less than weekday mornings. Users spent the most time at Site A (3:48) during weekend afternoons and the most time at Site B (2:50) on weekend mornings.

Figure 5.21: Tracing - average user time spent on site



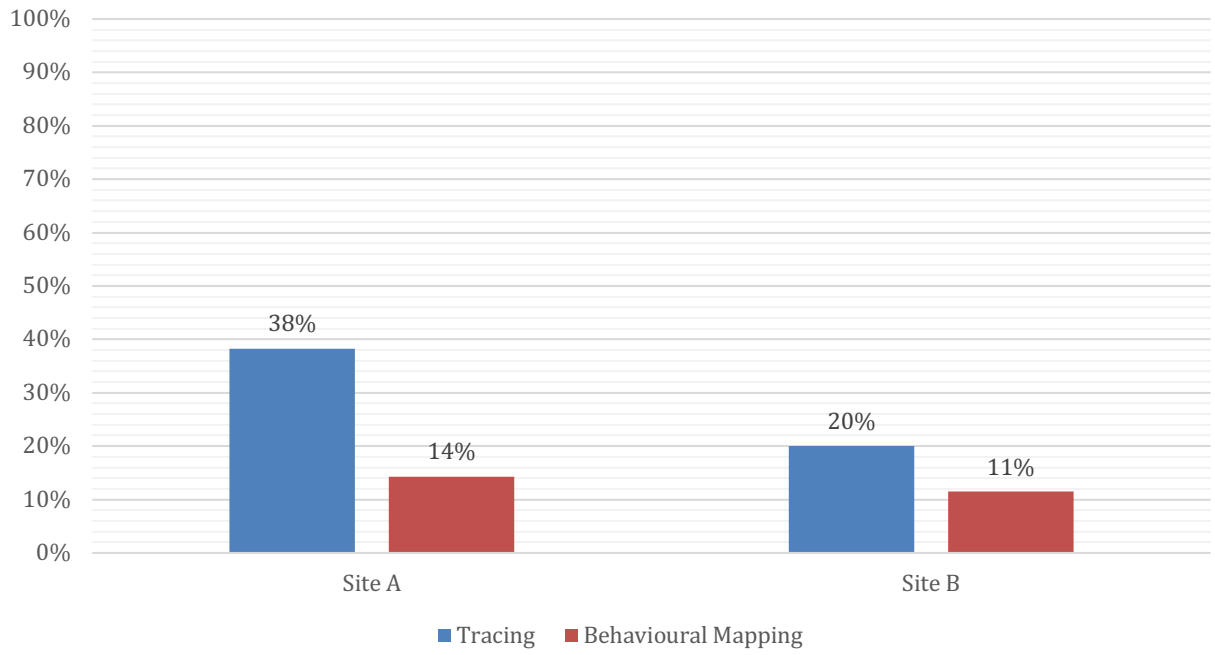
With users consistently spending more time at Site A than Site B, the analysis suggests Site A is better activated than Site B. However, with the average user spending no more than one to four minutes at a given site, the data suggests the overall Trail is predominantly used as an active transportation corridor rather than a community gathering space that invites people to linger for long periods of time.

Site Area Usage

To provide an approximate measure of site area traversed by Trail users during both tracing and behavioural mapping observation periods, each study site was divided into a 16 by 24 grid of 10 m by 10 m squares, for a total site area of 38,400 m^2 for each of the two study sites. Every time a user was registered within a square, the area of that square was included in the total

used site area for each site. Figure 5.22, compares the total site area used during both tracing and behavioural mapping observation periods.

Figure 5.22: Tracing and behavioural mapping - share of total study site area used



As shown in Figure 5.22, nearly twice as much site area was covered by Trail users at Site A (38%) than at Site B (20%) during tracing observations. By comparison, 25% more site area was covered by users at Site A (14%) than at Site B (11%) during the peak periods observed for behavioural mapping. These findings suggest Site A is better activated than Site B for this metric.

Given that a majority of the observed activity on both sites took place on the designated skating path and walking trail, the wider ice sheet at Site A may appear to give it an advantage over Site B for this particular metric. However, despite this apparent advantage, when disregarding all traffic along the designated skating and walking surfaces, over ten times the remaining site area was traversed by Trail users at Site A (21% of total site area) than Site B (2% of total site area) during tracing observations. This decreased to 2% and 1% for Site A and Site

B, respectively, for behavioural mapping observations. Therefore, even when compensating for the width of the ice sheet, observations suggest Site A remained better activated than Site B along this metric.

The Warming Hut Effect

In combination, the above metrics suggest Site A is significantly more activated than Site B, despite Site A observations being taken on days with overall lower Trail traffic volumes than Site B. If one assumes Site A's slightly closer proximity to the Forks and its wider ice sheet dimensions have a minimal impact on user volumes – it is worth noting the proportion of skaters at Site A was lower than Site B despite its wider ice sheet – the presence or absence of Warming Huts is the most prominent site-specific difference between the two study sites and, therefore, the most likely influencing factor on observed trends.

The share of users observed interacting with Warming Huts at Site A (38%) suggests they were a major influence on user behaviour and a potential motivation for site visits from a diverse user group. This is supported by the number of user path diversions that could be attributed to the Warming Huts, as evidenced in the travel patterns shown in the tracing maps, and by the pronounced clustering of users surrounding the Warming Huts, particularly *Hygge House* and *Shelterbelt*, as shown in the behavioural maps.

Further supporting this is additional tracing analysis of those users who interacted with the Warming Huts, including *Recycling Words*. As shown in Figures 5.23 and 5.54, users characterized as youths or part of a group of three or more, two demographics with a greater presence at Site A, interacted the most with installations at both sites. At Site A, a majority of these demographics interacted with Warming Huts and interaction was also much higher amongst other demographics at Site A than those interacting with *Recycling Words* at Site B.

Figure 5.23: Tracing - share of each user demographic that interacted with Warming Huts

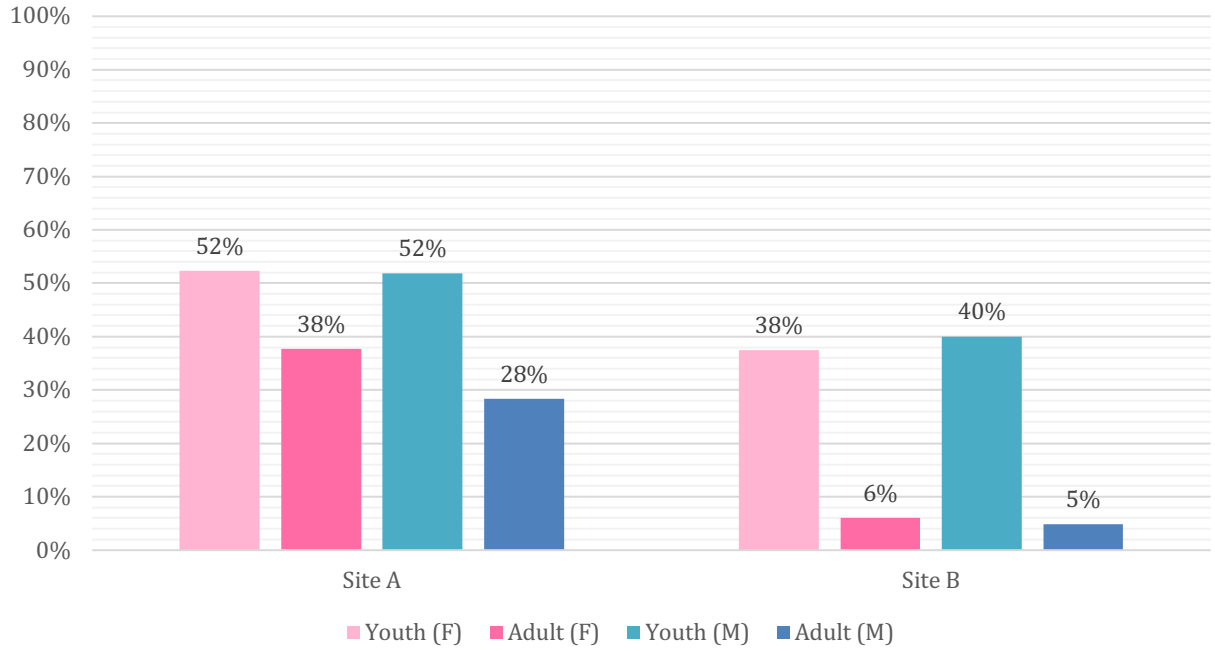
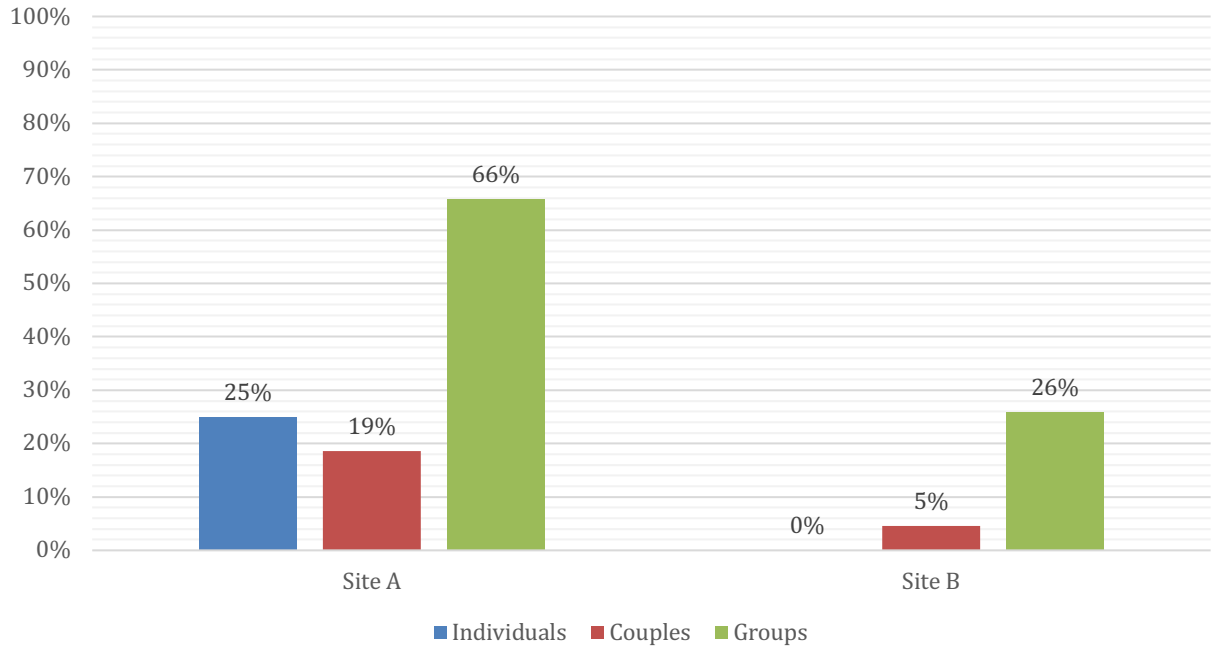


Figure 5.24: Tracing – group composition of users that interacted with Warming Huts



In addition to providing a direct source of distraction and enjoyment for Trail users, the behavioural trends at the two sites suggest the Warming Huts were also an indirect catalyst for

other behaviours, including stationary activities, such as standing and sitting, and passive social activities like people watching. The presence of Warming Huts ultimately encouraged users to spend more time at the site, cover more ground, and better activate the space at Site A than Site B.

5.4 Summary

This chapter provided a framework for comparing pedestrian activation at two sites along the Trail using a series of six metrics, including user volume, user diversity, behavioural diversity, social interaction, time spent on site, and site area usage. In conjunction with this framework, two mapping techniques – tracing and behavioural mapping – were used to analyze fieldwork observations and provide insight into pedestrian movement, behaviour, and characteristics in both the absence and presence of Warming Huts. The findings and additional considerations that arose from this analysis will be used to inform the final recommendations in Chapter 7 and contribute to answering the three key research questions in Chapter 8.

5.5 Key Considerations

- Six metrics, including user volume, user diversity, behavioural diversity, social interaction, time spent on site, and site area usage, provide a framework for measuring pedestrian activation.
- Site A had twice as much user traffic as Site B.
- Fieldwork observations confirm pedestrian count findings that weekend pedestrian traffic is higher than week day traffic and afternoon traffic is higher than morning traffic.
- Site A attracted nearly twice as many youths as Site B, where nearly half of traffic was adult males.

- A greater majority of Site B users travel through the site in a straight line than Site A users.
- Site A users traveled in a greater diversity of path types than Site B users.
- A greater majority of Site B users were observed skating than Site A users.
- Twice as many Site A users were observed walking and sitting than Site B users.
- A larger share of Site A users participated in stationary activities than Site B users.
- A larger share of Site A users participated in secondary activities than Site B users.
- Social activities were the most commonly observed set of secondary activities at both sites.
- Over a third of all Site A users were observed interacting with Warming Huts, with youths and groups of three or more interacting with them the most.
- A larger share of Site A users composed a group of three or more than Site B users.
- At both sites, couples were more common than solitary individuals or groups of three or more, except during periods of peak user volume, when groups of three or more composed a comparable (Site B) or larger (Site A) share.
- Social activities, especially people watching, were more common at Site A than Site B.
- Users spent over 50% longer at Site A than Site B on average.
- Users traversed nearly twice as much area at Site A than Site B.
- Site A was better activated than Site B along all metrics.

CHAPTER 6 | DESIGN ANALYSIS

This chapter compares the design characteristics of the Warming Huts against a typology of ludic design elements, which was developed through an analysis of real-world case studies and literature on play, public space, and design for winter cities (Donoff, 2014). This chapter also provides greater detail on the research methods used in the analysis, including typologies; introduces the specific typology used; and presents a detailed analysis and application of the typology to the individual Warming Huts installed along the Trail. Finally, a revised typology incorporating the findings of this analysis is presented.

The intent of this analysis is to explore the degree to which the Warming Huts incorporate playful design elements, answering research question (2). This analysis also identifies new playful design strategies, including features unique to the winter city context, helping to answer research questions (1) and (3).

6.1 Methods

Typologies

The following chapter applies a typology of ludic design elements to identify specific aspects of playful design incorporated into the Warming Huts. A typology can be described as a "coordinated set of categories or types that establishes theoretically relevant analytic distinctions" (Seawright & Collier, 2010, p. 356). Using a typology allows one to organize information into related categories to create a conceptual tool that is useful for comparative analysis. According to Lang (2017), typologies allow their users to "draw on the cumulative experience of the design fields in creating and implementing urban design schemes" (p. 4). Typologies are commonly used to characterize non-ludic urban design elements and are particularly effective tools for analyzing case study examples (Lang, 2017; Moughtin, 2003; Zucker, 1959).

Design Case Studies

Within the field of design, case studies can be defined as "descriptive and explanatory statements of the geometric qualities of specific designs" (Lang, 2017, p. 4). In this context, case studies are essentially design precedents, and should not be confused with the broader case study approach described in Section 1.4. According to Lang (2017), "the organization of urban design types through the description and analysis of a series of case studies enables professionals and lay people alike to understand the scope of the field" and "can provide empirical evidence of processes and methods used to achieve specific design ends" (p. 4). For the purposes of this analysis, each Warming Hut can be considered a design case study, or design precedent, and is supported by project images, a descriptive statement on its design philosophy written by its creator(s), and in-person naturalistic observations.

6.2 Defining Ludic Design

The specific typology used for the following analysis was developed by Gabrielle Donoff in her 2014 Master's thesis on ludic design. Donoff (2014) characterizes the 44-element typology as "a typology of playful pedestrian motivators... [that] highlights key processes and design elements for incorporating play into the urban environment" and organizes the elements under three broad categories: play type, design, and implementation (p. 136). Her typology was created through a review of literature on public space, winter cities, and urban play and through an analysis of 27 internationally distributed case studies, providing a balance of theory and real-world application (Donoff, 2014, p. 14).

A modified version of the typology was subsequently published by Donoff and Bridgman in 2017, which removed the winter-specific elements of Donoff's original version. Given the winter context explored in Donoff's original thesis and the potential for the winter-specific

elements she identified to inform the analysis of Warming Hut designs, and vice versa, her original typology is the version used for the following analysis.

Donoff's (2014) original "typology of ludic ways to increase pedestrian activity" is presented in Figure 6.1 below (p. 138).

Figure 6.1: Donoff's (2014) typology of ludic ways to increase pedestrian activity

PLAY TYPE	DESIGN	IMPLEMENTATION
Acting contrary to social convention	Attractive colours	Busy location
Adaptation of a well known game type	Bicycle infrastructure	Guerrilla installation
Auditory stimulation	Biomimicry	Infill in underused space
Chance	Celebrates northern spirit or aesthetic	Microclimate
Cognitive games	Fire or solar gain for warmth	Opportunity to people watch
Competition	Imageability	Reduce actual or perceived travel distance
Cooperation	Multigenerational appeal	Route choice or environmental mastery
Creative play	Materials intentionally absorb or reflect heat	Sense of belonging & community connection
Opportunity to escape	Pedestrian lighting	Temporary, pop-up, or seasonal
Opportunity to increase social contact	Scientific design	Uses existing infrastructure
Risk	Unique paths (e.g. width, texture)	Use of social media or pop culture
See cause & effect	Uses ice, snow, or wind as a positive feature	
See or move beyond boundaries	Use of common, everyday materials or objects	
Separate from everyday experience	Use of props to alter movement	
Simulation	Vibration	
Test of physical skills	Water	
	Written instructions	

6.3 Applying the Typology

A total of 16 Warming Huts are characterized below, including a project description, an overview of the creator's design philosophy, a list of applicable elements from Donoff's (2014) typology, a list of other key features not covered by the typology, and illustrative project images. The following case study examples include all those interventions installed along the Trail during the 2016 season, as shown in Figure 3.6 in Chapter 3, listed in order of appearance as one travels from the northern to the southern terminus of the Trail.

SKYBOX by the Faculty of Architecture, University of Manitoba, Winnipeg, Manitoba

Description

SKYBOX was one of the selected winners for the 2014 iteration of the Warming Huts design competition and was located at The Forks Historic Port, the northern terminus of the Trail, in 2016. From the exterior, *SKYBOX* appears as a large rectangular box covered in wood paneling, with no roof and two opposing openings for access to the inside. The interior, entirely covered in reflective metal panels, contains a built-in bench with a backing wall tilted at a 45-degree angle, which provides "an illusion of the visitors sitting amongst the changing winter skies" and also serves as an impromptu slide (Warming Huts, 2014a, para. 1). The walls on either side of the bench include written instructions for posting photos of the installation to online social media platforms.

Design Philosophy

> SKYBOX creates the visual emersion of people against a background not normally considered, the sky. Winnipeg's trademark aspect is its winter weather, and SKYBOX aims to create a mesh between the transforming weather conditions and the community… SKYBOX embraces the current generation's fascination with social media by creating a photographic opportunity amongst the changing skies. Through the process of uploading images with the tagline #SKYBOX, Winnipeg's community can interact with and promote The Fork's River Trail on an international scale. (Warming Huts, 2014a, para. 1)

Typology Elements

Opportunity to escape | Opportunity to increase social contact | See or move beyond boundaries | Separate from everyday experience | Simulation | Celebrates northern spirit or aesthetic | Materials intentionally absorb or reflect heat | Use of props to alter movement | Written instructions | Busy location | Microclimate | Sense of belonging & community connection | Temporary, pop-up or seasonal | Use of social media or pop culture

Other Features

Reflective materials | Contrasting materials | Visual stimulation | Optical illusion | Heightened self-awareness | Self-expression | Celebrates place or culture | Use of natural elements | Permeability | Change of perspective | Celebrates the natural world

Figure 6.2: SKYBOX

Red Blanket by Workshop Architecture Inc., Toronto, Ontario

Description

Red Blanket was another winner of the 2014 Warming Huts design competition and, in 2016, was installed under The Forks Historic Rail Bridge spanning the mouth of the Assiniboine River. The installation consists of five (originally ten) long and narrow fabric sheets made from bright red felt that hang from the bridge deck and extend across the Trail. Elevated a few feet above the groomed ice surface, the sheets invite passersby to interact with and move through them and can "act as a warm blanket for people to wrap themselves in, one or two at a time" (Warming Huts, 2014b, para. 1).

Design Philosophy

> Red Blanket will be a visual marker against the surrounding white winter palette. It will be seen by skaters far in the distance. First as a red speck, then, as you skate closer, you will see the dense fabric panels swaying under heavy winds. The wall of thick felt will be angled to protect skaters from prevailing wind and provide a sunny spot. Each of the ten panels is sized to be the width and length of a single roll of bright red felted wool. A rod will be affixed at each panel's top end and hung in two parallel lines from the underside of one of the bridges crossing the Assiniboine or Red River… Simple wooden benches will be slid into place by skaters as required to create different groupings from a single person lacing up their skates to a small group gathering to share hot cocoa. (Warming Huts, 2014b, para. 1)

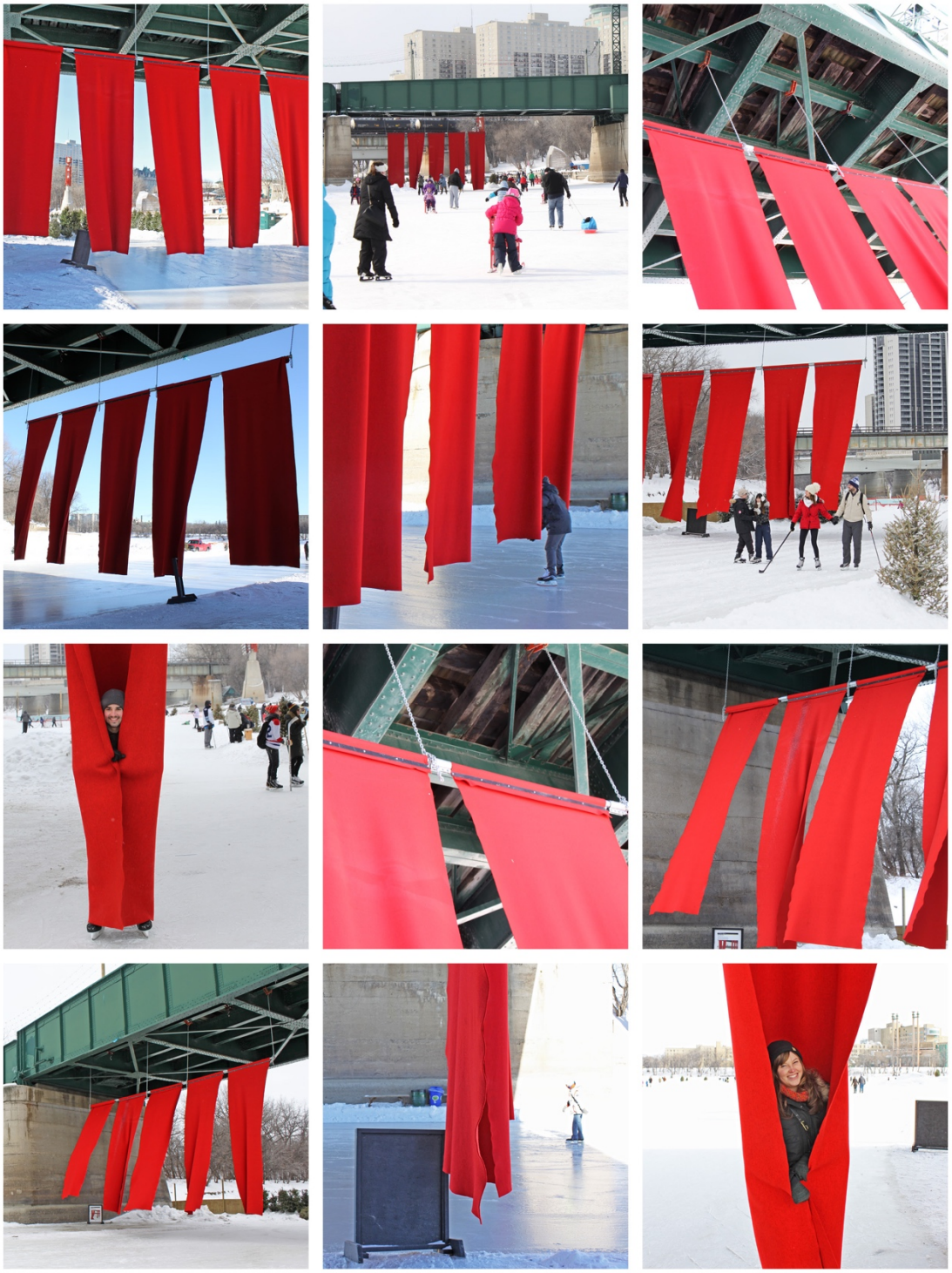
Typology Elements

Opportunity to increase social contact | See cause & effect | See or move beyond boundaries | Separate from everyday experience | Attractive colours | Imageability | Multigenerational appeal | Use of common, everyday materials or objects | Use of props to alter movement | Infill in underused space | Microclimate | Opportunity to people watch | Temporary, pop-up or seasonal | Uses existing infrastructure

Other Features

Visual stimulation | Tactile stimulation | Permeability | Opportunity for romance | Movement | Malleability

Figure 6.3: Red Blanket



In the Light of the Kudluk by Tanya Tagaq & Sputnik Architecture, Winnipeg, Manitoba

Description

In the light of the Kudluk was a winner of the 2016 Warming Huts design competition and was installed adjacent to the walking path on the north side of the ice sheet near the entrance to The Forks Historic Port. The installation consists of two parts: a rusted steel frame mould and a sculptural casting made from ice and snow. Both components are punctuated by openings, projections, and hard angles, which unintentionally invite people to climb and crawl through the structures. The casting, being constructed of snow and ice, gradually breaks down from melt and wear, giving it a dynamic and ephemeral form that changes and diminishes over time.

Design Philosophy

> A rusting steel vessel will form a large snow facetted sculpture that elicits a sense of mystery and reverence for the value and beauty of life. Placed on the river in order that the sculpture faces the four cardinal directions. North, East, South and West, each representing a stage of life – infant, youth, adult, and elder. The play of light on the sculpture was carefully considered as representation of four animals – the musk ox, the raven, the lemming, and the wolf. The sculpture will be lit at night by 1800 individual lights. Each light representing a life we must not forget. The steel vessel will be turned inside out and can be used as a traveling exhibit during the non-snow seasons in anticipation of the new season of snow. (Warming Huts, 2016b, para. 1)

Typology Elements

Creative play | See cause & effect | See or move beyond boundaries | Test of physical skills | Celebrates northern spirit or aesthetic | Multigenerational appeal | Pedestrian lighting | Uses ice, snow, or wind as a positive feature | Temporary, pop-up or seasonal

Other Features

Visual stimulation | Permeability | Use of natural elements | Malleability | Self-expression | Deconstruction | Celebrates the natural world | Celebrates place or culture | Contrasting materials | Use of in situ materials | Changes over time | Ephemeral

Figure 6.4: In the Light of the Kudluk

Wind Catcher by Tina Soli & Luca Roncoroni, Norway

Description

Wind Catcher was one of the selected winners for the 2012 iteration of the Warming Huts design competition and, in 2016, was located adjacent to the walking path where the Trail curved south from The Forks Historic Port towards the Norwood Bridge. From the exterior, the installation appears as a large blue rectangular box with a small inward-facing funnel-shaped hole in one side and the opposing side fully open to expose its interior. Its orange interior is empty except for the tube-like end of the aforementioned hole projecting into the centre, which is supported above and below by a set of vertical metal rods. The hole is a popular piece of climbing equipment, described by the designers as "a toy/play-element, a photo opportunity framing people and landscape, [and] a resting spot" (Warming Huts, 2012a, para. 1). The designers also describe the installation as including "swings hanging from the ceiling," though there was no evidence of this during the 2016 season.

Design Philosophy

> Wind Catcher is a simple (furniture-like) structure, a "hole in the wall." Our goal is to create a playful architecture, an object that stimulates curiosity, desire to interact and to discover. At the same time we would like the weather, in particular the wind, to play an active role with the architecture and to communicate with the public. This might be with sound, like a horn, or with "snow-formations" that build up around the hut, enlarging the physical space and making the hut constantly changing throughout the winter… this hut is a perfect entertainment area for the whole family. Strong colours emphasize the shapes and their functions, in contrast with the surrounding landscape. (Warming Huts, 2012a, para. 1)

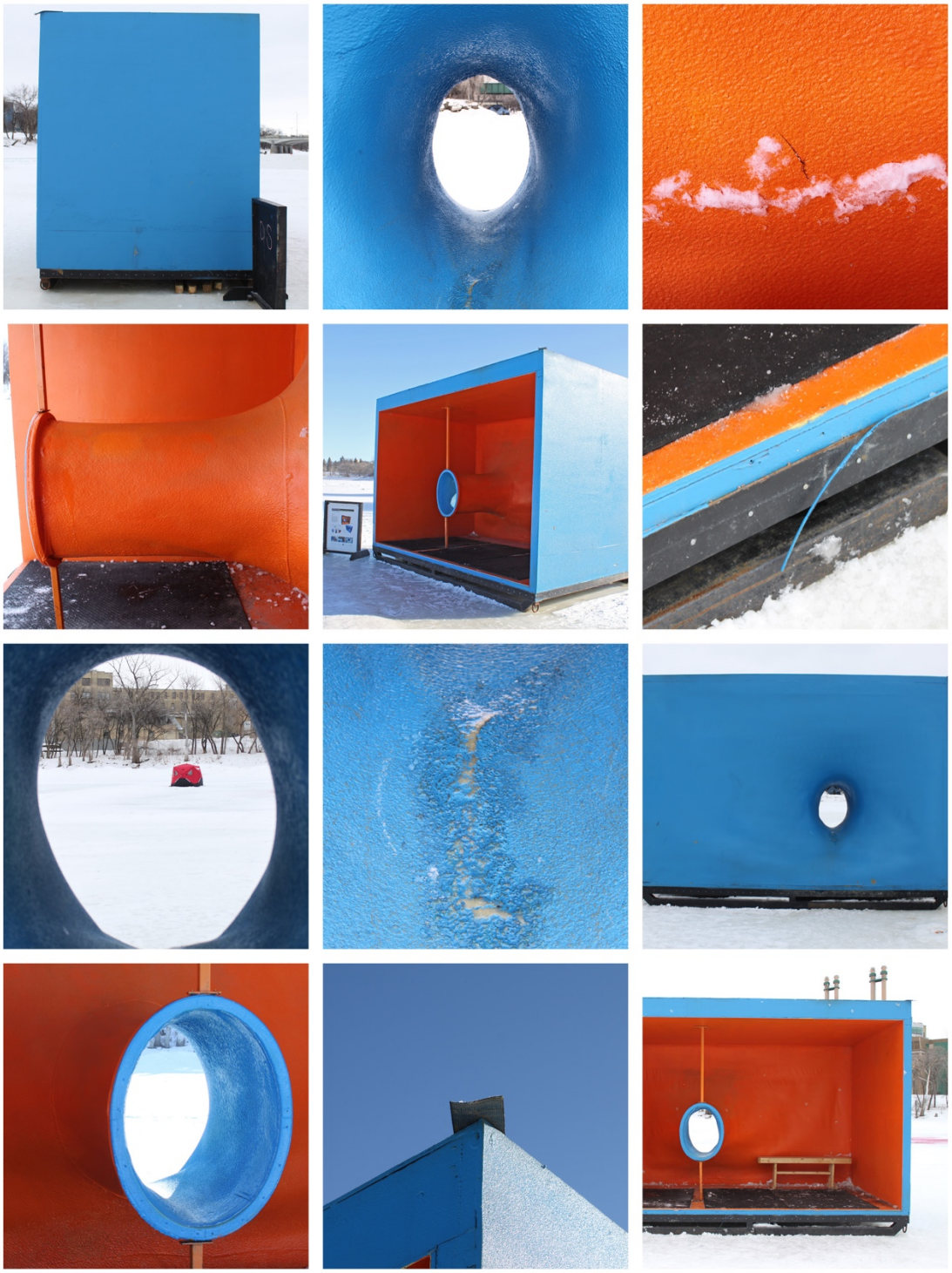
Typology Elements

Acting contrary to social convention | Auditory stimulation | Opportunity to increase social contact | See or move beyond boundaries | Separate from everyday experience | Test of physical skills | Attractive colours | Multigenerational appeal | Uses ice, snow, or wind as a positive feature | Use of props to alter movement | Microclimate | Opportunity to people watch | Temporary, pop-up or seasonal

Other Features

Self-expression | Visual stimulation | Permeability | Use of natural elements | Change of perspective | Framing | Changes over time | Refuge

Figure 6.5: Wind Catcher



Ice Maze by Andreas Mede, Woodside, California

Description

Ice Maze was a winner of the 2016 Warming Huts design competition and was located adjacent to the walking path on the east side of the ice sheet between The Forks and the Norwood Bridge. As the name suggests, the installation is a maze built of compacted snow and ice that encourages people to explore and challenge their navigation skills. Similar to *In the Light of the Kudluk*, *Ice Maze* gradually breaks down from melt and wear. This, accelerated by people's tendency to write names and messages in and physically break through maze walls, means the installation is in a constant state of change.

Design Philosophy

> Ice Maze is an interactive art installation, a temporary sculpture designed to allow children to experience movement through a variety of spatial situations, from tight restrictions to openings into greater spaces dominated by the sky. The idea is for children to engage with the space and have fun; to create their own mysteries, to get lost, to find their way. Once inside, the child's senses are dominated by the sky, by the ice, and the dimensions of a variety of spaces; the outside world is (for the moment) set aside. Constructed of blocks of ice, cut from the river, stacked and sprayed with a fine mist of water creating a solid sheen of ice. In spring, it crumbles and is gone; the memory remains, then also fades with time. (Warming Huts, 2016c, para. 1)

Typology Elements

Adaptation of a well-known game type | Cognitive games | Competition | Cooperation | Creative play | Opportunity to escape | See cause & effect | See or move beyond boundaries | Simulation | Test of physical skills | Celebrates northern spirit or aesthetic | Multigenerational appeal | Unique paths | Uses ice, snow, or wind as a positive feature | Microclimate | Route choice or environmental mastery | Temporary, pop-up or seasonal

Other Features

Self-expression | Permeability | Use of natural elements | Use of in situ materials | Change of perspective | Framing | Deconstruction | Malleable | Tactile stimulation | Changes over time | Ephemeral

Figure 6.6: Ice Maze

Hygge House by Plain Projects, Urbanink, and Pike Projects, Winnipeg, Manitoba

Description

Hygge House was a winner of the 2013 competition and was located on the east side of the Trail between The Forks and the Norwood Bridge. The installation is essentially a full-scale diorama of a small wilderness cottage, complete with a modest kitchen, dining area, windows, decorations on the wall, and other token cottage props. However, while the exterior walls are painted jet black, the interior and everything in it is painted a bright fluorescent yellow. Hygge House provides a familiar, yet surreal, space for people to take refuge from the elements, relax with friends, interact with its many props, and feel as though they have been transported elsewhere.

Design Philosophy

> Hygge House is cozy. It is a simple wood framed structure; a reproduction of one of the most cherished symbols of Canadiana – the wilderness cottage. Within Hygge House, artifacts of cottage life set the stage for an authentic depiction of the comfort and familiarity of the weekend getaway. The entire interior of Hygge House is painted fluorescent yellow. Coating the contents not only creates a warm, inviting space, sheltered from the wind – it also creates a stage set where the visitors to Hygge House become essential components of the experience. Although the house is full of mounted antlers and fish, warm blankets, a working wood stove, old baseball hats, comic books, plaid shirts, and old tins of matches, Hygge is only truly achieved when people come together Hygge House becomes a place for warmth and togetherness. (Warming Huts, 2013a, para. 1)

Typology Elements

Acting contrary to social convention | Creative play | Opportunity to escape | Opportunity to increase social contact | Separate from everyday experience | Simulation | Attractive colours | Celebrates northern spirit or aesthetic | Fire or solar gain for warmth | Imageability | Multigenerational appeal | Use of common, everyday materials or objects | Microclimate | Opportunity to people watch | Temporary, pop-up or seasonal

Other Features

Celebrates place or culture | Visual stimulation | Tactile stimulation | Olfactory stimulation | Changes over time | Refuge

Figure 6.7: Hygge House

Shelterbelt by Robert B. Trempe Jr., Lincoln, Nebraska

Description

Shelterbelt was a winner of the 2016 Warming Huts design competition and was located on the east side of the Trail between The Forks and the Norwood Bridge. The installation is composed of "several hundred steel [rebar] stalks of varying lengths… anchored vertically to a [rectangular] base, creating a protective screen" (Warming Huts, 2016d, para. 2). Two openings in the rebar provide access to the interior, where there is seating for people looking to take shelter from the elements. The rebar bends and "oscillates" from blowing wind and the touch of Trail users, creating a dynamic environment, audible rustling, and a well-screened "secret world for its occupants" (Warming Huts, 2016d, para. 2).

Design Philosophy

> The beauty of barren trees and tall grass in the winter prairie is matched only by the sounds of their branches and brush moving in the wind from the plains. It's a constant and subtle rustle that becomes both audible landmark and sonic envelope. These Shelterbelts, planted by farmers, operate as protective areas for animal feeding as well as landmarks and delineations on the open landscape.
>
> This 'Shelterbelt' seeks to reimagine the qualities of these windbreaks through an environment of steel rebar… Wind and the movement and interaction of those inside the installation causes the rebar to oscillate and collide, creating an almost constant metallic rustle; a sound field becomes an audible landmark and a sonic envelope for its inhabitants. (Warming Huts, 2016d, paras. 1-2)

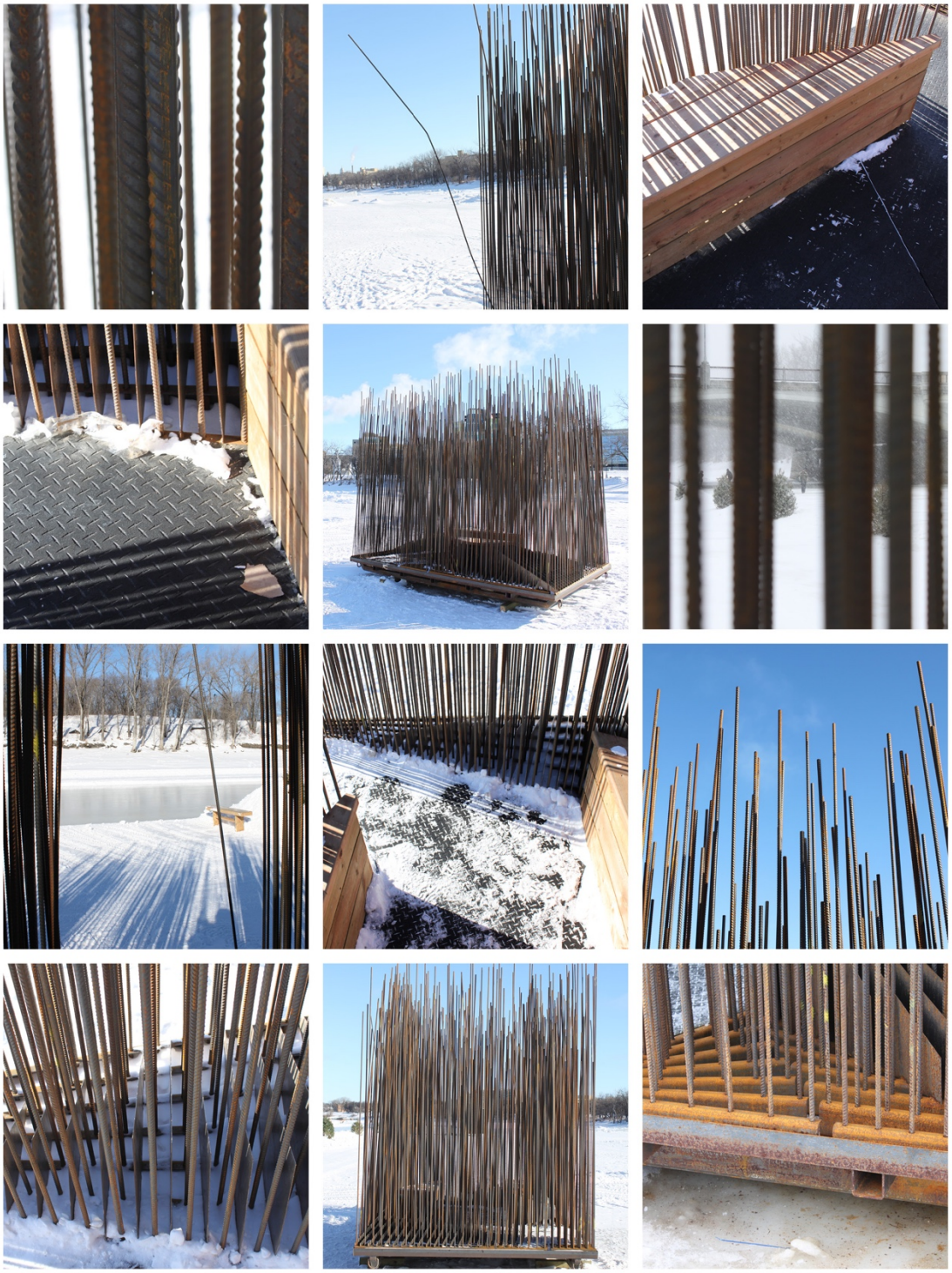
Typology Elements

Auditory stimulation | Opportunity to escape | See cause & effect | See or move beyond boundaries | Uses ice, snow, or wind as a positive feature | Use of common, everyday materials or objects | Vibration | Microclimate | Temporary, pop-up or seasonal

Other Features

Celebrates place or culture | Permeability | Visual stimulation | Tactile stimulation | Movement | Malleability | Use of natural elements | Refuge

Figure 6.8: Shelterbelt



Temple by Kirill Bair & Daria Lisitsyna, Russia

Description

Temple was another winner of the 2016 Warming Huts design competition and was located on the east side of the Trail to the north of the Norwood Bridge. The form of the installation is inspired by "ancient Greek places of worship" and is constructed from "steel fuel drums and pieces of recycled material," including black PVC pipes and corrugated metal sheets (Warming Huts, 2016e, para. 1). Inside, PVC pipes are loosely suspended in rows between the steel drum columns, where they are free to swing in the wind or from the push of a Trail user. The pipes make a distinct percussive thud as they collide with one another and catch the attention of passersby attracted by the obstacle-course-like challenge of running from one end of *Temple* to the other while dodging the swinging obstructions.

Design Philosophy

> …it is possible to build a temple and worship all that is connected with it. At the same time, some choose to worship things that have no meaning without any special place. At this Temple, you can hear buzzing noises and metal pipes inside knocking against one another. This Temple is a form without content. A place of worship connected only to the wind that celebrates new life for forgotten items. But do we choose to worship or not? (Warming Huts, 2016, para. 1)

Typology Elements

Auditory stimulation | Competition | Creative play | Opportunity to increase social contact | Risk | See cause & effect | See or move beyond boundaries | Test of physical skills | Uses ice, snow, or wind as a positive feature | Use of common, everyday materials or objects | Use of props to alter movement | Opportunity to people watch | Route choice or environmental mastery | Temporary, pop-up or seasonal

Other Features

Celebrates place or culture | Permeability | Visual stimulation | Tactile stimulation | Movement | Malleability | Use of natural elements | Heightened self-awareness

Figure 6.9: Temple

Under the Covers by Robert B. Trempe Jr., Philadelphia, Pennsylvania

Description

Under the Covers was a winner of the 2011 iteration of the competition and was placed between the ice sheet and walking path to the south of the Norwood Bridge. The installation is designed to appear as though a flap has been cut in the snow and lifted up to reveal green grass beneath. The resulting cave-like form has a white wooden exterior with green artificial grass lining the inside. The interior includes a wooden bench where people can rest and take shelter from the winter elements. The exterior is covered with horizontal wooden rungs to assist with enveloping the outer wall in snow; however, these more often end up supporting risk-taking climbers.

Design Philosophy

> The conceptual design comes from the very simple idea of splitting and peeling a pre-existing fabric. Its design development makes use of a technique in computational modeling that uses the act of "peeling" as logic towards its formal articulation. The construction technique then makes use of the same computational modeling system for the quick and precise generation of drafted construction documents. (Warming Huts, 2011, para. 1)

Typology Elements

Opportunity to escape | See or move beyond boundaries | Simulation | Test of physical skills | Risk | Attractive colours | Uses ice, snow, or wind as a positive feature | Microclimate | Temporary, pop-up or seasonal

Other Features

Visual stimulation | Tactile stimulation | Contrasting materials | Optical illusion | Change of perspective | Use of natural elements | Refuge

Figure 6.10: Under the Covers

Windshield by Kate Busby & Bella Totino, Vancouver, British Columbia

Description

Windshield was a winner of the 2014 Warming Huts design competition and, in 2016, was placed between the ice sheet and the walking path to the north of Lyndale Drive Park. The installation is composed of a large, colourful fabric sail, with a base that forms a semi-circular wall and is attached to a rotating circular platform. The disc and the sail's unique design allow the installation to turn to face the direction of the wind. When someone is standing on the platform, the semi-circular wall moves with the sail and shields them from the wind. A post with a horizontal steering wheel protrudes from the centre of the platform and allows users to manually rotate the sail, and themselves, as desired.

Design Philosophy

> Windshield is a five-metre tall wind vane that counters prevailing winds to protect its occupants. The vertical shelter is supported on a circular rotating steel base. Its modern aluminum frame and fabric skin are based on the tectonics of the early birch-bark canoes that would travel down the Assiniboine in the summer months. The light frame allows the shelter to adapt to changing wind pattern by rotating to protect its users from exposure to the elements…The shelter stands proud as a landmark feature along the frozen river, inviting new visitors to test its wind breaking abilities… (Warming Huts, 2014c, para. 1)

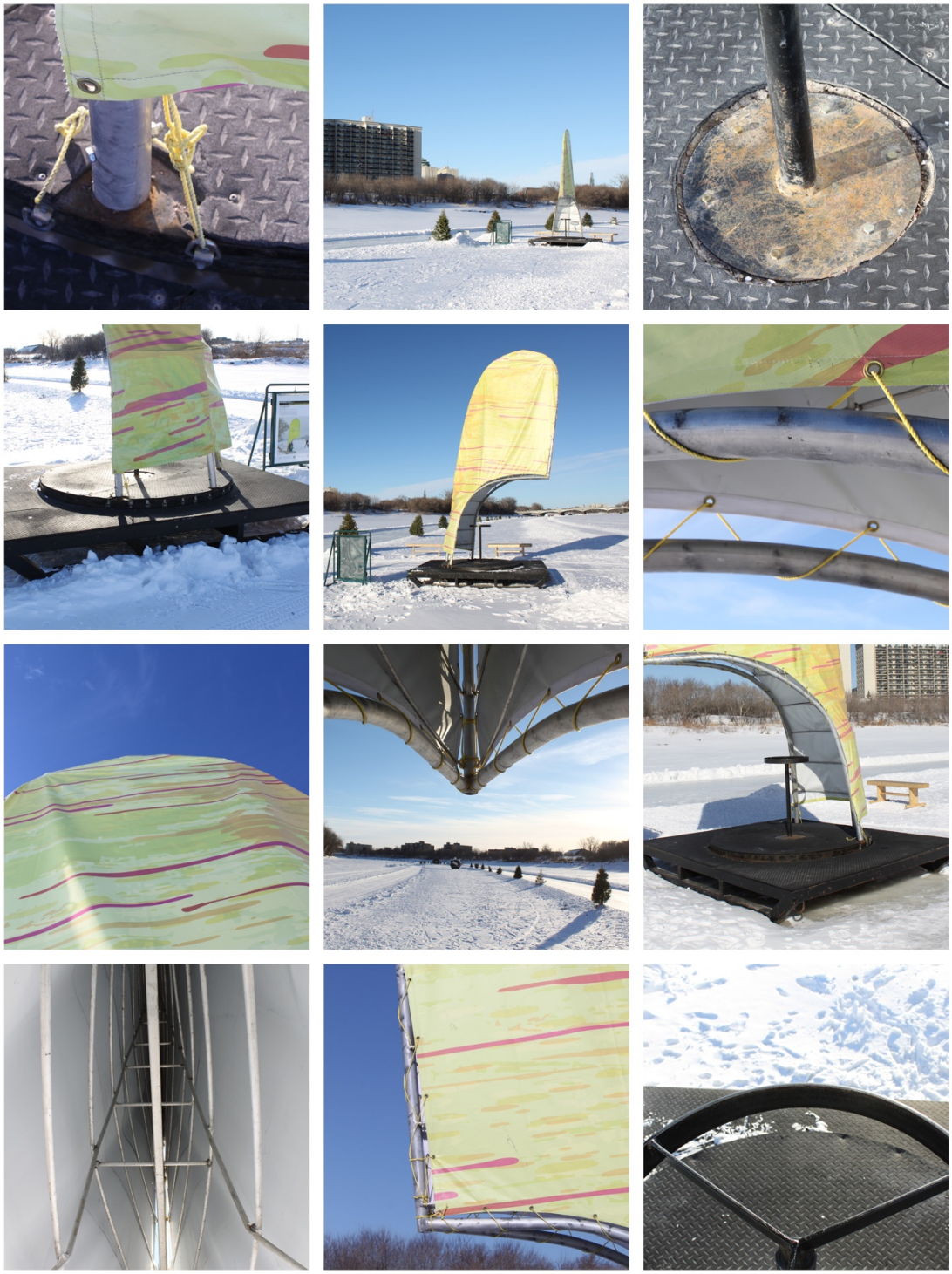
Typology Elements

See cause & effect | Test of physical skills | Attractive colours | Celebrates northern spirit or aesthetic | Imageability | Multigenerational appeal | Scientific design | Uses ice, snow, or wind as a positive feature | Use of props to alter movement | Microclimate | Opportunity to people watch | Temporary, pop-up or seasonal

Other Features

Vertigo | Visual stimulation | Movement | Celebrates place or culture | Use of natural elements | Mechanical control | Refuge

Figure 6.11: Windshield



The Hole Idea by Weiss Architecture & Urbanism Limited, Toronto, Ontario

Description

The Hole Idea was a winner of the 2015 competition and, in 2016, was placed between the ice sheet and the walking path near the north end of Lyndale Drive Park. The installation is composed of a large metal culvert, or tube, that is sealed at one end and open for access at the other. A series of smaller culverts of different lengths and diameters protrude out from the main culvert at various locations and angles and have openings at both ends. The interiors of the culverts are painted a variety of bright colours and two long wooden benches provide opportunities for seating inside the main culvert. The main culvert is large enough for most adults to stand in, while the smaller protruding culverts are large enough for children and, in some cases, adults to crawl through. The entire installation is intended to be covered with snow so that one can access all the small culvert openings and crawl from one hole to another through the structure; however, in 2016 the snow added so much weight that the installation broke through the river ice and had to be cleared of snow and relocated.

Design Philosophy

> The portable hole – first developed by Prof. Calvin Q. Calculus in the 1955 Looney Tunes animation, "The Hole Thing" and later sold by the Acme Company – has a troubled history. Almost right from inception, the ominous, mobile void was put to use for evil purposes – first as an effective enabler for a vicious crime spree and later as a means to capture the American desert fowl Geococcyx californianus or as it is commonly known as, "the Roadrunner". It is important to note that the later use always ended up with the direct opposite result than that of the intended; which is likely why the portable hole is no longer commercially available.
>
> This proposal takes as a starting point the portable hole, and by utilizing modern paint technologies, adds color. The resultant 1'6" diameter holes – which can be located anywhere along the snowy banks of the Assiniboine or Red River – are resistant to being co-opted by evil forces (including the greyness of soul-sucking foul weather) due to the sheer cheeriness of the palette of introduced color. Further, a large, bright and yellow 10' diameter hole is horizontally located in a 35' long snow drift and provides skaters a warm and sheltering burrow in the snowy river bank. Since they have an inside and outside, the holes also furnish the shelter with an abundance of light and sky views. (Warming Huts, 2015a, paras. 1-2)

Typology Elements

Acting contrary to social convention | Creative play | Opportunity to escape | Risk | See or move beyond boundaries | Separate from everyday experience | Test of physical skills | Attractive colours | Multigenerational appeal | Uses ice, snow, or wind as a positive feature | Use of common, everyday materials or objects | Use of props to alter movement | Microclimate | Opportunity to people watch | Reduce actual or perceived travel distance | Route choice or environmental mastery | Temporary, pop-up or seasonal

Other Features

Vertigo | Visual stimulation | Tactile stimulation | Permeability | Framing | Use of natural elements | Use of in situ materials | Refuge

Figure 6.12: The Hole Idea

Smokehouse by Aamodt/Plumb Architects, Cambridge, Massachusetts

Description

Smokehouse was a winner of the 2013 Warming Huts competition and, in 2016, was placed between the ice sheet and the walking path by the north end of Lyndale Drive Park. The installation takes the form of a small shack with a central front door. The exterior is clad in burnt wood paneling and the interior is covered in sheets of white felt. Smokehouse is well insulated, providing shelter from the wind and cold as well as creating a quiet, sound-muffled space, convenient for having a cozy conversation with friends. Benches line opposite ends of the hut and a hole in the centre of the ceiling is designed to vent smoke from an interior fire; however, it does not appear to have ever been used for this purpose. The white felt makes a tempting blank slate that compels some visitors to draw and write messages on.

Design Philosophy

> The elemental, pure form of the hut, almost the very symbol of home, rendered in the stark black of charred wood, is nestled in soft white snow. Inside, layers of thick ivory felt line the walls and seating, creating a nestlike interior reminiscent of ancient gathering places strewn with animal pelts. On closer inspection, one discovers that felt layers embossed with delicate patterns and textures, a subtle sanctification of the intimate space. The room has a unique sound, or absence thereof: it is silent, like the sound of new snow on the street.
>
> One enters and leaves through the same door, stooping to duck under the felt draftstop, bending to join the other visitors gathered in the quiet warm space. It is this unfolding of subtle surprises that lies behind the formal quietude of the hut. (Warming Huts, 2013b, paras. 1-2)

Typology Elements

Auditory stimulation | Creative play | Opportunity to escape | Opportunity to increase social contact | Separate from everyday experience | Simulation | Celebrates northern spirit or aesthetic | Microclimate | Temporary, pop-up or seasonal

Other Features

Celebrates place or culture | Tactile stimulation | Contrasting materials | Self-expression | Refuge

Figure 6.13: Smokehouse

Apparition by Antoine Predock Architect & Scatliff+Miller+Murray Landscape Architects, Winnipeg, Manitoba

Description

Apparition was a winner of the 2010 competition and, in 2016, was placed between the ice sheet and the walking path near the centre of Lyndale Drive Park. From the exterior, the Warming Hut looks like the tip of a crumpled metallic iceberg sticking out through the snow. The exterior is clad in layered aluminum sheets supported by an internal wood frame structure. A doorway provides access to the interior, which houses an L-shaped wooden bench and solar-powered lights. While the installation provides a place for people to take shelter from the winter elements, physically manipulating the exterior panels and writing messages around the interior appear to be popular secondary activities among visitors.

Design Philosophy

> A haunting, ambiguous object enmeshed with the ice realm – snow drifts on this geologic microcosm while glaciers in miniature advance and recede in the aluminum folds. Solar fueled lighting within the wooden structural armature focuses the entry aperture with an inviting, glowing promise of inner respite. (Warming Huts, 2010a, para. 1)

Typology Elements

Auditory stimulation | Creative play | Opportunity to escape | Opportunity to increase social contact | Separate from everyday experience | Simulation | Celebrates northern spirit or aesthetic | Pedestrian lighting | Uses ice, snow, or wind as a positive feature | Microclimate | Temporary, pop-up or seasonal

Other Features

Celebration of the natural world | Visual stimulation | Tactile stimulation | Reflective materials | Self-expression | Malleability | Refuge

Figure 6.14: Apparition

HOTHUT by the Faculty of Architecture, University of Manitoba, Winnipeg, Manitoba

Description

HOTHOT was one of the selected winners for the 2012 iteration of the Warming Huts design competition and was located between the ice sheet and the walking path near the Redboine Boat Club in 2016. *HOTHUT* is a large block of foam with uniquely shaped grooves and holes cut out of it, which provide a variety of spaces for standing, sitting, and climbing. Its bright red colour makes it stand out against the white of the surrounding ice and snow, and its uniformly squishy exterior attracts visitors who enjoy testing the foam's durability with pokes, kicks, sharp objects, and heat.

Design Philosophy

> Charged with the task of designing a space that is warm, low-cost and of a limited size, we propose a warming hut made entirely of foam. Providing more than just a break from the wind, HOTHUT is an exploration into foam's inherent structural, visual and acoustic qualities by intensifying the hut's social and cultural experience. Carved from a solid block of high-density foam, HOTHUT is a collection of body spaces that engage visitors. Experiences such as sitting, leaning, standing, kissing, looking through, meeting, stretching, resting, waiting are examples of what give HOTHUT form. HOTHUT playfully questions the relationship between empty and full, positive and negative, contained and exposed, generating spaces to rest and escape in ways that feel both inside and out. (Warming Huts, 2012b, para. 1)

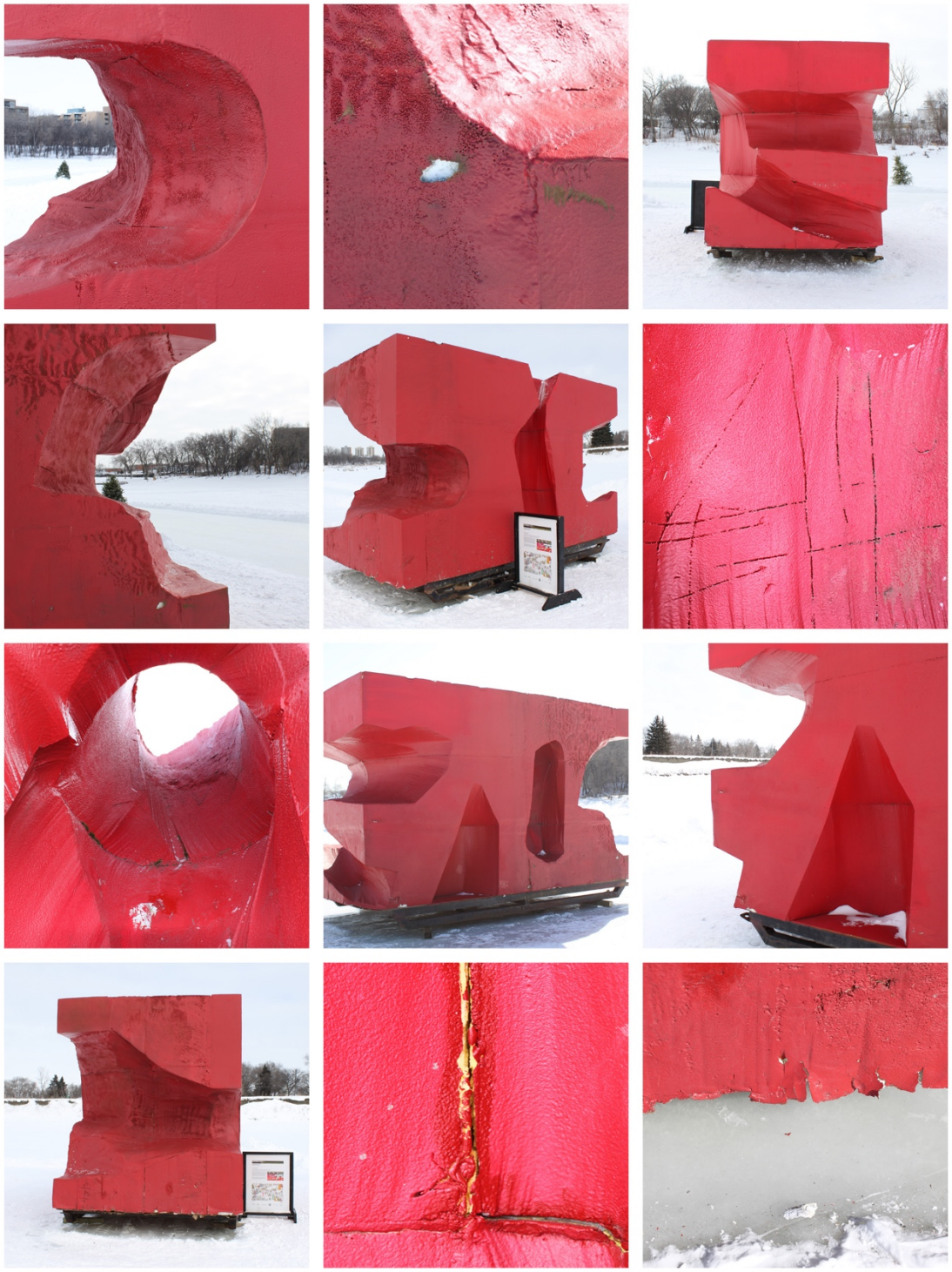
Typology Elements

Acting contrary to social convention | Cooperation | Opportunity to escape | Opportunity to increase social contact | Risk | See or move beyond boundaries | Separate from everyday experience | Test of physical skills | Attractive colours | Imageability | Multigenerational appeal | Use of common, everyday materials or objects | Microclimate | Opportunity to people watch | Route choice or environmental mastery | Temporary, pop-up or seasonal

Other Features

Visual stimulation | Tactile stimulation | Malleability | Permeability | Framing | Deconstruction | Opportunity for romance | Refuge

Figure 6.15: HOTHUT



Fir Hut by Richard Kroeker and Neil Forrest, Halifax, Nova Scotia

Description

Fir Hut was a winner of the 2010 Warming Huts design competition and, in 2016, was located on the edge of an enlarged rounded section of the ice sheet adjacent to the Manitoba Canoe & Kayak Centre, which was the most southern extent for Warming Hut installations. The hut is a triangular-prism-shaped wood structure with a thatched fir bough roof and two openings on either side. The interior contains two wooden benches along opposing sides of the hut. The hut once incorporated reused aluminum cans into its structure, but these have since disappeared.

Design Philosophy

> The Fir Hut borrows inspiration from early Aboriginal designs and materials. The project is an exhibition of the combination of these ancient techniques with modern materials (pop cans) in a seamless new whole. Richard learned the technique of thatching balsam fir from the Mi'kmaq people of Atlantic Canada. (Warming Huts, 2010b, para. 1)

Typology Elements

Opportunity to escape | Opportunity to increase social contact | Separate from everyday experience | Celebrates northern spirit or aesthetic | Use of common, everyday materials or objects | Microclimate | Opportunity to people watch | Temporary, pop-up or seasonal

Other Features

Olfactory stimulation | Celebrates place or culture | Use of natural elements | Contrasting materials | Permeability | Framing | Opportunity for romance | Refuge

Figure 6.16: Fir Hut

Recycling Words by KANVA Architecture, Montréal, Québec

Description

Recycling Words was a winner of the 2015 Warming Huts design competition and can be found scattered all across the Trail. The installation is composed of a large number of red chairs each mounted to two red skis, making them into de facto sleds. They provide an alternative means of moving across the ice surface and are well used by people of all ages. Typically, one person will sit in a chair while a friend pushes them from behind, but people can be seen using one or more at a time in a variety of different configurations and seating arrangements. They are particularly popular among young couples and for racing against friends.

Design Philosophy

> Recycling Words is an interactive art installation that assembles everyday objects and words to create a playful river narrative. Drawing reference to the physical and vocal exchanges that historically flocked the Red and Assiniboine rivers on canoe, Recycling Words offers a new cultural and social means of gathering along the Red River Mutual Trail. (Warming Huts, 2015b, para. 1)

Typology Elements

Acting contrary to social convention | Adaptation of a well-known game type | Cognitive games | Competition | Cooperation | Creative play | Opportunity to increase social contact | Risk | See cause & effect | Separate from everyday experience | Test of physical skills | Attractive colours | Celebrates northern spirit or aesthetic | Imageability | Multigenerational appeal | Use of common, everyday materials or objects | Use of props to alter movement | Opportunity to people watch | Reduce actual or perceived travel distance | Temporary, pop-up or seasonal | Uses existing infrastructure

Other Features

Vertigo | Celebrates place or culture | Visual stimulation | Opportunity for romance | Mechanical control

Figure 6.17: Recycling Words

6.4 Findings and Revised Typology

Many of the elements included in Donoff's (2014) typology can be observed through analysis of the 16 Warming Hut installations, such as "auditory stimulation", "attractive colours", and "opportunity to people watch" (p. 138). However, the analysis also highlights new elements and suggests the reorganization of others present in Donoff's typology. These newly identified elements and other suggested changes to the typology are described below. Finally, a revised typology incorporating these modifications is presented in Figure 6.18.

Sensory Stimulation

Sensory stimulation is a well-represented play type in the literature (Stevens, 2007). However, this is conspicuously absent from Donoff's typology. Her typology does include "auditory stimulation," but this is only one subset of this broader category, which, at a minimum, could also include visual and tactile stimulation. Common design strategies associated with this play type include use of reflective surfaces (e.g., mirrors); contrasting materials, including materials that contrast in colour and/or texture; and movement. Two visually stimulating design elements that are included in Donoff's (2014) typology are "attractive colours" and "pedestrian lighting" (p. 138). Examples of related design elements from the examined cases include the vibrant colouring of *Hygge House*, the metallic rustling sound produced by rebar on *Shelterbelt*, and the mirrored surfaces inside *SKYBOX*. Another, perhaps less common, subset of this play type observed during fieldwork, is olfactory stimulation, as provided by the aromatic fir boughs used in the construction of *Fir Hut*.

Change of Perspective

Another play type elicited by the Warming Huts is what could be described as a change of perspective, examples of which include heightened awareness of oneself, other people, objects, or spaces. This could be considered a subset of vertigo – a play type common in the

literature (Caillois, 1961; Stevens, 2006), which is defined by Donoff (2014) as "the act of escaping normal bodily experience, ranging from activity types to physical movements" (p. 48). Supporting the relation between vertigo and a change of perspective is Stevens (2004) description of "psychological vertigo" expressing as "heightened mutual awareness and tension" between strangers (p. 152). However, vertigo, as described in the literature, is so broad and inclusive a play type as to be impractical for the purposes of informing more nuanced design strategies, hence the need to break it down here into distinct play types characterized by more meaningful and relatable language. Design strategies used by the Warming Huts that promote a change of perspective include the reflective surfaces of *SKYBOX*, which heighten awareness of oneself and the sky; the hole in *Wind Catcher*, which can frame and direct attention to people and landscapes; and *Under the Covers*, which uses optical illusion to distort people's perceptions of space.

Celebration of Place and Identity

An expansion and re-categorization of Donoff's (2014) "celebrates northern spirit or aesthetic", celebration of place and identity is a play type that captures the intent of Donoff's design type while extending it to include the celebration of all place-based spirits, aesthetics, or cultures (p. 138). Re-categorizing this element as a play type is consistent with Sutton-Smith's (2001) description of play as identity, often expressed through "traditional and community celebrations and festivals" and occurring "when the play tradition is seen as a means of confirming, maintaining or advancing the power and identity of the community of players" (p. 10). Design strategies that celebrate northern spirit may be most appropriate for a northern winter city, but this should not preclude strategies that celebrate other aesthetics, cultures, or identities from being comparably successful at increasing pedestrian activity in winter cities, even if they may appear somehow less authentic or grounded in the local. Warming Huts that incorporate

design strategies celebrating place and identity include *Hygge House*, which aims to tangibly express the Scandinavian concept of *hygge*, or coziness; *Smokehouse*, which incorporates felt panels embossed with "prehistoric imagery from the area dating back 6000 years;" and *Temple*, which reflects the architecture and aesthetic of ancient Greece while using recycled contemporary materials ("The smokehouse," 2015, para. 2).

Celebration of the Natural World

Like celebration of place and identity, celebration of the natural world is a celebratory play type, but one that conveys an appreciation of the biology, landscapes, and materials of the natural, or non-anthropological, world. This play type can be evoked through design strategies that include the use of plant or animal imagery or that incorporate natural elements, such as water, snow, or ice. Warming Huts that provide opportunities for this play type include *In the Light of the Kudluk*, which uses snow and ice to sculpturally represent four northern animals; *Fir Hut*, which incorporates green fir boughs into the roof of its structure; and *The Hole Idea*, which uses piled snow to provide people with access to its various openings.

Use of In-situ Materials or Infrastructure

Use of in-situ materials or infrastructure is an implementation strategy used by several of the Warming Huts and is an expansion of "uses existing infrastructure" from Donoff's typology. In particular, many of the installations that celebrate the natural world through use of naturally occurring elements, like snow, are implemented in locations that allow them to use onsite materials. Examples of these include the aforementioned *In the Light of the Kudluk* and *The Hole Idea*, as well as *Red Blanket*, which uses The Forks Historic Rail Bridge as a suspension platform.

Temporal Change

Temporal change, or change over time, is a potential design strategy highlighted by a number of the Warming Huts, but perhaps none better than *Ice Maze*, which was extensively altered by Trail users over the course of its installation. Examples of these alterations include pervasive etching of words and images into its structure and the intentional breaking down of walls, which not only altered its physical form but also the way users moved through and interacted with it. The gradual degradation or erosion of *Ice Maze*'s original form reveals a related implementation strategy – an ephemeral installation. While this is arguably a variation of Donoff's (2014) "temporary, pop-up or seasonal" implementation type, the ever-changing, dynamic, and gradually diminishing nature of an ephemeral installation, in contrast to a static structure that might be dismantled and reassembled at another place and time, warrants a distinct implementation type (p. 138). Furthermore, a contrasting form of implementation to ephemeral or temporary is permanent, which is also absent from Donoff's typology.

Taking Refuge

Most of the Warming Huts, especially those that take the form of a rigid structure or flexible envelope that permits interior access, provide a degree of refuge. This is unsurprising given the name and intent of the Warming Huts design competition both highlight the installations' ability to provide shelter from the winter elements for Trail users. While taking refuge from the elements is a very practical function of some installations, according to Kirkby (1989) it also has "an ability to encourage or enhance" playful behavior (p. 11). Anyone who has ever been caught in a sudden downpour with a friend can attest to the thrill that ensues as you hurry to seek shelter. As a motivator of play, Kirkby (1989) found that "refuges, both natural and built, [are] highly preferred over traditional playground equipment" amongst children (p. 7). Design considerations for successful refuges include "physical access, visual access, visual

cutoff, complexity, scale, and plasticity [or manipulability]" (Kirkby, 1989, p. 11). Related design strategies with implications for other play types include creation of an enclosed space, providing physical and/or visual permeability of installations, and using a form or materials that are physically interactive or manipulable. Warming Huts observed to promote taking refuge include *Red Blanket*, *Smokehouse*, and *Windshield*.

Opportunity for Social Interaction and Expression

"Opportunity to increase social contact" is a play type included in Donoff's (2014) typology that is supported by many of the examined Warming Hut cases (p. 138). However, the Warming Huts highlight some specific design strategies not included in the typology that encourage this play type. Photography was a frequently observed interaction with most, if not all, the Warming Huts along the Trail. According to Oravec (1995), photography is a form of social expression used in the "construction of self and group" (p. 431), and Brighenti (2009) describes how the act of taking a picture can create "a social relationship" (p. 52). Today, when most people have a camera phone within reach at all times, photography has become a ubiquitous form of expression and social interaction that is reinforced and amplified through sharing on social media platforms. While Warming Huts like *SKYBOX*, which uses written instructions to explicitly encourage photography and social media sharing, provide ample opportunities for digitally interacting with others, they are also very successful at providing firsthand shared experiences amongst friends, family, or strangers.

Other design strategies used by the Warming Huts to encourage social interaction include the provision of seating, which was observed to support conversation and people watching; imageability, a quality that gives a physical object "a high probability of evoking a strong image" or serving as an easily identifiable landmark (Lynch, 1960, p. 9), which was observed to support the use of Warming Huts as rendezvous points; and elements that encourage physical closeness,

such as the suspended fabric sheets of Red Blanket, which were observed to promote intimacy and romantic play.

Revised Typology

The revised typology, presented in Figure 6.18 below, incorporates the findings described above and remains structured around the three categories established by Donoff (2014) – play type, design, and implementation (p. 138). However, the design category has been retitled *design strategy* and the implementation category has been retitled *approach to implementation* to provide more clarity and to better align with the updated categories presented by Bridgman and Donoff in their 2017 adaptation of the typology (p. 303). As with Donoff's (2014) typology, *play type* categorizes identified types, or motivators, of play; *design strategy* describes design elements that promote these established types of play; and *approach to implementation* outlines implementation considerations, such as installation duration and site-specific characteristics with the potential to enhance the design or facilitate implementation of the installation. The elements under each category are listed in alphabetical order as the typology does not attempt to connect, for example, specific design strategies with their associated play types, given that some strategies could apply to more than one type of play.

In addition to being informed by literature and analysis of case studies, the revised typology has the added advantage of incorporating firsthand observations. This provided additional opportunities for insight, including direct observations of how users interacted with the interventions, how the interventions changed over time, and elements that would not necessarily be conveyed through an analysis of second-hand materials, such as the aroma of Fir Hut. However, it is important to keep in mind that this revised typology is not an exhaustive representation of all playful design intervention possibilities and can be further refined with the analysis of new playful design theory and real-world cases. Just as Lang (2017) describes

typologies as drawing on the “cumulative experience” of the design field, the subsequent application of this typology presents an opportunity for iterative refinement and continuous improvement as a tool for playful design analysis and for guiding development of playful interventions (p. 4).

Figure 6.18: A revised typology of ludic ways to increase pedestrian activity

PLAY TYPE	DESIGN STRATEGY	APPROACH TO IMPLEMENTATION
Acting contrary to social convention	Attractive colours	Busy location
Adaptation of a well known game type	Bicycle infrastructure	Ephemeral installation
Celebration of place & identity	Biomimicry	Guerrilla installation
Celebration of the natural world	Contrasting materials (e.g. colour, texture)	Infill in underused space
Chance	Enclosure	Opportunity to people watch
Change of perspective	Encourages intimacy	Permanent installation
Cognitive games	Encourages photography or social media use	Reduce actual or perceived travel distance
Competition	Framing	Route choice or environmental mastery
Cooperation	Imageability	Sense of belonging & community connection
Creative play	Manipulability	Temporary, pop-up, or seasonal
Opportunity to escape	Materials generate, absorb, or reflect heat	Use of existing microclimate
Opportunity for social interaction & expression	Multigenerational appeal	Use of in-situ materials or infrastructure
Risk	Odor emitting	Use of social media or pop culture
See cause & effect	Optical illusion	
See or move beyond boundaries	Pedestrian lighting	
Sensory stimulation	Permeability (e.g. physical, visual)	
Separate from everyday experience	Reflective surfaces	
Simulation	Scientific design	
Taking refuge	Seating	
Test of physical skills	Unique paths (e.g. width, texture)	
Vertigo	Use of common, everyday materials or objects	
	Use of natural elements (e.g. water, ice, snow)	
	Use of props to alter movement	
	Vibration	
	Weather protection	
	Written instructions	

CHAPTER 7 | RECOMMENDATIONS

This chapter synthesizes the research, analysis, and findings presented in the previous chapters to produce a series of recommendations that can be used by planners, designers, and policy makers to inform new activation strategies for public spaces in winter cities, as well as to inform improvements to existing initiatives, such as Winnipeg's Red River Mutual Trail. Where appropriate, the recommendations are supported by additional observations made during fieldwork.

Twelve recommendations are organized under two broad categories: *Playful Design Strategies*, which recommend key playful design considerations and strategies for winter cities, and *Supporting Strategies*, which include more general, complementary strategies for animating public space that can serve to support the strategies presented in the first category. Within these two categories, the recommendations are presented in no particular order. These recommendations are not intended to be an exhaustive list of approaches for successfully animating public space, but rather reflect some of the key lessons learned from this practicum. Additional strategies drawing from best practices in planning and design, such as completing thorough public and stakeholder engagement prior to implementation and completing post-implementation monitoring and evaluation, will further ensure successful outcomes.

In addition to serving as a useful tool for enhancing public spaces and people's use and experience of them, the recommendations presented in this chapter answer research question (3): What lessons does Winnipeg's Warming Huts initiative have for public spaces in winter cities?

7.1 Playful Design Strategies

Recommendation 1: Employ a Variety of Playful Design Strategies

Implement multiple playful design strategies to encourage a variety of play types and ensure a space appeals to and attracts a wide range of users. As described in the literature on

play, there are many reasons people play and preferences can differ from one group or individual to another (Kerr & Apter, 1991; Stevens, 2007). Therefore, in order to attract and elicit playful behaviour in the largest number of individuals, a diverse variety of motivators or playful design strategies are required. Winnipeg's Warming Huts provide a successful example of using multiple playful design strategies to elicit a wide array of playful behaviours from a diversity of users, from the hole in *Wind Catcher* allowing a child to test their physical skills to the simulated wilderness cottage of *Hygge House* allowing people to act contrary to social convention.

Figure 7.1: Children climb over and through the hole in Wind Catcher

In addition to the types of well-defined, structured play opportunities presented by the Warming Huts, the literature also encourages implementing more unstructured, flexible, and spontaneous opportunities for play, which can further appeal to different users and activate a space in additional ways (Stevens, 2006). The Red River Mutual Trail also provides a successful

example of opportunities for unstructured play with its extensive ice surface that evokes loopy skating patterns, impromptu hockey skirmishes, and parent-powered sledding.

Figure 7.2: Young child being pulled by parent in sled

As seen at the Red River Mutual Trail, and study Site A in particular, using multiple playful design strategies can improve activation in numerous ways, including encouraging greater pedestrian volume, pedestrian diversity, and behavioural diversity.

Recommendation 2: Make Use of Materials Unique to Winter

Incorporate materials unique to winter into the design of playful interventions. Play literature appears to be generally lacking on this topic, but site observations reveal there are many advantages to using common winter elements, such as snow and ice, when designing playful public spaces. For practical purposes, this strategy provides an abundant, cost-effective, and sustainable construction material that can easily take on various physical forms and, with its ephemeral implementation qualities, can make for an effortless dismantling or cleanup process.

Additionally, this strategy offers design opportunities unavailable at other times of the year, can better integrate interventions into the winter landscape – a criteria of the Warming Huts design competition – and embraces and celebrates the spirit and aesthetic of the season.

Using snow and ice can turn something the literature generally considers a pedestrian barrier into something fun, given these materials also have inherently playful properties. More specifically, ice, with its slippery glass-like surface, can facilitate many play types from vertigo to sensory stimulation. Snow, as well-illustrated by Winnipeg's *Ice Maze*, is a highly interactive material people enjoy physically manipulating and expressing themselves through.

Figure 7.3: Ice Maze's walls covered in etched words and imagery

Recommendation 3: Prioritize Placemaking

Use design and implementation strategies that carefully consider site-specific characteristics and context to maximize the impact, novelty, and/or imageability of playful installations and enhance their placemaking potential. As described in the literature, effective

placemaking – giving meaning, identity, distinctiveness, and/or sense of community to a place – has the ability to renew underutilized urban spaces and promote a positive image or brand for a neighbourhood or entire city (Reynolds, 2012; Schuermans et al., 2012). In turn, these can have beneficial impacts on a space, including drawing pedestrian activity to previously neglected areas.

The literature suggests public design interventions, such as public art, are excellent vehicles for placemaking and, acting as a promotional or branding element for a city, can help to attract new residents, tourists, and investment (Schuermans et al., 2012; Zavattaro, 2010).

Winnipeg, a city experiencing transformative inner city renewal after decades of relative stagnation, may be benefiting from such processes. In recent years the Warming Huts have attracted attention from high-profile media outlets, like the *New York Times*, *Landscape Architecture Magazine,* and *Curbed*, which portray them as evidence for Winnipeg's new trendy and design-forward winter city image (Glusac, 2014; Lange, 2019; Mortice, 2019). *Hygge House*, with its visually impactful fluorescent colouring standing in stark contrast to the surrounding white snow – as well as in contrast to the established societal norms for a wilderness retreat – makes a strong impression on visitors to the Red River Mutual Trail and, accordingly, makes frequent appearances in media descriptions, including the aforementioned *New York Times* article (Glusac, 2014). Given The Forks Renewal Corporation's continued investment in the Trail and Warming Huts design competition, they undoubtedly ascribe to its visitor and economic development potential.

As observed at the Red River Mutual Trail, the kind of impactful design associated with placemaking can bring additional benefits for activating public space, including creating iconic landmarks that can serve as easily recognizable meeting places and inspiring subject matter for photographers and social media users alike.

Figure 7.4: Group posing for photos at Hygge House

Recommendation 4: Create Microclimates

Create design interventions that act as microclimates where people can take refuge from winter elements. As is well-supported in the literature and the analysis of pedestrian traffic patterns on the Red River Mutual Trail, winter weather, such as cold temperatures, wind, poor visibility, and precipitation, can be barriers to using outdoor public spaces in the winter (Li et al., 2012; Liu et al., 2016; Miranda-Moreno & Lahti, 2013). Using design and implementation techniques to reduce the impact of these elements can help to mitigate these barriers and encourage more pedestrian use and lengthier stays.

Amongst Winnipeg's Warming Huts, examples of effective microclimates include *Windshield*, which self-adjusts to put a barrier between users and the prevailing wind direction, and *Red Blanket*, which allows users to wrap themselves in heavy, insulating fabric. Additional techniques could include making use of solar gain on sunny days, when temperatures can be

coldest; providing a direct heat source, such as a fire; or providing overhead shelter from falling precipitation.

Opportunely, taking refuge is a play type that can complement microclimate strategies and support further activation of a space. Effective design techniques for refuges supported by the literature include enclosed spaces, permeability, and manipulable materials, which, incidentally, are all reflected in the designs of *Windshield* and *Red Blanket* (Kirkby, 1989).

Providing microclimates with opportunities for refuge play undoubtedly aids in the popularity of the Red River Mutual Trail and may have been an important factor behind the successful activation observed at study Site A, with its concentration of Warming Huts.

Figure 7.5: Red Blanket provides refuge from the winter elements

Recommendation 5: Enhance the Evening Experience

Employ strategies that make public spaces as attractive to pedestrians in the evening as they are in the daytime. With the shortest daylight hours of the year, darkness is as common to

winter as snow, ice, and cold temperatures. Therefore, making spaces inviting after the sun goes down is key for winter cities to keep public spaces active for a significant portion of the day.

During weekday and weekend evening observations, darkness was a defining feature of the Red River Mutual Trail. Despite Friday and Saturday evenings being the third and fourth busiest periods of the week, the darkness made it difficult to see the site, other users, and the Warming Huts, making the Trail feel empty and uninviting. Additionally, even though several Warming Huts were described by their creators as integrating electrical lighting or fires into their designs, such as *In the Light of the Kudluk*, there were no signs of either working or installed as originally envisioned. Like a shop with its lights turned off for the night, the Trail felt closed for business.

Combined with direct and indirect evidence of nighttime drinking, smoking, and vandalism occurring along the Trail and in Warming Huts, the darkness significantly reduced the sense of security felt on the site when compared to daylight hours. This may have had a direct impact on the observed evening demographics of the Trail as well, which had a noticeably higher share of teenagers and young adults and fewer families, children, and older adults.

Installing more lighting along the Trail would improve site visibility, make it feel livelier and more inviting, and improve the sense of safety. The latter is a particularly important consideration given how the literature illustrates that negative perceptions of public safety can significantly reduce pedestrian use of public space. Additionally, integrating more lighting features into the Warming Huts could make them easier to see and interact with, help with nighttime wayfinding, discourage undesirable nighttime behaviours, and serve as additional playful design elements. Using fire for lighting features would have the added benefit of providing warmth.

Additional strategies to help activate nighttime use include programming more evening events, especially on less busy weeknights, and introducing more services and activities into the area that appeal to evening users, such as food and beverage services (see Recommendation 8, *Integrate Food*, for more on this strategy). In addition to drawing more pedestrian activity, such strategies could attract a more diverse demographic as well.

Figure 7.6: Section of unlit Trail at night

Recommendation 6: Concentrate Playful Design Interventions

Provide a concentration of playful interventions to ensure that attractive curiosities and potential shelter spaces are always within close proximity to pedestrians, encouraging users to keep exploring a site, even in inclement weather.

Planners commonly consider 400 m or less a comfortable distance for pedestrians when considering walkability and access to amenities (Daniel & Burns, 2018; El-Geneidy, Grimsrud, Wasfi, Tétreault, & Surprenant-Legault, 2014); however, the spacing of Warming Huts observed

along the Trail suggests much closer siting is needed to support an active public realm. At Site A, Warming Huts were spaced about 65 m apart, while south of the Norwood Bridge Warming Huts were about 320 m apart. As illustrated by Chapter 5 analysis, Site A, with a greater concentration of Warming Huts, had twice as much pedestrian traffic as Site B and was better activated along all other activation metrics.

For winter cities in particular, the closer spacing has the added benefit of providing more frequent, accessible shelter areas to rest and take refuge from winter elements. It may also help to counter poor visibility during inclement weather, by providing more frequent visual markers or landmarks to assist with wayfinding and improving awareness of attractive site elements – it is unlikely pedestrians would be drawn to explore something they cannot see and are unaware exists. As the pedestrian count data suggested in Chapter 4, the closer proximity of Warming Huts near The Forks may have reduced the negative impact of wind speed, visibility, and precipitation on user volume, given the lower statistical correlation seen there compared to other areas of the Trail with greater spacing or no Warming Huts at all.

Figure 7.7: Close spacing of Warming Huts at Site A encourage users to keep exploring

7.2 Supporting Strategies

Recommendation 7: Provide Supportive Services and Facilities

Ensure public spaces include services and facilities that support lingering or permit people to extend their stay. High traffic corridors can see lots of pedestrian activity, but behaviours will be limited in diversity and most users will move through quickly if, for example, there are not places to rest when tired, to talk when you meet a friend, or to carry out basic biological functions when the need arises.

Well-supported by the literature, adequate seating is an absolute necessity for a successful pedestrian-friendly public space (Gehl and Svarre, 2013; Whyte, 1980). It provides a place to rest for people walking long distances, essential for older adults and those with mobility issues; can offer favourable configurations for socializing; and can serve as an ideal perch for people watching and taking in one's surroundings. Along the Red River Mutual Trail, benches

were provided adjacent to most Warming Huts and many of the installations incorporated seating into their designs. The Warming Huts with seating were generally observed to encourage a greater range of behaviours and longer stays from Trail users than those without. For example, people were observed using Hygge House's fluorescent chairs to take a break from exploring the Trail, eat snacks around the table, pose for photos, have conversations with friends, and put on or remove their skates.

As suggested in the literature, seating considerations for winter cities include using materials that will not feel too cold for users, are positioned at a convenient height, and have handrails to reduce the potential for slipping on snow and ice (Garvin, Nykiforuk, & Johnson, 2012).

Figure 7.8: Seating opportunities at Shelterbelt

Another important feature, which was observed to be sorely lacking along the Red River Mutual Trail, is public washroom facilities. Despite having indoor public washrooms at The

Forks Market and temporary porta-potties installed by The Forks Historic Rail Bridge at the northern terminus of the Trail, the remaining 6 km provided no public toilets. There was ample evidence of public urination observed along the Trail, with one Trail user witnessed urinating next to *Smokehouse* during a Thursday morning stroll. In addition to allowing users to enjoy a public space for longer periods of time, public washrooms help reduce issues of public urination, which creates unsanitary and offensive conditions that discourage others from using the space.

Further to serving much-needed functions for users and supporting greater pedestrian activation, incorporating features like seating and public washrooms can improve the overall quality of a public space, which has been shown to provide greater health benefits to users and surrounding residents (Francis et al., 2012a).

Figure 7.9: Public toilets installed at the northern terminus of the Trail

Recommendation 8: Integrate Food

Provide opportunities and areas for eating and drinking to support socializing, encourage longer stays, and activate the space during meal times and evenings.

Along the Red River Mutual Trail, many people could be observed walking or resting inside a Warming Hut with a hot drink, and food waste and beverage containers, including alcoholic beverages, were often discarded in Warming Huts as well as nearby garbage and recycling bins. Despite an apparent demand for food and drink along the Trail, there was little in the way of onsite food or beverage services, which may have accounted for the lull in Trail traffic consistently observed around dinnertime, as users apparently left the area to find food.

Figure 7.10: Discarded containers in a recycling bin along the Trail

The Forks Market, adjacent to the Trail's northern terminus, contains numerous establishments where one can purchase food and beverages; however, it is not readily accessible to users along most of the 6 km Trail and may be far enough away, especially on a cold day, to

discourage many users from carrying food and beverages hundreds of metres or more to enjoy out on the Trail. Offering food services directly on the Trail and further from The Forks, such as by encouraging small satellite venues operated by Market vendors, would greatly increase food access along the Trail and could provide additional marketing and revenue generation opportunities for The Forks and its vendors. In addition to providing food services, creating more areas with seating and tables, such as designated outdoor patio spaces, would make the user experience more comfortable and encourage people to remain for longer periods to eat, drink, and socialize, especially during meal times.

Despite the Trail's aforementioned shortcomings, efforts have been made to extend food services outside of the The Forks. One attempt is the *Rendez-Vous On Ice* event, which offers food and drinks, including alcoholic beverages, and provides a designated seating area complete with firepits and programmed entertainment. Another food venue that makes an annual appearance on the Trail is the *RAW:almond* pop-up restaurant, which offers fine dining on the frozen river surface within a temporary, design-forward structure. While these venues are successful attractions, they only operate for a few days of the season or limited periods of the day, reducing their potential impact on overall Trail traffic. Both are also typically located adjacent to The Forks, further concentrating food services at the northern terminus of the Trail.

In addition to better activating public space, providing more services and venues for food and drink could help to reduce alcohol consumption and litter inside the Warming Huts, improve perceptions of safety, and offer another way for people to warm up in cold weather.

Figure 7.11: Rendez-Vous On Ice provided food and beverage services for four days

Recommendation 9: Increase Ease of Access

Make accessing public space and playful interventions as easy as possible for people by locating them where large populations of people live, surrounding pedestrian infrastructure provides convenient connections, and their design ensures people of a wide range of ages and abilities can physically use them.

Locating public space and playful interventions close to where concentrations of people already live promotes walkability and ensures a large pool of potential site users are within a convenient distance. The literature also highlights how the more people within close proximity of public space, the more use and benefit they gain from it (Nutsford et al., 2013). Where public spaces are already located in sparsely populated areas, adding residential or mixed-use infill development can achieve the same outcome. The Forks North Portage Partnership and the City

of Winnipeg's (2015) *Go… to the Waterfront* planning study encourages residential infill development along the waterfront and the Red River Mutual Trail for this reason, citing its ability to support vitality, population diversity, and economic development opportunities in public spaces (pp. 40, 58). The pedestrian count findings in Chapter 4 also suggest this to be an effective strategy as they showed Trail traffic volumes increased with the surrounding neighbourhood population density.

Ensuring an effective pedestrian network and infrastructure, such as sidewalks and paths, are in place to connect residents with public spaces is also key to encouraging walking and greater use of public spaces. More specifically, ensuring public spaces are physically accessible by integrating universal design features creates more inclusive and accessible spaces for people with mobility issues, which can include many older adults. For sites like the Red River Mutual Trail, where an adjacent neighbourhood has up to 30% of its population over the age of 65 (City of Winnipeg, 2011d), this is especially key to ensure a large share of potential users are not discouraged or prevented from using the space. In winter, maintenance of access points and trails is particularly important as well, as the literature shows snow and ice can be a hazard and potential barrier for pedestrians, discouraging residents, especially those with mobility challenges, from venturing outside more regularly.

Figure 7.12: Stairs and gradually sloping paths provide access to Winnipeg's river banks

Figure 7.13: A ramp of snow connects the river bank with the river surface at The Forks

Recommendation 10: Accommodate a Broad Range of User Groups

Support a variety of functions and activities to appeal to a broad range of user groups. Creating a space that has opportunities not just for play, but also for active transportation, exercise, and other forms of socializing can ensure the space is consistently active throughout the day and week. Not all times of day are going to be peak times for people to play and recreate, such as during weekdays when a large share of the population is at work.

In the case of the Red River Mutual Trail – a long, linear public space – there is an opportunity to better support the Trail's function as a commuter corridor, which could improve its activation during the evening commute period on weekdays and, in particular, during quieter early morning periods. The Trail's well-maintained walking path and ice sheet make it an excellent active transportation corridor for pedestrians, cyclists, ice skaters, and other winter users, and the Trail connects residential areas with employment centres, such as Downtown, The Forks, and St. Boniface Hospital.

Given the Trail is typically shrouded in darkness during peak periods of the morning and evening commute, improved lighting along the trail could improve visibility, wayfinding, and added safety for commuters. Additional considerations, like providing opportunities to get a coffee, purchase a quick meal, or even participate in corporate teambuilding exercises, could help draw people out of their places of work and into the space outside of the typical commute periods as well. Incorporating playful interventions with commuter features may add extra impetus for users to add the Trail into their workday routines, turning the monotony of a typical morning commute into an uplifting and novel experience.

In winter, when people have a wide variety of means for moving around, including ice skates, snowshoes, skis, and sleds, improving the experience for multiple travel modes could further support commuters, as well as different recreational user groups. Although winter

conditions may be seen by some as incompatible with riding a bike, cyclists were frequently observed using the compacted snow path installed along the Trail. Providing complementary amenities and services, such as bike racks or public bike repair stations, and ensuring entrances to the space are accessible on wheels could support additional activation from this user group. Playful design interventions could also be tailored to certain transportation modes, such as the cycling-oriented installations *Whoopdeedoo* and *Mario Kart Bike Lane* described by Donoff (2014).

Strategies targeting commuters and active transportation users are likely to be particularly effective in areas where a smaller share of residents use cars, as is the case with the neighbourhoods surrounding the Red River Mutual Trail, where 16.1% of residents walk or ride their bike to work, compared to a city average of 7.6% (City of Winnipeg, 2011d).

Figure 7.14: Cyclists heading south along the Trail

Recommendation 11: Build on Existing Successes

Strategically locate or extend public spaces and playful design interventions where they can benefit from adjacent attractions or areas of high pedestrian use.

Pedestrian count data from The Forks Renewal Corporation indicates the most heavily used portion of the Red River Mutual Trail is the section adjacent to The Forks, a popular commercial and entertainment area with a variety of attractions and amenities. While the concentration of Warming Huts in the adjacent section of the Trail likely contributes to the observed traffic levels, as suggested by the comparison of Site A and Site B user trends in Chapter 5, the Trail undoubtedly benefits from its proximity and connection to The Forks. The Forks Renewal Corporation, the entity that operates and manages The Forks, likely locates the greatest concentration of Warming Huts adjacent to The Forks to leverage this mutually beneficial relationship.

Furthermore, locating playful design interventions in areas able to draw from established pedestrian corridors can contribute to a sort of positive feedback loop via a spectator effect. As described by Stevens (2004), while play opportunities can serve as an attractive, activity-generating element for public spaces, so can opportunities to watch others. Observing others, or people watching, can provide a form of entertainment, while some people's behaviour can be encouraged by the presence of an audience. In this sense, locating playful design interventions where they can attract an audience can have a synergistic effect, encouraging a greater diversity of behaviours and drawing an even greater number of users to a space.

Figure 7.15: Spectators enjoying the playful behaviours of their friends on the Trail

Recommendation 12: Connect Destinations

Develop public spaces and make use of playful interventions to connect established destinations, attractions, and amenities or fill gaps within existing pedestrian networks.

Building on Recommendation 11, connecting pedestrian-friendly public spaces with not just one pedestrian generator, but linking multiple key destinations together can create a comprehensive network that supports new pedestrian activity through the improved connectivity, convenience, and experience it offers to users. This can also expand overall quantity and access to public space across a city or neighbourhood, which encourages greater use and results in greater social and health benefits for residents, as shown in the literature. Additionally, this strategy lends itself to the development of a play network, as proposed by Lefaivre and Döll (2007) and described in Chapter 2.

While the Red River Mutual Trail connects numerous community amenities along its 6 km length (as shown in Figure 3.12), most of these are not strong standalone pedestrian hubs, aside from The Forks, and so do not significantly benefit Trail user volume and activation. Field observations also reveal many of these destinations are weakly connected to the Trail, both physically and visually. Greater mutual benefit could be derived from a strengthening of these nodes and their connection to the Trail.

For example, the Old St. Vital Business Improvement Zone (BIZ) is one of the few commercial areas located immediately adjacent to the Trail (as shown along St. Mary's Road in Glenwood in Figure 3.11). However, as seen from the Trail (shown in Figure 7.16), little is done to physically connect and visually demarcate this waterfront commercial area to create a strong gateway and activity generating node. Strategies to enhance the connection could include adding a prominent access point similar to the one at The Forks Historic Port (shown in Figure 4.3) and locating Warming Huts along this section of Trail. A partnership between The Forks Renewal Corporation and the Old St. Vital BIZ could also provide new resources and shared opportunities for programming, promotion, and Trail maintenance in the area, further boosting activity along this section of the Trail.

Figure 7.16: The St. Mary's Road commercial area (at left) as seen from the Trail

In order to create a strong pedestrian network, strategic partnerships with other community stakeholders is key to align objectives, coordinate land use planning, and pool resources. As determined through the review of key stakeholders and planning context for the Red River Mutual Trail in Chapter 3, there are opportunities for much greater coordination and partnership among area stakeholders and the City to derive greater benefit from this unique winter asset.

7.3 Summary of Recommendations

PLAYFUL DESIGN STRATEGIES	
Recommendation 1: Employ a Variety of Playful Design Strategies	Implement multiple playful design strategies to encourage a variety of play types and ensure a space appeals to and attracts a wide range of users.
Recommendation 2: Make Use of Materials Unique to Winter	Incorporate materials unique to winter into the design of playful interventions.
Recommendation 3: Prioritize Placemaking	Use design and implementation strategies that carefully consider site-specific characteristics and context to maximize the impact, novelty, and/or imageability of playful installations and enhance their placemaking potential.
Recommendation 4: Create Microclimates	Create design interventions that act as microclimates where people can take refuge from winter elements.
Recommendation 5: Enhance the Evening Experience	Employ strategies that make public spaces as attractive to pedestrians in the evening as they are in the daytime.
Recommendation 6: Concentrate Playful Design Interventions	Provide a concentration of playful interventions to ensure attractive curiosities and potential shelter spaces are always within close proximity to pedestrians, encouraging users to keep exploring a site, even in inclement weather.

SUPPORTING STRATEGIES	
Recommendation 7: Provide Supportive Services and Facilities	Ensure public spaces include services and facilities that support lingering or permit people to extend their stay.
Recommendation 8: Integrate Food	Provide opportunities and areas for eating and drinking to support socializing, encourage longer stays, and activate the space during meal times and evenings.
Recommendation 9: Increase Ease of Access	Make accessing public space and playful interventions as easy as possible for people by locating them in densely populated areas, providing convenient connections, and designing sites to accommodate a wide range of ages and abilities.
Recommendation 10: Accommodate a Broad Range of User Groups	Support a variety of functions and activities to appeal to a broad range of user groups.
Recommendation 11: Build on Existing Successes	Strategically locate or extend public spaces and playful design interventions where they can benefit from adjacent attractions or areas of high pedestrian use.
Recommendation 12: Connect Destinations	Develop public spaces and make use of playful interventions to connect established destinations, attractions, and amenities or fill gaps within existing pedestrian networks.

CHAPTER 8 | CONCLUSION

This final chapter summarizes the findings presented in the previous chapters to provide explicit answers to the three research questions first presented in Section 1.2. A series of assumptions and limitations are then described to acknowledge underlying suppositions and potential shortcomings of this study. This is followed by a reflection on the implications of this study for planning professionals and areas of further research that could help build upon the findings herein or fill remaining gaps in the literature.

8.1 Summary of Findings

There is a lack of literature on playful design in the winter context, including a lack of resources on how to use and implement playful design strategies as a tool for activating public space in winter cities. Through a review of the relevant literature and in-depth study of Winnipeg's Red River Mutual Trail, this research has found the Warming Huts initiative to be a successful example of incorporating playful design principles in the winter context, with lessons for cities elsewhere. With these lessons in mind, this study has endeavoured to address gaps in the literature by producing a resource that helps planning professionals, designers, and policy makers encourage greater use and animation of public space in winter cities to improve the health and quality of life of residents.

This study was guided by three key research questions, which were addressed in the preceding chapters and are summarized below:

1) How can the underlying principles of playful design be used to activate public space in winter cities?

The literature review in Chapter 2 identified underlying principles of playful design, including those related to motivators of play, effective design elements, and the types of behaviours it can elicit. The literature also provided examples of how these principles could be

implemented in practice, such as through public art installations, to activate public space. The literature on winter cities in Chapter 2 revealed a gap in terms of how playful design can be applied in the winter context, but highlighted a number of barriers and key considerations that public spaces and playful design strategies need to address, such as snow, ice, and cold temperatures.

The observations and analysis of the Warming Huts covered in Chapters 4, 5, and 6 helped to address this gap by identifying playful design strategies that can overcome winter deterrents and also be used to activate public space in winter cities in many different ways. Components of activation were presented as a set of metrics in Chapter 5, specific playful design strategies were presented in Chapter 6, and broader strategies and considerations for activating public space in winter cities were presented in the final recommendations in Chapter 7.

More generally, this practicum found playful design principles, when incorporated into design interventions, could be used to activate public space in several key ways: serving as novel spectacles and attractions that draw more people to an area; appealing to a diversity of users and spectators, including a wide range of age groups; eliciting a broad array of behaviours; encouraging people to linger or spend more time on a site; and helping to maximize spatial use of a site – all of which increase opportunities for social interaction and people watching. For winter cities more specifically – defined by such natural features as snow, ice, wind, cold, and dark – playful interventions that make use of or provide refuge from these elements were determined to be particularly effective and provide strategies unique to the winter context.

2) In what ways do Winnipeg's Warming Huts successfully incorporate principles of playful design?

Informed by playful design principles in the literature and a typology of ludic design developed by Donoff (2014), Chapter 6 identified various playful design elements incorporated into the Warming Huts and presented a revised typology including several additional elements they employed, such as use of in-situ materials, permeability, and ephemeral installation. Direct observations of user interactions provided throughout the practicum and the site analysis presented in Chapter 5 confirm a number of ways in which the Warming Huts were successful at eliciting playful behaviour and contributing to the overall animation of the site along six activation metrics: user volume, user diversity, behavioural diversity, social interaction, time spent on site, and site area usage.

3) What lessons does Winnipeg's Warming Huts initiative have for public spaces in winter cities?

The lessons presented by Winnipeg's Warming Huts initiative are captured in the 12 recommendations outlined in Chapter 7 and summarized in Section 7.3. These include playful design strategies with winter-specific considerations, as well as more general strategies for public space that can support and complement playful design strategies. These lessons were informed by the literature review in Chapter 2, including literature on public art and public spaces; the Red River Mutual Trail contextual analysis in Chapter 3; and the site-specific findings presented in Chapters 4, 5, and 6.

8.2 Assumptions and Limitations

This practicum makes two key assumptions without which this study would be rendered inconsequential: first, that playful design initiatives are an effective solution for stimulating pedestrian activity in public space and for encouraging more physical and social participation in

urban environments; and, secondly, that key decision makers, such as local governments, business interests, and other community stakeholder groups, have a desire to improve the urban winter experience for pedestrians.

This study does not intend to imply that playful design strategies are the only means to address issues of pedestrian inactivity. Rather it is assumed other well-established pedestrian generating strategies, such as building compact and complete communities with a mix of land uses, will be supported and occur in tandem as part of regular land use planning and development processes undertaken by a local government.

This practicum also assumes that Winnipeg's winter weather; urban geography; and cultural, economic, and land use contexts are analogous enough to conditions in other urban centres, so as to make the Red River Mutual Trail a suitable case study with lessons applicable to other jurisdictions. As such, despite referencing observations and potential strategies specific to the Red River Mutual Trail, this practicum has endeavoured to frame the lessons and recommendations contained herein broadly enough to apply outside the Winnipeg context.

As previously mentioned, the Red River Mutual Trail is configured and routed differently from one winter to the next, due to differences in river ice conditions; however, given resource constraints, the scope of this practicum was limited to one season and therefore only one potential permutation. Observing multiple years and different configurations could help reveal new trends and lessons and could help differentiate between those unique to specific annual configurations and those inherent to the Trail across all years.

Given the complexity found in a large public space like the Red River Mutual Trail and the interaction of many different variables, including people, elements in the built environment, weather, and time, reducing observations to broad categorizations and high level trends can overlook the many nuances and finer-grain details that may provide equally valuable insights and

lessons into effective planning for public space and winter cities. Similarly, with only one observer and point of view covering this large, complex site, valuable interactions between pedestrians and public space may have been overlooked on one section or during one time of day while attention was trained on another. To compensate for this, a significant portion of observations were focused on a smaller section of the site to gain a more in-depth picture, but a comparable study with more human resources covering greater area and hours of observation could provide more and better-informed lessons and insights.

Furthermore, the nature of the Trail, being a liquid river outside of the winter season, meant there could be no useful comparisons made between how users interacted with this space in winter versus times of year when snow and ice are not present. This may mean effective activation strategies for more permanent year-round public spaces may have been overlooked.

8.3 Implications for Planning Practice

While this study has implications for a number of professions and disciplines, planners play a critical role in shaping public space, and so the findings presented herein are largely intended for their use and consideration. For planners, the implications of this study are far-reaching as urban play and public space considerations touch on many aspects of planning practice, including land use, transportation, health, and economic development.

Urban play is often overlooked by local governments as a viable tool for advancing community objectives, despite the evidence of its effectiveness reflected in a growing body of literature and the findings of this study. While this practicum does not try to frame play as a "silver bullet" solution for lifeless public spaces and urban revitalization efforts, it does endeavour to raise the profile of play strategies as a valuable tool for planners and decision makers when formulating and implementing plans and strategies for public space.

While playful design strategies can be highly effective, they should not exist within a vacuum. A comprehensive, multifaceted approach to planning for public spaces should always be pursued as any strategy can serve to support and enhance the effectiveness of others.

Policy and Design

Many four-season cities focus their efforts and resources on improving public space in the warmer summer months, through such things as event programming or beautification initiatives, while, beyond snow-clearing policies, entirely neglect enhancing the winter experience for residents and visitors.

The findings of this study, such as the recommendations presented in Chapter 7, offer considerations that could assist planners in developing winter-related policy on a host of topics, including land use, active transportation, parks and recreation, community gathering space, accessibility, inclusivity, economic development, health, safety, and arts and culture. For example, Recommendation 10, *Accommodate a Broad Range of User Groups*, could encourage planners to think outside of typical urban mobility categories when considering transportation and recreation policies. Despite the barriers winter can pose to pedestrian accessibility, it also presents opportunities for a variety of mobility options not available at other times of year, such as ice skating, snowshoeing, skiing, and sledding.

Additional planning initiatives that could benefit from the findings include public art strategies, urban design guidelines, development permit criteria, and community amenity contribution or density bonusing schemes. For practicing urban designers, the playful principles and design elements outlined in the literature and the typology in Chapter 6 offer a wide variety of design strategies that could conceivably be incorporated into a broad range of public realm improvements.

Overall, this research can aid planners in not just improving the pedestrian experience, but also improving people's social lives, physical and mental health, sense of community, and sense of place, as well as provide a host of economic benefits, including healthcare savings, placing more foot-traffic in front of businesses, reshaping the image of a city, and attracting tourism and investment.

Implementation and Assessment

Highlighted by the typology presented in Section 6.4, the diversity of design techniques, approaches to implementation, and range of elicited behaviours afforded by playful design initiatives make them a highly flexible strategy useful in a wide variety of contexts and situations. For planners, this flexibility means interventions can be tailored to suit a wide range of applications, timescales, budgets, audiences, and physical layouts.

Furthermore, playful design offers a host of cost-effective design and implementation techniques that make it an exceptionally affordable strategy accessible to local governments and community stakeholder groups of all sizes and financial means. As the Warming Hut examples in Chapter 6 illustrate, playful interventions can be constructed from relatively cheap, commonplace materials, including repurposed or recycled objects. The winter context provides a particularly advantageous opportunity in this regard, as in-situ snow and ice can be obtained freely and used to great effect. The ability to make use of existing site infrastructure, such as by hanging installations from bridges, adds further to its flexibility and cost-saving potential.

Overall, the design and implementation techniques offered by playful design interventions also allow for more strategic deployment opportunities as they can be easily transported, quick to set up, and used for temporary initiatives, such as seasonal installations, community events, and moving or rotating exhibits.

In terms of assessing the success of initiatives following implementation, the activation metrics presented in Chapter 5 can provide a framework for local governments and community stakeholder groups to evaluate public spaces before and after initiatives are undertaken, whether a playful-design-specific strategy is used or not. In conjunction with appropriate monitoring and data collection, this assessment can inform corrective measures and future planning efforts.

Collaboration and Interdisciplinary Cooperation

This study highlights the opportunities for collaboration on public space initiatives and how well playful-design-related strategies lend themselves to interdisciplinary cooperation. The Red River Mutual Trail provides an informative model of collaboration for a public space project that consistently incorporates playful principles. The design competition format employed by the Warming Huts initiative serves as an engaging and effective platform for cooperation between government entities, professional design firms, educational institutions, independent artists, and the business community, who come together to promote, administer, and produce imaginative and attention-grabbing interventions.

In addition to generating submissions that present a variety of solutions for stimulating pedestrian activity in a winter context, the design competition also showcases how collaboration can be leveraged to raise the profile of a public space initiative and support economic development opportunities. The Warming Huts initiative has been a successful way for Winnipeg to rebrand itself, garner international media attention, and provide an engaging attraction for residents and visitors.

8.4 Directions for Further Study

While this practicum has served to fill gaps in the literature on playful design, public art, public space, and winter cities, there remain opportunities for further study to build on the work done herein and advance knowledge to fill remaining gaps.

More in-depth study of the Red River Mutual Trail, including interviews of Trail planners, administrators, or users and observations made over multiple years, of different annual route configurations, or of impacts on surrounding neighbourhoods, could reveal additional lessons for Winnipeg and other winter cities. Such lessons could provide greater insight into the economic development potential of playful design initiatives or the impacts on different users of the space, such as commuters or people using it for recreational exercise.

Despite the wealth of information in the literature regarding types of play and the range of behaviour they can elicit, there is a gap in respect to whether certain types of play only appeal to certain types of people. It is clear that not all aspects of play are universally seen as such. As one extreme example, some people would find it fun to jump out of an airplane, while others would avoid such an activity at all cost. Through interviews or an online survey, learning more about whether certain people, or personality types, are drawn to one form of play over another would provide a deeper understanding of the relationship between pedestrians and their environment that could inform more nuanced and effective strategies for activating public space. Greater insight in this regard could also shed light on how to best engage a variety of different demographics and user groups, such as commuters, new immigrants, or people with mobility issues. This draws attention to the need for cities to incorporate a variety of play types into the urban fabric in order to engage the widest variety and number of people possible, as encouraged in Recommendation 1 of this practicum.

There has been considerable research completed regarding the public health benefits of green space, such as parks, and, to a lesser degree, blue space, such as public water features. There remains an opportunity to study how seasonal variation in public spaces may affect health, including studying the potential health benefits of *white space*, or urban public spaces defined by the presence of snow and ice – see Finlay (2018), for example.

The lessons offered by the Red River Mutual Trail are particularly relevant to larger open spaces, such as parks, as well as temporary or seasonal public spaces, being situated on a frozen river. However, more research could be done on how to best implement playful winter strategies in more confined public spaces, such as plazas and streetscapes. Given how much of a city's public realm is composed of streets and sidewalks, further research on playful design for these areas in the winter context would be particularly valuable and relevant to residents' everyday experience of many cities.

With climate change threatening to reduce the length and predictability of winter weather and therefore limit winter-specific opportunities for play, research into mitigation strategies for public spaces in winter cities, including how to limit the impact on a city's winter identity, culture, and related economic benefits, could be invaluable. Such research could be particularly useful for cities, like Winnipeg, with initiatives relying on temporary conditions, such as a frozen river surface.

Finally, beyond the typology created by Donoff (2014) and subsequent refinement by Bridgman and Donoff (2017), there has been little work completed in the literature to explicitly define and organize playful design elements and strategies relating to pedestrian activation. This practicum has served to continue their work by producing a third, expanded iteration of the typology, but further study of related theory and additional real-world examples of playful interventions in different contexts could continue to build upon its breadth, depth, and utility. Similarly, there is little in the literature that provides an explicit framework for measuring pedestrian activation of public space. The six activation metrics presented in Chapter 5 borrow from commonly observed characteristics of public space studies, but additional application and testing of this activation framework could provide further refinement to produce a more effective tool for evaluating the success of public space initiatives.

8.5 Final Thoughts

Through a review of the relevant literature and site context; investigation of high-level pedestrian volume and weather trends; tracing and behavioural mapping analyses; and application of a ludic typology to real-world design cases, this practicum has sought to provide a firmer understanding of how winter influences pedestrian behaviour and how playful principles can be used to encourage more physical and social recreation in winter cities. This concluding chapter has explicitly addressed the research questions, identified some key assumptions and limitations of this practicum, reflected on implications for planning practice, and suggested additional avenues of inquiry that could build upon this research and further advance the understanding of play and winter in the urban context.

The ways in which our urban environments are configured have enormous impacts on our physical, mental, and social health, and well-used, high-quality public spaces have been shown to be beneficial in these regards. Despite the tendency for winter elements to create barriers to outdoor urban recreation and social interaction and, conversely, the ability of play to generate activity and connect people together, playful principles and comprehensive consideration of the winter context have yet to be incorporated as part of mainstream practice for planners in many cities, large and small. While this study has endeavoured to distill planning literature and insights garnered from first-hand observations into a helpful resource for planning practitioners, there is much more work to be done. Ultimately, it is my hope that this practicum will help raise the profile of playful design strategies for winter cities and contribute to creating happier, healthier, and more vibrant urban environments for residents.

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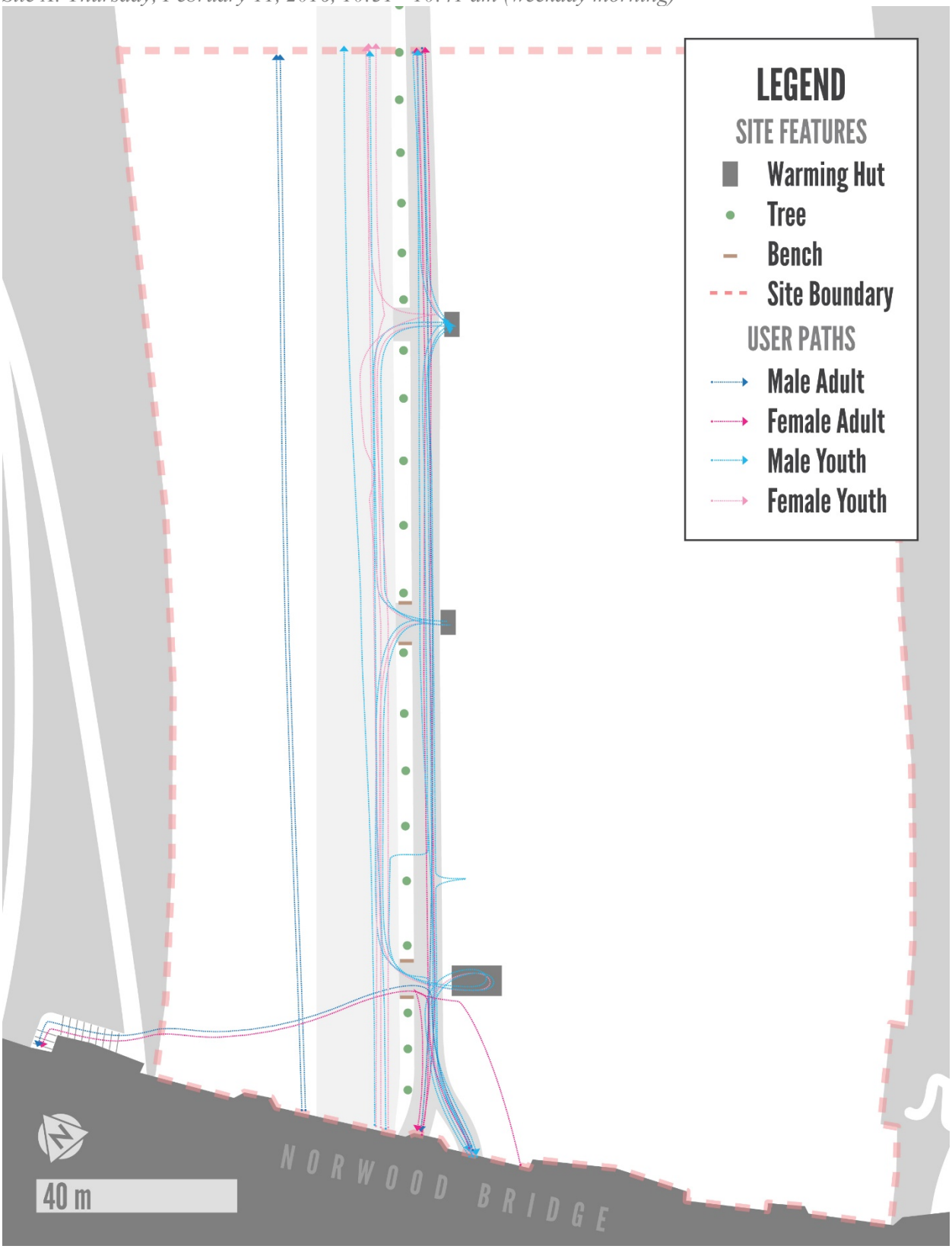
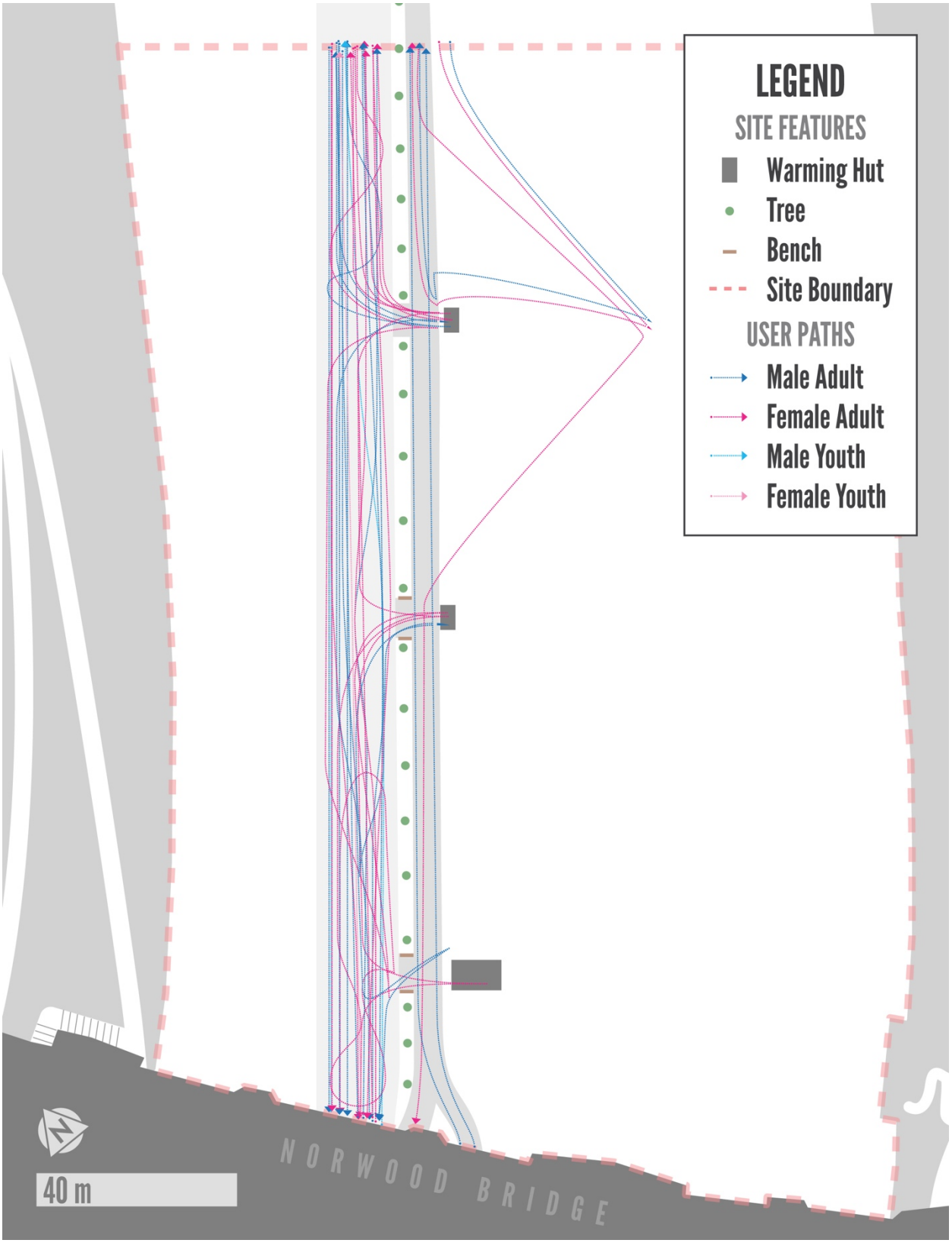
APPENDICES | A: TRACING MAPS

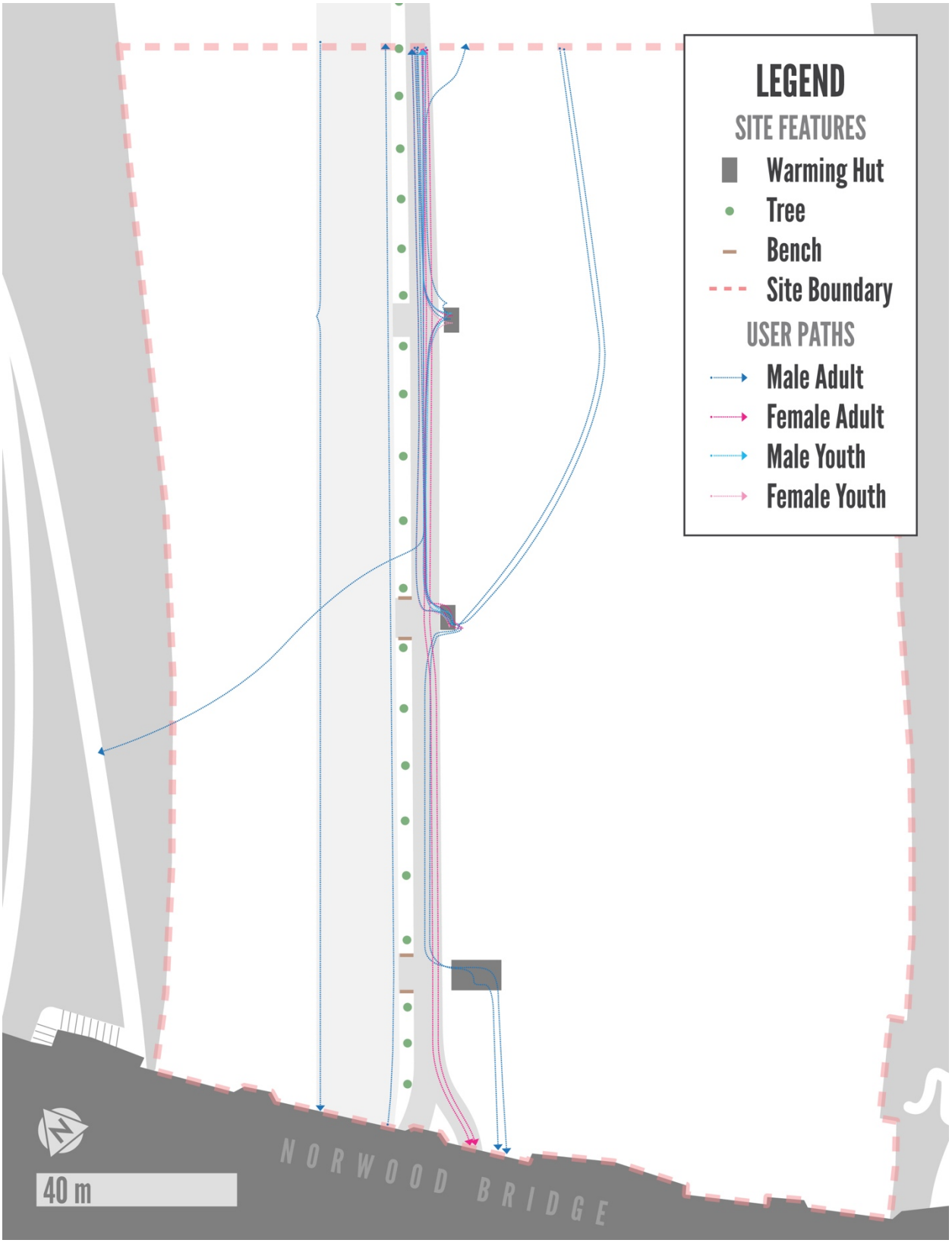
Site A: Thursday, February 11, 2016, 10:31 - 10:41 am (weekday morning)



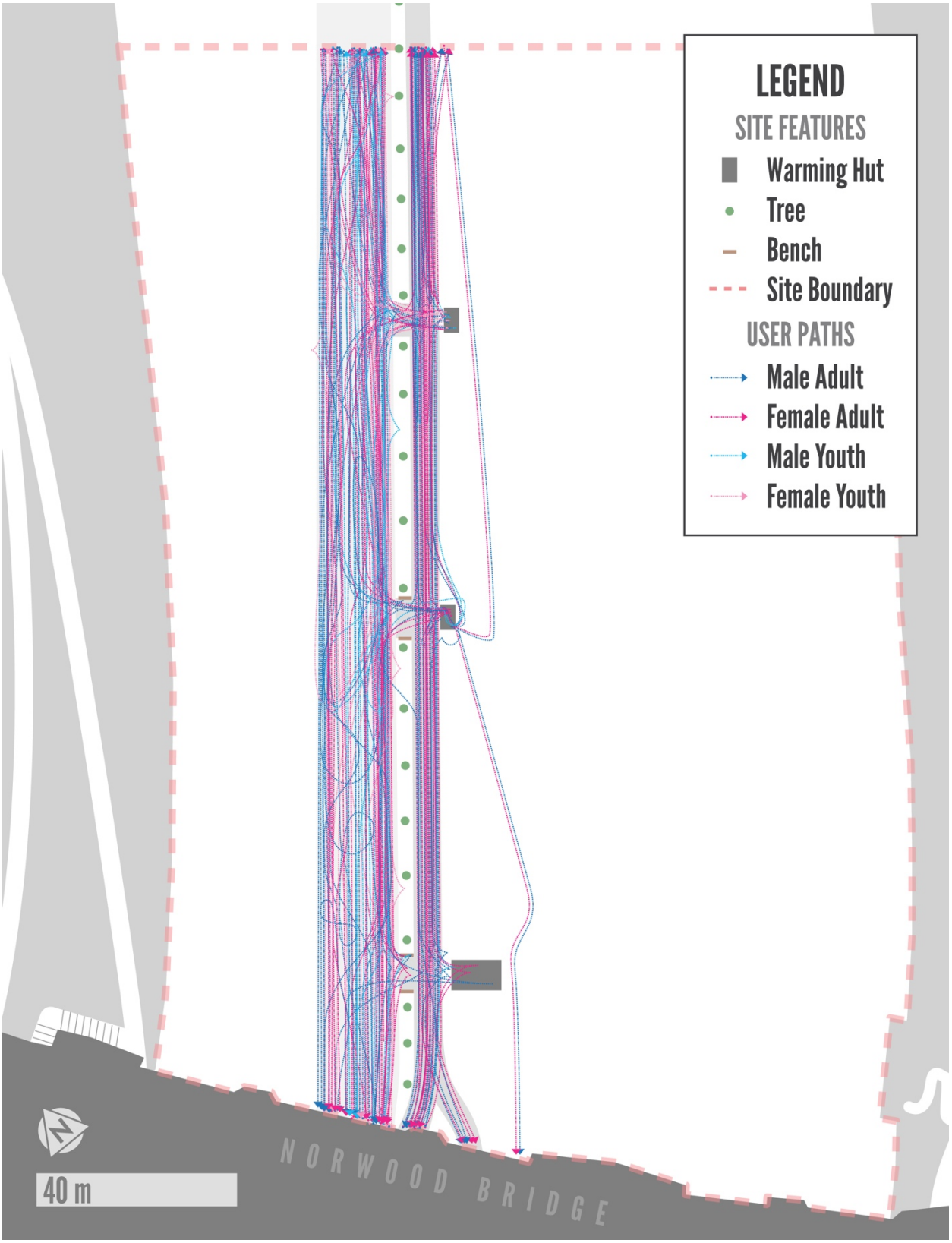
Site A: Thursday, February 11, 2016, 2:22 - 2:32 pm (weekday afternoon)



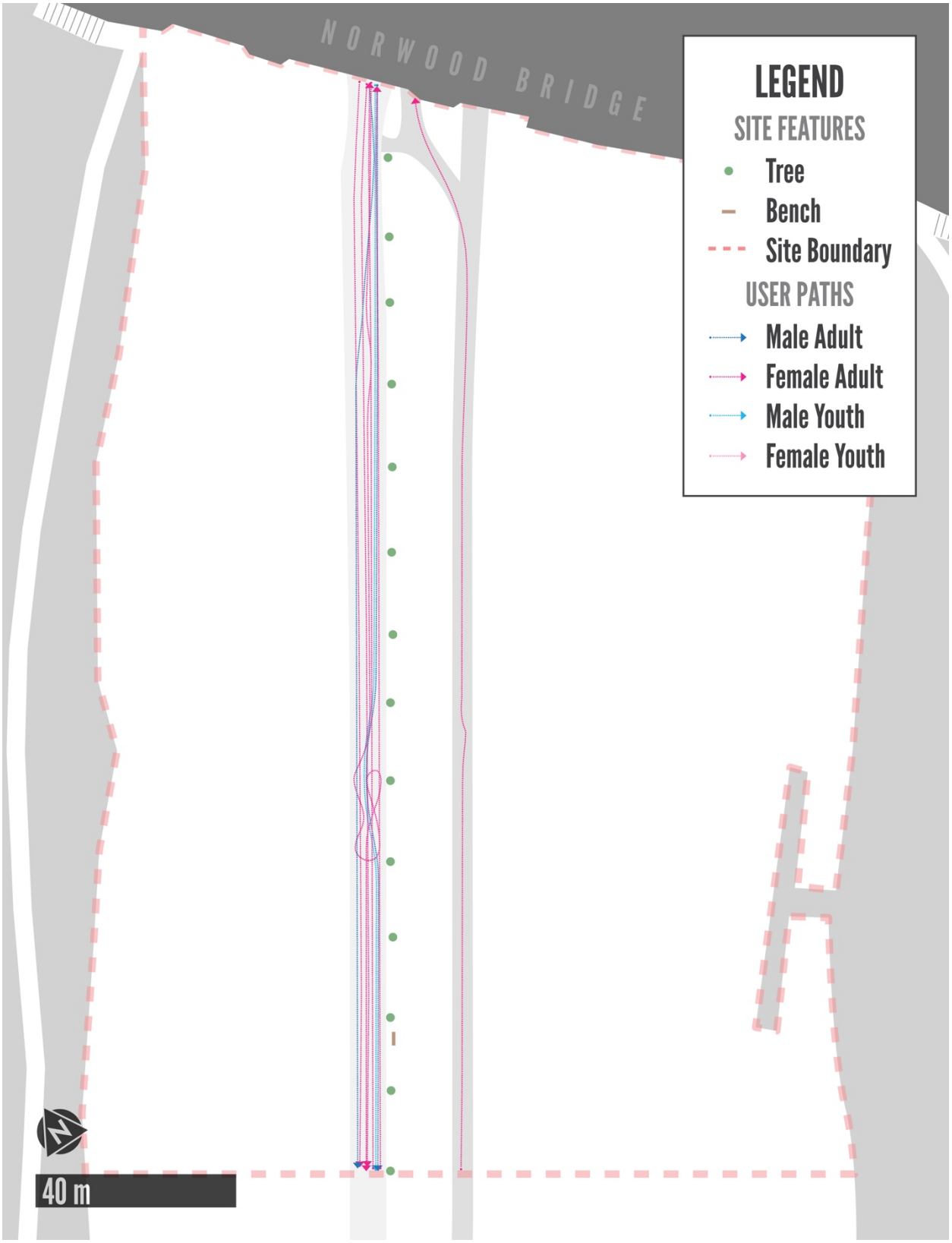
Site A: Saturday, February 20, 2016, 10:36 – 10:46 am (weekend morning)



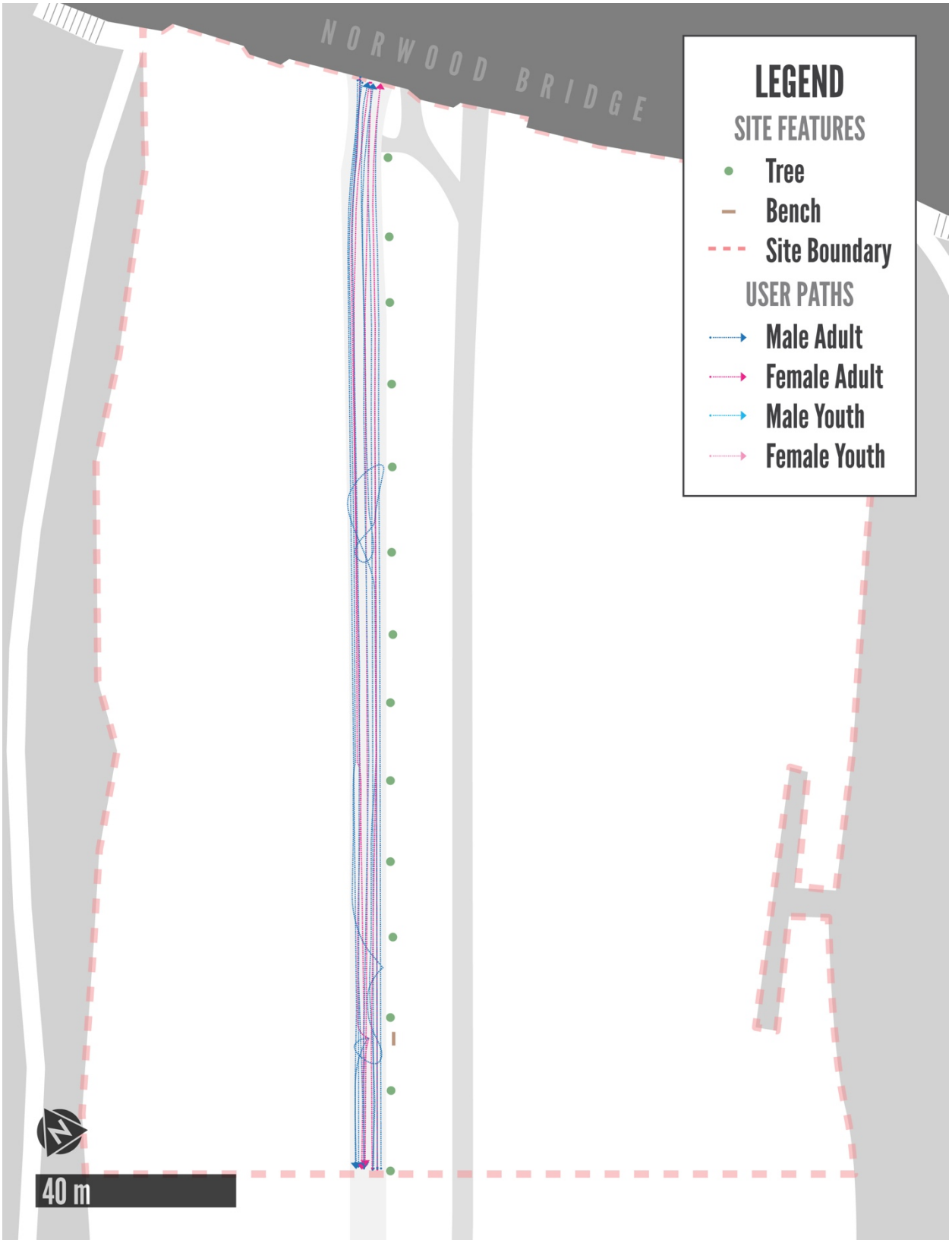
Site A: Saturday, February 20, 2016, 2:30 – 2:40 pm (weekend afternoon)



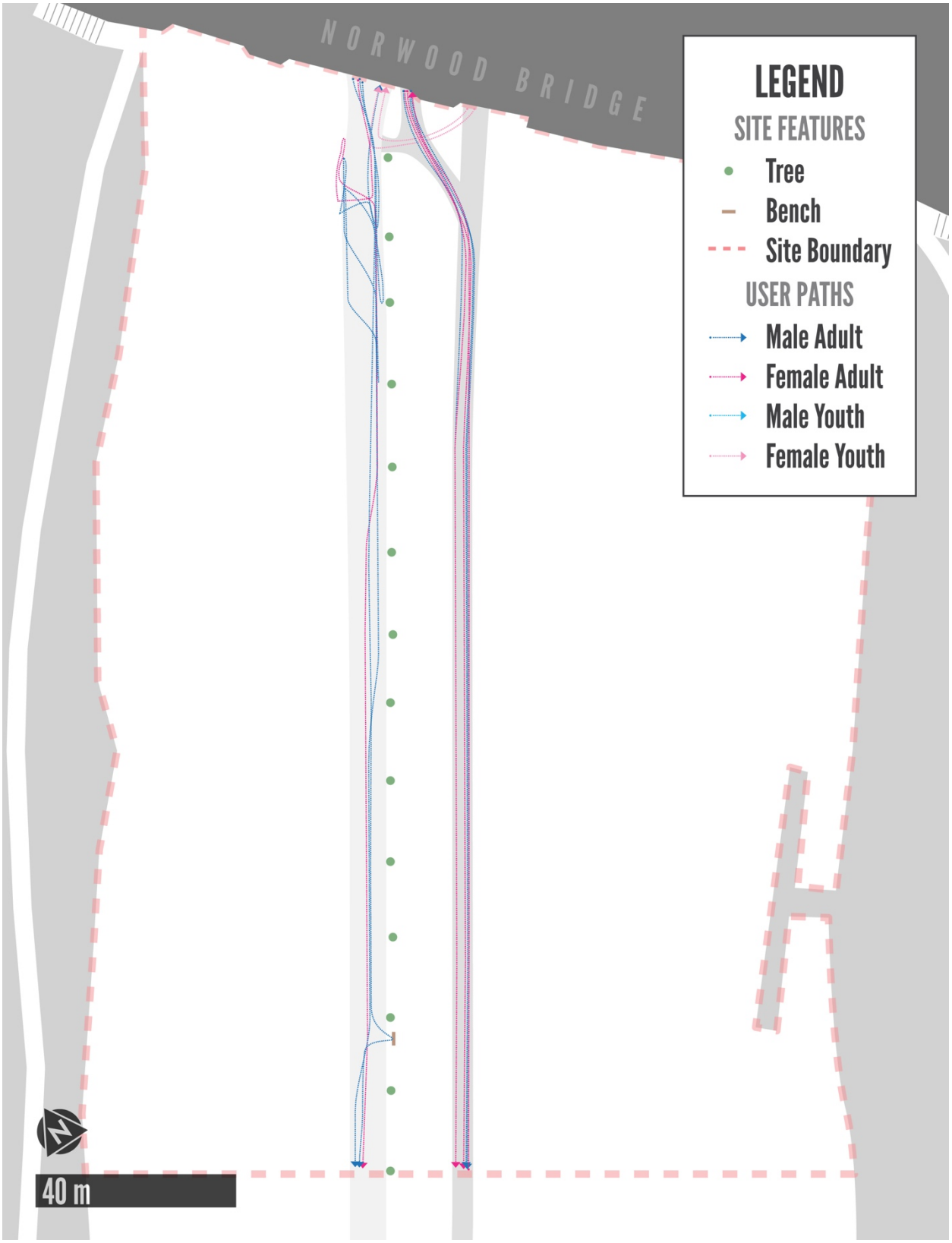
Site B: Thursday, March 3, 2016, 10:44 – 10:54 am (weekday morning)



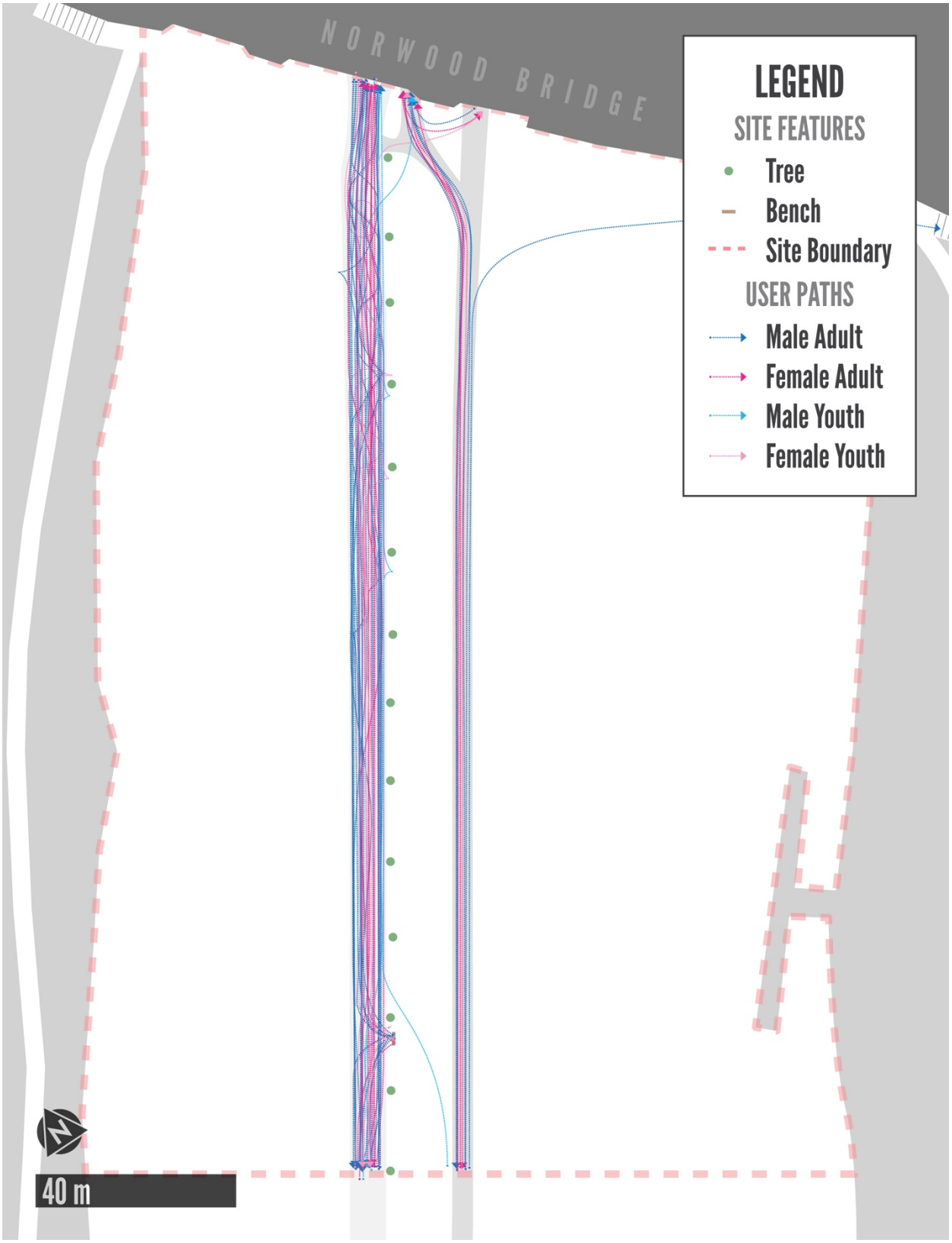
Site B: Thursday, March 3, 2016, 2:11 - 2:21 pm (weekday afternoon)



Site B: Saturday, February 20, 2016, 10:56 – 11:06 am (weekend morning)



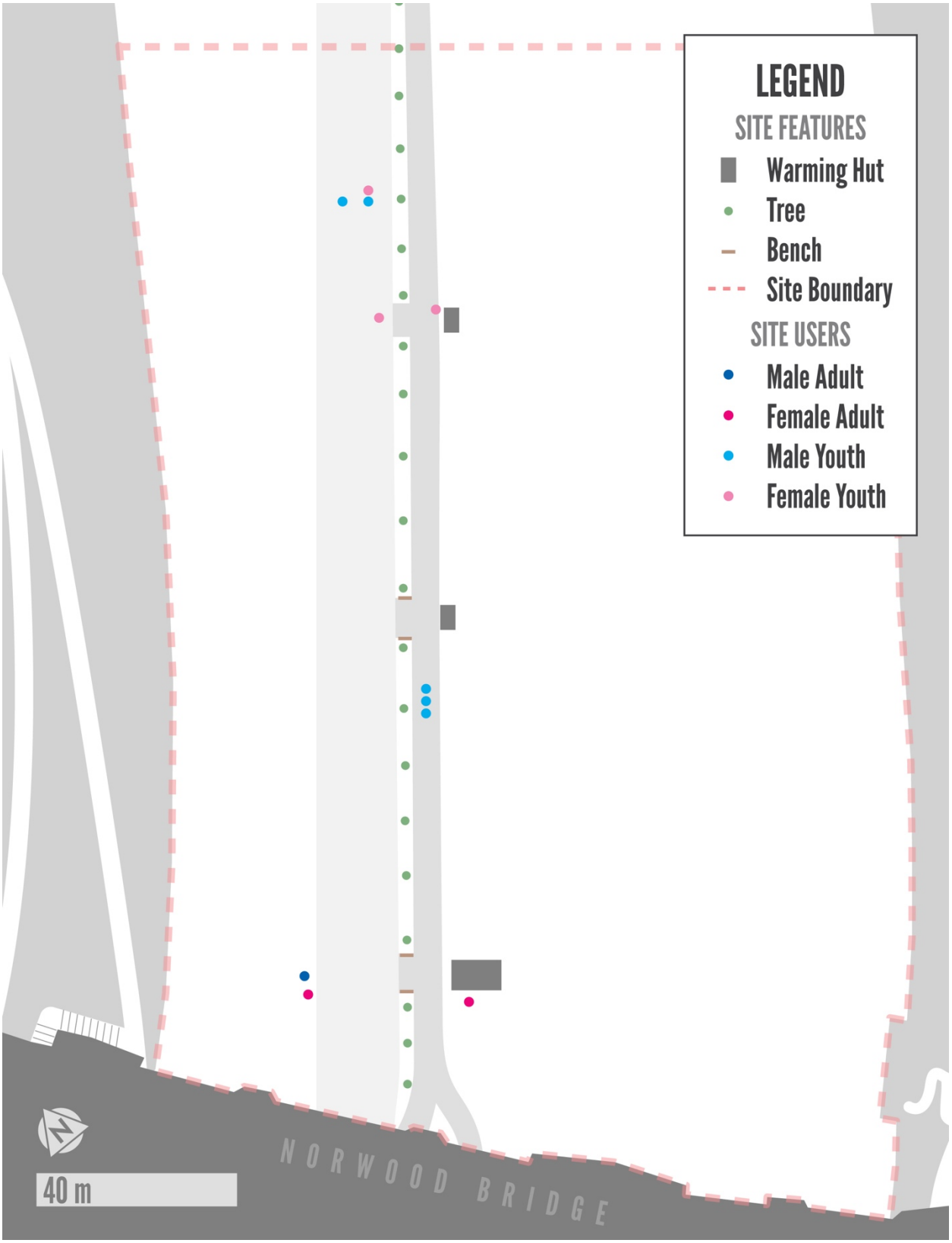
Site B: Saturday, February 20, 2016, 2:52 – 3:01 pm (weekend afternoon)



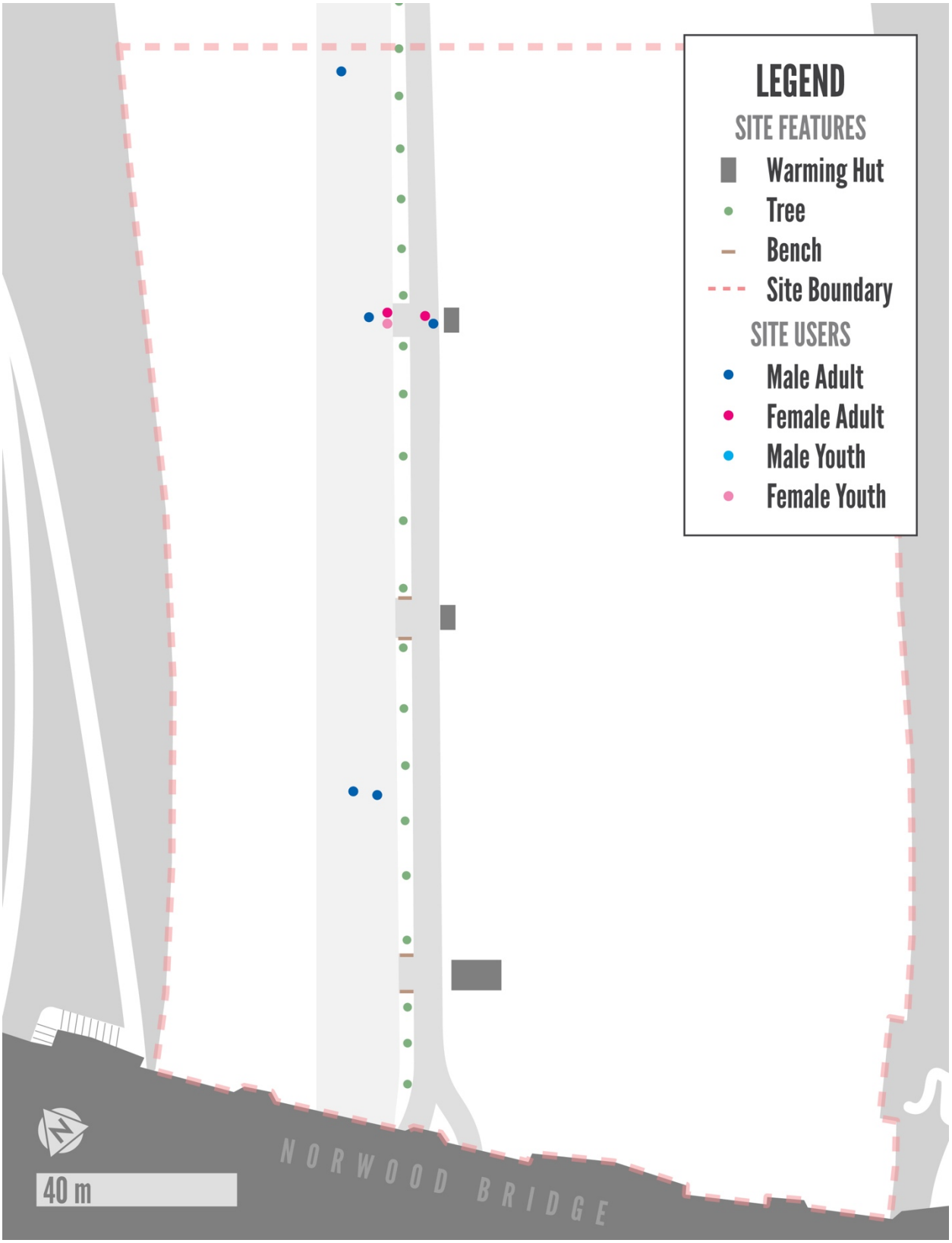
B: BEHAVIOURAL MAPS

Site A: Thursday, February 11, 2016, 10:07 am (weekday morning 1)

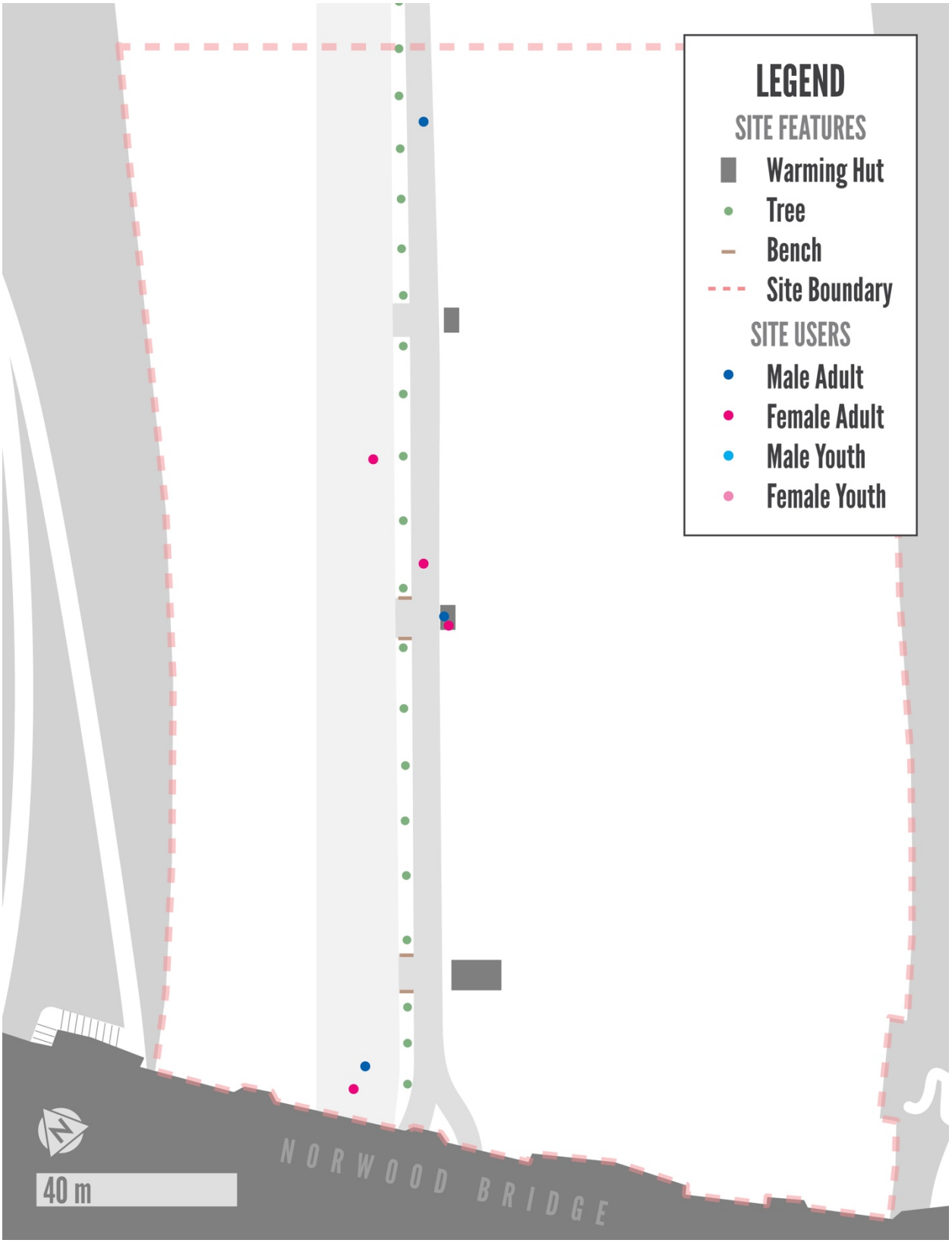
Site A: Thursday, February 11, 2016, 10:38 am (weekday morning 2)



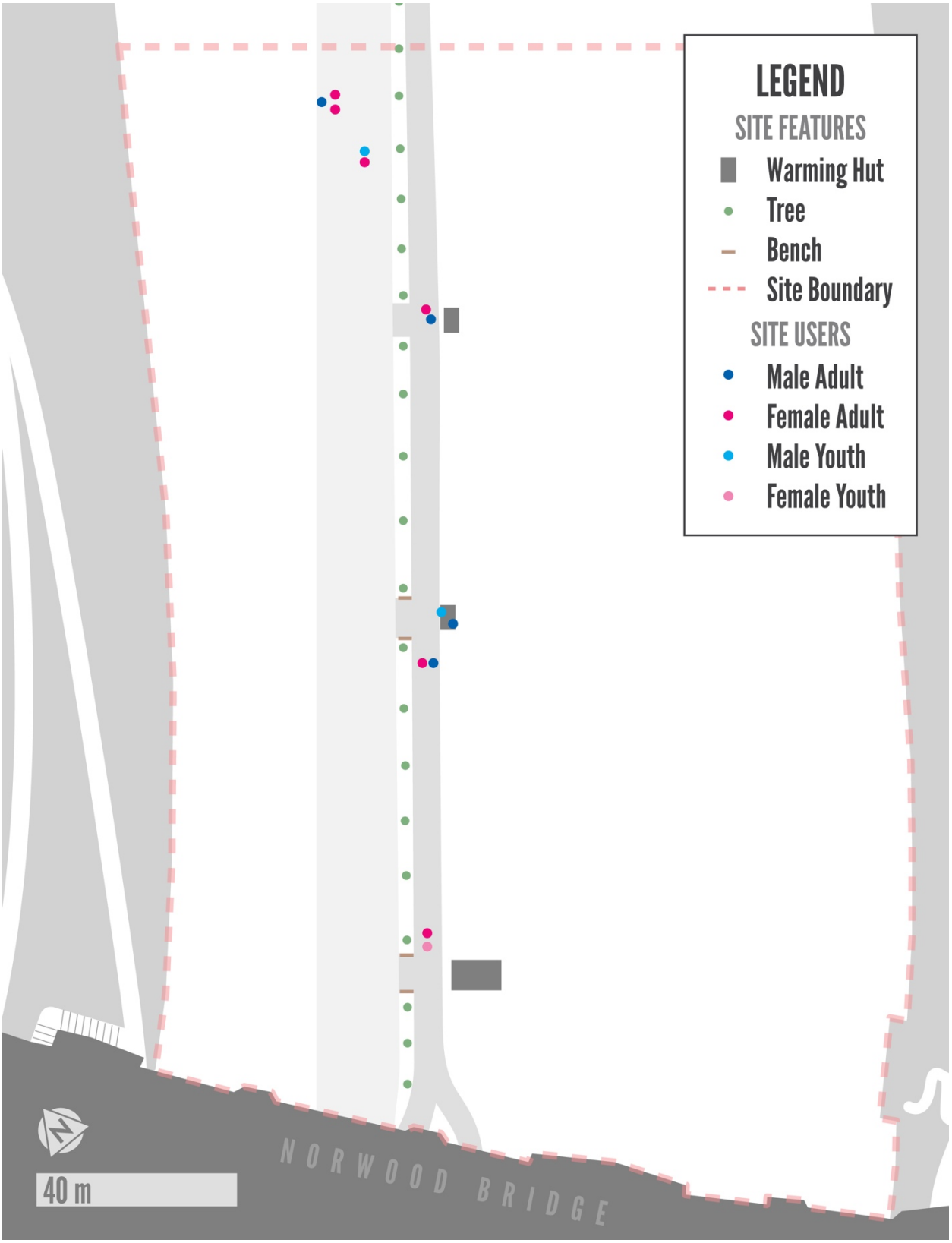
Site A: Thursday, February 11, 2016, 2:08 pm (weekday afternoon 1)



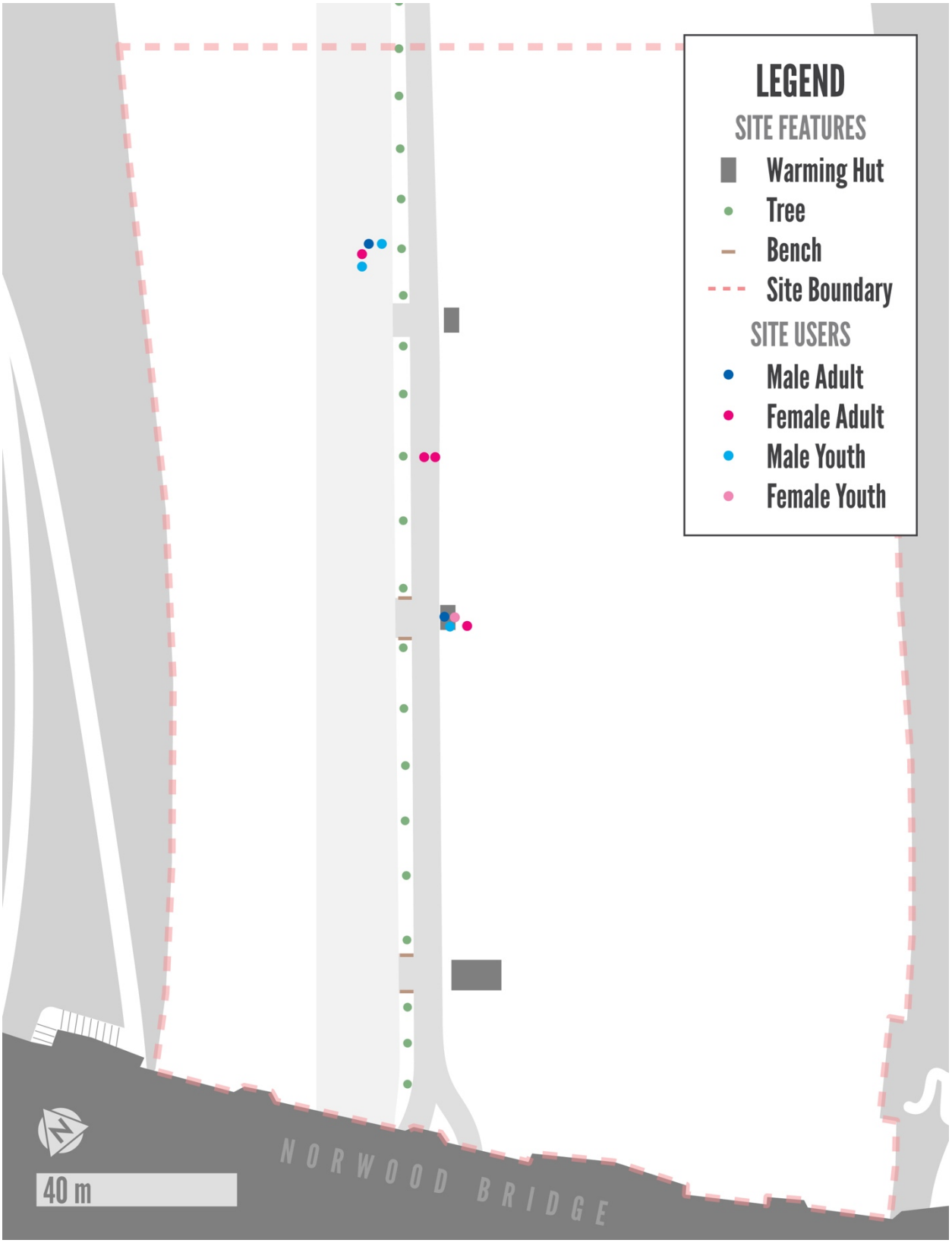
Site A: Thursday, February 11, 2016, 2:32 pm (weekday afternoon 2)



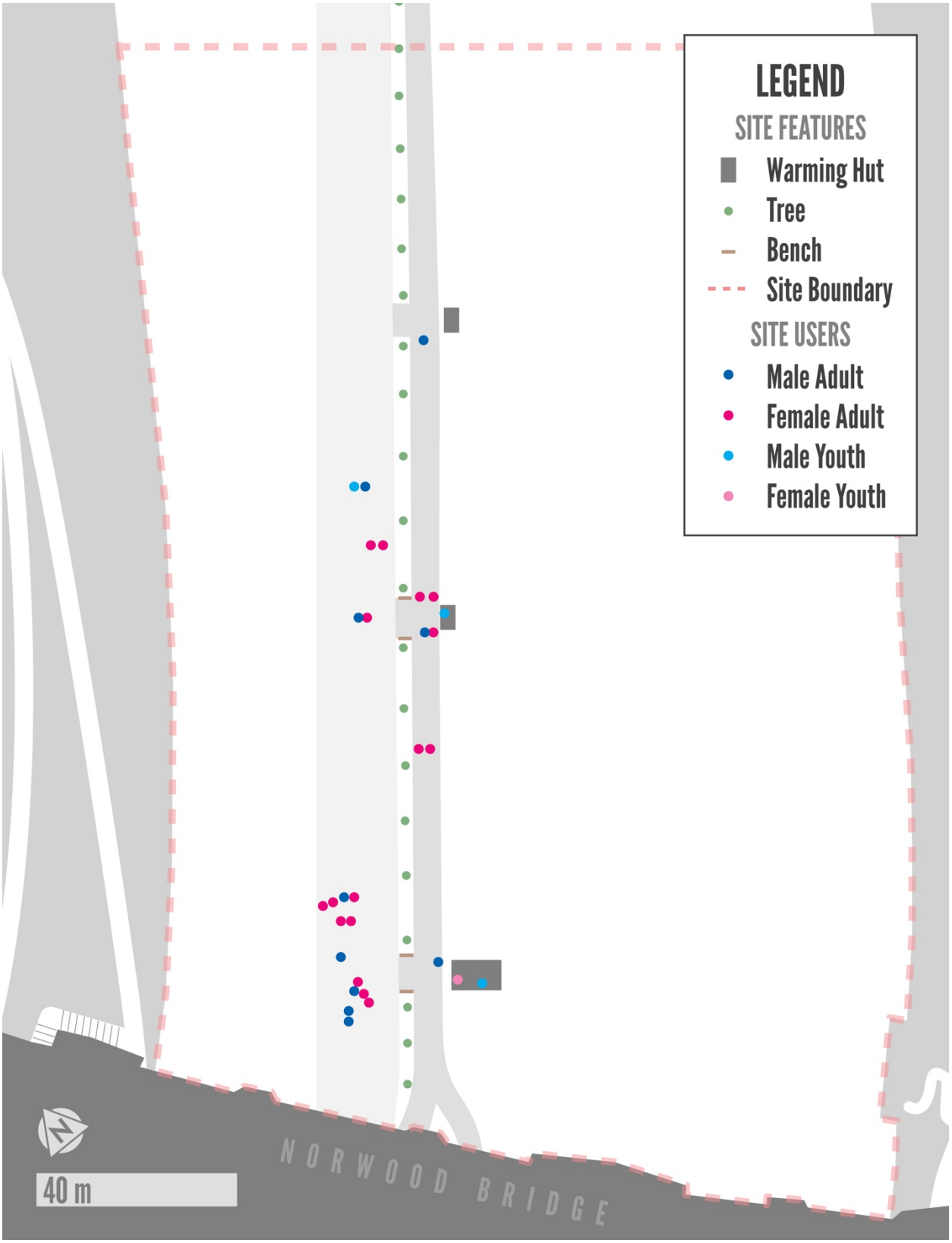
Site A: Saturday, February 20, 2016, 10:17 am (weekend morning 1)



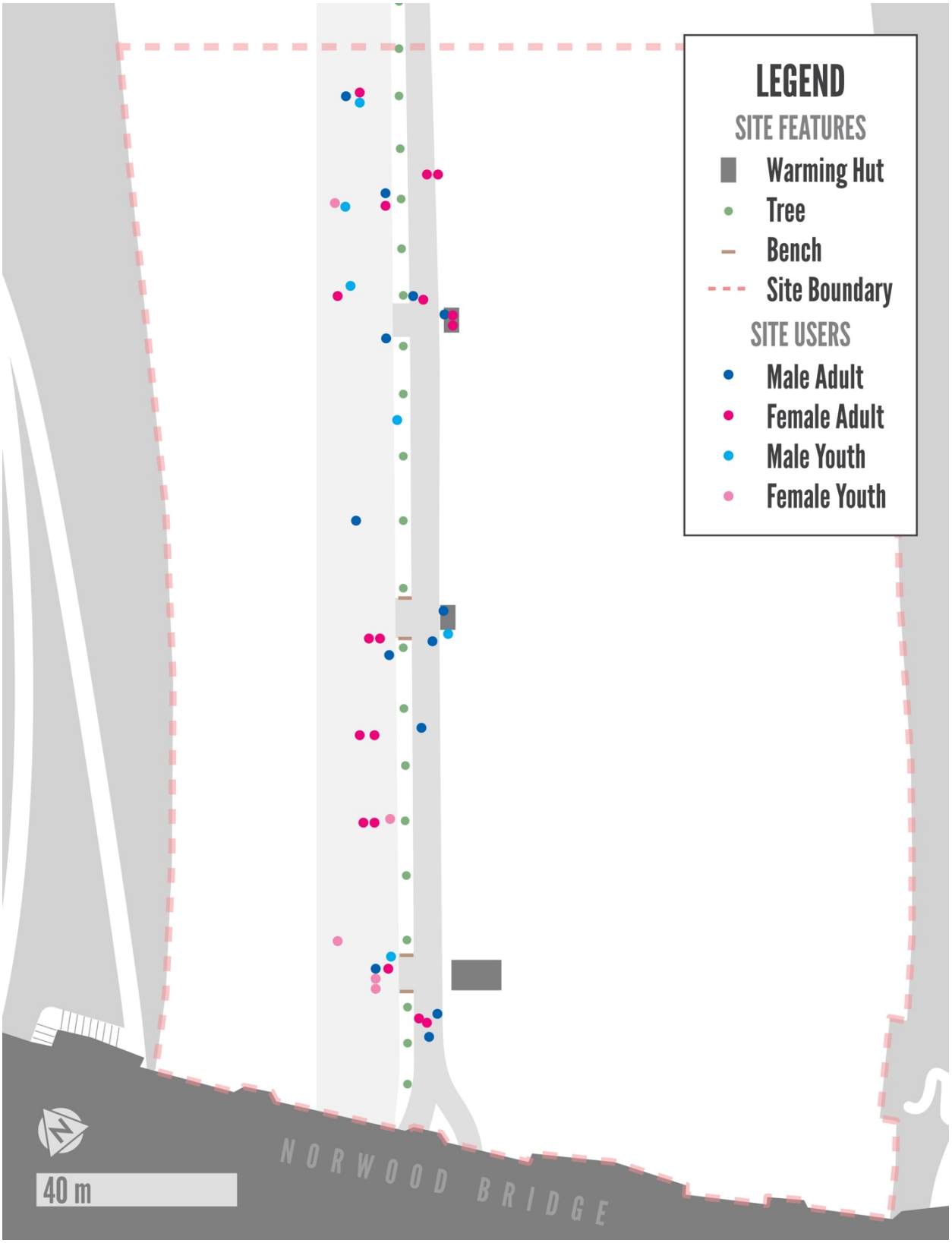
Site A: Saturday, February 20, 2016, 10:45 am (weekend morning 2)



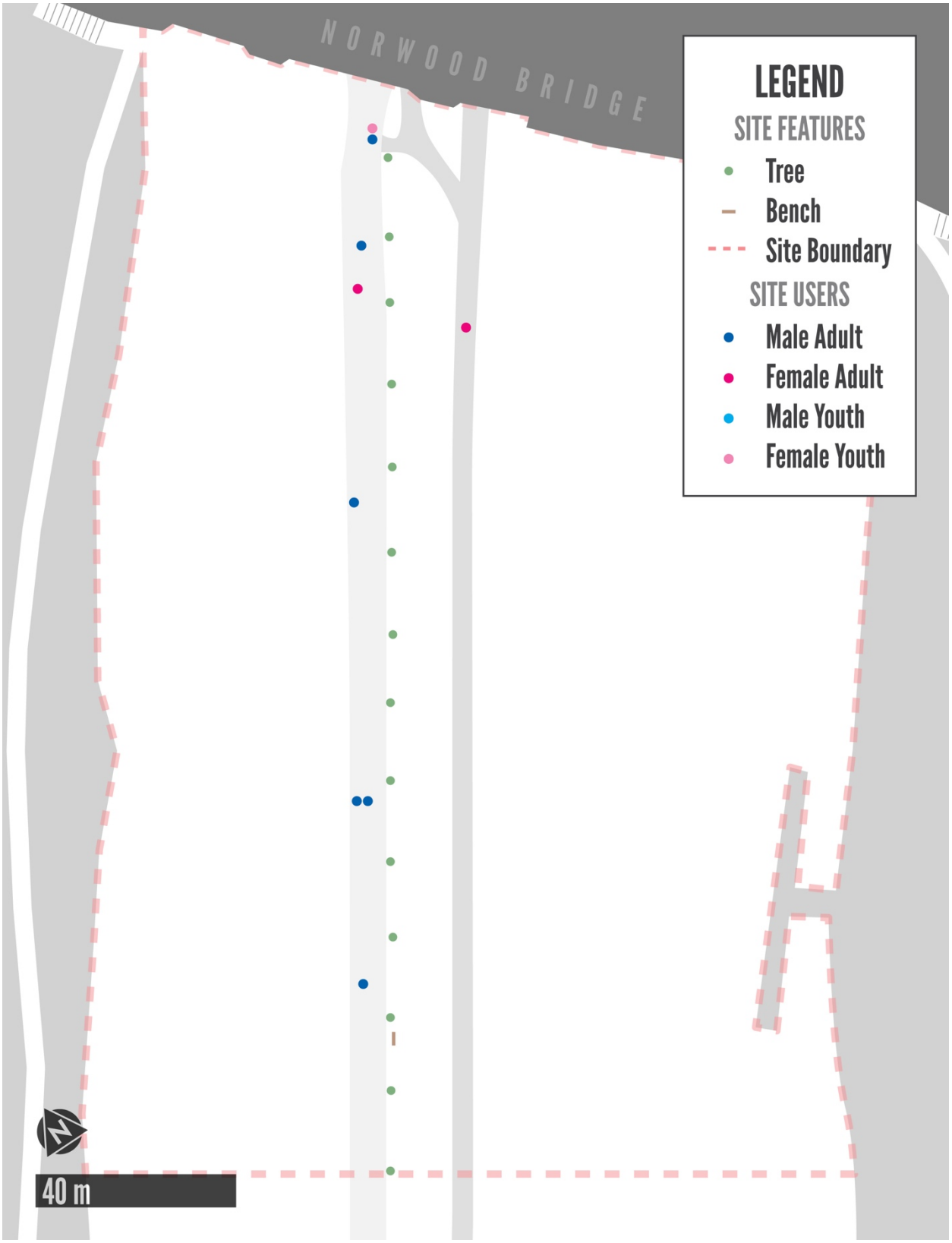
Site A: Saturday, February 20, 2016, 2:06 pm (weekend afternoon 1)



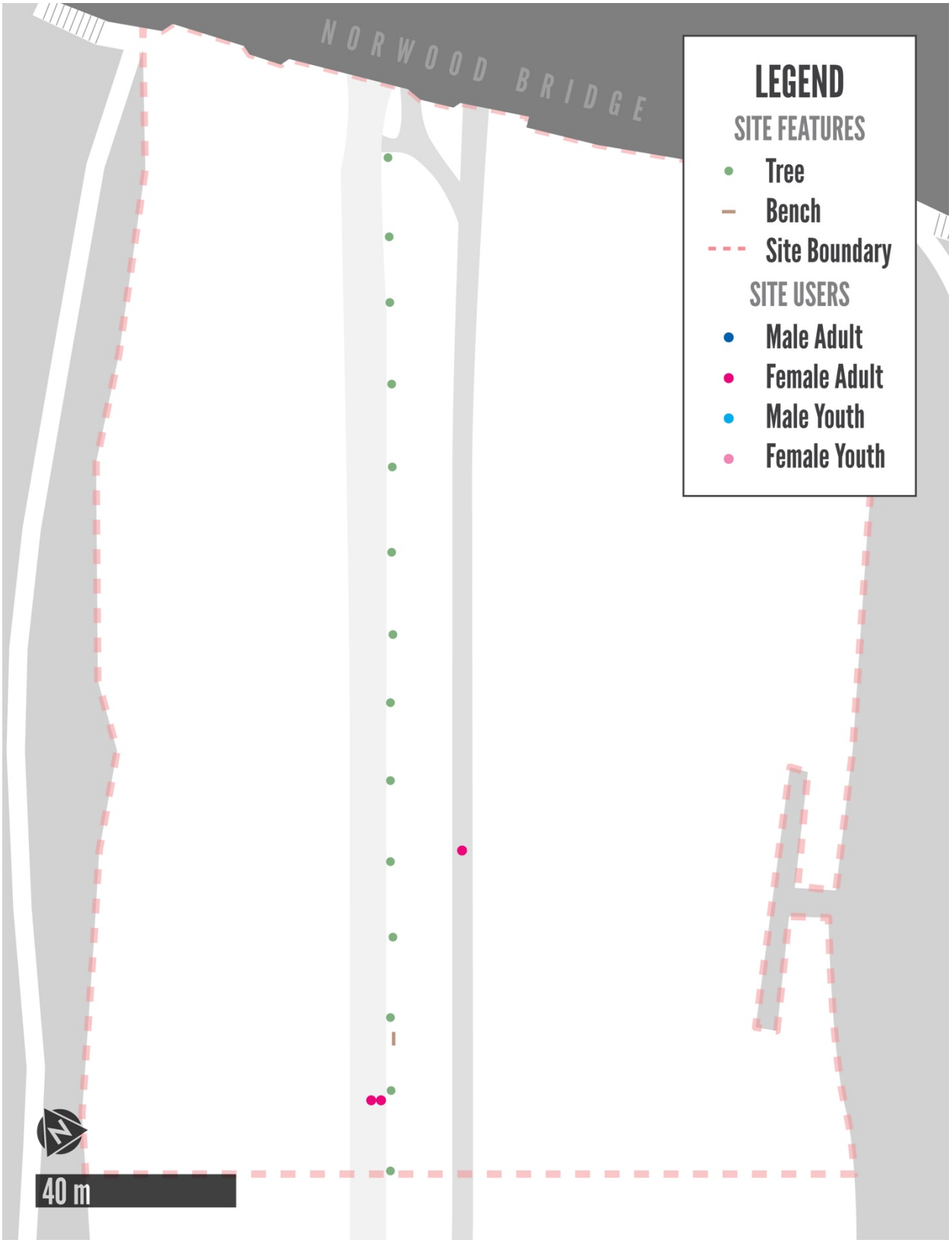
Site A: Saturday, February 20, 2016, 2:36 pm (weekend afternoon 2)



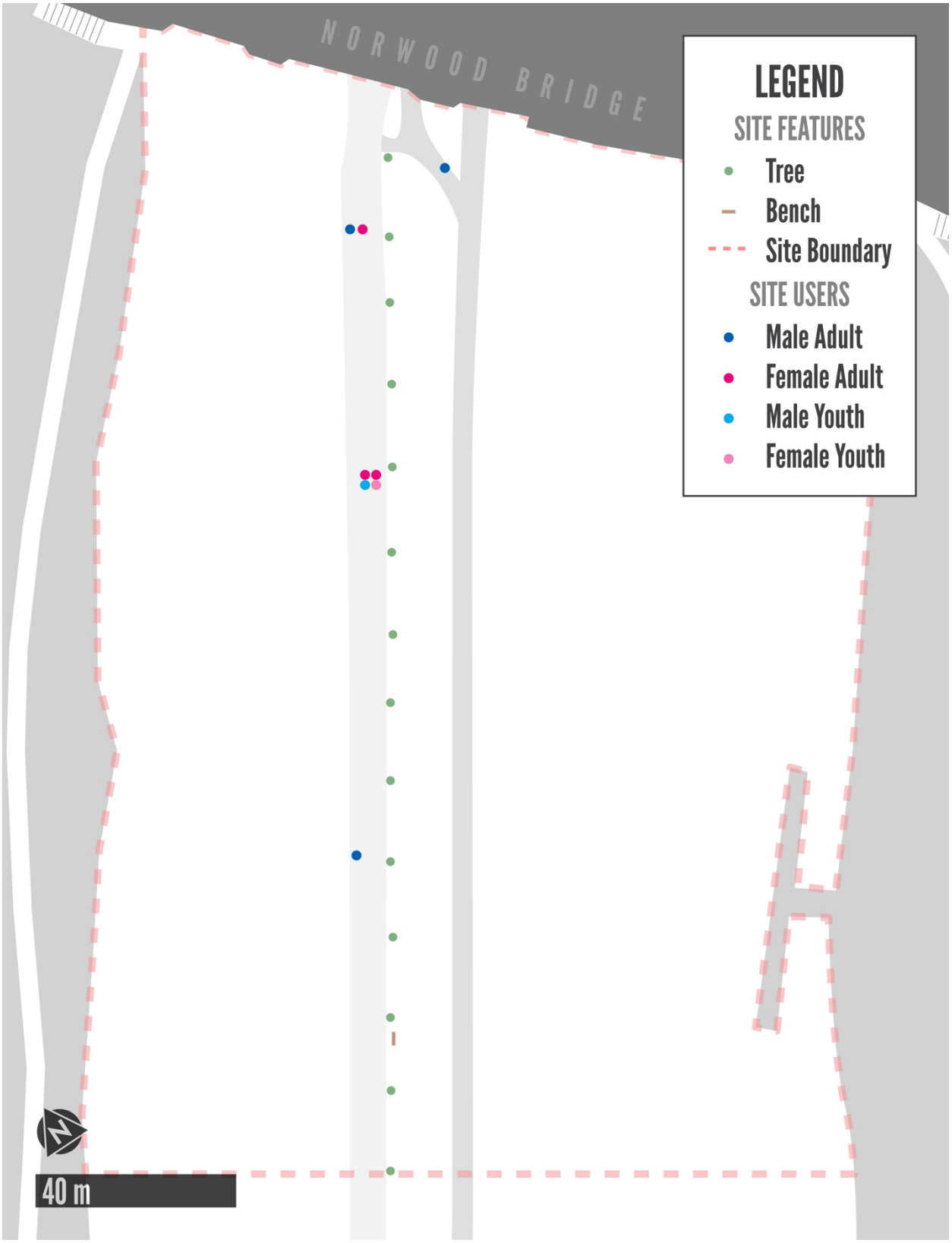
Site B: Thursday, March 3, 2016, 10:30 am (weekday morning 1)



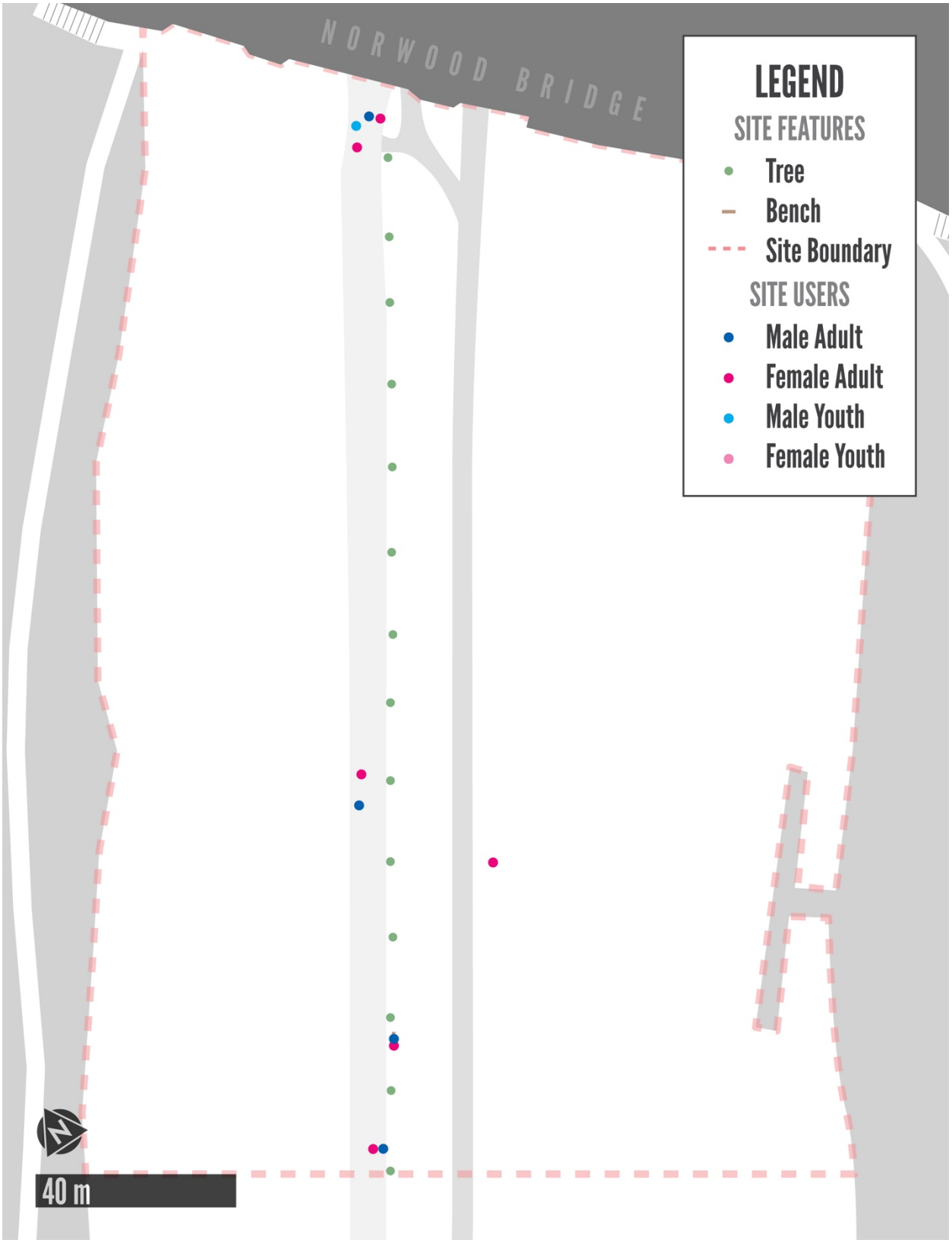
Site B: Thursday, March 3, 2016, 10:51 am (weekday morning 2)



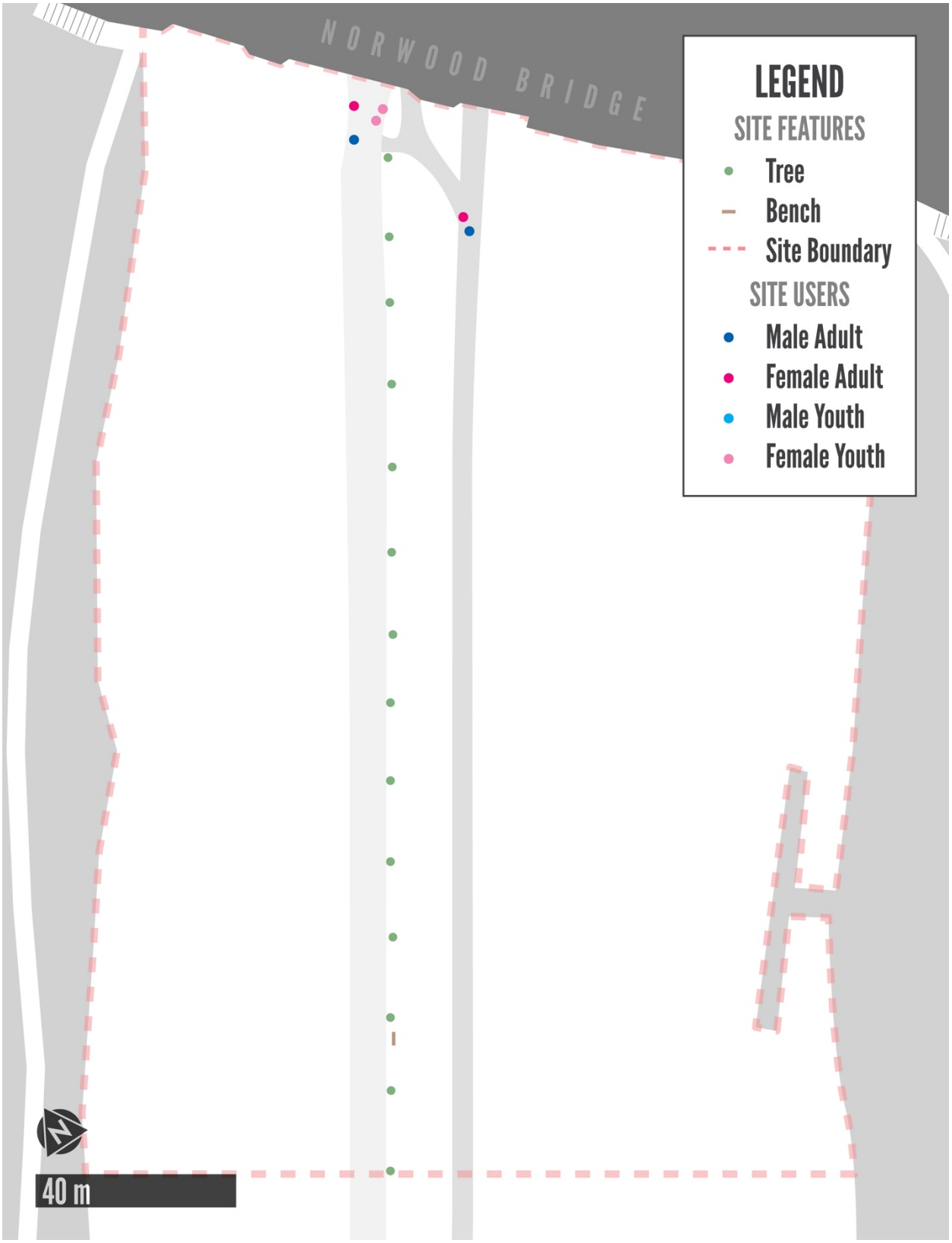
Site B: Thursday, March 3, 2016, 1:53 pm (weekday afternoon 1)



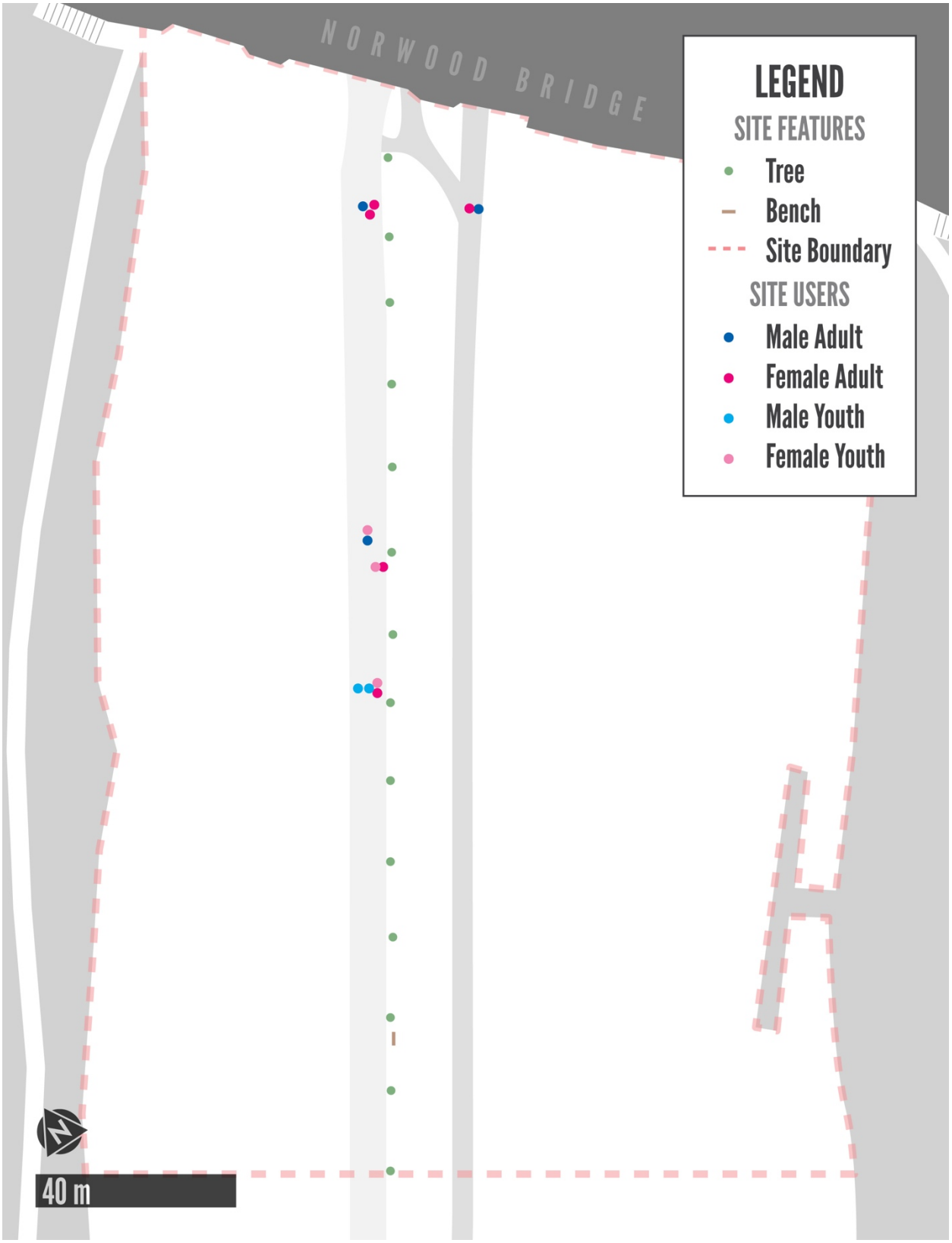
Site B: Thursday, March 3, 2016, 2:20 pm (weekday afternoon 2)



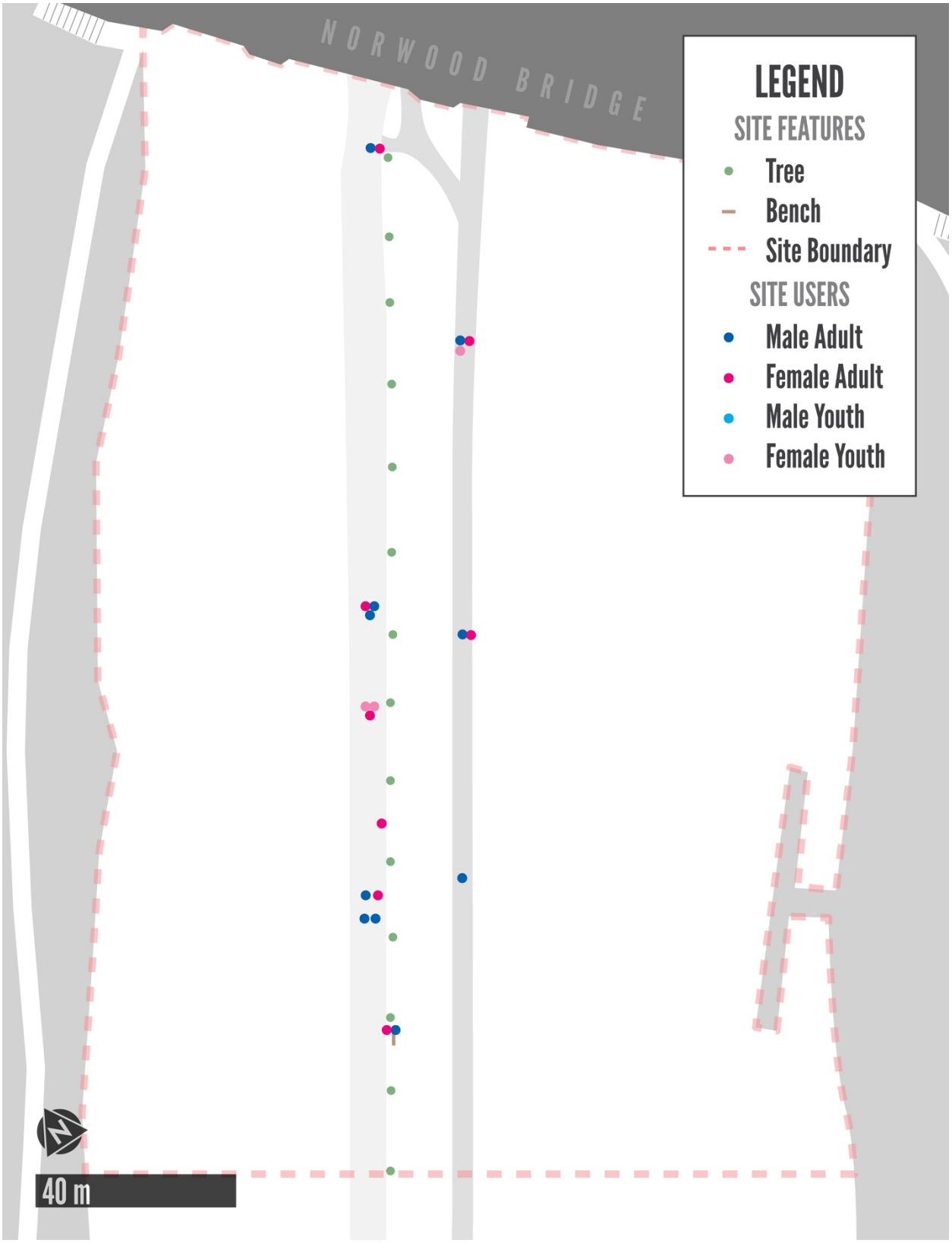
Site B: Saturday, February 20, 2016, 10:58 am (weekend morning 1)



Site B: Saturday, February 20, 2016, 11:29 am (weekend morning 2)



Site B: Saturday, February 20, 2016, 2:50 pm (weekend afternoon 1)



Site B: Saturday, February 20, 2016, 3:22 pm (weekend afternoon 2)