

**Emergence and Disappearance: How did managed
retreat move from an 'emerging direction' to being
removed as a policy option in Crescent Beach,
Surrey, B.C.?**

**by
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Abstract

Managed retreat is a transformative approach in contemporary city planning to adapt to sea level rise. Instead of focussing on structural barriers to prevent flooding, managed retreat involves the relocation of people, property, and infrastructure away from the floodplain. This research project investigates the consideration of managed retreat as a climate adaptation policy option for the seaside neighbourhood of Crescent Beach, Surrey, B.C. As part of the City of Surrey's Coastal Flood Adaptation Strategy (CFAS), managed retreat was initially considered the preferred long-term flood management strategy, or "emerging direction" for Crescent Beach. By the end of the CFAS policy process, however, managed retreat was no longer considered a viable policy option. This study weaves together the relationship between resilience and transformative change and development paths in policymaking to examine the CFAS policy process and the initial consideration of managed retreat in the face of climate change in Crescent Beach.

Keywords: urban resilience; development paths; managed retreat; climate change; transformative change; policy barriers

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List of Acronyms

CBPOA	Crescent Beach Property Owners' Association
CEEP	Community Energy and Emissions Plan
CFAS	Coastal Flood Adaptation Strategy
DMAF	Disaster Mitigation and Adaptation Funding
FCL	Flood Construction Level
IPCC	Intergovernmental Panel on Climate Change
UNFCCC	United Nations Framework Convention on Climate Change

Chapter 1.

Introduction

Both the frequency and intensity of extreme weather events is expected to increase as we move further along the path of climate change. More frequent and more intense weather events increase the likelihood of major disaster, and Canada is warming at twice the average global rate (Natural Resources Canada, 2022). An example of the effects climate change is already having on communities is illustrated by an increase in emergency relief funding being paid out by the Canadian federal government to provinces and territories through Disaster Financial Assistance Arrangements (Federation of Canadian Municipalities et al., 2020, p. 10). Between the years 2009 to 2015 (7 fiscal years), relief payments under this program totaled more than the sum of the previous 39 years of payments (Federation of Canadian Municipalities et al., 2020, p. 10).

During the course of researching and writing this study from 2021 to 2022, British Columbia, Canada broke dozens of heat records as a heat dome fell over the province at the end of June 2021 (Mangione, 2021). During the heat dome, Lytton, a village in the Fraser Canyon area of British Columbia, shattered all-time Canadian temperature records three days in a row, reaching 49.6 degrees Celsius (Digital Writers, 2021). The day after reaching 49.6 degrees, the village of Lytton burned to the ground due to a massive wildfire (Digital Writers, 2021; Kulkarni, 2021). In terms of wildfires, 2021 was the third worst season on record for British Columbia with 1,600 fires. Aside from the fire-related destruction brought on by the hot weather, 619 people in British Columbia died from the extreme heat during this heat dome (Dickson, 2022).

Rounding out the heat-related events of 2021 in British Columbia, the province also experienced extreme rain in November in the form of an atmospheric river which caused major flooding across the province. The damage from this event is anticipated to be approximately \$675 million (The Canadian Press, 2022). Parts of the Coquihalla Highway were entirely washed away, people were stranded for days due to flooding along main thoroughfares, and subsequent landslides killed five people (Judd, 2021). The Barrowtown Pump Station, which drains the agricultural Sumas Prairie

neighbourhood in Abbotsford, is one of the largest pumping stations in all of North America. The water levels of the Fraser River, Nooksack River, and Chilliwack River rose so high during the atmospheric river that the entire Sumas Prairie neighbourhood was forced to evacuate as the City of Abbotsford anticipated the pumping station would fail. It did not fail, but the area was still inundated with water (although not to the height it otherwise could have been) and inaccessible by car for several days (Olsen, 2021). It is argued that this extreme weather event was caused directly by climate change (Gillett et al., 2022).

The critical and personal nature of what climate change is and can do to individuals and society is becoming increasingly obvious; and for many of us is no longer happening somewhere else but happening locally.

The concept of resilience has been used in many disciplines, including ecology (Holling, 1973), psychology (Luthar et al., 2000; Werner, 1989), engineering (Woods, 2015), disaster studies (Paton & Johnston, 2017), and community planning (Berkes & Ross, 2013), but has recently taken on new meaning. With the onslaught of ominous reports about the effects of climate change (see Intergovernmental Panel on Climate Change, 2022 for example) as well as a growing number of people's experiences with more extreme weather events, 'resilience' has emerged as the solution to the traumatic challenges of planning in the Anthropocene (Reyers & Lee-Moore, 2016). Resilience has gained considerable attention in the fields of urban planning since the mid-2000s, with the concept deemed urban resilience (Cao et al., 2021; Leichenko, 2011; see also Resilient Cities Network). Urban resilience, unlike sustainability, is more of a loose framework for planning, and does not explicitly prescribe a values-based outcome of the planning strategy (outside of suggesting that the city or institution or society become more "resilient"), meaning that resilience can be interpreted in a multitude of ways (Holden et al., 2016). For instance, the intention of a resilience framework could be to make a city more resilient through being robust, and able to "bounce-back" to its present state in response to a particular stressor (i.e. climate change) or shock (i.e. a flood). An example of bounce-back resilience is building a seawall to protect existing infrastructure from flooding. The bounce-back approach to resilience focusses more on managing the disaster than managing the risk or vulnerability, as the same vulnerabilities perpetuate after the disaster (Manyena et al., 2011, p. 2). On the other hand, the intention of the resilience framework could be that a city becomes more resilient by becoming something

new and different to what it was before – “bouncing-forward” in response to a particular stressor or shock. An example of bounce-forward resilience could look like strategic retreat away from the floodplain in response to a flooding event or in response to sea level rise. The bounce-forward approach to resilience focusses less on managing the disaster and more on managing the vulnerability and the response to the disaster or stress (Manyena et al., 2011, p. 3).

Using the latter understanding of resilience, rather than the former as an example, resilience provides a way to think outside the prescribed urban planning toolbox in the context of climate change, and encompasses the idea that there are varying degrees to which cities can respond not just in a defensive mode, but in ways that demonstrate transformative capacities to respond to shocks or stresses (Davoudi et al., 2013). In this way, resilience is framed as a replacement for the term or concept of sustainability in climate change discourse. Resilience points to a need for cities to be able to adapt in these challenging times rather than maintain the status quo, as the notions of maintaining stability and permanence become increasingly unlikely. One such resilience framework that recognizes the need for cities to bounce forward is Davoudi et al.’s framework that includes four central, interacting tenets: persistence, adaptability, transformability, and preparedness (2013). Although the concept of persistence within this framework suggests that some level of resistance to change in a resilient system is important (i.e. bounce-back), it is explicitly noted by Davoudi et al. that persistence is only positive in short-term, rather than long-term recovery capacities, where adaptability and transformability become increasingly integral to disaster recovery, and align closely with the bounce-forward conceptualization of resilience.

Resilience, although capable of being dynamic, has often manifested itself instead in cities as bounce-back or defensive approaches that do not transformatively change the way we plan for climate change (Meerow & Stults, 2016a; Yumagulova & Vertinsky, 2019). In fact, radical transformation as a product of risk management is often considered a “system failure” (Davoudi et al., 2013, p. 10). That being said, as stated by Patterson et al. (2018), “Constraining global climate change...is commonly understood to require urgent and deep societal transformations” (p. 1), and we need to be able to make these changes to work towards a common future for the planet. Resilience offers a framework for achieving those urgent and deep societal transformations but often does not manifest itself in this transformative manner, in that resilience has preferentially been

adopted in the bounce-back fashion (Meerow & Stults, 2016a). If resilience frameworks are implemented in a bounce-back fashion, this further engrains the very lifestyles, attitudes, approaches to planning and development, and consumption practices that have contributed to the climate crisis. An important aspect of breaking the cycle of reverting to status-quo approaches, and instead directing our climate change response more effectively to challenge the dominant consumption, lifestyle, social, and development practices that have contributed to the climate crisis in the first place, is understanding why transformative, or bounce-forward approaches to resilience are less frequently adopted in practice than bounce-back approaches. This is especially true given implementation of a bounce-forward framework (such as Davoudi et al.'s 2013 framework) offers our cities promise to not just absorb the impacts of the climate crisis, but grow from them. My research aims to link macro understandings of why transformative, or bounce-forward resilience policy (specifically using Davoudi et al.'s 2013 framework of persistence, adaptability, transformability, and preparedness) is less frequently adopted in practice with a micro, or case study example of this policy challenge in the City of Surrey, British Columbia.

1.1. Research question

Managed retreat is the term used to describe a resilience planning response to rising water that involves “the purposeful, coordinated movement of people and assets out of harm’s way” (Carey, 2020, p. 13182). Given the volatility of climate change and its impacts, through heightened storm activity and sea level rise, previous approaches to controlling flooding through hard infrastructure may be increasingly challenging or impossible to maintain or upgrade to keep on pace with the effects of climate change. Additionally, increasing reliance on hard infrastructure to protect people and valuable assets also introduces significant risk in terms of failure and introduces significant risks in terms of sunk costs when or if that flood protection system fails. Rather than continually raising dikes and upgrading flood protection infrastructure to try and counter the predicted exacerbating effects of climate change in flood-affected communities, managed retreat, or relocation of people and infrastructure away from flooding hazards, is seen more and more as a viable and favourable flood management strategy (see Gies, 2022; Schut et al., 2010; van Herk et al., 2015 as examples). Managed retreat also can be viewed as a transformative or bounce-forward approach to climate resilience.

When met with the stress of the heightened likelihood of climate-induced flooding, or the shock of a flooding event itself, managed retreat as a response pathway does not look to maintain the status quo protection for communities; working against nature through continually upgrading hard infrastructure subject to potential failure, but instead, managed retreat looks to work *with* nature and find different uses for the space (for instance, for recreational purposes) where homes or other infrastructure housed on the floodplain would otherwise be considered vulnerable and in need of protection. In this way, managed retreat as an approach can transform spaces and places into assets rather than climate liabilities through embracing the potential for change and reimagination in land use planning. If a flood does occur in an area that adopted managed retreat, it will not strike in such a devastating manner.

Davoudi et al.'s framework for understanding resilience, with the complex interplay of persistence, adaptability, transformability, and preparedness is a way of conceptualizing how managed retreat is a bounce-forward implementation of resilience. Davoudi et al. emphasize that although persistence to a certain degree is important in short-term disaster recovery in resilient systems, the inflexibility of a focus on long-term persistence of a system is not resilient. Shorter term persistence as it used in Davoudi et al.'s framework aligns with what managed retreat accomplishes as an adaptation pathway. Implementing managed retreat recognizes that the present state of the community (flood-protected) is not inherently always the most desirable state of the community over the long-term, especially when faced with the stress of climate change or shock of a climate change-induced flood. In parallel with that understanding, long-term protection (persistence) of physical property is not the main goal of the managed retreat adaptation pathway. Transformability, a tenet in Davoudi et al.'s resilience framework, is also central to the idea of managed retreat. The managed retreat approach to flood adaptation recognizes that fixed vulnerabilities (i.e. infrastructure in the floodplain) can be transformed to opportunities; through seeing new uses for the space outside of human-serving infrastructure, and recognizing that there are other values to space such as assets that serve ecological or recreational purposes. Thus managed retreat conforms to the tenet of transformability in the Davoudi et al. framework. A managed retreat approach is also adaptable in terms of when it is implemented; it can be implemented when the risk of persistence (i.e. the status quo development pattern versus flood risk) outweighs the risk of significant change and disruption that managed

retreat could bring. It is also adaptable after it is implemented – with a multitude of possible futures in terms of use of the space for habitat or natural carbon capture – although less so from a strictly human economic values sense. The sunk costs of a protection-oriented strategy (like dikes or seawalls), as well as the long life cycle of grey infrastructure tend to constrain what types of use arise from that space after investment, in ways that managed retreat does not. Managed retreat also responds to the central tenet of preparedness as part of the Davoudi et al. resilience framework. Using Holling’s 2001 research as a support, Davoudi et al. argue that people have strengths in terms of “foresight and intentionality”, which is expressed through the notion of preparedness (Davoudi et al., 2013, p. 7). Complex systems, and certainly climate change, follow non-linear trajectories. Managed retreat recognizes that humans do not necessarily have the capacity to precisely predict the impacts of flooding on a community or when that flooding will occur, especially given the uncertainties that climate change brings to the equation. What humans do have is the foresight and intentionality to reduce vulnerability and to turn that vulnerability into opportunity in the wake of uncertainty. Managed retreat recognizes that preparedness is a key way to turn vulnerability (infrastructure in the floodplain) into opportunity for change (new uses for space).

The City of Surrey in the Lower Mainland of British Columbia engaged in a Coastal Flood Adaptation Strategy (CFAS) planning process from 2016 to 2019 as part of the City’s climate change planning efforts, and considered managed retreat in several of the CFAS study areas, including the small, seaside community of Crescent Beach (City of Surrey, 2019). In the face of the predicted 1m of sea level rise, managed retreat was labelled as the “emerging direction” or a viable high-level vision strategy for a significant portion of CFAS development and consultation. Near the end of the consultation process managed retreat was still considered a viable long term strategy and was actually preferred as an adaptation pathway for Crescent Beach, but was removed from the CFAS Final Strategy document with little explanation as to why (there is more detail on the policy process leading up to this removal in the following sections; 1.2 to 1.4). Despite managed retreat being removed from the CFAS Final Strategy document, managed retreat as a flood management policy outcome may be increasingly warranted in order to reduce coastal vulnerabilities and turn those vulnerabilities into new opportunities. Using bounce-forward frameworks of resilience can advance effective planning for the volatile effects of climate change in cases such as flood adaptation. Managed retreat fits the central tenets of the Davoudi et al. bounce-forward resilience

framework. Understanding through prior research that bounce-forward concepts of resilience are less-favoured than bounce-back conceptualizations in resilience practice, I was particularly curious to understand why managed retreat was removed from the CFAS Final Strategy document. Although CFAS is not explicitly labelled as a resilience strategy in its title, in the Final Strategy document “resilience” is mentioned 45 times. The first sentence of the Strategy’s executive summary implies a goal of resilience through the statement: “to help prepare Surrey for a changing climate and help our coastal communities become more resilient, the City of Surrey developed a Coastal Flood Adaptation Strategy” (The City of Surrey, 2019, p. 2). From this, one can extrapolate that resilience in some capacity was a goal of the policy. In this way, in my study, I characterize CFAS as a resilience policy. The City of Surrey case study provides an example of the chasm between the drastic types of action that need to be taken to prepare for the effects of the climate crisis versus the familiar, more incremental types of action that are often taken, which is a division literature on resilience also reflects. I wanted to better understand through the City of Surrey CFAS example which pointed towards a drastic type of action, namely, managed retreat as a viable long term policy outcome for Crescent Beach, why the removal of managed retreat was the ultimate outcome of the policy process. Additionally, being a longtime resident of Surrey and following the CFAS process in the news, the turn that the City took in removing managed retreat from the CFAS Final Strategy document was particularly interesting and also puzzling to me as the City seemed well-situated throughout the process to adopt this transformative measure. Thus, my research question is as follows: in terms of planning and policy priorities, how did managed retreat move from an ‘emerging direction’ for flood management in Crescent Beach to being removed as a viable option from the Coastal Flood Adaptation Strategy?

To answer this question, I needed first to understand the CFAS process and outcome in terms of the expectations of new policy designs more generally. This allowed me in turn to better understand what may have occurred within the CFAS process to radically alter the outcome compared to the direction the process appeared to be leading previously. According to Howlett and Ramesh (2003), policymaking follows a particular series of five stages: (1) problem emergence, (2) agenda setting, (3) consideration of policy options, (4) decision-making, (5) implementation, and (6) evaluation. The argument for using the policy cycle is that it is clear, sequential, and predictable, and by

weighting options against one another in a seemingly objective manner, will lead to the most rational or appropriate outcome (Davis et al., 1993). I use the policy cycle framework throughout this study to illustrate that the policymaking process can follow these six seemingly rational, logical, and predictable steps, but my research revealed that decision-making is far more complicated than that. Thus, policy decisions in governmental contexts do not necessarily follow these steps in such a predictable and unidirectional way, in which the outcome of one phase can be directly explained by the outcome of the preceding phase (see Everett, 2003 for more on decision-making in the context of contentious issues). This case study demonstrates that CFAS was designed to follow the contours of this rational policy cycle, but the final adaptation decision that is made within that cycle is not necessarily as clear and predictable as the stepwise nature of the cycle suggests. Simply, the decision made was not clearly explained or evidenced by the outcomes of the stages preceding it. The complication to the policy cycle demonstrated within the CFAS policy process provides evidence that there were additional factors at play that were not accounted for as part of CFAS's rational policy cycle, and these factors challenged the validity of this policy cycle framework in making sense of the CFAS process. Through a recognition of these additional factors at play within policymaking processes, my conceptual framework examines factors such as behavioural motivations to climate action, including risk perception, the notion of embeddedness, development paths, and how development paths can create barriers to policymaking to give us a greater insight into what complicates and convolutes seemingly rational approaches to decision-making, and how these factors may limit implementation of bounce-forward conceptualizations of resilience.

1.2. Context

In the following section I will firstly provide a brief history of the Crescent Beach community. This context provides the substance of the problem emergence stage of the policy cycle based on the model described by Howlett and Ramesh (2003). I will present the timing and effects of past flooding events this area has experienced. I will also describe some of the key policies that the City of Surrey has enacted in terms of historical land development and flood management in Crescent Beach that have contributed to some of the unique climate change planning challenges the area is now experiencing. Following this, I will provide an overview of the balance of the steps in the

CFAS policy cycle: emergence, agenda setting, and consideration of policy options. Howlett & Ramesh (2003) describe the approaches to addressing climate change that the City of Surrey has taken since the mid-2000s, which all serve as precursors to the Coastal Flood Adaptation Strategy. The key components of the Coastal Flood Adaptation Strategy process, and then the components that relate specifically to the Crescent Beach community, are subsequently introduced. Through these introductory and context-related sections, I hope to provide a clear picture of the nature and extent of the challenge of controlling flooding events in the future in Crescent Beach, as well as a clear picture of all the factors that were in circulation and may have contributed to the decisions taken and then implemented as the Coastal Flood Adaptation Strategy came to conclusion in Crescent Beach. Lastly, as mentioned above, in my use of the policy cycle stages to illustrate how CFAS unfolded, I begin to sketch out some of the complexity of decision-making in a governmental context which is analyzed and expanded upon in my results and discussion sections; and show the beginnings of gaps in the policy cycle model as they unfolded. The gaps in the policy cycle model reveal that other factors such as habits, structures, operational practices or ways of thinking may play a role in influencing decision trajectories in ways that are not predictable or do not follow clear logic when solely using the policy cycle to illustrate how policy is made, forging links back to my conceptual framework and the notions of embeddedness and development paths.

1.2.1. The History of Crescent Beach - The Emergence of Flooding as a Problem

Crescent Beach is a small, coastal community in Surrey, British Columbia. It is the City of Surrey's only oceanfront community, located at the confluence of the Nicomekl River and the Pacific Ocean and is about 225 acres in size (The City of Surrey, 1999, p. 1). Crescent Beach is also of cultural importance to the Semiahmoo First Nation, who have made the lands in and around Crescent Beach home since time immemorial (The City of Surrey, 2018a, p. 1). The City of Surrey engaged with Semiahmoo First Nation in a separate focus area as part of CFAS, which is outside the scope of this study.

The Crescent Beach area is home to approximately 1,200 residents (The City of Surrey, 2018a, p. 1). The neighbourhood land use typology consists mostly of single

detached homes, which make up 87% of the homes in the Crescent Beach area, as compared to 33% for the City of Surrey in 2021 (Statistics Canada, 2022). Crescent Beach comprises mostly an older demographic; with approximately 30% of Crescent Beach residents being over the age of 65, as compared to 15% for Surrey on average (Statistics Canada, 2022). Using assessed property values and average household incomes as benchmarks, Crescent Beach is also a wealthier neighbourhood as compared to the City of Surrey as a whole. Among privately owned, single family residential zoning classifications in Crescent Beach, the average gross property assessment for 2022 in Crescent Beach was approximately \$2,022,000 (The City of Surrey, 2022b). This is compared to \$1,477,000 for Surrey on average using the same qualifiers (2022b). 27% of households in Crescent Beach reported average incomes of \$200,000 or over for 2022, compared to 12% on average for the whole of Surrey (Statistics Canada, 2022).

Crescent Beach lies in the coastal floodplain. The coastal floodplain extends in size far past the borders of the City of Surrey, but the portion within Surrey “stretches from Boundary Bay and Mud Bay along the Nicomekl and Serpentine Rivers towards [the] Cloverdale and Newton neighbourhoods”, including the area known as Crescent Beach (The City of Surrey, n.d.-b, p. 2). For an illustration of this, see Fig. 1 below.

As determined by the Provincial Ministry of Forests, Lands and Natural Resource Operations (2012), Crescent Beach is deemed to be an area of higher than average flood risk by the year 2100, factoring in “approximate flood construction levels and incorporating sea level rise [projections]” (p. 1).

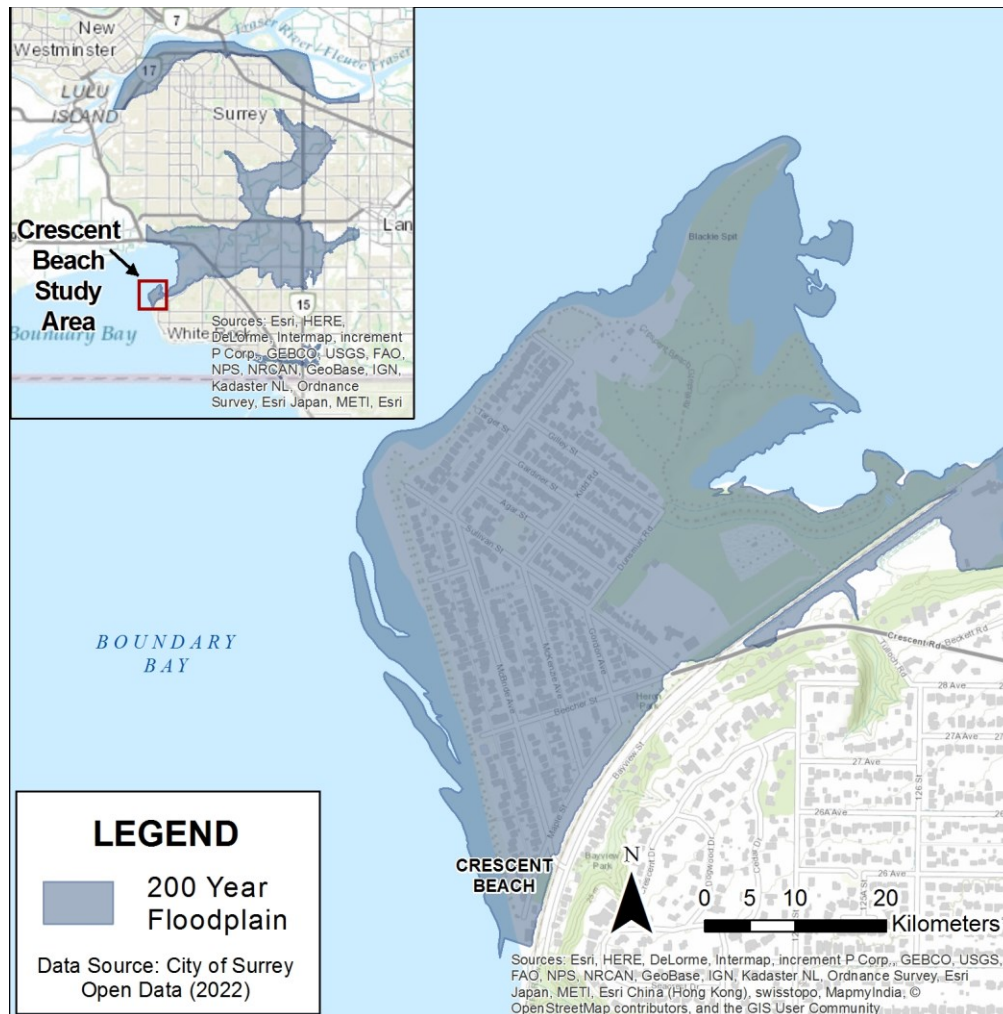


Figure 1: Crescent Beach’s Location within the 200 Year Floodplain

Historically, Crescent Beach was a cottage community with few permanent residences (Chaster, 2015, p. 45). The first permanent dike was installed by the original cottage developer in 1913 to protect the community, and eventually further development in the area followed (The City of Surrey, n.d.-a). The maintenance of the dike proved to be too much for the private developer and the title of the foreshore area was transferred to the City of Surrey (The City of Surrey, n.d.-a).

Various flood protection measures have been constructed since early settlement and the first permanent dike in Crescent Beach, including additional sea diking systems surrounding the area (The City of Surrey, n.d.-b). In 1951, one of the sea dikes protecting Crescent Beach failed and caused extensive flooding (*Flooding in Surrey: A Timeline of More Than [Sic] a Century of Flood Events and Municipal Response*, n.d.;

see also Northwest Hydraulic Consultants, 2012). An additional seawall was constructed in 1953 to reinforce protections (The City of Surrey, n.d.-b, p. 8). Eventually, Crescent Beach developed from a seasonally-inhabited cottage community to a more permanent residential area requiring greater, year-round protection from the risk of flooding and damages due to flooding (Chaster, 2015).

In 1982, high winds in conjunction with high tide overtopped the dike in and around Mud Bay and Colebrook (adjacent to Crescent Beach), as well as the sea dike in Crescent Beach, causing damage to properties in the area (Flooding in Surrey: A Timeline of More Than [Sic] a Century of Flood Events and Municipal Response, n.d.).

Following the 1982 flood, the Provincial Government enhanced flood protection for Crescent Beach and the surrounding area as part of the Flood Control Program between 1983 and 1986 (Province of British Columbia Ministry of Environment and Parks: Water Management Branch, 1987). The existing diking system was relocated in certain areas; with various safety improvements including a wider base, uniform height, and enhanced emergency vehicle access through surface material and form improvements (1987, pp. 1–3). Additionally, the beach itself was configured to provide better protection against wave action and flooding during high tide events (1987, p. 2). This took the form of upgraded timber groynes and rock rip-rap to break waves (1987, p. 2). After the work was completed by the Provincial Government, maintenance of the upgraded flood control system was transferred to the City (then-District) of Surrey (1987, p. 1).

Since these upgrades, additional work on flood management infrastructure has occurred in Crescent Beach. Some of this work includes upgrades in the year 2000, with further dike raising, widening, and rock placement along the waterfront to combat wave action (The City of Surrey, n.d.-a). There was initial resident opposition to this round of dike upgrades, with issues such as view obstruction and accessibility being raised (General Manager of Engineering, the City of Surrey, 2009, p. 2). Despite this initial opposition, in 2006 when storm surges breached dikes in nearby Delta, Crescent Beach remained protected by the dike upgrades that the City had completed, which validated the City's choice to increase protections in the area (General Manager of Engineering, the City of Surrey, 2009, p. 2).

1.3. Current State

As it stands currently, the area surrounding Crescent Beach utilizes a flood control system that incorporates a complex array of dikes, sea dams, spillways, and pumping stations.

A basic outline of the functionality of these protection measures, as described by the City of Surrey (n.d.) is as follows:

1. Dikes - River dikes are utilized along the Serpentine/Nicomekl and sea dikes along the ocean (p. 5).
2. Sea dams - “[Built] along tidal rivers (Nicomekl and Serpentine)...to keep salty ocean water from moving upstream where it could [damage] agricultural irrigation” (p. 5).
3. Spillways - “A low section of a river dike where...water can spill over into a holding area called a cell... located on agricultural fields...Once the flood event has ended and river level returns to normal, water stored in the cells will drain back into the river through floodboxes or with... pumps” (p. 5).
4. Pumps – “During high tides or when sea dams are closed, electrically powered pumps, like the Maple Pump Station in Crescent Beach, are used to help push water [away from inhabited areas]” (p. 5).

All of these pieces of infrastructure work together to protect the Crescent Beach community and also work to protect the surrounding floodplain from flooding events that would otherwise threaten the area (The City of Surrey, n.d.-b, pp. 3–4). The coastal floodplain in Surrey has a high reliance on flood prevention infrastructure to protect over \$1 billion in assessed property value, \$100 million in farming revenue, and vital transport routes such as provincial highways, rail infrastructure, as most of the land (outside of Crescent Beach specifically) was originally reclaimed for farming through dikes and drainage ditches and the area would be somewhat non-viable in terms of economic uses without some form of flood protection (The City of Surrey, n.d.-b, pp. 3–4).

1.3.1. Non-Structural Approaches to Flood Management

In addition to the array of flood control infrastructures noted above, non-structural approaches to flood control are also used in British Columbia. Flood warnings and flood-proof construction are non-structural approaches to flood management, as is land use policy which can include managed retreat as a risk mitigation strategy. Non-structural

approaches to flood management also include flood construction levels. Flood construction levels (FCLs) are used as a mitigative measure to prevent flooding damage by requiring structures on lots in floodplain areas to be built to a certain height to account for high tides, storm surge, sea level rise and wind and waves and also allows for a set amount of freeboard (ACT SFU et al., 2016, p. 9).

Until 2003, the Province was responsible for overseeing flood control within municipalities (Danielson, 2015, p. 12). However, by 2004, this was devolved through the *Local Government Act* to the city level, and hence currently, cities are responsible for establishing, based on provincial guidance, and enforcing their own flood construction levels (FCLs) which can vary from city to city (Danielson, 2015, p. 13). The major requirement that the Province has maintained in regulating flood control is that municipalities must “consider” the provincial guidelines when they adopt their zoning bylaws, but this does not mean they have to follow the recommendations (Danielson, 2015, p. 13).

The City of Surrey has a standards framework for development in the floodplain, called the Hazard Lands Development Permit Guidelines. The purpose of the Hazard Lands Development Permit Guidelines is to designate either steep slopes or floodplain areas development permit only sections, wherein if there was any new construction or demolition and redevelopment within the boundaries of this area, the property owner would have to apply to the city to gain a permit to proceed (The City of Surrey, 2014, p. 361). This policy also stipulates that for a development permit to be issued, new developments should be built to Provincially recommended FCL levels (which can be a certain number of metres or fractions of metres above the natural elevation based on broad area topography characteristics in the *Flood Hazard Area Land Use Management Guidelines* document, but can also include site-specific dike-breach modelling conducted by an engineer), or City of Surrey or other engineering professional recommendations (The City of Surrey, 2014, p. 365; The Government of British Columbia, 2018, p. 10).

Although the Hazard Lands Development Permit Guidelines recommend development permit applications in the floodplain meet provincial FCLs, in Crescent Beach, variances to FCLs have historically been granted by the City due to the way homes would sit significantly higher on their respective lots than adjacent established homes (Chaster, 2015, p. 6). Additionally, current zoning in the Crescent Beach

neighbourhood enacts a height restriction on buildings which is a limiting factor if homes are built to FCL (Chaster, 2015, p. 51; City of Surrey Staff, personal communication, 2021). Crescent Beach has a strong, established historical neighbourhood character, and the aesthetic of the community generally conforms to the heritage look, with the elevation of homes on individual lots in the area being part of that particular aesthetic. Conforming to FCLs would change the existing aesthetic.

Since 1992, a special permitting process through adoption of Policy O-28 “Development Variance Permit – Crescent Beach” has been made available to Crescent Beach residents, which constitutes an accelerated Development Variance Permit process, bypassing the usual requirement to go through a planning report presentation to City Council for any development that does not conform to existing zoning or city bylaws (The City of Surrey, General Manager, Planning & Development, 2020, p. 2). However, owners who go through Policy O-28 must indemnify the City of any potential losses due to building below the FCL through a restrictive covenant on the title of the property (Chaster, 2015, p. 51). According to City of Surrey Corporate Report R060 (2020), “since 1992, approximately 83 DVPs have been approved in order to reduce the required FCL in the Crescent Beach community” (p. 2).

In Crescent Beach, as of 2015, over 400 residential properties lie at an average FCL elevation of 2.6 m with a median of 1.97 m, where the City’s Zoning Bylaw stipulates the minimum FCL for any redevelopment or new construction is 3.3 m geodetic (Chaster, 2015, p. 48). 3.3 m geodetic, however, is guidance that is several decades old. *The Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use* developed by the Provincial Ministry of Environment in 2011 recommends local governments plan for at least 1m of SLR by year 2100, which is not accounted for as part of the city’s minimum 3.3 m geodetic FCL requirements (BC Ministry of Environment & Ausenco Sandwell, 2011, sec. C, p. 1; Chaster, 2015, pp. 49-50). This leaves Crescent Beach homes at an even greater discrepancy between recommended heights and actual heights, thereby increasing community vulnerability to flooding. According to a 2012 Northwest Hydraulic Consultants report, the “2010 FCLs for new development in Crescent Beach should be approximately 3.52-3.73 m (0.93-1.13 m above average existing built FCL elevation) and year 2100 FCLs should be 4.6-5.05 m (2.0-2.45 m above average existing built FCL elevation)” (as cited in Chaster, 2015, p. 51). This is again a large discrepancy between what is present in the

community in terms of climate change preparedness versus what is recommended for both the current state and the future to mitigate the risks of sea-level rise and climate-induced flooding.



Figure 2: Homes Situated at Elevations Below Dikes and Below FCLs, Crescent Beach (Chang, 2017).

Note. Original figure by R. Chang, 2017. Reprinted with permission.

1.3.2. Structural Approaches to Flood Management

In addition to updated recommendations for flood control elevations for individual properties in the face of sea level rise, the 2011 British Columbia Ministry of Environment *Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use* provides recommendations for sea dike crest elevations (DCEs) (BC Ministry of Environment & Ausenco Sandwell, 2011).

The dikes protecting Crescent Beach are lower than the 2011 provincial guidelines. In three locations in Crescent Beach, the dikes are currently 0.86-1.05 m lower than the year 2010 DCEs, and approximately 2.02-2.73 m lower than the year 2100 recommendations (Chaster, 2015, p. 58).

Crescent Beach utilizes a single pump station, called Maple Drainage Pump Station, constructed in 1968, to help divert water from adjacent channels during high tides (Urban Systems & Golder and Associates, 2009, p. 15). According to the 2009 Urban Systems and Golder and Associates assessment of the area, “A high priority should be set on...design and implementation of the new Maple Drainage Pump Station and flood box, given the issues associated with the existing pump station and flood box, and...value of property and infrastructure it is protecting” (p. iii). Following this assessment, the pump station was upgraded and replaced in 2013 at a cost of approximately \$2.3 million (p. iii). While replacement of the pumping station does provide increased risk management, relying on a single pump station does not offer redundancy in the case of the pump’s failure during an extreme weather event.

In 2009, a study was launched to investigate ongoing drainage issues in Crescent Beach, which was the first step in developing a longer term climate adaptation strategy for the area (Baron, 2011, p. 7). As part of a 2009 City of Surrey Corporate report detailing the findings of this drainage study, a survey was completed of Crescent Beach residents by the City, and of those who responded to the survey, “45% advised that they had either minor to no drainage issues while 55% described experiencing minor to significant drainage issues during winter months” (General Manager of Engineering, the City of Surrey, 2009, p. 2). It was found that groundwater ponding was correlated with high local tide levels and nuisance flooding, and that this situation will only worsen in the wake of sea level rise without some form of intervention, whether structural or policy change oriented (Baron, 2011, p. 8). Although a structural approach to protection from sea level rise would help reduce wave action, groundwater ponding and seepage in conjunction with the soft soils that are present in Crescent Beach makes that structural protection more challenging and potentially less effective, as groundwater levels will also rise with sea level rise and continue to cause flooding (Baron, 2011, p. 8).

1.3.3. Area Context and Problem Emergence Summary

Crescent Beach faces many challenges in regards to flood protection;

- it sits on the coastal floodplain with a housing typology of mostly high-value single family homes;

- the majority of residents experience groundwater ponding which can lead to nuisance flooding, with sea level rise likely to exacerbate the groundwater issues and potentially stymie the effectiveness of structural flood protection measures;
- the dike elevations that protect the community are not up to provincial guidelines; and
- the flood control elevations of homes are not built to City or provincial guidelines due to a longstanding policy that waives the usual permitting process. The basic flood construction levels advised by the City, which are already not met in Crescent Beach, are even further from meeting updated provincial guidelines that account for climate-change induced sea level rise by 2100.

This combination of factors makes the area particularly vulnerable to flood-related issues, especially in the wake of climate change and its amplifying effects. These factors serve as an example of the problem emergence stage for climate change planning in Crescent Beach as part of the policy cycle as described by Howlett and Ramesh (2003).

In the context of resilience specifically, using Davoudi et al.'s 2013 framework that indicates the hallmarks of resilient systems are persistence, adaptability, transformability, and preparedness, before the CFAS process was initiated, Crescent Beach exhibited serious challenges and did not exemplify resilience in terms of:

1. Persistence: prior planning decisions did not lend themselves to embracing alternatives to structural flood protection. For instance, Policy O-28 allowed residents to bypass building to FCLs, and that encouraged persistence of non-resilient flood management practices and a strong reliance on structural flood protection;
2. Flood preparedness: aging and inadequate flood management infrastructure, inconsistent enforcement of existing non-structural flood management regulatory tools;

3. Adaptability in the face of a flood: with a strong reliance on fixed structural rather than non-structural approaches to flood management and land use of high value residential property; and
4. Transformability in the face of a flood: hard infrastructure that offers the community protection serves the single purpose of protection, and because of lifecycle requirements, locks-in non-resilient flood management strategies.

Now that the Crescent Beach context and existing risks have been described as they relate to resilience, the following section describes provincial and municipal policy contexts wherein the formation of the Coastal Flood Adaptation Strategy, the focus of this study, is spurred. This section represents the remaining aspects of problem emergence as well as agenda setting for climate change planning in Crescent Beach.

1.4. Climate Change Planning in the City of Surrey - Problem Emergence and Agenda-Setting

The Province of British Columbia launched the Climate Action Charter in 2007, a voluntary agreement between local governments and the provincial government to work towards combatting climate change (The Province of British Columbia, n.d.). The City of Surrey was a local government signatory to the provincial charter. In 2008, as a response to the actions promised in signing the Climate Action Charter, the City developed and adopted the City of Surrey Sustainability Charter, a framework document that charted a path to becoming a sustainable Surrey (The City of Surrey, 2013a, p. 8)¹. The Sustainability Charter committed to developing a climate change adaptation strategy for the city, and the City of Surrey's 2013 Community Climate Action Strategy responds to this 2008 commitment (p. 8). The City of Surrey's Community Climate Action Strategy consists of two separate but related documents: the Community Energy and Emissions Plan (CEEP) and the Climate Adaptation Strategy (The City of Surrey, 2013a, p. 8). The Climate Adaptation Strategy focusses specifically on the adaptation pathways to respond to the demands of climate change, and the Community Energy and Emissions

¹ The Sustainability Charter has been updated since 2008, and the Sustainability Charter 2.0 was adopted in 2016. The City's original Sustainability Charter is noted here as it preceded and led to the development of 2013's Community Climate Action Strategy.

Plan focusses on mitigative measures. The division of response to climate change into the broad adaptation and mitigation categories reflects the two possible response characterizations delineated in the United Nations Framework Convention on Climate Change (UNFCCC). This is also how the IPCC frames climate change response types (Klein et al., 2007, p. 748). Mitigation responses to climate change focus on reducing greenhouse gas emissions. In reducing greenhouse gas emissions, mitigation quells the severity and works to slow climate change impacts (Klein et al., 2007, p. 747). Adaptation responses recognize that we will in some capacity feel the effects of climate change, regardless of mitigation (although adaptation is far more effective when coupled with aggressive mitigation efforts) and encompass a broad array of policy, land use, behavioural, or structural measures that serve to prepare us and allow us to live with climate change. In this way, development of the City of Surrey’s Community Energy and Emissions Plan (CEEP) and the Climate Adaptation Strategy address both avenues of planning for climate change.

Other climate change related policies at the City of Surrey that align with the Community Climate Action Strategy are named in Fig 3. below. Fulsome discussion of these other policies is not possible within the specific scope of this study.

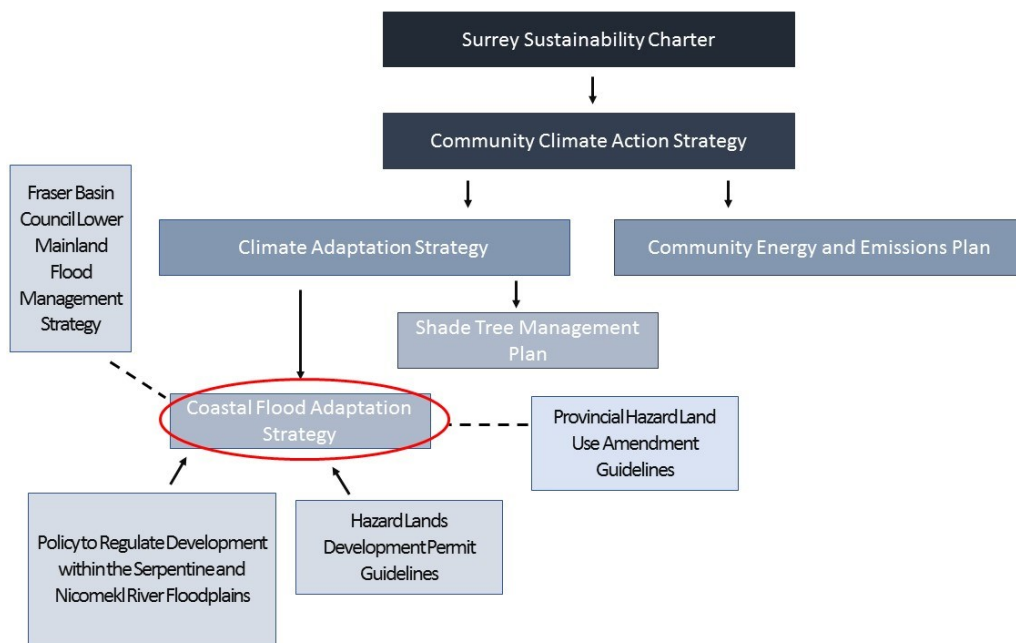


Figure 3: Climate Change Planning Policy Linkages to the Coastal Flood Adaptation Strategy
 Note: Solid line indicates direct policy linkage, hatched line indicates indirect policy linkage.

1.4.1. The City of Surrey Community Climate Action Strategy

The Climate Action Strategy focuses on four areas of policy work:

- Ecosystem Protection, Hazard Avoidance, and Compact Land Use;
- Ecosystem Health and Carbon Sequestration;
- Heat Management and Passive Solar Design; and
- Community Energy Supply and Self-Sufficiency (2013a, p. 14)

The hazard avoidance component of the first strategy goal is most relevant to this particular study given the potential hazard implications of floodplain development and land use in the future, but all of these strategy areas play a role in terms of mitigation of hazards brought on by climate change. For instance, adopting community energy solutions, passive solar design, and sequestering carbon reduce energy consumption and greenhouse gas emissions, and that reduction in emissions has knock-on effects on mitigating sea level rise and the effects of climate change more broadly. In this way, there is interplay between mitigative and adaptive approaches outlined in the Climate Action Strategy document.

Goals from the Climate Action Strategy that are relevant to engaging in the CFAS policy process highlighted by the City of Surrey include:

- “Minimizing risks and vulnerabilities from climate change impacts;
- Building adaptive capacity to respond effectively to climate change impacts over time; and
- Increasing awareness among the public and City staff to build understanding and capacity related to adaptation” (General Manager, Engineering, the City of Surrey, 2016, p. 2).

These goals were provided as a portion of the justification to seek council approval of starting the CFAS planning process; part of the agenda setting phase of the policy cycle.

1.4.2. City of Surrey Climate Adaptation Strategy

The City of Surrey Climate Adaptation Strategy focusses specifically on adaptive measures as responses to climate change and is a complement to the mitigative strategies outlined in its sister document, the Community Energy and Emissions Plan (CEEP). The Community Energy and Emissions Plan is outside of the direct scope of this study, but it is worth recognizing that the City of Surrey, through the development of both of these documents, follows coupling adaptation and mitigation approaches to step up to the demands of climate change, and the focus on both mitigative and adaptative measures is an approach that the IPCC calls for as well (described in section 1.4). The City Of Surrey Climate Adaptation Strategy (2013b) recognizes that, “[The City remaining] resilient in the face of unavoidable climate change impacts is critical to maintaining community well-being, environmental health and a vibrant local economy over the long-term” (p. 6). Climate resilience, one of the key concepts integrated into this study, is thus acknowledged as a key characteristic for the City of Surrey that represents preparedness for the effects of climate change.

The City of Surrey Climate Adaptation Strategy outlines responses to climate change in terms of resilience-building in six sectors:

- flood management and drainage;
- infrastructure;
- ecosystems /natural areas;
- urban trees and landscaping;
- human health and safety; and
- agriculture/food security (The City of Surrey, 2013b).

Within the flood management and drainage component of the Climate Adaptation Strategy, based on a vulnerability matrix that analyzed the probability of an event occurring versus consequence, three of four climate impact varieties are rated as high risk, and all three have to do with coastal floodplain risks (The City of Surrey, 2013, p. 128) (see Table 1). The coastal flooding-related climate impact varieties exhibited a higher likelihood of occurrence and higher consequence of occurrence than Fraser River freshet flooding according to the City’s vulnerability matrix (pp. 131–132). Coastal floodplain risks are of direct relevance to the Crescent Beach study area, and also highlight that the challenges the area already faces in regards to flood management will

only be exacerbated by the effects of climate change. The City’s inclusion of building resilience in flood management and drainage as part of the Climate Adaptation Strategy highlights the importance the City places on resilience frameworks in the development of responses to planning for climate change, and also shows that the City acknowledges a lack of resilience in this sector, which was described in the context of Crescent Beach in section 1.3.3.

Table 1: Climate Impact Statements Included in the City of Surrey’s Climate Adaptation Strategy Relevant to the Coastal Floodplain (The City of Surrey, 2013b, p. 40)

Climate Impact Statements	Risk
Increased probability that existing sea dikes will be overtopped due to a combination of sea level rise, subsidence and storm surge and wind setup resulting from significant weather events (The City of Surrey, 2013b, p. 40)	High
Increase in frequency and duration of flooding within low lying floodplains due to reduced system drainage resulting from sea level rise and more intensive precipitation events (The City of Surrey, 2013b, p. 40)	High
Reduced subsurface drainage in some floodplain areas due to seepage and/or rising water table associated with sea level rise and more intensive precipitation events (The City of Surrey, 2013b, p. 40)	High
Increased risk of Fraser River freshet flooding due to changing temperature and precipitation regime in the Fraser River Basin, and SLR raising Fraser River water levels (The City of Surrey, 2013b, p. 40)	Medium

1.4.3. The Coastal Flood Adaptation Strategy

The Coastal Flood Adaptation Strategy emerged in the wake of the City of Surrey publishing several strategic climate change-related plans and policies (as delineated above) related to coastal flooding and flood impacts in the future, as well as the release of a significant number of publications about new climate change-related flood hazard management guidelines in British Columbia, including:

- *Simulating the Effects of Sea Level Rise and Climate Change on Fraser River Flood Scenarios, Final Report* (BC Ministry of Forests, Lands and Natural Resource Operations & Northwest Hydraulic Consultants, 2014);

- *National Floodplain Mapping Assessment – Final Report* (Public Safety Canada, June, 2014);
- *Seismic Design Guidelines for Dikes, 2nd Edition* (Ministry of Forests, Lands and Natural Resource Operations et al., 2014);
- *Floodplain Mapping Funding Guidebook for BC Local Governments* (British Columbia Real Estate Association, Herbert, et al., 2014);
- *Floodplain Mapping Backgrounder* (British Columbia Real Estate Association, Lyle, et al., 2014);
- *Sea Level Rise Adaptation Primer, A toolkit to build adaptive capacity on Canada’s South Coasts* (The Arlington Group Planning and Architecture Inc. et al., 2013 prepared for British Columbia Ministry of Environment);
- *Guidelines for Legislated Flood Assessments in a Changing Climate in British Columbia* (Association of Professional Engineers and Geoscientists of BC et al., 2012) (Deputy City Engineer & General Manager, Planning & Development, the City of Surrey, 2014, p. 2); and
- *Regional Assessment of Flood Vulnerability* (Northwest Hydraulic Consultants, 2016, prepared for the Fraser Basin Council).²

These documents generally pointed to the potential to consider moving flooding preparedness and awareness from either standard/status quo 1:100 to 1:200 year return events to much lower exceedance probabilities (for instance, return rates of 1:1,000) to be better prepared for more severe weather events spurred by climate change. An example of this is the National Floodplain Mapping Assessment, prepared for Public Safety Canada, calls for updating existing floodplain maps to not only encompass 1:200 year events, but also include up to 1:1,000 year events to help account for uncertainty (MMM Group Limited et al., 2014, p. 35). This assessment also calls for a new proposed national standard of flood preparedness from 1:100 return rates to a minimum of 1:350 return rate (p. 44). British Columbia falls below the 1:350 minimum recommendation in that it uses a 1:200 return rate for regulatory purposes (MMM Group Limited et al., 2014, p. 34). Building on calls for considering lower exceedance probabilities, the Simulating

² This document was part of larger planning efforts through the Fraser Basin Council, a coordinating body, to develop the Lower Mainland Flood Management Strategy in conjunction with municipalities from Hope to Vancouver to Squamish. The final implementation of the strategy is still under development as of 2022 so is not described in further detail in this report.

the Effects of Sea Level Rise and Climate Change on Fraser River Flood Scenarios report also indicates that “much higher standards [than the status-quo 1:200 annual exceedance probability] may be justified for [flood] protection of densely populated urban areas” (BC Ministry of Forests, Lands and Natural Resource Operations & Northwest Hydraulic Consultants, 2014, p. 1). Specifically the report cites the Netherlands as an example of design that takes into account the high consequences of failure. The Netherlands employs a 1:10,000 return rate design standard (BC Ministry of Forests, Lands and Natural Resource Operations & Northwest Hydraulic Consultants, 2014, p. 3). Aside from discussion of other countries’ approaches to flood protection, this report does not recommend specific design standards, but does determine that what are between current 1:200 and 1:500 year events will be 1:50 year events by 2100 in British Columbia, which furthers a justification for considering lower exceedance probability events in flood management in the province.

In addition to shifting policy recommendations on planning for flood management both provincially and nationally, several large flooding events occurred in Canada during the years preceding CFAS, specifically in Southeast Alberta and Toronto in 2013, and Southern Saskatchewan in 2014. These events were highlighted in 2014 Corporate Report R167 to Surrey City Council, which detailed new provincial hazard land use guidelines. The shifting policy recommendations and the effects of recent floods across Canada were used to convey importance of flood management strategies in terms of mitigating economic loss and avoiding disruption in the event of extreme weather. The framing within the report to council with a focus on mitigating economic loss is important to note. At a municipal scale, there are many different types of losses that can arise from being ill-prepared for flooding events, both tangible and intangible (Kundzewicz et al., 2014). Tangible losses include things like infrastructure and economic productivity, and intangible losses include loss of community cohesion, loss of life, and decreased health outcomes (Kundzewicz et al., 2014, p. 5). The mitigation of economic loss was not necessarily the sole focus of CFAS throughout the policy process, but the use of economic loss prevention rationale to City Council to, in part, justify its development is an interesting one to note.

Rounding out the need for better preparedness outlined in the above guideline documents and report to council, the reduction of flood risk was generally a priority identified in the City of Surrey Community Climate Action Strategy and the Climate

Adaptation Strategy as mentioned above, and reports were commissioned by the City that detailed vulnerabilities to flood protection infrastructure in other parts of the City of Surrey coastal floodplain (including the Serpentine, Nicomekl & Campbell Rivers - Climate Change Floodplain Review) (General Manager, Engineering, the City of Surrey, 2016, pp. 1–2). Finally, international recognition of the importance of resilience in planning for climate change following flooding caused by Hurricane Katrina and Superstorm Sandy was highlighted in the years preceding the development of CFAS. Notably, the Rockefeller Foundation’s 100 Resilient Cities initiative was founded during this time, of which Surrey’s neighbouring city, Vancouver, became a member in 2016 (Bliss, 2019; The City of Vancouver, 2019, p. 7).

All of these contextual guidelines, recommendations in the City’s municipal adaptation strategies, and flood infrastructure vulnerability assessments, pointed to the need for a new, cohesive floodplain planning policy; and contributed to both the problem emergence and agenda setting stages of the CFAS policy process as described by Howlett and Ramesh (2003). Given the complex, interconnected, nature of floodplain planning in addition to the geographic dispersal of areas in which hazard mitigation was warranted, in February of 2016, City of Surrey staff recommended council approval in principle of the development of a Coastal Flood Protection Strategy for the coastal floodplain (General Manager, Engineering, the City of Surrey, 2016). The City is responsible for maintaining the majority of the diking systems across Surrey, including the Fraser River, Crescent Beach, and the Serpentine and Nicomekl Rivers. The City is also responsible for Surrey’s drainage system, which constitutes approximately 1,100 km of ditches, as well as 1,700 km of storm sewers (The City of Surrey, 2013b, p. 37). The Coastal Flood Protection Strategy was envisioned to speak to current vulnerabilities as well as long-term climate change planning (General Manager, Engineering, the City of Surrey, 2016). A long-term, resilient plan that takes into account the challenges of adapting protective infrastructure to meet the demands of climate change was needed, especially given the immense network of protective measures that the City is required to maintain.

Surrey City Council made the decision to start the Coastal Flood Protection Strategy policy creation process in February of 2016 (General Manager of Engineering, the City of Surrey, 2016, p. 1). Although originally called the Coastal Flood Protection Strategy, the Strategy was eventually renamed the Coastal Flood Adaptation Strategy

(CFAS) to better reflect the fact that flood management measures are not always protection-oriented, or structural, and can encompass a wider suite of non-structural responses (see section 1.3.1 and 1.3.2 for more on structural versus non-structural flood adaptation response types).

In terms of policy development, the goals of CFAS were to:

- Establish a preferred approach for adapting to coastal flood hazards through time [wherein] the risks from climate change impacts are minimized;
- Position the City to secure external funding to implement the recommended strategy;
- Strengthen the relationships between the City of Surrey and external stakeholders;
- Align Surrey's work with other regional flood management strategies being developed in the region (e.g., Fraser Basin Council's Lower Mainland Flood Management Strategy);
- Build the adaptive capacity of stakeholders and City staff to respond to the uncertainties inherent in climate change impacts over time; and
- Achieve public support for CFAS directions and short-term tactical actions (The City of Surrey, 2019, p. 22)

Coastal Flood Adaptation Strategy Planning Process Overview

The CFAS Study Area is comprised of the coastal floodplain, which includes Mud Bay, Crescent Beach, and Semiahmoo Bay, all adjacent areas within South Surrey (The City of Surrey, n.d.-b).

CFAS engaged a variety of different stakeholders, including over 2,500 residents, the agricultural community, different community groups as well as environmental and business organizations, provincial and federal departments, as well as abutting local governments such as Delta and White Rock (The City of Surrey, 2019, p. 29). CFAS also engaged with Semiahmoo First Nation (The City of Surrey, 2019, p. 29).

The CFAS engagement framework was designed to align with the City of Surrey's Consultation Principles. The principles from the City of Surrey's Consultation Framework deemed relevant to CFAS specifically (1-7 below) were delineated in the

Coastal Flood Adaptation Strategy Stakeholder Engagement Framework with specific reference in the document to how they fit in the CFAS context below:

1. Two-Way Communication: Communication between the project planning team and stakeholders will be timely, responsive, transparent, collaborative, and provide opportunities for the engagement of the community, stakeholder groups, and the community at large at each of the five project phases.
2. Respectful Partnership: The project planning team and stakeholders will work to build and maintain relationships that reflect constructive, respectful, meaningful, inclusive, and compassionate partnerships aimed at achieving outcomes built upon all voices.
3. Inclusive Public Process: Working with the City, the project planning team will work to ensure that public process is accessible to the broad community via many communication modes, will encourage the equal involvement of stakeholder groups who wish to be heard, and will acknowledge the value of all participant views. Project communications will be supported through an integrated Communications Framework.
4. Balance: The project planning team and stakeholders will work to acknowledge and understand the diverse needs and priorities that exist within the communities, and as partners shall commit to balancing these with the interests of the wider community.
5. Early Involvement: Working with the City, the project planning team will work to ensure that various input options are in place to enable stakeholder involvement through each of the five project phases. Multiple methods of participation will be provided to help ensure that stakeholders who cannot attend project meetings or workshops can provide comment and feedback through other methods.
6. Transparency: The CFAS process will provide substantive opportunities for input and feedback through all project phases, and include robust participation opportunities at key decision points.
7. Knowledge and Education: Coastal flooding and climate change are serious and important (and inter-related) issues that demand informed input from stakeholders. Community education and learning will be a part of most project phases (Northwest Hydraulic Consultants et al., 2016, pp. 7–8).

Later in this study, I will delineate some of the challenges along the policy process that contributed to a lack of public approval of managed retreat. These barriers relate to the engagement framework principles and how these principles may or may not have been effectively implemented throughout the CFAS process.

In terms of decision-making, CFAS utilized a structured, values-based decision-making framework. The City of Surrey (2019) notes that this approach was chosen to prioritize:

- Facts and values – The approach used both technical facts (e.g., cost, feasibility, risk) and community values (e.g., protect farmland, enhance environmental values, maintain public access) to help identify, screen, and prioritize strategy options;
- Multiple perspectives – The approach facilitated a broader understanding of the variety of perspectives that are important to consider when making the difficult decisions that climate change adaptation presents. This included the review and incorporation of different City plans and strategies;
- [Being] Holistic – By involving a wide range of participants, including different stakeholders and the public, the approach was more inclusive and took into account non-material aspects of community wellbeing and quality of life;
- [Incorporating] local knowledge – The approach used multiple types of knowledge, expertise and qualitative information, alongside the more scientific, quantitative information from technical studies and assessment; and
- [Being] participatory – Acknowledging the different values that people held helped build common ground and enabled a better, shared understanding of present issues and the pressing climate change challenge (p. 28).

The values criteria below developed as part of engagement workshops and focus groups with various stakeholders engaged in CFAS, and aimed to delineate the values that were most important to these stakeholder groups in terms of coastal flood adaptation (The City of Surrey, 2019, p. 37). These values were later used to weight the different shortlisted flood management options being considered in CFAS against one another.

Table 2: Values criteria developed through community consultation as part of CFAS (Adapted from The City of Surrey, 2019, p. 37).

Value	Description
Residents	Minimize people displaced
Agriculture	Reduce permanent loss of agricultural land
Environment	Minimize impacts to wetland habitats and riparian areas
Infrastructure	Minimize vulnerabilities

Economy	Minimize loss of local businesses
Recreation	Maximize recreational opportunities
Culture	Maximize opportunities for traditional practices

CFAS was divided into five stages (which echo the policy cycle in some capacity) as follows:

1. What matters most and who is affected? (Summer 2016 – Spring 2017) This comprised a series of open houses and workshops about flooding hazards and this stage started to assess values and objectives of stakeholders that were part of the CFAS. Depictions of what sea level rise could look like based on provincial assessments were also presented to stakeholders and different, general forms of adaptation strategies were discussed (The City of Surrey, 2019, p. 23).

2. & 3. What can we do? And what is acceptable? (Spring 2017 – Winter 2018) This involved the more nuanced formation of different flood management strategies as compared to the broad the broad overview presented in stage 1, as well as a more detailed depiction of tradeoffs for each strategy. Analysis and technical modeling of the different flood management options was also incorporated. Stakeholder engagement was also a key part of this phase as the now-developed options shortlist with relevant tradeoffs was evaluated by stakeholders (The City of Surrey, 2019, p. 24).

4. How will we do it? (Spring 2018 – Winter 2018/19) – This is the stage where the refined strategies for each of the three planning areas were evaluated in terms of cost and potential funding. During this time, the federal government announced Disaster Mitigation and Adaptation Funding (DMAF) opportunities, which spurred the creation of a series of shorter-term adaptation strategy funding opportunities for which the City applied These shorter-term adaptation strategies worked alongside the longer term strategies the City was engaging on in previous phases of the Coastal Flood Adaptation Strategy process (The City of Surrey, 2019, p. 24).

5. Reporting Back (2019) – In this stage, the Final Strategy document materials are sent out to the public, with a final round of engagement with both stakeholders and partners in the planning process (The City of Surrey, 2019, p. 24).

Flood Management Options - Consideration of Policy Options

The CFAS Final Strategy document lays out 46 recommended actions that came out of the technical studies and community engagement work (The City of Surrey, 2019, p. 36). These 46 recommended actions are split into two categories:

- 1) CFAS Program and Policy Actions - these actions are relevant to the entire CFAS Study Area.
- 2) CFAS Planning Area-Specific Actions - these are mainly flood management infrastructure projects which are relevant only to each specific planning area (Crescent Beach, Mud Bay, or Semiahmoo Bay) within the CFAS Study Area.

These two categories can be further refined into short-term adaptation and mitigation strategies which are actions to be taken within a 10 year timespan, and are labelled by the City as “no regret” or “low regret” actions, policies, or investments (relatively low cost flood management interventions that provide significant benefits) and the long-term strategic directions which are action, policy, or investment paths that may be implemented over a longer period of time, as far in the future as 2080 (The City of Surrey, 2019, p. 36).

A long-term, strategic direction for each planning area was recommended through the CFAS Final Strategy document. For the purposes of this study, the Crescent Beach Strategic Direction is the only one about which I will delve into detail as the long-term, strategic measure is more relevant to precedent-setting (i.e. the decision made in Crescent Beach could steer the City’s long-term approach to protect-oriented flood management in other neighbourhoods). Smaller-scale, incremental changes, such as the short-term adaptation and mitigation strategies that were pursued under DMAF funding are still important, but do not have the same potential to set precedent for transformative conceptualizations of resilience going forward.

In Phase 2 of the CFAS process, which represents the consideration of policy options phase of the policy cycle (Howlett & Ramesh, 2003), four different potential strategic directions for Crescent Beach were presented to stakeholders along with rankings based on a combination of the flood management values criteria above weighted against both cost and risk. The strategic directions are as follows, according to ranking from highest to lowest:

1. Managed retreat – The restoration of the land to nature would result in about 500 households being displaced, and the loss of about 15% of the City’s heritage house properties, although the environmental impacts would be positive. Managed retreat was ranked as the best option in terms of reducing costs and being viable as a strategy long-term. The capital costs are estimated to be in a range of \$1 to \$4B, with maintenance and other infrastructure costs estimated to be about \$10M (The City of Surrey, 2018a, pp. 16–18).
2. Expanded edge - this would involve raising and expanding the dikes to approximately 2.5m from their current heights. There will still be groundwater seepage issues, exacerbated further by sea level rise. Roads and homes will have to be elevated by approximately 1m by 2100 and new perforated pipes will have to be installed. This will affect views in an acute way and will likely only act as a solution for this century and the strategy will have to be revisited. The capital costs are estimated to be in a range of \$100M to \$1B, with maintenance and other infrastructure costs ranging from \$11M-\$110M (The City of Surrey, 2018a, pp. 4–6).
3. Barrier island/spit - this option consists of a 6m high island off the coast to minimize wave action. It would still involve the raising of the dikes (although not as high as with the expanded edge option) as well as raising of roads and homes by 1m, and does not address seepage issues. It also carries a high risk due to the likelihood of dike failure and the impacts that would cause to homes and infrastructure. The capital costs are estimated to be in a range of \$1B to \$4B, with maintenance and other infrastructure costs ranging from \$11M-\$110M (The City of Surrey, 2018a, pp. 8-10).
4. Mud Bay barrier – in this option, an earth-filled, 10m high offshore barrier measuring approximately 4.5km in length would be built to protect the area from storm surges and from high tides. The need for raising the dikes would be significantly lowered, however, the environmental impacts would be detrimental, the height would impact views significantly, and the structure would not be seismically sound, resulting in failure or expensive repairs. The capital costs are estimated to be over \$4B, with maintenance and other infrastructure costs ranging from \$11M-\$20M (The City of Surrey, 2018a, pp. 12-15).

Managed retreat for Crescent Beach was labeled by the City as an “emerging direction”, or most viable long term adaptation pathway amongst the suite of long-term strategic adaptation measures for a significant portion of the CFAS consultation process. This “emerging direction” assessment by the City was based on various surveys conducted by the City with stakeholders engaged in CFAS as well as the risk versus values criteria that was developed to rank different options against one another (see Table 3 below and Table 2 above).

Table 3: Preferred Adaptation Option for Crescent Beach (Adapted from Northwest Hydraulic Consultants et al., 2018, p. 25).

Adaptation Option	Surrey Survey Respondents	Crescent Beach Workshop Respondents
Expanded Edge	30%	60%
Barrier Island	6%	10%
Mud Bay Barrier	2%	7%
Managed Retreat	62%	24%

Indeed, in February of 2018, at the Crescent Beach Options Selection Workshop, a workshop put on by the City to engage with stakeholders, managed retreat was still being considered (The City of Surrey et al., 2018), and in April of 2018, at the CFAS Public Open House, an update workshop put on by the City about progress that was being made on the development of the final CFAS Strategy document, managed retreat remained a short-listed option for Crescent Beach and was ranked as preferred (The City of Surrey, 2018b; personal communication, 2021). This was after several years of public consultation, risk assessment, and values-based criteria being weighed against the available options (The City of Surrey, 2018b). In May 2018, the Globe and Mail and the CBC also published articles that cited the City of Surrey’s message that managed retreat was the emerging direction for a long-term flood management strategy in Crescent Beach (Bula, 2018; CBC News, 2018).

Decision-Making Stage

In the CFAS Final Strategy document, however, the recommended strategic direction for Crescent Beach ended up being the expanded edge (or raising the dikes).

This is inconsistent with prior messaging from the City, results from City surveys, as well as the technical scoring of the options being considered for Crescent Beach. In the CFAS Primer Part II, which describes the options shortlisted for Crescent Beach, the expanded edge/raising the dikes option is ranked as second (The City of Surrey, 2018a, p. 2). In the Primer, considerable drawbacks to the expanded edge adaptation measure, and structural measures in general, are described, in that Crescent Beach would need a new drainage system and all homes and roadways would need to be lifted by approximately 1m to account for FCL discrepancies (p. 2). Long term viability of the strategy may also be compromised by the porosity of the soil and the tendency for groundwater seepage (p. 2). The expanded edge/raising the dikes option is also ranked with a high likelihood of failure and a high impact to community values if that failure were to occur (p. 3). This ranking is in opposition to managed retreat, which is ranked very low in terms of risk of failure and risk of impact to community values if failure (i.e. a flood that affected uninhabited land) occurred (The City of Surrey, 2018a, p. 3).

According to Corporate Report R021 from the General Manager of Engineering to the City of Surrey Mayor and Council (2019), "...[after] additional consultation...and... agreement of the Crescent Beach Property Owners' Association, Managed Retreat has been taken off the table. No further analysis will be conducted on this option under CFAS" (p. 3). Similarly, the City of Surrey released a media memo about the removal of managed retreat from the CFAS Final Strategy document, stating that:

In response to additional feedback from directly impacted stakeholders from Crescent Beach, the Managed Retreat option is being removed from the Crescent Beach study area. No further analysis will be conducted on this option and it will not be recommended by staff in the draft Coastal Flood Adaptation Strategy (CFAS) to be brought forward in spring 2019. The city will continue to investigate and evaluate the Crescent Beach community's preferred option of an Expanded Edge and its second preferred option of a Barrier Island/Spit (The City of Surrey, 2018c)

The City of Surrey did not publicly expand further on the reasoning behind the removal of managed retreat from the CFAS Final Document and what went on during the decision-making stage of the CFAS policy development. The CFAS process otherwise had a plethora of documentation provided by the City, with open and publicly available results from various surveys the City conducted to help inform the short-listed strategic directions for each CFAS planning area, the risk versus values criteria used to rank each of the flood management options under consideration, a timeline of all of the

engagement workshops the City put on as part of the CFAS consultation process, as well as slide decks and other meeting materials that were shared at each of these workshops, all accessible through an online portal. Through this publicly available documentation, a clear narrative developed of the CFAS process and the direction that it was heading in terms of a final recommended strategic direction for Crescent Beach; and that specific long-term direction according to the narrative was managed retreat. There appeared to be a disconnect between the option that seemed like it would be chosen during the decision-making stage and what was actually chosen as the strategic direction for Crescent Beach. From a rational perspective, here is where we see a disjuncture between the previous stages of the policy cycle and the decision-making stage, and begin to see that there is additional complexity to making decisions in governmental context that is difficult to account for through the logical, stepwise policy cycle approach.

The goal of my research was to figure out what happened between the clear narrative provided by the City up until the Final Strategy document was released; reporting out on all of the engagement sessions and the preferred options, and the release of the CFAS Final Strategy document, and why there seemed to be such a disconnect between the previous years of engagement and what ended up being chosen for the Crescent Beach neighbourhood. I sought to find this out through the research question: in terms of plan and policy priorities, how did managed retreat move from an “emerging direction” for flood management in Crescent Beach to being removed as a viable option from the Coastal Flood Adaptation Strategy?

Chapter 2. Conceptual Framework

In order to better understand the disconnect between the long term strategic direction that was chosen for Crescent Beach in the CFAS Final Strategy document, and the vanishing of the “emerging direction” in favour of a less effective, riskier and more costly alternative, it is integral to understand four key concepts:

- Urban and community resilience to climate change;
- The development path approach to effective climate change understanding and strategies;
- Risk perception and behavioural motivations to climate action;
- Barriers to transformative climate policy.

It should be noted that risk perception can be part of a development path or serve as a barrier to transformative change, but as risk perception plays such a key role in this study and is a broader and also more nuanced concept than just what is delineated as part of development path literature, it is treated as a separate concept in this conceptual framework.

2.1. Urban Resilience

2.1.1. Introduction to Resilience Thinking: Engineering, Ecological, and Evolutionary Resilience

Although climate change planning demands of planners the ability to work effectively in the arena of uncertainty; for instance, uncertainty of climate models and uncertain ability to predict human behaviour and willingness to adapt, the roots of North American and European planning trace back to beliefs that planners do have perfect knowledge and cause and effect are straightforward concepts. A particular model of planning that is built on the notion that planners can bring order and harmony to space through the use of formulas informed by economics and work to simplify the complexities of daily life into universalizing rules, is the rational comprehensive model of planning (Friedmann, 1987). The ideological groundwork of the rational model goes back to 18th

century Enlightenment thinking (Friedmann, 1987; Scott, 2008, p. 91), but generally took root in the early parts of the 20th century (Sandercock, 1998). Rational planning relies on the understanding that space can be ordered in a logical way for the greatest social benefit through the use of scientific models and other quantitative methods (Friedmann, 1987). The planner, in this context, is the “knower”; the “professional,” and can use a set of tools based on decision rules and linear understandings of cause and effect to solve complex problems (Friedmann, 1987; Sandercock, 1998).

Linear understandings of cause and effect are further challenged in the context of planning for climate change, given uncertainty associated with climate projections and behavioural aspects of climate adaptation. The uncertainty associated with planning in the Anthropocene stymies the effectiveness of the rational comprehensive model; the planner is no longer “the knower” with perfect knowledge of causes and their clearly traceable effects but has to operate on limited, imperfect knowledge to prepare for multiple potential realities. The complex, interconnected, and sometimes mutually reinforcing stresses or shocks to cities brought about by climate change, on social, economic, and environmental fronts, necessitate broader, more flexible frameworks for understanding issues outside of a strictly linear fashion. Resilience is one such framework that works in contrast to linear understandings of cause and effect. Resilience, however, is not a particular model of planning, it is a framework. In the context of planning for climate change, resilience as a framework embodies a different approach to planning that the stresses and shocks of climate change require; moving the manner in which planning is conducted outside of siloed understandings of closed systems that are neither complex nor interwoven, towards an understanding of open systems, inputs and outputs, and their interdependencies.

Resilience, although now considered a commonplace concept in planning for climate change (Holden et al., 2016, p. 296), did not originate as a concept within urban or community planning theory or practice. Emerging from the field of ecology, Holling’s 1973 paper, “Resilience and stability of ecological systems,” provided the hallmark definition of the ‘original’ form of resilience that spurred the larger discourse surrounding the topic. Holling’s paper presents resilience not as a system’s ability to withstand shocks and return to its original state, but as a system’s ability to adapt to various shocks or disturbances, deemed ecological resilience. He uses ecosystems as an example of this system behavior. In a later paper, Holling (1996) describes his original

concept as “the magnitude of the disturbance that can be absorbed before the system changes its structure” (p. 33). Within an ecological resilience framework, a system is not confined to one equilibrium under which it can be stable, and this system transformation can be the result of a disturbance or stress. Using an ecological conceptualization of resilience, the current state of social-ecological systems is not the only ideal state that the system can occupy. This notion of dynamism and the potential for multiple equilibria is important and suggests that the familiar is not always the only way a system can function. Ecological resilience works in contrast to the conceptualization of resilience in engineering and economic disciplines, otherwise deemed by Holling as “engineering resilience”. Engineering resilience seeks “efficiency, constancy, and predictability...at the core of engineers’ desires for fail-safe design” (Holling, 1996, p. 33). In seeking that efficiency and predictability, engineering resilience only recognizes one equilibrium as a system’s ideal state. Thus resilience in the engineering sense is how much of a particular shock or stress a system can take while maintaining its present state, or equilibrium. Engineering resilience introduces a rigid understanding of what systems can or should be, whereas ecological resilience introduces fluidity.

Evolutionary resilience, similar to ecological resilience, rejects the notion in engineering resilience that only one equilibrium is possible. Evolutionary resilience builds on ecological resilience but also challenges it. Evolutionary resilience is similar to ecological resilience in that it represents the way that systems can adapt and change in light of stressors, but rejects the necessity of a system occupying a state of equilibrium at all, and that not all inputs and outputs have to exist in balance with one another (Davoudi et al., 2013).

2.1.2. Competing Epistemologies of Resilience

Since its theoretical development in ecological studies, and conceptualizations along the spectrum of engineering, ecological, and evolutionary, the concept of resilience has emerged in many different disciplines. For instance, the notion of resilience has been used in psychology in examining how people who have been through trauma are able to still live productive lives through embracing positivity (Bonanno, 2004; Luthar et al., 2000). Within planning frameworks, the usage of resilience in the context of disaster studies and climate change is generally the most common (Meerow et al., 2016a), and recently a specific focus on urban resilience, and

its utility in planning for climate change in cities has taken root (Cao et al., 2021; Leichenko, 2011). Resilience, if implemented in either ecological or evolutionary senses, speaks to the transformative capacities for cities in adapting to climate change through the recognition that cities have multiple states of equilibrium or multiple states of being aside from the status quo. This holds particular value in the context of climate change, where our ability to maintain the status quo or perceived normalcy is challenged. Resilience as a concept in urban and community planning recognizes that cities are open systems; products of both dynamic inputs and dynamic outputs. A city is not in control over global mitigation strategies, but the recognition of dynamism of inputs and outputs inherent to a resilience lens is a useful guide for planning effectively even in an absence of control.

Engineering, ecological, and evolutionary resilience represent alternative ways of conceptualizing what it is that resilient systems do or their fundamental ways of being, but are not necessarily agreed upon conceptualizations (see Holling, 1996; Meerow & Stults, 2016a; Yumagulova & Vertinsky, 2019 for examples). In addition to the differences between engineering, ecological, or evolutionary forms of resilience, what makes up these systems is another aspect of the resilience discourse within which there are competing epistemologies. Resilience lacks a strong, ontological root, and this has led to a disjuncture between resilience theory and resilience in practice (Davoudi et al., 2012; Meerow & Stults, 2016b). In *The Resilience Dividend: Being strong in a world where things go wrong*, Rodin (2014) provides an account of the five characteristics of resilient systems. Rodin served as president of the Rockefeller Foundation, which is the organization that founded the 100 Resilient Cities program and also served as one of the key appointees to guide resilience-building in New York City following Hurricane Sandy (The Rockefeller Foundation, 2022). Gleaned from her experience in the field of resilience planning, Rodin identifies awareness, diversity, integration, self-regulation, and adaptation as the key attributes of resilient complex systems. Davoudi et al. (2013) summarize the views of Holling & Gunderson (2002), Walker, and Folke et al. (2010), in stating that resilience is about the “dynamic interplay between persistence, adaptability and transformability” (pp. 3–4). Davoudi et al. (2013) build on this understanding in the context of socioecological systems. They state that a fourth component, in addition to persistence, adaptability, and transformability, needs to be added to this framework that represents the purpose-driven power of human action. They label this component as

preparedness and state its fundamental relation to social learning. These aforementioned examples of conflicting but also overlapping characteristics of resilient systems illustrate a lack of conceptual clarity in resilience literature. The lack of conceptual clarity helps explain why implementation of resilience in cities is difficult, or, at the least, can take many forms. Without a clear, unifying definition and goal to strive for when implementing resilience, it can be difficult to make a strong case for resilience's value in policy. Summarizing the contested conceptualizations of resilience, Davoudi (2012) states that "it is not quite clear what resilience means, beyond the simple assumption that it is good to be resilient" (p. 299). Despite the challenges that a lack of a strong ontological root poses to translating resilience theory to practice, a certain level of conceptual ambiguity lends itself well to resilience being used in many different contexts, which, if used in beneficial ways could also be harnessed as a strength for the concept. The strength of resilience's use to bring together different disciplines is illustrated in Davoudi et al.'s (2012) hope for resilience as a valuable "bridging concept" between the natural and social sciences, and Brand and Jax's (2007) assertion that resilience has become a "boundary object" for communicating in a common language across disciplines. Climate change planning centres at the interface between natural sciences in terms of science-based understanding and forecasting of environmental effects, as well as human behavioural change which necessitates social science expertise to help guide. As a bridging concept, resilience is a particularly promising framework to integrate into climate change planning efforts that can link the different kinds of thinking in natural and social sciences to meet the demands of planning in our changing climate.

Cities exhibit significant vulnerabilities to climate change, given the concentration of infrastructure, economic activity, and lives in relatively small spaces (Hallegatte & Corfee-Morlot, 2011, p. 1). Cities also, however, are where intertwined social, economic, and political systems can be effectively harnessed to respond to the effects of climate change through capacity-building and innovation (Ernstson et al., 2010, p. 531). In this way, bounce-forward conceptualizations of resilience as a form of urban policy innovation are well-suited to implementation at city-scales and can have multiscale benefits in adapting to and mitigating the effects of climate change.

Using specifically the bounce-forward conceptualizations of resilience (ecological or evolutionary) as examples, resilience as a framework offers hope for new urban

imaginaries while planning for climate change; equilibrium, or simply a functioning state for our cities that does not have to be determined by the same assemblage of inputs and outputs interacting in the same way. Shocks and stressors can actually push our cities to be something different than they are, and different does not have to entail “bad” if conceptualizations of ecological and evolutionary resilience are used as frameworks. Despite resilience being a pervasive concept in planning and offering a framework through which to understand potential change in cities, there is still a marked fear of radical change in urban structures. Meerow and Stults (2016b) provide an illustration of this fear of change. They gathered data through a literature review and through a survey sent to resilience practitioners (planners, for instance) and found that:

Diversity, flexibility, and redundancy are considered fundamental to resilience in the scholarly literature, yet they are rarely mentioned in practitioners’ definitions. Conversely, robustness, which is more controversial in the resilience literature, was rated as the most important characteristic in the survey (2016b, p. 12).

Robustness signals more of a bounce back (engineering approach) to resilience; when a system is robust it can withstand change, maintaining its current state when subjected to shocks or stresses. Despite a practical reliance on engineering resilience, planning literature has generally progressed from the bounce back, or defense-oriented resilience, to a bounce-*forward*, or transformation-oriented conceptualization, based on the heightening demands of planning for climate change that fall beyond status-quo approaches. Yumagulova and Vertinsky (2019), in a study on what knowledge systems are dominant in flood resilience practice, found that engineering or structural methods (i.e. raising dikes, building hard infrastructure to combat rising waters) were historically and presently the dominant resilience styles in Metro Vancouver. They state that flood management has been and is often treated in policy as a “technical problem”. Treating flood management as a technical problem separates people from the hazard at hand through structural measures. This approach misses out on the opportunity to create systems that can respond in new ways and end the perpetuation of flood hazard vulnerabilities (Yumagulova & Vertinsky, 2019, p. 66). In this way, structural approaches to flood resilience do not address the important, resilience-building steps of social learning advocated for in ecological and evolutionary resilience frameworks (Davoudi et al., 2012). Meerow and Stults (2016b) critique the reliance on a robustness or bounce-back approach in planning practice, and argue that despite resilience theory pushing

towards an acceptance of change from the unknown, an emphasis on the importance of robustness (i.e maintenance of the present state) by planning practitioners shows a lack of desire to change from our cities' status quo. In the context of climate change, where status-quo behaviour is likely inadequate as a climate change response, an embedded resistance to change in resilience-oriented policies greatly diminishes the value of resilience practice. This echoes Rose's (2007) sentiment that resilience is at risk of becoming a vacuous buzzword.

2.1.3. Implementing Resilience

It is increasingly obvious that due to climate change, status-quo, predominantly structural methods are not going to be as effective an approach to flood management as they may have been in the past. If resilience does not actually push for substantial change when incorporated into planning practice then it serves little more than to be an embellishment in policy. The implementation of resilience is complicated by its conceptual ambiguity and multiple epistemologies; it is not a straightforward process to look at the notion of resilience in a particular policy and delineate whether it is or is not resilient taking into account the multitude of competing definitions. That being said, some of the definitions of resilience hold more value in planning for climate change than others, which helps respond to the outstanding issue of competing epistemologies. Specifically, resilience as a concept holds hope in communicating across the different disciplines that work together to develop climate action policy and can push for meaningful change if the *bounce-forward* conceptualization is used effectively to guide policy outcomes.

Tangibly, bounce-forward resilience can look like accommodating floods through managed retreat or floodways, or flood-proof construction so damage to property and human health is minimized in the case of a flood. Bounce-back resilience can look like status quo building/construction types and high-value, residential land use in floodplains, with higher dikes and a greater number of pumping stations, but catastrophic failure if any of those systems did not perform as expected or a flood was larger than anticipated. The first, bounce-forward example requires behavioural changes; both in terms of land use (creating space/retreat to create floodways) and changing building materials and construction types to be floodproof. The second, bounce-back example requires no behavioural change; land use type and construction type can remain the same, with

structural measures protecting status-quo lifestyles, and may be easier for policymakers to “sell” as an option to residents.

With the unprecedented severity of events that climate change brings, it is problematic to rely on status-quo approaches to flood management when we know in many cases those have been challenged by extreme weather events or climate stresses in the past. Further, status-quo planning poses a great danger in the event of failure or a breach of structural protections, both in terms of economic impact and human lives. It is reasonably clear that bounce-forward resilience is needed, but not often implemented (see Davoudi et al., 2012; Meerow & Stults, 2016a; Yumagulova & Vertinsky, 2019 for examples of this disconnect). Understanding what guides policymaking in the arena of resilience and shapes it to fall under either the bounce-back or bounce-forward approach will be integral to developing the new and effective climate policy needed that responds to the demands of climate change. The following section on development paths seeks to identify some of the points of inertia in planning and policy that shape the trajectory of resilience towards the less-useful and less-valuable status quo, bounce-back resilience conceptualizations, and offers insight into how those trajectories may be redirected to bounce-forward or transformative conceptualizations of resilience.

2.2. Development Paths

In the preceding section on the concept of urban resilience, a differentiation was made between the concept of bounce-back versus bounce-forward resilience. Bounce-back resilience focusses on maintaining a system’s current state, but bounce-forward resilience focusses on the adaptability and transformability of a system to different ways of being. As described, in planning practice, resilience has generally manifested itself in the bounce-back context; emphasizing the robustness, or a city’s ability to withstand change to and within itself. Similar to a resistance to change being dominant in resilience practice, according to Olsen and March (1989), based on their research on the role of institutions on broad political and economic systems, people tend to behave and make decisions according to routine or established and known practices (status quo or anchored to previous experiences), rather than based on weighing costs and benefits in a rational way. Peters (1999), in his study of institutional behavior as it relates to government and politics, also came to a similar conclusion, suggesting that people are

more likely to behave in accordance with their own established values than they are likely to be influenced by a set of rules or by choosing in a rational manner.

The tendency to make decisions based on routine or established practices works in contrast to the assumptions that are integral to certain forms of planning, for instance, the rational planning model which relies on strictly logical approaches to weighing costs and benefits. An example of the rational model in policymaking is the pervasiveness of reference to the policy cycle as a means to illustrate in a stepwise, predictable, and “scientific” fashion how policy is created (see the Howlett & Ramesh, 2003 policy cycle model, for example). Everett (2003) argues that especially for contentious issues, the influence that the consultation stage has on determining the outcome of a policy is generally overstated and despite what the policy cycle suggests, what happens during the decision-making stage is not based on the results of the previous stages of the policy cycle but rather is determined through highly politicized decisions instead. Similarly, Everett consultation through the policy cycle model does not always encourage a process that involves thorough inquiry and evaluation of all possible options, and “orthodox and established interests are frequently over represented and judgments tend to be made based on only a narrow range of factors,” which is not the outcome that a rational, orderly and predictable model should produce (Everett 2003, p. 69). These examples help illustrate that policymaking is not necessarily straightforward and rational and actual decision-making within an institution is significantly more complex. Bourdieu’s (1990) concept of habitus, Giddens’s (1984) concept of structuration and Jasanoff (2005) and O’Riordan et al.’s (1998) concept of political cultures all build on the idea that if we want to insert new value systems or new norms into policies or behaviour, using logic and scientific rationale to make the argument for embedding these new values or new norms are not necessarily the most effective arguments to actualize change (as cited in Burch, 2009).

Additionally, in relation to urban resilience specifically, the tendency to make decisions based on established practices challenges the implementation of bounce-forward conceptualizations of resilience, and steers resilience towards a bounce-back to status quo outcome for cities. A bounce-forward conceptualization of resilience offers opportunities for transformation and new urban imaginaries. In the long-run these opportunities for transformation may outweigh the risks of adopting a reality that is new and different. That being said, we may not capitalize on transformative opportunities

because of fear of the unfamiliar, and familiarity acts as a force of both comfort and inertia. Understanding forces of inertia to bounce-forward conceptualizations of resilience is critical to effective climate change policymaking.

Development paths gained prominence as a concept within the International Panel on Climate Change (IPCC) *Special Report on Emissions Scenarios* in 2000, and highlight the challenges of transformative change and the inertia of established routines and practices. Development paths were used within the report to characterize different broad-scale models for how the future could look in terms of development and emissions (Holden et al., 2016; Nakicenovic et al., 2000). Development paths serve as a way to examine how the capitalist production model, centred around assumptions of continued growth, is embedded within the development trajectory and works to shape emissions. The development paths within this report emphasized less-so the explicit climate policies that direct the trajectory of development and emissions, but more-so the composition of the interwoven fabric of society on a political, cultural, and economic level. Similarly, development paths are the often unintentional series of interdependencies that form between culture, technology, institutions, social factors, and through decision-making at various levels both in the private and public sphere (Holden et al., 2016). Given that development paths steer emissions and development, and thus play a role in a city's ability or inability to respond to the demands of climate change through emissions reduction and changing development patterns, Burch (2009) describes development paths as, "comprised of multiple trajectories that shape the way [climate mitigation and adaptation] capacity is translated into action in practice" (pp. 2-3). Development path theory suggests that the direction of prior cultural, technological, and institutional investments or norms play an important part in shaping not just present but future behaviour of individuals and institutions, and thus development paths usually shape future policy decisions in favour of familiar and known approaches that align with the current development path (Burch, 2009). These familiar or known approaches can be either helpful in terms of creating effective climate change policy or problematic. Development paths are influenced by power dynamics, networks of trust and reciprocity, as well as structural, operational, cultural, and contextual factors, and development paths can be considered the "context within which human behavioural responses to a risk such as climate change emerge" (Burch 2009, pp. 49, 51). Burch argues that one of

these factors does not usually determine the development pathway alone, but they are usually interlinked.

According to Burch (2009), “Actions inconsistent with development path trajectories are likely to face greater hurdles in implementation and may indeed not be given serious consideration” (p. 40) because these actions do not align with dominant cultural, technological, and institutional frames of reference. Due to the capitalist model that favours continued growth, approaches to climate action are often met with resistance when limits to economic growth are imposed by a particular climate policy. The inertia presented by the capitalist model is a fundamental challenge when increased consumption and growth under this model are what drive the climate crisis but remain difficult to change. An effective approach to climate change action takes into account development path factors, and works with, not against these factors to steer the development path towards more environmentally sustainable or resilient outcomes. Effective approaches to climate action can both spur transformation but also work with development paths to re-orient their trajectories, especially if these approaches to climate action offer benefits to the public (Holden et al., 2016, p. 305; Jordan et al., 2015). Transition management as delineated by Smith et al. (2005) emphasize the role of reorienting trajectories in socio-technical transitions, and the framing of that reorientation towards something perceived as positive, rather than negative, to support regime shifts. An intimate understanding of what factors constitute the development path, an articulation of the benefits that transformative climate action can have, as well as an intimate understanding of the factors motivating human behaviour (linked in part to the benefits that climate action can provide) are integral to creating effective approaches to climate action.

Development paths on a broad scale in Canada are not sustainable. In 2019, Canada was the highest greenhouse gas emitting country in the world per capita (Environment and Climate Change Canada, 2022). Within Canada, different regions and different cities exhibit variability in terms of their development paths, but generally, the inertia presented by the current development trajectory in Canada is a difficult but important one to combat in order to effectively respond to the demands of climate change. Canada overall experiences a higher than average warming rate (Natural Resources Canada, 2022), but also is following a development path that is unfavourable in terms of sustainable or resilient climate change planning. The Lower Mainland, within

the national Canadian development path context, is set in a coastal area, making it vulnerable to the effects of sea level rise and other coastal hazards which are only exacerbated by this unsustainable development path. Using a similar framework to Smith et al.'s (2005) notion of reorienting trajectories, it is especially pertinent to understand what the existing development path is in the Lower Mainland at a detailed scale, articulate the benefits that climate action can have, and understand what motivates human behaviour towards more resilient or sustainable outcomes in order to embed viable policy solutions that create the conditions for multi-scalar transformative change. Specifically, if bounce-forward resilience is to be implemented effectively in ways that challenge the status-quo consumption patterns and ways of life that have contributed to the climate crisis, and for resilience to not just end up as an embellishment or buzzword in climate change planning with little tangible transformative potential, a nuanced understanding of the factors that shape policy outcomes (i.e. the development path) is necessary to sow the seeds for change. The CFAS process as it unfolded in the Crescent Beach community is a case study that can support this kind of analysis.

There is existing research that begins to examine local development paths and, through a detailed understanding of the conditions that make up the development path, ways that reorientation of trajectories can occur. One such example is pioneered by Burch (2009). Using development paths as a guiding framework, Burch (2009) assesses the relationships between capacity and action in three cities in Metro Vancouver and delineates some of the barriers encountered in translating that capacity to climate action. Prior to its conceptualization within climate change adaptation studies and the IPCC process, development path literature is historically grounded in technological innovation literature with a strong emphasis on the roles of firms and institutions (see Nelson & Winter, 1982). On harnessing the transformative potential of cities in the context of climate change and highlighting the importance of influences other than technology and institutions, such as culture and values, on climate change response capacity, Romero-Lankao et al. (2018) state that “[Pursuing] a transformative urban agenda for climate change will require innovative work, and efforts that go beyond a relatively technocentric view of research and synthesis” (p. 1). Although Burch (2009) incorporates some contextual values-based elements in her study and characterization of development paths in the Lower Mainland, such as “the values and priorities of the public... and the

capacity that the community possesses to respond to climate change impacts and causes[;] including human, financial, and technical capital” (p. 291), she only conducts interviews with planners, engineers, and politicians. This interview approach limits insight into social and behavioural aspects of the public. The values of the general public may play important roles in shaping the political climate of decision-making and thus play a role in development and emissions, but are somewhat divorced from the manner in which Burch’s study is conducted and the considerations generally of the development path concept. The results of the study end up focussing more on institutional factors in governance affecting policy efficacy, such as job descriptions and the position of sustainability within city planning frameworks.

Although institutional factors affecting governance are important aspects of development paths, they miss out on key behavioural motivations that shape the policymaking landscape and determine what are and what are not acceptable outcomes to stakeholders in the policymaking environment. Development path thinking is not necessarily sufficient to understand individual behavioural motivations for climate action, and although development paths do acknowledge the role of both public and private decision-making in shaping emissions trajectories, development paths tend to have a broader focus on socio-economic conditions and institutions, rather than individual decision-making. Romero-Lankao et al. (2018) emphasize the importance of individual values in planning for climate change, stating that “Values, beliefs, interests, and worldviews shape personal narratives and political discourse[.] They underpin the framings, priorities, and blind spots at the heart of action as well as the counter-narratives, skepticism and denialism at the heart of inaction” (p. 14). Burch’s approach, with an emphasis on the institution and not the individual, and in assuming that the knowledge conveyed about public values is unbiased or effectively translated through the policy cycle, presents opportunities for misrepresentation.

In addition to analyzing development paths on a more institutional level, I argue a more fulsome approach to understanding how to re-orient development and emissions trajectories could incorporate interviews with members of the public in addition to policymakers, especially given Smith et al.’s (2005, p. 1501) assertion that in order to effectively reorient trajectories, one must have an understanding of what environments motivate human behaviour to act more sustainably. I treat behavioural motivations as loosely linked to development path thinking but deserving of detailed and nuanced

analysis that a more institutionally-focussed development path lens tends to obscure. At a local level, like that of the Crescent Beach case study, I argue it is beneficial to examine individual behavioural motivations as additional forces of inertia in policymaking outside of solely broad-scale development paths; where development path thinking alone could mask details. Corroborating the value in the approach of looking at development paths in conjunction with individual behavioural motivations to climate action and not treating development paths and these behavioural motivations as one and the same, Clar and Steurer (2019) state that:

Policy change is frequently triggered and shaped or prevented by (persistent) framework conditions...[amongst these] are societal aspects such as path dependencies (Leach et al., 2007a, 2007b; Kristof, 2010; Knox-Hayes, 2012), [and] public values, and opinions (Kabat et al., 2005; Kristof, 2010; McEvoy et al., 2013) (p. 121).

Related to the notion of behavioural motivations, in the following section on individual behavioural motivations and risk perception I expand on an example of the importance of public values and beliefs in risk perception that determine response capacity when planning for climate change, making a stronger case for incorporating more contextual, values-based factors as considerations in the policy development environment.

2.3. Risk Perception as it Relates to Climate Change Planning and Effective Policymaking

Climate change communication and the way that communication translates to behavioural change is a lively area of research and debate. One such debate is whether behavioural change is better achieved when engaging people emotionally through grassroots understandings of climate change, or better achieved when engaging people through scientific expert understandings of climate change (Nerlich et al., 2010, p. 4). Another contention is whether broad-scale alarmism is more or less effective in changing people's behaviour and bringing attention to climate issues than a focus on small, tangible, incremental actions (Nerlich et al., 2010, p. 8). Within that line of thought it is argued that small actions are simply not enough to respond to climate change, or, on the other end of the spectrum, that alarmism creates a desensitization to climate issues that results in complete inaction (Nerlich et al., 2010, p. 8). Another contention is how best to unite the differences between the concentrated interests of stakeholders involved in

climate change planning with the diffuse interests of the public good (Olson, 1965); an outstanding mismatch of the scales that climate change planning both affects and involves. Planning for climate change is planning for the public good, but affects people's concentrated interests on a personal level (Holden, 2011, p. 314).

An example of how concentrated and diffuse interests can be divergent in the policymaking arena is exhibited through the tension between the city and stakeholders in responding to sea level rise. For instance, the city is obliged to act in a fiscally responsible manner with respect to the broader tax base whilst reducing the risk of flooding for those on the floodplain, answering to the diffuse interests of the public good. Property owners, however, act in favour of appreciation of their property investment and their desire to be treated fairly as taxpaying citizens; continuing to be protected from flooding, which answers to their concentrated interests. When the public good and concentrated interests as part of a policy process are misaligned, a policymaker's ability to influence behavioural change or translate knowledge of risk to action may be diminished. Understanding the linkages within the knowledge to action cycle and how to harness those linkages in the policy process is integral to planning effectively for climate change.

Similarly, awareness of a risk and associated action to combat or minimize that risk do not go hand in hand. This disjuncture is illustrated by Lieske et al. (2014). Lieske et al.'s study sought to compare the public's climate risk perception in terms of climate change being a global threat versus the threat that they felt on a local level. Lieske et al. (2014) found that "81% of respondents felt that the problem of climate change was considerable or severe...[but in terms of] personal vulnerability to dyke failure and subsequent coastal flooding, only 35.6% considered themselves to be at considerable or severe personal risk" (p. 83). In a report by the Council of Canadian Academies prepared for Public Safety Canada highlighting important steps to reduce disaster risk in climate change, the importance of how subtle difference in communicating hazards can shape risk perception is emphasized. Citing the ideas of Meyer and Kunreuther (2017), the report states that:

[An] individual may dismiss a 1-in-100-year flood event as a remote possibility but react very differently to hearing that there is a 63% chance of such a flood occurring over the course of the next 100 years, or being told that the chances of such a flood occurring over the course of a 25-year

period are greater than 1-in-5...All of these statements are based on the same underlying data, but their meanings will be interpreted differently. (2022, p. 72).

Understanding how information about risk is received, processed, and acted upon is crucial to understanding how to effectively engage on climate change. If risk is solely communicated in the policy process in reference to risk to the public good or diffuse interests, and concentrated interests within the policy process run counter to the collective good, it is unlikely that the risk knowledge translated through the policy will actually spark change and drastic action – concentrated interests will often prevail (Holden, 2011; Olson, 1965). Individual behavioural motivations are not necessarily accounted for in the broader brushstroke approach that a development path lens uses. Development paths account for culture and social norms, but human behaviour on an individual level can be more nuanced and can stray from social norms and cultural context. Failure to adequately consider how public risk perception steers policy and can, at best, perpetuate climate vulnerabilities, and at worst, lead to destruction when status-quo systems fail in the wake of severe weather events caused by climate change. This has ramifications for the type of resilience that ends up included as part of policy. In the following section, I explore several varieties of behavioural motivations that influence or play roles in public risk perception which are relevant to this study, namely: time, wealth and age, anchoring bias, attachment to place, and moral hazard.

2.3.1. How Time Influences Risk Perception

One of the reasons that risk knowledge does not translate to action is time; fear of a particular hazard tends to fade with time. As described by Tierney et al. (2001):

While people may be generally concerned about a hazard, particularly after a disaster event or after receiving hazard-related information, the salience of the hazard in people's lives may well decline in the face of other more daily concerns unless a potential threat is re-emphasized continually through interaction (p. 159).

A similar finding was described by Burch (2009) in her assessment of barriers to effective climate change planning in three municipalities in the Lower Mainland. One staff member from the City of Vancouver stated that Vancouver had not recently experienced severe flooding or mudslides, unlike Delta or the District of North Vancouver, so not having experienced issues related to climate change or natural

hazards, there was a complacency amongst City of Vancouver residents about the threats of climate change, and the staff member posited that this complacency led the City to not look proactively at climate change adaptation. This is similar to the idea of the policy window that suggests there are specific and short periods of time that allow for effective policy change (Kingdon, 1984).

In pre-emptive climate adaptation, time poses a challenge in translating a rationale for drastic action. In the case of managed retreat, this is especially true. Convincing residents that managed retreat may be necessary as a plan 25 years in the future, prior to any disastrous flooding occurring goes against the way that people generally perceive climate hazards; in that the risk associated with a particular hazard is more effectively conveyed by being confronted by that hazard head-on. Sea level rise in particular is an insidious threat and aside from coastal erosion that may be noticeable, sea level rise generally may not play a particularly disruptive role in residents' lives until reactive measures are necessary. As long as sea level rise and storm surges do not cause disastrous flooding, the salience of the hazard to residents may be low. Directly relevant to residents, pro-active or pre-emptive managed retreat allows for better community engagement, a more comprehensive community planning processes, as well as greater process certainty, and from a financial perspective, pro-active or pre-emptive retreat offers a high rate of return on investment (Thistlethwaite et al., 2020). Research suggests that for every \$1 invested in community resilience proactively, \$2–\$10 in losses can be averted in the future (Global Commission on Adaptation, 2019, p. 12; Saunders-Hastings et al., 2020, p. 9). These are only a subset of the benefits that pro-active managed retreat has, versus reactive (see Council of Canadian Academies, 2022; Saunders-Hastings et al., 2020; Thistlethwaite et al., 2020 for further examples). Despite these benefits, pro-active retreat tends to be far less acceptable to residents based in part on human perception of hazards (Gawel et al., 2018). There is thus a significant tension between implementation of pro-active retreat, which tends to have the most benefit to communities and also is most financially prudent, versus reactive retreat which is more easily sold as a policy option to stakeholders because of their prior intimate experience with flooding hazards and the destruction that ensues.

2.3.2. The Influence of Age and Wealth on Risk Perception

Risk perception is also influenced by other factors such as wealth. Wealthier individuals generally are perceived to have more political influence, so tend to believe they may have more say in controlling risk (Slovic et al., 2007). Risk is mediated in part by the political agenda in deciding who receives protection from the effects of climate change and who does not receive protection (Slovic et al., 2007). For instance, during Hurricane Katrina, a significant amount of destruction took place in the Lower Ninth Ward. The Lower Ninth Ward neighbourhood was built on low-lying floodplain and its composition was 98% African-American, with over 33% of residents living in poverty (UN-Habitat, 2006). Poverty significantly limited opportunities for residents to move from the hazardous lands and to higher ground (UN-Habitat, 2006). Upgrades to flood management infrastructure were historically concentrated in wealthier parts of the city and not in low-lying areas like the Lower Ninth (Landphair, 2007).

Crescent Beach is a different case in certain respects as Crescent Beach residents made the choice to move to beachfront, low-lying property and were not necessarily restricted by the same income and poverty challenges as Lower Ninth Ward residents. Crescent Beach residents are predominantly white and generally wealthier than the rest of Surrey (Statistics Canada, 2022) and historically residents have had political influence in terms of neighbourhood representation on City Council and in the Mayor's chair (Chaster, 2015, p. 48). Based on existing literature, Crescent Beach residents' perceived risk of flooding may be lower as compared to other, less-wealthy and less-represented communities, with an expectation that the government would support adequate flood protection. There is the additional agency that wealth brings to the equation, wherein it may be easier from a financial perspective for Crescent Beach residents to both find alternative locations to live and leave on their own accord when they perceive flooding risk to be too high, as compared to a poor community. Crescent Beach residents may not have to rely as heavily on government intervention or aid as part of their relocation process. In the meantime, there are obvious lifestyle benefits to living by the water that may outweigh the risks for Crescent Beach residents, and until flooding risk is perceptible, many residents may choose to stay (King et al., 2014). The influence of wealth on perceived flooding risk is a factor this study seeks to analyze at least from a correlation perspective.

Older age exhibits a similar force of inertia on residents' willingness to relocate. In a study assessing factors that affect viability of land acquisition programs in the United States, it was found the change associated with relocation was felt particularly strongly by the elderly (Fraser et al., 2003, p. 26). Approximately 30% of Crescent Beach residents are over the age of 65, as compared to 15% for Surrey on average (Statistics Canada, 2022). Older age in the Crescent Beach case may play a form of inertia to adopting managed retreat both in terms of residents' ability to manage change in the later stages of life, and likelihood of future flood occurrence within residents' lifetimes likely being lower than those in a younger demographic. If a flood is unlikely to happen in an older resident's lifetime, it serves their interests to stay where they are. This is at odds with a City's obligation to reduce the risk that floods have on citizens.

Both age and wealth are factors that influence risk perception, and consideration of these factors within the climate change policymaking environment may influence policy success.

2.3.3. Anchoring Bias

Anchoring bias occurs when humans tend to make decisions based on what happened in the past or based on limited information (Kahneman et al., 2017; Thaler & Sunstein, 2009).

A study by Romanowski on storm surge flooding in Boundary Bay, Tsawwassen had a significant focus on residents' risk perception of potential and actual flooding and provides an illustration of anchoring bias. In the study, it was found that the City issued warnings to Boundary Bay residents about the upcoming storm surge, but many of the residents assumed that there would not be any flooding so none of those interviewed as part of the study took any protective action in regards to preparing their homes and properties for potential flood (2010, pp. 58–59). Those who did not experience extensive damage because of this flooding were more likely to perceive future flooding risks as low and would not pursue any changes to minimize risks, as opposed to those who experienced more severe flooding and saw greater future flooding risks (Romanowski, 2010, p. 71).

A potential example of anchoring bias in the case of Crescent Beach is where residents may assume the City will continue to protect their homes through structural

flood management measures, rather than pursue an avoid or retreat flood management strategy, with this assumption based on prior rounds of municipal investment in flood management infrastructure. Describing the challenge posed by existing grey infrastructure to realistic perceptions of risk, Lieske et al. (2014) state that, “Willingness to [adapt] is...eroded by overreliance on public infrastructure, e.g., [dikes]. This can lead to a dangerous, false sense of security in their integrity and reliability” (p. 84).

As long as the public continues with confidence in the integrity and reliability of structural flood management approaches and assumes their relative inexperience with hazardous flooding will continue, there may be an absence of the sense of fear or urgency needed to make transformative flood adaptation measures such as avoid or retreat palatable to the public. In the meantime, status-quo, structural adaptations measures may be pursued as they are more acceptable to the public than drastic measures such as managed retreat. Structural measures, in the short-term, may remain the path of least resistance for policymakers and politicians.

2.3.4. Attachment to Place

Attachment to place is “the bonding that occurs between individuals and their meaningful environments” (Scannell & Gifford, 2010, p. 1). Attachment to place plays a role in risk perception and, in turn, plays a role in determining the acceptability of retreat or avoid flood management strategies to the public, as the bonds created between people and place can act as forces of inertia to resettlement.

In a report commissioned by Natural Resources Canada on managed retreat to support resilience, using Canadian case studies as examples, it was found that a source of resistance to managed retreat centred around place-based attachments, and that these “place-based attachments [would] be destroyed or significantly degraded by a move to a new location, especially if the original place is strongly tied to a person’s identity or livelihood” (Saunders-Hastings et al., 2020, p. 39). Strong place-based attachments reduce public acceptance of avoid or retreat flood management strategies, which in turn can reduce the desirability to pursue these measures from a political standpoint, influencing the outcome of policy.

Related to risk perception, attachment to place can contribute to familiar locations or “home” engendering a false sense of security even in dangerous situations (Billig, 2006). This sense of security can defy rational thought when legitimate dangers present themselves such as “ecological hazards, crime, or hostilities” (Billig, 2006, p. 251). The sometimes-irrational nature of place attachment is important to recognize in the policymaking arena to try and minimize situations where the public dismisses real risk as perceived risk due to the confounding effects of place attachment. One way to account for attachment to place is through the scale at which a planning process takes place. For instance, residents directly in coastal areas where relocation would take place tend to display lower perceptions of risk which are biased by factors such as attachment to place (Dachary-Bernard et al., 2019, p. 778). These individuals tend not to support managed retreat (Dachary-Bernard et al., 2019, p. 778). Including a larger part of the tax base in these planning processes gathers a broader array of input and tends to include people with less biased, higher perceptions of risk who are more supportive of managed retreat (Dachary-Bernard et al., 2019, p. 778). Many homes in Crescent Beach are family homes that have been passed down for several generations which may further entrench an attachment to the community – attachment to place in certain communities would be a key consideration within the design of climate change planning processes such as the CFAS policy process.

2.3.5. Moral Hazard

Moral hazard was first used in the field of health economics in the 1960s as a way to illustrate how people tend to behave when they have health insurance (see Pauly, 1968), and encompasses the idea that the price an individual pays for being careless is less personally costly when you are insured for that carelessness than when you are not insured for it (Shughart, 2006, p. 43). Moral hazard relates not just to health economics, but also disaster studies (see Shughart, 2006; Terpstra & Gutteling, 2008 as examples). When relief in some form is anticipated in the wake of a disaster, people are inclined to take greater risks in terms of their choice of living and the hazards to which they are exposed (Council of Canadian Academies, 2022, p. 86).

This is specifically relevant to development in floodplains, where moral hazard can influence homeowner’s risk perception. With the assumption that there will be availability of federal, provincial or municipal aid or insurance coverage in the event of a

flood, the actual costs of the risks of living in the floodplain are not borne by the homeowner. Problematically in Canada, overland flood insurance is not typically covered by home insurance as default, and if overland flood insurance is covered, it usually only relates to freshwater (which is often moot in the context of sea level rise hazards) (Council of Canadian Academies, 2022, p. 84). The actual costs of the risk of living in a coastal floodplain are borne by a wider swath of taxpayers who are not necessarily taking on those particular climate risks themselves (generally taxpayer-funded disaster funds, distributed by various levels of government, end up covering the costs for homeowners to rebuild or settle).

Moral hazard obfuscates fulsome accounting for the financial risks of living in floodplains, and without accounting for externalities, stakeholders may be less supportive of managed retreat or other hazard avoidance-based flood management strategies. Managed retreat strategies are of high personal costs to those living in floodplains (these strategies would require them to uproot), whereas maintaining the status-quo protection-oriented flood management strategies, such as dikes and seawalls, are of low cost personal costs to those living in the floodplain (there is no requirement for a wholesale lifestyle change). Even if a disaster were to occur, government aid still greatly attenuates the cost of the risk being taken when living in hazardous areas. Moral hazard acts as a force that can lock in risky development practices, and stymies climate resilience.

2.3.6. Conclusion

Recall Smith et al.'s (2005) notion of reorienting trajectories. Their central argument is the ability to successfully reorient trajectories and embed viable policy solutions that create the conditions for multi-scalar transformative change requires a knowledge of the existing development path, an articulation of the benefits that climate action can have, and an understanding of what motivates human behaviour towards more resilient or sustainable outcomes. Individual risk perception and the behavioural motivations that shape that risk perception are not factors that are strongly emphasized in a development path framework alone, outside of a recognition of cultural and social context, which is broader in scale. These behavioural motivations are nuanced and translate knowledge to climate action making them key factors to consider in the climate policy development process, playing either limiting or enabling roles in transformative

change. Thus it is important to look at a combination of individual climate action motivations, such as time as it relates to risk perception, wealth and age as they relate to risk perception, anchoring bias, attachment to place, and moral hazard, in conjunction with the broader ideas explored in development paths to gain a fuller understanding of what lies at the root of climate inaction or policy stagnation. These motivations shape people's concentrated interests and complicate how people perceive risks. Policymaking must take these factors into account in policy design, and cannot assume that stakeholders will act on the same motivators such as the "what is best for the public good is best for me". The opportunity to pre-empt the worst disasters of climate change, via resilient planning and policy, forces us to bring new interests, timeframes, and spatial scales into consideration that stakeholders may not be well-situated to hear based on their concentrated interests if status quo engagement processes are used. In Crescent Beach, examining behavioural motivations and risk perception could help determine how CFAS was redirected from a transformative to non-transformative policy outcome, and may give us further insight into how we can pull on the right knowledge to action levers to harness the transformative value of resilience planning even when diffuse and concentrate interests may seem to be at odds.

2.4. Barriers to Climate Change Policy Development

The effectiveness of climate change policy has stagnated at a time when deep and transformative change is needed to combat the climate crisis (Patterson et al., 2018). For instance, the Paris Agreement treaty adopted in 2015 seeks to contain global temperature increases to below 2 degrees Celsius as compared to pre-industrial times, and preferably closer to 1.5 degrees Celsius (Connors et al., 2018). Following our current trajectory of warming, however, there is a 50% chance we will reach 1.5 degrees between 2022 and 2026 at least temporarily, and countries' current individual climate pledges are insufficient to restricting warming to this level over the longer term (Connors et al., 2018, p. 23; The World Meteorological Organization, 2022). Pacala and Socolow, through their research on using current technology to respond to climate change adaptation and mitigation, found that climate policy stagnation is not because of the prohibitive cost of mitigation and adaptation nor because of a lack of technological advancement, which would otherwise be rational explanations for why progress has not been made (2004). Burch (2009) asserts that the notion of "barriers" plays an integral

role in policy stagnation. Barriers can constitute the broad-scale institutional and social contexts that limit our responses to climate change, described by the notion of development paths (Burch, 2009), but also can constitute individual behavioural motivations such as risk perception (Moser & Ekstrom, 2010). Barriers, in the case of this study, solidify the abstract factors such as “cultural context” or “institutional factors” within development paths and human behaviour that steer trajectories towards the familiar and known. In other words, barriers are the specific manifestations of development paths and behavioural motivations that pose challenges to implementation of bounce-forward resilience.

Moser and Ekstrom (2010, p. 22026) make an important differentiation between the concept of “barriers” and the concept of “limits”. They define “limits” as “obstacles that tend to be absolute in the real sense” versus “barriers” which can be surmounted by a variety of different mechanisms including reprioritization, effort, or different ways of thinking. Barriers make transformative approaches to adaptation and mitigation more challenging, but not impossible. There have been many studies on the concepts of barriers as they apply to climate change planning. Blake (1999) presents a significant shift in the direction of research in assessing human behaviour in an environmental policymaking context. Previous to Blake’s work, “pro-environmental” behavioural analysis literature came out of the discipline of psychology and generally assumed people acted rationally in terms of their environmental choices (Kollmuss & Agyeman, 2002, p. 246). Blake’s approach to analyzing pro-environmental behaviour is more of a sociological than psychological one, and begins to account for social as well as institutional contexts that shape human responses to environmental policies (Kollmuss & Agyeman, 2002, p. 246). This kind of framework starts to show the interplay between individual human behaviour and the kind of contexts that development paths represent. Blake (1999) identifies three barriers to action:

1. Individuality: personal attitudes that work in opposition to those of environmental concern;
2. Responsibility: the idea that our individual needs can trump a collective need to curb emissions; and

3. Practicality: an absence of time, money or information to act in ways that are more environmentally friendly.

Moser and Ekstrom (2010) build on the approach Blake (1999) has taken, but unlike Blake, focus more on the policy process than people's behaviour in response to a particular policy or in response to their environmental beliefs. Moser and Ekstrom (2010) recognize the importance of the interplay between three factors: "the actors (not a static but often wide-ranging and dynamic set over time), the larger context in which they act, and the object upon which they act (i.e., the specific coupled human–natural system to be managed or altered)" (p. 22027) in the creation of barriers in the policymaking process. Through their study, Moser and Ekstrom identify four sources of barriers:

1. Leadership: leadership can elicit trust in a process or destroy it;
2. Resources: a lack of resources to pursue climate change adaptation can stop the process before it starts;
3. Communication and information: the way information is conveyed and the type of information that is conveyed can influence policy outcomes; and
4. Values and beliefs: these factors can influence risk perception and what information they deem to be important.

The paper is an important contributor to literature on barriers to climate action; it has 55,000 downloads and has been cited 877 times. Through its focus on institutional, political, and behavioural motivations to climate adaptation, it links the principles of development path thinking with individual behavioural factors that affect climate motivation, but does not explicitly/by name discuss the role development paths play on policymaking in the context of climate change.

Burch (2009) examines similar factors to Moser and Ekstrom (2010), including institutions, political environments, and public values as part of her framework to examining barriers to climate change policymaking in the Lower Mainland. Burch identifies four varieties of barriers effective climate change planning:

1. Structural or operational: priorities of an institution;

2. Behavioural barriers (in terms of institutional decision-making, not public behaviour): leadership ability within an organization;
3. Regulatory: tools like zoning bylaws or community plans as well as interactions of policy at different levels and whether this policy complements climate change adaptation efforts or not;
4. Context: previous climate change impacts, public values, as well as community response capacity.

She explicitly describes development paths and their role in barrier creation, and although context is discussed in terms of public values and a community's previous experiences with or impacts from climate change, her study has less of a focus on human behavioural motivation and more of a focus on institutional and political factors that affect policymaking.

In addition to the variables that serve as barriers identified in the above frameworks, Siders (2019) in her study of barriers to adopting managed retreat in the United States brings forward the concept of place attachment, which is described further in section 2.3.4. It is not clearly described what kind of framework Siders uses throughout this study, but her focus on institutional, psychological, and practical barriers to adopting managed retreat seems to echo a combination of development path thinking with finer scale analyses of individual behavioural motivations.

As elucidated by the above frameworks for understanding barriers to climate change policymaking, the inertia presented by these barriers results from both a combination of development paths and individual climate action motivations, such as risk perception or attachment to place. Barriers constrain the types of policy that are acceptable to the public and in doing so often limit the transformative capacity of our cities, shifting policy trajectories back toward the known. Resistance to change or the unknown reflects the robust, bounce-back, or defense-oriented concept of resilience, and shirks away from the bounce-forward, or transformative idea of resilience. Despite barriers appearing as if they may be full stops to new and effective climate action and climate change policymaking, Burch asserts that barriers are not necessarily dead ends, and that an understanding of the barriers present in our cities is the root to actualizing a city's response (2009; Burch et al., 2014). Thus, assessing barriers serves as one of the

keys to unlocking the potential for more effective climate change planning. The hope for policymaking provided in Moser and Ekstrom's argument that barriers are surmountable (2010), and Burch's argument that barriers are also the roots of a city's response capacity (2009), is complementary to Smith et al.'s (2005) notion of reorienting trajectories which was introduced earlier in the conceptual framework. Smith et al. emphasize the importance of the role of policymakers' knowledge of existing development paths, an ability to articulate the benefits that climate action, and an understanding of what motivates human behaviour towards more resilient or sustainable outcomes (2005). Development path thinking alone suggests that policymaking does not really have an effect on the emissions or development practices that are central to shaping effective climate action (Holden et al., 2016; Nakicenovic et al., 2000). Smith et al. (2005) and Burch (2009) offer counterpoint views, and thus potential ways to overcome the limitations of policy interventions in reorienting development paths. In harnessing a fulsome knowledge of development paths, articulating the benefits of climate action, and understanding human behavioural motivations that steer more sustainable or resilient climate choices, policy can sow the seeds for opportunity to reorient development trajectories. Although this process is not an easy one, barriers, in this way, can be flipped to opportunities through policymaking.

One challenge that a resilience lens in particular poses to policy reorientation and transformative change is that a resilience framework does not clearly articulate an ideal process outcome, aside from a general assertion that it is "good to be resilient" (Davoudi et al., 2012, p. 299). Resilience can also act as a bridging concept or boundary object between the different disciplines involved in climate change planning (Brand & Jax, 2007; Davoudi et al., 2012), as well as a bridging concept for those directly involved in the policy process uniting concentrated and diffuse interests, the basis upon which actors ground their motivations, over a common goal. Although Smith et al. (2005) emphasize how trajectory reorientation requires a clear description of what benefits may accrue from a transformative approach in order to motivate behavioural change, characterizing what benefits may arise from a bounce-forward resilience lens, when resilience focusses more on a process rather than an outcome could limit the effectiveness of the concept of resilience in practice (Holden et al., 2016). When the goal of resilience is not articulated, there is little content from which to draw to actually build necessary connections between different interests in the policy process. In this way,

considerable attention must be paid by policymakers to be able to both characterize and communicate the opportunities or benefits that bounce-forward, or transformative resilience can have in terms of climate change planning in order to embed viable and effective climate change planning policies that overcome the policymaking barriers articulated above.

2.5. Research Gap

Recognizing the importance of development paths as well as finer-scale, individual behavioural motivations within policymaking points to the value of combining both development path thinking with finer-scale human behavioural motivation factors. These frameworks for understanding barriers to climate change action described above, accomplish this, each in varying capacities. Linking these barrier frameworks with one another strengthens the integration of both development path thinking and human behavioural motivations, where one framework may be weaker than the other. A linkage of these barrier frameworks with additional tenets from development path thinking and literature on human behaviour in the context of climate action could form a more comprehensive picture of how different factors, both contextual and individual, affect the outcome of a particular policy process, and ultimately community resilience. The frameworks described above do recognize common barriers to climate change planning to a certain extent, but each framework tends to leave out at least one factor that the other mentions. I developed a framework that combines the Blake (1999) barriers framework, the Moser and Ekstrom (2010) barriers framework, and the Burch (2009) barriers framework, as well as Siders's (2019) notion of attachment to place along with additional factors that are part of development path literature (political risk perception, the policy cycle, previous political decisions constraining future choices) and human behavioural motivators (risk perception, practicality of climate action, anchoring bias, attachment to place) to characterize the multitude of factors at play that affected the resiliency of the policy that was ultimately chosen through CFAS for Crescent Beach (see Table 4 for conceptual framework).

The concept of embeddedness traces back to Polyani (1944) and the link he demonstrated showing how non-economic institutions limit economic activity. According to Polyani's theory, non-economic institutions include values, norms, and relationships (Polyani, 2001; Thompson-Dyck et al., 2016). Embeddedness has since been adapted

to other contexts, including disaster planning (see Iversen & Armstrong, 2008). Embeddedness is a particularly valuable concept when translated to the context of the planning profession given it does not solely say planners must consider context in policy development, but clearly establishes four different contextual elements that either encourage or discourage climate action. These four contextual elements are labelled by Thompson-Dyck et al. (2016, p. 281) as “cognitive, cultural, structural, and political embeddedness”. The embeddedness framework offers a way to conceptualize the interplay between development paths, and the other social and human behavioural facets that shape and constrain climate policy development. Embeddedness is the overarching concept that guides the creation of my conceptual framework.

There is a significant amount of literature on resilience, managed retreat, and development paths, as well as macro-level analyses of barriers to adopting managed retreat, but there is little literature available on a specific case study that links the concepts of transformative or bounce-forward resilience, managed retreat, and development paths, as they relate to the production and persistence of embedded barriers in the climate change policy development environment.

The specificity provided by this particular case study (Crescent Beach) and using a particular policy process as an example (CFAS) gives more detailed and nuanced insight into what other challenges municipalities may encounter in terms of implementing transformative change in flood management. It helps move the hypothetical, macro-conceptualizations of development paths and response capacity – described as “analytical vagueness” by Burch (2009), towards a tangible and applicable connected suite of barriers and the outcomes (or response capacity) that they can produce. My case study also offers a reference framework of development paths and social context as they relate to barriers for other researchers or climate change adaptation practitioners, particularly in the Lower Mainland, given similarities in political process, jurisdiction, and general socio-cultural contexts. In order to develop effective and viable policy, as posited by Burch, one must understand what these barriers are and how they interact with development paths and social context to produce response capacity (or resilience in this case) (2009). I hope to uncover how these barriers and development paths in the City of Surrey can actually become catalysts for change in new consultation processes by better understanding, firstly, what the barriers or development paths there

are and in doing so, uncovering potential points for embedding new values in the policy process.

Table 4: Conceptual Framework Used to Assess as they Relate to Development Path Barriers in the CFAS Process

Development Path Typology	Barrier	Source
Political Development Paths	Lack of political importance of climate change adaptation	Burch (2009)
	Job descriptions	
	Lack of collaboration opportunities	
	Political risk perception	Additions based on general tenets in development path literature
	The political cycle	
	Previous political decisions constraining future choices	
	The policy cycle	Everett (2003)
	Institutional culture	Burch (2009)
	Trust in leadership at an institutional level	Moser and Ekstrom (2010)
Policymaking Development Paths	Regulatory challenges	Burch (2009)
	Inadequate communication and/or information	Moser and Ekstrom (2010)
	Lack of resources	Moser and Ekstrom (2010)
Public values and beliefs	Attachment to place	Siders (2019)
	Public risk perception (moral hazard; familiarity with hazards; psychological distancing)	Stone (2006); Dachary-Bernard et al. (2019)
	Reponses to climate change are impractical for stakeholders	Blake (1999)
	Anchoring bias	Lieske et al. (2014)
Social Context	Economic and demographic context (older age and wealth)	Siders (2019); Slovic. et al (2007)
	Media	Siders (2019)
	Personal responsibility for climate action not embedded in social systems	Blake (1999)

Chapter 3. Methods and Research Design

3.1. Overview

My research aimed to delineate the chronological narrative of the Coastal Flood Adaptation Strategy (CFAS) engagement process in Crescent Beach from project inception, to engagement sessions, to Final Strategy document. The research worked to identify the main political, planning, and behavioural barriers to adopting managed retreat in this particular case through posing the question: in terms of plan and policy priorities, how did managed retreat move from an 'emerging direction' for flood management in Crescent Beach to being removed as a viable option from the Coastal Flood Adaptation Strategy? This is a study of local climate change policy development, and as illustrated by Burch (2009) in her study of the relationship between capacity and climate policy action in the Lower Mainland, the case at hand demonstrates that the barriers to change (both from a development path and behavioural lens) are also the roots of a city's climate response capacity. Understanding what these barriers are in a city is a first step toward embedding policy changes that support transformative change and build resilience, and helps highlight the factors that convolute and complicate seemingly rational policy development processes. Ultimately, through my study, building the full narrative of the CFAS process and identifying development path and behavioural motivation barriers to transformative, bounce-forward resilience, I sought to assess policy, process, social conditions and other interventions or factors (be they political timing, stakeholder values, etc.) in the CFAS process that may have led to managed retreat being adopted as the long-term strategic adaptation measure for Crescent Beach. These factors represent development paths and behavioural motivations to climate action, described in Chapter 2. I argue that this account of the CFAS process and outcome offers lessons for other municipalities seeking to enact climate change and urban resilience policy and plans. These lessons are particular warnings for the intentions of climate change and urban resilience policy presented in the climate change resilience literature as transformative: towards a bounce-forward, rather than bounce-back mentality.

I used a mixed methods approach, which relied specifically on primary (City plans, policies, newspaper reports) and secondary (consultant reports about particular

events or processes) document review to build an understanding of the CFAS context and process, and supplemented this document review with semi-structured key informant interviews from 1) Crescent Beach residents, 2) contractors/institutions who undertook work for the City or institutions as part of CFAS, and 3) City of Surrey staff. Through the semi-structured interviews, I looked to understand key milestones within the CFAS process or key perspectives or considerations for those involved that may have influenced the policy trajectory that were not documented in the materials available for public review. I coded these data according to a coding methodology delineated below and illustrated in Table 4, which helped me answer my research question.

My methodology is similar to what Saunders-Hastings et al. used to inform their 2020 report on “Planned Retreat Approaches to Support Resilience to Climate Change in Canada,” in both the use of document review to build a basic environmental scan for planned retreat in their study area of interest, and the utilization of key informant interviews. In terms of the key informant interview approach, Saunders-Hastings et al. only interviewed practitioners and researchers involved in executing planned retreat. For my case study, I thought only interviewing planning practitioners/City staff may miss values or perspectives centering around the issue of managed retreat that are not reported by the City, but may have played a part in the choice of the final strategy for Crescent Beach; for instance, values and risk perception of residents or other stakeholders who were involved in the CFAS process. In Burch’s description of turning barriers to climate action into opportunities for transformative change in British Columbia, she identifies “context” as a key barrier to local action on climate change planning, and defines context, in part, as “the values and priorities of the public” (2009, p. 291). The notion of embeddedness as described by Thompson-Dyck et al. (2016) also highlights the importance of values, norms, and relationships in steering climate action and resilience policy. In this way, public opinion and public values are important as the end result of a climate change planning process would be influenced by this social and behavioural context. Examples of behavioural motivations to climate action (such as values and risk perception) are further described in Chapter 2. Sometimes public opinion can be concealed, lost, or poorly translated from a public engagement session to its assessment as part of a policy process. In a review of managed retreat approaches in the United States, Siders emphasized the importance of psychological barriers to adopting managed retreat; identifying fear, optimism, place attachment, and a retreat

equals defeat mentality as resident based opposition to managed retreat (2019, p. 219). As part of my study, I wanted to explore directly from Crescent Beach residents how particular psychological or behavioural context factors (Siders 2019), values, or priorities (Burch, 2009) may have influenced their thoughts on managed retreat in their community. Although a values framework was developed by the City of Surrey as part of the CFAS policy process, and managed retreat ranked as the most viable long-term strategy using that values framework, the removal of managed retreat as the final adaptation strategy for Crescent Beach suggests that this values framework was not fully reflective of both the behavioural and social context in which this policy was development. Where residents were not supportive of managed retreat for Crescent Beach, I sought to identify undocumented or unaccounted for barriers to adopting managed retreat, or if they felt that managed retreat was appropriate, enablers or factors that led to them considering managed retreat an appropriate adaptation strategy for their community. In doing so, I strived to develop a better representation of both social context and individual behavioural motivations to climate action in Crescent Beach. I purposefully designed interview questions around interviewees' personal experience with flooding in Crescent Beach (in relation to the concept of risk perception; see Chapter 2), their assessment of hazards in their own community, and their level of engagement with the CFAS process (to better understand whether or not they were acquainted with the materials that the City presented).

3.2. Document Review

I reviewed documents to familiarize myself with the work that had been done by the City as part of the problem emergence, agenda setting, and consideration of policy options stages of the CFAS policy process. I sought specifically to:

- 1) Examine how the City communicated out progress about consideration of policy options (through media releases, corporate reports, and community engagement sessions); and
- 2) Identify existing citywide or neighbourhood-level policies or guidelines that could influence the outcome of the CFAS process, through the problem emergence and agenda setting stages of the policy process (i.e. sustainability policies, hazardous lands strategies, or zoning laws).

The document review stage helped me understand the context in which CFAS was being developed, and allowed me to build a narrative of the way that the strategy developed over time. The narrative I developed through document review was what I needed to start narrowing down what aspects of the story were actually missing from the documents that I had read through; were there gaps in the story or certain decisions that seemed unclear or not well documented? Because the intention of CFAS was that it was transparent to the public (EPI et al., 2016), whether those seeking documentation and decision-making criteria were directly involved in the consultation or not, through document review, any gaps in the CFAS storyline became reasonably clear. Examples of these gaps include decisions made that do not follow a logical sequence of events based on previous stages and results from the policy cycle, providing evidence of the role development paths or residents' risk perception may have played in the policy process. In order to find related municipal documents, I first searched the City of Surrey website using the key words "Crescent Beach CFAS", which generated four search result pages; CFAS Background and Resources, Coastal Flood Adaptation Strategy, Surrey's Coastal Floodplain, and Water, Drainage and Sewer. The CFAS Background and Resources page contains a public repository in chronological order of CFAS and non-CFAS-specific documents as they pertain to Crescent Beach, and the remaining web pages delineate different CFAS-related projects as well as other relevant policies relating to coastal flooding. I reviewed all documents on these web pages (some were less relevant to my study than others; relevant documents provided in Table 5). Through this search, I also noticed other corporate reports or other policies/non-municipal documents such as provincial guidelines for planning for sea level rise, so using a snowball method from my initial municipal search, examined these other relevant documents (see Table 5 for summarized list, and Appendix for full list).

The documents produced by the City of Surrey: Coastal Flood Adaptation Strategy (CFAS) Primers Parts 1 & 2, the Engagement Report Phases 1-3, and the Final CFAS Document, all provided a helpful narrative of the CFAS process from start to finish. I was also able to obtain the CFAS Media and Communications Framework, the Draft Decision Framework, and the Draft Engagement Framework. These documents were all used to understand how decisions were made as part of CFAS and how stakeholders were consulted (see Table 5). I also supplemented the City's documents with the Crescent Beach Property Owners' Association meeting minutes as this group

was identified in my initial document review as being participants in the CFAS engagement process. I suspected they may have additional records of meeting with the City about CFAS (see Table 5). The Association was quite involved in the CFAS process and remains active in terms of their participation in many things that happen in the Crescent Beach community (personal communication, 2021). A record of meetings was kept on the Association's website, including meetings they had with the City to express their concerns and interests in CFAS, so these meeting records provided a good supplement to the City reports and helped to validate some of the sentiments from the workshops (i.e. support or opposition of managed retreat) that were reported out by the City. The City of Surrey also held a repository of documents related to the CFAS process outside of these main reference sources listed above on an online portal which allowed users to download the documents (CFAS Background and Resources webpage mentioned above). The repository of documents online included materials presented at each of the CFAS engagement workshops. This webpage formed a basis for my document review as well. Through this repository, I created a timeline of significant events that were part of the CFAS process (see Fig. 5). The significant events that I documented in the timeline mainly took the form of engagement sessions, and reports that led up to the creation of the final CFAS document. Additionally, I analyzed several newspaper articles and City of Surrey media releases/corporate reports that were published near the time the final adaptation strategy for Crescent Beach was being chosen (see Table 5). Lastly, through my document review, I was able to parse out what policies were related to CFAS. Through this, I created a policy linkages diagram to better understand which existing City policies, both at a city and neighbourhood-scale helped inform CFAS and potentially influenced its outcome (see Fig. 4).

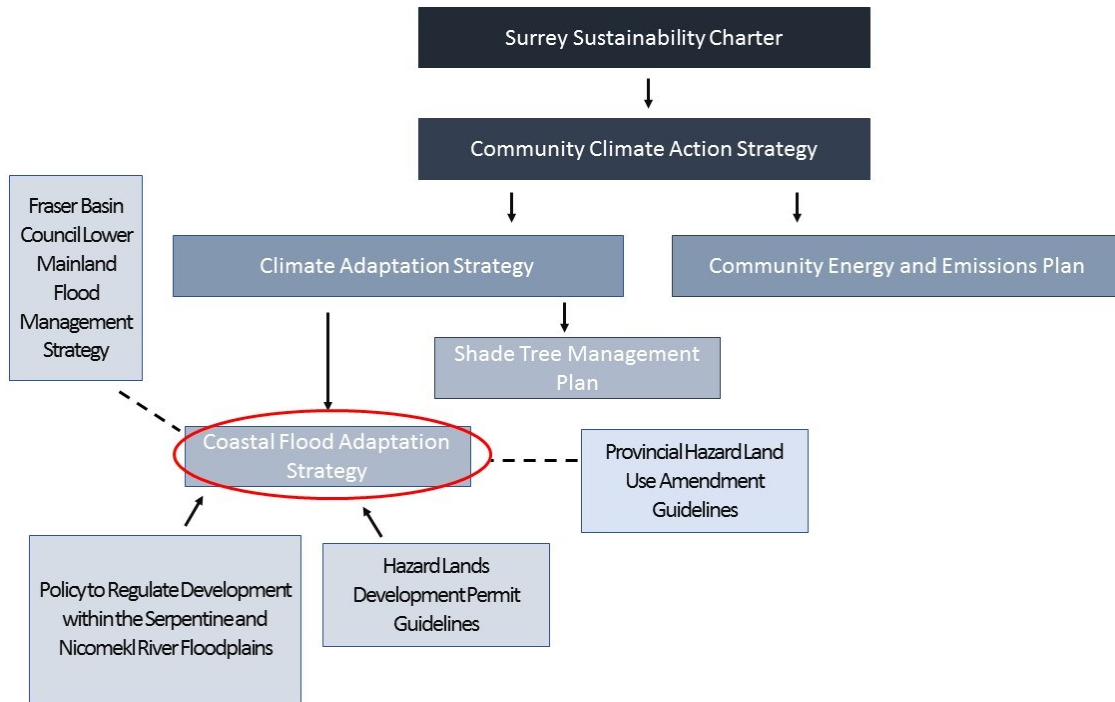


Figure 4: Policy Linkages Tree for CFAS Process
 Solid line indicates direct policy linkage, hatched line indicates indirect policy linkage.

Table 5: Summary of Key Primary and Secondary Documents Relevant to the CFAS Policy Process

Document	Category	Description	Date
Policy O-28: Development Variance Permit – Crescent Beach	Primary document, City of Surrey	Allows for expedited development permit process to build below FCLs.	1992
Crescent Beach Climate Adaptation Strategy Addressing Drainage Concerns (Corporate Report No. R033)	Primary document, City of Surrey	Report to council discusses ongoing drainage issues for properties in Crescent Beach and discusses a longer term climate adaptation strategy.	Mar-09
Crescent Beach Climate Change Adaptation Study (USL Project No. 1072.0159.01)	Secondary consultant report	Drainage study is cited in R033 and highlights the vulnerability of flooding infrastructure in Crescent Beach.	Jun-09
The Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use	Primary document, Provincial Government	Recommends planning for at least 1m of sea level rise and highlights recommended dike heights.	Jan-11
Serpentine, Nicomekl & Campbell Rivers—Climate Change Floodplain Review (Final Report No. 300014)	Secondary consultant report	Highlights deficiencies in dike heights in Crescent Beach and surrounding areas.	Dec-12
The City of Surrey Climate Adaptation Strategy	Primary document, City of Surrey	Highlights several flooding hazards as high risk related to the Crescent Beach area.	Nov-13
Proposed Amendments to the Provincial Flood Hazard Area Land Use Management – City of Surrey Comments (Corporate Report No. R167)	Primary document, City of Surrey	Highlights deficiencies in current City policy as compared to new provincial guidelines.	Sep-14
Development of a Surrey Coastal Flood Protection Strategy (Corporate Report No. R034)	Primary document, City of Surrey	Recommends development of a Coastal Flood Adaptation Strategy, which is approved by Council in the same month.	Feb-16
City of Surrey: Coastal Flood Adaptation Strategy (CFAS) Primer Part 1: Coastal Flooding in Surrey	Primary document, City of Surrey	Describes current approaches to flood management in the area as well as flood risks.	N/A
Surrey Coastal Flood Adaptation Strategy: Crescent Beach Options Selection Workshop	Secondary consultant report	Managed retreat is still presented as a viable option in terms of flood management.	Feb-18
City of Surrey: Coastal Flood Adaptation Strategy (CFAS) Primer Part 2: Crescent Beach	Primary document, City of Surrey	Describes short-listed flood management options. Managed retreat is ranked as number one in terms of risk versus cost versus community values.	Apr-18

Surrey Coastal Flood Adaptation Strategy. Phases 2 and 3 Open House	Primary document, City of Surrey	Managed retreat is still presented as a viable option in terms of flood management.	Apr-18
B.C. cities debating bold moves to cope with rising sea levels	Newspaper article	Managed retreat is labelled as the emerging direction by the City for flood management for Crescent Beach.	May-18
Buying out 400 Crescent Beach homes an option for Surrey as sea levels rise	Newspaper article	Managed retreat is labelled as the emerging direction by the City for flood management for Crescent Beach.	May-18
Surrey mulls relocating 400 Crescent homes in decades to come	Newspaper article	Managed retreat is described as having received the most support from Surrey residents through online surveys and public consultation sessions	Jun-18
Crescent Beach Property Owners' Association Meeting Minutes July 2018	Primary document, external organization	City staff meet with Crescent Beach Property Owner's Association (CBPOA), who raise concern about emerging direction of managed retreat. Managed retreat discussed as not City's intention despite recent comments in media. Some members of CBPOA threaten legal action against the City.	Jul-18
Crescent Beach Property Owners' Association Meeting Minutes August 2018	Primary document, external organization	Staff meet with Crescent Beach Property Owner's Association and announce City will remove managed retreat as an option from the CFAS.	Aug-18
Update: Coastal Flood Adaptation Strategy	Primary document, City of Surrey	City press release announces City will no longer consider managed retreat for Crescent Beach in the CFAS Final Strategy document and it will be removed as an option.	Aug-18
Coastal Flood Adaptation Strategy Engagement Report Phases 1-3	Secondary consultant report	Engagement report highlights managed retreat as preferred adaptation option for Crescent Beach according to City of Surrey survey.	Sep-18
Development of a Surrey Coastal Flood Adaptation Strategy 2018 Year End Update and Disaster Mitigation Adaptation Fund Status (Council Report No. R021)	Primary document, City of Surrey	Highlights to council the City will no longer consider managed retreat for Crescent Beach in the CFAS Final Strategy document and it will be removed as an option.	Feb-19
Coastal Flood Adaptation Strategy (CFAS)	Primary document, City of Surrey	Expanded edge/raising the dikes chosen as long term strategy for Crescent Beach.	Nov-19

Crescent Beach Neighbourhood Zoning - Response to Higher Flood Construction Levels (Council Report No. R060)	Primary document, City of Surrey	Recommends rescinding Policy O-28: Development Variance Permit – Crescent Beach, in light of the work done as part of CFAS. Recommends revisiting zoning requirements for Crescent Beach to push for more flood resilient construction. Motion passes.	Apr-20
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All of these documents together provided a storyline of what engagement sessions occurred, what was being reported out by the City to residents, and results from various City surveys (included in the City’s Engagement Report) about preferred adaptation strategies for the area. The overall transparency of most of the CFAS process; i.e. public access to the materials shared, and the published engagement survey results is consistent with the City’s objectives as part of the communication and engagement principles in the Media and Communications Framework in that, “Communication between the project planning team and stakeholders will be timely, responsive, transparent, collaborative, and provide opportunities for the engagement of the community, stakeholder groups, and the community at large at each of the five project phases” (2016, p. 8).

The narrative appeared incomplete, however, based solely on document review. There were no clear indicators in my document review that suggested that removal of managed retreat for Crescent Beach may be the direction that the City was headed in terms of decision-making; especially nearing publication of the final document. Little was said about the removal of managed retreat, outside of a media release from the City of Surrey which stated:

In response to additional feedback from directly impacted stakeholders from Crescent Beach the Managed Retreat option is being removed from the Crescent Beach study area. No further analysis will be conducted on this option and it will not be recommended by staff in the draft Coastal Flood Adaptation Strategy (CFAS) to be brought forward in spring 2019 (the City of Surrey, 2018)

Illustrating why this gap may have been present (but not why the option was removed), in a commissioned report by Natural Resources Canada on municipalities’ approaches to managed retreat discussions stated that, “Even in situations such [as CFAS] where all relevant resources were made available online in a single space, the

affected population sought less transparency, via ‘behind closed doors’ discussions,” (Saunders-Hastings et al. 2020, p. 43). Building on the idea that there may also these behind closed-door discussions happening in parallel to the published CFAS consultation work – hinted at through the City’s press release which described managed retreat was removed based on “additional feedback from directly impacted stakeholders” (2018) – I had to look beyond what was actually published publicly. I wanted to determine what happened, in terms of whether there were these ‘behind closed doors’ discussions’ and other potential causal factors such as values, psychological, regulatory or structural barriers, between the clear narrative provided by the City up until the Final Strategy document was released; reporting out on all of the engagement sessions and the preferred options, and the release of the CFAS Final Strategy document, and why there seemed to be such a disconnect between the published findings from previous years of engagement and what ended up being chosen. The gaps discovered during my document review linked my findings to my conceptual framework; with the intention of revealing how development paths and individual behavioural motivations such as risk perception steered the trajectory of CFAS in ways for which the rational policy cycle process did not account. This helped me pick out broad themes within the CFAS process that may have been barriers to adopting managed retreat, to supplement or inform what I sought to find out through further research.

3.3. Rationale and Interview Design

It became apparent through my document review that I needed to know more about CFAS from both the City and affected stakeholders than what was provided solely in published documents in order to answer my research question. Burch (2009) labels some of the barriers to transformative change in communities as structural or operational in nature, regulatory, or contextual (value systems or priorities of the public). Siders (2019) identifies psychological barriers to adopting managed retreat; pinpointing specifically fear, optimism, place attachment, and a retreat equals defeat mentality as resident based opposition to managed retreat (2019, p. 21). I used broad classifications of “development path typology” to characterize some of these barriers, as described in the Chapter 2. In addition to describing how these barriers related to or did not relate to my case study, I sought to find out if there were additional, undocumented factors at a municipal or other government level that may have influenced the outcome of the CFAS

process. Based on the findings of both Burch (2009) and Siders (2019), who stressed the importance of residents' values and priorities in adopting transformative change or managed retreat, and Smith et al.'s recognition of the importance of human behavioural motivators in reorienting policy trajectories, I knew that key informant interviews would be the appropriate next step for my study to account for the range of factors that complicate and convolute rational policy cycle processes. I interviewed 2 consultants/members of an external organization involved in the CFAS process, 4 Crescent Beach community members, and 2 City of Surrey staff, and 1 other confidential informant (n=9, see Table 6 below). I used a purposive sampling method. The document review I had completed informed who I contacted at the City of Surrey to be an interviewee, with some snowball sampling incorporated. I also researched who had done consulting work with the City on the CFAS project, through review of primary and secondary documents, and reached out to them. Through my document review, I noticed the Crescent Beach Property Owners' Association (CBPOA) was quite involved in the CFAS workshops and engagement sessions, and conducted some community outreach on behalf of the City. I contacted the CBPOA and they provided three volunteers to participate in interviews. I contacted an additional participant through a personal acquaintance.

Overall, through my sampling method, I tried to approach my research question from different angles (not just the City's perspective; not just a consultant's perspective, and not just the residents' perspective) given there was not just one party that determined the trajectory of the CFAS process. I wanted to hear different views of how the CFAS process progressed over time, and what some of the catalytic events, according to different parties, were that led to managed retreat being removed from the final CFAS document, in order to understand the locus of the different barriers to adopting managed retreat.

Table 6: List and Rationale of Key Informant Interviewees

Interviewee Type	Rationale	Number of Participants
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Crescent Beach Residents	Crescent Beach residents may have particular priorities and values (see Burch, 2009 or Siders, 2019) that contribute to their support or opposition of managed retreat. These priorities or values may be more difficult to ascertain from City-published documentation versus inquiring directly. The City also stated that conversations with affected stakeholders influenced their decision to remove managed retreat from the Final Strategy document (the City of Surrey, 2018).	4
City of Surrey Staff	I interviewed City staff involved in CFAS who I identified through document review. I sought to discover more about what they learned about consulting on managed retreat through the CFAS engagement process, what they perceived to be residents' values, and what they identified that could have been barriers to managed retreat being adopted for Crescent Beach.	2
Consulting Firms/Institutions Who Partook in CFAS Consultation	I interviewed two parties involved in the CFAS engagement process and/or document development, but not affiliated with either residents or the City. I looked to round out the perspectives represented through my study and also hoped these participants would provide potentially more objective views of the process given they were not directly implicated by the decisions.	2
Confidential Contributor	One other individual was identified through my document review as a key contributor to CFAS. This person asked to keep their affiliation confidential.	1

I used semi-structured interview questions to allow for flexibility in terms of interviewee responses (i.e. a more open structure than a survey with set response options). Semi-structured interviews felt like a good balance of allowing interviewees to tell me about their experiences in CFAS or their values through the process in an open, dynamic manner and potentially uncover things that I had not considered while developing my interview questions, and also allowed me to structure the questions in a way that led to concrete answers or evidence, based on the findings of existing literature, to support an answer to my research question. I used a deductive method to develop my coding strategy. Specifically, I coded my interview data according to the framework that I developed in my conceptual framework, which combines the Blake (1999) barrier framework, the Moser and Ekstrom (2010) barriers framework, and the Burch (2009) barriers framework, as well as Siders (2019) notion of attachment to place along with additional factors that are part of development path literature (political risk perception, the policy cycle) and provides connections between barriers and types of development paths. See Table 7 below for more on these barriers, and see Chapter 2 for more on how they were derived.

Table 7: Codes Used to Assess Interview Data

Development Path Typology	Codes
Political Development Paths	Political importance of adaptation
	Job descriptions
	Collaboration opportunities
	Political risk perception
	The political cycle
	The policy cycle
	Constraint of previous decisions
	Institutional culture
	Institutional leadership
Policymaking Development Paths	Regulatory challenges
	Inadequate communication and/or information
	Resources
Public values and beliefs	Attachment to place
	Public risk perception
	Anchoring bias
	Practicality
Social Context	Economic and demographic context (older age and wealth)
	Media

The interviews were conducted via Zoom instead of in-person due to COVID-19 precautions. Given the openness to participate via Zoom rather than telephone (which was also offered as an option), I assumed the participants were comfortable with the platform. No one specifically requested to meet in person. I provided a list of questions beforehand for all survey participants so they could have time to reflect beforehand on their experiences, given some of these workshops had taken place up to five years prior to the interview. The questions were tailored to the individual that was participating in the interview (i.e. a separate set of questions for City employees, Crescent Beach residents, external but affiliated groups etc.). I also provided a timeline of events that led up to the CFAS final document being published, including engagement sessions and important media articles (see Fig. 5). This timeline was intended to serve as a guide to participants so they could point to events at specific workshops, or point to specific pieces of media when answering their questions, and so that I could use their responses at the end of the session to create a more fulsome chronology of the steps that led up to managed retreat

being removed from the Final Strategy document. These steps (which may not be specific events in some cases but can also be community values or other key guiding principles) serve as the barriers that Burch and Siders describe. These steps in CFAS were uncovered through designing interview questions that asked about key catalysts in the policy process that residents, consultants or City staff identified that led up to the removal of managed retreat, and coding interview data allowed me to see where there were themes that were common amongst responses. The shortlisted steps, or barriers, that led up to the removal of managed retreat from the CFAS Final Strategy document are described in Chapter 4. One set of interviews was conducted with participants, which ranged from about 45 mins to 1.5 hours. Some email follow-up was done if further clarification on responses was required, but generally I tried to keep the interviews to be low commitment for the participants. I did not provide any incentives for participation. Transcription and coding, according to the coding strategy in Table 7 was conducted after the interviews.

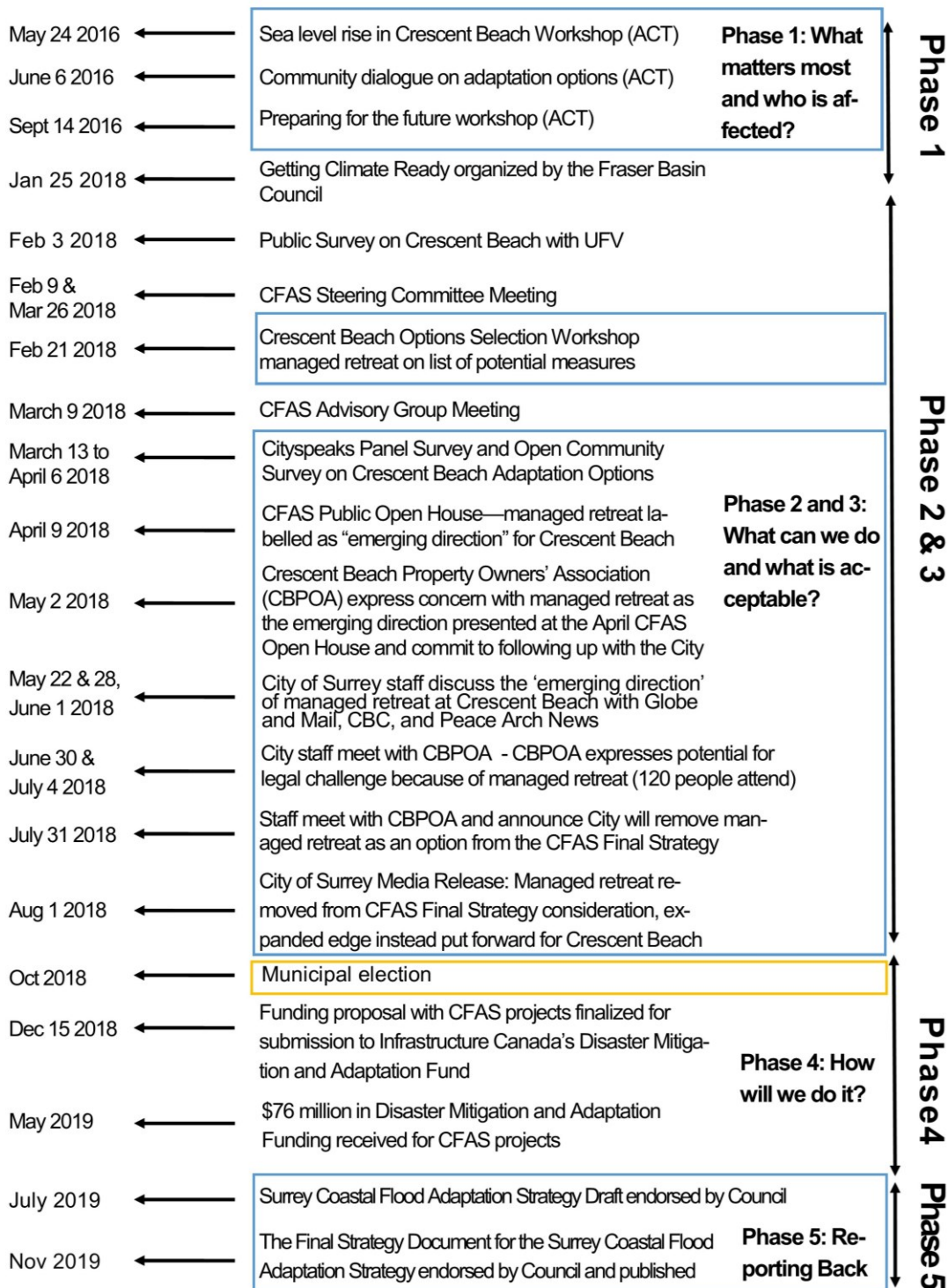


Figure 5: Timeline of Events Leading Up to the CFAS Final Strategy document
 Blue Boxes Representing Key Events During CFAS Process, Yellow Representing Municipal Election

3.4. Limitations

I was able to conduct interviews with 9 participants due to the nature of the length of the Urban Studies final project and limitations in terms of my own personal time and money. There are limitations to my study in terms of whose voices are represented in my thesis being from groups whom I identified as playing key roles in CFAS through my document review and through aspects of snowball sampling, and only those who agreed to speak with me. That being said, I interviewed residents who were both in favour of managed retreat for their community and against it, which represents the two particular factions that were involved in the CFAS process as I found out through subsequent interviews with staff involved in CFAS. Although my sample size is small, I did get a variety of answers from a variety of groups; the City, external consultants, and affected residents, which I feel are a valid representation of the array of views held about the CFAS process. There may be other limitations or considerations I am unaware of that are not represented in this thesis, or other factors I may not be able to assess; including the fact that those willing to speak with me may have stronger opinions than the other participants in CFAS, given they were willing to share their views —the degree to which this is true I may not be able to assess within the scope of this study. That being said, the intent of the study is not to represent the CFAS process as a definitive whole; the intent of my study is to find the key events that led up to managed retreat being removed from the final CFAS document, and to find out why there was seemingly a mismatch between the City's emerging direction. Parsing out some of the key events and some of the themes that came out in literature and in my interviews gives insight into the prevailing issues or considerations that forged the direction of CFAS; and even through a small sample size I was able to uncover these key events, issues, and considerations.

Chapter 4. Findings

4.1. Introduction and Structure

The following sections describe the results of the original research including semi-structured interviews with key City of Surrey staff, consultant groups, a confidential participant, and Crescent Beach residents. As described in sections 3.1 to 3.5, I sought to understand key milestones within the CFAS process, key perspectives or considerations that may have influenced the policy trajectory that were not documented in the materials available for public review. I discuss why managed retreat was initially considered the emerging direction for Crescent Beach. Subsequently I organize the remainder of the findings section into key events, milestones, or processes that influenced the CFAS outcome, as determined by the suite of interviews I conducted and the subsequent coding process I undertook to inform this study. The key events, milestones, and processes that influenced the CFAS outcome are described below:

1. The West Coast Environmental Law, Adaptation to Climate Change Team from Simon Fraser University, and Ideospace-led workshop and its role in building a protection bias in Crescent Beach (May to September 2016);
2. CFAS Open House for Phases 2 and 3 and its presentation of managed retreat as the emerging direction for Crescent Beach (April 2018);
3. Several media articles covering managed retreat as the emerging direction for Crescent Beach (May 2018)
4. Meeting between the City and the Crescent Beach Property Owners' Association (July 4th, 2018);
5. An imminent municipal election and role of politicians near the decision-making stage of the CFAS policy process (2018); and
6. Meeting between the City and the Crescent Beach Property Owners' Association (July 31st, 2018).

I discuss these key events, milestones, and processes within relevant development path contexts in Crescent Beach, linking them to my conceptual framework. In doing so, I describe the broader challenges that have been identified with in planning practice as these challenges relate to long-term resilience building and climate action.

At the end of this section, I provide a summary of the barriers described within my conceptual framework that were relevant to this case study. I then characterize the development path context that shaped the CFAS policy process in Crescent Beach, through evidence uncovered in my document review and interviews.

4.2. How Managed Retreat Was Selected as the Emerging Direction

According to City of Surrey staff members I interviewed, managed retreat was actually the preferred option for Crescent Beach in the draft Final Strategy document, in addition to being labelled the emerging direction at the CFAS Open House in April 2018 (one of the final large public engagement sessions before publishing the CFAS Final Strategy document). Leading up to that choice, the City assessed many different factors including the cost of building the infrastructure and the cost of maintenance or enhancements as sea levels continue to rise (pers comm. 2021). According to City staff, the City used the community values criteria that were collected as part of the CFAS engagement process and weighed the shortlisted options against those values criteria. They found that in pursuing any of the protection-oriented strategies such as raising the dikes or building other structural barriers to prevent flooding, the values framework indicators across most categories were lower as compared to pursuing managed retreat. As described by City staff:

In pursuing protection-oriented flood management strategies at Crescent Beach, environmental values would be degraded because of coastal squeeze. From an infrastructural perspective, depending on man-made structures that are subject to failure could result in failure that is catastrophic in nature. That was one of the things we considered. From an economic perspective, to build any of the protection-oriented options would be extremely expensive and you would have to continue building higher and higher. And failure again is a huge risk. From the recreational values perspective, residents have lost contact with the coast because of these large, structural protection measures, reducing recreational opportunities. There is a huge cost and huge risk to the

public should that structure break in the future as well as a high cost to the rest of Surrey, with few gains in terms of the values criteria, and people living in Crescent Beach would lose the value of seeing the ocean. That's why we went with managed retreat as the preferred option.

These values criteria were intended to represent public values as part of CFAS. One could posit from this that if the climate adaptation strategy chosen was the highest ranked in terms of preservation of public values criteria, that would be the option that would be favoured by the community. In the case of CFAS, the option that preserved the highest values rankings across categories was managed retreat. The values criteria, however, were diffuse and representative of the values collected within the whole coastal floodplain so were broader than just the Crescent Beach community's concentrated values. Crescent Beach residents, directly affected by pursuing managed retreat, may place a higher value on avoiding resident displacement than other communities not affected by managed retreat. The importance of scale of consultation in flood adaptation planning is described by Dachary-Bernard et al. (2019). While waterfront residents who would be affected by relocation may not perceive the risks of staying rationally; displaying less concern about risks, residents not directly implicated by relocation but who may still have connections to the coast are generally more supportive of managed retreat and tend to have greater risk awareness (Dachary-Bernard et al., 2019, p. 778). In the case of Surrey, the broader city tax base fronts at least some of the costs of coastal adaptation, and thus offsets some of the costs of the moral hazard that Crescent Beach residents engage in when living on the waterfront (moral hazard is described in greater detail in Chapter 2). The citywide financial implications of flood adaptation decisions underline the importance of citywide participation in flood management planning. Stakeholders within the CFAS planning area as well as City of Surrey residents more generally weighed in on CFAS policy development. The tension in the values framework between the CFAS process as a whole and what Crescent Beach residents wanted for their community can likely be explained in part by the scale at which the CFAS planning process was conducted. Illustrating the collective nature and need to involve the broader public in decision-making, a consultant on the project stated:

It's not just a neighbourhood [problem]... climate change knows no borders, sea level rise knows no borders, at least along the coastline. And they are collective challenges. I think a values-based process can be used on for neighborhood level projects for sure... But a project of

this scale scope and magnitude, it can't just be Crescent Beach [residents that are involved].

A Crescent Beach resident also described the financial implications of moral hazard within their own community, stating:

People expect the government to assist in times of emergency, bailing out homeowners who build in unsafe areas, but they do not want to pay any more taxes. Where do they think the money is going to come from?

The resistance to relocate from the floodplain by directly affected residents is a policymaking barrier that requires careful consideration in terms of how different groups' opinions are weighted throughout the policy development process, with specific attention to how "any contradictions between the personal interests of...individuals, and the collective interest" present themselves (Dachary-Bernard et al., 2019, p. 773) especially in terms of longer-term resilience-building.

The values criteria as part of CFAS were also weighed against risk of failure of each flood management type. All of the structural protection measures had high risks if they were to fail. In terms of the CFAS engagement framework, "balance" was specifically noted as a key engagement principle. Within the engagement framework, balance was characterized as working to "acknowledge and understand the diverse needs and priorities that exist within the communities, and commit[ting] to balancing these with the interests of the wider community" (Northwest Hydraulic Consultants et al., 2016, p. 7). The values criteria, in their acknowledgement of overarching values of the entire coastal floodplain, do consider wider concerns, but in doing so, did not address the unique values of Crescent Beach residents, given their opposition to the highest ranked strategy.

According to a consultant who worked on the Final Strategy document and other CFAS materials, part of the choice to pursue managed retreat was also based on a citywide survey that was conducted on the shortlisted options (expanded edge, Mud Bay barrier, barrier island, managed retreat) (personal communication, 2021). According to the survey, managed retreat was the preferred option for all Surrey residents but was the second most preferred option for Crescent Beach residents. Choosing managed retreat in this case shows how the City sought to address principles outlined within the CFAS Engagement Framework, specifically through the principle of balance. The City illustrated how it attempted to balance the needs of a small community with the desires

of the rest of Surrey, given managed retreat was still the second-highest ranked option for respondents to the survey living in Crescent Beach. Illustrating the outcome of the citywide survey and also the principle of balance, a City of Surrey staff member remarked:

We were talking to Surrey at-large and other people in the floodplain, and there was a reticence from these groups to spend the amount of money required to protect, in a relative sense, only a few homes.

Another consideration, aside from public support, was the viability of managed retreat from a political perspective, given how different managed retreat was from protection-oriented approaches taken at Crescent Beach in the past and represented a significant shift in the way of thinking about adaptation at a municipal policymaking level. A confidential correspondent commented on the viability of the strategy of the time amongst decision-makers at the City. The correspondent remarked that:

...On the CBC, there was a National Radio Show that interviewed the mayor at that time, and she voluntarily talked about Crescent Beach and managed retreat and it was a very viable option. I think it had support at that level.

The combination of values criteria weighed against risk of failure of structural flood management strategies, the life-long costs of maintenance of structural measures, political support for managed retreat, and a general preference from other residents in Surrey to adopt managed retreat (and it still being ranked second in terms of preference by Crescent Beach residents) led the City of Surrey to choose managed retreat for Crescent Beach as the emerging direction in CFAS. Managed retreat, however, was met with a strong negative reaction by many Crescent Beach residents in subsequent weeks and months after the City identified it as the emerging direction. The following sections describe the six steps and milestones identified through my interviews that led up to managed retreat moving from the emerging direction for Crescent Beach to being removed from the Final Strategy document. These six steps and milestones begin to illustrate the disconnect between the policy chosen and the underlying development path and social context in Crescent Beach.

4.3. The West Coast Environmental Law, Adaptation to Climate Change Team, and Ideaspace-led workshop (May to September 2016)

From May to September of 2016, West Coast Environmental Law, the Adaptation to Climate Change Team from Simon Fraser University and Ideaspace Consulting, working with the City of Surrey, led workshops in Crescent Beach on potential responses to flood management for the community. This was part of Phase 1 of CFAS and some of the first engagement that was done with residents as part of CFAS. This community workshop series involved a charette with flood scenarios, where residents worked together to show how they would protect Crescent Beach from flooding using play dough and other miniature representations. This charette focussed specifically on protection-oriented options. Later in the CFAS Engagement Report prepared for the City of Surrey, which highlighted some of the key findings from the CFAS engagement process including lessons learned, it was noted that:

Project outreach started with the Crescent Beach community meeting series which included a design charrette...focused on the 'protection' adaptation pathway...While facilitators and City staff were careful to let participants know that their work was purely exploratory in one of several adaptation pathways, it resulted in a bias towards protection for the community (Northwest Hydraulic Consultants et al., 2018, p. 14).

As part of my interviews, I sought to discover the rationale behind only focussing on protect adaptation measures as part of the community charette and the effect that may have had on the CFAS process and the general aversion to managed retreat in the community. Concerning the community charette and the focus on solely structural or protection-oriented flood management strategies, a confidential correspondent stated that:

This was back in late 2015 when the City was planning this, and started work in the community in 2016, and at that time they were quite worried about just even talking about climate change...and they thought it would be safer to not have anything controversial at the start... because if things derailed at the start, it would have affected the whole Coastal Flood Adaptation Strategy. [They] deliberately started with a small scope. It was almost like that was the pilot phase in Crescent Beach.

The correspondent agreed that the protection-focussed approach in the beginning led to the community expecting implementation of protection measures as a result of the CFAS policy process, stating that:

They deliberately avoided managed retreat in those initial workshops which actually sort of introduced a bias against managed retreat because initially they went out to the community talking about protection, and then that made it harder for the discussion to go to retreat later.

Despite the bias it introduced, the benefits of the focus on only protection-oriented strategies at the early stage of engagement were highlighted by a consulting firm, stating that:

...[The community charette] did make it very tangible. People had the maps with acetate on top of the flood levels....they got really into the process, 'oh, but if we built the breakwater here instead of [there]; what would that look like?' They could kind of visualize it a bit better... for instance, if you're in 2100, the sea level will rise this much [which is] really hard to sort of put your mind around. So I think that exercise had a lot of benefits in that it made it feel more real to people, but it may have [introduced a bias]. I don't think that it was a decision to try to skew the conversation to focus just on protect responses...and how do you do that same type of energizing activity for something like managed retreat? I'm sure there are many ideas of how to do that...I just don't know them, but it would be harder. Because you can't just say where do you want your house to go on the map? It might be an exercise like: if you had to move more inland, what would you lose?

One of the challenges of engaging on managed retreat as a flood management policy option is illustrated by the above quote. Translating managed retreat to a visioning exercise in the same, tangible, participatory way as the structural flood adaptation option exercise would be challenging. Managed retreat forces residents to confront the uncomfortable reality that behavioural change and ways of life as we know them are challenged by climate change. Our familiarity with structural flood management measures brings a sense of comfort and predictability and suggests that life does not have to change significantly in the wake of climate change. The costs to residents from a practicality perspective are much lower for structural flood protection measures, where little to no behavioural change is required, as compared to managed retreat, where a costly, wholesale relocation would be required. Practicality costs being high was identified as a behavioural barrier to climate action, as posited by Blake (1999) and described in Chapter 2. Additionally, leaning on familiar, protection-oriented flood

protection measures as a basis for forming judgments of what *should* happen in the future reflects the concept of anchoring bias, where humans tend to filter information based on what happened in the past (Kahneman et al., 2017; Thaler & Sunstein, 2009). Illustrating the concept of anchoring bias as it relates to the continuation of investment in structural flood adaptation measures at Crescent Beach, a confidential correspondent stated:

There have been many cycles of flood investment [at Crescent Beach] that have reiterated the need or, rather expectation that as the threat [of flooding] increases, further investment will be made to the community to protect them. So that's the expectation that's been set up...and it's hard to change that perception, right?

In the way that the community charette series engaged only on structural or protection-oriented flood management strategies, it may have re-iterated or reinforced an existing anchoring bias centring around the expectation that the City pursue protection-oriented flood management approaches, rather than look to alternatives such as managed retreat during the CFAS process. The community charette series illustrates the way anchoring bias manifested itself as an aspect within public values and beliefs during the CFAS process, and served as a barrier to transformative conceptualizations of resilience. Anchoring bias acted as a constraining factor to the types of flood management strategies the City felt they could effectively consult on with the public, and thus steered policy directions toward familiar or known approaches. Although the City could have set the stage in a more publicly contentious manner, introducing managed retreat as part of these workshops, as described above, there is a chance it may not have been received well by the public given the protection bias had already been set up with previous structural flood control investments. In this way, the development path in Surrey through previous political decisions to invest in flood protection in Crescent Beach set up “social” or “public values-based” lock-in of existing and familiar flood management policies.

Another consultant illustrated the protection bias that was introduced as part of the community charette series, stating:

There was a charette...And it was great, but it wasn't very grounded technically. So some of the [solutions] that they came to were like, we'll build offshore islands and there will be habitat islands. We can paddle out to them. It'll be great and that will address the issue. And that really stuck. And it took a while for people to realize that [barrier islands are]

not going protect land because [they] would [not] help attenuate or reduce wave action [in the context of sea level rise] and stuff like that. And in storms. But it took a while to move past that. But there were some people who to the end who stuck with it. I know that we certainly didn't reach everybody, and I don't think any process can.

Within sustainable development there is an expectation that “economic, social and environmental sustainability all correlate” creating a “triple bottom line” or positive sum game (Holden et al., 2016, p. 299). As opposed to sustainable development, within bounce-forward conceptualizations of resilience, the positive sum game or triple bottom line is not emphasized in the same way. Bounce-forward or transformative resilience requires significant change to dominant assumptions about the way we live our lives, and using status-quo lifestyles and consumption practices to situate what the win-win-win solutions are runs contrary to what bounce-forward resilience really calls for; which is the transformative potential of cities. As long as the benefits of adopting bounce-forward conceptualizations are rooted in our understanding of status-quo here and now, there will often be ongoing tension between what transformative resilience requires and current frames of reference from a public values perspective. Transformative resilience is not always win-win-win when rooted in static frames of reference.

One resident I interviewed also mentioned the offshore islands option, and the residents' commentary served as a case-in-point to the challenges described above by the consultant regarding offshore islands. This quote illustrates residents' focus on perceived benefits or positive sum game of offshore islands as a flood management approach:

I think I gave a more optimistic perspective and...environmentally pleasing perspective: I'd rather do a barrier island. That was my favorite because it creates a place for people to go and creatures to be. And I mean... I think it works for everyone. It's not stopping things. It's creating a distance between where those waves break and your home.... So the waves would break up over there, and I'm sure many houses there would prefer that to having berms built up and built up [because] they can't see anything after a while.

The consultant, above, argues that offshore islands would not do enough from a sea level rise perspective to be effective as a flood management strategy at Crescent Beach, and although the resident suggests there are benefits that go along with offshore islands, as an actual flood protection strategy, it is argued to be not as effective as what

is needed. In this way, offshore islands do not have the same positive sum game that they are perceived to have.

Another challenge of the expectations that the charette series set up on a community level are described by a confidential correspondent. This individual stated that they were aware of one resident who attended the charettes and assumed that the City was solely pursuing protection adaptation measures because these were the only types of flood management strategies that were discussed during the charette series. This resident disengaged from the CFAS process as it appeared to match their expectations that the City would continue looking at structural or protection-oriented flood management strategies at Crescent Beach as they had in the past, and then the resident was surprised to hear that managed retreat was being explored as the emerging direction near the end of the process. The confidential correspondent, however, remarked that it may have been only a small proportion of people who disengaged because of the charette series, assuming the City would protect them. The correspondent felt that this small group was not necessarily a key cohort that could have been engaged otherwise and necessarily changed the course of the community being very angry about managed retreat being pursued. Illustrating this point, the correspondent stated:

The City may have lost some of the audience who may have otherwise come to the idea that managed retreat was acceptable. Maybe it played a 5% role in the community....but the key role for it being dropped was not the neutral 5%. There was a faction of residents who were very much against it and I don't think that would have changed had there not been the charette series.

This quote illustrates that even though the charette series set up protection bias, and illustrated how anchoring bias manifested itself in the CFAS process, there was significant community resistance to managed retreat as an approach regardless of the way that the charette series was designed. Managed retreat was misaligned with dominant values and beliefs in the community, the implications of which I go into greater detail in Chapter 5.

In summary, the charette series did play a role in advancing protection bias in the Crescent Beach community and built expectations around pursuing a protect strategy for Crescent Beach as part of CFAS. It is difficult to say concretely, however, whether the design of the charette series in the way that it introduced protection bias would have

changed the outcome of the CFAS process given the group in Crescent Beach that was so strongly opposed to managed retreat. As stated by the confidential correspondent, it is unlikely this strongly opposed group would have changed their minds had the notion of not protecting Crescent Beach been introduced through a workshop. Previous policy decisions to protect Crescent Beach from flooding bolstered a system of public values and beliefs that steered preferences towards protect-oriented strategies which is likely what formed the strongest opinions on protecting Crescent Beach, with some augmenting effect from the choices made in designing the charette series. Counter to its drawbacks in introducing protection bias in some capacity, the series also provided benefits as it engaged the community in an active and tangible manner.

In terms of barrier classifications, as they relate to the conceptual framework, the specific type of barrier illustrated through this example is both a communication and information barrier in policymaking as described by Moser and Ekstrom (2010) as well as public values and beliefs in terms of anchoring bias, with this anchoring bias being affirmed through previous political decisions to protect Crescent Beach. Recall communication barriers relate to quality and conveyance of information to decision-makers and the public as part of the climate change planning policymaking process. In this particular example, purposeful selection was done by the City to not introduce concepts such as managed retreat at the beginning of the policy process. A confidential correspondent provided the justification that introducing a controversial measure such as managed retreat right at the beginning, before building relationships and knowledge bases with stakeholders, may have caused the process to derail entirely. Although this justification makes sense, filtering information going out to residents through focussing on protection created a situation where residents were searching for solutions that were positive sum games, and this made it difficult to approach more challenging and arguably less immediately desirable flood management strategies such as managed retreat. On a broader and more pervasive scale, public values and beliefs rooted in Crescent Beach continuing to be protected because of previous political decisions to do so far prior to CFAS, contributed to protection biases in the CFAS process.

4.4. CFAS Open House for Phases 2 and 3 (April 2018)

The City of Surrey put on an Open House in April 2018 to display the results from CFAS community consultation and their own structured decision-making process over

the course of phases 2 and 3 of the CFAS policy process. The Open House was held at the Rotary Field House in South Surrey. At this Open House, managed retreat was presented as the emerging direction for Crescent Beach. Managed retreat became the emerging direction for reasons indicated in section 4.2. In the Crescent Beach Owners' Association (CBPOA) meeting minutes from May 2018, a member of the Association noted that they had attended the CFAS Open House and were concerned that managed retreat had been presented as the emerging direction for Crescent Beach (2018a). This CBPOA member felt that the survey results for adaptation option preferences (i.e. managed retreat) that were displayed at the Open House did not align with a Crescent Beach's preference for a protection-oriented strategy, nor did they feel that the outcome of managed retreat reflected what any of the City's surveys, displayed at the Field House, depicted.

Similar to the situation noted above that outlined the perceived discrepancy between managed retreat as the emerging direction for Crescent Beach and what residents believed the community's preferences were (i.e. not managed retreat), during my interviews, a resident noted that:

Not that I know everybody down in Crescent Beach by any means, but...Surrey did put on a thing at the Rotary Field House to display all their results. And to the best of my knowledge, I didn't see anybody else from Crescent Beach. And I came home from that a little hot under the collar... You had to put down whether you were a Crescent Beach resident or a Surrey resident. At the Field House, there were all kinds of charts up with graphs and you know, this is what the residents wanted and this is what Surrey wanted...but I remembered saying, you know, guys, this is wrong because the graph showed, this is what the residents were in favour of. And you're saying it was the other one. Well, you know, you did the graphs. It wasn't like I did them and made a mistake.

Managed retreat as part of the citywide survey was the second-highest ranked option for Crescent Beach residents, and highest ranked for the City of Surrey as a whole as described in the CFAS Engagement Report. Its ranking in positions one and two was why it was presented as the emerging direction (City of Surrey Staff, personal communication, 2021). The results of this survey, however, with managed retreat ranking second, were not what residents felt actually represented viewpoints in Crescent Beach nor would have illustrated on their own why managed retreat was chosen as the emerging direction. No option was ranked as the first choice for both City of Surrey and Crescent Beach residents, so there would be trade-offs for either residents or the

broader tax base regardless of the option that was chosen. As described in Chapter 2, there can often be differences in what the broader tax-base values as part of discussions surrounding managed retreat versus what the community directly affected by retreat values (with the directly-affected community more influenced by emotion over rationally-rooted decision-making) (Dachary-Bernard et al., 2019). In this particular case, we can see a tension between the preferences of City of Surrey residents more broadly and Crescent Beach residents, and the City as part of its decision to choose an emerging direction, had to weigh the diverging views of these community scales. Additionally, the values criteria and risk of failure were considered as part of the structured decision-making framework that the City employed, and all of the structural, protection-oriented strategies for Crescent Beach had a high risk of failure. Weighing the risk of failure of each of the proposed flood management options was the more rational side of the decision-making framework and created opposition between what residents wanted and what the City ended up putting forward at the Field House.

There is also a very strong sense of place and attachment to place in Crescent Beach that further engrained a resistance from residents to relocate. In regards to whether attachment to place played a role in residents' resistance to move, one resident noted:

Oh my goodness yes. I mean some families have five generations [of history in Crescent Beach], and the Crescent Beach Swim Club is one place where that shows up, and there's a history of all the families. It's quite fascinating.

Similarly, City of Surrey staff noted the multi-generational aspect of the community, and how that strong sense of place contributed to a resistance to retreat, noting:

Some residents are generational. For example, some have said "my grandfather had the cottage here and I remember the neighbourhood was a whole cottage community". In Crescent Beach, the sense of place and ownership of place is really there, as well as the values of that area; including recreation values and environmental values. Residents kind of take the neighbourhood as their own, which is nice...but when it comes to implementing managed retreat in this context, I really don't think it'll stand a chance until a disaster happens.

Attachment to place plays a role in minimizing perceptions of risk (Billig, 2006) and also partially determines the perceived costs of relocation for residents (Bohnert &

Doberstein, 2022). Stronger attachment to place raises the perceived costs of relocating for residents and thus reduces the likelihood that people will accept relocation as a viable flood management strategy. The bonds between people and place can act as forces of inertia to resettlement. The quotes above illustrate the strong sense of place and attachment that residents of Crescent Beach have to the community, with the intergenerational aspect of the community tightening those ties even further. Crescent Beach residents highly valued their existing community over perceived risk. Crescent Beach is also the only community in Surrey with direct access to the ocean, which makes it difficult for residents to find a comparable alternative community in Surrey if forced to relocate.

At the same May 2018 CBPOA meeting where the results from the Rotary Field House were discussed, an action item is identified to follow up with the City of Surrey and have them attend the subsequent CBPOA meeting and clarify the City's intentions of pursuing managed retreat. At this point in the CFAS policy process, a disconnect between a resident group in Crescent Beach, the CBPOA, and the City's choice of managed retreat as the long-term strategic direction for the area begins to emerge, with residents disagreeing that managed retreat reflects their views.

The CBPOA notes in their meeting minutes that:

...Whilst this is a long term adaption study and the potential outcomes may in reality be for our grandkids' time, it is important that any presentations to the City, going forward for policy discussions, clearly state the underlying assumptions and predictions used as the basis for the study work. The risk that has to be carefully managed is to avoid any perceptions or misconceptions at this early stage that could affect property values (2018a).

In addition to the issue of scale at which CFAS was conducted, where there were differences in preferred options between the City of Surrey as a whole and Crescent Beach residents made evident at the Rotary Field House (see Dachary-Bernard et al., 2019 for examples of this scale disconnect), practicality, situated within social context, begins to emerge as barrier in this CFAS milestone. Practicality as a barrier is illustrated by the CBPOA's meeting notes which describe their concern with how property values may be implicated in the adoption of managed retreat. Blake (1999), as described in Chapter 2, identifies practicality as a key barrier for citizens to adopt or support different climate change-related policies or to behave in a climate-friendly manner. Practicality

according to Blake's framework can take the form of time, money or information costs associated with responding in environmentally-supportive ways to different policies (1999). In the case of CFAS, managed retreat would require a wholesale lifestyle change due to relocation and could also have a high monetary cost to residents. Property values in the area (which are much higher than City of Surrey averages, see Statistics Canada, 2022) could fall, as with managed retreat the land at some point would be acquired by the City. Residents also had a strong attachment to place which affected their perception of risk and also raised perceived costs of relocation. In this way, managed retreat represents a relatively impractical flood management option to Crescent Beach residents and does not align with social context. Communication and information (Moser & Ekstrom, 2010) is also exemplified as a barrier in this milestone, as there appears to be a disjuncture between the information presented by the City on flood management preferences and what residents thought were the preferences within their community. The assumptions built into the structured decision-making model the City used to determine the strategic direction were not conveyed in ways that made sense to stakeholders, as exemplified by the resident's confusion with the graphs at the Rotary Field House.

4.5. Media attention on managed retreat as the emerging direction for Crescent Beach (May 2018)

In May 2018, following the April Open House which listed managed retreat as the emerging direction for Crescent Beach, city staff were quoted in several media articles (notably the CBC and the Globe and Mail, and later, the Peace Arch News) covering the possibility of the City of Surrey pursuing managed retreat for Crescent Beach. The media articles were originally written in a manner that was biased towards speaking only about managed retreat but were amended to mention managed retreat was only one of four options that were under consideration by the City (Hinks, 2018). These articles were catalysts for inciting a lot of anger in the Crescent Beach community over what the City of Surrey was pushing for in terms of managed retreat, and residents felt blindsided by the decision firstly, to potentially adopt managed retreat, and secondly, to go to the media about this emerging direction before speaking with residents. All of the interview participants from the City of Surrey and the Crescent Beach community mentioned the role the media article played in the CFAS process. Some of the residents I interviewed

only realized managed retreat was being so seriously considered as part of CFAS through community uproar about the media articles.

Another resident emphasized the role of the media in shaping people's perceptions of CFAS, especially those who did not participate in the consultation process, noting that:

The Property Owners have a meeting every month and you send out the minutes and usually maybe 10 people show up except if there's something to do with property development or if there's dogs on the beach or something like this. And so this article [came out and]... I'm sure that 90% of the people in Crescent Beach had no idea what the Coastal Flood Adaptation Strategy was all about, but that [media article] sure brought it to mind. So it was unfortunate.

Another resident noted how the media attention spurred community anger and subsequent follow-up with the City remarking:

That's when [the City of Surrey staff member] got that stuff in the news and then away we went. So that was an interesting time. Lots of people were very, very upset with that.

A resident also remarked they were impressed with the work that the City of Surrey did on consultation and engagement as part of CFAS until this point, but the media articles were turning points for how that process unfolded and people's anger towards the process and the emerging direction outcome.

You know, until the issue with [the City staff member] and the reporter I thought they had done a great job. [But this staff member] definitely spoke out of turn.

I was a little miffed it the way that [managed retreat] was presented [at the Field House] because that's not what the graphs and the charts said, but it wasn't until this media thing. And I mean, I don't think at the time I even read [the article]...It was, you know, kind of the grapevine and it quickly moved.

City staff members also noted that the emphasis on managed retreat being decided was misleading and potentially a misquote on behalf of the media. The articles are noted to be edited since being published to include a description of the other flood management options being considered as part of CFAS, but this was too late given community members were already upset with the information being released to the media before they felt they were adequately consulted about the strategy. On the

misleading nature of the media representation of managed retreat, City staff members stated:

It was either a misquote that happened with the Globe [and Mail] or something that happened because nothing had been decided in terms of CFAS and options were still on the table.

I think the, the whole media thing was [the staff member] said a couple things in jest that [they] shouldn't have...and the media ran with that.

Citing the importance of media coverage in shaping the CFAS process, a confidential correspondent noted that:

Definitely when you look at the timeline, the media story by the Globe and Mail and then by the CBC - that didn't work well. So what was problematic in the City's process was they were really fully transparent with the whole process, but when anticipating a controversial thing like [managed retreat]... it's worth being proactive and...delaying some transparency items until there's a chance to have some of the more intimate, private conversations with the special interest groups. Like yes, that may give [people] a chance to fight the process, but the risk of it coming out in the media and losing control of that process I think is greater. It is a delicate balance, how much is fully public and transparent versus how much is done in confidence.

In a 2022 study on the public acceptability of buyouts in Chatham-Kent, a flood-prone region in Ontario, Doberstein and Bohnert use social license as a framing concept. Social license in the Chatham-Kent case study represents the willingness of residents to accept public buyouts as a flood management strategy within their community. Citing Leena et al. (2019), Doberstein and Bohnert (2022) state that social license can be strengthened by project proponents (or in this case, the City of Surrey) through building trust with the community, demonstrating benefits of the project, and engaging in both accountable and participatory policy processes. The media articles may have broken the remaining trust that Crescent Beach residents had with the City. Residents felt they were hit unexpectedly with the news that the City was planning to pursue managed retreat, without the City first stating their intentions of going to the media with this information. Trust was further eroded by the media misrepresenting that managed retreat had been decided on (at that point the City was looking at it as the emerging direction, but no final policy had been adopted). There were existing tensions between the City and the community, as described in the CBPOA minutes, about the notion of managed retreat being considered and how that flood management strategy may have a negative effect on the psyche of residents as well as how widespread news

about managed retreat could affect property values in the community (Crescent Beach Property Owners' Association, 2018a). The only benefits of managed retreat that were discussed in the media articles were framed in terms of risk reduction, without any articulation of what co-benefits for the community might look like if managed retreat was adopted. Doberstein and Bohnert (2022) describe the importance of institutions such as City governments demonstrating the benefits of buyouts to residents to build social license in communities, but the media articles simply did not do this. The media articles eroded social license through breaking trust between residents and the City, and social license was also diminished through a perception that the CFAS policy process was no longer participatory and the outcome had been decided before the City consulted with Crescent Beach residents about their intentions. The social context required for successful adoption of managed retreat was absent from Crescent Beach at this time.

In addition to general frustration of the residents I interviewed around them feeling blindsided about the media articles, half of resident interviewees as well as one City staff member interviewee noted the importance of property values to residents and how the heightened media coverage precipitated further concerns about property values in the CFAS process. The concern surrounding property values is delineated further in Chapter 5, as it is one of the overarching development path challenges that the City of Surrey faced in implementing managed retreat. Short excerpts about property values from participant quotes are noted below, to illustrate some of the reasons residents were concerned about how managed retreat was presented in the media in relation to Crescent Beach and property values.

A City of Surrey staff member noted that;

So when [managed retreat] started hitting more mainstream media, people [panicked] and thought their property values would crumble, even though that was a known factor in the floodplain.

Because there was so much controversy about property values, just even saying it, residents thought property values would plummet and a lot of people were asking when the City was going to buy up the land.

A resident stated that they believed the anger at the media article was mostly because residents believed it would impact their property values, stating;

People were so upset with the Globe and Mail article and about what it was going to do to property values and they were all going to lose

money. And you know, what houses are selling for here? Like \$4 million now. Ridiculous.

Moral hazard is hinted at in some of the residents' reactions in regards to property values. Recall moral hazard is the idea that people tend to expose themselves to more risk when they do not have to bear the costs of those risks (see Pauly, 1968). There are certain risks to purchasing a home in the floodplain, and the risks are not solely borne by the homeowner, at least in the case of Crescent Beach. The broader Surrey tax-base pays to maintain flood protection infrastructure for the Crescent Beach community, thus absorbing some of the cost of the risk of living in the floodplain. Additionally, because the community is very desirable from a lifestyle perspective and somewhat exclusive, Crescent Beach residents both enjoy the lifestyle benefits that the area has to offer and capitalize from a financial perspective on the real estate appreciation in the community (Crescent Beach's property assessments are approximately 40% higher than the average assessed home value in Surrey, see Statistics Canada, 2022), without accounting for the true costs of that themselves. On a contrary note to this argument, Crescent Beach residents may also pay to maintain infrastructure for other communities in ways that do not directly benefit them directly. It would also be a disproportionately high individual cost to expect residents to move as a response to the collective problem that is climate change. The tension of scale and collective versus private interests in flood management policy creation is evident, although the example of moral hazard in this case is worth noting due to the significance of the costs of some of the structural flood management strategies being considered as part of CFAS, and the lifelong costs of maintaining that infrastructure.

Another issue from a social context lens, as well as a policymaking challenge within the CFAS process was that CFAS centred around a topic that is future-oriented in nature (up to the year 2080). In the Province of British Columbia's latest intentions paper on building flood resilience (2022, p. 11), there is a strong emphasis placed on proactive rather than reactive resilience; resilience must be built before major flooding events occur. Proactive intervention, especially over long time scales, works contrary to how people prefer to behave, which is generally more reactive in nature. This can make participation in resilience-building processes challenging, because they often are future based and when most effective, not initiated as an immediate, reactionary measure. Illustrating the challenge of engaging on a long-term topic, and how short, reactive, and

tangible media articles shaped people's reactions to CFAS in greater ways than CFAS stakeholder engagement, a confidential correspondent stated:

And then that's where the City got into significant tension. Because almost everyone will listen to the news article, but few people will commit to going to a three-hour workshop to listen to the issue and be part of the decision-making process.

People generally place significantly less value on long-term, future solutions than they do on short-term solutions (Achen & Bartels, 2004). In the case of CFAS, the City was consulting on a long-term strategy (stretching out to the year 2080) so it may not have garnered the same attention and engagement in the community as something that is a shorter term topic or something more immediately accessible, such as these media articles. Without previous engagement in CFAS, some residents did not have the context of why the City was consulting on managed retreat and may not have contributed their thoughts as part of the outreach the City had done previously. They only had a portion of the story as part of the larger policy process.

Wrapping up the interviewees' comments on the media articles are statements about their trajectory-shifting effect on the CFAS process, with City staff stating:

The catalyst [that led to managed retreat being removed] was really that interview, those conversations and... then it becoming more of an issue for the Crescent Beach Rate Payers' Association³

[Decision-makers] made us take some of the retreat content [out of CFAS and the draft documents] mainly because of how some of the media portrayed the retreat option.

In summary, the media coverage just prior to the publication of the CFAS Final Strategy document played a very important role in inciting anger in Crescent Beach residents. Although managed retreat had already been labelled as the "emerging direction" at the CFAS Open House and concern was relayed by a member of the CBPOA at the April 2018 meeting, it was not until May to June 2018, after considerable media attention on managed retreat as the potential flood management strategy for Crescent Beach that many of the interviewees noted a change in direction for CFAS and anger towards the City. It is evident that the media articles broke the trust between

³ Crescent Beach Rate Payers' Association was the previous name of the Crescent Beach Property Owners' Association

residents and the City; especially those residents that had not attended prior CFAS workshops, and this caused a highly emotional reaction and destroyed any social license the City had built with residents related to managed retreat. Several residents who had attended the CFAS workshops participated in these interviews, and also noted they felt blindsided by the media articles. They did not feel that the choice of managed retreat reflected what the Crescent Beach community wanted as a whole, so it was not necessarily solely those who were *not* engaged in the CFAS process that were surprised by the policy direction. This community anger was a reflection of a larger gap in communication or understanding between residents and the City in regards to managed retreat. This anger illustrated a disconnect in the values and factors that were used to weigh flood management options between the City policy process and Crescent Beach residents' own considerations, a tension between a transparent process that involved media and how Crescent Beach residents wanted to be consulted, and a lack of knowledge that managed retreat was one of the options being explored in the first place. This particular milestone: the anger sparked in the Crescent Beach community by the media articles, exemplifies a communication and information barrier in the CFAS policy process (Moser & Ekstrom, 2010). This milestone also represents the importance of considering social context throughout the policy process: with media acting as a barrier, moral hazard influencing Crescent Beach residents' perceptions of being continually protected from flooding, individual versus collective interests, and the preference for people to heavily discount the future as compared to the present, resulting in reactive rather than proactive actions. Little was said in the media articles about what the benefits of managed retreat could be outside of it being framed as a way to reduce risks. All of these factors reduced the viability from a community acceptance perspective of managed retreat, and thus affected the likelihood of bounce-forward conceptualizations of resilience being adopted.

One of the key engagement principles within the CFAS Stakeholder Engagement Framework is transparency. Sharing the potential adaptation pathway of managed retreat for Crescent Beach was on one hand transparent, signalling to a broader audience other than those directly involved in CFAS what the City was considering, but on the other hand, without notifying directly-impacted residents of the intention of going to the media was also not transparent. Given this point in time was very close to the decision-making stage of the CFAS policy process, it was an especially sensitive point in

CFAS that required close consideration of the consequences media portrayals could have on existing relationships between the City and residents and thus the CFAS policy process trajectory.

4.6. Meeting between the City and the Crescent Beach Property Owners' Association (July 4th, 2018)

Following the significant media attention on managed retreat for Crescent Beach, as well as the CBPOA action item to follow up with the City about the April Open House, the City of Surrey met with the Crescent Beach Property Owner's Association on July 4th, 2018 in a follow-up meeting. As part of the CFAS Engagement Framework, two-way communication is underscored as a key principle, and is defined as communication that is "timely, responsive, transparent, collaborative, and provide opportunities for the engagement of the community, stakeholder groups, and the community at large" (Northwest Hydraulic Consultants et al., 2016, p. 7). In meeting with the CBPOA, the City of Surrey demonstrates a commitment to two-way communication, although the way that communication occurred during some of the previous milestones (notably the media articles) may not have lived up to these standards.

According to the CBPOA Meeting Minutes, over 120 people were in attendance at the July 4th meeting (as per a resident interviewee, they usually expect around ten people at the meetings). Senior City of Surrey staff as well as project leads for CFAS attended this meeting. As documented in the CBPOA minutes, during this meeting, senior City of Surrey staff stated the City did not have a strategy for how to advance managed retreat and they were not planning on moving ahead with it; that it was only one of four options being considered at that point in time (Crescent Beach Property Owners' Association, 2018b). It was expressed that "members [were] very upset and angry with how the messages were miss-handled (sic) through the media and the impact of this on property values and home ownership plans" and that a "a very impassioned question period" (Crescent Beach Property Owners' Association, 2018b) followed the City's presentation. Describing the sentiment in the room during this meeting, one City of Surrey staff member stated that:

The most effective conversation piece or conversation that I witnessed in the process was the anger...at the first meeting, that was a crowd that was not happy. I think many of them had felt that, wait a minute, this

was out of out of the blue. Yet you look through the record, and it wasn't out of the blue.

It was a barrage of okay...what is going on here? And you could, you could feel that this was a group that was not interested in hearing any analysis, any evaluation, any of those sorts of things. So it would be quite pointless to have gone out and gone through all [of that].

A long-time councilperson and resident of Crescent Beach apologized to City Staff after this particular meeting for the way that people had expressed their anger, with a City Staff member recollecting:

[The councilperson] just came up and said... I'm very embarrassed that what people had said and things like that.

It was clear from my interviews that the July 4th meeting was highly emotional for many different people involved in CFAS. Crescent Beach residents who attended this meeting also reported similarly about the day's events and the tension that was running through the room, stating that:

I feel so sorry for the engineer who was planning it...I mean [the engineer] was so committed to it but there was a public meeting, which was unfortunately after the article in the Globe and Mail. And [the engineer] was just crucified.

...And that meeting it's on my heart about how nasty [people] were.

Well, I think there were a lot of people that were speaking up and interrupting each other at the meetings because they were sort of hot under the collar that this was not how [the options were] presented and you know, "who was this [person] to speak to the media out of hand"?

And I would certainly say when they had that, I'll call it an "emergency meeting", with [the City of] Surrey, people were angry because they, they knew that [a preference for managed retreat was] not what they had expressed and ...probably a little bit of distrust wondering what was going on.

A resident as well as consultant noted the importance of this particular CBPOA meeting as well as political pressure in steering the CFAS outcome stating that:

As I understand, it was because of that meeting that [managed retreat] was pulled and it was because of political pressure.

The anger expressed at this particular Crescent Beach Property Owner's Association Meeting is an example of where political risk perception begins to emerge as a barrier to managed retreat for CFAS. Within this study, political risk perception is

characterized as the political risks to making an unpopular decision, versus the risks of not adapting to climate change. At this meeting, it becomes apparent to the City of Surrey how much the media articles have angered residents, galvanizing and strengthening the barriers to adopting managed retreat present within social context and public values and beliefs that revealed themselves in previous stages of the policy process. At this point in the CFAS process, there was political risk in proceeding with managed retreat given the lack of resident support and uproar, which outweighed the risks of committing to costly structural flood management measures. The anger displayed at this meeting begins to solidify a reason for the City to revisit managed retreat as the potential long-term adaptation strategy for Crescent Beach and instead, look at other options. In the following section I detail additional context, aside from residents' values and beliefs and social context that led to the importance of considering political pressure and risk in directing the trajectory of CFAS at this stage of the policy process.

4.7. The Municipal Election and Role of Politicians

At the time that the July 4th 2018 meeting was occurring between the City of Surrey and the CBPOA, a municipal election was also imminent. This election timing added to the political risk of pursuing an unpopular flood management strategy. The current mayor of Surrey was supportive of managed retreat as a potential flood management strategy, but the election complicated unwavering support for this strategy. A previous mayor who was running again as a mayoral candidate during this election cycle attended the July CBPOA meeting. This previous mayor also owns property in Crescent Beach (Crescent Beach Resident, personal communication, 2021). It was noted by the City staff as well as by residents that this individual played a role in encouraging residents to express their anger at how the City spoke to the media about managed retreat.

As noted by a resident:

[The mayoral candidate] was in that meeting and [this individual] was nasty.

[This individual] was criticizing the management of the strategy and that they had permitted [the media articles] to be...published like that without going through the political process. It "should have been

checked first". [This individual] was really angry at [the City of Surrey staff member that spoke to the media] and just the fact that they had the audacity to put this message out without going through the political process within council and that if [the individual] were in council that would've never have happened: "The people don't deserve to have this type of information".

Within the CFAS Media and Communications Framework, "regular media releases on project updates, milestones, and current and upcoming activities" was identified as a tool and tactic for communicating through traditional media (EPI et al., 2016, p. 11). The City of Surrey's approach to speaking with the media about managed retreat in the CBC, Peace Arch News, and Globe and Mail articles does not necessarily veer away from the communications framework the City had established to guide CFAS. What was problematic about the articles was the specific focus on managed retreat as though the strategy had been already decided at that point, rather than managed retreat being presented alongside the other options being considered. Within the CFAS Media and Communications Framework, there was no requirement noted that communications go through a council process before they are released, as this mayoral candidate had suggested was the correct process. CFAS was intended to be transparent, and part of that transparency was navigating a thin line between sharing information with the broader City tax-base and ensuring Crescent Beach residents were apprised of key events within CFAS that may affect them. Although City staff had spoken to the media in a way that was not in contradiction to the CFAS Media and Communications Framework, there should have been more consideration to chronology — discussing the Crescent Beach community's concerns before the articles were published was likely warranted.

Corroborating the memories of the residents, City staff recalled a similar story of how this mayoral candidate interacted with City Staff who were working on CFAS, stating:

There was a certain politician that came to that meeting which I believe, had a point of view and was very strong about that point of view. And that then precipitated others to speak up, which was good. I mean, speaking up and hearing them was all very good. [But] after the event, there were other politicians in the meeting that didn't feel that it was appropriate for [that individual] to say certain things and do certain things.

I don't want to say [this individual] was politically motivated to incite a group of people that would be on the bandwagon because I had no idea...I thought that [the individual] was disrespectful to staff at the

meeting. And if anyone should know better, [this person] should know better...when you start pointing fingers and calling people [names] and things like that, it's inappropriate.

This mayoral candidate debated the existence of climate change and [the individual] was the big one against the council saying, "they are going to take your land". So [the individual] used it a bit as a political card for the election...and it wasn't huge in the election, but definitely with the people in Crescent Beach, [the individual] was using it that way.

At the time in the City of Surrey, climate change was a contentious topic and its relevance and the urgency to act at a municipal level was debated. About sea level rise and the City's response from a policy perspective, one City politician was quoted saying: "I believe strongly in leaving nature alone...It's looked after Crescent Beach for hundreds of years, and will continue to look after Crescent Beach for hundreds of years in the future" (Browne, 2018). Statements such as these from a senior political level reduce the urgency to act and challenge the messaging that the entire CFAS process was built on; that climate change requires coordinated action. This statement also could legitimize behavioural barriers amongst Crescent Beach residents, such as a low perception of the real risk that sea level rise poses to their community. For impacted residents, it is easier to assume structural flood protection measures (or no flood management measures in the case of the politician's quote) will continue to work against the impacts of climate change than it is to confront the lifestyle changes and the frames of reference changes that would be required to see managed retreat as the viable solution to flooding. These barriers are compounded by previous City policy decisions to protect Crescent Beach, which set the expectation the City would continue to protect Crescent Beach in the future.

City Staff also noted the importance of the election and the timing of it coinciding with difficult decisions around the long-term adaptation strategy for Crescent Beach; the general sentiment was that decision-making was even more political at this point in time than it may have been otherwise. The election in conjunction with the mayoral candidate running and being so critical of the CFAS process was a combination that helped mould the trajectory of CFAS away from choosing managed retreat.

All City Staff members highlighted the importance of the election, with statements such as:

That's the biggest reason it's off the table is political and because of the election at the time.

It got so political because of property values that people were threatening to sue and because it was an election year.

I think it would have gone a little differently had there not been an imminent election, and the mayor running against the whole council lived in [the Crescent Beach area]. So he had a platform there.

At the time with the election and it was too close to call, they didn't want to risk anything and nothing was going to be built anyways [quite that early]. So, I think it was easier for council to defer that ... And we just made it go away to deal with the situation at the time [rather than] have it become more of a political issue during an election.

There is considerable literature on voting behaviour and the tensions between short election cycles and long-term challenges such as climate change. From a political economy perspective, voters generally care much more about recent policy benefits than longer-term preparedness, and this tends to skew political decisions towards short-term fixes that are usually less cost-effective, especially in the case of disaster preparedness (Bechtel & Hainmueller, 2011; Healy & Malhotra, 2009). Illustrating the mismatch between voting behaviour and disaster preparedness, a study assessing government accountability through voting preferences across the United States was conducted. In this study, the authors Healy and Malhotra find that, "Voters offer scant incentive to presidents to pursue cost-effective preparedness spending, but do encourage them to send in the cavalry after damage has been done and lives have been lost" (Healy & Malhotra, 2009, p. 388).

Generally, this study also found that people support private goods over public ones (2009, p. 401). Relief spending after a disaster is a direct payment to an individual and relief is thus considered a private good (Healy & Malhotra, 2009, p. 389). Preparedness spending, on the other hand, is a public good and for some, they may never tangibly see the benefit of that spending (Healy & Malhotra, 2009, p. 389). In the case of relief payments, individuals receive the full benefit of the good while only fronting part of the cost, which makes it acceptable as a solution from a behavioural perspective, especially to those who are receiving it (Healy & Malhotra, 2009, p. 389). Managed retreat is public good with high private costs – this is a bad combination from a voter preferences perspective. It goes against the dominant way people think about and make decisions around their willingness to engage in disaster preparedness. Politicians are

concerned with being voted into office and getting voted back in requires community support. Although Crescent Beach was a small community in terms of a voting base, it was still politically challenging around the time of the municipal election to pursue an unpopular flood mitigation strategy like managed retreat. The tension between short-term fixes that voters prefer, and in turn politicians prefer, versus the long-range adaptation that climate change requires remains a fundamental challenge from a government climate change response perspective and illustrates political cycle barriers within developments paths. This tension is perhaps even more difficult to navigate in a municipal environment than higher levels of government, given the effects of policy are often felt on a more personal level than broader scale national or provincial policies.

4.8. Meeting between the City and the Crescent Beach Property Owners' Association (July 31st, 2018)

The City of Surrey committed to following up with the CBPOA in subsequent meetings and coming up with a public statement to clarify the City's stance on managed retreat as an adaptation measure for Crescent Beach (Crescent Beach Property Owners' Association, 2018b). On July 31st, 2018, approximately three weeks after the previous CBPOA meeting, the City followed up with this commitment and met with the CBPOA again (Crescent Beach Property Owners' Association, 2018c). Senior City of Surrey staff stated to the residents present at the meeting that managed retreat would be off the table for Crescent Beach and also circulated a draft public statement for their review (2018c).

One resident who attended this meeting stated that

[The City] did a very good job [at this meeting] and you know, pretty much gave the residents [their] word that managed retreat was going to be taken off the table and would not be considered.

This resident also stated they understood these July 2018 meetings between the CBPOA and the City to be pivotal moments in determining that managed retreat would be removed from the CFAS Final Strategy document;

I mean I might be wrong, but it seems to me after we had that special meeting [July 31st] and the fellow said, you know, it's off the table I don't remember it being discussed a lot after that.

A City of Surrey media release described the City's decision to remove managed retreat the day after the July 31st CBPOA meeting, stating:

In response to additional feedback from directly impacted stakeholders from Crescent Beach the Managed Retreat option is being removed from the Crescent Beach study area. No further analysis will be conducted on this option and it will not be recommended by staff in the draft Coastal Flood Adaptation Strategy (CFAS) to be brought forward in spring 2019.

The city will continue to investigate and evaluate the Crescent Beach community's preferred option of an Expanded Edge and its second preferred option of a Barrier Island/Spit (The City of Surrey, 2018b).

I posed the question of what interviewees think would have happened had the City pursued managed retreat despite the resident opposition, and I received varying responses. From the City:

I think what would've happened is...that the residents would've come out quite forcefully to the current council at that time. And then once we went past the election, the new council would've directed staff back to go back [and they would have] talked to the community again... and I think it would come down again to this fact: when would [the decision around managed retreat] have to be made? And it's a long ways out there.

A confidential correspondent stated that:

I think [residents] would have really fought hard and maybe the council at the time would have still endorsed [managed retreat]. But then with the next council there would have been ongoing pressure to revisit it so even if it got passed, you know... well actually in this case the council did endorse the document in the final format. So [managed retreat] might have been endorsed in principal by the one council and rejected by the next council. It could have risked that situation happening.

In addition to political pressure at a municipal level to ensure any strategy that the City proceeded with had strong acceptance from stakeholders, there was a similar expectation from the federal level as well. In early 2019, the City of Surrey applied for \$76 million in federal funding through the Disaster Mitigation and Adaptation Fund (DMAF) to help fund the implementation of CFAS (The City of Surrey, 2022a). The DMAF application carried an expectation that stakeholders implicated in CFAS would be content with the policy outcome. Describing the requirements of the DMAF funding, a confidential correspondent remarked:

[If managed retreat was adopted despite resident opposition] it would have made it awkward for the City's federal funding agreement which was to implement the Coastal Flood Adaptation Strategy...In general, the funding was to go where there was broad support and no controversy...[and residents] would probably still be upset a couple years later.

The DMAF funding that the City intended to use to implement CFAS served as a regulatory barrier to adopting managed retreat. If the City had made the choice to proceed with managed retreat, there may have been risks to doing so from a federal funding perspective, given the lack of support. This compounded the political challenges of adopting an unpopular strategy at a municipal level.

Within the previous stages of the CFAS policy cycle (from problem emergence, to agenda setting, to consideration of policy options) when you account for the values frameworks that were developed with the broader CFAS community, the rational trade-offs surrounding risk of failure, and the surveys that the City of Surrey conducted about flood management strategy preferences for the broader City of Surrey tax-base, you can draw a logical path between these policy stages and the City's original support of managed retreat as the emerging direction for Crescent Beach. The path is complicated, however, by the factors described by interviewees in my study. These interviewees described the development path and human behavioural motivation conditions not apparent in documentation about CFAS that led to the outcome of the policy cycle, i.e. managed retreat as the emerging direction for Crescent Beach, being both inconsistent with what the majority of residents wanted at the time and inconsistent with political motivations to appease voters. The disconnect between the outcomes from the previous stepwise policy cycle stages and the outcome of the decision-making stage corroborates Everett's argument that especially for contentious issues, the consultation stage of the policy development process has less of an effect on policy outcome than the policy cycle suggests, and the decision-making stage is not based on the results of the previous stages of the policy cycle but rather determined through politicized decisions (2003, p. 69). Within the CFAS process, decision-making became a highly political choice with the imminent municipal election magnifying the variety of barriers to change that originated in Surrey's development path and social context and federal funding agreements constraining policy choice to what was non-controversial.

4.9. Characterization of the Development Path in Crescent Beach

According to the findings of this study, I have presented my conceptual framework to show the barriers that were present as part of this policy process in Table 8 below, and have shown the barriers that were present in literature and described in my conceptual framework, but were not present within the CFAS process. My findings in only a limited number of barrier types being identified from the original conceptual framework are not to suggest that barriers other than the ones I identified in my study are *not* present in different policy processes.

Table 8: Findings and Development Path Barriers Relevant to Crescent Beach and CFAS

Development Path Typology	Barrier	Source
Political Development Paths	Lack of political importance of climate change adaptation	Burch (2009)
	Job descriptions	
	Lack of collaboration opportunities	
	Political risk perception	Additions based on general tenets in development path literature
	The political cycle	
	Previous political decisions constraining future choices	
	The policy cycle	Everett (2003)
	Institutional culture	Burch (2009)
	Trust in leadership at an institutional level	Moser and Ekstrom (2010)
Policymaking Development Paths	Regulatory challenges	Burch (2009)
	Inadequate communication and/or information	Moser and Ekstrom (2010)
	Lack of resources	Moser and Ekstrom (2010)
Public values and beliefs	Attachment to place	Siders (2019)
	Public risk perception (moral hazard; familiarity with hazards; psychological distancing)	Stone (2006); Dachary-Bernard et al. (2019)
	Responses to climate change are impractical for stakeholders	Blake (1999)
	Anchoring bias	Lieske et al. (2014)
Social Context	Economic and demographic context (older age and wealth)	Siders (2019); Slovic. et al (2007)
	Media	Siders (2019)

Through the course of my interviews I was able to characterize the development path in Crescent Beach. In terms of social context, the neighbourhood consists of an older, wealthier demographic and older age and increased wealth have been correlated with a reduced likelihood of accepting relocation/managed retreat as policy outcomes (Siders, 2019; Slovic et al., 2007). Crescent Beach is also a historic community with many homes being passed down from generation to generation. This created a strong sense of place and a resulting strong attachment to place. The attachment to place raised the perceived costs for residents of relocating and reduced the likelihood they would accept managed retreat as a viable flood management outcome.

The City of Surrey has continually invested in infrastructure to protect the community from flooding, setting up an expectation with residents that the community will continue to be protected, which is a barrier that implicates anchoring bias from a public values and beliefs lens (see Lieske et al., 2014 for more on anchoring bias) and demonstrates the constraining nature of past political decisions from a political development paths lens. In the Crescent Beach community there is a strong sense of private property rights which is embedded as a combination of social context and values and beliefs, and private property rights go against the collective, public good response that managed retreat entails (Healy & Malhotra, 2009). Finally, the mismatch between short political cycles and unpopularity of long-term preparedness measures amongst voters, especially when that long-term adaptation measure requires wholesale lifestyle changes for those it implicates, (see Bechtel & Hainmueller, 2011; Healy & Malhotra, 2009 for more on voting preferences and disaster preparedness measures) led to the City not taking the political risk in displeasing residents that would be required to adopt managed retreat within CFAS.

Chapter 5. Discussion

5.1. Introduction

As described in Chapter 4, there were many complex and intertwined factors that led to managed retreat being removed from the CFAS Final Strategy document. These factors stemmed from political decision-making constraining future policy choice, disconnect in the objectives between short political cycles and the requirements of long-term policymaking, dominant economic development paths that emphasize accumulating wealth through property, behavioural motivations such as moral hazard, psychological distancing, and attachment to place, as well as social context factors such as age and wealth. A protection-oriented strategy, such as the one that was ultimately chosen (raising the dikes) was the policy option that best fit within the existing development path in Crescent Beach. The outcome of the CFAS policy process in Crescent Beach was not necessarily transformative nor was it a clear example of bounce-forward resilience, when compared with managed retreat. The outcome of CFAS in Crescent Beach was more closely aligned with engineering resilience and its desire to withstand stresses and shocks (i.e. protect homes from flooding). This case study provides further evidence of Meerow and Stults's (2016b) findings: that in practice, resilience tends to manifest itself in a bounce-back fashion, with an emphasis on robustness, signalling a resistance to change and transformation.

Several barriers in Figure 6 warrant additional attention. I identified through the interview coding and research process that there were barriers that continued to present themselves throughout the CFAS policy process (and not just in one or two of the milestones) which limited the policy process effectiveness from the outset. This chapter expands upon this finding. Although the six milestones described in sections 4.3 to 4.8 were instrumental in shaping the final CFAS strategic direction for Crescent Beach, and are in and of themselves barriers to transformative policy development, they may not have played such significant roles if the City of Surrey followed a different development path trajectory or if the social context and behavioural motivations in the community were different. This is important to frame my study in the context of planning theory and practice on a broader scale. In effect, the six milestones described in sections 4.3 to 4.8 were only barriers to transformative resilience building in Surrey because of the

development path in which they were situated. I expand on the constraining nature of development paths in sections 5.2 and 5.3, with relevance to climate change planning practice as a whole.

Holden et al. (2016) describe the importance of climate action policies and the articulation of policy benefits in alignment with dominant development paths (2016, p. 306). Although the values framework incorporated into CFAS attempts to align climate action with community values, the assessment of values against risk of failure in that process was problematic. Within the social context of Crescent Beach, risk perception of residents did not align with the technical and scientific risks that CFAS policymakers used to inform their weighting process. Individual property owners have a vested interest in preserving their properties and operate in a context that prioritizes the security and value of property ownership. This encourages people to act in favour of their own concentrated interests rather than diffuse or “public good” interests. For this reason, property values were more important to Crescent Beach residents than was reducing the risk of failures of flood management infrastructure – the risk of loss of property value from inaction, at least in the shorter term, was not made adequately apparent to residents in the policy process. This discrepancy in risk perception between residents and the City was not accounted for accurately in the values framework. The way that the values framework was created is symptomatic of the challenge of discounting related to scalar mismatch in climate planning and policy processes: values can be different between groups of different scales and the values framework was built for the whole CFAS planning area, not just a singular neighbourhood (see Bukvic et al., 2018; Dachary-Bernard et al., 2019 for more on community values at different scales that inform flood response pathways).

The City is obligated to answer to the diffuse interests of the broader tax-base, whereas individuals act according to concentrated interests. Policy processes have risk and cost implications for a larger constituency than a specific neighbourhood, so offering the opportunity to create a unique and independent values framework specific to a neighbourhood is a disingenuous representation of local democratic process, in the context of local decisions that may put the larger community at significant risk and/or subject them to high public costs. Instead, planning processes are often conducted at broader scales more representative of the larger community that bears part of the costs of those decisions, as was the case with CFAS where the values framework was

representative of the whole CFAS planning area with input from the City of Surrey as a whole through various flood management preference surveys.

Development paths and individual human behavioural motivations are what determine the perceived or actual cost of a particular plan, strategy, or policy direction (Holden et al., 2016; Smith et al., 2005). Although government policy may not be the most effective avenue to change dominant development paths, what governments can do as part of effective resilience planning is take into account existing development paths and human behavioural motivations in determining the costs associated with plans, strategies, and policy directions to a particular community as part of setting the stage for policy change. Holden et al. (2016) state that “progressive resilience planning must provide opportunity space for proactive human system interventions in order to shape the change that is coming” (p. 313). That is to say, governments may not be able to completely change existing development paths or social context, but policy can still be transformative in approach, where governments, through effective resilience planning, create the policy conditions that favour change to existing development paths towards something that is more sustainable or resilient (Holden et al., 2016; Smith et al., 2005).

Specific to this case study, previous political decisions set expectations that the City would continue to protect Crescent Beach homes, so much that some residents discounted new concerns about the risks of flooding due to sea level rise. This led to dominant development path and human behavioural motivations in Crescent Beach being misaligned with the policy direction of managed retreat, and thus ill-suited to pursuing bounce-forward resilience policy solutions. Illustrating the difficulty of implementing resilience policies that run counter to dominant development paths and social context, Holden et al. (2016) state,

[I]n most contemporary cultures, being told to limit one’s consumptive activities runs counter to the dominant grain of cultural messages that are deeply seated within our nations, communities, and households. Instead... we are urged and incentivized to grow, increase activities, and put self-interest first..[and] this makes it extremely unlikely for any notion of resilience via harm reduction and imposed limits to appeal to more than a small, counter-cultural segment within society. Thus, the narrative misses the opportunity to be backed by a political, cultural majority (p. 300).

If the policy process were implemented based on this expectation, the City would have offered different information, rewards and incentives to make the preferred solution

possible. This would have included clear articulation of the benefits of managed retreat at individual or household levels, the perceived costs of inaction to households as well as to the larger city, and the possibilities pursuant to adopting a managed retreat approach. Although reducing risk, an inherent benefit of managed retreat strategies, is desirable from a public interest in climate change planning perspective, a focus on risk reduction alone at the vague scale of the public interest does not adequately change the levers of environmental politics and public values in order to make bounce-forward resilience policy palatable to property owners.

As described throughout this study, the drivers and forces of inertia to accepting managed retreat from a development path and behavioural lens are critical to understand. Through my interviews I identified development path and behavioural motivation factors that acted as forces of inertia to resilience-building within the CFAS process. In sections 5.2 and 5.3, I assess two key underlying factors inhibiting transformative policy development, reaching well beyond the specifics of the CFAS policy cycle process:

- Property as a mode of capital accumulation; and
- The differences in risk perception for the public sector versus for individual homeowners.

Property as a mode of capital accumulation and the differences in risk perception for the public sector versus for individual homeowners are factors that are relevant to planning practice more broadly. As exemplified in literature, these factors are likely to serve as barriers in other resilience policy processes (see Anderson, 2022; Bohnert & Doberstein, 2022; Council of Canadian Academies, 2022; Dachary-Bernard et al., 2019; Thistlethwaite et al., 2020). As part of this chapter, I link the specific findings in my Crescent Beach case study to further-reaching implications for planning practice. Although property as a mode of capital accumulation as well as community risk perception are common factors across planning practice that can constrain policy choice, Burch asserts that within these barriers lie the roots of a city's response capacity (2009). In sections 5.2 to 5.3, in alignment with Burch's framing of challenges as hope, I describe the tensions as well as opportunities within these factors to building bounce-forward resilience through community planning processes.

As described in Chapter 2, resilience is a concept rooted in multiple epistemologies. This is both a strength of the concept, as a master signifier – it offers the conceptual flexibility to bridge the gaps between the multiple disciplines involved in climate change planning – and a weakness – it is unclear what resilience ultimately accomplishes (Davoudi et al., 2012; Holden et al., 2016). In section 5.4, I describe how resilience can be challenging from an implementation standpoint, especially when the goals of resilience within policy processes are not clearly defined from the outset.

Moser and Ekstrom (2010) argue that barriers are different from limits in the context of the policy process. They define limits as “obstacles that tend to be absolute in the real sense” (p. 22026) — limits cannot be overcome. On the other hand, they emphasize that barriers within policy processes can be surmounted by a variety of different mechanisms including reprioritization, effort, or different ways of thinking (2010, p. 22026). The outcome of CFAS was not immediately transformative, but the barriers presented throughout the policy process do not necessarily preclude transformative resilience in the future. Pathways were put in place as part of the CFAS policy process that can be leveraged in the future to continue working towards a bounce-forward approach to resilience. These pathways are described in Section 5.5, and represent avenues relevant to other policy processes that may help build long-term resilience and work to re-orient development path trajectories towards the type of bounce-forward resilience required to adequately respond to the demands of climate change.

5.2. Property as a mode of capital accumulation

The importance of private property and property value defined in terms of capital accumulations emerged as a key interest that motivated residents’ resistance to managed retreat in Crescent Beach. Crescent Beach is an affluent area with an average 2022 property assessment of \$2,022,000, approximately 40% higher than the average home value in Surrey. Property in a capitalist society is seen as an investment and a means through which to accumulate more capital (Molotch, 1976). Especially in the Lower Mainland in the past twenty years, property values have steadily increased (McElroy, 2016). The MLS Housing Price Index is designed to measure the average rate of price changes in the real estate market, similar to the National Consumer Price Index except specifically applicable to real estate (Real Estate Board of Greater Vancouver, 2022a). From 2005 and 2010 in the Lower Mainland, the housing price index for

detached homes increased by 52.7 points, from 2010 to 2015 it increased by 33.9 points, and from 2015 to 2020, it increased by 24.9 points (Real Estate Board of Greater Vancouver, 2022b). There is an expectation that the upward trend will continue, and risk to property values is not commonly considered as an impact of climate change that households must bear. The imposition of managed retreat into this property value dynamic turns this expectation on its head; managed retreat, imposed upon a residential piece of property, would immediately reverse years or decades of property value increase and makes certain a loss in property value. In this way, adopting managed retreat would impose a very high cost for Crescent Beach property owners and a large sacrifice by them of the opportunity to grow their own property value in the future, as other property owners like them expect to do in Surrey and throughout the Lower Mainland. From the perspective of individual property owners, this move would unfairly impose collective costs of climate action on them as individual property owners.

Compounding this perceived unfair mismatch between the normalized expectation of property value appreciation in the region as a whole and among Crescent Beach property owners under a managed retreat scenario, is the pervasive underestimation of the risk to their property values from future flooding in the event of inaction. The way property value is constructed is significantly more complex than simply a number assigned by an appraiser and is worth examining in detail given the role property values played in building anger and fear of managed retreat within the CFAS process.

In *Urban Futures*, Logan and Molotch (2007) emphasize how place has been commodified, and how the result of that commodification “influences virtually every cultural, economic, and political institution that operates on the urban scene” (p. 2). In this way, the financial value of place is embedded in everyday life in a multiplicitous manner. The value of a home is not simply a number on an assessment notice, but embedded in culture, the economy, and politics – akin to development paths. On property values, and specifically how they relate to climate change policy development, Anderson (2022) provides an account of failed attempts on the California coast to implement managed retreat. In his study, Anderson (2022, p. 288) found that property values are determined not just by what we consider valuable, but what we choose to ignore or deny as part of the construction of that value. Anderson recognizes that property values are mediated by measures that are often outside of actions or

investments by a particular property owner, and the value that those external measures add to a property are often overlooked in our construction of value. For instance, Anderson mentions specifically the actions that cities or states take in terms of “coastal armouring” (or flood protection measures) that protect homes in the event of a disaster and absorb some of the risk of living in hazardous areas. He also describes the role of private insurance companies that offer flood protection insurance, preserving values through cost-sharing of risks. Coastal armouring and flood insurance bolster the values of homes in floodplains through risk mitigation. Without insurance or coastal armouring, homes would likely have significantly diminished value, depending on their proximity to coastal hazards and risk of inundation. He found that although the availability of insurance and past flood management decisions such as building a seawall boosts the value of a home, the effect of external measures on property values tends to be noticed by residents only when it has negative impacts. The general consensus from local realtors in Anderson’s (2022) case study was that “the implementation of managed retreat would result in the identification of hazardous homes and structures, and this would result in both lost value and a situation in which lenders or insurers [may] no longer be willing to support such properties” (p. 293).

Value for the at-risk homes Anderson (2022) describes was partly constructed through downplaying the risk of being located within the floodplain, offsetting risks through insurance, and assuming past coastal armouring would be adequate to withstand future floods. Although for instance, where Anderson’s study takes place in California, flood disclosures as part of property leases or sales that fit certain criteria are required (Practical Law Real Estate, 2018), a disclosure in and of itself may be an acceptable risk to buyers, but discussions about managed retreat as a policy solution suggests to potential buyers that the government cannot adequately protect this property so it is not worth investing in. Siders (2019, p. 216) discusses how retreat as a flood management strategy is often equated to defeat or failure and that “build it back” and “never retreat” were used as “rallying cries” to unite over rebuilding after the devastation Hurricanes Katrina and Sandy wrought. The negative framing of retreat can assign a label of failure to an individual property which challenges our construction of what that property’s value was to begin with.

My research came to similar conclusions in terms of what is included in residents' conceptualization of the value of their homes and what is not included or ignored in that understanding.

One of the specific questions I asked during my interviews was: "Do you think the City intervenes in property values when it comes to planning processes? Do you think prior City decisions have influenced the value of your home personally? Do you feel like your home is more influenced than others? If so, how?" Most residents did not think that prior city planning decisions had effects on the values of their property more than other areas. Specifically, I wanted to see whether residents viewed prior flood protection measures that the City maintained as adding value to their property in terms of risk mitigation over the past several decades, but no residents mentioned how the upgrade work to flood management infrastructure could have added value to their homes. This is similar to the argument that Anderson makes, in that the infrastructure projects or policy by government to protect homes and bolster value generally go unnoticed unless projects or policy have negative impacts on residents (2022). While residents in Crescent Beach did not believe the City influenced their property values through prior investments in flood protection, they did recognize that the City influenced or could influence their property values through talking about adopting managed retreat. Illustrating this point, a resident stated:

...Because they're doing these consultations, then the public are more aware of the discrepancies of the area. So if someone buys into Crescent Beach I believe they now would have to be knowledgeable about the new building code, the risk of flood, and the risk of storm damage. So for people that have been here a long time, it was never a risk in the beginning, but it's become a risk in the end.

This quote illustrates that residents believed the CFAS policy process drew attention to the fact Crescent Beach was in the floodplain and that had knock-on effects on people's risk perception of buying into the community and that, in turn, had an effect on property values. Counter to this, though, some of the residents I spoke with were not terribly concerned about their property values, given the major increase in values in the area over time (and generally in the Lower Mainland). Despite some residents not being concerned, however, based on reports about the final meetings with the Crescent Beach Property Owners' Association and the City before managed retreat was removed,

property values seemed to be an important point of contention for many residents (Crescent Beach Property Owners' Association, 2018b).

In addition to what residents described, a confidential correspondent emphasized the role that bringing up risks of climate change had on people's perceptions of property values in Crescent Beach:

That was a concern: that even by talking about the risks related to climate change and the hazards of flooding, that that in and of itself could negatively impact property value which was definitely a consideration [in the CFAS policy process] from the outset.

A City staff member reiterated a similar point:

So when [managed retreat] started hitting more mainstream media, people [panicked] and thought their property values would crumble, even though that was a known factor in the floodplain.

Some residents described the importance of flood insurance as a safeguard to their investment, with one resident specifically noting:

It might be the insurance companies that actually would get involved with the indemnity clause [for homes that went through the Policy O-28 process to waive the FCL requirements].

Despite what residents described about reliance on insurance, overland flood insurance is often not offered in Canada by default, and if overland flood insurance is offered, it usually only relates to freshwater, not saltwater (Council of Canadian Academies, 2022, p. 84). As of 2021, there was only one insurer in Canada that offers coverage for saltwater flooding (Institute for Catastrophic Loss Reduction, 2021, p. 13). Part of residents' construction of value of their homes may be based on the assumption they would be covered by insurance in the event of coastal flooding. The reality is, however, that they may not be covered under standard insurance policies. This represents a potential gap in risk perception and reality of risk due to climate change in the community.

Part of residents' perceived value of Crescent Beach homes is also based in how past accumulation of value will or should continue to follow along that same upward trajectory without disruption. Illustrating a need to look beyond what we are used to, one City of Surrey staff member stated:

We have to get rid of this concept of stasis which I think a lot of the world has— that everything stays the same or has always looked the same. However, things are changing and don't be afraid of change, but we have to think about how to manage for change.

Offering a way to break the cycle of the selective way we view the value of property, with property values often divorced from risk, there is a growing recognition amongst owners and investors of the importance of accounting for climate change risks in the purchase of property (see Bakkensen & Barrage, 2021; Bernstein et al., 2019; Clayton et al., 2021 as examples). Specifically, it was found by Bernstein et al. (2019 pp. 253, 269) in their study on the effect of sea level rise on property values in coastal communities across the United States, that areas vulnerable to sea level rise experience average discount rates of 7%, with this discount growing over time in alignment with increasingly bleak climate outlooks. Compared to the actual risk of losing a home to a flood, 7% is a low discount rate, but it does illustrate that underlying assumptions are changing about property risk when it comes to climate change. New online address querying tools such as ClimateCheck respond to buyers' concern over climate change-related risks. ClimateCheck allows people to assess vulnerability of properties in terms of heat, storms, flood, fire and drought using risk modelling so buyers can be more adequately informed about the risks of purchasing a particular property (Jarvis, 2021). As the effects of climate change are increasingly felt, climate risk pricing may be further embedded into the ways we characterize property and how that translates into value. The availability of the ClimateCheck tool demonstrates one of the avenues through which climate risk may be integrated into real estate market home pricing.

A shift in the recognition of the importance of climate change on mediating property values is occurring to an extent. This is exhibited by increasing discounts over time assigned to properties vulnerable to sea level rise, as well as new tools such as ClimateCheck that buyers can use to inform themselves of the climate risks associated with investment in certain properties. Ignorance to climate risk and assumptions around continuous capital accumulation through property, especially property at high risk from a hazards perspective, may be challenged over time. In this way, our constructions and expectations of property value and risk are changing. As real estate pricing begins to better reflect climate risk, it will likely affect areas like Crescent Beach. Over time, as property values are mediated by the real risks that sea level rise poses to real estate, property values become less of a barrier to adopting managed retreat and palatability of

managed retreat will likely be enhanced, not just in Crescent Beach, but likely in many places that currently rely on real estate as a predictably appreciating investment. This is a change in development paths that better supports a policy environment amenable to bounce-forward resilience.

5.3. The differences in risk perception for the public sector versus for individual homeowners

5.3.1. Age and its influence on risk perception

One concept that became evident through my study was that the majority of residents I interviewed did not feel threatened personally by the effects of climate change, and this risk perception created considerable inertia to adopting new types of flood control measures; if no risk was perceived in the first place, residents did not feel an urgency to act in a drastic way, especially when that drastic action would significantly affect their community and compromise their concentrated interests. This made selling the concept of managed retreat difficult for City staff involved in CFAS, who were obliged to ensure the safety of residents as well as answer to more diffuse interests of the broader City of Surrey tax-base. Risk perception was the code that was used most often throughout my analysis of the interview data, and most of the data coded under the risk perception category pointed to the fact residents did not feel particularly vulnerable to the effects of climate change in their lifetime, or in their community as compared to other places.

Most residents I interviewed believed they would not feel the effects of climate change within their lifetime and thought it would be something which their children or grandchildren would have to manage. Examples of the faraway nature and non-urgency of the issue are illustrated by residents' statements such as:

At [the different CFAS] meetings I would quite often say, when this is going to be an issue I'm going to be dead and maybe even my adult children, so it's hard to get really, really irate about something that probably isn't going to happen in your life.

We have to do something about it and Crescent Beach is going to get flooded, and it'll be after I've moved onto my rewards and my son has sold the house.

I don't think I will feel the effects of climate-induced flooding in my lifetime.

The sentiments surrounding a lack of urgency on the part of many Crescent Beach residents in regards to a response to climate change were corroborated by City staff. For example, an individual mentioned:

You've got an older demographic in that area.. who tend to think...these are hundred year events; it won't happen in their lifetime. So the kids can worry about it.

Approximately 30% of Crescent Beach residents were over the age of 65 according to the 2022 Canadian Census, as compared to 15% for Surrey on average. An older age likely played a role in residents' risk perceptions as elucidated by the quote above, in that many residents have lived in the area for their whole lives and have not experienced catastrophic flooding. In residents' minds, the likelihood of catastrophic flooding happening before they sell their homes and capitalize on their home investments is low, and the risk of property devaluation because of a managed retreat policy strategy being applied to their property in Crescent Beach is much higher. The age of stakeholders is an additional consideration for policymakers looking to implement managed retreat, as older age can put up additional barriers to policy acceptance and may also thrust significant lifestyle changes on a demographic that be least well-situated to handle that kind of change.

5.3.2. Time and its influence on risk perception

Illustrating the most extreme example of some Crescent Beach residents who are not worried about the effects of climate change, one City staff member described their experience with a certain faction of residents:

There was a group in Crescent Beach who did not want to do anything...one: the group did not in believe climate change, and two: they did not want a higher wall in front of their home. And they said they would rather take the chance of flooding than we do that.

Illustrating the point made above by City of Surrey staff, at the CFAS Crescent Beach Options Selection Workshop presentation in 2018, although this option was ranked slightly lower than the others, 15% of attendees at the workshop voted for proceeding with no additional flood adaptation (status quo) even after the risks of no

adaptation were described in that same workshop (The City of Surrey et al., 2018, p. 86). As described in Chapter 2, fear of a particular hazard generally fades as more time passes between exposure to that hazard and the present (Tierney et al., 2001). The policy window concept is similar; in that there is a specific window of time after an event, in this case a flood, in which a particular policy is most likely to be accepted (Kingdon, 1984). Crescent Beach has had minor floods, but not anything that qualifies as a major flooding event in recent years, and not having exposure to hazards frequently has led to complacency in concern over major flooding in the area.

Illustrating the importance of the influence of extreme weather events on the creation of a policy window in Crescent Beach, a consultant for the CFAS project stated:

Since they started keeping weather records at Point Atkinson which goes back to turn of the last century, we have dodged bullets and there have been storm events, but we have not experienced and are due for our [Hurricane] Sandy. Some people who work in the area almost talk about how it is going to be important to have something like that happen to show [risk]. Because...even with no climate change, there's risk; there's coastal flooding risk. And we have not experienced the type of coastal flood that we certainly could experience in the winter king tide. I think that would change the conversation quite a bit here as well.

A resident also stated that unless a major flooding event occurred, there would likely remain a rejection of managed retreat as a possible flood adaptation pathway within the Crescent Beach community:

I think it's going to be hard for government in advance of a flood actually happening.

Although there are demonstrated benefits to spending on climate preparedness responses, including up to a 10-fold cost savings as compared to post-disaster recovery-spending (Global Commission on Adaptation, 2019, p. 12; Saunders-Hastings et al., 2020, p. 9), preparedness runs counter to how people perceive risks (Achen & Bartels, 2004). For this reason, managed retreat remains an unpopular flood management strategy and is generally only implemented after a disaster happens (Bohnert & Doberstein, 2022, p. 2). The CFAS process in the Crescent Beach neighbourhood exemplifies the tension between preparedness and dominant perceptions of risk. Describing this tension, City staff emphasized the role that exposure to hazards has on acceptance of implementation of otherwise unpopular flood prevention infrastructure, stating:

[We've] raised the dikes [in Crescent Beach] in the past around the year 2000 and... you wouldn't believe the quantity of letters and amount of media attention we received. And it was only after the big storm that Delta had, I think it was about three years later, that people actually thanked [the City] for raising the dikes...and [we] only raised them maybe a metre at that time. People don't think [flooding] will happen to them.

In a study in the United States about whether voters effectively hold elected officials accountable for policy decisions, it was found that “Citizens may only appreciate successful preparedness expenditures after they successfully mitigate a disaster, which may be years after the incumbent leaves office. Hence, politicians may not be able to claim credit for preparedness projects” (Healy & Malhotra, 2009, p. 389). The Crescent Beach example described above illustrates the challenge of implementing flood control mitigation strategies without broad acceptance. Political decisions may remain unpopular until that preparedness spending actually proves to be worthwhile to residents. Given short political cycles, preparedness spending may not win votes. Navigating problems that require long-term planning horizons within the constraints of short political cycles remains an ongoing tension in resilience planning. Politicians are not always incentivized by voters to look at policy solutions with a time horizon further than the next election.

5.3.3. Behavioural manifestations of risk perception

Psychological distancing was also a way risk perception manifested itself in conversation in Crescent Beach surrounding coastal flooding risk. Psychological distancing as a coping mechanism came up in my interviews, and was described in the *CFAS Engagement Summary Phases 1-3*, which was a report about some of the key findings from and considerations about the CFAS engagement process. Psychological distancing was characterized in the engagement summary as a potential barrier to having effective conversations about climate change planning in the CFAS process. The report stated the City and consultants were able to effectively manage psychological distancing throughout the CFAS process. However, based on some of the responses from interviewees about the challenges posed by psychological distancing to the CFAS policy process, it was evident that psychological distancing still acted as a barrier to engagement and acceptance of flood management alternatives as compared to protection-based strategies.

Illustrating the challenges that psychological distancing posed to the CFAS process, a confidential correspondent noted:

In general, the people living [in Crescent Beach] would consider themselves fairly liberal, open-minded people, but definitely the discussion of something really painful like managed retreat, that's when it felt like psychological distancing really kicked in. I think the literature doesn't generally talk about that too much. Most of the literature the City found when developing the strategy was focused more on having the climate discussion, not about how you actually talk about managed retreat at that time.

Another example [of psychological distancing] is, "Nowhere else is talking about managed retreat, so why should we talk about it here? If Boundary Bay Village in Delta doesn't need to talk about managed retreat, why do we need to talk about in our community? I've lived here for a while and I've never seen a flood, so how could it happen here?" Those are a couple of the most obvious examples of psychological distancing.

Kunda's (1990) concept of motivated reasoning describes that human cognition can be very selective in determining beliefs, and in this way, reasoning may not be employed to search for the truth, but rather to search for ways to support a desired conclusion. This is how psychological distancing takes place.

Motivated reasoning is an important concept in climate change planning in that it explains some of the challenges in translating risk perception from the policy environment to a factor that actually motivates climate action within a public values context. Motivating reasoning is especially powerful when contending with the painful and uncomfortable realities of climate change. Specifically in my interviews, several interviewees mentioned how other places like New York and New Orleans were facing far worse challenges than Crescent Beach. There was an acknowledgement that sea level rise was happening in other cities, but not to the same extent in their own community. In order to try and mitigate the effects of psychological distancing on future implementation of CFAS and provide evidence that sea level rise was occurring in Surrey and not just other places, the City of Surrey installed a buoy in the waters near Crescent Beach to monitor water levels. A City staff member described the importance of this buoy installation:

We put out buoys; ones that look at the tides and ones that actually look at wave and storm surges, because there is not this type of ocean monitoring [here]. If you went up to Point Atkinson, you can get a small

amount [of data] or there's a bit in the Strait of Georgia, but nothing that's totally relevant for this area. And we said, everybody can have the information. It helps us in terms of preparation to have a good source of information. And now we can track sea level rise more accurately. So now the data is going to be able to show locally what sea level rise may be doing to the bay.

Furthering the effectiveness of solutions such as buoys that provide local data about sea level rise to reduce the psychological distance of climate change but still place a focus on underlying risks, Leviston et al. (2014), through their study on people's affective responses to climate change imagery, provide benefit-based guidance on ways to overcome psychological distancing as a barrier to effective climate policy development. They emphasize the importance of "a coherent positive narrative about climate change" (p. 453). Developing a positive narrative about the devastating effects of climate change is certainly a tall order. However, highlighting the "social benefits of collective response" is identified as a way to avoid senses of powerlessness and encourage effective climate action (Leviston et al., 2014, p. 453). Highlighting the benefits of collective response is an attainable and tangible way for policymakers to surmount barriers associated with risk perception. Similarly, as described in the Chapter 2, Smith et al. (2015) highlight the importance of the role of reorienting trajectories in socio-technical transitions, and the framing of that reorientation towards something perceived as positive, rather than negative to support regime shifts.

The City attempted to describe the community values preserved in adopting managed retreat through a values matrix presented throughout the CFAS process. This matrix, however, described values in a risk mitigation manner which was not effective given residents and the City had different perceptions of the risk of sea level rise. Holden et al. (2016) describe the role of backcasting: using a successful future outcome as a starting place to guide the path towards it. A visioning exercise that incorporates managed retreat as an adaptation pathway with a specific focus on backcasting may be a useful way to describe the benefits of managed retreat in a more tangible way to the community. Articulation of the benefits of managed retreat, rather than the risks related to climate change in Crescent Beach, may have been a more effective behavioural motivator to gain broader public acceptance of managed retreat. Aligning the articulation of the benefits of managed retreat with dominant development paths (reorienting trajectories in a positive manner) is a key to building resilience from a bounce-forward

perspective and should be woven into climate policy processes to contribute to their effectiveness.

5.4. The Characterization of Resilience Within the CFAS Final Strategy Document

Akin to the overall analytical vagueness of the term resilience, which is echoed in Davoudi et al.'s (2012) statement that "it is not quite clear what resilience means, beyond the simple assumption that it is good to be resilient" (p. 299), resilience as a framework that guides the CFAS Final Strategy document is not actually ever clearly defined by the City. Resilience is mentioned 45 times within the document, but no framework for assessing what the key tenets to resilience may be is incorporated into the CFAS process. As described, I use Davoudi et al.'s (2013) conceptualization of resilience to inform my understanding of resilience and analyze the CFAS policy process, but it is difficult, without a description of the City's understanding of resilience supposed to accomplish or be, whether the CFAS process actually aligned with what the City intended it to in terms of resilience-building. In this sense, resilience serves more as a buzzword in the CFAS document than a well-articulated guiding principle.

The communicative action model of planning, the logic upon which the CFAS engagement process is roughly constructed, can be a weak model of planning to use for stakeholder engagement because those involved in the policy process may not ever reach consensus; the concentrated and diffuse interests (city versus stakeholders), the basis upon which actors within this policy process ground their motivations, are at odds with one another in terms of outcome objectives. Resilience is a "bridging concept" that could be used within a communicative action model to unite interests and dialogue between parties with differing interests – they can come together over building resilience when the goals of resilience are mutually defined and mutually beneficial. But when resilience doesn't have a clear goal outside of it being pursued for the vague notion of the "public good" (one of the inherent challenges with a process rather than-outcome-oriented approach that resilience often takes on), then resilience cannot bridge the divides or make headway in terms of overcoming climate change policymaking barriers. Definition of clear goals for resilience that align with both concentrated and diffuse interests may be demanding, but may act as a catalyst within planning processes to shift

trajectories towards more effective climate change planning and transformative resilience.

5.5. Resilience Building in CFAS and Opportunities for Transformative Change

Despite the barriers that presented themselves during the CFAS policy process, future opportunities for transformative resilience were both embedded into the CFAS policy outcomes and may also come about from changes in regulatory environments. In the following section, I firstly describe municipal regulatory changes in the City of Surrey that help build resilience, with these regulatory changes specifically spurred by CFAS. Following this, I describe the larger provincial and federal flood management context that, in itself, is changing or could spark change in municipal flood planning approaches. Finally, I describe the policy flexibility built into the CFAS Final Strategy document that moves away from technical lock-in and towards the recognition of how behavioural motivation as well as regulatory changes may open up opportunities for discussing managed retreat again at a later date with potentially more acceptance of it as a viable strategy from stakeholders. Although the CFAS outcome was not immediately transformative; i.e. managed retreat was not pursued within the Final Strategy document, this section aims to show how aspects of the CFAS document can still be transformative and offers hope for resilience as a guiding concept in flood adaptation planning.

5.5.1. Changing municipal regulatory environments

Recall that Policy O-28 was in place since 1992 in Crescent Beach to bypass and fast-track the regular development variance permitting process when homes are not built to FCLs. Policy O-28 created vulnerabilities in the Crescent Beach community that could not have been solved, but at least could have been mitigated by building homes to FCL heights. The City has recognized the uptake of using restrictive covenants as a problem and stating;

Allowing the restrictive covenants may have been one of the mistakes that we [made] at the time.

With CFAS, however, the engineers and planners working on the project were able to make progress with politicians' views on the restrictive covenants and reverse the expedited development variance permit process, thus requiring homes to be built to FCLs. Illustrating the benefits that the reversal of Policy O-28 had on flood preparedness, as well as flood resilience, a City staff member stated:

...What happened is we actually got far enough along that we convinced politicians that even if we don't do retreat or even protect, all new houses should be built higher to flood construction levels. Crescent Beach was the only part in Surrey that the houses weren't required to be built to FCL, and with all this process we've got council and a new bylaw that went through that they have to build to FCL. So now it's the norm, not the exception. That to me is a huge benefit alone. At least the houses being built now are high enough...people won't die. You may flood your car and your first floor, which should have nothing on it anyway. So your recovery's quick, but people shouldn't die. To me, if nothing else, that's a huge accomplishment.

When we took it back to council later after CFAS was finished, they understood the concept that if [residents] build higher, there is no problem. The problem is when you don't let [residents] build higher. It used to be a height restriction that limited them. So we said, take off that high restriction from your zoning. Over time they're going to be more prepared than the rest of the area will be.

The requirement to build homes to FCL significantly reduces risk to new and redeveloped properties in Crescent Beach and is transformative in the sense that it provided a radically different approach to FCL enforcement in the neighbourhood as compared to the previous thirty years. Davoudi et al. (2013) emphasize that "small changes can reverberate through the system and cause large effects" and that this notion is fundamental to bounce-forward conceptualizations of resilience (p. 313). Coupling the long-term strategic direction with shorter term actions as CFAS does still leaves the process open to change in some capacity as implementation unfolds. The new requirement to build homes to FCLs is an example of how this smaller change can reverberate and have large effects in terms of resilience-building capacity. This offers hope for resilience in that both political values and residents' values can change as part of climate adaptation engagement processes despite the constraining nature of development paths.

5.5.2. Changing provincial and national regulatory environments

One particular regulatory barrier within the CFAS process was that there was no national strategy in place to guide how managed retreat would unfold during implementation. Describing the difficulty of navigating conversations about managed retreat without the policy to guide it, a confidential correspondent stated:

So one thing that made [discussing managed retreat] challenging is there is no standard in Canada for how a managed retreat compensation process works, so it was difficult for the City because they weren't the policy makers for some of those provincial and federal decisions. An example of this challenge unfolding in real-time is Grand Forks, where there was a debate about how the homeowners should be paid out for their properties. The Grand Forks example was a little different because it was reactive post flood; whether the valuation should be based on pre- or post-flood values. [But not having a national policy] was one of the stress points within CFAS. The City couldn't point to a national policy that said "don't worry, the precedent in Canada is that you get paid the fair value of the house, not including the impact of climate change" or what have you.

In a study on key considerations to build effective buyout policies, Thistlethwaite et al. (2020, p. 4) describe that in the United States, buyout programs have generally been ad-hoc, uncoordinated, and not developed in alignment with any national strategy. The uncoordinated nature of buyouts has led to a situation where policy makers do not learn from past buyout programs, resulting in "undermined program evaluation and improvement" (Thistlethwaite et al., 2020, p. 4). A report commissioned by Natural Resources Canada describes relevant policy considerations from select past managed retreat programs in Canada (see Saunders-Hastings et al., 2020), but this report is not a substitute for a national policy that municipalities can use to guide the implementation of managed retreat. A national strategy on managed retreat at a federal level would help patch the regulatory gap and aid municipalities' discussions about this policy avenue.

In 2022, less than a year after devastating floods occurred across British Columbia the Province of British Columbia released an intentions paper on guiding flood management strategies across the province. Within the intentions paper, there is a focus on the importance of flood accommodation and flood avoidance through a variety of mechanisms including: building to flood control elevations, allowing basement or nuisance flooding, building with flood tolerant materials, zoning restrictions to keep development out of hazardous lands, and acquisition of private lands (Government of

British Columbia, 2022). In the intentions paper, this is deemed “safe flooding” (p. 9). Within the intentions paper, the provincial government describes structural flood protection measures as “costly yet fallible” and focusses on allowing flooding to occur rather than trying to prevent it (p. 24). This represents a shift from the assumption we can continue to focus only on structural flood protection measures and instead demonstrates a reliance on the multitude of tools within the policymaking toolkit to respond to floods. The report also emphasizes the need to decrease reliance on “predicting and controlling change” and instead to focus on “enhancing community capacity to anticipate uncertainties and adapt to change” (p. 24). This approach is closely aligned with the tenets of bounce-forward resilience. Policy support at a higher level of government than municipal may begin to change the regulatory environment in ways that better support managed retreat as a viable policy solution, not just in Crescent Beach, but in other vulnerable regions that heavily rely upon structural flood protection measures.

5.5.3. Policy flexibility within the CFAS final document

Although managed retreat was not adopted, other aspects that were retained within the CFAS Final Strategy document for Crescent Beach do align in some ways with Davoudi et al.’s (2013) bounce-forward conceptualization of resilience. For instance, although the long-term strategic direction for Crescent Beach is an expanded edge or raising the dikes, the CFAS policy document leaves the door open for future evaluation as to when exactly that strategy would be implemented. As stated within the CFAS document, “Shorter-term tactical actions include a series of smaller-scale drainage improvements and regulatory changes (e.g., higher flood construction level) until such point that sea level rise...triggers an ‘expanded edge’ approach” (The City of Surrey, 2019, p. 4). As described in a report on approaches to planned retreat in Canada that included key informant interviews with government staff, with CFAS acting as a particular case study:

Planned retreat was ultimately not pursued [in CFAS] under this cycle of adaptation, but the option could be revisited down the road as climatic conditions change, the community makeup evolves, and direct community experiences with the impacts of climate change continue to be experienced (Saunders-Hastings et al., 2020, p. 21).

This statement suggests that from an evolutionary and longer-term view, the CFAS may represent a stop along a transformative change trajectory for the Crescent Beach community. The City also takes into consideration, within the framing of the expanded edge (raising the dikes) in CFAS, the “External and interconnected issues, such as flood insurance, property values and public risk perception [that] are expected to influence triggers to implement longer-term actions” (The City of Surrey, 2019, p. 4).

In the way that the adoption of an expanded edge is characterized, the City does not commit itself to a particular timeframe for implementation and recognizes the malleability of the strategy over the long-term due to similar motivating behavioural and development path factors that were analyzed in this study, such as property values and public risk perception. Using Davoudi et al.’s framework for resilience, the City’s approach with the expanded edge as a long-term strategic direction within the CFAS document demonstrates the preparedness (characterized as learning capacity), adaptability, and transformability tenets. The City is willing to learn from how factors such as flood insurance, property values, and risk perception may be catalysts for implementation, demonstrating preparedness. The City’s approach is also adaptable and transformable and although managed retreat is in the long-term strategy document, there is evidence the City is willing to revisit that choice at some point in the future (Saunders-Hastings et al., 2020). In and of itself, the expanded edge approach is not radical, nor does it reorient development trajectories, but the way that it is framed in terms of revisiting its implementation evaluation and trigger points does foster resilience in a bounce-forward capacity, such as how Davoudi et al.’s framework delineates.

Chapter 6. Conclusion

In this study, I provided a narrative of the Coastal Flood Adaptation Strategy (CFAS) engagement process in Crescent Beach from project inception, to engagement sessions, to Final Strategy document. I studied the implications of the policy and engagement process followed in Crescent Beach to obtain insights into the meaning and communicative strategy of resilience planning and the variety of factors affecting perception of climate risk and its translation into planning and policy. While the option of managed retreat is the most certain policy strategy to minimize long-term risk of losses in Crescent Beach under realistic climate change scenarios, and while it did emerge from the staff-driven policy analysis process as an “emerging direction”, the plan took an abrupt change of direction following resident outcry against the option of managed retreat. I identified the main political, planning, and behavioural barriers to adopting managed retreat as they appeared within the way the CFAS policy was constructed by way of consultation, engagement, education. In order to achieve this, I posed the question: in terms of plan and policy priorities, how did managed retreat move from an ‘emerging direction’ for flood management in Crescent Beach to being removed as a viable option from the Coastal Flood Adaptation Strategy? Through this study I weaved together understandings of development paths, contextual factors such as risk perception, and the notion of embeddedness to understand how these factors can play a role in producing barriers to transformative resilience.

Using a combination of primary and secondary document review and semi-structured interviews, I found that there were six milestones within the CFAS policy process that were key to steering policy trajectory. These milestones were as follows:

1. The West Coast Environmental Law, Adaptation to Climate Change Team from Simon Fraser University and Ideaspace-led workshop and its role in building a protection bias in Crescent Beach (May to September 2016);
2. CFAS Open House for Phases 2 and 3 and its presentation of managed retreat as the emerging direction for Crescent Beach (April 2018);
3. Several media articles covering managed retreat as the emerging direction for Crescent Beach (May 2018)

4. Meeting between the City and the Crescent Beach Property Owners' Association (July 4th, 2018);
5. An imminent municipal election and role of politicians near the decision-making stage of the CFAS policy process; and
6. Meeting between the City and the Crescent Beach Property Owners' Association (July 31st, 2018).

The milestones revealed both new and overlapping barriers, mostly in the form of human behavioural barriers such as risk perception and development path contexts including the political cycle and the constraining effect of prior political decisions. Although these milestones were important in steering the trajectory of the CFAS policy process, the underlying development path context ultimately caused managed retreat to be perceived by residents as a high-cost strategy – if managed retreat was not perceived as a high cost strategy, the six milestones that steered the policy process away from managed retreat as a CFAS outcome for Crescent Beach may not necessarily have had the same effect. The underlying development path created an environment before the CFAS policy process even commenced that limited the palatability of managed retreat as a viable policy outcome. The leading contextual factors I discovered through my study were the focus on property as a form of capital accumulation as well as the behavioural motivation of risk perception.

My research builds on Burch's (2009) research into barriers to climate action in the Lower Mainland, specifically incorporating more of the influence of social context into barrier production and persistence. Although in the intervening decade between Burch's study and my own, many municipalities have engaged in effective climate action policymaking, managed retreat as a policy avenue as part of that climate action is one that remains particularly contentious (see Anderson, 2022) and worthy of nuanced analysis. Whereas Holden et al. (2016) provide a broad-scale conceptual model for understanding the linkages between development paths and resilience frameworks, my research links the notions of resilience to development path thinking via a small-scale case study identifying specific policy interventions that may have reoriented the CFAS trajectory.

Through the identification of barriers to CFAS policy development, using Burch's understanding that barriers are also the roots of a city's response capacity (2009), I uncover and describe opportunities to embed policy incentives that harness behavioural motivations and the existing development path to support transformative resilience in planning, and policy outcomes that favour diffuse interests. I specifically speak to the importance of a clear articulation of the "social benefits of collective response" when challenged with risk perception that takes the form of psychological distancing (Leviston et al., 2014, p. 453), and also speak to how climate risk pricing may reduce the barriers that materialize through property acting as a mode of capital accumulation. Finally, I describe how the regulatory environment at both provincial and national scales can impede or encourage the acceptability of managed retreat, with specific lessons to draw from via the Province of British Columbia and Government of Canada.

6.1. Policy Recommendations

Through this study, my analysis identified a series of policy recommendations that can favour more transformative approaches to adaptation and resilience to climate change. These policy recommendations include:

1. Communication about the benefits of resilience to climate change usually cannot solely be focussed on risk reduction. Careful consideration and development of a communication strategy that aligns the public benefits of a resilient approach to climate change planning with the concentrated and private interests and values of affected stakeholders is required.
2. Clear and specific reflection on the case-specific meaning of climate resilience. Scenarios and back-casting approaches can be used to develop concrete images of what the community could look like and the benefits that could result in the long-term from a policy approach grounded in resilience.
3. Consider the importance of the decision-making stage of the policy process and how it aligns with political election cycles. Time important

milestone decisions as far from elections as possible in order to reduce the impact of playing politics with climate resilience.

4. Take into account existing municipal, provincial, and federal policy conditions that may influence stakeholders' risk perceptions or the willingness of stakeholders to adopt more resilient approaches (for instance, Policy O-28 in this case study). Design policy to better incentivize, and not discourage, the uptake of more resilient approaches through leadership and enabling innovative organizations to implement transformative change.
5. Take into account relevant economic or market conditions in the development path; in this particular case, private insurance and the property market, and address market condition misalignment with desired climate resilience policy goals. Mitigate perverse incentives as part of the climate policy process, when these cannot be overcome.
6. Strategic media relations to facilitate more predictable public debate at different stages of the policy cycle.

Smith et al. (2005) emphasize the importance of the role of policymakers' knowledge of existing development paths, their ability to articulate the benefits of climate action, and understanding of what motivates human behaviour towards more resilient or sustainable outcomes. My case study answers these calls. My research delineates a handful of opportunities within a suite of barriers that can act as constructive ways to reorient policy trajectories towards the long-term public interest in transformative climate resilience, in spite of short-term private interests that discourage this change. Significant work and research, however, are still required to build more fulsome understandings and overcome these barriers within climate change planning processes and motivate social, political, and behaviour towards more resilient objectives that favour the public good.

References

- Achen, C., & Bartels, L. (2004). *Musical Chairs: Pocketbook Voting and the Limits of Democratic Accountability*. Annual Meeting of the American Political Science Association, Chicago, Chicago.
- ACT SFU, West Coast Environmental Law, & The City of Surrey. (2016). *Crescent Beach Community Meeting Series: Summary Report on Coastal Flooding and Climate Change*.
<https://www.surrey.ca/sites/default/files/media/documents/CFASCrescentBeachSummaryReport.pdf>
- Anderson, R. B. (2022). The taboo of retreat: The politics of sea level rise, managed retreat, and coastal property values in California. *Economic Anthropology*, 9(2), 284–296. <https://doi.org/10.1002/sea2.12247>
- Association of Professional Engineers and Geoscientists of BC, Ministry of Forests, Lands and Natural Resource Operations, & Natural Resources Canada. (2012). *Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC*. <https://sooke.ca/wp-content/uploads/APEGBC-Legislated-Flood-Assessments.pdf>
- Bakkensen, L. A., & Barrage, L. (2021). Going Underwater? Flood Risk Belief Heterogeneity and Coastal Home Price Dynamics. *The Review of Financial Studies*. <https://doi.org/10.1093/rfs/hhab122>
- Baron, C. (2011, November 2). *Challenge of Sea Level Rise for the City of Surrey*. <https://www.bcexpropriationassociation.ca/wp/wp-content/uploads/2016/09/2011-Challengeofsealevelcarriearon.pdf>
- BC Ministry of Environment & Ausenco Sandwell. (2011). *The Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use* (Project No. 143111). Government of British Columbia.
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/sea_dike_guidelines.pdf
- BC Ministry of Forests, Lands and Natural Resource Operations & Northwest Hydraulic Consultants. (2014). *Simulating the Effects of Sea Level Rise and Climate Change on Fraser River Flood Scenarios, Final Report* [Final Report]. Government of British Columbia.
https://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/Simulating_Effects_of_Sea_Level_Rise_and_Climate_Change_on_Fraser_Flood_Scenarios_Final_Report_May-2014.pdf
- Bechtel, M. M., & Hainmueller, J. (2011). How Lasting Is Voter Gratitude? An Analysis of the Short- and Long-Term Electoral Returns to Beneficial Policy. *American Journal of Political Science*, 55(4), 852–868. <https://doi.org/10.1111/j.1540-5907.2011.00533.x>

- Berkes, F., & Ross, H. (2013). Community Resilience: Toward an Integrated Approach. *Society & Natural Resources*, 26(1), 5–20. <https://doi.org/10.1080/08941920.2012.736605>
- Bernstein, A., Gustafson, M. T., & Lewis, R. (2019). Disaster on the horizon: The price effect of sea level rise. *Journal of Financial Economics*, 134(2), 253–272. <https://doi.org/10.1016/j.jfineco.2019.03.013>
- Billig, M. (2006). Is My Home My Castle? Place Attachment, Risk Perception, and Religious Faith. *Environment and Behavior*, 38(2), 248–265. <https://doi.org/10.1177/0013916505277608>
- Blake, J. (1999). Overcoming the “value-action gap” in environmental policy: Tensions between national policy and local experience. *Local Environment*, 4(3), 257–278. <https://doi.org/10.1080/13549839908725599>
- Bliss, L. (2019, June 12). The Rise, Fall, and Possible Rebirth of 100 Resilient Cities. *Bloomberg Citylab*. <https://www.bloomberg.com/news/articles/2019-06-12/the-demise-of-rockefeller-s-100-resilient-cities>
- Bohnert, S., & Doberstein, B. (2022). *Enhancing the acceptability of buyouts for climate change adaptation: Exploring a social license approach for Erie Shore Drive, Ontario* (No. 71; ICLR Research Paper Series). Institute for Catastrophic Loss Reduction. <https://www.iclr.org/wp-content/uploads/2022/01/Enhancing-the-acceptability-of-buyouts-for-climate-change-adaptation-Erie-Shore-Drive.pdf>
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, 59(1), 20–28. <https://doi.org/10.1037/0003-066X.59.1.20>
- Bourdieu, P. (1990). *The Logic of Practice*. Polity Press.
- Brand, F. S., & Jax, K. (2007). Focusing the meaning(s) of resilience: Resilience as a descriptive concept and a boundary object. *Ecology and Society*, 12(1). <https://www.ecologyandsociety.org/vol12/iss1/art23/>
- British Columbia Real Estate Association, Herbert, Y., Picketts, I., & Lyle, T. (2014). *Floodplain Mapping Funding Guidebook for BC Local Governments*. British Columbia Real Estate Association. <https://www.bcrea.bc.ca/wp-content/uploads/2019-07FloodplainMapGuideBook.pdf>
- British Columbia Real Estate Association, Lyle, T., Picketts, I., & Herbert, Y. (2014). *Floodplain Mapping Backgrounder to the BC Real Estate Association Floodplain Mapping Funding Guidebook for BC Local Governments*. British Columbia Real Estate Association. <https://www.bcrea.bc.ca/wp-content/uploads/2014-FM-backgrounder.pdf>

- Browne, A. (2018, August 1). 'Managed retreat' option dropped from Surrey's coastal flooding strategy. *Peace Arch News*.
<https://www.peacearchnews.com/news/managed-retreat-option-dropped-from-surreys-coastal-flooding-strategy/#:~:text=A%20media%20release%20issued%20Wednesday,impacted%20stakeholders%20from%20Crescent%20Beach.%E2%80%9D>
- Bukvic, A., Zhu, H., Lavoie, R., & Becker, A. (2018). The role of proximity to waterfront in residents' relocation decision-making post-Hurricane Sandy. *Ocean & Coastal Management*, 154, 8–19. <https://doi.org/10.1016/j.ocecoaman.2018.01.002>
- Bula, F. (2018, May 22). B.C. cities debating bold moves to cope with rising sea levels. *The Globe and Mail*. <https://www.theglobeandmail.com/canada/british-columbia/article-bc-cities-debating-bold-moves-to-cope-with-rising-sea-levels/>
- Burch, S. (2009). *Local Responses to Climate Change: An Exploration of the Relationship Between Capacity and Action* [University of British Columbia].
<https://open.library.ubc.ca/soa/cIRcle/collections/ubctheses/24/items/1.0067519>
- Cao, Y., Wilkinson, E., Pettinotti, L., Colenbrander, S., & Lovell, E. (2021). *An Analytical Review: A Decade of Urban Resilience*. UNDP.
<https://www.undp.org/sites/g/files/zskgke326/files/2021-12/UNDP-ODI-An-Analytical-Review-A-Decade-of-Urban-Resilience.pdf>
- Carey, J. (2020). Managed retreat increasingly seen as necessary in response to climate change's fury. *Proceedings of the National Academy of Sciences*, 117(24), 13182–13185. <https://doi.org/10.1073/pnas.2008198117>
- CBC News. (2018, May 28). Buying out 400 Crescent Beach homes an option for Surrey as sea levels rise. *CBC News*. <https://www.cbc.ca/news/canada/british-columbia/surrey-crescent-beach-climate-change-1.4675432>
- Chaster, R. (2015). *Managing the Unavoidable: Planning for a Resilient Surrey in the Face of Sea Level Rise* [Master's Thesis, University of British Columbia].
<https://open.library.ubc.ca/cIRcle/collections/graduateresearch/310/items/1.0300045>
- Clar, C., & Steurer, R. (2019). Climate change adaptation at different levels of government: Characteristics and conditions of policy change. *Natural Resources Forum*, 43(2), 121–131. <https://doi.org/10.1111/1477-8947.12168>
- Clayton, J., Devaney, S., Sayce, S., & Van de Watering, J. (2021). Climate risk and real estate prices: What do we know? *Journal of Portfolio Management*, 47(10), 75–90.

- Connors, S., Pidcock, R., Allen, M., de Coninck, H., Engelbrecht, F., Ferrat, M., Ford, J., Fuss, S., Hawtin, N., Hoegh Goldberg, O., Jacob, D., Ley, D., Diana, L., Masson-Delmotte, V., Millar, R., Newman, P., Payne, A., Perez, R., Rogelj, J., ... Tschakert, P. (2018). *Frequently Asked Questions*. The International Panel on Climate Change. https://www.ipcc.ch/site/assets/uploads/sites/2/2018/12/SR15_FAQ_Low_Res.pdf
- Council of Canadian Academies. (2022). *Building a Resilient Canada* (The Expert Panel on Disaster Resilience in a Changing Climate). <https://www.cca-reports.ca/wp-content/uploads/2022/01/Building-a-Resilient-Canada-web-EN.pdf>
- Crescent Beach Property Owners' Association. (2018a, May 2). CBPOA - May 2nd, 2018—General Meeting Minutes. *CBPOA MAIN PAGE*. <http://cbpoa-mainpage.blogspot.com/>
- Crescent Beach Property Owners' Association. (2018b, July 4). CBPOA - July 4th, 2018, General Meeting Minutes. *CBPOA MAIN PAGE*. <http://cbpoa-meetingminutes.blogspot.com/2018/07/>
- Crescent Beach Property Owners' Association. (2018c, July 4). CBPOA - July 31st, 2018, General Meeting Minutes. *CBPOA MAIN PAGE*. <http://cbpoa-meetingminutes.blogspot.com/2018/07/>
- Dachary-Bernard, J., Rey-Valette, H., & Rulleau, et B. (2019). Preferences among coastal and inland residents relating to managed retreat: Influence of risk perception in acceptability of relocation strategies. *J Environ Manage*, 232, 772–780. <https://doi.org/10.1016/j.jenvman.2018.11.104>
- Danielson, L. (2015). *Patching the Leaks: Reforming British Columbia's Policy Approach to Property-level Flood Resilience* [Master's Thesis, Simon Fraser University Faculty of Arts & Social Sciences: School of Public Policy]. <http://summit.sfu.ca/item/15372>
- Davis, G., Wanna, J., Warhust, J., & Weller, P. (1993). *Public Policy in Australia*. Allen & Unwin.
- Davoudi, S., Brooks, E., & Mehmood, A. (2013). Evolutionary Resilience and Strategies for Climate Adaptation. *Planning Practice & Research*, 28(3), 1–16.
- Davoudi, S., Shaw, K., Haider, L. J., Quinlan, A. E., Peterson, G. D., Wilkinson, C., Fünfgeld, H., Mcevoy, D., & Porter, L. (2012). Resilience: A Bridging Concept or a Dead End? *Planning Theory & Practice*, 13(2), 299–333.
- Deputy City Engineer & General Manager, Planning & Development, the City of Surrey. (2014). *Proposed Amendments to the Provincial Flood Hazard Area Land Use Management – City of Surrey Comments* (Corporate Report No. R167). The City of Surrey. https://www.surrey.ca/bylawsandcouncillibrary/CR_2014-R167.pdf

- Dickson, C. (2022, June 7). Hundreds died because they couldn't escape B.C.'s extreme heat. Alerts wouldn't have saved them, advocates say. *CBC News*. 07-21-2022. <https://www.cbc.ca/news/canada/british-columbia/bc-changes-extreme-heat-2022-1.6480993#:~:text=According%20to%20a%20new%20report,extreme%20heat%20blankets%20the%20province>
- Digital Writers. (2021, June 29). B.C. village scores hottest temperature hat trick no Canadian wants. *The Weather Network*. <https://www.theweathernetwork.com/ca/news/article/british-columbia-village-scores-hottest-temperature-hat-trick-no-canadian-wants#:~:text=B.C.%20village%20scores%20hottest%20temperature%20hat%20trick%20no%20Canadian%20wants,-Digital%20Writers&text=Third%20time%20is%20a%20charm,46.6%C2%B0C%20on%20Sunday>
- Environment and Climate Change Canada. (2022). *Global greenhouse gas emissions*. The Government of Canada. <https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/global-greenhouse-gas-emissions.html>
- EPI, The City of Surrey, & Northwest Hydraulic Consultants. (2016). *Coastal Flood Adaptation Strategy: Media and Communications Framework Draft*.
- Ernstson, H., Leeuw, S. E. van der, Redman, C. L., Meffert, D. J., Davis, G., Alfsen, C., & Elmqvist, T. (2010). Urban Transitions: On Urban Resilience and Human-Dominated Ecosystems. *Ambio*, 39(8), 531–545. <https://doi.org/10.1007/s13280-010-0081-9>
- Everett, S. (2003). The Policy Cycle: Democratic Process or Rational Paradigm Revisited? *Australian Journal of Public Administration*, 62(2), 65–70. <https://doi.org/10.1111/1467-8497.00325>
- Federation of Canadian Municipalities, Insurance Bureau of Canada, & Green Analytics Corp. (2020). *Investing in Canada's Future: The Cost of Climate Adaptation at the Local Level* [Final Report]. <https://data.fcm.ca/documents/reports/investing-in-canadas-future-the-cost-of-climate-adaptation.pdf>
- Flooding in Surrey: A timeline of more than [sic] a century of flood events and municipal response*. (n.d.). Retrieved July 21, 2022, from http://cdn.knightlab.com/libs/timeline3/latest/embed/index.html?source=1HHSV7mmtRGE-dbN38_n5Tyi5o8UWqNaxKzt8fmF-gE&font=Default&lang=en&initial_zoom=2&height=650
- Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockstrom, J. (2010). Resilience Thinking: Integrating Resilience, Adaptability and Transformability. *Ecology and Society*, 15(4), Art. 20. <https://doi.org/10.5751/ES-03610-150420>

- Fraser, J., Elmore, R., Godschalk, D., & Rohe, W. (2003). *Implementing Floodplain Land Acquisition Programs in Urban Localities* [Commissioned by the Federal Emergency Management Agency (FEMA) and the National Science Foundation]. The Center for Urban & Regional Studies, University of North Carolina at Chapel Hill.
https://www.researchgate.net/publication/237546980_Implementing_Floodplain_Land_Acquisition_Programs_in_Urban_Localities
- Friedmann, J. (1987). *Planning in the Public Domain*. Princeton University Press.
- Gawel, E., Lehmann, P., Strunz, S., & Heuson, C. (2018). Public Choice barriers to efficient climate adaptation – theoretical insights and lessons learned from German flood disasters. *Journal of Institutional Economics*, 14(3), 473–499.
<https://doi.org/10.1017/S1744137416000163>
- General Manager, Engineering, the City of Surrey. (2016). *Development of a Surrey Coastal Flood Protection Strategy* (Corporate Report No. R034). The City of Surrey. https://www.surrey.ca/sites/default/files/corporate-reports/RPT_2016-R034.pdf
- General Manager of Engineering, the City of Surrey. (2009). *Crescent Beach Climate Adaptation Strategy Addressing Drainage Concerns* (Corporate Report No. R033). The City of Surrey. https://www.surrey.ca/sites/default/files/corporate-reports/RPT_2009_R033.pdf
- General Manager of Engineering, the City of Surrey. (2016). *Development of a Surrey Coastal Flood Adaptation Strategy 2016 Year End Update* (Corporate Report No. R263). The City of Surrey. https://www.surrey.ca/sites/default/files/corporate-reports/RPT_2016-R263.pdf
- Giddens, A. (1984). *Constitution of Society*. Polity Press.
- Gies, E. (2022, May 24). Letting the Sea Have Its Way Welcome to Selsey, a community that welcomed back the marsh. *Hakai Magazine*.
<https://www.atlasobscura.com/articles/selsey-england-slow-water>
- Gillett, N. P., Cannon, A. J., Malinina, E., Schnorbus, M., Anslow, F., Sun, Q., Kirchmeier-Young, M., Zwiers, F., Seiler, C., Zhang, X., Flato, G., Wan, H., Li, G., & Castellan, A. (2022). Human influence on the 2021 British Columbia floods. *Weather and Climate Extremes*, 36, 100441.
<https://doi.org/10.1016/j.wace.2022.100441>
- Global Commission on Adaptation. (2019). *Adapt Now: A Global Call for Leadership on Climate Resilience*. World Resources Institute.
<https://openknowledge.worldbank.org/handle/10986/32362>
- Government of British Columbia. (2022). *From Flood Risk to Resilience in BC: An Intentions Paper*. Government of British Columbia.
<https://engage.gov.bc.ca/app/uploads/sites/797/2022/10/From-Flood-Risk-to-Resilience-in-B.C.pdf>

- Gunderson, L. H., & Holling, C. S. (2002). *Panarchy: Understanding transformations in human and natural systems*. Island Press.
- Hallegatte, S., & Corfee-Morlot, J. (2011). Understanding climate change impacts, vulnerability and adaptation at city scale: An introduction. *Climatic Change*, 104(1), 1–12. <https://doi.org/10.1007/s10584-010-9981-8>
- Healy, A., & Malhotra, N. (2009). Myopic Voters and Natural Disaster Policy. *Am Polit Sci Rev*, 103(3), 387–406. <https://doi.org/10.1017/S0003055409990104>
- Hinks, A. (2018, June 1). Surrey mulls relocating 400 Crescent homes in decades to come. *Peace Arch News*. <https://www.peacearchnews.com/news/surrey-mulls-relocating-400-homes-in-crescent-beach/>
- Holden, M. (2011). Public Participation and Local Sustainability: Questioning a Common Agenda in Urban Governance. *International Journal of Urban and Regional Research*, 35(2), 312–329. <https://doi.org/10.1111/j.1468-2427.2010.00957.x>
- Holden, M., Robinson, J., & Sheppard, S. (2016). From Resilience to Transformation Via a Regenerative Sustainability Development Path. In Y. Yamagata & H. Maruyama (Eds.), *Urban Resilience: A Transformative Approach* (pp. 295–319). Springer International Publishing. https://doi.org/10.1007/978-3-319-39812-9_15
- Holling, C. S. (1973). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, 4, 1–23. JSTOR.
- Holling, C. S. (1996). Engineering resilience versus ecological resilience. In P. C. Schultz (Ed.), *Engineering Within Ecological Constraints* (pp. 31–44). National Academy Press.
- Howlett, M., & Ramesh, M. (2003). *Studying Public Policy: Policy Cycles and Policy Subsystems*. Oxford University Press.
- Institute for Catastrophic Loss Reduction. (2021). *Focus on Types of Flooding*. Institute for Catastrophic Loss Reduction. https://www.iclr.org/wp-content/uploads/2021/04/ICLR_Flooding_2021.pdf
- Intergovernmental Panel on Climate Change. (2022). *Climate Change 2022: Impacts, Adaptation and Vulnerability* (No. 6). Intergovernmental Panel on Climate Change. https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_FinalDraft_FullReport.pdf
- Iversen, R. R., & Armstrong, A. L. (2008). Hurricane Katrina and New Orleans: What Might a Sociological Embeddedness Perspective Offer Disaster Research and Planning?: Katrina and Embeddedness. *Analyses of Social Issues and Public Policy*, 8(1), 183–209. <https://doi.org/10.1111/j.1530-2415.2008.00164.x>

- Jarvis, C. (2021, October 8). Climate risk assessments may soon impact Canadian real estate prices. *The Vancouver Sun*. <https://vancouversun.com/moneywise-pro/borrowing-money/climate-risk-assessments-may-soon-impact-canadian-real-estate-prices>
- Jasanoff, S. (2005). *Designs on Nature*. Princeton University Press.
- Jordan, A., Huitema, D., Hildén, M., van Asselt, H., Rayner, T., Schoenefeld, J., Tosun, J., Forster, J., & Boasson, E. L. (2015). Emergence of polycentric climate governance and its future prospects. *Nature Climate Change*, 5, 977–982. <https://doi.org/10.1038/nclimate2725>
- Judd, A. (2021, November 25). 5th victim of deadly B.C. mudslide identified as 36-year-old man. *Global News*. <https://globalnews.ca/news/8402055/fifth-victim-bc-mudslide-highway-99/>
- Kahneman, D., Slovic, P., & Tversky, A. (2017). *Judgment under Uncertainty: Heuristics and Biases*. Macat Library. <https://doi.org/10.4324/9781912282562>
- King, D., Bird, D., Haynes, K., Boon, H., Cottrell, A., Millar, J., Okada, T., Box, P., Keogh, D., & Thomas, M. (2014). Voluntary relocation as an adaptation strategy to extreme weather events. *International Journal of Disaster Risk Reduction*, 8, 83–90. <https://doi.org/10.1016/j.ijdr.2014.02.006>
- Kingdon, J. (1984). *Agendas, alternatives and public policies*. Harper Collins.
- Klein, R. J. T., Huq, S., Denton, F., Downing, T. E., Richels, J. B., & Toth, F. L. (2007). *Inter-relationships between adaptation and mitigation* (Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, pp. 745–777). Cambridge University Press. <https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg2-chapter18-1.pdf>
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/13504620220145401>
- Kulkarni, A. (2021, October 4). A look back at the 2021 B.C. wildfire season. CBC News. <https://www.cbc.ca/news/canada/british-columbia/bc-wildfires-2021-timeline-1.6197751>
- Kunda, Z. (1990). The Case for Motivated Reasoning. *Psychological Bulletin*, 108(3), 480–498. <https://doi.org/10.1037/0033-2909.108.3.480>

- Kundzewicz, Z. W., Kanae, S., Seneviratne, S. I., Handmer, J., Nicholls, N., Peduzzi, P., Mechler, R., Bouwer, L. M., Arnell, N., Mach, K., Muir-Wood, R., Brakenridge, G. R., Kron, W., Benito, G., Honda, Y., Takahashi, K., & Sherstyukov, B. (2014). Flood risk and climate change: Global and regional perspectives. *Hydrological Sciences Journal*, *59*(1), 1–28. <https://doi.org/10.1080/02626667.2013.857411>
- Landphair, J. (2007). “The Forgotten People of New Orleans”: Community, Vulnerability, and the Lower Ninth Ward. *Journal of American History*, *94*, 837–845.
- Leena, S., Karina, U., & Jungsberg, L. (2019). Social license to operate in the frame of social capital exploring local acceptance of mining in two rural municipalities in the European North. *Resources Policy*, *64*, 101498. <https://doi.org/10.1016/j.resourpol.2019.101498>
- Leichenko, R. (2011). Climate change and urban resilience. *Current Opinion in Environmental Sustainability*, *3*(3), 164–168. <https://doi.org/10.1016/j.cosust.2010.12.014>
- Leviston, Z., Price, J., & Bishop, B. (2014). Imagining climate change: The role of implicit associations and affective psychological distancing in climate change responses. *European Journal of Social Psychology*, *44*(5), 441–454.
- Lieske, D. J., Wade, T., & Roness, L. A. (2014). Climate change awareness and strategies for communicating the risk of coastal flooding: A Canadian Maritime case example. *Estuarine, Coastal and Shelf Science*, *140*, 83–94. <https://doi.org/10.1016/j.ecss.2013.04.017>
- Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, *71*(3), 543–562. PubMed.
- Mangione, K. (2021, June 28). 59 temperature records broken in a single day as B.C. swelters under “heat dome.” CTV News. <https://bc.ctvnews.ca/59-temperature-records-broken-in-a-single-day-as-b-c-swelters-under-heat-dome-1.5488672>
- Manyena, S. B., O’Brien, G., O’Keefe, P., & Rose, J. (2011). Disaster resilience: A bounce back or bounce forward ability? *Local Environment*, *16*(5), 1–8. <https://doi.org/10.1080/13549839.2011.583049>
- McElroy, J. (2016, February 21). One chart shows how unprecedented Vancouver’s real estate situation is. *Global News*. <https://globalnews.ca/news/2531266/one-chart-shows-how-unprecedented-vancouvers-real-estate-situation-is/>
- Meerow, S., Newell, J., & Stults, M. (2016a). Defining urban resilience: A review. *Landscape And Urban Planning*, *147*, 38–49.
- Meerow, S., & Stults, M. (2016b). Comparing Conceptualizations of Urban Climate Resilience in Theory and Practice. *Sustainability*, *8*(7). <https://doaj.org/article/8e364150e44d453d9df39dfae10831a8>

- Meyer, R., & Kunreuther, H. (2017). *The Ostrich Paradox: Why We Underprepare for Disasters*. Wharton School Press.
- Ministry of Forests, Lands and Natural Resource Operations, Atukorala, U., Hawson, H., Mylleville, B., & Williams, R. (2014). *SEISMIC DESIGN GUIDELINES FOR DIKES, 2nd Edition* (No. 2nd).
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/seismic_guidelines_dikes-2014-2nd_edition.pdf
- MMM Group Limited, JFSA Water Resources and Environmental Consultants, & Matrix Solutions Inc. Environment & Engineering. (2014). *National Floodplain Mapping Assessment—Final Report*. Public Safety Canada.
<https://www.slideshare.net/glennmcgillivray/national-floodplain-mapping-assessment>
- Molotch, H. (1976). The City as a Growth Machine: Toward a Political Economy of Place. *American Journal of Sociology*, 82(2), 309–332.
<https://doi.org/10.1086/226311>
- Molotch, H., & Logan, J. (2007). *Urban fortunes: The political economy of place*. Berkeley, CA: University of California Press.
- Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proc Natl Acad Sci U S A*, 107(51), 22026–22031.
<https://doi.org/10.1073/pnas.1007887107>
- Nakicenovic, N., Alcamo, J., Davis, G., de Vries, B., Fenhann, J., Gaffin, S., Davidson, O., Grübler, A., Kram, T., & La Rovere, E. L. (2000). *IPCC Special Report on emissions scenarios* (A Special Report of Working Group III). Intergovernmental Panel on Climate Change.
https://www.ipcc.ch/site/assets/uploads/2018/03/emissions_scenarios-1.pdf
- Natural Resources Canada. (2022). *Climate change adaptation in Canada*. The Government of Canada. <https://www.nrcan.gc.ca/climate-change-adapting-impacts-and-reducing-emissions/what-adaptation/10025>
- Nelson, R., & Winter, S. G. (1982). *An Evolutionary Theory of Economic Change*. Bellknap Press.
- Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *WIREs Clim Change*, 1(1), 97–110.
<https://doi.org/10.1002/wcc.2>
- Northwest Hydraulic Consultants. (2012). *Serpentine, Nicomokl & Campbell Rivers—Climate Change Floodplain Review* (Final Report No. 300014).
<https://www.surrey.ca/sites/default/files/media/documents/NicomoklSerpentineCampbellRiversClimateChangeFloodplainReview.pdf>

- Northwest Hydraulic Consultants. (2016). *LOWER MAINLAND FLOOD MANAGEMENT STRATEGY PROJECT 2: REGIONAL ASSESSMENT OF FLOOD VULNERABILITY* (Final Report). The Fraser Basin Council.
https://www.fraserbasin.bc.ca/_Library/Water_Flood_Strategy/Regional_Assessment_of_Flood_Vulnerability_April_25_2016_web.pdf
- Northwest Hydraulic Consultants, The City of Surrey, & EPI. (2016). *City of Surrey Coastal Flood Adaptation Strategy – Stakeholder Engagement Framework Draft*.
- Northwest Hydraulic Consultants, The City of Surrey, & EPI. (2018). *Surrey Coastal Flood Adaptation Strategy (CFAS) Engagement Summary: Phase 1-3*. The City of Surrey.
https://www.surrey.ca/sites/default/files/media/documents/CFAS_Engagement%20Report_05092018.pdf
- Olsen, J. P., & March, J. G. (1989). *Rediscovering Institutions: The Organizational Basis of Politics*. The Free Press.
- Olsen, T. (2021, November 30). The two Sumas prairies, and why the Barrowtown floodgates are so important. *The Fraser Valley Current*.
<https://fvccurrent.com/article/sumas-prairie-barrowtown-floodgates/>
- Olson, M. Jr. (1965). *The Logic of Collective Action: Public Goods and the Theory of Groups*. Harvard University Press.
- O’Riordan, T., Cooper, C. L., Jordan, A., Rayner, S., Richard, K. R., Runci, P., & Yoffe, S. (1998). *Institutional Frameworks for Political Action*. In S. Rayner & E. Malone (Eds.), *Human Choice and Climate Change Vol. 1: The Societal Framework*. Battelle Press Ltd.
- Pacala, S., & Socolow, R. (2004). Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies. *Science*, 305(5686), 968–972.
<https://doi.org/10.1126/science.1100103>
- Paton, D., & Johnston, D. (2017). *Disaster Resilience: An Integrated Approach* (2nd Edition). Charles C Thomas.
- Patterson, J. J., Thaler, T., Hoffmann, M., Hughes, S., Oels, A., Chu, E., Mert, A., Huitema, D., Burch, S., & Jordan, A. (2018). Political feasibility of 1.5°C societal transformations: The role of social justice. *Current Opinion in Environmental Sustainability*, 31, 1–9. <https://doi.org/10.1016/j.cosust.2017.11.002>
- Pauly, M. V. (1968). The Economics of Moral Hazard: Comment. *The American Economic Review*, 58(3), 531–537.
- Peters, B. G. (1999). *Institutional theory in political science: The new institutionalism*. Pinter.

- Polyani, K. (2001). *The Great Transformation* (2nd ed.). Beacon.
- Practical Law Real Estate. (2018). *California to Require Flood Disclosures in Residential Leases*. Thomson Reuters. [https://content.next.westlaw.com/practical-law/document/I5902e3d5fc6f11e79bf099c0ee06c731/California-to-Require-Flood-Disclosures-in-Residential-Leases?viewType=FullText&transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://content.next.westlaw.com/practical-law/document/I5902e3d5fc6f11e79bf099c0ee06c731/California-to-Require-Flood-Disclosures-in-Residential-Leases?viewType=FullText&transitionType=Default&contextData=(sc.Default)&firstPage=true)
- Province of British Columbia Ministry of Environment and Parks: Water Management Branch. (1987). District of Surrey: Serpentine River and Crescent Beach Flood Control Works Operation and Maintenance Manual. Province of British Columbia Ministry of Environment and Parks: Water Management Branch. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/as-built-dike-drawings-and-reports/sur_om_m2_colebrookdistrict.pdf
- Real Estate Board of Greater Vancouver. (2022a). *MLS® Home Price Index explained*. <https://www.rebgv.org/content/rebgv-org/news-archive/mls-home-price-index-explained.html>
- Real Estate Board of Greater Vancouver. (2022b). *MLS® HPI Home Price Comparison*. <https://www.rebgv.org/content/rebgv-org/market-watch/MLS-HPI-home-price-comparison.hpi.all.all.detached.2020-1-1.html>
- Reyers, B., & Lee-Moore, M. (2016). *Development in the Anthropocene: The role of resilience* (Guidance for Resilience in the Anthropocene: Investments for Development (GRAID)). Stockholm Resilience Centre. <https://www.stockholmresilience.org/publications/publications/2019-02-07-development-in-the-anthropocene-the-role-of-resilience.html>
- Rodin, J. (2014). *The Resilience Dividend: Being Strong in a World Where Things Go Wrong*. PublicAffairs.
- Romanowski, S. A. (2010). *Storm Surge Flooding: Risk perception and coping strategies of residents in Tsawwassen, British Columbia* [Master of Arts, University of Alberta]. <https://era.library.ualberta.ca/items/d78a5cf4-5967-4969-9212-46a5171b3ddc>
- Romero-Lankao, P., Bulkeley, H., Pelling, M., Burch, S., Gordon, D. J., Gupta, J., Johnson, C., Kurian, P., Lecavalier, E., Simon, D., Tozer, L., Ziervogel, G., Munshi, D., Environmental Governance, & Innovation Studies. (2018). Urban transformative potential in a changing climate. *Nature Climate Change*, 8(9), 754–756. <https://doi.org/10.1038/s41558-018-0264-0>
- Rose, A. (2007). Economic resilience to natural and man-made disasters: Multidisciplinary origins and contextual dimensions. *Environmental Hazards*, 7(4), 383–398.

- Sandercock, L. (1998). *Towards Cosmopolis*. John Wiley & Sons.
- Saunders-Hastings, P., Bernard, M., & Doberstein, B. (2020). *PLANNED RETREAT APPROACHES TO SUPPORT RESILIENCE TO CLIMATE CHANGE IN CANADA*. Natural Resources Canada.
<https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/full.e.web&search1=R=328323>
- Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, 30(1), 1–10.
<https://doi.org/10.1016/j.jenvp.2009.09.006>
- Schut, M., Leeuwis, C., & van Paassen, A. (2010). Room for the River: Room for Research? The case of depoldering De Noordwaard, the Netherlands. *Science and Public Policy*, 37(8), 611–627.
<https://doi.org/10.3152/030234210X12767691861173>
- Scott, J. C. (2008). *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* / James C. Scott. New Haven, CT : Yale University Press.
- Shughart, W. F. (2006). Katrinanomics: The Politics and Economics of Disaster Relief. *Public Choice*, 127(1/2), 31–53. <https://doi.org/10.1007/s11127-006-7731-2>
- Siders, A. R. (2019). Managed Retreat in the United States. *One Earth (Cambridge, Mass.)*, 1(2), 216–225. <https://doi.org/10.1016/j.oneear.2019.09.008>
- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007). The affect heuristic. *European Journal of Operational Research*, 177(3), 1333–1352.
<https://doi.org/10.1016/j.ejor.2005.04.006>
- Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable socio-technical transitions. *Research Policy*, 34(10), 1491–1510.
<https://doi.org/10.1016/j.respol.2005.07.005>
- Statistics Canada. (2022). *Census Profile, 2021 Census of Population*. Government of Canada. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/download-telecharger.cfm?Lang=E&SearchText=surrey&DGUIDlist=2021S051259153401,2021A00055915004&GENDERlist=1,2,3&STATISTIClist=1&HEADERlist=0>
- Terpstra, T., & Gutteling, J. M. (2008). Households' Perceived Responsibilities in Flood Risk Management in The Netherlands. *International Journal of Water Resources Development*, 24(4), 555–565. <https://doi.org/10.1080/07900620801923385>
- Thaler, R., & Sunstein, C. R. (2009). *Nudge: Improving Decisions About Health, Wealth, and Happiness* (Updated edition.). Penguin Books.

- The Arlington Group Planning and Architecture Inc., EBA, a Tetra Tech Company, DE Jardine Consulting, & Sustainability Solutions Group. (2013). *SEA LEVEL RISE ADAPTATION PRIMER A TOOLKIT TO BUILD ADAPTIVE CAPACITY ON CANADA'S SOUTH COASTS*. British Columbia Ministry of Environment. <https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/resources/slr-primer.pdf>
- The Canadian Press. (2022, June 15). Flood of atmospheric rivers in B.C. cost \$675M in insured damage: Insurance bureau. *The Vancouver Sun*. <https://vancouversun.com/news/local-news/flood-of-atmospheric-rivers-in-b-c-cost-675-million-in-insured-damage-bureau#:~:text=Local%20News-,Flood%20of%20atmospheric%20rivers%20in%20B.C.%20cost%20%24675M%20in,for%20damage%20that%20was%20insured>
- The City of Surrey. (n.d.-a). Crescent Beach: Dynamic, Beautiful, Ever-changing. The City of Surrey. Retrieved July 21, 2022, from <https://cosmos.surrey.ca/external/tools/CrescentBeach/>
- The City of Surrey. (n.d.-b). *Surrey Coastal Flood Adaptation Strategy (CFAS) Primer Part I: Coastal Flooding in Surrey*. The City of Surrey. Retrieved July 21, 2022, from <https://www.surrey.ca/sites/default/files/media/documents/CFAS-primerpart1.pdf>
- The City of Surrey. (1999). *Crescent Beach Land Use Plan*. The City of Surrey. https://www.surrey.ca/sites/default/files/media/documents/Crescent_Beach_LUP_1999%282%29.pdf
- The City of Surrey. (2013a). *City of Surrey: Community Climate Action Strategy*. The City of Surrey. <https://www.surrey.ca/sites/default/files/media/documents/CommunityClimateActionStrategy.pdf>
- The City of Surrey. (2013b). *The City of Surrey Climate Adaptation Strategy*. The City of Surrey. <https://www.surrey.ca/sites/default/files/media/documents/ClimateAdaptationStrategy.pdf>
- The City of Surrey. (2014). *Development Permit Guidelines: Hazard Lands*. The City of Surrey. https://www.surrey.ca/sites/default/files/media/documents/DP2_Hazard_Lands.pdf
- The City of Surrey. (2018a). *Surrey Coastal Flood Adaptation Strategy (CFAS) Primer Part II: Options, Chapter 2: Crescent Beach*. The City of Surrey. <https://www.surrey.ca/sites/default/files/media/documents/CFAS-primerpart2CB.pdf>

- The City of Surrey. (2018b). *Update: Coastal Flood Adaptation Strategy*. The City of Surrey. <https://www.surrey.ca/news-events/news/update-coastal-flood-adaptation-strategy>
- The City of Surrey. (2019). *Coastal Flood Adaptation Strategy (CFAS)*. The City of Surrey. <https://www.surrey.ca/sites/default/files/media/documents/CFASFinalReportNov2019.pdf>
- The City of Surrey. (2022a). *Coastal Flood Adaptation Strategy*. <https://www.surrey.ca/services-payments/water-drainage-sewer/flood-control/coastal-flood-adaptation-strategy>
- The City of Surrey. (2022b). *Property Detail Listing*. The City of Surrey Open Data Portal. <https://data.surrey.ca/dataset/property-detail-listing>
- The City of Surrey, EPI, & Northwest Hydraulic Consultants. (2018, February 21). *Surrey Coastal Flood Adaptation Strategy: Crescent Beach Options Selection Workshop*. <https://www.surrey.ca/sites/default/files/media/documents/CFAS-CBOptionsSelectionWorkshop.pdf>
- The City of Surrey, General Manager, Engineering. (2019). *Development of a Surrey Coastal Flood Adaptation Strategy 2018 Year End Update and Disaster Mitigation Adaptation Fund Status* (Council Report No. R021). <https://www.surrey.ca/city-government/council-meetings-documents/corporate-reports/r021-development-of-surrey-coastal>
- The City of Surrey, General Manager, Planning & Development. (2020). *R060: Crescent Beach Neighbourhood Zoning - Response to Higher Flood Construction Levels*. https://www.surrey.ca/sites/default/files/corporate-reports/CR_2020-R060.pdf
- The City of Vancouver. (2019). *RESILIENT VANCOUVER*. The City of Vancouver. <https://vancouver.ca/files/cov/resilient-vancouver-strategy.pdf>
- The Government of British Columbia. (2018). *AMENDMENT Section 3.5 and 3.6 – Flood Hazard Area Land Use Management Guidelines*. The Government of British Columbia. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/integrated-flood-hazard-mgmt/final_amendment_to_s_35_and_36_fhalumg_17-10-01.pdf
- The Province of British Columbia. (n.d.). *B.C. Climate Action Charter*. The Province of British Columbia. Retrieved July 21, 2022, from <https://www2.gov.bc.ca/gov/content/governments/local-governments/climate-action/bc-climate-action-charter>
- The Rockefeller Foundation. (2022). *PROFILE: Judith Rodin*. <https://www.rockefellerfoundation.org/profile/judith-rodin/>

- The World Meteorological Organization. (2022, May 9). *WMO update: 50:50 chance of global temperature temporarily reaching 1.5°C threshold in next five years*. The World Meteorological Organization. <https://public.wmo.int/en/media/press-release/wmo-update-5050-chance-of-global-temperature-temporarily-reaching-15%C2%B0c-threshold>
- Thistlethwaite, J., Henstra, D., & Ziolecki, A. (2020). *Managed Retreat from High-risk Flood Areas: Design Considerations for Effective Property Buyout Programs*. Centre for International Governance Innovation; JSTOR. <http://www.jstor.org.proxy.lib.sfu.ca/stable/resrep24935>
- Thompson-Dyck, K., Mayer, B., Freeman Anderson, K., & Galaskiewicz, J. (2016). Bringing People Back In: Crisis Planning and Response Embedded in Social Contexts. In Y. Yamagata & H. Maruyama (Eds.), *Urban Resilience: A Transformative Approach* (pp. 279–293). Springer International Publishing. https://doi.org/10.1007/978-3-319-39812-9_15
- Tierney, K. J., Lindell, M. K., & Perry, R. W. (2001). *Facing the unexpected: Disaster preparedness and response in the United States*. Washington, District of Columbia : Joseph Henry Press.
- UN-Habitat. (2006). *New Orleans: Poor residents suffer deepest impact of Hurricane Katrina* (State of the World's Cities 2006/7). https://mirror.unhabitat.org/documents/media_centre/sowcr2006/SOWCR%2013.pdf
- Urban Systems & Golder and Associates. (2009). *Crescent Beach Climate Change Adaptation Study* (USL Project No. 1072.0159.01). The City of Surrey. <https://www.surrey.ca/sites/default/files/media/documents/CrescentBeachClimateChangeAdaptationStudyReport2009.pdf>
- van Herk, S., Rijke, J., Zevenbergen, C., Ashley, R., & Besseling, B. (2015). Adaptive co-management and network learning in the Room for the River programme. *Journal of Environmental Planning and Management*, 58(3), 554–575. <https://doi.org/10.1080/09640568.2013.873364>
- Werner, E. E. (1989). HIGH-RISK CHILDREN IN YOUNG ADULTHOOD: A Longitudinal Study from Birth to 32 Years. *Am J Orthopsychiatry*, 59(1), 72–81. <https://doi.org/10.1111/j.1939-0025.1989.tb01636.x>
- Woods, D. (2015). Four concepts for resilience and the implications for the future of resilience engineering. *Reliability Engineering & System Safety*, 141. <https://doi.org/10.1016/j.ress.2015.03.018>
- Yumagulova, L., & Vertinsky, I. (2019). Moving beyond engineering supremacy: Knowledge systems for urban resilience in Canada's Metro Vancouver region. *Environmental Science & Policy*, 100, 66–73. <https://doi.org/10.1016/j.envsci.2019.05.022>

Appendix.

Primary and Secondary Documents Used in Study

Document	Category	Description	Date
Policy O-28: Development Variance Permit – Crescent Beach	Primary document, City of Surrey	Allows for expedited development permit process to build below FCLs.	1992
Crescent Beach Land Use Plan	Primary document, City of Surrey	Original land use plan for Crescent Beach.	Apr-99
B.C. Climate Action Charter	Primary document, Provincial Government	Voluntary agreement between local governments and the provincial government to work towards combatting climate change. City of Surrey is signatory in 2007.	2007
The City of Surrey Sustainability Charter	Primary document, City of Surrey	Sustainability Charter is developed as response to signing of the B.C. Climate Action Charter.	2008
Crescent Beach Climate Adaptation Strategy Addressing Drainage Concerns (Corporate Report No. R033)	Primary document, City of Surrey	Report to council discusses ongoing drainage issues for properties in Crescent Beach and discusses a longer term climate adaptation strategy.	Mar-09
Crescent Beach Climate Change Adaptation Study (USL Project No. 1072.0159.01)	Secondary consultant report	Drainage study is cited in R033 and highlights the vulnerability of flooding infrastructure in Crescent Beach.	Jun-09
The Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use	Primary document, Provincial Government	Recommends planning for at least 1m of sea level rise and highlights recommended dike heights.	Jan-11
Challenge of Sea Level Rise for the City of Surrey	Primary document, City of Surrey	Presentation that describes ongoing drainage concerns in Crescent Beach and planning for sea level rise.	Nov-11
Serpentine, Nicomekl & Campbell Rivers—Climate Change Floodplain Review (Final Report No. 300014)	Secondary consultant report	Highlights deficiencies in dike heights in Crescent Beach and surrounding areas.	Dec-12
City of Surrey: Community Climate Action Strategy	Primary document, City of Surrey	The Climate Action Strategy highlights hazard avoidance as a key climate change planning policy area.	Nov-13

The City of Surrey Climate Adaptation Strategy	Primary document, City of Surrey	The Climate Adaptation Strategy is a sister document to the Climate Action Strategy, and highlights several flooding hazards as high risk related to the Crescent Beach area.	Nov-13
Proposed Amendments to the Provincial Flood Hazard Area Land Use Management – City of Surrey Comments (Corporate Report No. R167)	Primary document, City of Surrey	Highlights deficiencies in current City policy as compared to new provincial guidelines.	Sep-14
Development Permit Guidelines: Hazard Lands	Primary document, City of Surrey	Recommends best practices in regards to developing on floodprone lands.	Oct-14
Climate Change: Crescent Beach Arms Itself Against the Rising Sea	Newspaper article	Highlights the flooding challenges in South Surrey, including Crescent Beach. Also discusses the possibility of managed retreat for Mud Bay, which was discussed in the Climate Adaptation Guidelines released by the Province in 2011 (see above).	Nov-15
Development of a Surrey Coastal Flood Protection Strategy (Corporate Report No. R034)	Primary document, City of Surrey	Recommends development of a Coastal Flood Adaptation Strategy, which is approved by Council in the same month.	Feb-16
CFAS Media and Communications Framework	Primary document, City of Surrey	Provides a framework for communicating values, risks, adaptation opportunities and process to CFAS stakeholders and partners.	2016
CFAS Draft Decision Framework	Primary document, City of Surrey	Describes approach, methods, data needs, and decisions markers part of the decision-making stage of the policy process.	2016
CFAS Draft Engagement Framework	Primary document, City of Surrey	Guides the consultants on how to collect input and feedback from stakeholders and partners to inform the CFAS process.	2016
City of Surrey: Coastal Flood Adaptation Strategy (CFAS) Primer Part 1: Coastal Flooding in Surrey	Primary document, City of Surrey	Describes current approaches to flood management in the area as well as flood risks.	N/A
Crescent Beach Community Meeting Series: Summary Report on Coastal Flooding and Climate Change	Secondary consultant report	Summarizes the outcome of a flood management design charette public engagement workshop, also provides additional information on flooding in South Surrey.	Nov-16

Development of a Surrey Coastal Flood Adaptation Strategy 2016 Year End Update (Corporate Report No. R263)	Primary document, City of Surrey	Summarizes key engagement sessions and groups that the City has consulted with as part of the CFAS process.	Dec-16
Surrey Coastal Flood Adaptation Strategy: Crescent Beach Options Selection Workshop	Secondary consultant report	Managed retreat is still presented as a viable option in terms of flood management.	Feb-18
City of Surrey: Coastal Flood Adaptation Strategy (CFAS) Primer Part 2: Crescent Beach	Primary document, City of Surrey	Describes short-listed flood management options. Managed retreat is ranked as number one in terms of risk versus cost versus community values.	Apr-18
Surrey Coastal Flood Adaptation Strategy. Phases 2 and 3 Open House	Primary document, City of Surrey	Managed retreat is still presented as a viable option in terms of flood management.	Apr-18
B.C. cities debating bold moves to cope with rising sea levels	Newspaper article	Managed retreat is labelled as the emerging direction by the City for flood management for Crescent Beach.	May-18
Buying out 400 Crescent Beach homes an option for Surrey as sea levels rise	Newspaper article	Managed retreat is labelled as the emerging direction by the City for flood management for Crescent Beach.	May-18
Surrey mulls relocating 400 Crescent homes in decades to come	Newspaper article	Managed retreat is described as having received the most support from Surrey residents through online surveys and public consultation sessions	Jun-18
Crescent Beach Property Owners' Association Meeting Minutes July 2018	Primary document, external organization	City staff meet with Crescent Beach Property Owner's Association (CBPOA), who raise concern about emerging direction of managed retreat. Managed retreat discussed as not City's intention despite recent comments in media. Some members of CBPOA threaten legal action against the City.	Jul-18
Crescent Beach Property Owners' Association Meeting Minutes August 2018	Primary document, external organization	Staff meet with Crescent Beach Property Owner's Association and announce City will remove managed retreat as an option from the CFAS.	Aug-18
Update: Coastal Flood Adaptation Strategy	Primary document, City of Surrey	City press release announces City will no longer consider managed retreat for Crescent Beach in the CFAS Final Strategy document and it will be removed as an option.	Aug-18

Coastal Flood Adaptation Strategy Engagement Report Phases 1-3	Secondary consultant report	Engagement report highlights managed retreat as preferred adaptation option for Crescent Beach according to City of Surrey survey.	Sep-18
Development of a Surrey Coastal Flood Adaptation Strategy 2018 Year End Update and Disaster Mitigation Adaptation Fund Status (Council Report No. R021)	Primary document, City of Surrey	Highlights to council the City will no longer consider managed retreat for Crescent Beach in the CFAS Final Strategy document and it will be removed as an option.	Feb-19
Coastal Flood Adaptation Strategy (CFAS)	Primary document, City of Surrey	Expanded edge/raising the dikes chosen as long term strategy for Crescent Beach.	Nov-19
Crescent Beach Neighbourhood Zoning - Response to Higher Flood Construction Levels (Council Report No. R060)	Primary document, City of Surrey	Recommends rescinding Policy O-28: Development Variance Permit – Crescent Beach, in light of the work done as part of CFAS. Recommends revisiting zoning requirements for Crescent Beach to push for more flood resilient construction. Motion passes.	Apr-20