Dumping Like a State: 
An Environmental History of the 
City of Vancouver Landfill in Delta, 1958–1981

by
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Abstract

In 1966, the City of Vancouver opened a new landfill in Burns Bog, in the nearby municipality of Delta. This is an environmental history of its creation and first sixteen years of operation. Although the landfill resembled other high modernist projects in postwar Canada, this thesis argues it is best understood as an example of “mundane modernism.” The landfill’s planning and operation aligned with broader contemporary American and Canadian practices of cost-effective waste disposal. It was an unspectacular project to which Deltans offered little initial resistance. Officials therefore had no need to demonstrate technoscientific expertise to manufacture citizens’ consent. Yet the landfill soon posed environmental nuisances and hazards to Delta’s residents, including leachate, the liquid waste a landfill produces. Although Deltans mounted some protests, the mutually beneficial relationship between the municipalities of Delta and Vancouver protected the landfill’s operators from the consequences of mismanagement and allowed that mismanagement to continue throughout the 1960s and 1970s. This thesis suggests that further scholarly attention be paid to the history of solid waste management in Canada, and especially to specific sites such as the Burns Bog landfill.

Keywords: Environmental history; Discard Studies; Landfill; High Modernism; City of Vancouver; City of Delta
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Introduction

Mayor Rathie’s Chickens

On February 19, 2016, the Vancouver Sun heralded the City of Vancouver Landfill, sited in the nearby municipality of Delta since 1966, as “Canada’s most prolific, if unconventional, bird habitat.”¹ From December through March each year, as many as 2,000 eagles are drawn to the landfill—not to graze on garbage, as one might think, but on the seagulls which the garbage attracts, and which supplement eagles’ diet in the winter when fish stocks are low. The land around the fill, now freer of pesticides than a half-century ago, also offers eagles protection from winds off nearby Boundary Bay and space for perches and nests.² The celebration of such birds as a local attraction is a recent phenomenon. For more than 50 years, the eagles and seagulls that frequented the fill threatened Delta’s human and non-human residents by scattering refuse over nearby lands. Soon after the fill opened, Deltans began calling the seagulls “Mayor Rathie’s chickens,” linking their bad behaviour to the then-mayor of Vancouver.³ They had a point.

Birds’ persistent presence in and around this landfill, a type of site usually imagined as toxic, suggests that it is time to re-imagine—and re-examine—the Burns Bog Landfill.⁴ This thesis uses an environmental historical lens to study the fill’s creation and first sixteen years of operation. It interprets the fill as a hybrid landscape, one shaped both by anthropogenic and non-anthropogenic factors—by Mayor Rathie and his “chickens.”⁵ This introduction places the fill in historical and historiographical context. Scholarship on discard and high modernism, particularly its postwar Canadian context,

¹ Larry Pynn, “Landfill Birds: For Better or Worse, Dump in Ladner is One of B.C.’s Greatest Bird Habitats,” The Vancouver Sun, February 19, 2016, A1.
³ Minutes of the Solid Waste Committee, 4 April 1974, Box: ARPEG/City of Van., Folder: SECTION II -- #46–99, City of Vancouver Landfill Engineering Services, City of Vancouver [hereafter CVL], p. 23.
⁴ “City of Vancouver Landfill” and “Burns Bog Landfill” both refer to the site. The latter is preferable within historical discussions to avoid confusion with Vancouver’s earlier Kerr landfill, which closed after the Burns Bog site opened.
helps to illuminate how Burns Bog’s material and socio-political effects were received and acted upon by politicians, engineers, residents, and nonhuman actors in Delta and Vancouver between 1958 and 1981. I introduce the complementary idea of mundane modernism and suggest that further scholarly attention to solid waste management in Canada, especially specific sites such as the Burns Bog Landfill, would be worthwhile.

**Delta’s History of Land Occupation and Use**

The people now known as the Tsawwassen First Nation have occupied and used the land on which the Burns Bog landfill now sits since time immemorial. Following the creation of the British colony of British Columbia in 1858, European settlers began to seize and colonize these lands in the 1860s. By 1874, Tsawwassen holdings shrank to a mere 490-acre reserve. Provincial and federal policies further restricted Indigenous sovereignty by recognizing the incorporated town of Delta in 1879, with Ladner its administrative centre. They also restricted Tsawwassen people’s cultural and religious ceremonies and access to the commercial fisheries.6

Settlers such as the Ladner brothers took possession of this territory principally through farming operations. Approximately 40,000 acres were under cultivation by 1879. In the late nineteenth century, settlers raised stock animals and produced hay for the market in Victoria. With urbanization and the growth of markets in Vancouver and New Westminster as well as on Vancouver Island in the early twentieth century, demand for dairy, poultry, and produce grew rapidly. Delta farmers tuned their operations to meet demands as far away as Victoria and Nanaimo. Dairy declined in importance after 1906, when Delta’s creamery shut down.7 Most Delta farmers were white, but North Delta housed more than 100 families of Japanese descent. In an echo of the dispossession earlier visited upon Tsawwassen people, these families’ properties were seized during

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6 Settler-led acts of cultural and physical dispossession against this community continued into the twentieth century. Children from this First Nation were required to attend residential schools. In 1958, the Nation’s longhouse was destroyed as part of the construction of the Tsawwassen Ferry Terminal and highway entry. See Tsawwassen First Nation, “Timeline of History: Pre-Treaty and Colonialism Treaty,” accessed June 10, 2020, http://tsawwassenfirstnation.com/about-tnn/our-nation/timeline-of-history/#:~:text=Tsawwassen%20lands%20were%20stolen.

the upswelling of anti-Asian racism in the Second World War and they were sent to internment camps in the British Columbian interior.⁸

Access to markets was a key problem from the beginning. Ferries were crucial to ship goods even to Vancouver and New Westminster, let alone Vancouver Island.⁹ In 1910, Delta’s Board of Trade petitioned the municipal council to build a bridge over the southern arm of the Fraser River, connecting Delta to Vancouver by way of Richmond. Nothing happened, but citizens continued to lobby for a bridge to overcome the Fraser River’s winter ice and spring floods. An increasing number of automobilists formed another interest group for better roads. In 1931, construction began on a bridge over the Fraser at Ladner but then shifted to New Westminster to serve its political and business interests. The result was the Pattullo Bridge in 1937.¹⁰ In 1947, Delta businessman (and eventual Social Credit MLA, 1956–1960) George Massey called for a tunnel under the south arm of the Fraser River, and the eponymous Massey Tunnel opened in 1959, finally linking Delta to Vancouver via Richmond. Soon after Vancouver officials began to consider Delta as a possible site for the city’s next landfill.¹¹

**High Modernism or Mundane Modernism?**

To a certain extent, this thesis interprets the origins and early years of the Delta landfill through the lens of high modernism, a term coined by anthropologist James C. Scott and adapted by scholars of North America and elsewhere. Scott used the term to describe the confidence in state-sponsored megaprojects to provide grand-scale social benefits, particularly since the 1930s. A key belief was that technoscientific expertise and planning could make nature, landscapes, and the people who inhabited and worked in these spaces more “legible.” According to Benjamin Forest and Patrick Forest, high modernist engineering featured “both a mastering technology—one that gave humans control over nature—and a mastered technology—one that humans believed they

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¹⁰ Mary Keen, *Time and Tide: The Settlement of Lulu Island’s South Arm Shore* (Richmond: City of Richmond Archives, 2005), 28–30.

¹¹ Keen, *Time and Tide*, 30–32.
controlled fully.” Harnessing the “muscle-bound” or brute force of state authority, politicians, planners, and engineers developed synoptic understandings of landscapes and communities and then simplified and standardized them to, in theory, realize aspirations of linear national progress.\(^13\)

While Scott originally applied high modernism to authoritarian societies, later scholars have found similar patterns in democratic settings. The literature is considerable, ranging from agricultural and forestry projects to urban planning, highways, hydroelectric dams, and power projects.\(^14\) Four of these scholars directly inform my analysis of the Burns Bog landfill. Daniel Macfarlane’s study of the St Lawrence Seaway and Power Project (SLSPP) complicates our understanding of high modernism in postwar Canada by demonstrating what he calls negotiated high modernism, a mediated form of planning suited to democratic societies. Macfarlane contends that the SLSPP was high modernist, despite its situation in Canada. It featured the top-down seizure of and then management of the site in question; unwavering


confidence in the synoptic, simplified, and standardized models presented by planners, politicians, and engineers (the latter of whom relied on “a global engineering fraternity and the transborder spread of engineering techniques and ideologies”); and a displacement of so-called people in the way.\textsuperscript{15}

The flooding of the Lost Villages in the St. Lawrence Valley exemplified how Canada did not need authoritarianism to aggressively reorganize landscapes and peoples for the alleged good of the nation. Also key to the notion of negotiated high modernism is what Macfarlane terms the “manufactured consent” of residents. Engineers and planners manufactured such consent through the use of “sampling, polling, surveying, testing, and modelling,” which gave residents the illusion of inclusion in preparation for such projects, but which project managers ultimately harnessed to “control information [and] set the terms of the debate.”\textsuperscript{16} Projects such as the SLSPP used modern technoscience to better the nation, even if it literally submerged homes and rearranged traditional ways of living. Similarly, in the case of the Burns Bog landfill, engineers and city officials made limited gestures toward manufacturing consent among Deltans, but ultimately put in place the landfill they wanted and needed.

While Macfarlane questions the association between high modernism and authoritarian states, Tina Loo and Meg Stanley qualify high modernism’s investment in synoptic views. In their studies of the Peace and Columbia River dams constructed after the Second World War, Loo and Stanley observe that a key assumption of high modernism as espoused by Scott is that scientific expertise and technocratic planning act in tandem to view peoples and environments from above. This bird’s-eye view is said to produce a simplified vision of how to reconfigure biophysical and social contexts.\textsuperscript{17} Part of the “violence of high modernism” thus stems from how it ignores local ecologies

\textsuperscript{15} Macfarlane, \textit{Negotiating a River}, 221.


\textsuperscript{17} Loo and Stanley, “Environmental History of Progress,” 402; Loo, “People in the Way.”
and ways of knowing landscapes. Yet Loo and Stanley note that, in fact, “dam-building was characterized by an intense engagement with place that generated a particular kind of knowledge, something we like to call ‘high modernist local knowledge.’” “Seeing like a state” when building dams meant “having a penetrating eye for the particular, locating seams in rock or shifts in soil composition, and identifying boulders underwater.” As I demonstrate in the first chapter, the planning of the City of Vancouver’s landfill included similar attempts to produce high modernist knowledge of prospective sites within and beyond Delta.

Many studies of high modernism in North America focus on projects in hinterland, rural, or small-town settings. Historian Will Langford’s study of municipal planning in postwar Vancouver offers a useful example of how high modernism informs case studies in large urban centres. He notes Vancouver politicians, engineers, and planners’ similarly “exaggerated belief in the capacity of scientific and technological progress to meet growing human needs and bestow social benefits.” With memories of the Great Depression still fresh, Vancouver’s Department of Planning was created in 1953 to spearhead urban renewal programs that would produce modern cityscapes and to ward off hardships of future recessions. Under leaders such as Gerald Sutton Brown, department decisions were not open to debate by citizens, businesses, or scientists. The public was expected to trust the department’s efficient, bureaucratic management with no questions asked. Langford shows how “the ideology of high modernity was mobilized to effect significant physical and social change while obscuring and depoliticizing the consequences for the people subjected to the transformations.” High modernist policies were already operating within Vancouver’s municipal government by the early years of this thesis’ case study, but they would assume novel forms in the specific bodies and negotiations considered here.

Upon first glance, the Burns Bog Landfill holds many of the high modernism traits of postwar Canada that scholars have identified. Planning and operating the landfill did

18 Loo and Stanley, “Environmental History of Progress,” 404.
require City of Vancouver engineers and consultants to envision the bog’s landscape in a simplified manner and then to construct a fill according to that vision. Engineers ignored the specifics of local hydrogeography and Delta’s material and social relations. Planners imposed a large-scale entity—a landfill—to better the lives of Deltans and Vancouverites through more efficient and effective disposal of solid waste. As in other cases of North American high modernism, a few residents bore a disproportionate cost: their properties were expropriated to make way for the new landfill.

However, the Burns Bog landfill is better understood as an example of what I call *mundane modernism,* a concept marked by three distinguishing traits. First, it was mundane in the sense that it was business as usual. The landfill’s planning and operation aligned with broader contemporary American and Canadian practices of cost-effective waste disposal; unlike high modernist practices, it was not driven by technoscientific expertise. Burns Bog was chosen for a landfill because it made good use of land widely believed, within the context of a capitalist economy, to have little value otherwise. Like previous Vancouver landfills, the Burns Bog landfill did not follow best practices for the coverage, compaction, and containment of solid waste as prescribed by professional engineers since the 1930s. Nor did it deviate from long-established practices for handling leachate, the liquid waste emitted by fills. As with waste water, Vancouver engineers relied on the assimilative capacity of waterways (in this case, the Fraser River) to dilute urban effluent. Following best practices in the management of solid waste or inquiring further into the formation and impacts of leachate would have required further expenses, and there seemed no pressing need to make any adjustments.

This brings us to the second meaning of “mundane”: it was uncontroversial. What Deltans mostly desired was cheap solid waste disposal to solve nuisances and hazards that had emerged during the late 1950s and early 1960s. In contrast to many high modernist case studies, there was very little local resistance to the proposed landfill at first, and therefore little need for Vancouver or Delta officials to demonstrate technoscientific expertise to manufacture citizen consent. As in other North American

suburban contexts after 1945, Delta residents demonstrated a certain level of tolerance for nuisances that accompanied landfills, so long as they did not cross the line separating nuisance from hazard. Engineers simply had to propose and operate a fill which would not threaten the fine balance between financial cost and hazard to human health. Even when leachate became too urgent a hazard to ignore, Deltans sought mundane forms of redress—greater diligence in containing refuse and maintaining acceptable conditions—rather than revolutionary reform to solid waste management in Greater Vancouver.

Third, the Burns Bog landfill was mundane in the sense of unspectacular. Although it was a large-scale project, it was not a big, shiny structure embodying national technocratic progress in the same way as dams, water reservoirs, or highways. Intended to be out of sight and out of mind, the landfill was instead a modest continuation of practices. It did not even inspire plans for municipal-level community reorganization. Its mundanity is all the more apparent when contrasted with the earlier, related, and much more explicitly high modernist project of the Deas Island Highway, completed in 1962. That structure elicited far greater resistance from Deltans, but its completion also undermined resistance to the landfill by expropriating properties adjacent to the landfill site. High modernism and mundane modernism worked together: a grandiose highway and tunnel literally paved the way for a landfill of more modest, unassuming mien.

The concept of mundane modernism highlights the uncontroversial, unspectacular ways that governments and associated actors managed relationships between humans and nonhuman environments to prioritize continuity. It offers a departure point from which to discern different stories about postwar Canada. One can readily apply this examination to histories of Lower Mainland British Columbia and, of course, structures and institutions which appear to have been high modernist. Broadly speaking, this thesis seeks to contribute to discussions of modernism and modernities, but particularly at the level of engineering and waste management which functioned as large-scale but everyday municipal business and examples of environmental injustice. It is one account of inter-municipal relations which were more eventful and impactful than a cursory glance would suggest. What we see here are often dynamic (albeit inconsistent and heterogeneous) relations between Delta residents, engineers, provincial authorities, and politicians, relations which were influenced by this specific
hydrogeological site, the engineers’ particular management strategies, and the various personalities at play. This study is a reminder that postwar municipal and provincial efforts to maintain continuity in regional and continental discard practices did not go unchallenged at the local and individual level, particularly as time passed and public knowledge about toxins slowly improved. Such a thesis framework also seeks to add to discard studies as a whole, a sub-field detailed below.

This particular study uses the term “mutual benefit,” taken from the first page of the 1962 bylaw agreement governing Burns Bog which framed the mundane relations among governments and citizens. The municipalities of Delta and Vancouver constructed a mutually beneficial relationship around the landfill. As it was proposed and managed, the fill was advantageous to both governments, even when the site produced deleterious environmental consequences for residents affected by the refuse. The Corporation of Delta divested some power to Vancouver in the matter of the landfill in exchange for various benefits. It gave up the power to advocate on behalf of Deltans seeking compensation from Vancouver, but it gained free landfilling services and annual payments from Vancouver, as well as protection from legal responsibility for the failings of landfill management. In the 1970s, the provincial government, through its Pollution Control Board, was also drawn into this “mutual benefit” relationship by granting extensions of Vancouver’s permit to operate the Burns Bog Landfill. The PCB also enabled business as usual, becoming complicit in both governments’ continued exposure of Deltans to the hazards and nuisances of a landfill that was not managed according to best practices.

Discard Studies and Delta’s Landfill

To understand those practices, I draw upon the literature of “discard studies.” Scholars working in this area use the term “discard” rather than “waste” to convey the heterogeneity of landfill objects and to foreground that “waste” is a social construct. They argue that refuse is not inherently morally or materially disgusting. Instead, we should

24 City of Vancouver, “By-law 3990: A By-law to Authorize an Agreement Between the City of Vancouver and the Corporation of Delta respecting the operation in The Corporation of Delta of a disposal ground for garbage and refuse,” 29 May 1962, City of Vancouver fonds, MCR 18, City of Vancouver Archives [hereafter CVA], p. 1.
recognize the social, political, technological, and economic contexts that have defined “waste” and discard systems.\textsuperscript{25}

A key feature of high modernism and discard studies concerns how the social, political, and environmental effects of these projects and systems intersect with issues of race and class. Although this study focuses on a white, settler population, it resonates with many examples of environmental injustice. From 1958 to 1981, the well-being of the Tsawwassen First Nation, Delta’s farmers, and other Delta residents who lived near the fill was threatened by the hazards and nuisances of that waste site, while more affluent Deltans and Vancouverites lived farther from the landfill, which was for them literally out of sight, smell, and mind.

My research also builds upon geographer Arn Keeling’s study of waste water management in postwar Greater Vancouver. Keeling found that less affluent neighbourhoods in the postwar Greater Vancouver region were more exposed to the nuisances and hazards of sewage disposal than more privileged municipalities. Waterways in Richmond and Vancouver’s Wreck Beach were imagined as “sacrifice zones” to shield more wealthy areas from harm. The Burns Bog landfill functioned similarly. Keeling also demonstrates how waste-water management’s bias toward the cost-efficient solution of assimilative capacity bared engineers’ poor knowledge of water’s capacity to purify.\textsuperscript{26} These problems also pervade this thesis, as does Keeling’s finding that BC’s Pollution Control Board and Pollution Control Branch showed little inclination to hold public and private actors accountable for threats to water quality.\textsuperscript{27} Chapter two likewise demonstrates how the PCB shored up Vancouver’s and Delta’s mutually beneficial relationship, delaying reformation of solid waste management practices across the region.


In a different vein, debates over what constituted “water pollution,” as well as the nature of the policymakers, shaped the formation of policies in postwar Quebec. According to Stéphane Castonguay and Vincent Bernard, “pollution may be subject to conflicting definitions, according to the identification of different point sources,
responsibilities, and causal mechanisms.” What matters in certain contexts “is not so much to determine the cause or degree of pollution as to understand how an urban population seized the problem of pollution and sought to solve it.” This guides my approach to leachate, a subject of debate among politicians, engineers, and residents during the late 1960s and 1970s. Leachate’s physical characteristics and impacts were poorly understood, yet politicians and citizens alike nevertheless responded to it and demanded action. Castonguay and Bernard’s focus on relationships among governments concerning waste water management provides a useful template for examining the Burns Bog landfill, a product of the mutually beneficial relationship between Vancouver and Delta but also supported by the province.

Canadian scholars have focused on modern waste water and air pollution. Americans have attended more to the history of urban solid waste production and its management, particularly since the later nineteenth century, but few studies exist of these processes in landfills. A recent exception is Martin Melosi’s Fresh Kills, which offers sustained analysis of one site in New York City. This thesis aims to expand understandings of the socio-political and material relationships that informed understandings of and efforts to manage solid waste. Residents adjacent to landfills and politicians and engineers who oversaw such sites each possessed unique experiences and concerns. Understanding how perceptions evolved and shaped interactions is worth close study. The material specificities of place also mattered; variations in soil, moisture, and weather affected the City of Vancouver’s efforts to comprehend and manage the Burns Bog landfill’s solid and liquid refuse. This thesis demonstrates the necessity of finely tracing the human and nonhuman geographies that coalesced at landfill sites, and how hybrid landscapes produced understandings of waste’s workings and effects found nowhere else, Mayor Rathie’s chickens included.

Chapter Outlines

Chapter one traces the events leading to the creation of the Burns Bog Landfill in 1966 and then its early years of operation. The site was supposed to solve the growing waste disposal crises of Vancouver and Delta by turning a marginal landscape into a sacrificial space. Delta residents put up little resistance to this plan because they too desired a cost-effective landfill that would serve their needs, especially in the wake of the socio-political effects of the Deas Island Highway. The resulting bylaw agreement stipulated the terms of construction and maintenance as well as Delta’s compensation for acting as host, but the shared emphasis on economizing, evident first and foremost in Vancouver’s continued reliance upon waste management practices that fell short of contemporary professional standards, produced new hazards and nuisances for Delta residents while failing to ameliorate older problems. Meanwhile, those who benefitted most from the Burns Bog landfill—Vancouver residents and politicians in both municipalities—effectively avoided the consequences of mismanagement.

Chapter two centres on the mundane but dynamic and politically important substance of leachate, the liquid waste produced by the Delta landfill. The appearance of this mysterious new hazard in Delta’s ditches inspired some residents to critique what they now realized was sub-par management, but two obstacles stood in their way. First, there was no consensus among engineers, politicians, and residents on the nature of this black ooze or the best practices for its treatment. Still concerned with cost, Vancouver refused to study the human and non-human factors influencing the production and effects of leachate, or to consider solutions other than dilution in surrounding waterways. Residents inadvertently abetted neglect by dwelling on their qualitative experiences rather than on quantitative data. They effectively undermined their own protests to the Pollution Control Board. Conflicting understandings of leachate helped produce a managerial status quo for most of the 1970s. Second, the PCB became a co-conspirator in Delta and Vancouver’s “mutual benefit” relationship by condoning the continuation of poor practices at Burns Bog. Although Deltans’ protests were heterogeneous, inconsistent, and insufficient to stop leachate’s seepage, they did have some success. They helped to block a long-term permit for the Burns Bog operation until 1977, and they did help force the treatment of leachate at the Annacis Island Treatment Plant by September 1981, a strategy that better aligned the Lower
Mainland with practices at other, more effectively managed large-scale waste sites around North America.
Chapter One.


In the early 1960s, British Columbia’s Lower Mainland was plagued by garbage. Vancouver’s Kerr fill site had reached capacity and was set to close, while Delta was coping with an ineffective incinerator, scattered landfills, and dumping practices that posed nuisance hazards to residents. Both municipalities recognized the need for a larger landfill, and that the Burns Bog could handle their combined waste streams. At the time the Bog was deemed a nuisance, and landfilling an effective use of a marginal landscape. By May 1962, Vancouver and Delta had formalized a bylaw agreement for a new landfill operation that both cities termed a “mutual benefit” partnership.34 In theory, the landfill would solve the waste disposal crises of both municipalities when it opened in January 1966. Solid waste would no longer be a distraction for Vancouver development, and management by Vancouver would alleviate the smaller community of Delta of a significant municipal cost.

The broader context of Western Europe, the United States, and Canada offers necessary background to explain how and why Delta’s landfill came to be. Landfill management at the Vancouver-run Kerr fill had strayed from what industry professionals considered proper postwar practices. Refuse was rarely covered, and liquid waste (leachate) was not effectively contained within the site. Yet this was common at many American and Canadian landfill sites, particularly small and municipal fills. Corners were cut in the disposal of waste by dumping, landfilling, and incineration to save money for the collection of refuse from homes and businesses, which was far more cost-intensive at a time of rapidly increasing expenses due to postwar population growth.35 This is necessary context to understand how municipal engineers and politicians designed and pursued solid waste management at Burns Bog in the name of a mutually beneficial, cost-effective policy that allowed environmental problems to literally and figuratively fester.

35 Melosi, Sanitary City, 160.
The poor outcomes of the new Burns Bog fill were not surprising at the time or later to anyone familiar with Vancouver’s dumping practices. The landfill construction and early years of operation diverged from contemporary best practices. Coverage of waste and containment of leachate (the liquid waste produced when precipitation percolated through a site) were critical issues. The result was what we now call environmental injustice. Nearby Delta residents had to endure illegal dumping when discarders tried to avoid the cost and hassle of the new landfill, leachate-tainted communal ditches, odours, noise, animal-scattered litter due to poor coverage of dumped waste, and livestock losses when cows consumed the scattered refuse. They also had to contend with two negligent governments. Delta had signed away the ability to represent its residents in the event of a claim against Vancouver, making it much more difficult for residents to change landfill management practices. Meanwhile, those who benefitted the most from the Vancouver-run landfill—Vancouver’s citizens and politicians in both municipalities—never directly confronted the consequences of mismanagement.

In the early 1960s, Delta and Vancouver converted a problem into a “mutual benefit” pact based on a cost-effective, Vancouver-run landfill located in a section of Delta that had recently been expropriated for a freeway project. The resulting landfill would solve the waste disposal crises of both municipalities. However, politicians and engineers’ unwillingness to invest in a “sanitary landfill” model emerging elsewhere in North America, and instead to hew to Metro Vancouver’s status quo model, ensured that Delta, especially its less privileged residents, gained new problems. This chapter shows how the mundane modernity of the Burns Bog landfill produced quotidian problems as an everyday reality.

The Socio-Political and Material Formation of a Landfill

In examining how the materiality of this postwar landfill unfolded, we must understand concurrent European, American, and Canadian standards for appropriate collection and landfilling. Since the 1920s, many Western landfills had adopted “controlled tipping,” which involved the careful and strategic covering of discarded material. By the postwar era this had become the primary method of waste disposal in the United Kingdom and the United States. American engineer Jean Vincez was an important proponent of expansive and standardized “sanitary landfilling,” which was
another primary means of American and Canadian waste disposal in the years after the Second World War.\textsuperscript{36} Crucial to Vincez was a focus on effective coverage of refuse with materials such as soil or sand, in tandem with consistent compaction of wastes. Vincez also promoted the practice of dumping in cells or trenches to confine the refuse to a planned and limited space, but he stressed that coverage and compaction were the most important practices to follow.

The other major reform to solid waste management in this period was cost-effectiveness and consistency. North American municipalities sought to decrease the cost of \textit{disposal} (landfilling and incineration) so they could upgrade \textit{collection} technologies and systems (compaction trucks, efficient routing, and transfer stations). Collection had been pricey and ripe for reform, and backers of municipal services argued that private collection and landfilling services resulted in “incomplete coverage, unsanitary methods, and high expenses.” Moreover, shortcomings in collection were highly visible to the public. Thus there was little reason for discard engineers to invest in disposal when it could hardly get much cheaper, and residents and authorities recognized as early as the 1930s that municipal collection was, while more costly, also more consistent.\textsuperscript{37} The industry definition of landfilling stabilized. The Sanitary Division of the American Society of Civil Engineers defined sanitary landfilling as “a method of disposing of refuse on land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day’s operation, or at such more frequent intervals as may be necessary.” In Vancouver, however, city engineers adopted some of Vincez’s concepts but failed to implement others. The pattern of policies reveals the city’s prioritizing of costs over nuisances during this era.\textsuperscript{38}


**Vancouver’s Need for a Landfill**

Vancouver faced a growing garbage crisis during the 1950s. City managers knew that the Kerr landfill, in present-day Everett Crowley Park, had been in operation since 1944, and that it was fast approaching the end of usefulness. They also knew that the government did not have a suitable replacement. In 1958, the city brought in Chicago-based Greeley and Hansen Engineers to devise a solution. The following points derive mainly from their report.39

An incinerator had been one means of disposing of Vancouver’s solid waste during the postwar era, but the site had posed many problems with pollution, space, and technologies.40 Given its location next to Cambie Bridge, it could only accept refuse from 9:30 am to 4:00 pm to avoid rush hour congestion. The incinerator also processed only 40 tons per day on average, 60 at peak. This was woefully insufficient by 1958, when Vancouver’s population of 370,000 produced hundreds of thousands of tons per year. The incinerator’s proximity to urban residents, limited square footage, and cost led Greeley and Hansen to suggest that the site be maintained only for minimal performance, such as the burning of dead animals.41 This paralleled other cities’ growing distaste for incineration.42 Greeley and Hansen were also critical of Kerr fill management practices. They noted that the operators made “[n]o effort to cover the face [the active portion of a landfill] at the end of the day’s work.”43 This meant an open, festering pile of garbage twelve feet by four hundred feet, as long as the height of Vancouver’s Bentall 3 building, was continually exposed to wind, rain, and animals. Non-textual sources

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39 Greeley and Hansen, Consulting Engineers, “Report on Refuse Disposal: Part II – Detailed Report,” February 1958, Box: Odds and Sods Plans and Reports: 1958–, CVL. Most of the historical documents contained in the landfill collection were kept in unsorted and unlabeled boxes. Since my investigation at the landfill began in August of 2018, the contents have remained in their original boxes, but the different folders and binders have been arranged according to chronological order.

40 The incinerator had been a key site for the disposal of Vancouver’s solid waste since opening in 1911. Greeley and Hansen, “Report on Refuse Disposal,” p. 30.


confirm that the Kerr fill was poorly maintained, and that leachate seeped straight into the Fraser River\textsuperscript{44}

Typically for the postwar era, Greeley and Hansen argued that landfilling was “one of the most economical means of disposing of refuse together.”\textsuperscript{45} The use of the word “together” undergirded a critical point. Incinerating different forms of refuse in large quantities was very challenging—for example, processing glass and metals. Twenty percent of the volume would remain in the form of ash, and that ash had to go somewhere. Discard practices made landfills seem the inevitable end of the waste stream. Greeley and Hansen praised landfilling by defining what proper landfilling entailed. Their visionary definition echoed what elite Western engineers had described above:

The land fill (or sanitary landfill) method of refuse disposal is applicable to all kinds of refuse, either combined or separate. It usually comprises dumping and compacting the refuse in and above shallow pits, each day’s deposition being covered with material excavated from the pits. It may also be conducted to fill existing ravines, abandoned quarries and gravel pits. If the excavated material is insufficient or unsuitable for the covering layer, other material must be brought in from off the site. The fill is compacted by the excavating and refuse handling equipment.

Where there is adequate land available, with suitable soil and drainage, the landfill is one of the most economical means of disposing of all refuse together. With proper and adequate cover material and careful operation, there should be no nuisance from odors, rodents or insects, although the control of blowing paper is difficult.\textsuperscript{46}

Vancouver engineers were aware of best practices in the 1950s and 1960s, and, if nothing else, the Greeley and Hansen report would have made them aware that the Kerr fill did not meet Vincez’s criteria. Thus we must ask: why the difference between landfill theory and landfill practice in Delta? This is why the concept of \textit{mundane modernism} is so important. As in many cases of discard history, best practices took a

\textsuperscript{44} Darryl MacKenzie, personal communication, August 2, 2018. Vancouverites’ anxieties about leachate paled in comparison to those concerning air pollution and sewer waters. Those two forms of discard threatened the well-being of residents with more political clout than those living near landfills, particularly as fills of the postwar era were increasingly large and centralized, thus limiting their numbers of neighbours. Keeling, “Urban Waste Sinks”; Keeling, “Sink or Swim”; Thiessen, “Protesting Smoke.”

\textsuperscript{45} Greeley and Hansen, “Report on Refuse Disposal,” p. 33; Melosi, \textit{Garbage in the Cities}.

\textsuperscript{46} Greeley and Hansen, “Report on Refuse Disposal,” p. 33.
back seat to cost efficiency, a goal that united the governments of Delta and Vancouver. Political and economic factors discouraged politicians and engineers from implementing sanitary standards at Kerr and whatever site replaced it. The record of evidence is fragmentary for fleshing out Vancouver’s motives and actions. However, the proposals and communications we have access to, paired with the contexts of Western and Lower Mainland discard practices, strongly suggest that politicians and engineers concluded that updating landfilling practices had a poor cost-benefit ratio. Operations could continue to run fairly smoothly so long as they could locate a site where nearby residents had little political leverage, were used to the consequences of local dumping, and thus were less inclined to complain. Ignoring problems and cutting corners might have seemed a logical approach to landfilling. This context formed the basis for the selection, negotiation, and construction of the Delta fill site.

**Delta’s Need for a Landfill**

Delta was also struggling to contain its solid refuse and odours by the early 1960s. The municipality’s incinerator, the small and scattered dumpsites, the principal landfill along the Fraser River, and the unregulated dumping by residents were widely noted problems. Delta’s incinerator, a key means of municipal waste disposal, was an especially hot-button issue for residents in its northeastern quadrant. W.A. Michener lived near the incinerator. In 1961, he “sent a handwritten letter and a large box of flaked ash [collected on his property] to council.”47 Other residents complained of “disgusting odors, flies and vermin.”48 L.H. Cornell requested compensation from the council when he found his newly painted roof dirtied by soot. Resident Ronald Rind noted “he was paying heavy taxes for the privilege of living in filth.”49 Beyond the nuisance-level concerns, mismanagement at the site led to incessant fires that posed challenges. The site had minimal fire-fighting technologies, and little time or energy seems to have been spent in protecting refuse from sparks or ensuring that flammable and explosive materials were separated from other refuse. When fires inevitably broke out, firefighters rushed to suppress the flames before they extended into neighbouring properties.

47 “Garbage Dump Knocked,” *Ladner Optimist*, June 1, 1961, 1.
The situation fostered cynicism among Delta’s less affluent: one landfill was as good, or as bad, as another. It really did not matter to most Delta residents where their refuse went, or how many unregulated sites existed, so long as it appeared to solve their municipality’s waste disposal needs without posing a serious nuisance. Deltans relied on landfilling in the nearby Fraser River, as well as a series of smaller, terrestrial landfills. The dumping into the Fraser River inspired Councillor Ed Vidulich to express concern that such neglect had left the river “‘pretty filthy.’” The small terrestrial landfill sites, classified as open dumps, were entirely uncovered and presented odour problems.

Delta’s principal, municipally sanctioned dump was situated on the ecologically vulnerable site of Ferry Road. During the early twentieth century, Ferry Road was continuously claimed by the neighbouring Fraser River. In an effort to stabilize the site, Delta either converted the site itself, or contracted private interests to convert it into a landfill which operated until the 1960s. But the site was not without problems, particularly concerning odours and fires. Similar to the municipality’s incinerator, there was neither sufficient coverage of refuse to decrease fire risks and odours, nor did the operators give much attention to separating out more hazardous materials.

Another key discard problem in the early 1960s was agricultural and domestic dumping by residents. There were reports of agricultural refuse such as “manure and filthy water overflowing into open ditches.” Delta had been a settler community with a long history of farming. The needs and nuisances of the industry were typically tolerated by most residents. Not all nuisance refuse was linked to agricultural sources, however. Residents also dumped household garbage throughout the early 1960s into town ditches, streets, and smaller, informal landfills.

Community-level “solutions” failed to resolve these problems. Deltans had common grievances grounded in dissatisfaction with municipal waste services. Residents’ complaints went straight to the municipality’s engineering department, and, typically, the deputy engineer was responsible for summoning a clean-up crew. The department would also instruct residents to sift through refuse and pass along identifying

50 “People Are Dumping Garbage In Wrong Places, Claims Clerk,” Ladner Optimist, April 28, 1965, 1.
51 “People Are Dumping Garbage,” 1.
52 “Quacks and Rats Create Nuisance,” Ladner Optimist, January 12, 1961, 1.
information to engineers. The Delta Ratepayers Association, in line with requests from residents, suggested that the Delta council place "litter cans' in strategic places" to curb street dumping. Council responses, conveyed through the City Clerk, stated only that "the matter is being studied and there is a possibility that some service organization will place the cans as requested." The 1960 council minutes suggest that written materials were distributed to institutions such as schools to encourage the use of bins.

When these measures failed to address complaints satisfactorily, residents who endured the increasing onslaughts to eyes and nostrils began to recognize that their scattered and poorly regulated dump sites would not last. As refuse mounds grew, haphazard practices within Delta resulted not only in stench and blight upon the senses, but also a burden on the Delta taxpayer when the municipality had to pay for the ongoing clean-up and fire regulation of ditches, roadways, unsanctioned dump sites, and the principal fill. In response to the worsening waste disposal crisis and the resulting media coverage, Delta’s city council finally developed a coherent response. They announced that a new landfill would alleviate problems posed by the incinerator and local dumping practices. This Vancouver-run operation would, in theory, decrease the sanitary problems around Delta, make use of the infamously unusable bog land, and garner a profit for the municipality.

Given the twin waste disposal crises in Delta and Vancouver, their mutual needs led to a mutual solution. Sources do not fully answer why Vancouver considered Delta in the first place, nor why they eventually settled on Burns Bog. In this respect, the broader context of Western landfills—their designs, structures, and impacts—helps to illustrate Vancouver and Delta’s materially intertwined interests. In many respects the proposed landfill at Burns Bog was a product of the broader North American, cost-cutting context.


54 Committee Meeting Minutes of the Delta Municipal Council, 16 May 1960, p. 3.

55 "Incinerator Fires Cause Anger," 3.
Burns Bog before the Landfill

For Delta residents, politicians, and municipal engineers, Burns Bog had long been considered a landscape with little value. The decay of vegetative debris and rising water levels there since 500 BP produced an accumulation of acidic peat, high in iron and manganese. Being a natural sponge for water and gases, the bog was also difficult to traverse. With the exception of cranberries, these conditions hindered the principal industry of the region, agriculture. Instead, settlers exploited the terrain for peat, which was marketable as garden mulch and explosive material.56

The bog was hardly an empty land before 1962. A site of bustling industrial activity, the bog was home to a series of peat-producing companies, first Industrial Peat Produce Limited (IPPL) and then Western Peat Moss Limited (WPML). Both were directed and owned by E.E. Carncross, who also owned the lion’s share of the bog during the postwar period. By contrast, the Corporation of Delta owned just 2.3 percent of the bog by 1976. The tract that eventually hosted the landfill was largely within the property bounds of the Burns family estate.57

Industrial peat operations had affected the hydrogeology of the bog since 1910. Producers had extracted logs of peat for decades, drying out large sections of the bog. Western Peat Moss Limited’s activities were also intertwined with those of the Dow Chemical plant across the Fraser River on the east side of Tilbury Island. In the 1940s, Dow facilitated WPML’s blast removal of peat by supplying as much as 4,546 litres of water per minute through a south-bound pipeline. The quality of the water was suspect, however. Limited postwar assessments of the water alleged that it contained “no biocides.” However, we know that Dow had used the water as a cooling agent in the production of synthetic materials before it piped it into the bog. No evidence definitively indicates that Dow Chemical piped water that was less than innocuous, but if the waters were tainted, then there is a possibility that Burns Bog had become a large-scale industrial dump site at least twenty years before the landfill opened. Agricultural activities


along the edges of the bog also reshaped its ecology through the application of pesticides such as DDT during the 1940s and 1950s. At least one farm relied on aerial spraying.\textsuperscript{58}

Residents also interacted with the bog as a site of leisure and recreation. Individuals and families seem not to have had considerable concerns about the industrial chemical impacts on the site. The bog was instead a place to express their “naturalist” sides, perfect for blueberry picking. One resident fondly remembered her aunt as “the primo berry picker of the family.” Others searched the bog for bird eggs or joined families in the quest to select and cut a Christmas tree. The industrial activities within and surrounding the bog did not preclude it from being a meaningful natural space for Delta residents.\textsuperscript{59}

Site Selection on the Part of Vancouver

Despite its complex environmental history and human ecology, Burns Bog remained the obvious choice for Delta officials when they selected a new landfill. Vancouver’s road to the bog was more circuitous. As late as November 1961, the city council was still considering three possible landfill sites. Greeley and Hansen recommended one site along the shoreline north of Vancouver International Airport in Richmond.\textsuperscript{60} The second was in North Surrey, next to the Port Mann Bridge on the south bank of the Fraser River. This was farther from Vancouver but still easily accessed by road and water. That it was surrounded by active industries and rail lines made the land more valuable and thus less attractive to sacrifice for a landfill, however.\textsuperscript{61} Only after a commissioned report in 1961 did Vancouver’s path clear.

In that report, soils consultant Paul Cook ultimately concluded that the Surrey and Delta sites were comparable in terrain quality. Before Cook could declare both


\textsuperscript{59} “DJ” in discussion with the author, April 3, 2019.

\textsuperscript{60} Greeley and Hansen is the first recorded party to suggest that Vancouver look beyond its municipal boundaries when selecting a new landfill site. They may have indirectly influenced Vancouver’s choice of a site in Delta.

\textsuperscript{61} Council Minutes of the City of Vancouver, 28 November 1961, Series S31, CVA, pp. 1, 7–9.
properties similarly boggy and thus worthy of “reclamation,” however, he had to engage intimately with landscapes in ways that illustrate the importance of thinking about mundane modernism.\textsuperscript{62} High modernism ebbs and flows in and out of the Burns Bog landfill planning process. Cook was emblematic of modernist engineers’ efforts to catalog and standardize local ecologies prior to imposing grand structures. Cook’s study conforms to Tina Loo’s and Meg Stanley’s observations regarding the detailed nature of high modernist “local knowledge.”\textsuperscript{63} Before he could write his assessment, Cook had to engage intimately with each site, transforming site-specific data into portables that could be compared in a decontextualized analysis of nature. He thus had to make a detailed assessment of the proposed sites, measuring soil layers and moisture levels and estimating landfill stability and the potential of bog peat and clay as a foundation when those soils were compressed. He offered a range of estimates for how much refuse height and weight could be supported by peat bases of different moisture contents. Cook noted that hard conclusions were impossible because authorities remained conflicted as to the impacts of moisture levels upon landfill stability.\textsuperscript{64} Rather than fund further studies, Cook advised city soil engineers to measure layer thickness and strength and, from there, “temper the indications with judgement based on experience, particularly in a disappointing experience.”\textsuperscript{65} Given how much Cook referenced gaps in soil engineering knowledge, this advice seems curious from a scientist. Yet Cook never saw the bog only as a soil scientist. He also presented a synoptic vision of a simplified site for a lay audience interested in constructing a landfill. As a consultant for a municipality with a history of investing minimal effort and funds in landfill management, he needed to produce a landscape that was just legible enough to support a new fill.

Cost and ease of acquisition again emerged as guiding considerations in Vancouver’s decision-making process. First and foremost, the city appreciated that the Delta property would cost half as much as the Surrey site. Additional bog acreage would also be easier to acquire in the future should the city wish to expand operations. Vancouver officials further noted that both Delta and Surrey were concerned with the

\textsuperscript{62} Council Minutes of the City of Vancouver, 28 November 1961, pp. 1, 7–9.
\textsuperscript{63} Loo and Stanley, “Environmental History of Progress,” 402–8.
\textsuperscript{65} Cook, “Evaluation of Property,” p. 2.
industrial value of a potential landfill property. Any landfill would freeze the value of the property and likely inhibit later usage, even for industrial purposes. Vancouver seemed to recognize the value of listening when municipal councils explained why certain properties were (or were not) valued as landfill sites. Certainly there was civility in attending to the concerns of other municipalities, but we should also recognize that this was smart politics: courtesy facilitated inter-municipal relations and eased negotiations both in the present and future.

There were other benefits to the Delta site as well. The Burns Bog offered easier access than the Surrey site. Trucks reached the bog via a quick exit from the Deas Island Thruway/Highway 99, while the Surrey site required a longer, more circuitous route after exiting the Port Mann Bridge on Highway 1. The Delta site also enabled Vancouver planners to convert the Kerr fill into a refuse transfer station that could process urban wastes before being channeled via existing routes to Burns Bog. The Surrey site would necessitate more extensive changes to Vancouver waste workers’ transport networks. Finally, the competing landfill sites contained critical differences in how citizens occupied the properties. In the early 1960s, the Delta site presented fewer legal hassles and expenses to remove residents simply because there were fewer residents to be relocated in comparison to the Surrey property. Delta’s relative emptiness stemmed from previous land clearing to facilitate the construction of the Deas Island Highway (Highway 99). The main intent of building the highway was to connect the American highway with the highway and Deas Island Tunnel (later named the George Massey Tunnel after Delta’s Social Credit Party MLA) to Vancouver, Richmond, Delta, and Surrey, but it also enhanced access to Burns Bog.

The highway expropriation process that had ousted residents before the landfill was ever proposed tore an emotional, generations-old bond between residents and the lands their families had drained, dyked, and cultivated since the late nineteenth century. Farming properties were seized or bisected, forcing the Burr, Gillander, Green, Harris,

66 Historical landfill neighbourhoods often became sites for later transfer stations, both in North America and around the globe. It was easier to situate a transfer station in a neighbourhood that had already hosted a landfill because the property was cheap, there was some continuity in waste vehicle routes, and municipalities could limit the number of new residents exposed to the nuisances of municipal waste sites.

67 Council Minutes of the City of Vancouver, 28 November 1961.
Holmes, Nottingham, and Trevitt families to dismantle houses, barns, and worksites.\textsuperscript{68} Some properties were reduced to wedges inaccessible by farming equipment. Farmers had to switch to cattle raising. The highway also literally split the community. The tarmac cut residents on each side off from social and business-related activities on the other side. Traffic noise by 1965 also prompted requests for the installation of tree barriers.\textsuperscript{69}

\textsuperscript{68} “DJ” in discussion with the author. In the same conversation, “DJ” also noted that the highway generally dismantled “homes, life, and [relations with] animals.” The latter were more than just creatures; they were “part of one’s heart.”

\textsuperscript{69} Residents on the north side of the highway had to drive much further in order to access South Delta services, while citizens south of the highway were cut off from intimate experiences with the bog’s ecology.
Figure 1. Proposed New International Express Highway showing Fraser River Tunnel and North Arm Crossing.

Figure 2. **George Massey and J. Kirkland with tunnel map.**

Pictured is the announcement of the Deas Thruway plan. The American flag is included as the proposed highway (99) would connect with its American counterpart. The pointer is centred where the Deas tunnel would soon open, but the plan George Massey is presenting still shows no highway line.

Source: Delta Municipal Archives, Delta Museum and Archives photograph collection, CR-101, 1970-001-144, c. 195. © New Westminster Museum and Archives (We are not certain if the image currently resides as an unidentified medium format negative within the New Westminster Archives, though the collection of Frank Goodship, the photographer, is currently held under the following collection number: IH1995.71.)

Oral testimonies indicate that the highway exhausted community resistance after their protests against its construction produced no change. The locally famous Mrs. Pybus, pictured below, sat in peaceful protest on her field after the provincial government ordered construction work to commence even though Delta’s residents had yet to be paid compensation for the expropriation of their land. Instances such as a front-

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70 Warren Nottingham (farmer) in discussion with the author, April 16, 2019; “DJ” in discussion with the author.
page story of Mrs. Pybus best conveyed community issues concerning the highway. Even Delta children gained some awareness and concern for both residents and their livelihoods.

Figure 3. Mary Pybus halts highway construction.

71 Mrs. Pybus’ set-up allegedly included both a gun and tent, although neither appear in this particular photo. “DJ” in discussion with the author.
Figure 4. Newly opened Deas Island Tunnel.

One resident learned of at least two men who died of heart-related complications linked to the stress of expropriation. For children and adults alike, the highway was a key event in a timeline where “Delta [became] nothing but a traffic corridor…for the other people to drive their stink machines through.” The expropriation was also a learning experience for the province and city. Vancouver figured out how to affirm its position of power in relation to Delta’s government and citizens. When the province experienced challenges in removing residents for the highway, Vancouver politicians chose to collaborate with the provincial Department of Highways to ensure “some consistency” and (perhaps) lower pay-outs for the few remaining properties to be expropriated for the proposed landfill. There were few residents to remove from around the bog, but the highway expropriations had also seasoned municipalities and citizens in the kinds of processes involved when implementing a new landfill.

72 “DJ” in discussion with the author.
Negotiations between Delta and Vancouver

Details regarding early negotiations between Delta and Vancouver are veiled by the few extant documents, but Delta council minutes project some light on how negotiations played out.74 Delta sought a landfill operator by 1960, and councillors considered both private operators and a Vancouver-run operation. Delta’s council minutes for August 1960 indicate that two private entities competed to open a fill at the bog’s north end, not the eventual site at the southwest corner.75

The two companies were Industrial Peat Produce Limited (IPPL) and the Pacific Coast Disposal Company (PCDC). Of the two, IPPL shows up more often in Delta’s records. They suggested a disposal site that would serve both Delta and Vancouver, even conveying a City of Vancouver letter to the Delta council which suggests that IPPL had the support of the City of Vancouver. The company proposed to fill property already owned, cleared of peat, and drained by IPPL. The plan called for filling twenty-five acres per year to a total of 350 acres. The proposal seemed well within the company’s capabilities, considering they claimed to clear roughly 100 acres of peat per year.76 The IPPL offer effectively sought to kill two birds with one stone. Already actively clearing the peat, IPPL needed to perform some kind of landfilling to reclaim the bog space as a useful terrain. A contract with Delta would have allowed the company to profit from both activities, but something made the Delta council balk. The reason likely relates to the bad reputation of private waste disposal companies in combination with concerning

74 The lack of documented communications between Delta and Vancouver could be the result of Delta’s record-keeping history. When the council changed municipal hall locations in 1968, the corporation sent both their minute books and council-supporting documents to the landfill. The latter include materials received by Delta’s council from all persons outside the corporation’s administration, including other municipalities and Delta’s own residents. The location of those council-supporting documents is unknown; they may be decomposing in the Burns Bog fill itself. Thankfully, the minute books were rescued by residents and currently reside in the Delta Municipal Archives.

75 Engineer Jim Atwater refers to a small-scale landfill in Coquitlam owned by “Pacific Disposal Ltd.” It is likely that PCDC was an American company providing small-scale landfilling services for Canadian industrial and municipal clients. Jim Atwater, “Fraser River Estuary Study Water Quality Impact of Landfills,” prepared at the request of the Environmental Protection Service, Environment Canada, April 1980, pp. 184–87.

76 IPPL promised that “there would be no burning or odor, [they] anticipate picking up material at a central depot, [and] they would layer the material.” The height would have been 10 feet in the active area at any given moment, a maximum of 40 acres. Committee Meeting Minutes of the Delta Municipal Council, 25 August 1960, DMA, p. 11.
communications between Delta’s council and the company. An IPPL representative referred to in the minutes as “Mr. Gilley” may have made a less than favourable impression on Delta’s council when he refused to answer a question presented by Councillor Alvin Bastedo on August 25, 1960. Gilley would not indicate where the “(tentatively) arranged” sand cover material for the landfill would come from, insisting an answer would be released only when the “transaction is complete.”

Delta council minutes stop referencing IPPL after August 1960, nor was there further discussion of a proposed landfill until January 1961. At that point, PCDC was seemingly the more viable contender. Accompanied by his lawyer, the PCDC’s representative A. Gazsity pitched a contract to the Council. However, Gazsity was not alone. Arriving two hours late, three representatives of Western Disposal Company Limited (WDCL) presented a letter from the City of Vancouver Engineering Department dated January 12, 1961. The letter contained “a ‘draft agreement’ . . . [with] various points that the City of Vancouver wishes covered by an agreement with the Corporation of Delta, and [WDCL’s] submissions.” After hearing WDCL’s proposition, one Delta Councillor recommended that the two municipalities meet to discuss “a direct agreement for garbage disposal.” The motion was carried, and Delta’s negotiations over a landfill immediately narrowed to a deal with Vancouver.

Formal meetings between the municipalities commenced on April 28, 1961, and negotiations were generally quick. The bylaw agreement on the legal foundations of the landfill was already largely composed. By December, the municipalities had agreed that Delta should receive compensation via an annual fee rather than a royalty on Vancouver’s discard, but the parties could not agree what the fee would include. Vancouver also dragged its heels, only committing to the Burns Bog site in November 1961. Once it settled on the location, however, negotiations accelerated. By May 1962, Delta’s municipal administrator, clerk, solicitor, planner, municipal engineer, and engineering consultant had formalized the bylaw agreement.

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77 Committee Meeting Minutes of the Delta Municipal Council, 25 August 1960, p. 11.
Both Delta and Vancouver stood to gain more from the agreement than simply a solution to their waste problems. The bylaw stipulated that Delta would receive annual payments of $20,000; the reclaimed land once Delta’s council approved of the closing and reversion of ownership from Vancouver back to Delta; a commitment to not welcome other municipalities’ refuse or to sell the operation, unless permitted by Delta council; and the promise that all substances and hazards, solid or liquid, would be contained.\footnote{The reclaimed land would presumably be used as parkland, police shooting training grounds, or for other suitable recreational activities. City of Vancouver, “By-law 3990.”}

But Delta also ceded significant power to Vancouver when it came to matters of landfill management and impacts upon Delta residents. Vancouver indemnified Delta from all claims and suits against the landfill operation. In exchange, however, Delta agreed that it would “not, without written consent of Vancouver, make any admission, offer, promise or payment related to any claim from which Delta is indemnified,” and that “Vancouver may take upon itself the settlement of any such claim and if any legal proceedings are taken against Delta to enforce such a claim.” Delta even agreed that every “claim . . . and every document relating to any such claim will be delivered by Delta to Vancouver immediately.” In essence, Delta became a ward of Vancouver when it came to Burns Bog landfill operations.\footnote{City of Vancouver, “By-law 3990,” p. 7.} Vancouver’s power over Delta spared the latter the responsibility of compensating for the landfill’s drawbacks, but the Delta council lost all say over fill management. They could not force Vancouver to improve its practices there. In contrast to many case studies of high modernism in Canada, Delta’s politicians embraced this hierarchy because it lessened their costs and liability.\footnote{Nottingham in discussion with the author.} Delta’s delegation of responsibility over the construction and maintenance of the Burns Bog site to Vancouver was a crucial moment, given Vancouver’s subsequent failure to conduct proper containment of solid and liquid refuse there.
Negotiations between the Municipalities and Delta Residents

Hints of dissatisfaction surfaced soon after the bylaw was formalized. The matter was presented to Delta residents at a July 1962 town hall meeting. This event seems to have been just for show: once Delta’s council agreed to the date of the meeting, there was no further discussion of or reference to its reports recorded in council meeting minutes. At the meeting, only one resident, the farmer Harold Cullis, sought clarification about the bylaw’s promise that Vancouver would contain all substances: in this case, leachate. The official response reminds us of the very different scientific context of the early 1960s when compared to today. This was still the era of “assimilative capacity,” an assumption that waterways acted as sinks which diluted effluent. It had been common engineering practice within the Greater Vancouver region since the late nineteenth century, in part because engineers still had a poor understanding of how water actually functioned as a purifying technology.83

Vancouver engineers merely directed leachate into nearby ditches, a practice that went uncontested by Vancouver and Delta politicians in the 1960s. Engineers for both municipalities generally ignored the issue of leachate, expecting little outcry from not containing and treating the substances. In fact, the earliest chemical tests the city provided to defend its alleged diligence in handling leachate came in 1970. Because engineers and politicians invested no time or effort in researching leachate, they were not equipped to answer questions about its impacts on nearby water, flora, and fauna. The same situation applied to Delta’s residents, who were equally ignorant of and disinclined to ask tough questions and demand answers. Although Cullis was concerned about the substance’s impact on his cattle, he was seemingly satisfied with the Vancouver’s solicitor’s vague assurances that if water pollution occurred as a result of the landfill, the water would be treated.84

Oral testimonies suggest that coercion or misinformation campaigns were unnecessary to gain Delta residents’ consent for a landfill.85 Here there was no need to

83 Keeling, “Sink or Swim.”
85 Nottingham in discussion with the author; “DJ” in discussion with the author.
manufacture consent among citizens, in contrast to high modernist projects carried out elsewhere in Canada around this time.\footnote{Macfarlane, \textit{Negotiating a River}, 226–27; Macfarlane, “Negotiating High Modernism,” 334–35.} No one demanded that Vancouver and Delta engineers discuss hydrogeology or landfill engineering, and the Delta and Vancouver councils did not pursue further public engagement, either in written or verbal form. The July 1962 town hall meeting was the solitary consultation with the public on the bylaw agreement. Council records also suggest that the municipalities were not inclined to act on concerns such as those raised by Harold Cullis. Delta council’s position was shaped by economic incentives. They were happy to agree to the bylaw terms that capped their liability, and that, for all intents, shifted figurative and literal exposure onto residents of Delta to pay the price for cheap landfilling. While this was not a calculated imposition, the inter-municipal relationship let Vancouver take the reins in a relationship defined narrowly in terms of mutual benefits among governments and not necessarily residents.

**Landfill Construction**

The bylaw agreement excluded several factors that were central to the generation of later environmental and political problems. The bylaw defined a “sanitary landfill” as

> a method of disposing of garbage and refuse on land, taking all reasonable precautions to prevent nuisances or hazards to public health and safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and to cover the top and sides of the refuse excluding the working face with a layer of earth at the conclusion of each day’s operation or at such more frequent intervals as may be reasonably necessary, provided, however, that the operator of the sanitary landfill operation may elect to cover the working face at such times as the operator considers necessary.\footnote{City of Vancouver, “By-law 3990,” p. 3.}

This largely mirrors the American Society of Civil Engineers’ definition of a sanitary landfill, except for the critical difference that American operators had to “cover [the fill] with a layer of earth at the conclusion of each day’s operation.”\footnote{Melosi, “Historic Development of Landfills,” 20.} The bylaw authors, most likely Vancouver engineers, specifically excluded “the working face,” or active area of the landfill, from such coverage. The bylaw framed the landfill operator as a figure of

\begin{flushright}
\textit{\footnotesize 87 City of Vancouver, “By-law 3990,” p. 3.}
\textit{\footnotesize 88 Melosi, “Historic Development of Landfills,” 20.}
\end{flushright}
“expertise,” and the employee was trusted to maintain the balance between cost-effective waste management and nuisance management, even when coverage did not include the area in most need of coverage.

The bylaw contained similar gaps regarding leachate management. Prior to the opening of the Burns Bog fill in 1966, the subject of leachate was absent from communications and reports by Vancouver and Delta politicians and engineers. By 1969, it had become a key issue, yet the bylaw contained no description of or instructions for how to handle leachate other than it would be contained “if” it was a problem. The bylaw did not clarify what would count as a problem, and the operative assumption by government officials and residents was that leachate would go straight into the waterways unless widespread dissatisfaction forced politicians’ hands. These were the priorities and framework that guided engineers in constructing and opening the landfill in 1966.

**Landfill Impacts upon Residents**

At one level, the bylaw resulted in a low-cost landfill that fulfilled the fiscal and material needs of two municipalities through a true “mutual benefit” relationship. Vancouver’s residents benefited from sending their waste elsewhere on the cheap, and both governments and their elected and civil servants enjoyed a relationship that remained generally consistent and friendly.

However, the shortcuts at the site and its studied neglect of landfill standards also produced what activists and scholars now call environmental injustice. It was Delta’s residents who faced the ecological consequences of the Burns Bog fill, problems that were often a *continuation* of plagues they had faced prior to the new operation. The impacts fell into four categories: dumping, unpleasant sensory effects, new hazards, and the foreclosure of cultural practices.

Dumping practices within Delta’s residential areas from 1961 to 1966 did not change *fundamentally* with the new landfill. Vehicles from other municipalities actually added nuisance in the familiar form of more roadside garbage through inadvertent and intentional littering, but residents also discovered a new structural incentive to litter. A municipal fee in 1966 introduced a 50-cent charge for all disposal up to 1,000 pounds, a
measure that encouraged Delta residents to discard their trash outside the new landfill. Warren Nottingham discovered that family friends were dumping refuse onto the Nottingham property. Like other property owners who did not catch the culprits red-handed, Nottingham encountered only obstacles to compensation and assistance. Similar to before 1966, both Vancouver’s and Delta’s councils denied responsibility for dumping on properties even a short distance from the landfill access road. The Tsawwassen Nation also notified Delta’s municipal engineer that the nation was being used as a dump site by Delta residents. Delta’s council refused to “educate” citizens about this issue even though it had made a similar effort to do so regarding dumping on settler property. Instead, it ordered the Tsawwassen nation to sift through the garbage and report culprits, essentially outsourcing policing to the First Nation while externalizing the ecological costs of waste management onto marginal populations.

The landfill also created unpleasant sensory effects in the form of blight, litter, noise, and odour. Local ditches were soon lined with a thick black ooze as a result of failure to contain leachate from the fill. Farmers paid for fences to keep cattle out of ditches they had once roamed, and then rains raised water levels, making the fences useless. The fill was generally left uncovered and, as a result, was both visible and odoriferous to residents and highway users. Delta Mayor Dugald Morrison (1968–1973) was so appalled that he requested that Vancouver’s Mayor Tom Campbell visit the site in 1970. Campbell never came, instead asking for “a report from city administrators.”

Vancouver’s engineers walked the site with Delta Administrator and engineer Ray Cunliffe, but the meeting served only to reinforce their municipalities’ mutually beneficial relationship. Cunliffe stated, “I feel that the Vancouver landfill operation is highly efficient. … Handling garbage is a difficult procedure at any time.” Cunliffe tried to balance the interests at play. He instructed council members to “discuss the operational

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89 “Burns Bog Garbage Dump,” 1.
90 Nottingham in discussion with the author.
91 What “education” meant in this context is unclear, but it might have referred to discussion in schools, written material for wide public consumption, or signage. “Indians Protest Dumping,” Ladner Optimist, February 23, 1966, 1.
92 Nottingham in discussion with the author; Edward Vernon to W.N. Venables, Director of Pollution Control Branch (Department of Lands, Forests and Water Resources), 11 July 1972, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
93 “‘Take A Whiff, Tom’: Dump’s Stink Scored,” The Vancouver Sun, August 18, 1970, 7.
difficulties with the professionals—the dump workers themselves.” He continued, “I can appreciate that the job at the dump is a difficult one, and feel that the personnel involved are genuinely attempting to make this a model operation.” Cunliffe chose to validate and focus on workers at the dump to distract from the city’s subpar landfill maintenance.

The squeaking and grating disposal trucks meandering through local roadways also annoyed residents throughout the day, while litter scattered by animals and winds due to the lack of coverage invaded neighborhoods and fields. Residents were forced to deposit this detritus in their own bins or endure the squawking presence of seagulls, known locally as “[Vancouver] Mayor Rathie’s chickens.” The gulls also dropped excrement, used diapers, bones, chunks of metal, and other contents onto cars, people, fields, and the livestock inhabiting these sites. And the landfill created new hazards, including threats to cattle and therefore the livelihood of local farmers. Delta councillor and farmer Harold Savage angrily warned that “if any cows choke on the bones, someone is going to get sued!” According to at least one resident, cattle often died after consuming sharp metal or glass refuse dropped by gulls. Fire hazards were another problem, one first associated with the old incinerator and directly tied to landfill management. These included odours, smoke, and property damage if the flames spread. Resident Edward Vernon notified the Pollution Control Branch that neighbouring residents were “concerned with fires which occur from time to time at the Dump. Approximately ½ mile north of the Dump there is 150,000 lbs. of dynamite and between the Dump and the storage area is a small forest.” Vernon added that if a fire began at night, “there is only one employee on duty to handle it, and it generally burns until the morning crew comes to fight it.” The landfill also ended cultural practices linked to the bog, including bird watching, berry picking, and nearby water-based activities. At a meeting of the Greater Vancouver Regional District’s Solid Waste Committee, one

95 “Delta Plans Bull-session.”
96 Minutes of the Solid Waste Committee, 4 April 1974, p. 23.
97 “DJ” in discussion with the author; Darryl McKenzie, personal communication, August 2, 2018; “Claims Seagulls Drop Bones Taken From Dump,” Ladner Optimist, March 2, 1966, 1; “Burns Bog Garbage Dump,” 1–2.
98 “Claims Seagulls Drop Bones,” 1.
99 Nottingham in discussion with the author; Minutes of the Solid Waste Committee, 4 April 1974, p. 23.
100 Vernon to Venables, 11 July 1972.
resident reported that leachate had harmed water quality in Deas Slough, halting swimming, water skiing, and fishing there.\textsuperscript{101} Vancouver and Delta officials remained silent about these intimate, generations-long relationships with the bog.

Meanwhile, most Vancouver residents remained ignorant of the aforementioned issues and paid little in monetary compensation. The evolution of that city’s garbage crisis is not transparent in archival sources, but it appears that most Vancouverites enjoyed the luxury of no longer worrying about the city’s garbage, and that once the fill agreement was finalized, their city council moved on to new concerns. The silence in the sources suggests the council successfully shifted responsibility over landfill maintenance to the city engineering department. Only the less affluent neighbourhood around the Kerr fill continued to experience the burdens of a discard centre as it evolved into the new transfer station \textit{between} Vancouver and Delta. As in Delta, the Kerr neighbourhood likely experienced dumping problems when residents avoided their own city’s collection expenses. While Delta’s politicians were also spared the hazards of living within sight and sniffing distance of the landfill, they did have to answer complaints by suffering residents. Only when a formal case or claim was made, however, did Vancouver respond.

\textbf{Landfill Impacts upon Governments}

Dumping problems in Delta continued unabated, so both the council and local papers became hotlines for victims. The council could and did reject responsibility for the landfill’s shortcomings in management, but they remained caught between berating citizens and a nonresponsive City of Vancouver. Delta was compelled to honour an agreement grounded in a landfill that seemingly served mutual interests. Conflict could become a monetary and political hassle, if not catastrophe, for both municipalities, and the Delta council seemingly sacrificed credibility in the eyes of residents, particularly those close to the landfill, rather than strain relations with the City of Vancouver. In reality, they had little choice. The Delta Council was less powerful than its Vancouver

\textsuperscript{101} The GVRD is a federation of municipalities formed by the provincial government in 1966. Minutes of the Solid Waste Committee, 4 April 1974, p. 22.
counterpart, but local politicians were also sheltered by that relationship from the harms of the landfill.

Vancouver’s garbage problems did not continue, nor did complaints pose a problem for its city council. The city and its residents got all they desired: cheap, effective, and effectively distanced collection and disposal of city waste. They avoided having to “spoil” another plot of valuable Vancouver land and all the wrath that accompanied resident anger about incinerator air pollution or smelly landfills. The Burns Bog landfill operations were almost completely attended to by the city engineering department. Vancouver spent relatively little money on waste disposal, and it became someone else’s problem. The authority of politicians and engineers allowed landfill operations to continue unchallenged and, therefore, cheaply. For years fill practices avoided the scrutiny of the Pollution Control Board, and Vancouver and Delta authorities generally said or did little regarding the well-being of residents near the fill.

Conclusion

Delta’s Vancouver-run landfill emerged as a mundane solution to a garbage crisis that plagued both municipalities. The Western landfill model had not changed much since the 1930s, and Delta’s residents and politicians understood that the landfill would serve as a good-enough-for-government site. Their common goal was to minimize nuisances and municipal expenses. The municipalities agreed that Burns Bog was a wasted space, cheap, “unoccupied,” and easy to access thanks to a new highway. Deltans consented to the new landfill, partly because they lacked much leverage after the earlier highway expropriations and were eager to gain a local and cheap landfill. While the mutually beneficial arrangement between Vancouver’s and Delta’s governments did not lead to a relationship of equals, this was also not simply another high modernist story of governments imposing a grand scheme on distant places and peoples—in this case, those situated beyond Vancouver’s borders. Some of Delta’s residents were ousted to make way for the landfill, but the negotiations between Vancouver and Delta proceeded relatively smoothly and consensually. Delta’s government was eager for Vancouver to take the role of expropriator. Like many of its residents, it, too, desired a landfill, and this was the cheapest way to get one. The lack of future legal liability was the cherry on top.
The landfill was negotiated with the understanding that Vancouver’s city engineers could be trusted to run it to serve the needs of both municipalities. Inter-governmental relations remained strong, but Deltans with little political clout bore the main brunt of the landfill’s shortcomings. Poor coverage of waste in the name of cost-cutting resulted in odours, blight, litter, and harmed livestock. City engineers also denied that leachate was a problem, but this elicited increasing and consequential challenges from Delta’s residents shortly after the landfill opened in 1966.
Chapter Two.


Current landfill methods, although acceptable for many years, mainly because they have been out of sight and out of mind, are becoming unacceptable in light of their impact upon the environment.

– J. D. Sansom, Director of Engineering Services (Delta), 1 March 1973.

This chapter is about a mundane, but consequential substance: ooze. Its story begins shortly after the City of Vancouver opened its Burns Bog landfill in 1966. The area had once been home to relatively clean ditches. Crescent Slough was clean enough to swim and fish in, but all that changed with leachate, a black, filmy liquid waste produced as precipitation percolated through the landfill.\(^{102}\) Delta residents quickly noticed this new form of pollution and tried to stop it. They criticized what they regarded as the sub-par management of Burns Bog’s landfill, but they were stymied by two obstacles. First, there was no consensus on the nature of ooze or best practices for its treatment. Conflicting understandings of leachate helped produce a managerial status quo. Vancouver (hereafter “the city”) refused to conduct studies on the human and environmental factors that influenced quotidian leachate production or do more than cursory tests of the leachate itself. It also refused to divert ooze from “receiving waters” that emptied into Crescent Slough and the Fraser River. Second, an alliance of mutual benefit between Vancouver, the Delta Municipal Council, and the BC Pollution Control Branch (PCB), which wrote the rules on landfill management, granted permits, and regulated municipal environmental conduct, functioned as a bulwark against reform.\(^{103}\)

The ensuing tensions were driven by engineers’, politicians’, and residents’ divergent views on the formation, impact, and management of leachate. Engineers and politicians often seemed preoccupied by costs, and they preferred to deal with leachate

\(^{102}\) Crescent Slough is a semi-circular waterway which begins and ends at the south shore line of the Fraser River. The north tip of the slough is located near to Tilbury Island. It then curves southwest through the west side of Burns Bog and southeast towards and through North Ladner.

by using local waters to dilute and presumptively purify the ooze. Residents were influenced only partly by the New Ecology, an era of activism that increasingly drew on the life sciences to explain environmental problems, and that was already protesting water and air pollution. Landfills were another issue altogether. Some citizens and engineers called for terminating landfilling, but residents near the Vancouver-run landfill focused mainly on leachate and refuse coverage. Rather than overhaul waste disposal, they sought a more mundane solution: greater diligence in containing refuse and maintaining acceptable conditions. The primary resisters were a collection of Delta residents and a cantankerous (aspiring) farmer named Dr. Arne K. Mathisen. One weakness of their efforts was their fragmented nature, both intellectually and socially. The arguments mounted against the landfill’s management were diverse to the point of being scattershot; the petitioners themselves experienced similar difficulties coming together as a united front. While one resident, Edward Vernon, was able to join other community members to produce a petition to the PCB, Mathisen consistently imagined himself as a solitary victim of the landfill’s operations. What they all shared, however, was an inability to speak about leachate in quantifiable terms. Their continued reliance on sensory experiences when critiquing the landfill’s management ultimately undermined their ability to influence PCB policies.

Too strong a focus on cognition and strategy, however, can deflect us from leachate, which was the primary force driving tensions. Ooze was a dynamic and elusive compound, influenced by short-term weather and long-term climate, the hydrogeology and age of a landfill, the nature of the refuse, and the methods and materials used to cover it. The complexity of these interactions made leachate immensely difficult for Vancouver engineers to formulate effective responses, even had they invested more time and effort than they did in studying its qualities and impacts. Meanwhile, residents’ focus on the phenomenology of ooze, the odours and sights of dead or absent fish, and slime-lined ditches made for incomparable terms of debate. The resulting ambiguities of leachate formation and testing created a discourse about leachate that could not be reconciled. This was an explicitly mundane discourse, one that privileged timeworn

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104 Melosi, Fresh Kills; Melosi, Sanitary City, 171.

105 There is currently no evidence to conclude that cattle or other livestock died from leachate. The culprit in the case of cattle deaths was the sharp refuse that birds distributed and then cows vacuumed up. If farmers did not put a cow magnet into their animals’ stomachs to avoid friction and puncturing of those organs, they were playing a gambler’s game.
methods of perceiving and dealing with hazards. Efforts to acquire more expertise in the ways of leachate, or to make it more legible through precise methods of study were too expensive to undertake, or they required too much specialized education to understand—or both. They were therefore eschewed.

One irony was how costs shaped all sides of the leachate issue. Residents could have commissioned quantitative chemical studies, but this would have cost more time and money than they could afford. Nor would such tactics have guaranteed change. In both Canada and the United States, studies of leachate formation and toxicology were not yet a focus of extensive research. The lack of studies limits what we can know about the toxicology of Burns Bog, yet it also helps explain engineers’ self-reinforcing disinterest in investing in testing, containment, and treatment. Instead they relied upon the perceived wisdom that the solution to pollution was dilution. We can trace this impasse by following J.D. Sansom, Delta’s Director of Engineering Services in the early 1970s. Sansom knew that leachate studies were complicated but also that contemporary leachate management posed unacceptable risks. He criticized the city’s failure to contain and treat leachate, and he achieved important if limited victories. Tellingly, unlike other residents’ complaints, Sansom’s reports invoked quantitative data and circulated among a number of activists and researchers in the region. Conversely, Sansom’s resignation in 1974 might suggest that his complaints highlighted the limits of reform for a “mutual benefit” operation that, in the end, remained more concerned with costs than ecology.

The PCB’s regulatory role bookends this story and is central to understanding the city’s success at delaying costly reforms. In February 1972, the PCB notified Vancouver that it had to apply for a pollution control permit to continue operations at the Burns Bog landfill. In theory, the PCB could have halted operations there for failing to contain refuse, but it never did much more than request improved practices for the handling of leachate. This underscores the conclusion that cost containment remained the united concern of Vancouver and Delta’s “mutual benefit” pact, and that economizing was a key factor explaining the continuity in waste management practices at the landfill during the 1970s. Whether the city intended malice or was just slothful and incompetent is unclear, but that the city persuaded the PCB to sustain good-enough-for-government

management was the outcome. This casts unflattering light on the PCB, which was allegedly supposed to advocate on behalf of citizen concerns but instead behaved as an enabler of negligence. Over the course of the 1970s, it allowed poor practices to continue at the Burns Bog fill through a series of temporary permits. Deltans’ protests were ultimately heterogeneous, inconsistent, and insufficient to stop the ooze, yet they did help block Vancouver from acquiring a long-term permit until 1977, and they did help force the treatment of leachate at the Annacis Island Treatment Plant by September 1981, a strategy that better aligned the Lower Mainland with practices at other, more effectively managed large-scale waste sites around North America.

**What Is Leachate?**

Leachate’s characteristics and historical relations with bogs, engineers, and residents are the environmental foundation of this story. The ooze, technically known as “landfill leachate” and abbreviated here as “leachate,” was the liquid waste produced when water filtered through the refuse at the Burns Bog. The substance accelerated waste decomposition as it passed through the landfill. To fully understand this story, we need to grasp leachate’s basic nature. We also need to explain how weather, climate, and landfilling practices shaped its characteristics, how leachate moved through and was altered by the Burns Bog ecology, what engineers knew and did not know about leachate during the 1970s, and how their policies and practices changed in later decades. A key point is that knowledge about leachate emerged only slowly because postwar landfill engineers typically avoided the subject to save time, money, and energies.

Leachate characteristics are primarily defined by weather, climate, and landfilling practices. Climatic and diurnal weather patterns generate the majority of leachate volume as water gravitates downward through a landfill. The greater the amount of precipitation, the more (in general) it dilutes leachate. The landfill itself was another variable. Effective examinations of leachate must account for recent weather patterns and broader climatic forces such as temperature and seasonality, the types of waste dumped at a site, the length of time materials have been decomposing, and the materials and methods used to build a landfill. Different forms of refuse produce different elements and compounds when exposed to precipitation. Typically, landfills emit the most leachate soon after waste deposition, and the rate declines along a curve over
months and years so long as no more refuse is added. Therein lies a basic problem with studying leachate. Deposition does not stop. Moreover, how engineers cover refuse, and the materials they use in that process, also influence the rate and details of leachate generation. Infrequent coverage and reliance on permeable materials such as crushed gravel and sand enable precipitation to move more quickly through a landfill, while layering refuse with less permeable silt or clay slows the course of leachate through the refuse.

Leachate’s interactions with refuse generally form acidic effluents, with the lowest pH readings usually occurring in the early years of fill operations that produce notable quantities of lead and iron. Other typical leachate substances include cadmium, manganese, aluminum, and ammonia. All pose risks to biota, and leachate tends to increase the Chemical Oxygen Demand (COD), which is the amount of “oxygen required to biochemically degrade organic, nitrogenous, and inorganic materials.”107 When waters have a higher COD, there is less oxygen left for other organisms such as fish fry.108

The nature of Burns Bog further complicates our understanding of leachate management there. The Delta landfill resides at the southwest corner of a sphagnum peat bog. Peat is a soil that contains organic materials with little to no decomposition. A raised peat bog such as Burns Bog forms when sphagnum moss retains water and (along with other vegetation) decomposes but the nutrients remain intact because of anaerobic conditions. As a result, the peat accumulates. These sites naturally emit acidic water with elevated levels of iron and manganese and higher rates of COD. Put simply, Burns Bog already produced environmental impacts similar to leachates, but the reports and communications produced by Vancouver’s engineers indicate that they either did not have an effective understanding of these dynamics or chose not to develop one. During the 1970s, they assumed that the bog would largely act as an insular sump. They thought (and largely correctly) that the landfill would compress the underlying peat and clay layers into an impervious bowl, thereby preventing leachate from entering groundwater through the bottom of the fill. Postwar engineers in Canada and the United States shared this vague notion, yet soils expert Paul Cook noted in 1961 that

knowledge of peat behavior was tentative and varied across different bog environments. Only later did engineers realize that clay and peat were more reliable than plastic as landfill liners only if geological strata were consistently thick. Examining the history of New York City’s Fresh Kills Landfill, historian Martin V. Melosi is skeptical of historical claims that clay landfills were reliable containers of leachate in the postwar era.110

Firmer conclusions are hampered by the paucity of research on leachate during this era. Private and public engineering and biochemistry specialists conducted minimal studies during the 1960s. Researchers’ vague references to residents’ complaints about neighbouring landfills in Canada and the United States suggests that the science on landfills and leachate was in catch-up mode as late as the mid-1970s.111 Studies generally funded and conducted by universities and governments slowly began to chart leachate’s chemical characteristics at particular landfills. Awareness of the toxic threat it posed to flora and fauna lagged even more.112 The variability of leachate across sites certainly contributed to delayed awareness of the problems it posed, but we should also note how self-interest, particularly among municipal employees and private waste disposal interests, might have retarded understandings. Liability concerns made engineers reluctant to admit that leachate from a landfill under their management might produce effects comparable to those of sites known to be toxic to nearby water ecologies. The specificity of leachate thus served as an obstacle to general understandings and broader mandates of leachate management. Historians are dependent on site-specific examinations of leachate, usually commissioned and produced by the particular municipal engineering departments overseeing a landfill. The biases are inherent, but historians who dig beyond the broad context may find how

109 Cook, “Evaluation of Property.”
110 Melosi, Fresh Kills, 294.
111 Residents who experienced the smells and sights of a neighbouring landfill could raise an outcry at meetings of regional waste-related committees such as the Greater Vancouver Regional District’s Solid Waste Committee. Newspapers could also function as a means to gauge citizens’ discontent with landfill-related mismanagement, even if large-scale legal cases centring on such negligence did not become prominent in the media until the 1970s. R.H.F. Young, “Effects on Groundwater: Reports of Pollution,” Water Pollution Control Federation (June 1971): 1254; Melosi, Fresh Kills.
engineers at particular landfills used science to justify stricter or more lenient leachate management in comparison to other fills.

There was little incentive for Canadian and American waste disposal interests, private and public alike, to study leachate until the 1980s. Costs in time and money were one impediment. The potential admission of shortcomings in its management was another disincentive. These actors’ attitude seemed to be that if things smelled and looked acceptable, and animals were not dying, then there was no need to waste public resources on broadly testing leachate. Channeling leachate into waterways was the most cost-effective way to manage liquid waste disposal and minimize its visibility.  

Recycling was another way to manage leachates, especially when public outcry grew about sites such as New York City’s Fresh Kills Landfill. Leachate recycling entailed collecting and piping waste water back through a landfill. As late as 1980, engineers contended that this method was “an effective means of attenuating toxicity, [reducing] toxicity five times” faster than relying on precipitation for dilution. This helps explain why the NYC’s Department of Sanitation used recycling to cope with rising complaints about leachate management at Fresh Kills. In 1978, the department tried to halt the contamination of groundwater by drilling a new well into the base of the fill and pumping the effluent back to the top of the fill. We do not know how many other landfills did this. Poor access to records precludes gauging the popularity of such methods in Canada, but the largest landfills there likely followed suit by the early 1980s.  

As the Fresh Kills example suggests, citizen pressure forced improvements in knowledge of leachate characteristics and impacts by the 1970s. Lawsuits and unflattering news coverage led the Burns Bog operators to consider how to better contain or treat leachate. Peat was the key resource here. Leachate studies from the mid-1970s to the early 1980s considered the ability of peat columns to filter leachate before channeling it into local waterways. Engineering professor Robert Cameron noted in 1974 that one of his UBC graduate students, John Corbett, argued that “peat is very

114 Cameron and Koch, “Toxicity of landfill leachates,” 768.
115 Melosi, *Fresh Kills*, 644.
116 Melosi, *Fresh Kills*. 
effective in heavy metal removals from leachates.” Bog hydrogeology thus enabled city engineers to justify relative consistency in its leachate management. If they could filter liquid waste effectively through peat, which was locally abundant, they could still collect, channel, and dump leachate into neighbouring ditches at little additional cost. The fundamental problem with this approach was that it ignored the dynamic variability of leachates. Engineers tested the chemistry of ooze so infrequently that they could not make definitive claims about whether treated leachate was less or more toxic than untreated leachate. Moreover, the peat filters, because of their acidic nature, prevented engineers from understanding whether later leachate releases were more acidic and contained higher measures of COD and heavy metals.

The more postwar engineers and politicians gravitated toward the empiricism of scientific data, even when they did not conduct frequent tests, the less they valued the bodily experiences of people living by landfills. If anything, fish bodies mattered more than human bodies. In a move similar to one used in contests over DDT spraying on Long Island in the 1960s, researchers turned to fish to assess leachate toxicity. Historian Christopher Sellers explains how a 1966 lawsuit about pesticide use led to the use of toxicity studies of birds to document the damage DDT did to “natural resources,” because resident sightings of “dead birds, tadpoles and crabs” were no more than


118 Bodily experience has long been a primary way of knowing nature, but the interpretation of this experience changed markedly by the postwar era. Prior to the cementing of bacteriological understandings in the late nineteenth century, miasmic theory linked climate and odours to bodily health. Health professionals and laypersons alike tied epidemics such as cholera and yellow fever to sources such as the industrial smells of cityscapes. The transition from miasmas to germs as agents of ill health, according to Melanie Kiechle, was a slow “turning of the tide.” In domestic settings in particular, people, especially women, continued to perceive health-related threats through a mixture of lenses, and fresh air continued to be linked to good health well into the twentieth century. Environmental historians Joy Parr and Christopher Sellers have noted the importance of viewing human bodies as subjects of historical experience. Bodies are a confluence of social, political, and technoscientific streams. The knowledge humans collect through their senses are difficult to quantify, and perceptions change as memories fade, making them less reliable artifacts in legal settings. Melanie A. Kiechle, Smell Detectives: An Olfactory History of Nineteenth-Century Urban America (Washington: University of Washington Press, 2017), 26–27, 170–71, 256; Joy Parr, Sensing Changes: Technologies, Environments, and the Everyday, 1953–2003 (Vancouver: UBC Press, 2010), 190; Joy Parr, “Smells Like?: Sources of Uncertainty in the History of the Great Lakes Environment,” Environmental History 11, no. 2 (April 2006), 269–99; Christopher Sellers, “Body, Place and the State: The Makings of an ‘Environmentalist’ Imaginary in the Post-World War II U.S.,” Radical History Review no. 74 (Spring 1999): 31–64.
“unquantified personal observations.” Sellers notes that the “ostensibly placeless and universal assertions of environmental harm articulated by epidemiology or toxicology” supplanted the “voices of the threatened . . . in the dry abstractions” of science. What was true of Long Island held for the Lower Mainland as well. Quantitative data would trump anecdotal experiences in the unfolding contest over leachate at the Burns Bog.

In the mid- to late 1970s, a few studies of leachate toxicity emerging out of university settings turned to fish, just as Long Island researchers had once turned to birds. Engineers created their own leachate samples of “‘typical’ landfill leachate” within labs and then exposed fish to the undiluted waste water for set periods of time. Researchers recognized that leachates varied, and that this complicated the study of their impact on fish. A 1979 study noted inconsistent relationships between leachate and salmon bodies and activities. The authors concluded that this suggested a set of overlapping stressors on salmon bodies. Therein lay the basic problem of leachate studies. The variabilities of leachate—how weather, climate, human management, and the bog all shaped the production and examination of leachates as toxic threats—undermined researchers’ ability to make general claims about its environmental impacts. This is partly why North American scholarship had little to say about leachate toxicity and management until the 1980s. For sources, historians are compelled to rely on legislation which was slowly implemented during the late twentieth century. That legislation also lagged because of the limited amount of postwar engineering research related to leachate toxicity. Simultaneously, the lack of broad resistance by citizens or intervention by large waste disposal companies further defined (and maintained) landfill management in the United States until the late 1970s.

**An Idiosyncratic Foe: Dr. Arne K. Mathisen**

What kind of resistance did Deltans mount against the Burns Bog landfill after it opened in 1966? Dr. Arne K. Mathisen stands out. He was called “quite the character”—

119 Sellers, “Body, Place and the State,” 44.
120 Sellers, “Body, Place and the State,” 57–58.
“cantankerous” might be more accurate—but information about him is limited. Neighbours knew very little about this reclusive man. Legal documents portray him as stubborn and quite prickly towards those who stood in his way. What we do know is that he clashed with the City of Vancouver shortly after purchasing property wedged between the Deas Island Thruway and the landfill entrance in 1969. He seemed to want to raise blueberries and cattle, but his choice to do so next to a three-year-old landfill raises questions.¹²³

Oral testimony suggests that Mathisen shared the views of other conservatively minded Delta farmers. He too initially considered leachate more a nuisance than a hazard and believed that letting waterways dilute it was a reasonable form of management.¹²⁴ His clash with the city, which began via a series of letters in the summer of 1969, is best described as a neighbourly dispute regarding economic and sensory concerns. His initial letters did not mention toxicology, nor did he show any ability to speak effectively about leachate characteristics. He was instead focused on the poor aesthetics and flooding threat of liquid and solid refuse migrating onto his property from the landfill. Mathisen wanted Vancouver to cover half the cost of a fence between his property and the landfill. His main concern was to separate cattle from refuse. His only request concerning waste water was that the city ensure the effective flow of ditch water to prevent it flooding onto his property. Mathisen did not seek a cessation of landfill operations; rather, he wanted the city to dispose of its waste water without incursion onto his property and into his operations, as was the current situation.

The conflict escalated when the city denied any duty to ditch or fence beyond the landfill.¹²⁵ Vancouver managers further riled Mathisen by doing nothing to address the ineffective construction and maintenance of the ditches along the border of the two properties, such that they allowed liquid and solid refuse to escape. In the city’s defense,

¹²³ Nottingham in discussion with the author.
¹²⁴ Nottingham in discussion with the author; Arne K. Mathisen, President of ARPEG Holdings Limited, to J.A. Kaneen, Assistant Superintendent, Sanitation (City of Vancouver), 29 July 1969, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
¹²⁵ The city evaded responsibility for the ditch by blaming the previous owner of Mathisen’s land, who had allegedly moved the ditch farther south, thus placing it beyond the city’s remit. Phil S. Herring, Assistant City Engineer (Sewer, Water & Sanitation), City of Vancouver, to Arne K. Mathisen, 19 August 1969, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL; Phil S. Herring to Arne K. Mathisen, 25 June 1971, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
Mathisen’s property seemed prone to flooding even before the landfill was built. It was low-set against the nearby Crescent Slough, and tidal surges plagued the area. Conversely, it is easy to sympathize with Mathisen’s feelings of frustration as liquid and solid refuse flowed onto his property. Vancouver’s actions also suggest that Mathisen’s complaints represented a real threat. To help quash them, city administrators quickly established a line of communication between its landfill engineering and legal departments. A handwritten note on a letter from Mathisen suggests that the latter body advised the engineers to take “no action.”

Meanwhile, Mathisen hired the engineering firm Ripley, Klohn, & Leonoff International (hereafter RKLI) to produce a study by October 1970. By present-day understandings, the firm’s depiction of peat characteristics within the landfill greatly exaggerated the downward gravity of a landfill in pushing surrounding land away from the landfill site. The firm was correct in condemning the city’s failure to contain solid and liquid waste, however. The RKLI study showed how solid refuse such as tires spilled onto Mathisen’s property, and how landfill operations exacerbated flooding of the Mathisen property. They contended that Vancouver’s operations constituted a violation of the 1962 bylaw agreement governing the landfill. The original contract stipulated that the city should “take all reasonable precautions” to contain solid and liquid wastes and odours. None had been contained in the time before the firm’s report of October 1970. This report became the basis for Mathisen’s assertion that his conflict with the city

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126 The handwritten “noted. no action” is simply signed with “R.” The writer could have been either Ray Cunliffe, the recipient of the communication from Mathisen, or, less likely, E.F. Rideout, the Assistant City Analyst of Vancouver and someone involved with ditch tests during the early 1970s. Regardless of its author and the conversations that preceded and produced this comment, the placement of this document and related communications in the archives demonstrate collaboration between Ray Cunliffe, A.K. Thompson (Delta’s solicitor), and different branches of the Vancouver government, including their legal department. Arne K. Mathisen, to Ray Cunliffe, former Municipal Administrator of Delta, 19 January 1971, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.

127 RKLI was formed after a merging of two engineering firms in 1952. The resulting company grew into a national firm during the 1950s and 1960s and an international one in the 1970s. Today, it operates under the name Klohn Crippen Berger, Engineering & Environmental Services. Little is known about how Mathisen came to select this specific company: RKLI is only mentioned in the court records as the author of this study.

was more than “a [sensory] dispute between adjoining neighbours.” It confirmed that
city management had been legally negligent and that Vancouver’s administrators had
disrespected a neighbour to their landfill. By 1971 Mathisen was threatening legal action,
seeking an injunction to halt landfill operations.

In January of that year, Mathisen also enlisted the help of Delta’s Municipal
Administrator, Ray Cunliffe. Mathisen hoped that his own municipal government would
offer him some aid, but Cunliffe was little help. This is not surprising given Delta’s
mutually beneficial relationship with Vancouver with respect to this landfill. Cunliffe
merely provided Mathisen with publicly accessible texts, and he explained that Delta
“disclaim[s] all responsibility for the ditch, and are not prepared to receive representation
from me in this connection.” Jurisdiction over the landfill had passed to Vancouver with
the 1962 bylaw agreement. Functionally, this meant Delta had signed away its rights to
represent its citizens in this matter. As a result, Cunliffe’s communications with Mathisen
were shared with Delta’s solicitor, A.K. Thompson. Cunliffe’s conduct in this case
paralleled his responses to other residents’ complaints about the landfill. As noted in the
first chapter, he was happy to claim that the city’s staff were doing their best at the
difficult task of managing the landfill, and that all liability for these operations rested with
Vancouver.

Two sets of documents suggest that liability was indeed a concern for
Vancouver’s city managers. In the early 1970s the PCB notified Vancouver that it was
required to apply for a pollution control permit to continue its operations in Burns Bog.
How the city responded is telling. The city did submit an application to the PCB, but it
also tried to buy Mathisen’s silence regarding the landfill’s incursion onto his property. In
a provisional contract that Mathisen seemingly never signed, the city offered to pay him
$1,700 when he completed the new ditching on his land. They also tried to stipulate that
Mathisen could not move the northern boundary of the ditch and he would have to

129 Arne K. Mathisen to Ray Cunliffe, 13 January 1971, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
130 Ray Cunliffe to Arne K. Mathisen, 8 January 1971, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
131 J. Mulberry, employee with the City of Vancouver Legal Department, to R.M. Martin, City
Engineer (Vancouver), 3 February 1971, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
maintain it in good condition.\textsuperscript{132} The clincher lay in what the city would have received for its “generosity.” The agreement included a waiver that Mathisen and all his representatives would discharge the city of all legal responsibilities “in respect of any matter of thing done, omitted or suffered to be done by the said City, its servants or agents, now or hereafter in respect of any inquiry or damage to the [Mathisen] property.” Mathisen would also have to cease making “any representations to the Municipality of Delta, the Greater Vancouver Regional District, or any other Government authority which will prejudice the said City in its occupation or operations.”\textsuperscript{133}

There is no evidence that Mathisen signed the contract, nor did the city reference it in any later communication. We thus lack some context and definitive evidence regarding the results of this negotiation, but the draft says much about the threat Mathisen posed to Vancouver and the marginal status of leachate in the early 1970s. Like most of his neighbours, Mathisen focused on aesthetics and flooding; the city’s handling of leachate was a secondary complaint. The all-encompassing nature of the contract suggests the city mainly wanted to prevent Mathisen from holding the city accountable for its general mismanagement of the landfill. It also reminds us that he was a singular figure, unable or unwilling to ally with other residents of Delta—including its farmers or Edward Vernon’s “petition” crowd, to whom discussion now turns.

\section*{Deltan and Regional Resistance to Landfills}

Complaints from Deltans other than Mathisen emerged shortly after the landfill opened in 1966. An undated petition, probably from the late 1960s, demanded its improved management no later than 1971.\textsuperscript{134} The evidence buttresses the view that residents were not opposed to a landfill, but that they wanted one which was cost-effective and free of nuisances and hazards.\textsuperscript{135} Burns Bog fell short on all counts,

\begin{flushleft}
\textsuperscript{132} There is no conclusive link between the city’s application to the PCB and the provisional agreement they offered Mathisen. However, the timing of these actions and the desirability of securing Mathisen’s silence before the PCB ruled on Vancouver’s application suggests a relationship between the two.

\textsuperscript{133} City of Vancouver, Untitled contract, March 1972, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL, pp. 2–3.

\textsuperscript{134} The reference to a petition is made in a letter from Edward Vernon to the PCB in July 1972. Vernon to Venables, 11 July 1972; Nottingham in discussion with the author.

\textsuperscript{135} Nottingham in discussion with the author.
\end{flushleft}
according to testimony from a Greater Vancouver Regional District (GVRD) Solid Waste Committee meeting in April 1974.¹³⁶ Warren Nottingham, a neighbour on the west side of the fill and a representative of Delta’s Farmers’ Institute, noted that a black oily ooze predominated in local ditches shortly after the landfill opened.¹³⁷ Nottingham remarked that “we had times during the summer when the effluent coming from [the landfill] was so toxic it actually killed all the growth along the [Crescent] slough in our area.” His concerns somewhat mirrored those expressed by Mathisen, with different levels of importance associated to the various impacts; he complained about odours and the cattle deaths (caused by scattered, sharp refuse which the cows consumed), but “our prime concern [was] ground water pollution control.” Nottingham ended by requesting the collection and treatment of leachate and greater coverage of landfill waste.¹³⁸

Debates and demands regarding Burns Bog were complicated, however, because they were actually part of a region-wide discussion about waste management. By the mid-1970s the municipalities of the GVRD were struggling to secure large-scale landfill sites. Citizen resistance mounted in opposition to the well-known problem of smells and the emerging awareness of leachates as toxic effluent. This period also marked “the crest wave of great ecological concern” with respect to toxicological issues.¹³⁹ Nick Martin, a representative of a “public participation group” called the Environmental & Pollution Control Sub-Committee, presented an idealized vision of future solid waste management at an April 1974 meeting of the Solid Waste Committee. Martin believed that recycling solid waste would decrease environmental impacts and increase profitability. The current cost-saving strategies were akin to “saving pennies to spend dollars in the long run.” He and others called for investing in leachate and gas management to prevent community nuisances and damage to local fisheries. Surrey

¹³⁶ The Solid Waste Committee was a small branch of the Greater Vancouver Regional District’s governance structure. Activists, industrialists, businesspeople, and politicians all attended this particular meeting, and the minutes specify that Mayor Jim Tonn of Coquitlam acted as chair. I have found little information on the background of this committee; it may lie elsewhere in provincial and Vancouver municipal archives.

¹³⁷ The Delta Farmers’ Institute was formed in 1898 primarily to provide educational resources for its members, but also to advocate for their interests. “Canada 150: Delta Farmers Institute changing with the times,” North Delta Reporter, May 25, 2017, https://www.northdeltareporter.com/community/canada-150-delta-farmers-institute-changing-with-the-times/.

¹³⁸ Minutes of the Solid Waste Committee, 4 April 1974, p. 22.

¹³⁹ Minutes of the Solid Waste Committee, 4 April 1974, p. 23.
alderman Ed McKitka dwelled on the impacts of past and present landfills within his municipality. He did not want Surrey to bear the toll of a proposed regional landfill farther up the Fraser River. The present Port Mann landfill presented intolerable odours, and both it and the Sunnyside (Elgin area) fill were leaching into waterways. The Elgin site was “killing off some of our spawning fish up the [Nicomekle] river.”

Sensory nuisances continued to inform resident desires for the future of waste disposal. McKitka spoke for many when he argued that “garbage is a problem and the only way to solve it is by eliminating it.” Technological optimists espoused a future of recycling and composting that would eliminate most refuse; the rest would be incinerated to produce energy. Landfills would be a thing of the past. Most GVRD residents and North Americans, however, were not quite so sold on a landfill-free future. The majority of attendees at the 1974 Solid Waste Committee meeting were willing to consider the economics of recycling and incineration, but also inclined to keep landfilling. Their key concern was to solve existing nuisances.

Perhaps the most important of these advocates was Edward Vernon, a resident of Delta. We know that by 1972 Vernon had contacted the Pollution Control Branch at least once, perhaps several times, to complain about a variety of problems at and around the Burns Bog landfill. How the PCB responded is the most important part of this story. The 1956 Pollution Control Act was the first effort by the province to set standards for how much waste could be pumped into waterways. From 1956 to the mid-1960s, regulators mostly addressed sewage disposal matters, but industrial discharge within municipal boundaries also fell within their jurisdiction. Critics correctly noted that the Act functioned as a bureaucratic distributor of permits to pollute. Only when mining pollution on Vancouver Island drew attention did the province demand more accountability from operators. The amended Pollution Control Act of 1967 created the Pollution Control Branch “with the power to investigate pollution, issue permits and punish violations.” Geographer Arn Keeling notes, however, that “under the Pollution

140 Minutes of the Solid Waste Committee, 4 April 1974, p. 24.
141 Minutes of the Solid Waste Committee, 4 April 1974, p. 35.
142 Vernon to Venables, 11 July 1972.
Control Act, the board was empowered ‘to determine what qualities and properties of water shall constitute a polluted condition,’ yet the [PCB] evaluated permit applications without reference to published water-quality standards and based on effluent data provided by the applicant.”

The reason why the PCB disregarded water quality standards and leachate problems festered is that regulators held on to the centuries-old theory of “assimilative capacity.” The policy melded well with concerns over cost efficacy, but it was blind to the breadth of problems at Burns Bog by the early 1970s. A mild turning point (in discussion, even if policy changes did not immediately follow) emerged between 1972 and 1974 when Edward Vernon and others began to nudge the PCB toward stricter regulation of the Bog’s landfill. In July 1972, Vernon wrote to complain about odours, lack of coverage, dispersed refuse, fire hazards, and “leeching black oily ooze” seeping from the landfill. The PCB quickly relayed his complaint to the city, suggesting that his array of complaints and reference to community unity in the form of a petition was significant enough to merit action. Soon after, the PCB flagged the importance of Vernon’s letter more explicitly, noting that while it did not directly mention the city’s March 1972 application for a pollution control permit, “it does contain certain allegations regarding possible odour problems and fire hazard [in relation to] a dynamite storage area.” The PCB requested a response from the city “on both of these matters.”

The PCB’s critiques of city operations peaked in the fall of 1973. In September it warned that the Burns Bog landfill was not “in strict compliance with general Board Policy,” specifying that “drainage ditches surrounding the site and Crescent Slough are watercourses and the Act therefore requires their protection.” The following month it nevertheless issued “a limited time” pollution control permit “to afford the City the opportunity of demonstrating that a landfill operation can be carried out successfully . . .

146 Keeling, “Effluent Society,” 175.
147 Vernon to Venables, 11 July 1972.
148 The dynamite was not central to leachate management, but it was one of the few factors that elicited the PCB’s concern. That this body zeroed in on odours and fire hazards rather than leachate is telling. P.F. Scott, PCB, to W.H. Curtis, Deputy Chief Engineer, City of Vancouver, July 1972, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
without impairment to the quality of these neighbouring watercourses.” Generally at this time the PCB cast itself as an advocate of citizen welfare, but in this and other instances it acted more like an ally of the city. Arguably, the main reason for the PCB’s light regulation and the ensuing continuity of leachate management at the Delta landfill is rooted in how its critics framed their problems. We can see this clearly in the course of Arne Mathisen’s ongoing struggles with Vancouver and the PCB.

Instead of collaborating with other aggrieved residents of Delta, Mathisen maintained that he was “the only one . . . directly affected by the dumping.” The assertion was foolish, especially in hindsight. Mathisen never established causation concerning the alleged damages to his property produced by the landfill. He blamed the city for the alleged failure of his blueberry and cattle operations, but he did not provide any chemical evidence that leachate affected the flora and fauna on his property. His claims of deteriorating land quality lacked documentation. Nor did it help that both Vancouver and Mathisen’s neighbours agreed that his property was prone to flooding. Mathisen seems not to have had the resources to gather scientifically generated, quantitative evidence of leachate’s toxicity. The inability to speak in terms of parts per million, and thus to provide data-driven correlations between landfilling practices and their material effects on private properties, was a key common weakness in Mathisen’s and Vernon’s complaints. Both lacked the basis for a legal case.

Mathisen and other residents further undermined themselves with inconsistent arguments. We know nothing about Brian Ratcliffe’s background, but his testimony at the same 1974 Solid Waste Committee meeting mentioned above speaks volumes about the limits of lay critiques. Ratcliffe contended that he and Mathisen “would like to

149 The dynamite was not central to leachate management, but it was one of the few factors that elicited the PCB’s concern. That this body zeroed in on odours and fire hazards rather than leachate is telling. P.F. Scott, PCB, to W.H. Curtis, Deputy Chief Engineer, City of Vancouver, July 1972, Box: ARPEG/City of Van., Folder: SECTION I -- #1–45, CVL.
150 Arne K. Mathisen to J.E. Dew-Jones, Municipal Division Engineer, PCB, 27 January 1976, Box: ARPEG/City of Van., Folder: SECTION II -- #46–99, CVL.
151 Untitled, handwritten briefing of the BC Supreme Court hearing held 15 June 1978, GR-3079.74, File: Pollution Control Board hearings – Arpeg Holdings, British Columbia Archives, Victoria, British Columbia; City of Vancouver, “Submission of the City of Vancouver: History of Landfill Site in Relation to Pollution Control Act,” 1 June 1978(?), Box: ARPEG/City of Van., Folder: SECTION III-- #100–130, CVL; Minutes of the Solid Waste Committee, 4 April 1974, p. 12.
152 City of Vancouver, “Submission of the City.”
be farming neighbours,” but the “severe deterioration of the land” by the landfill was a fundamental obstacle.\textsuperscript{153} All else being equal, they preferred the termination and removal of the landfill. Ratcliffe deemed it an inappropriate method of waste disposal, noting the lack of soil coverage, the dispersed solid and liquid refuse, absent fencing, and poor ditching, which the city had publicly admitted was essential to a successful operation.\textsuperscript{154} Ditching was Ratcliffe’s segue to “leachate,” but the subject also exposed the limits of his power in this forum. Ratcliffe had to confess ignorance about the chemistry of elements and compounds. He could only reference phenomenological impressions, so he walked back his demand to close the landfill, proposing instead to continue its operations under better management. His strongest argument was merely to reference reports by an engineering firm and the Delta Director of Engineering Services calling for containment and treatment of leachate. Ratcliffe called out politicians at the meeting who held influence over Delta residents, including F.R. Bunnell of the GVRD Planning Committee, for characterizing leachate as potentially innocuous and refusing to acknowledge that people who lived and worked near those sites would pay the price if leachate was indeed harmful. Ratcliffe concluded by calling for a strip of land to be left as a forested barrier between the landfill and neighbouring properties. A tree barrier would hide the operation, and the peat could filter leachate.\textsuperscript{155}

The testimonies of Mathisen, Vernon, and Ratcliffe bare the limitations of their separate and common tactics. Of the three, Vernon’s petition generated the most evidence of constituting a significant challenge to Vancouver’s operation of the Burns Bog landfill. Coincidentally or not, Vernon’s charges came at a time when the PCB was slowly moving into a more assertive regulatory position regarding the city. Most likely the PCB foregrounded his complaint to give itself some leverage with the largest urban municipality in the province. Similarly, the draft contract with Mathisen emerged and died in the same period, suggesting again that context was a critical factor in Mathisen’s complaints about the ditch. All three complainants shared the same tactical shortcomings: scattered arguments, a lack of unified voices, and, most importantly, a lack of quantitative evidence. They made it easy for Vancouver to stonewall Deltan

\textsuperscript{153} Minutes of the Solid Waste Committee, 4 April 1974, p. 12.
\textsuperscript{155} Minutes of the Solid Waste Committee, 4 April 1974, pp. 14–18.
protests, and made it more difficult for the PCB to resist the city’s permit applications. It is possible that if all their voices had been channeled as one in the transmission of persistent complaints grounded in basic and easily verified sensory experiences, the unified community of Delta might have forced changes at the landfill. But they still would have needed chemists and engineers to present quantifiable evidence of leachate’s toxic effects. Their best and most cheaply acquired evidence was the infrequent coverage of refuse that infiltrated neighbouring fields and killed cattle. To argue more effectively required quantifiable documentation of leachates as ecological risks. Pairing community resistance with scientific evidence could have mutually amplified criticisms of the landfill in ways that could have yielded more concrete and faster results in terms of leachate containment and treatment. Instead, residents and scientists each went their own way and dissipated the power of resistance.

**Vancouver Leachate Testing, 1970–78**

The chemical characteristics of Burns Bog complicated understandings of leachate. As previously noted, peat bog tends to turn water acidic and elevate its levels of iron and manganese and its chemical oxygen demand (COD). These features mirror many of the environmental impacts posed by leachates. Vancouver engineers may or may not have recognized this fact. Gaps in archival records prevent firm conclusions about whether the city deliberately exploited these ambiguities to continue dumping untreated leachate into area ditches. What we can know comes from evidence submitted by the city in their legal battles with Mathisen during the 1970s. Those records show the city arguing it was not obligated to improve water quality beyond what was found in the “virgin bog waters,” and that they shifted blame onto the bog for the landfill’s chemical impacts on local ditches. In 1978, the city made a two-pronged defense of their operations to, in effect, naturalize the term “leachate” and to confuse the assignation of responsibility by spreading blame. It began by contending that “leachate,” as a term, “does not connote something necessarily detrimental” because it should include emissions from “the virgin bog water itself.” Vancouver then extended the definition to include “runoff from farms containing residues of fertilizers and other materials as well as from other lands.” Having implicated additional sources of pollution, the city then attempted to set the standard by which it should be regulated by regulators. It argued that “where allegations are made with respect to damage or injury from leachate they are
not significant as regards the landfill site unless it is established; first that the leachate is
harmful and second, that the leachate originated on the landfill site.” Their tactic was a
classic example of sowing doubt to avoid regulation.156 Vancouver engineers were
laughably inconsistent. By the late 1970s they blamed the bog for elevated levels of
acidity, iron, manganese, and COD even though they had previously claimed that peat
would act as a natural filter to reduce such problems.157

Varied and sometimes internally contradictory, the city’s leachate tests were
fraught all along. Engineers began by wrongly claiming that leachate was consistently
basic even though it was already well known to be generally acidic, especially during the
early years of a landfill’s operation. By 1975, however, they were working with the
provincial Department of Agriculture to figure out whether they could add lime to the
landfill to raise pH readings.158 If the landfill did have a basic influence on the
neighbouring waterways, as claimed, then the city should not have needed to add lime.
While no smoking-gun document shows that the city was deliberately deceptive, the
inconsistencies in city engineers’ reports on landfill leachate raises questions about their
intentions and, maybe, their competence.

City engineers’ insistence on minimal testing throughout the 1970s also aligned
with their view that leachate did not vary over time or from test site to test site. Their
tests said otherwise. City landfill samples produced water and soil pH levels ranging
from 2.8 to 7.7—or very acidic to more or less neutral—but the testing data had many
gaps. Some ditch tests from the 1970s, and particularly before 1974, left the pH column
blank.159 This makes it impossible to make any definitive argument about engineer
intentions, but the absence without explanation of pH values does raise questions. The
possible explanations range from faulty testing, to omissions of inconvenient numbers, to
refusal to test based on the suspicion of undesirable pH values. The researcher cannot

156 City of Vancouver, “Submission of the City;,” p. 5.
157 W.M. Curtis, Deputy City Engineer, City of Vancouver, to P.F. Scott, 20 November 1972, Box: ARPEG/City of Van., Folder: SECTION III -- #100–130, CVL.
158 Cliff H. Danner to Phil S. Herring, 27 August 1975, Box: ARPEG/City of Van., Folder: SECTION II -- #46–99, CVL; Ron Bertrand, Field Crops Specialist (Soils), BC Department of Agriculture, to
Cliff H. Danner, Materials Engineer, City of Vancouver, 27 August 1975, Box: ARPEG/City of Van., Folder: SECTION II -- #46–99, CVL.
159 E.F. Rideout, Assistant City Analyst, City of Vancouver Health Department, to R.G. Ross,
Materials Engineer, City of Vancouver Engineering Department, 21 June 1974, Box: ARPEG/City of Van., Folder: SECTION II -- #46–99, CVL.
assess the range of leachate characteristics based on extant documents. The blanks elicit questions we cannot answer, but the questions are still worth considering.

Landfill operators’ use of waterways to dilute leachate and raise pH levels raise further questions about mismanagement. Engineering reports to the PCB include reference to “initial dilution zones” in testing. These were locations for measuring pH levels of leachate as it moved offsite. It was a reasonable practice for tracking downstream effluvia. In practice, though, the testing regime was ripe for abuse. City staff could easily arrange to test on rainy days, when ditch water would further dilute leachate. Gaps in data and weather contexts, particularly during the early 1970s, characterize the sampling records except when there was a particularly unfavourable result. The exception, a rather acidic sample allegedly produced during a dry spell, heightens our awareness of how much is missing from most samples. This again suggests, at best, uneven technical standards and, at worst, intentional deception. It is not merely hindsight wisdom to point out that weather greatly impacted test results. Engineers knew this at the time, so the absence of notations about the weather was, at best, shoddy practice and, at worst, calculated disregard for the well-being of the animals and farmers who relied on those waters.

True diligence would also have included detailed explanations about when and why city engineers added elements and compounds to their list of ditch test substances. This was never discussed in legal documents provided by the city to show that they were managing the landfill effectively. Here again we see the internal contradictions of Vancouver’s rhetoric. In 1970, its engineers claimed that heavy metals were “non-detectable,” yet within a few years the levels of those invisible elements—cadmium, arsenic, mercury—rose rapidly in their test data. Ammonia was another key substance recorded in notable quantities far from the fill no later than 1977. The city’s response was to ask whether the levels were significant enough to require treatment, rather than to treat leachate holistically. With no secured regional or provincial funding to support treatment, it was in the city’s interest to minimize the PCB’s concerns about leachate.

160 Glennis Taylor, Computer Co-ordinator, PCB, to Wayne Bits, City of Vancouver, 23 April 1975, Box: ARPEG/City of Van., Folder: SECTION II -- #46–99, CVL.

161 J.E. Dew-Jones to R.C. Boyes, Deputy City Engineer, City of Vancouver, 20 September 1977, Box: ARPEG/City of Van., Folder: SECTION III -- #100–130, CVL.
The costs of acknowledging the need for expensive leachate treatment facilities were fiscal and political.

Control samples cast further unflattering light on city conduct. The PCB did remark on those shoddy practices. According to a report produced in November 1970, city engineers had used an urban location, likely bordering a lumber mill landfill, as a “control sample” for leachate testing. They offered no rationale for selecting the site, and subsequent tests across the first half of the decade continued to rely on urban “control samples.” They blamed poor results on the location rather than on their selection of those locations. Tests often omitted the locations of control samples, raising questions about reliability for the PCB, critics of the landfill, and historians. By September 1973 the PCB found the landfill’s operation inadequate. It also expressed concern about city control site choices. The PCB’s P.F. Scott noted that test “results from the City’s control stations differed” from those produced by the PCB’s New Westminster District Office. Scott did not universally condemn the city’s engineering practices, but he did convey the PCB’s expectation that the city had to improve its management of leachate.162

Figure 5. Untitled map of the City of Vancouver Burns Bog Landfill, C. 1973.
The above image and those like it feature in the 1973 Golder, Brawner & Associates report produced for the City of Vancouver and in the court files concerning the Mathisen case. What the image demonstrates is that landfilling occurred outside the ditches, to the north-west side of the "pond." It was commonly understood by engineers of the 1970s that demolition materials could be used as landfill to provide more stable ground for labour next to the pond. However, that material likely contained substances such as asbestos and any westward moving leachate (on account of the ground water currents at the time) would not have been contained by any drainage ditches, which existed north and north-west of the landfill extension. (The line to the west of that refuse is merely the property line between the city and Mathisen.) The presence of those materials in the first place, and the lack of any record of objection from the PCB, residents, or other parties, raises serious questions concerning impacts and negligence. © City of Vancouver.

Source: Golder, Brawner & Associates, "Report to City of Vancouver on Sanitary Landfill," Appendix 2; GR-3079.74, File: Pollution Control Board hearings – Arpeg Holdings, British Columbia Archives, Victoria, British Columbia.

The city's testing practices and communications reveal no urgency to study leachate, but it is impossible to know whether this was due to malfeasance or sloth. The PCB and Delta’s residents expressed enough concerns about containing waste water that the city should have recognized a need to better understand landfill leachate. Instead, it fought every effort to hold the city accountable for its management of Burns Bog, consistently arguing there was no proof that leachates posed a toxicological threat. The broader context of waste water management, paired with city reports and communications during the 1970s, strongly suggests that city engineers’ priority was to
minimize the costs of testing, containing, and treating leachate.\textsuperscript{163} From 1973 onward, when residents complained about odours due to a lack of daily or even monthly coverage of the fill’s surface, the city offered the excuse that compaction technologies and labour costs made it prohibitively expensive to operate the landfill. In reality, Vancouver would have actually passed that cost on to consumers. It was not eager to listen to residents in another municipality, even when their complaints were grounded in basic principles of appropriate landfilling practice. Containing solid and liquid waste to prevent nuisances and hazards was standard procedure by the 1930s. Throughout the 1970s, however, the city instead blamed farms and nearby industries for polluting local waters, and it invoked the ambiguities of leachate production and testing to blunt critics.\textsuperscript{164}

\textbf{J.D. Sansom}

One resister stands out in this history. J.D. Sansom was Delta’s Director of Engineering Services during the early 1970s and a vocal advocate for extensive improvements in landfill management at Burns Bog. Sansom’s first critical emergence in the record is a public report in 1973 in which he took the City of Vancouver to task. The PCB had launched a Public Inquiry that invited local municipalities “to submit briefs describing their operations with specific reference to pollution abatement procedures.”\textsuperscript{165} The inquiry suggests there were already enough complaints to warrant a general airing of concerns by residents and governments. It now seems like little more than a formal venting session. The PCB did use the responses to refine its instructions for regional landfills, but they lacked enforcement power, making these instructions more guidelines than regulations.\textsuperscript{166} Delta Municipal Council seemingly made no official statement to the inquiry, but Sansom seized the opportunity to commission a study by the environmental engineering firm B. H. Levelton & Associates Limited. He then expanded upon their report and its implications for Vancouver’s management of the landfill. Sansom noted

\begin{itemize}
  \item \textsuperscript{163} City of Vancouver, “Submission of the City.”
  \item \textsuperscript{164} Golder, Brawner & Associates, “Report to City.”
  \item \textsuperscript{166} Dew-Jones to Boyes, 20 September 1977.
\end{itemize}
that “current landfill methods, although acceptable for many years, mainly because they have been out of sight and out of mind, are becoming unacceptable in light of their impact upon the environment.”

His call for improvements that “will raise the standard of operation to the mutual acceptance of both parties” was strategically telling. “Mutual acceptance” meant something very different from “mutual benefit.” The 1962 bylaw’s “mutual benefit” language lacked substance, and municipal and provincial standards were “inadequate” for lessening existing environmental impacts. The 1962 bylaw did not even contain the teeth to effectively regulate city practices concerning coverage, let alone leachate.

Sansom’s remarks both did and did not distance himself from other critics. His demands prefigured present-day standards, particularly concerning leachate, and his language regarding leachate moved beyond the phenomenological testimonies of other residents. He also demanded that regulation be both municipal and provincial, as well as science-based. Sansom remarked that “while municipalities . . . should be responsible for the operation, even if the operation is carried out by another party”—an implicit criticism of Delta’s arrangement with Vancouver—“periodic monitoring” should be conducted independently by the provincial government. Sansom implicated Delta, Vancouver, and British Columbia in ways that aligned with the demand of the Delta Farmers’ Institute that leachate be effectively contained and treated. However, being a well-read engineer, he buttressed his arguments by referencing an array of BC and American studies indicating that landfill leachates threatened neighbouring waterways and associated wildlife. The studies were patchy and defined by the spatial and temporal contexts in which tests were conducted, but they constituted a far more powerful criticism of the city’s usage of bog idiosyncrasies to justify lax leachate management than anyone else in this story. Sansom understood that the bog’s chemical inconsistencies made it all the more important to conduct consistent testing and to contain leachates within channels built with compressed clay, a technology still in use.

Sansom’s engineering background afforded him the ability to invoke scientific terms and quantitative arguments with influence, at least within the community and over

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the short term. Where residents of Saanich on Vancouver Island saw downstream slime, Sansom could describe “insoluble iron which was causing downstream deposition of slime and the formation of encrustations due to action with iron fixing bacteria.” Where Deltans saw ooze, he explained that “leachates from sanitary landfills are in many respects equivalent to the nature of effluents from chemical processing industries,” and that the “effluent quality objectives for the Chemical Industry could be used as guidelines for Effluent Quality Objectives of leachates from sanitary landfills.” Sansom’s assertions were bold and valid counters to Vancouver’s claims that landfill leachates posed no verifiable environmental harm. The comparison to effluent produced by chemical industries offered the most solid basis for viewing leachates as a perpetual threat, even if their characteristics did vary over time and space.

Although not quite a counterfactual example, Sansom ultimately raises as many questions as answers because he did not long remain in his position. One possible reason for his resignation by the end of 1974 is that his critiques made life harder for Delta Council members who preferred to continue their “mutual benefit” relations with Vancouver. Sansom’s proposals for leachate containment and treatment would indeed have raised the bill for both municipalities. It might also have been the case that Sansom grew frustrated with the PCB’s limitations with respect to landfill management, and that he sought advancement elsewhere—perhaps on Vancouver Island, where he had grown up and begun his career. Soon after leaving Delta, he returned to the Island and took up a position with the City of Victoria’s engineering department.

**Capture of the PCB**

The PCB’s position on leachate management was encapsulated in a statement made by engineer J. E. Dew-Jones in 1977. Dew-Jones noted that there was “always uncertainty as to the detection of deleterious effect” of leachate because a “major refuse disposal site may be the depository for numerous compounds,” and that the ability to control “the discharge of such materials is limited.” Tracing those releases was also hampered by “practical restrictions on the frequency of sampling, the total number of

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172 “Engineer Chosen for City,” The Daily Colonist, October 31, 1974, 23.
parameters for which each analyses are carried out, the number of locations at which
samples are collected, and our capability to analyze for some parameters at all." All
conclusions were “a matter of interpretation and judgement, not a simple comparison of
numerical values.” Dew-Jones explained that “these were some of the factors taken into
account by the Pollution Control Board in setting ‘objectives’ following the 1973 Public
Inquiry on municipal waste discharges.” The PCB desired “to be cautious in authorizing
discharges in this province,” saying that releases into communal ditches “must be
‘negligible’ outside an initial dilution zone,” and that “the onus to prove a discharge will
not cause pollution lies with the discharger.”

Dew-Jones’s views were presented in a letter to Vancouver Deputy City Engineer
R.C. Boyes. His final remark seems to articulate a cautionary principle, one that places
the burden of safety upon the discharger—in this case, the operators of the Burns Bog
landfill. Yet his list of qualifications raises questions about what, exactly, was PCB’s
standard of proof. At a time when citizens complained increasingly about landfilling
operations and leachate treatment, a PCB engineer had to explain to another engineer
that leachate studies were complicated by the ecologies of waste sites and constrained
by economic practicalities. Dew-Jones prescribed a cautionary standard for granting
discharge permits, yet his reference to initial dilution zones revealed that the PCB
continued to rely on the theory of assimilative capacity to do critical sanitary work.
Perhaps most telling was his assertion that assessing leachate was “a matter of
interpretation and judgement.” It begs the question of whether that would have been
sufficient to prove that the city needed to contain and treat fill leachate, even if residents
had conducted chemical tests on leachate.

The PCB ostensibly acted as a mediator between private individuals such as
Arne Mathisen and the City of Vancouver; in reality, it shared both Vancouver’s and
Delta’s interests in minimizing large-scale infrastructure costs. Lacking municipal funds
to conduct effective leachate management, both governments turned to provincial and
regional bodies to help cover costs. One study that Delta commissioned recommended
the construction of a new ditch that would send leachate directly “to the Big Slough-
Beharrel area,” and that would be partially underwritten by funding from the Greater

Vancouver Sewerage and Drainage District (GVS&DD).\footnote{174} Such improvements were expensive, however, and bodies such as the GVS&DD and PCB were no more eager to pay for them than were municipalities such as Vancouver or Delta. Hence the PCB was drawn into a shared fiscal vision of leachate management that compromised its ability to advocate for citizens such as Mathisen. If cities like Vancouver had to invest in costly infrastructures to replace their reliance on assimilative capacity, budgets would quickly balloon. Mutually beneficial relations thus connected not only the Corporation of Delta and the City of Vancouver, but also these two bodies and larger authorities within the province.

Vancouver’s ability to draw the PCB into a “mutual benefit” relationship is crucial context for understanding the city’s prolonged response to leachate. The landfill did not meet PCB standards until 1981 because the PCB refused to terminate, or even pause, its operations. The PBC actually condemned city management of the fill in October 1973, seventeen months after the city had applied for its first permit. The regulatory body noted that the city’s current operation did not fully conform “with regard to required physical separation from watercourses.”\footnote{175} Despite its conduct, the city received a deferral to operate the fill until December 1975. That temporary permit seemed to provide ample time to improve operations, yet the city made almost no changes to its practices.\footnote{176} It continued to dump leachates into ditches bound for Crescent Slough and to leave refuse uncovered. City managers were three months late in submitting their renewal application in 1975, a violation they denied throughout the late 1970s and that fit a broader pattern of refusing to follow the PCB’s recommendations. Taken as a whole, Vancouver engineers’ and managers’ assertions that they did their best was a self-condemnation for anyone who understood the history of Burns Bog.\footnote{177}

The PCB nevertheless granted the city one extension after another. The next temporary permit lasted until June 1976. The rationale for that expiry date is unclear, but a statement connected to the 1973 temporary permit suggests that that abbreviated timeframe was meant to spur Vancouver to quickly improve its coverage and leachate

\footnote{175} Scott, “Resume for Permit Application,” p. 2. 176 City of Vancouver, “Submission of the City.” 177 City of Vancouver, “Submission of the City.”
\footnote{176} City of Vancouver, “Submission of the City.”
\footnote{177} City of Vancouver, “Submission of the City.”
practices. The problem with this in terms of leachate management, however, was that the PCB continued to share the city engineers’ view that assimilative capacity was the proper approach to leachate, rather than containing and treating it separately. As Sansom noted in his 1973 critique, the PCB’s guidelines never specified when leachates must be treated. The PCB’s ambiguity was part of the problem. It stated that leachates had to maintain the quality of receiving waters but did not specify which characteristics of leachates could not be conveyed into local waterways without treatment. As a result, PCB extensions never compelled the city to improve its landfill management, rapidly or otherwise. The PCB granted yet another extension to December 1977, ignoring the city’s request for a permit with no time limit, but the city received a final permit at its expiry. The problem of leachate was not resolved until construction of piping brought the effluent to the Annacis Island Treatment Plant for processing, beginning in September 1981.

The PCB permits might appear inconsequential, but it is not clear what else it could have done. The PCB could not reasonably have required the Burns Bog landfill to shut down. The city had to send its garbage somewhere, and any significant change to its discard practices required months, probably years, of preparation. The region’s broader discard history suggests that permits were not entirely meaningless, however. The PCB could have required the city to find a new site to replace the substandard landfill, and the city could have diverted its refuse to another existing landfill. This would have been easier to effect in the 1970s than later on, after property values climbed and landfill proposals drew more resistance from better-informed residents. But this scenario would not have been very likely. Any change entailed greater expense, and cost containment was the one constant in Vancouver’s waste management program.

This is not to discount the capacity for change. The heterogeneity of understandings and positions among critics of the Burns Bog landfill—residents, farmers, business owners, and one municipal engineer—complicated their efforts to resist the continuation of business as usual, and to call for reform of a mundane rather than monumental variety. Mathisen never grasped leachate chemistry, a knowledge requisite to demonstrating tangible links between leachate, blueberries, and cattle, and so appears never to have received compensation for alleged damages to his property, or

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178 City of Vancouver, “Submission of the City,” p. 5.
for further work made necessary as a result of that damage. Delta farmers wanted leachate contained and treated, yet their sensory experiences lacked the quantitative analysis of engineer Sansom. When Sansom resigned in 1974, landfill opponents lost a crucial part of their toolkit. Documents cannot resolve to what degree Vancouver engineers and administrators deliberately exploited the nuances and uncertainties surrounding leachate to keep the Delta council and PCB on their side, but they consistently did the minimum to continue operations at Burns Bog.

Yet, and this is key, the resistance that spanned 1966 to 1978, especially up to 1974, did have some effect. It forced the City of Vancouver to articulate its understanding of leachate hazards in relation to a bog environment, to share engineers’ findings (if generally only with the PCB), and to make at least minimal adjustments in its testing and treatment practices. Credit must ultimately go to these Deltans who forced the PCB to be a little more accountable and to actually act as a mediating body rather than a rubber-stamper and enabler of Vancouver’s mismanagement. For all the limitations of their brief and inconsistent interventions, we should ask what the Delta flood plain would have looked like had Mathisen, Sansom, Vernon, and other residents not intervened. Leachate could have been dumped into neighbouring ditches for years or decades had those protests not led to the construction of piping – which conveniently also served the municipal storm water needs of Delta, as well as limiting the cost of installing that infrastructure – leading to Annacis Island by September 1981. Historical examination of leachate shows both how the messy nature of liquid wastes complicated its comprehension and thus criticism of its management, and how an unspectacular kind of resistance to this most unspectacular substance nevertheless effected change.
Conclusion

This thesis has presented a history of the City of Vancouver Landfill in Burns Bog to 1981 in which themes of continuity and mundanity loom large. It posits that the Vancouver-operated Burns Bog Landfill should be understood less as an example of high modernism than of mundane modernism. Although it was a large-scale and fairly expensive project, the events attending this landfill’s creation and early operation were not marked by narratives of national, provincial, or even local progress. The landfill was produced by a desire on the part of both Vancouver’s and Delta’s governments to economize waste disposal wherever possible. This frugal mindset combined with low levels of citizen-led resistance to the landfill’s opening, as Delta’s populace desired a fill to replace their faulty waste disposal infrastructure of the 1950s and 1960s. In contrast to many examples of grand, awe-inspiring structures within traditional Canadian high modernist studies, Deltans in the 1960s did not care precisely how well the proposed fill would be managed, so long as the refuse remained reasonably out of sight, out of nostril, and unimpactful upon local industries such as farming. That lack of local controversy helped to dissuade Vancouver’s engineers from developing the technoscientific expertise concerning peat landfills, leachate production, and more effective strategies for managing waste containment within the hydrogeological setting of Burns Bog.

Likewise, the prevailing “mutual benefit,” cost-minded relations between the two municipal governments (and, by extension, provincial authorities) further aided in maintaining continuity in engineering practices at the site, while Delta’s government continued to ally with Vancouver in spite of the site’s increasing environmental hazards from 1966. Prioritizing cost-effective practices over the well-being of people living nearby left those residents subjected to heightened waste-related nuisances and hazards after the fill opened in 1966. Deltans’ belated efforts in the late 1960s and 1970s to compel Vancouver to improve its fill management had some positive effects. But they still paid a heavy price for their initial, easy consent to the siting of that structure in their community—something exacerbated by their municipality’s desire to maintain good relations with Vancouver, even if this meant alienating or abandoning the very people they were meant to represent.
This thesis has argued that the Burns Bog landfill is best understood as a hybrid landscape co-created by human and nonhuman forces. Politicians and engineers delimited a space for depositing municipal refuse, but precipitation, gravity, peat, and birds also had much to do with what followed. To this day, eagles and gulls still congregate and redistribute refuse from the landfill’s uncovered surface. Drivers cruising past on Highway 99 still espy shards of plastic wrapping hanging from nearby trees like spectres, courtesy of the eagles. This is a roadside distraction for most metropolitan residents, left behind as quickly as it is seen. For Deltans, however, the waste-related nuisances of the Vancouver-run landfill is an ongoing reminder that while Mayor Rathie is long gone, his chickens are still part of the ecological and cultural fabric of Delta’s community.

Burns Bog remained a go-to site into the 1980s for dumping urban solid waste. Early in the decade, the GVRD tried to acquire the landfill from the City of Vancouver, hoping to expand and re-purpose it for regional use. Like other North American metropolitan areas, the GVRD was facing skyrocketing amounts of solid and liquid waste from a growing population. Regionalizing waste management seemed the most efficient, effective solution. The GVRD’s gambit provides an opportunity to examine how the mutually beneficial, intergovernmental relationship between Vancouver and Delta evolved further in the 1980s.

The GVRD’s offer appealed to Vancouver officials for several reasons. They knew that they would need a new municipal landfill once the present one was full, and that finding such a site would be more difficult and costly than it had been at midcentury. They were also eager to continue landfilling at seven dollars per ton. The lengthy, drawn-out process of seeking permits in the 1970s, and the heightened pressure to measure and manage leachate, raised the appeal of allowing the GVRD to assume financial and managerial responsibility, but the 1962 bylaw agreement stipulated that Vancouver could not sell the site or permit new municipalities to dump refuse without Delta’s consent. There was already significant resistance among Delta residents because the landfill engineers proved unable to successfully process the discard from Vancouver, Delta, White Rock, and the University Endowment Lands by the early 1980s.

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179 City of Vancouver Engineering Department, "Economic Analysis of Burns Bog Landfill Site," 29 March 1982, Box: Odds and Sods #2, CVL.
Delta’s council members and bog preservationists were in no mood to let Langley, Surrey, and Burnaby and other GVRD municipalities also use the fill.

The GVRD did not give up without a fight, however. It had hoped to open a “230 ha landfill site immediately adjacent and north of the City’s site” in 1983.\(^{180}\) Representatives wooed Delta’s council members, offering increased royalties per ton of discard, opportunities to survey the proposed site from the air and a tour of a Portland, Oregon landfill. Delta duly sent its Director of Engineering Services to Portland, but this did not change the council’s tepid interest. Council members seemed to use the GVRD’s interest to leverage greater benefit from its existing relationship with the City of Vancouver. Tellingly, its wish list had not changed: higher royalties, better clean-up of roads near to the landfill, and near-daily coverage.\(^{181}\)

The increased resistance among Delta residents and representatives to taking more waste from surrounding communities aligned with broader North American trends concerning solid waste management. By the late 1970s, American citizens were not only protesting shoddy landfills loudly and publicly but using the federal Clean Water and Clean Air acts passed in the early 1970s to launch lawsuits against landfill operators who managed leachate and odours poorly. The emerging environmental justice movement helped bring the days in which landfills could be sited and expanded with little to no local resistance to an end. Delta temporarily became a regional landfill in the early 1980s; citizen resistance may have helped ensure that this status did not last. Elsewhere in southern BC, Texada Island also fended off a plan for a regional landfill thanks to citizen efforts. Anti-landfill resistance in Greater Vancouver also developed a collaborative mien in the 1980s, mirroring top-down structures like the GVRD with similar bottom-up initiatives. Cross-municipal alliances such as the Lower Mainland Refuse Project wanted “to develop a solid waste management plan on a co-operative basis,


\(^{181}\) Committee Meeting Minutes of the Delta Municipal Council, 17 May 1982, DMA; Committee Meeting Minutes of the Delta Municipal Council, 21 June 1962, DMA. It is unclear why the GVRD did not open for inspection a locally run facility such as the Port Mann Landfill in Surrey or the New Westminster Braid Street Landfill.
ignoring all internal jurisdictional boundaries."¹⁸² In the face of such pressures, regional authorities sought alternatives to expanding old landfills or opening new nearby sites. They learned to stretch the lifespans of existing landfills and opened an incinerator in Burnaby in 1988. Tellingly, the following year the GVRD opened a new regional landfill in Cache Creek, a stunning 354 kilometres northeast of Vancouver. Despite the sociopolitical shifts in attitudes toward waste management, the factors that led to Cache Creek parallel those in Delta thirty years earlier. Cache Creek had a trough-like geography suited to landfilling, residents who welcomed the landfill for its economic benefits, and politicians who were amenable to a privately managed operation.

Although North Americans increasingly objected to landfills in their communities, this was not the only factor driving waste management reform. Lobbying by private waste disposal companies such as Waste Management Incorporated (WMI) also shaped events. The motive was the bottom line, according to Heather Rogers. During the mid-1980s, major waste management corporations in the United States were weeding out smaller competitors. Backing more stringent waste management rules had the effect of shutting down many disposal sites and diverting even more waste into their own landfills.¹⁸³ Subtitle D of the Resource Conservation and Recovery Act of 1976 raised standards for planning and operating of landfills.¹⁸⁴ The issues it covered included siting, containment, coverage, groundwater monitoring, and closure. The legislation was an important environmental reform, but it also helped large waste disposal companies eliminate competitors and expand their clientele. As heightened responsibilities brought heightened costs, municipalities increasingly shifted from costly, publicly owned and run landfills to those managed by private companies.¹⁸⁵

The history of waste management reform in Canada in the 1980s remains to be written, but developments in Delta and British Columbia offer suggestive contrasts to those in the United States. The Burns Bog Landfill remained municipally owned and

¹⁸⁵ Melosi, Fresh Kills, 333; Melosi, Garbage in the Cities, 214.
managed, and the province’s Waste Management Act of 1982 left room for it and other municipalities to continue subpar operations at landfills. The Act required all regional districts and otherwise unaffiliated municipalities to develop waste management plans in consultation with their communities and submit them for approval. Plans were to contain “provisions or requirements for the collection, treatment, handling, storage, utilization and disposal of refuse, sewage and other waste within the whole or a specified part of a municipality.” But permissions to landfill would be assessed on a case-by-case basis and at the discretion of the Minister of Environment, something that threatened to further entrench landfill mismanagement in Delta and beyond.

While neither British Columbia’s nor Canada’s governments passed legislation of comparable scope and strength to the U.S.’s Subtitle D, the 1980s saw some improvements to waste management nonetheless. Expanded recycling programs reduced landfill volume and methane production. The treatment and disposal of hazardous substances such as asbestos and those containing polychlorinated biphenyls (PCBs) became more strictly regulated through legislation passed in the late 1980s and 1990s. In the Lower Mainland, the construction of piping from the Burns Bog Landfill to the Annacis Island Treatment Plant in 1981 mitigated the threats posed by leachate exuding from the fill. Odours caused by its production of gases persisted until 1991, when new legislation finally compelled the City of Vancouver to install gas collection and flare technologies.

Recent years represent a new chapter in the management of landfill waters as the site undergoes capping (or, closing) in stages, a process which began in 2007. One branch of such water management will concern the handling of precipitation, also known as stormwater. It is formed in extensive amounts when waters land above the capped landfill refuse and cannot pass through the coverage membrane. The precipitation will thus travel to neighbouring properties unless it is contained and/or channeled. Local farmers have come to express interest in the usage of that water for their properties bordering or nearby to the bog, particularly during the fall, so long as it tests as neutral and free of toxic substances. Concurrently, the Burns Bog Conservation Society is unwilling to allow even neutral stormwater to interfere with the acidic environment of the

bog. The City of Vancouver’s response marks a new era in relations with Delta residents. The city has wholeheartedly agreed to prevent stormwaters from altering the pH of the bog ecology.

As plans and negotiations with farmers unfold over the coming years, the city is still committed to treating leachates sourced from uncapped sectors of the landfill at Annacis Island, given the recognized long-term risk of leachates produced by decomposing landfill refuse. In the case of stormwaters which are not approved to be channeled for commercial use outside of the landfill site (on account of a risk of toxicity as ruled by City of Vancouver or regional authorities or, more likely, the farmers’ lack of need for such waters at that given moment), the city will use on-site ponds, thus allowing stormwaters to drain slowly over years. The combined processing time in those ponds, the peat and clay linings which still remain, and the continued monitoring of those waters according to improved, present-day standards, will all act to generally contain and detoxify potentially concerning substances in the stormwaters.187

In Delta and elsewhere, the history of landfilling after 1981 is marked by continuity and change, and by the complex interactions among human and nonhuman forces. In general, the histories of landfills are still too infrequently told, perhaps in part because they seem mundane and even distasteful. My hope is that more scholars and laypersons will become curious about these structures’ past and present contours. Shaped by planners, managers, consumers, and nature, landfills reveal much about how we understand, act toward, and turn away from hybrid landscapes of discard.

References

Archival Collections

British Columbia Archives
    GR-3079.74

City of Vancouver Archives
    MCR 18 (City of Vancouver fonds)

City of Vancouver Landfill Engineering Services
    Untitled collection

Delta Archives
    PR 1988-047 (Corporation of Delta Clerk’s Department fonds)

Primary Sources

Ladner Optimist

North Delta Reporter

Times Colonist / The Daily Colonist

The Vancouver Sun

Author interview with "DJ," 3 April 2019.

Author interview with Warren Nottingham, 16 April 2019.

Secondary Sources


Keen, Mary. Time and Tide: The Settlement of Lulu Island’s South Arm Shore. Richmond: City of Richmond Archives, 2005.


———. Negotiating a River: Canada, the US, and the Creation of the St. Lawrence Seaway. Vancouver: UBC Press, 2014.


Young, R.H.F. “Effects on Groundwater: Reports of Pollution.” Water Pollution Control Federation (June 1971): 1254–57.

Theses and Unpublished Materials


