



PARKS CANADA

# WATERTON KENOW WILDFIRE REMEDICATION

CATEGORY D:  
ENVIRONMENTAL REMEDIATION

CANADIAN CONSULTING  
engineer



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## Summary

*In September 2017, the Kenow Wildfire burned 19,303 hectares in Waterton Lakes National Park causing environmental contamination to nine sites within the Park. Parks Canada retained Dillon Consulting Limited to address environmental impacts caused by the fire and prevent further adverse effects on the Park's ecosystem. Applying innovative risk management, expedited design and tendering, and local resources, the sites were expeditiously remediated, successfully mitigating the anthropogenic impacts of the fire and allowing for uninhibited restoration.*

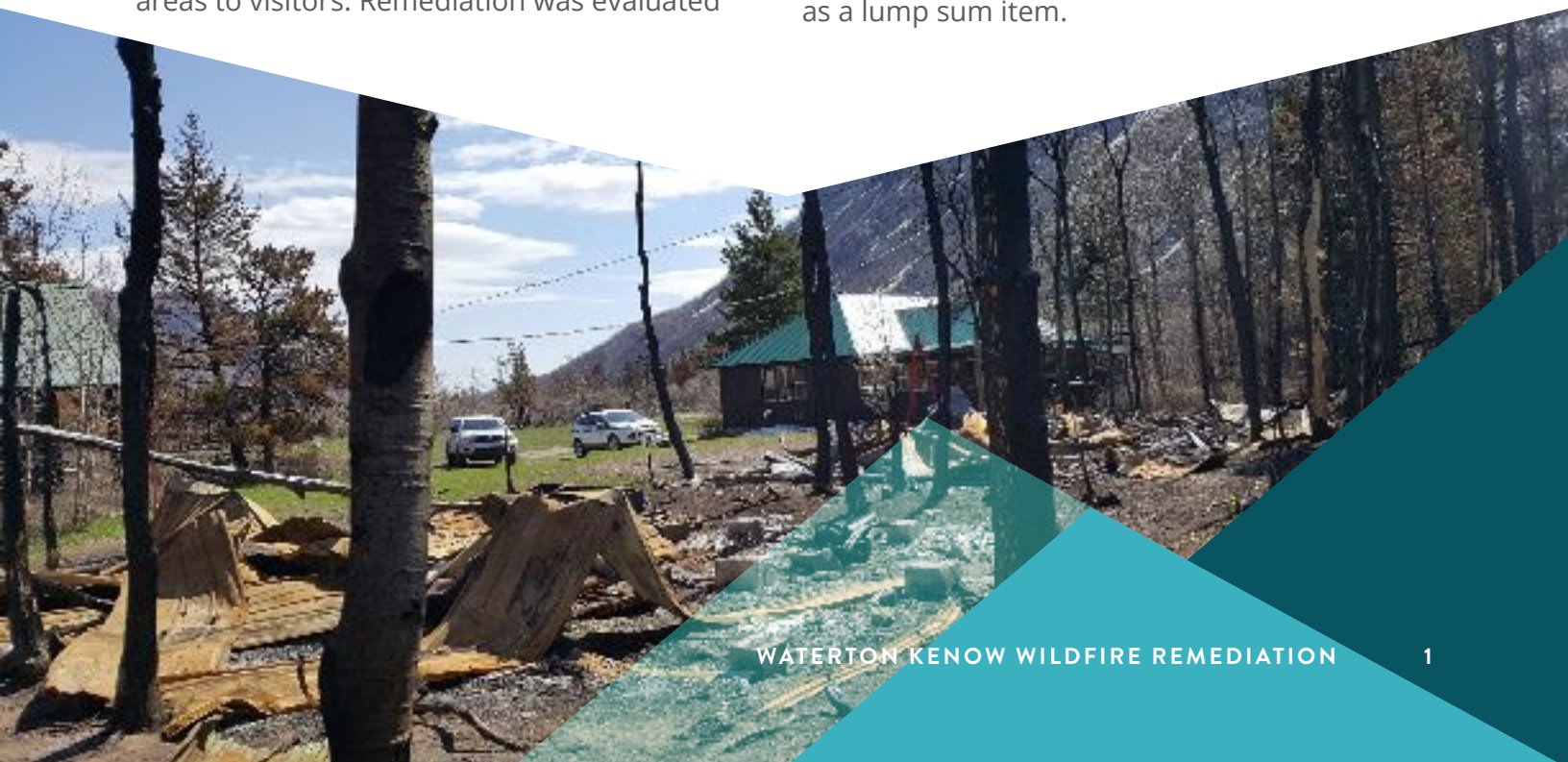
## Innovation

Operating year-round, Waterton Lakes National Park, located in the Rocky Mountains in southwestern Alberta, is an International Peace Park, a UNESCO-designated Biosphere Reserve and World Heritage Site, and an International Dark Sky Park. In September 2017, the Kenow Wildfire burned 19,303 hectares of the Park, temporarily closing a large portion of the Park and causing damage to buildings, equipment, and infrastructure within the Park. As a result, environmental contamination was identified at nine sites within the Park, including the visitor reception centre, stables, youth centre, maintenance shed, equipment staging area, and staff housing and associated infrastructure (e.g., water, septic, and electrical systems). Parks Canada retained Dillon Consulting Limited to assess and characterize hazardous materials and contaminated media, develop and implement a remediation and risk management strategy including remedial design with tender-ready drawings and specifications, and provide full-time resident engineering services during remediation.

Recognizing that protection of the ecological integrity of the Park's ecosystem was a high priority, Dillon approached the project by considering the holistic impact the project may have on the environment, while acknowledging the desire to expeditiously re-open these areas to visitors. Remediation was evaluated

in context with the potential risks posed by the environmental contamination. Based on review of site conditions, contaminant concentrations, exposure pathways, and potential receptors, Dillon determined three of the nine sites did not require remediation, eliminating the impacts thereof (erosion and sediment runoff, damage to existing flora), vehicular truck traffic (and corresponding greenhouse emissions, noise, impact to Park infrastructure, and temporary hazards to wildlife), and shortening the overall schedule so work did not extend into the following year. The design also ensured that no non-native vegetation was introduced by identifying native, Park-approved borrow sources for topsoil.

Additionally, site conditions including snow over a meter deep and winds gusting over 100 km/hour, presented significant challenges with respect to defining the extent of environmental impact between initial reconnaissance and start of construction. When the project was ready to be tendered, debris and ashes had shifted and were distributed widely making it impossible to quantify for contracted removals. To ensure that the sites would be remediated to the satisfaction of Parks Canada, the design mandated contractors attend a site visit at each site and remove all visual debris observed, including partially buried debris that was in the top 100 mm of soil, and disposed of as a lump sum item.





## Complexity

Remediation of the environmental impacts caused by the Kenow Wildfire presented many challenges. Conventional environmental remediation of hazardous materials in buildings typically involves removal of relatively intact material; due to the intensity of the fire, much of the structures (and their hazardous contents) had disintegrated and the high wind gusts resulted in continually distributing debris across the landscape, ever changing the limits of the project prior to tendering. Further, snow, up to 1.2 metres deep, curtailed the construction season and made characterization of the extent of contamination difficult. To overcome these challenges, Dillon, over the course of the project, progressively delineated the extents of the contamination and consequent excavation areas based on observable conditions, known and perceived hazardous debris and contaminated soil locations, and likelihood for

cross-contamination. Additionally, a mandatory site meeting during the tender period established the extent of the project site based on observed conditions. Regular and frequent communication with Parks Canada during design and remediation addressed concerns on potential impacts of imported borrow on the native ecosystem.

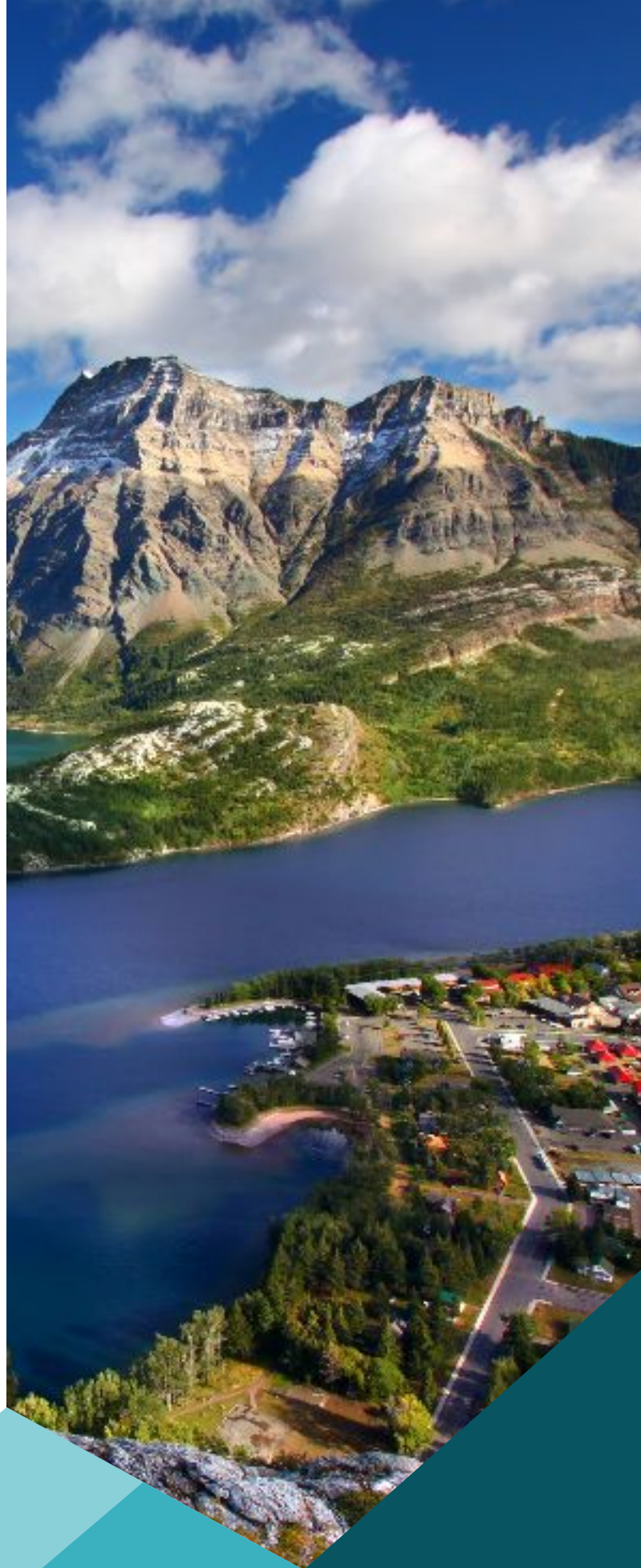
To address the client's desired schedule to open the Alpine Stables site and remediate the Visitor Reception Centre prior to the 2018 summer season, Dillon expedited the development and implementation of the respective remedial designs. Dillon also supported the training and oversight of the Park's highways crew who completed the work at Alpine Stables.

In conjunction with pre-design data, confirmation samples collected, following excavation, demonstrated that contaminated soil had been effectively and completely removed at all sites.



## Social and/or Economic Benefits

The 2017 Kenow Wildfire burned a significant portion of Waterton Lakes National Park causing damage and destruction to buildings, equipment, and infrastructure, resulting in adverse environmental impacts and temporary evacuation of the Park. Many local residents were displaced, visitor access was affected, and nine sites presented potential adverse human health and environmental risks to the Park's visitors and ecology. Of note, the Alpine Stables site, a popular visitor destination, was the first site remediated, resuming operations in May 2018, just months following the wildfire. Despite operating at limited capacity due to the fire effects on trails, buildings, and barns, the Alpine Stables offered guided trail horseback riding for visitors in the summer of 2018, and serves as a valuable destination for visitors and residents to connect with the pristine natural environment of the Park. Similarly, the Canyon Church Camp, which served as a youth camp was also successfully remediated. The remaining sites, which included the Visitor Centre, Parks Operations Compound, equipment areas, golf course maintenance shed, and staff housing were located in public areas and served as popular visitor attractions or provided the infrastructure necessary to operate the Park. As part of the Park's rebuilding efforts, the successful remediation of these sites has mitigated the anthropogenic impacts of the fire and allows for the uninhibited restoration of these sites so that the Park can continue to fulfill its mandate to ensure ecological integrity while fostering public understanding, appreciation, and enjoyment.



## Environmental Benefits

A UNESCO-designated World Heritage Site and World Biosphere reserve, Waterton Lakes National Park is part of the Crown of the Continent ecosystem and is home for more than 60 species of mammals, 250 species of birds, 24 species of fish, 10 species of reptiles and amphibians, and more than half of Alberta's plant species. The Kenow Wildfire burned 19,303 hectares of the Park and caused damage to buildings, equipment, and infrastructure. While the effects of wildfires can be beneficial to the natural environment, incineration of man-made structures and the subsequent release of their combusted contents risks further impacts to the ecosystem. Specifically, asbestos, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, metals, volatile organic compounds, and other unsafe materials (e.g., nails, shredded metal, wires) leached into soil (with the potential to migrate via groundwater to nearby lakes or rivers) or were distributed across the landscape at numerous sites presenting potential human health and environmental risks via various exposure pathways (e.g., ingestion, inhalation, direct contact).

Remediation of contaminated soil and removal of the hazardous and non-hazardous materials addressed the potential environmental risks and prevented further impact to the Park's ecosystem. Excavation was carefully monitored to prevent the excess removal of clean, native soils. Imported backfill and topsoil was sourced locally to prevent invasive species and reduce the environmental footprint (greenhouse gases, noise) associated with construction traffic. During excavation, areas were fenced off to prevent wildlife from injuring themselves in open excavations.





## Meeting Client's Needs

Following the wildfire, Parks Canada wanted to expeditiously remediate the impacted sites so that environmental contamination was addressed safely, further impact to the ecosystem was prevented, and the Park could reopen around these sites. Appreciating the challenges of winter in the Park, Dillon worked quickly to characterize the nature and extent of contamination at each site and, in order to facilitate the Park advancing the restoration of the Alpine Stables and Visitor Reception Centre sites for the summer visitor season, developed and helped Parks Canada implement separate remedial action plans and remedial designs. To this end, Dillon assisted with the preparation of health and safety documents, training, and orientation for the Park's highways crew who undertook the remedial efforts at the Alpine Stables. The Alpine Stables were subsequently opened in May 2018, eight months after the fire. For the balance of the sites, Dillon developed a remedial action plan that removed the need for remediation at three sites and worked with the contractor to expedite excavation and site restoration, allowing the balance of the remediation to be completed during the 2018 construction season, prior to heavy snowfall in Waterton, well in advance of the projected end date of the project. Dillon worked with the Park's Environmental Assessment Officer to protect the ecological integrity of the area around the impacted sites. The specifications identified special environmental protections to limit impacts to the local flora and fauna (e.g., introduction of invasive plants, erosion and sediment control) and to protect trees during construction.



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