The Near Surface Disposal Facility

Presentation to the Greenspace Alliance of Canada's Capital
General Meeting of May 29, 2017
Hintonburg Community Centre

Ole Hendrickson
Concerned Citizens of Renfrew County and Area

Canada's historical role in developing nuclear weapons

May 28, 2012

Chalk River Laboratories, February 1954. Located about 200 km north of Ottawa, Ontario, Chalk River Laboratories buildings contained the ZEEP, NRX and NRU reactors (under construction). Originally part of an effort to produce plutonium for nuclear weapons, the ZEEP reactor was designed by a team of Canadian, British and French scientists and engineers during the Second World War.

Radioactive Wastes at Chalk River Laboratories

"The extraction and processing of uranium as well as research into the **production of nuclear materials for military purposes** are part of Canada's history. The better-known chapter of that history is probably **Canada's participation in the Manhattan Project** during the Second World War (WWII), when our country supplied and refined uranium for use in U.S. facilities… Less well known to most, perhaps, is our involvement in **research to produce and extract plutonium as part of the Manhattan Project**… Canada also sold irradiated (used) nuclear fuel, from which plutonium was extracted, to the U.S.… **Between 1959 and 1964, about 252 kg of plutonium contained in used nuclear fuel was exported**…"

Source: *Canada's historical role in developing nuclear weapons*, Canadian Nuclear Safety Commission, May 28, 2012 http://nuclearsafety.gc.ca/eng/resources/fact-sheets/Canadas-contribution-to-nuclear-weapons-development.cfm

"More than half of the nuclear legacy liabilities under the responsibility of the GoC… **are the result of Cold War activities during the 1940s, 50s and early 60s… Estimated at about $7 billion (current day dollars),** these liabilities consist of buildings, a wide variety of buried and stored waste and affected lands**."**

Source: *Evaluation of the Nuclear Legacy Liabilities Program (NLLP) of the Energy Sector, Natural Resources Canada*, Reports 2011 http://www.nrcan.gc.ca/evaluation/reports/2011/814

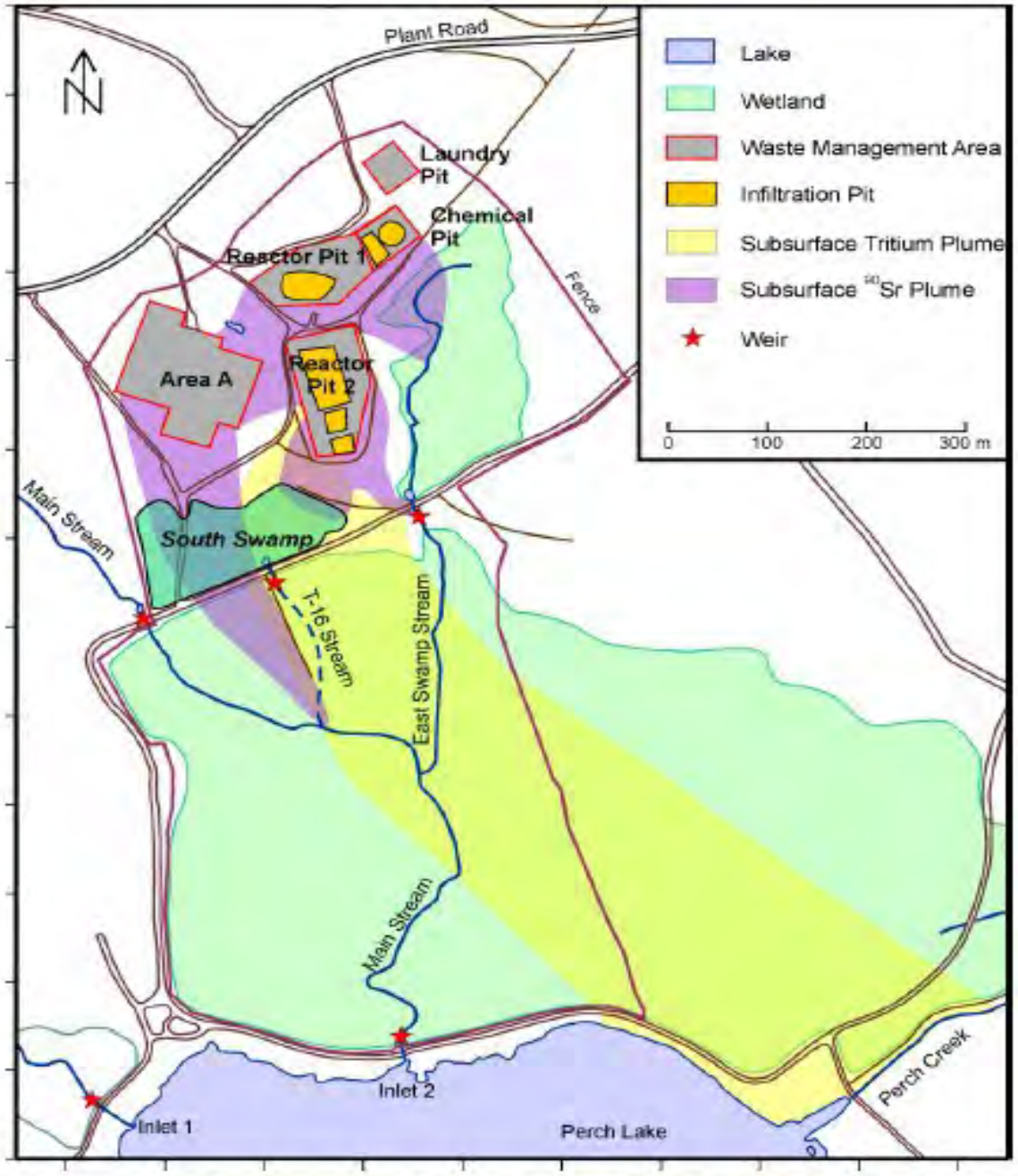


Figure B-1 Subsurface Plumes from WMA A and the LDA

Waste Management Area A

The first emplacement of radioactive waste into the CRL Supervised Area (formerly referred to as the Outer Area) took place in 1946 into what is now referred to as WMA A. These emplacements took the form of **direct disposal of solids and liquids to excavated trenches into the sand overburden**. The scale of operations was modest until 1952 when the cleanup from **the NRX accident generated large quantities of radioactive waste**… At this time, approximately **4,500 m3 of aqueous waste containing mixed fission products was poured into excavated trenches**.

Liquid Dispersal Area

Development of the Liquid Dispersal Area (LDA) commenced in 1954 when the first of several infiltration pits was established to **receive active liquids via pipeline** from Building 204 (the NRX Rod Bays). Dispersals included mainly 90Sr, along with a wide variety of other fission products. **Between 1956 and 1998, the pit was backfilled with solid materials that included contaminated equipment and vehicles** previously stored in WMA A plus potentially contaminated soils from excavations in the Active Area.

Source: *Comprehensive Preliminary Decommissioning Plan*, March 2014 CPDP-508300-PDP-001 Revision 2

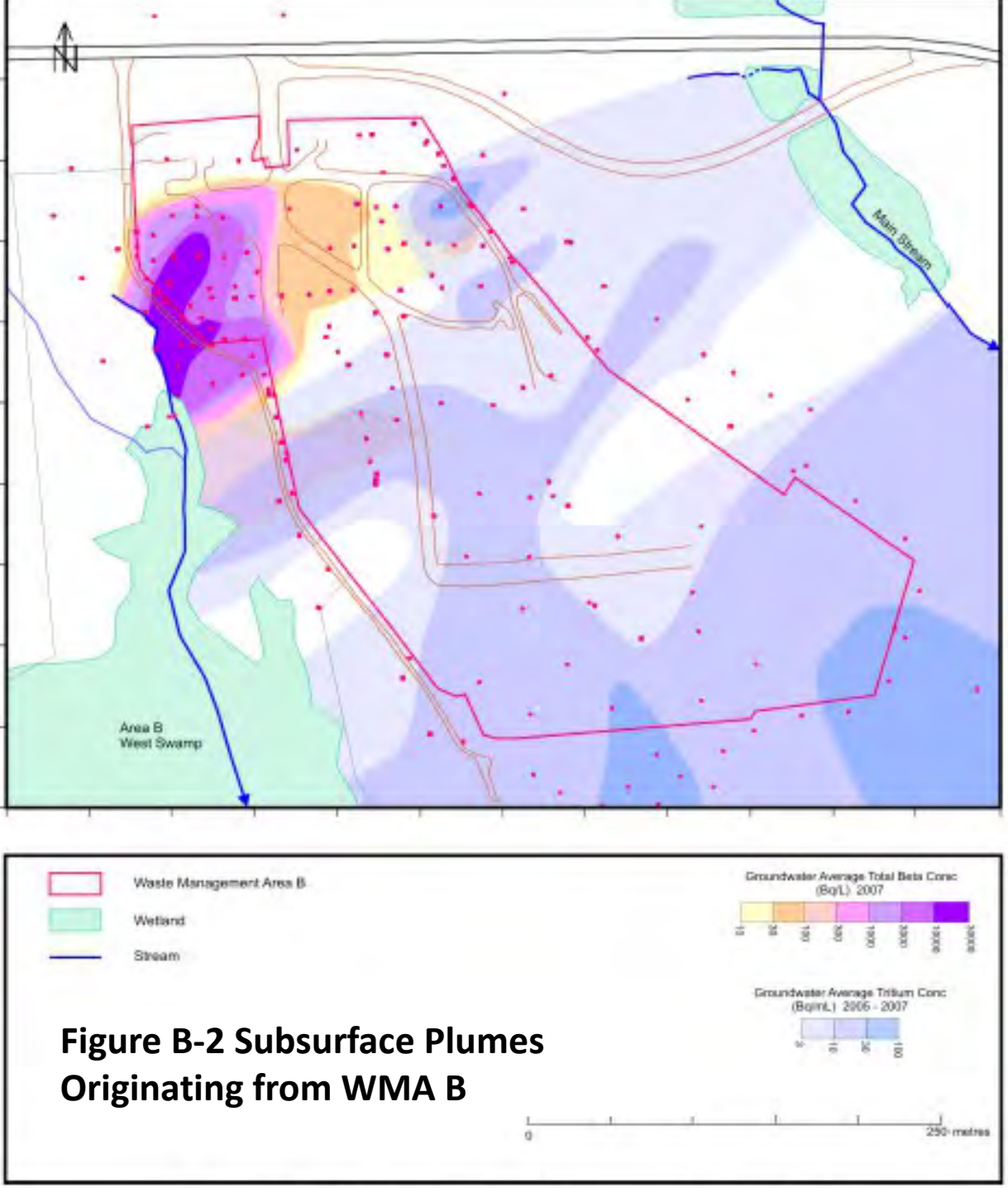


Figure B-2 Subsurface Plumes Originating from WMA B

Waste Management Area B

WMA B was established in 1953 to succeed WMA A as the site for solid waste management. The site is located on a sand covered upland approximately 750 m west of WMA A. Early waste storage practices for LLW were consistent with those used in WMA A, namely **emplacement in unlined trenches** capped with sandy fill, in what is now the northern portion of the site.

Additionally, there were numerous **"special burials"** of components and materials, sometimes in concrete containers or **directly in sand (e.g., the first NRU and the second NRX calandrias).** Asphalt-lined and -capped trenches were used for solid ILW from 1955 to 1959 when they were superseded by concrete bunkers constructed below grade but above the water table in the site's sands.

High-level wastes are also stored in WMA B, **in engineered facilities known as Tile Holes**. Tile Holes are used to store radioactive material that requires more shielding than can be provided in concrete bunkers.

Source: *Comprehensive Preliminary Decommissioning Plan*, March 2014 CPDP-508300-PDP-001 Revision 2

Disposal facilities

An inactive landfill is expected to be required to accommodate some four million cubic meters of conventional inactive waste from decommissioning all the buildings on the site. An inactive landfill facility does exist on the CRL site, but is nearing the end of its operational lifetime (2020).

A facility may be required for disposing of Very Low Level Waste (VLLW), such as slightly contaminated soil or concrete, that is considered to be too radioactive for off-site landfills, but not active enough for either the ILW or the LLW facility.

An ILW & LLW disposal facility will be necessary to dispose of ILW and LLW. **The current schedule assumes that an ILW facility would not be available to receive wastes until 2035. The LLW facility is also assumed to be available at the time. It may be advantageous to advance the availability of this LLW facility, but this requires further analysis before an optimum date can be identified.**

Source: *Comprehensive Preliminary Decommissioning Plan*, March 2014 CPDP-508300-PDP-001 Revision 2 (page 7-7)

AGREEMENT FOR THE MANAGEMENT AND OPERATION OF CERTAIN PROPERTIES AND ASSETS THAT ARE THE RESPONSIBILITY OF ATOMIC ENERGY OF CANADA LIMITED

ATOMIC ENERGY OF CANADA LIMITED

- and -

CANADIAN NUCLEAR LABORATORIES LTD.

September 13, 2015

IN WITNESS WHEREOF this Agreement has been executed by the Parties.

ATOMIC ENERGY OF CANADA LIMITED

by _____

Name: Peter Currie
Title: Chair of the Board

_____

Name: Jonathan Lundy
Title: Chief Transition Officer

CANADIAN NUCLEAR LABORATORIES LTD.

by _____

Name:
Title:

_____

Name: Mark Lesinski
Title: Director, President and Chief Executive Officer

Extracts from the Contract between AECL and CNL

1.3.5.4 CNL shall seek the **fastest**, most cost effective way(s) of executing the DWM [Decommissioning and Waste Management] Mission including **disposal of all waste**.

1.4.2.3.3.1.4 CNL shall present **options and recommendations** for a preferred LLW disposal method that best meets the needs of CNL for the LLW waste streams. **Options could include, but are not limited to, near surface engineered disposal or waste management facility**.

1.4.2.3.3.2.2 Once approved by AECL and the Regulatory Authority, CNL shall perform all subsequent activity including the design, build and commissioning to achieve a fully licensed LLW disposal or LTWM facility, with a **target completion date of six years following the Commencement Date**.

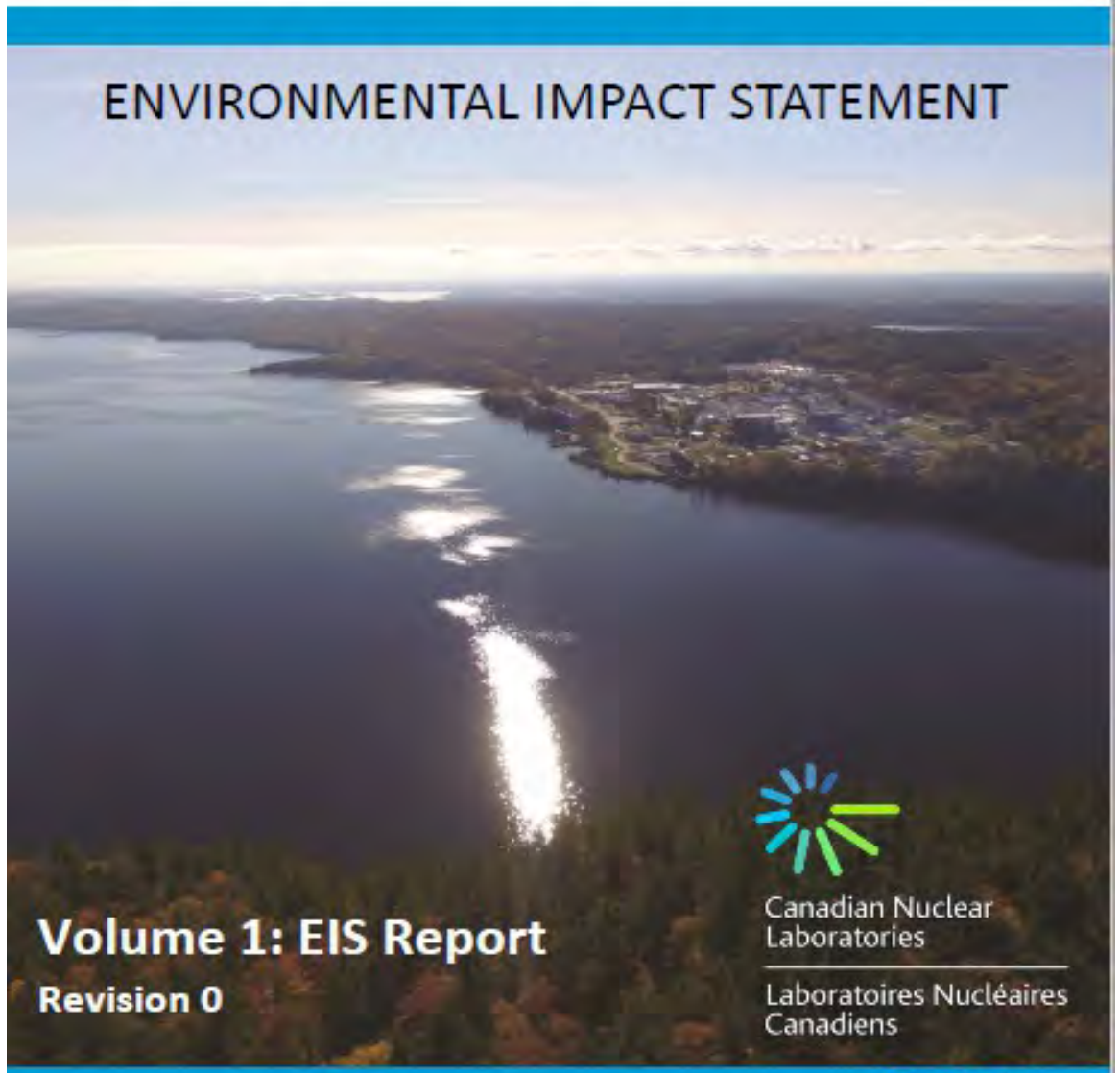
1.4.2.4.2 CNL shall **manage and store ILW, and shall develop long-term disposal options**.

Near Surface Disposal Facility

Deep River, Renfrew County, Ontario

232-509220-REPT-004
UNRESTRICTED

ENVIRONMENTAL IMPACT STATEMENT



Volume 1: EIS Report

Revision 0

Canadian Nuclear Laboratories

Laboratoires Nucléaires Canadiens

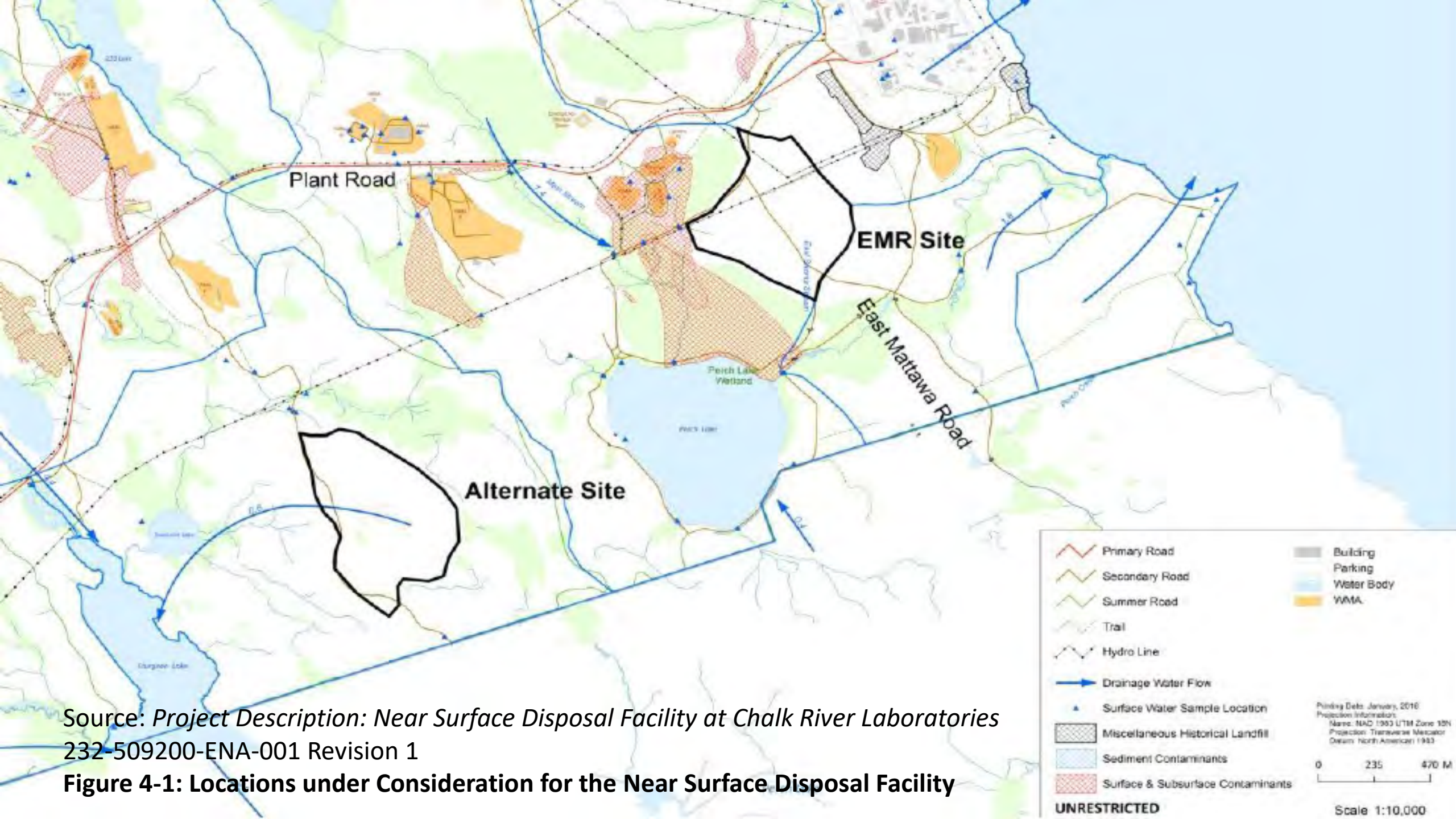
Prepared by:

Project Number: 1547525
March 2017

Golder Associates

The purpose and urgency of the NSDF Project is rooted in the requirements established by Atomic Energy of Canada Limited (AECL), on behalf of the Government of Canada, to substantially reduce the risks associated with the CNL legacy wastes (see Table 2.2-1), liabilities and the cost of laboratory operations to taxpayers in the 10-year period 2016 to 2025, and to create the conditions for the revitalization of the CRL property… **CNL intends to reduce its radioactive waste stores, to decommission more than 100 buildings and structures that are not needed for future CNL missions, and to remediate various WMAs** at the CRL property. Candiand Nuclear Laboratories will also close the WL and the NPD prototype reactor site and **ship the waste** that is not disposed in situ with the reactors **to CRL**. Canadian Nuclear Laboratories will continue to accept waste on a commercial basis (e.g., medical waste from hospitals). **All of the waste** from the aforementioned activities **is intended to be disposed in the ECM** to be established under the NSDF Project.

Source: *Environmental Impact Statement: Near Surface Disposal Facility*
March 2017 232-509220-REPT-004 Revision 0



Source: *Project Description: Near Surface Disposal Facility at Chalk River Laboratories* 232-509200-ENA-001 Revision 1

Figure 4-1: Locations under Consideration for the Near Surface Disposal Facility

Figure 3-1 Illustrative Layout of the Near Surface Disposal Facility at the EMR

Source: *Project Description: Near Surface Disposal Facility at Chalk River Laboratories* 232-509200-ENA-001 Revision 1

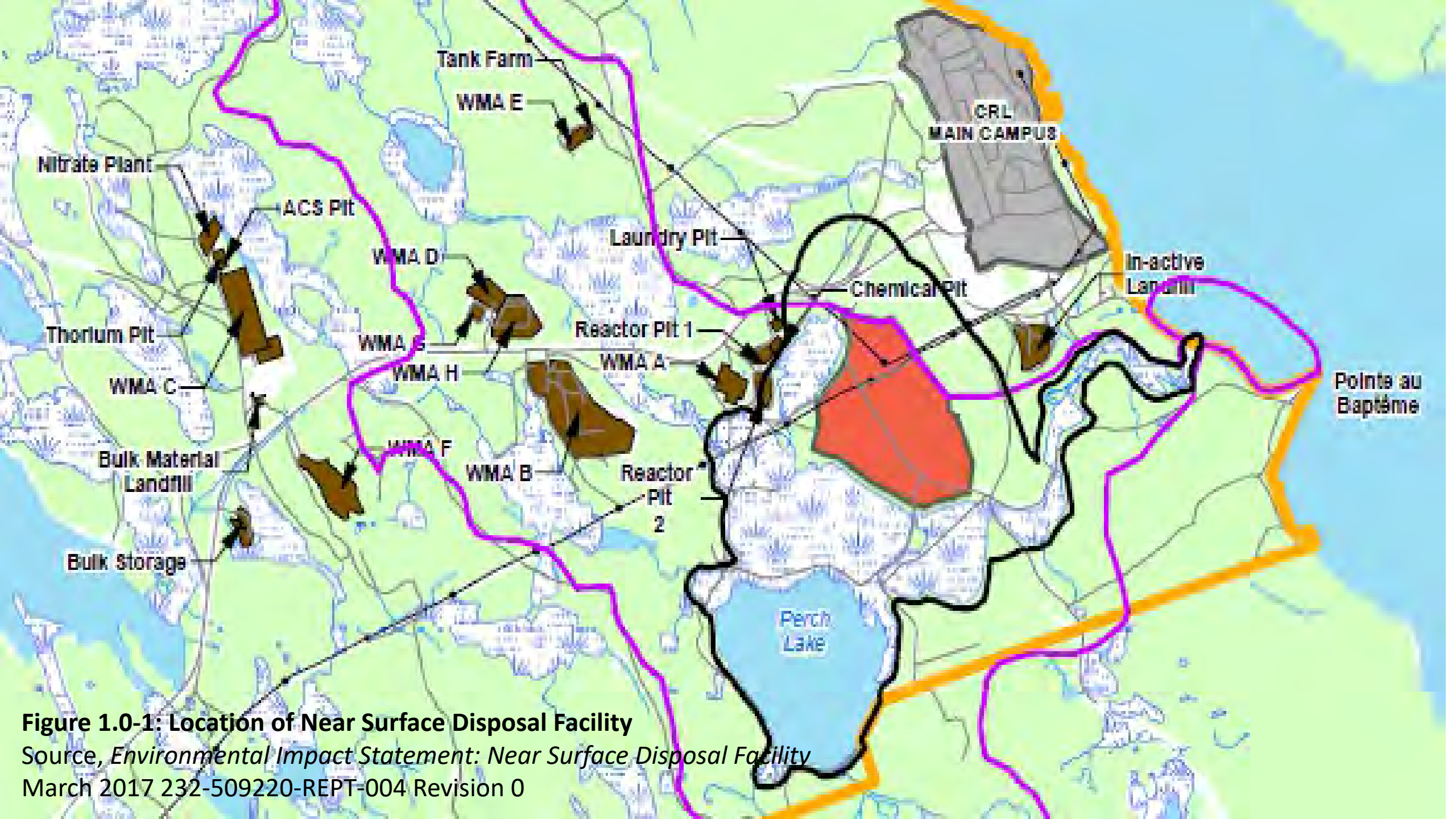


Figure 1.0-1: Location of Near Surface Disposal Facility
Source, *Environmental Impact Statement: Near Surface Disposal Facility*
March 2017 232-509220-REPT-004 Revision 0

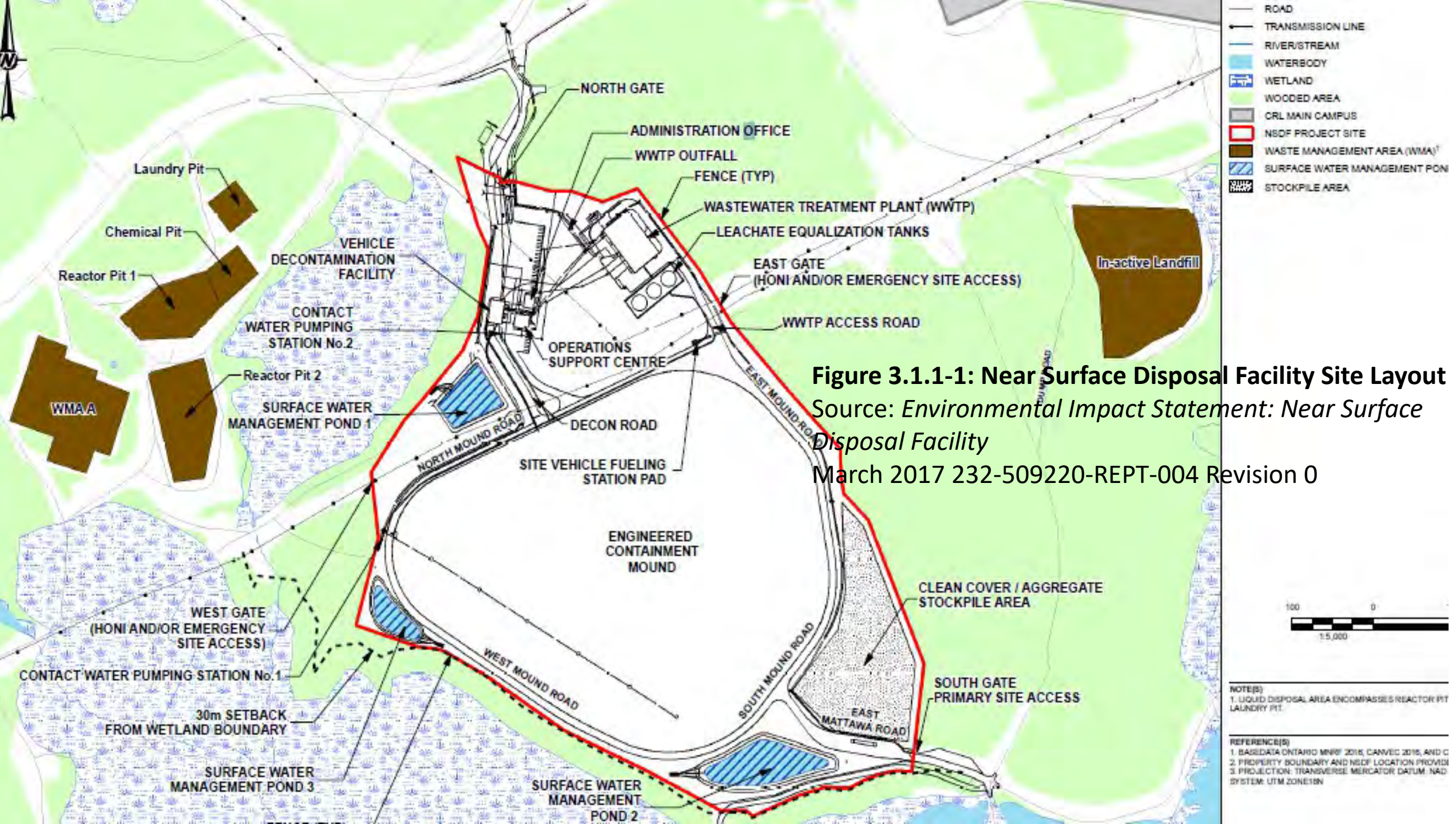


Figure 3.1.1-1: Near Surface Disposal Facility Site Layout

Source: *Environmental Impact Statement: Near Surface Disposal Facility*

March 2017 232-509220-REPT-004 Revision 0

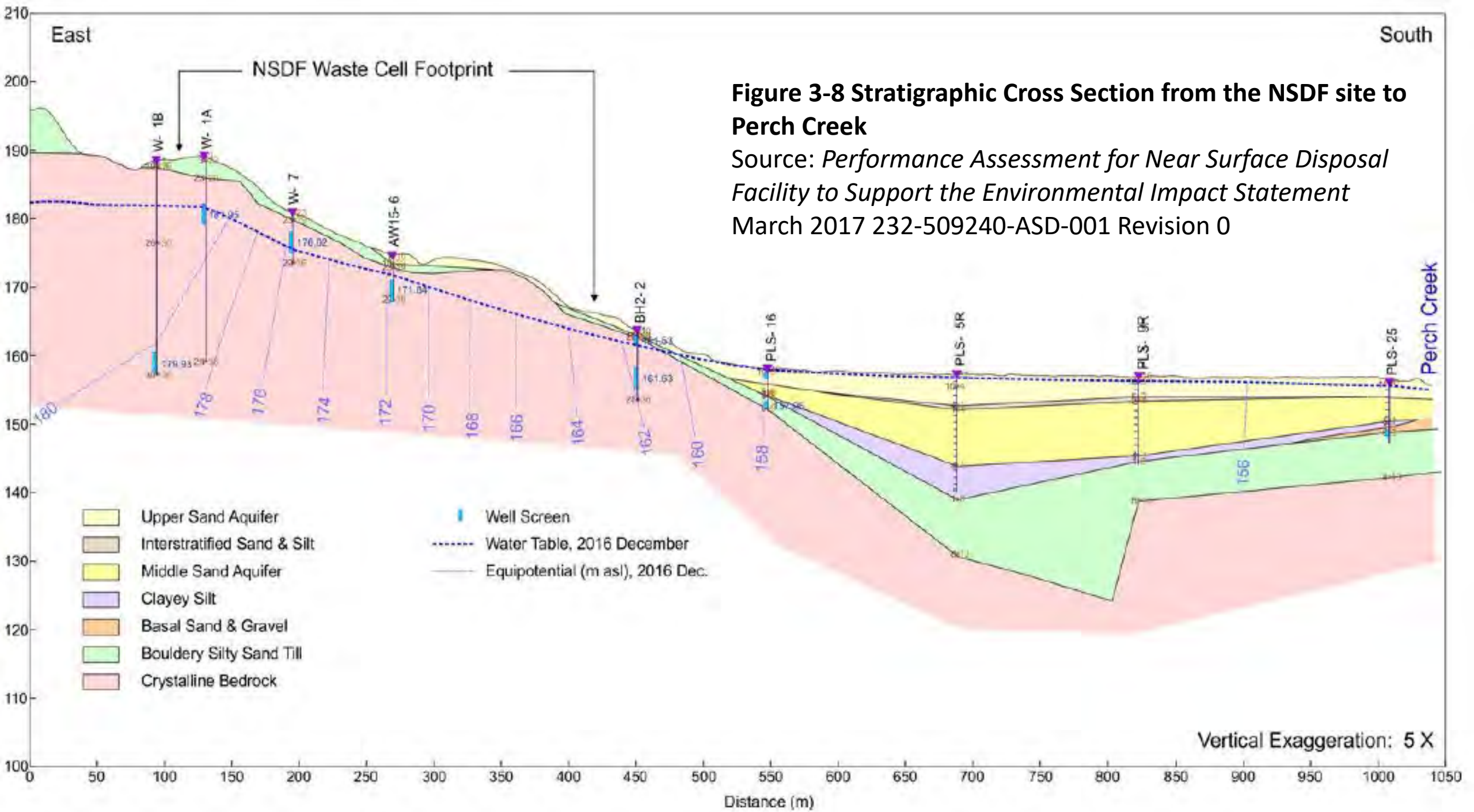
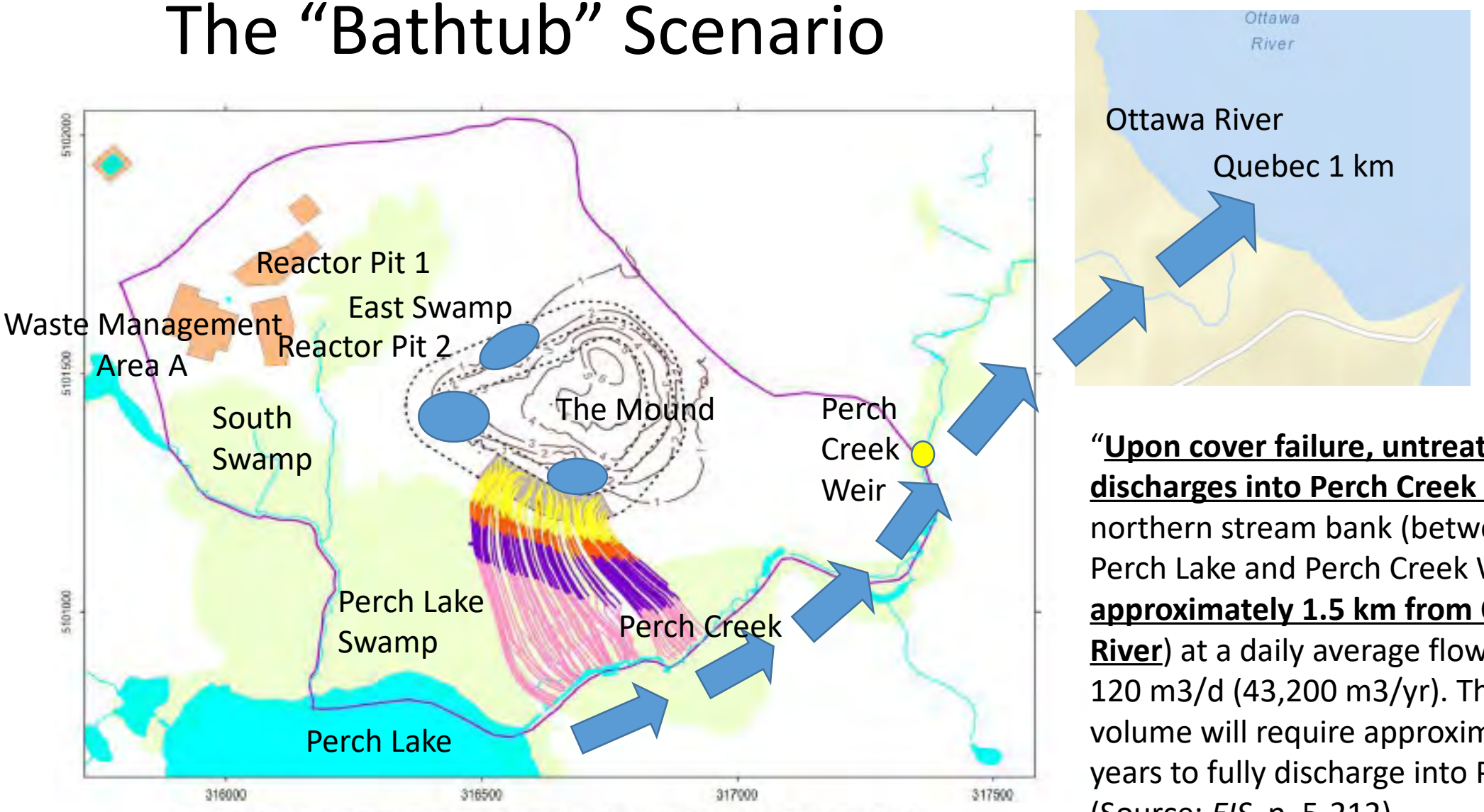


Figure 3-8 Stratigraphic Cross Section from the NSDF site to Perch Creek

Source: *Performance Assessment for Near Surface Disposal Facility to Support the Environmental Impact Statement* March 2017 232-509240-ASD-001 Revision 0

The “Bathtub” Scenario



“**Upon cover failure, untreated leachate discharges into Perch Creek** along its northern stream bank (between Perch Lake and Perch Creek Weir **approximately 1.5 km from Ottawa River**) at a daily average flow rate of 120 m3/d (43,200 m3/yr). The total waste volume will require approximately 25 years to fully discharge into Perch Creek.” (Source: *EIS*, p. 5-212)

Figure 8-5 Conceptual Representation of the “Bathtub” Scenario

Source: *Performance Assessment for Near Surface Disposal Facility to Support the Environmental Impact Statement* March 2017 232-509240-ASD-001 Revision 0

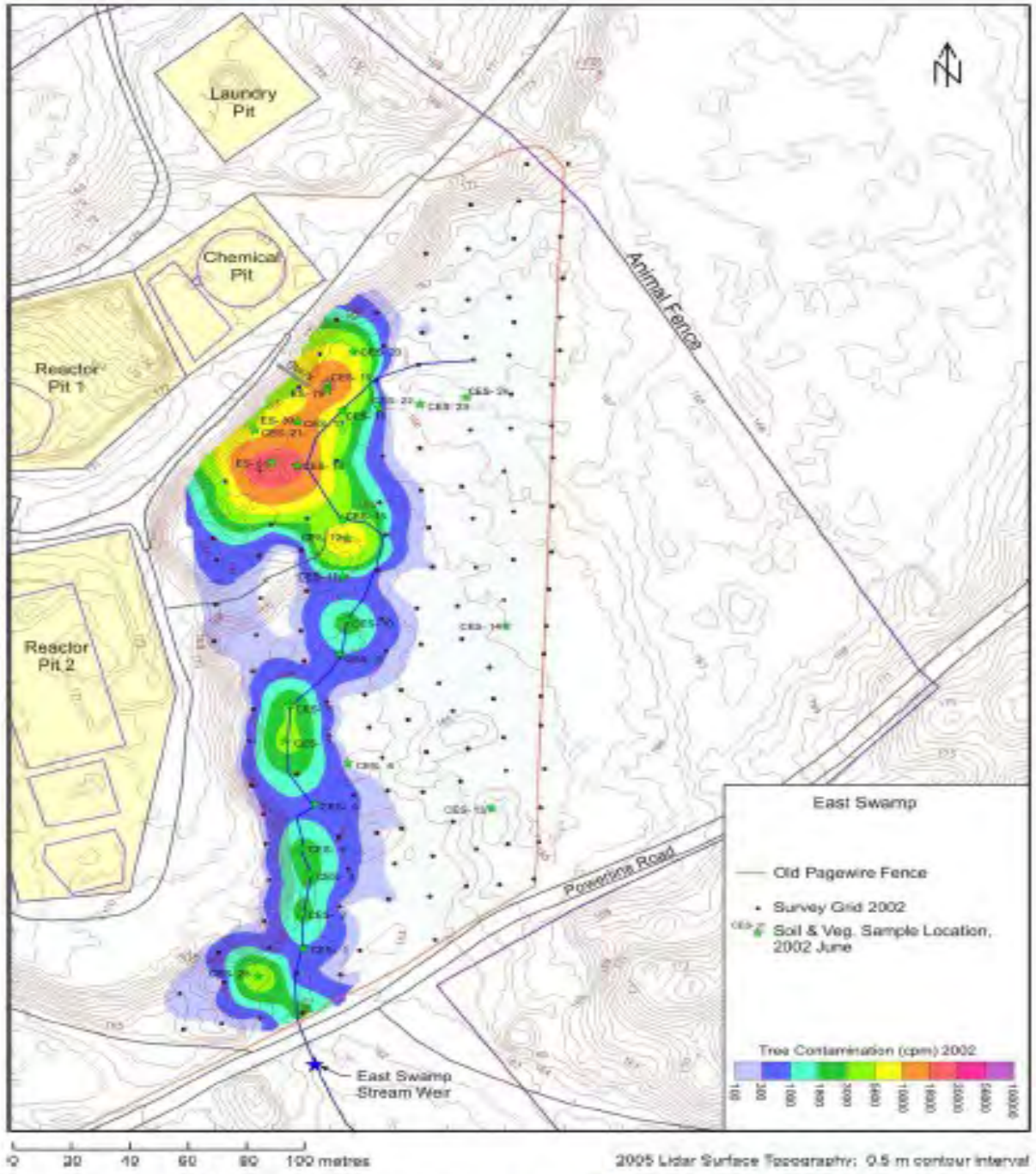


Figure 19 Vegetation Contamination in East Swamp in 2002 June

Radiological Contamination in the East Swamp, 2002 to 2012, 3611-121250-REPT-006, Revision 0, March 2015

The CRL ERA assessed doses to aquatic receptors from exposure to surface water measured at East Swamp Weir. **The dose rate to snails**, the most sensitive aquatic receptor present, from total beta activity of 428 Bq.L-1 **was calculated to be 458 Gy.hr-1 [5]. The dose slightly exceeds the ecological benchmark of 400 Gy.hr-1 for protection of aquatic biota** indicating there is some potential for ecological effects to result.

Contamination count rates in vegetation generally exceed count rates on soil with the average count rate for vegetation a factor of 1.6 higher than for soil.

The dose rate to vegetation (alder) within the wetland from bioaccumulation of 90Sr in the trees was also assessed in the ERA [5]. Alder was selected as it is the most sensitive native tree/shrub species to radiation. **The calculated dose to alders was 49 Gy.hr-1, less than the benchmark of 100 Gy.hr-1 for terrestrial species**.

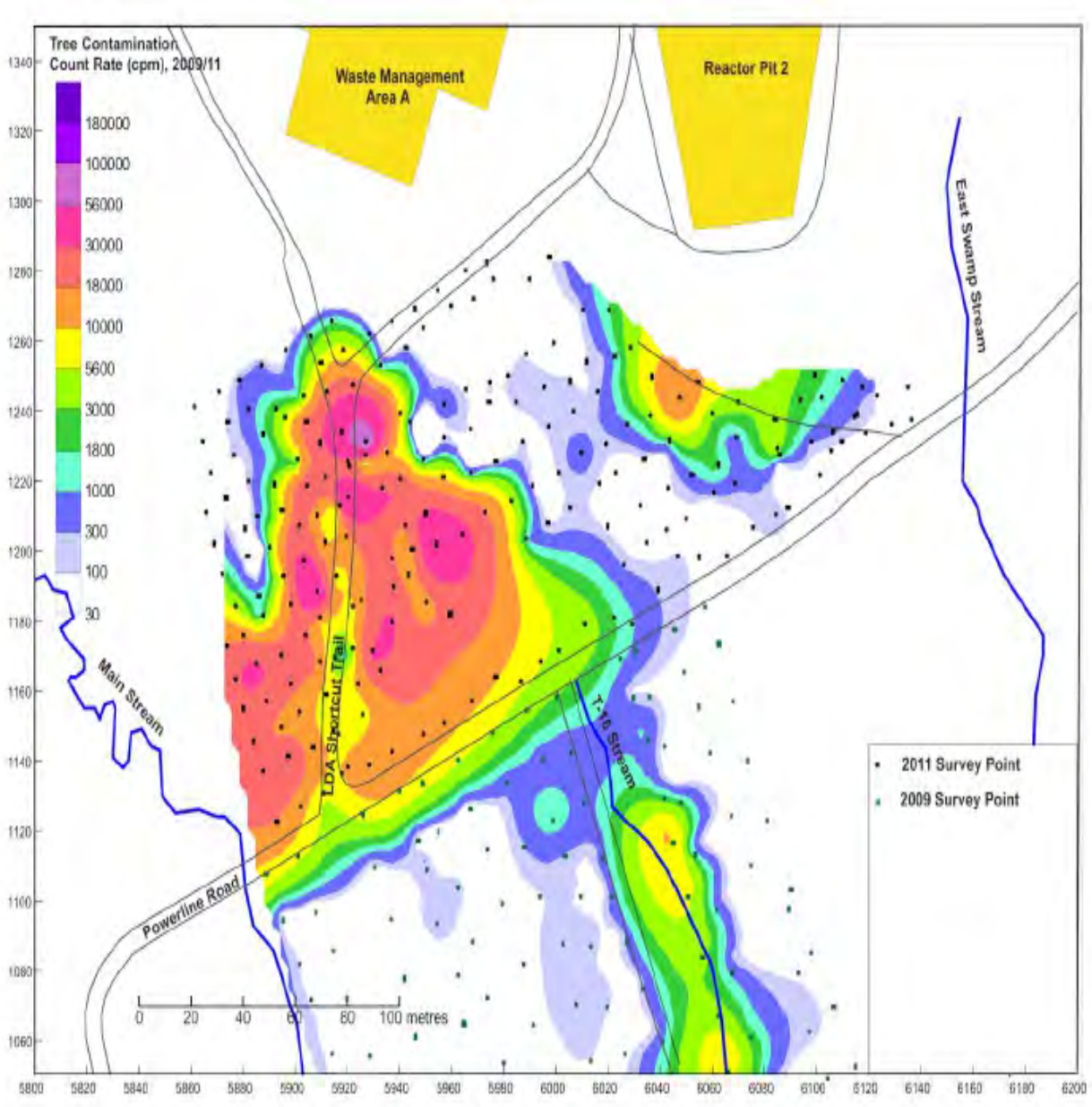


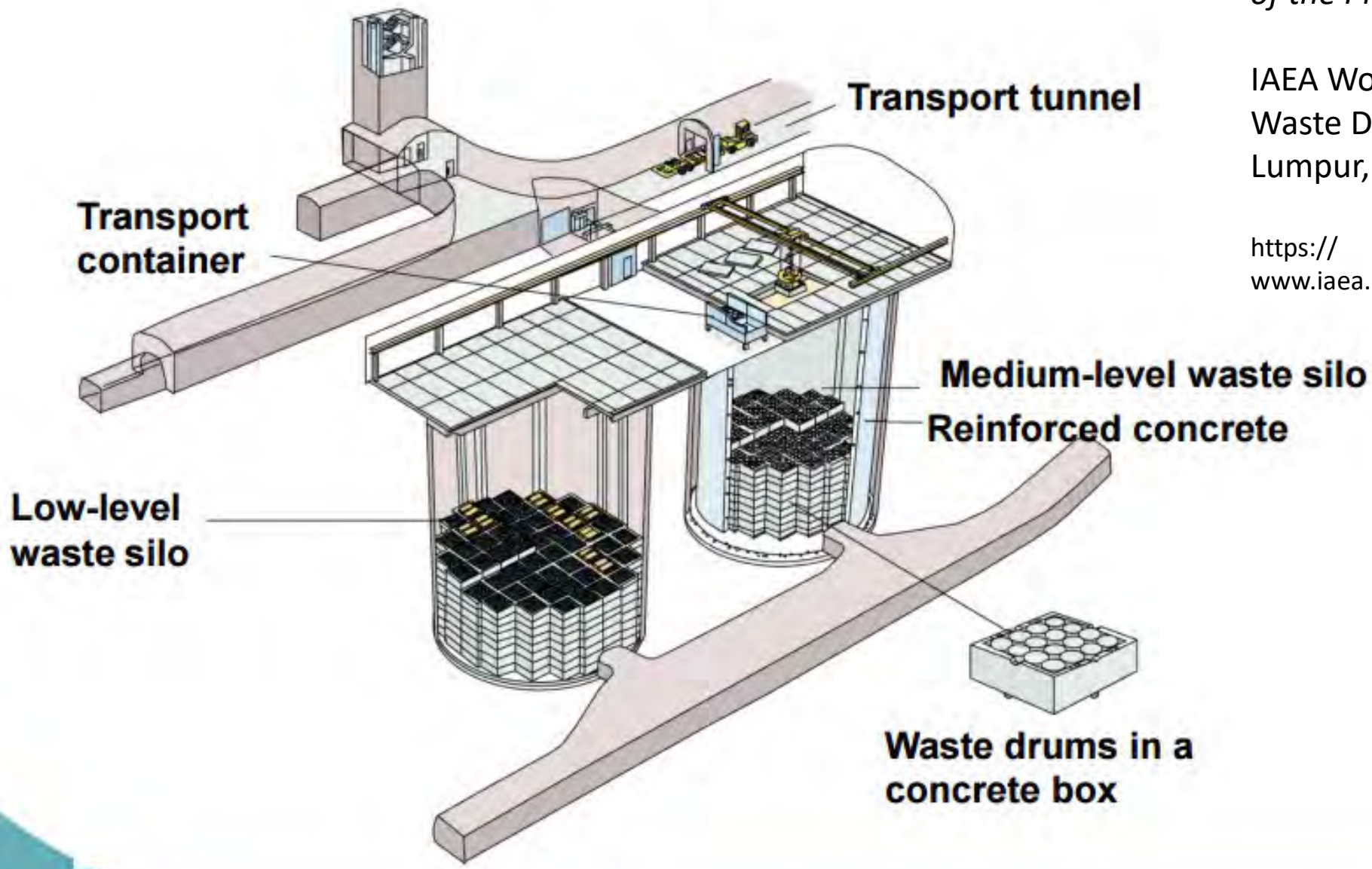
Figure 37 Measured Vegetation Contamination Count Rates (cpm) in the South Swamp, 2009 and 2011.

Radiological Contamination in the South Swamp, 1997 to 2011 3611-121250-REPT-005, Revision 0, January 2015

The CRL ERA assessed doses to aquatic receptors from exposure to surface water measured at South Swamp Weir. **The dose rate to snails** calculated in [2] from exposure to surface water measured at South Swamp Weir with 642 Bq.L-1 total beta activity **was 704 Gy.hr-1. The dose slightly exceeds the ecological benchmark of 400 Gy.hr-1 for protection of aquatic biota** indicating there is some potential for ecological effects to result.

The dose rate to vegetation (alder) within the wetland from bioaccumulation of 90Sr in the trees was also assessed in the ERA [2]. **The dose to alders within the most contaminated area of the wetland,** having measured beta activity in tree tissue of 1140 Bq.gfw-1, **was 292 Gy.hr-1, slightly exceeding the benchmark of 100 Gy.hr-1 for terrestrial biota**.

LLW/ILW REPOSITORY AT OLKILUOTO – SILOS



Source: *Management of Spent Fuel and Other Nuclear Waste in Finland - Progress of the Programme since the 1970s*

IAEA Workshop on Building Partnership in Waste Disposal Programme Kuala Lumpur, 31 October – 2 November, 2011

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ACCESS TUNNEL OF THE LLW/ILW REPOSITORY

Source: *Management of Spent Fuel and Other Nuclear Waste in Finland - Progress of the Programme since the 1970s*

IAEA Workshop on Building Partnership in Waste Disposal Programme Kuala Lumpur, 31 October – 2 November, 2011

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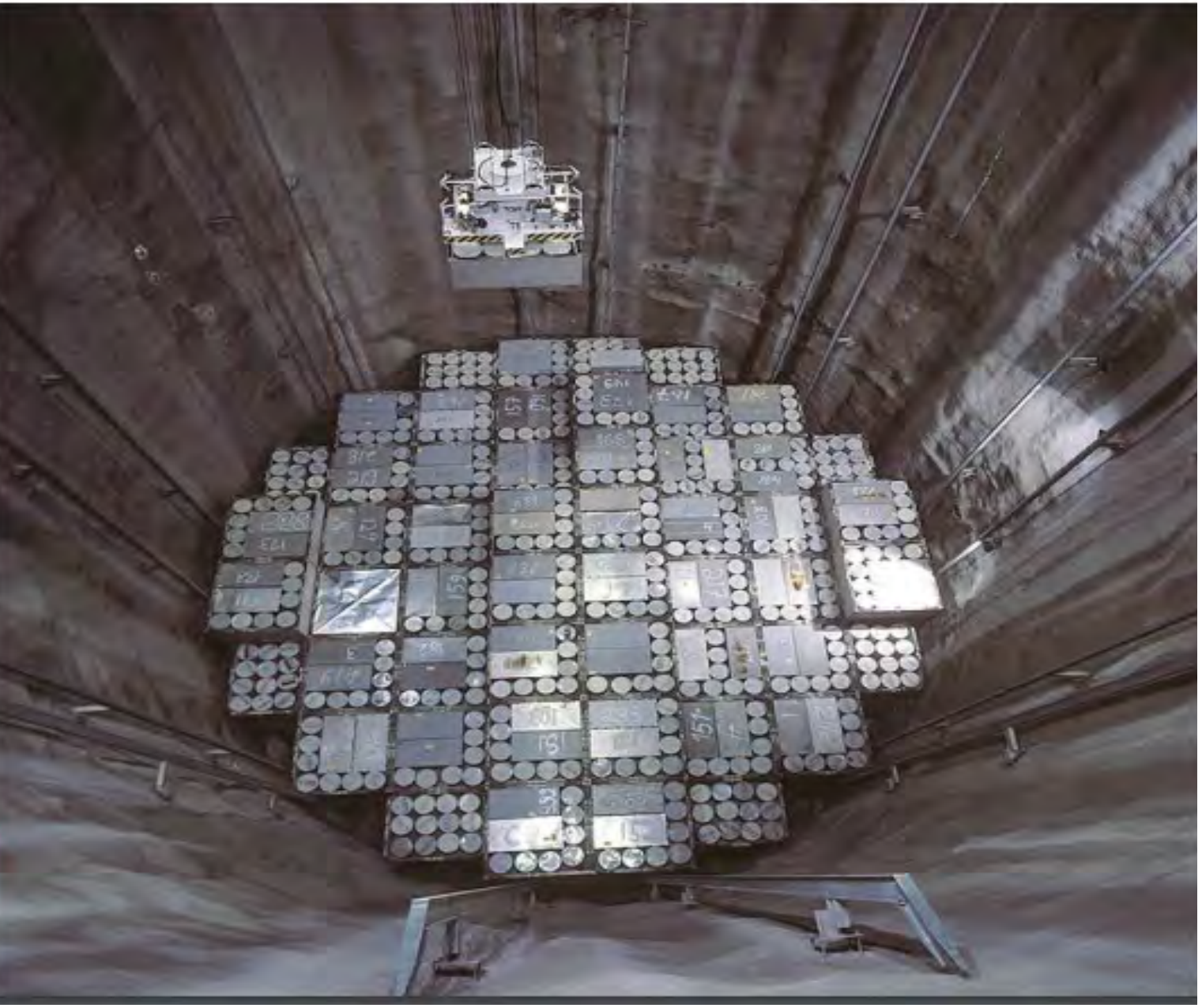
SILO FOR LLW



Source: *Management of Spent Fuel and Other Nuclear Waste in Finland - Progress of the Programme since the 1970s*

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www.iaea.org/OurWork/ST/NE/NEFW/WTS-Networks/DISPONI

A Geologic Waste Management Facility (GWMF):

- would provide increased barriers for potential releases to the environment in the long-term;
- is considered to be robust and technically feasible;

Source: *EIS,* Section 2.5.2.2, pages 2-19 to 2-26

- provided suitable geology is

So, what's wrong with the NSDF Project?

Wrong Technology

A 25-meter-high landfill-type radioactive waste mound is not "near surface". A million cubic meters of radioactive waste would be exposed to wind, rain and snow. This proposal flaunts IAEA Safety Standard No. SSR-5, Disposal of Radioactive Waste, which calls for "impermeable and water diverting features" for low level radioactive waste disposal.

Bad Location

The Chalk River Laboratories are next to the Ottawa River because reactors need cooling water. The chosen site for the dump is ~ 1 km from the river in the highly contaminated Perch Creek basin, with its many existing leaking waste sites.

Wrong Objective

Canadian taxpayers "own" the nuclear liabilities from 70 years of Chalk River operations. Parliament allocates over 500 million dollars per year to nuclear clean-up. Priority must be given to issues impacting water quality now -- such the plume of fission products migrating from WMA A. Demolishing old buildings is a lower priority cosmetic exercise.

Bad Process

In 2012 The Harper Government gave the Canadian Nuclear Safety Commission, an unelected body, sole authority to approve nuclear projects, eliminated any decision-making role for the Minister of Environment, eliminated independent panel reviews, and fast-tracked project approvals. This project is being rammed through with a discredited "Decide, Announce, Defend" model.

Wrong Proponent

In 2015 the Harper Government downsized Atomic Energy of Canada Limited (AECL) by creating the "Canadian Nuclear Laboratories Limited" (CNL). It gave five, for-profit multinational corporations a 10-year contract to operate CNL. Parliamentary appropriations for Chalk River flow through AECL. Why isn't AECL, not CNL, the project proponent?

Thank you!

For more information, go to the Concerned Citizens of Renfrew County and Area website

https://sites.google.com/site/concernedcitizensrca/

To participate in the EA process, go to the Canadian Environment Assessment Agency website

http://www.ceaa.gc.ca/050/details-eng.cfm?evaluation=80122