

# What is an Environmental Assessment? *Near Surface Disposal Facility*

The environmental assessment for the Near Surface Disposal Facility (NSDF) began in late 2015. As a part of the environmental assessment process for the NSDF Project, Canadian Nuclear Laboratories (CNL) undertook numerous scientific studies, including geological and hydrogeological studies, archaeological work, environmental protection mitigation initiatives and extensive engagement with the public and Indigenous communities.

The Canadian Environmental Assessment Act (CEAA) 2012 has been replaced by the new Impact Assessment Act, however the NSDF Project will continue to follow the CEAA 2012 process. Check out the NSDF's environmental assessment page: CEAA #80122

The Canadian Nuclear Safety Commission (CNSC) is federal nuclear regulator and the responsible authority for designated nuclear projects undergoing environmental assessments. Learn more about the CNSC and environmental assessment here.

Environmental assessment is a forward-looking planning process that:

- Must reflect input from Indigenous communities and the public.
- Must consider the environment as a whole.
- Considers the potential for cumulative effects.
- Assesses the significance of residual adverse effects.
- Determine mitigation measures to minimize negative environmental effects.
- Must consider alternatives.

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## Environmental Impact Statement

The Environmental Impact Statement (EIS) details how CNL is fulfilling the requirements of the environmental assessment process. CNL submitted a draft EIS in 2017, a revised draft EIS in 2019 and a final EIS document in 2020 to the Canadian Nuclear Safety Commission (CNSC), which is the federal authority responsible for making the environmental assessment decision. CNL plans to resubmit the final EIS to the CNSC at the end of May 2021.

Indigenous communities, members of the public, interested organizations, federal bodies (including Environment and Climate Change Canada, the CNSC and the Province of Quebec) have all submitted comments on the NSDF Project's EIS. CNL undertook further studies and has incorporated public and Indigenous feedback into the final EIS.



## FYI: what is the difference between a residual effect and a cumulative effect?

Residual effects are changes to the environment after the implementation of mitigation measures. Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions.

# NEAR SURFACE DISPOSAL FACILITY



## NSDF Project Description in Brief



The Near Surface Disposal Facility (NSDF) is a key facility required to enable Canadian Nuclear Laboratories (CNL) to conduct environmental remediation of contaminated soils and materials that are already present at the Chalk River Laboratories (CRL) site to protect the environment, including the Ottawa River. The NSDF has been specifically design as a permanent solution to reduce environmental risk and isolate low-level radioactive waste, in accordance with international guidance and regulatory requirements.

For close to eight decades, workers at Chalk River Laboratories have led the world in ground-breaking nuclear innovations. These include the production of medical isotopes that have improved the lives of millions of people in Canada and worldwide, and the CANDU reactors that continue to generate more than 60 percent of Ontario's electricity – clean, emission-free energy. This research activity has created waste that over the years has been managed in a way consistent with evolving best practices and regulations. The proposed NSDF will allow CNL to dispose of the low-level waste using modern engineering technology.

The NSDF will only hold low level radioactive waste. This waste consists of building materials – mainly from the revitalization underway at Chalk River Laboratories – contaminated soils, and general items such as discarded mops, protective clothing and rags that have become contaminated. Ninety percent of the waste proposed for the NSDF is already at Chalk River Laboratories, five per cent comes from hospitals and universities, and five per cent comes from other AECL sites.

The main feature of the proposed facility will be an engineered containment mound with natural and synthetic barriers which are designed to work together to isolate the waste materials from the environment for more than 550 years, hundreds of years after the radioactivity of the waste will have decayed to levels found naturally in the environment. The NSDF will also feature a wastewater collection and treatment system that will remove radiological and chemical contaminants so that the treated effluent is safe to humans and the environment for discharge. Treated wastewater will be sampled prior to discharge to the environment to ensure that discharge targets are met.

CNL will expand its already extensive environmental monitoring of CRL, the sampling of air, water and groundwater, to include the NSDF. The Environmental Assessment for the NSDF project does not predict any significant impacts to humans or the environment, with the implementation of mitigation measures. The ongoing monitoring for NSDF will confirm these predictions and the effective use of the mitigation measures.

CNL continues extensive engagement with the public, federal and provincial governments, and Indigenous communities, to hear comments and concerns about the proposal, with a view to making changes when possible to address the issues raised.

The proposed facility would be licensed under the Nuclear Safety and Control Act, and subject to the associated regulations and independent regulatory oversight from the Canadian Nuclear Safety Commission.

## NSDF Project Quick Facts

- The NSDF mound will hold up to 1,000,000 cubic metres of low-level waste.
- Following its closure, the mound will resemble a grassy rise built into an existing bedrock ridge, which will not be visible from the Ottawa River. The NSDF will occupy a 37-hectare footprint on the 4,000-hectare Chalk River Laboratories (CRL) site.
- Queen's University has studied conducted tests on the synthetic geomembrane to be used in the engineered liners and found that the expected design life will be up to 1,700 years. The radiation in the facility will decay to levels found naturally in the environment in approximately 100 years.
- The base of the proposed NSDF is located approximately 163 metres above sea level, approximately 50 metres above the current water levels of the Ottawa River. Public and Indigenous peoples can be assured that the proposed site is situated well outside of a flood plain.
- Since 2015, CNL has demolished 98 buildings and facilities on the CRL site to make way for a revitalized campus. The resulting debris and soil contaminated with low-level radiation is in safe temporary storage, awaiting approval for disposal in the NSDF.
- It is estimated the NSDF will cost \$365 million to license and construct. Operating costs are estimated at \$275 million over a 50-year period.
- The construction phase will require an average of 225 full-time skilled workers, with a peak workforce of approximately 300 personnel.
- CNL will continue to engage with Indigenous peoples on potential employment and contracting opportunities for the NSDF Project.
- CNL has conducted more than 100 engagement activities with the public, including individual community members, government and environmental groups to share information and gain feedback on the project. Activities included public information sessions, presentations, meetings, community events, open houses and more.
- Indigenous communities are engaging with CNL on the NSDF Project to ensure Indigenous rights and interests are represented.
- CNL has conducted over 200 engagement activities on the NSDF project with sixteen identified Indigenous communities and organizations since 2016, and is committed to ongoing engagement should the project proceed.

## Chalk River Laboratories

- The Chalk River Laboratories is the single largest science and technology laboratory in Canada.
- The campus is 4,000 hectares in size
- 81 hectares of lab complex
- 17 nuclear-capable facilities and 70 major buildings
- More than 3,000 employees, including
  - 1,600 engineering, scientific, and technical staff
  - 300 skilled tradespeople



## NSDF Project Q & A

### 1. **What is a Near Surface Disposal Facility?**

The NSDF is first and foremost the key enabling facility to support environmental remediation at the Chalk River Laboratories. It will significantly improve the existing conditions at Chalk River Laboratories and enable the cleanup of contaminated soils and materials that are already present on the site. The facility has been specifically engineered for disposal of low-level radioactive waste by safely by isolating it from the environment.

### 2. **Why does CNL have to build this facility?**

CNL has conducted remarkable work over the past 70 years, including the production of lifesaving medical isotopes, and the development of CANDU reactors which cleanly, safely and reliably generate more than 60 per cent of Ontario's electricity. This work has also produced radioactive waste. While this waste was stored according to the best practices and regulations at the time, standards have changed. CNL is cleaning up this waste and managing it with modern technology. CNL is also in the process of revitalizing Chalk River Laboratories to create a world-class nuclear research centre. The NSDF is a key element in that transformation, helping us to ensure the responsible and safe disposal of resulting debris and building materials.

### 3. **What will the NSDF look like?**

The NSDF, in its final form, will resemble a large, grassy hill. While in operation it will include an engineered containment mound, a wastewater treatment plant, and support facilities. It will have a total footprint of 37 hectares -- equivalent to 10 soccer fields.



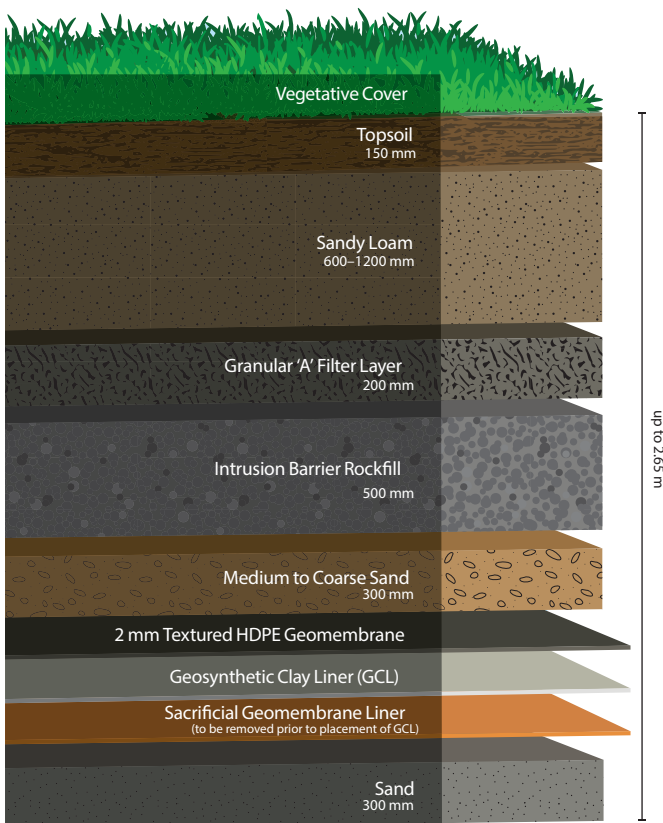
## NSDF Project Q & A

### 4. How will the NSDF keep the waste from contaminating the environment?

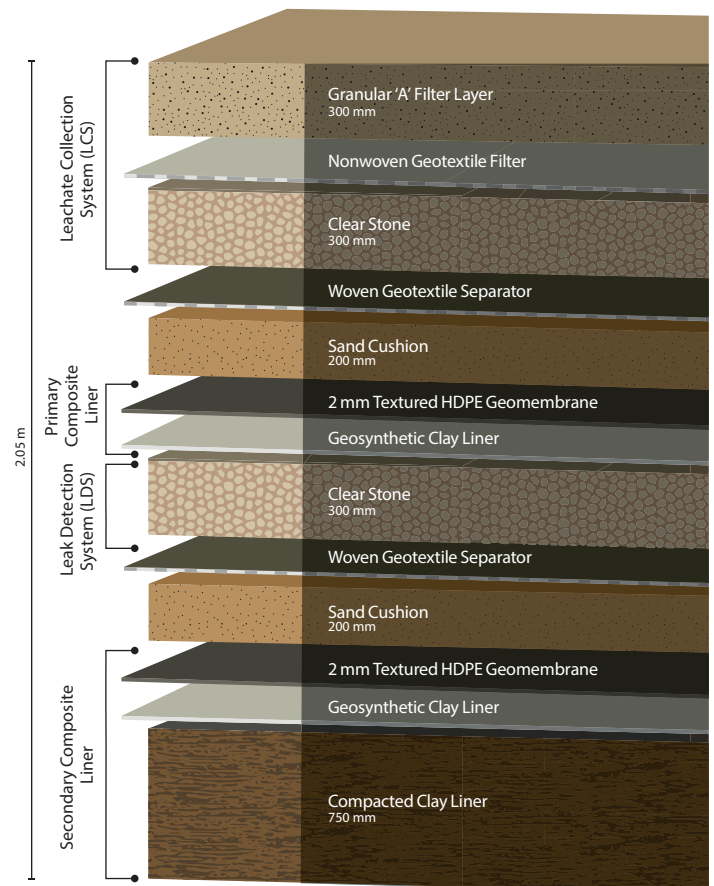
The facility's engineered containment mound includes base and cover systems that will fully contain wastes. The base liner and cover system and monitoring are key safety features:

- The base liner system will be approximately 1.5 metres thick.
- The cover system will be approximately two metres thick.
- Queens University has tested the synthetic geomembrane and concludes it will stay intact for more than a thousand years – much longer than the time it will take to for the radioactivity to decay to a safe level.
- There are primary and secondary collection systems to collect and transfer any contaminated water for treatment at a purpose designed wastewater treatment plant.
- The design includes features to enable inspection of the system performance and allow for repairs if necessary.
- An array of environmental monitoring systems that will sample air, water and groundwater quality will surround the NSDF.
- The water discharged from the wastewater treatment plant will meet discharge targets and protect humans and the environment, including the Chalk River wetlands and the Ottawa River. Treated effluent will be tested prior to discharge to the environment to ensure the discharge targets are met.

COVER SYSTEM CROSS SECTION



BASE LINER SYSTEM CROSS SECTION



## NSDF Project Q & A

### 5. **What will you put in the facility?**

The NSDF will contain only low-level radioactive waste such as soil from environmental remediation work on the Chalk River site, demolition debris from the revitalization of the campus, protective clothing or equipment. Ninety percent of this waste is already on site at Chalk River Laboratories, five per cent comes from hospitals and universities, and five per cent comes from other AECL sites. Only materials that meet the stringent Waste Acceptance Criteria which has been accepted by the Canadian Nuclear Safety Commission will be allowed for disposal in the NSDF.

### 6. **Why are you locating the NSDF beside the Ottawa River?**

The preferred site met all of the criteria for size, proximity to the main campus for safe monitoring and operation of the facility, low flood risk, protection of species at risk and geotechnical qualities. The site is just over one km from the Ottawa River, but is on a bedrock ridge that naturally forces water away from the River.

### 7. **Does the location pose a risk to the river?**

No, it does not. The NSDF is designed to protect the Ottawa River, not to harm it. Drinking water in any location downriver is not at risk. The proposed facility is designed to contain contamination and protect the surrounding environment. And CNL must prove that is happening. CNL conducts and annually reports on the results of its extensive environmental monitoring program, which has been in place for over 60 years. Environmental monitoring occurs at over 400 sampling locations with CNL collecting on average 5,000 samples annually and over 40,000 unique analyses. CNL posts environmental monitoring results on its website every year.

This environmental monitoring program will be expanded to include specific monitoring related to the NSDF project.

### 8. **As you fill the NSDF with waste, parts of it will be open to the environment, is this safe?**

Yes, it is safe. The NSDF will have one cell (ten total) uncovered as it is being filled with waste. Exposure to the elements will be minimized and monitored. Any water that does enter the facility will be captured and treated in a purpose-built wastewater treatment plant. The water released following treatment will not pose a human or environmental risk.

### 9. **What will happen when you close the facility, will it be abandoned?**

The NSDF site will not be abandoned in the years following closure. It will remain under institutional controls and supervision for hundreds of years. This includes an extensive surveillance and monitoring program to ensure the facilities are performing as designed. Should any issues arise during that period, CNL will be in a position to address them. For NSDF, this is a practical consideration for planning such a facility at the Chalk River site.

## NSDF Project Q & A

### 10. **How will the NSDF withstand natural events like an earthquake or a tornado?**

The NSDF has been designed to withstand extreme weather and events such as earthquakes, tornadoes, forest fires, sabotage and major storms. The base of the facility is located approximately 50 metres above the Ottawa River, much higher than any flood waters that might occur.

### 11. **How can I have a say in this project?**

CNL has conducted more than 100 engagement activities with the public, including individual community members, government and environmental groups to share information and gain feedback on the project. Activities included public information sessions, presentations, meetings, community events, open houses and more recently virtual events. We want to make sure that the project is well understood by the public and that they have the opportunity to share with us their concerns and comments. Further to that, we listen. We have adapted our plans based on feedback we have heard from the public and Indigenous communities.

### 12. **What about Indigenous communities? How are you ensuring their rights are protected?**

We are working very closely with Indigenous peoples to ensure Indigenous rights and interests are represented and valued species are appropriately protected. CNL has engaged more than 200 times with sixteen identified Indigenous communities, including the Algonquins of Pikwakanagan First Nation, Algonquins of Ontario and Métis Nation of Ontario. The environmental assessment will consider Indigenous peoples' potential or established Indigenous or treaty rights pursuant to section 35 of the Constitution Act, 1982.

### 13. **What is happening with the Environmental Impact Statement for the NSDF?**

CNL submitted a draft Environment Impact Statement (EIS) for the NSDF project in 2017. CNL responded to over 600 comments and requests for information and re-submitted the EIS in late 2019. While the Federal Provincial Review Team found that CNL had responded adequately to the majority of information requests, more information to satisfy requirements for Indigenous engagement has been requested. It is expected that CNSC Commission hearings for the NSDF will begin in 2022.

### 14. **Why has this project taken so long to get started?**

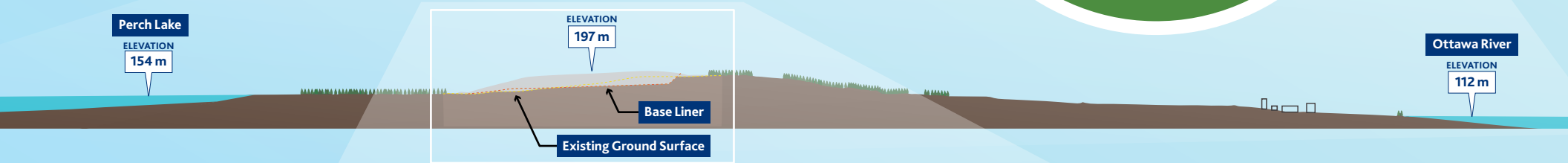
CNL has taken time to carefully address comments and requests for information received from the public, government agencies, Indigenous groups and various regulatory bodies following the submission of the EIS for the project. This process takes time to do thoroughly, to get it right. This delay is not unusual for a project of this unique nature, it was anticipated. CNL is taking the time necessary, with oversight from the CNSC, to clearly demonstrate that we have the best design possible to protect the environment and people.



# Near Surface Disposal Facility

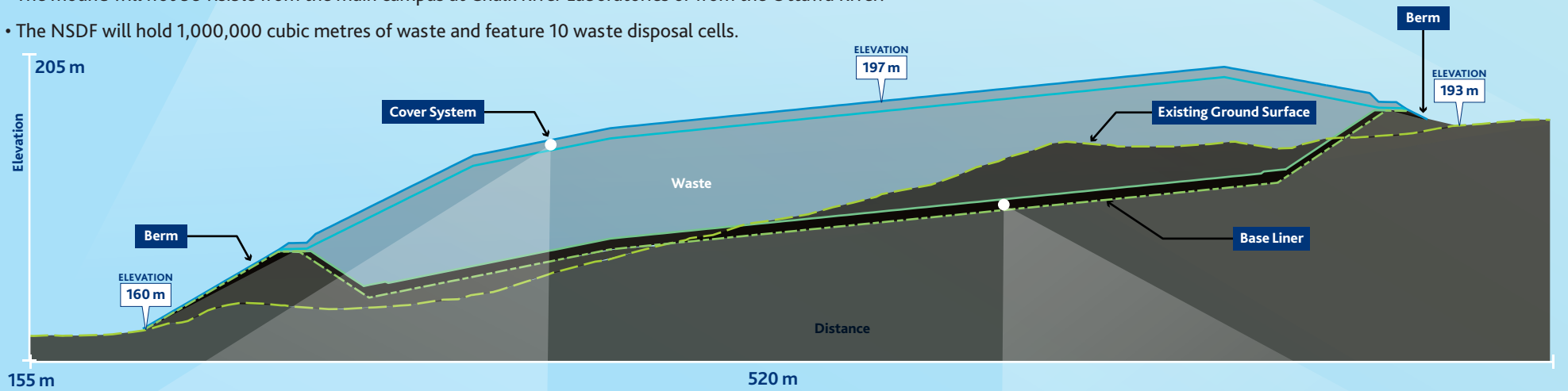
## NSDF Elevation & Location

- The NSDF will be an Engineered Containment Mound (ECM) built at the Chalk River Laboratories site to safely dispose of low level radioactive waste.
- The centre of the ECM is ~1.2km from the Ottawa River.
- The top of the ECM is ~90m above the Ottawa River and is sloped towards Perch Lake.



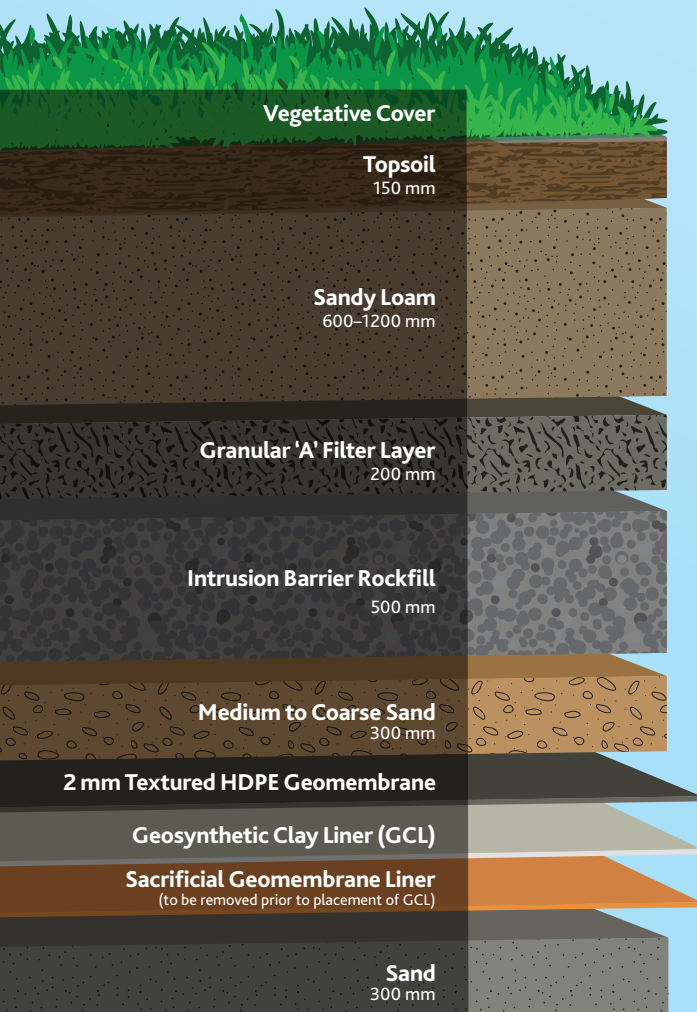
## Engineered Containment Mound

- The ECM will resemble a grassy outcrop built into an existing hillside and will occupy a 16-hectare footprint on the 4,000 hectare Chalk River Laboratories site.
- The mound will not be visible from the main campus at Chalk River Laboratories or from the Ottawa River.
- The NSDF will hold 1,000,000 cubic metres of waste and feature 10 waste disposal cells.



## Cover and base liner systems

### COVER SYSTEM CROSS SECTION

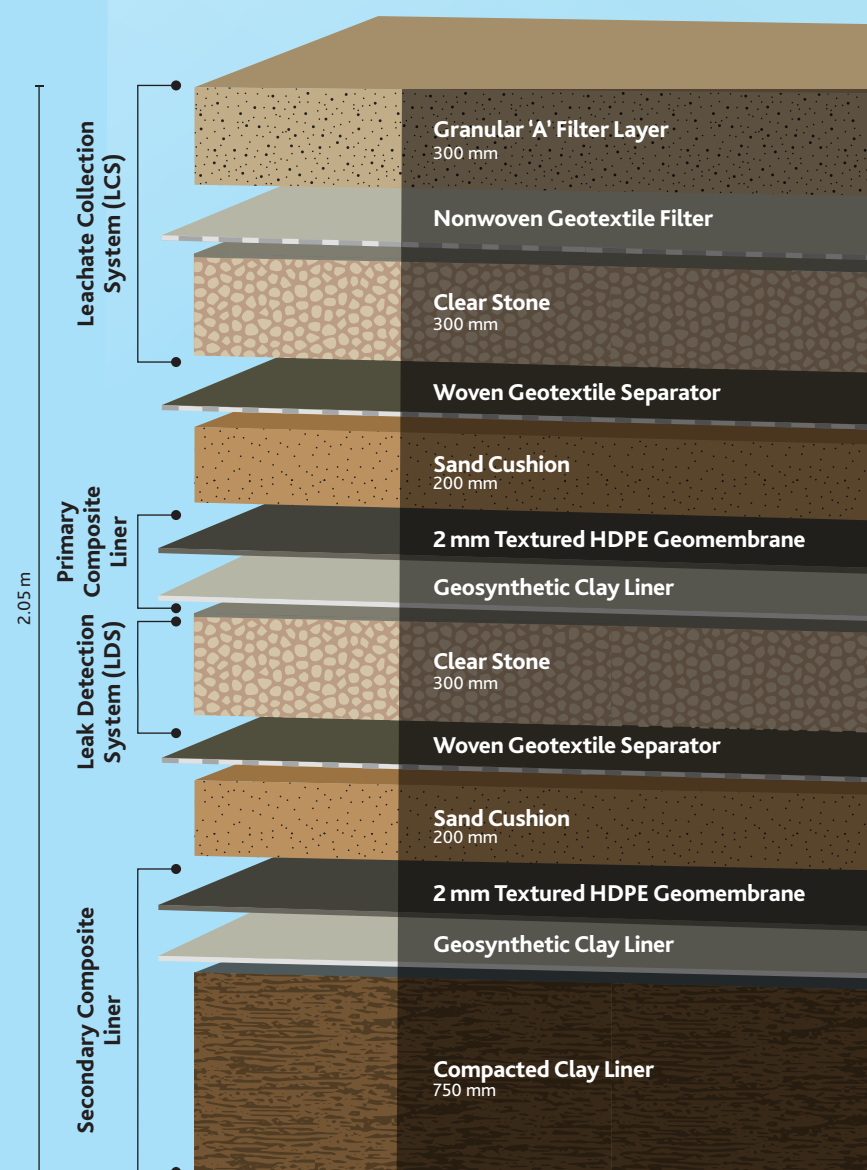


### DEFENCE IN DEPTH

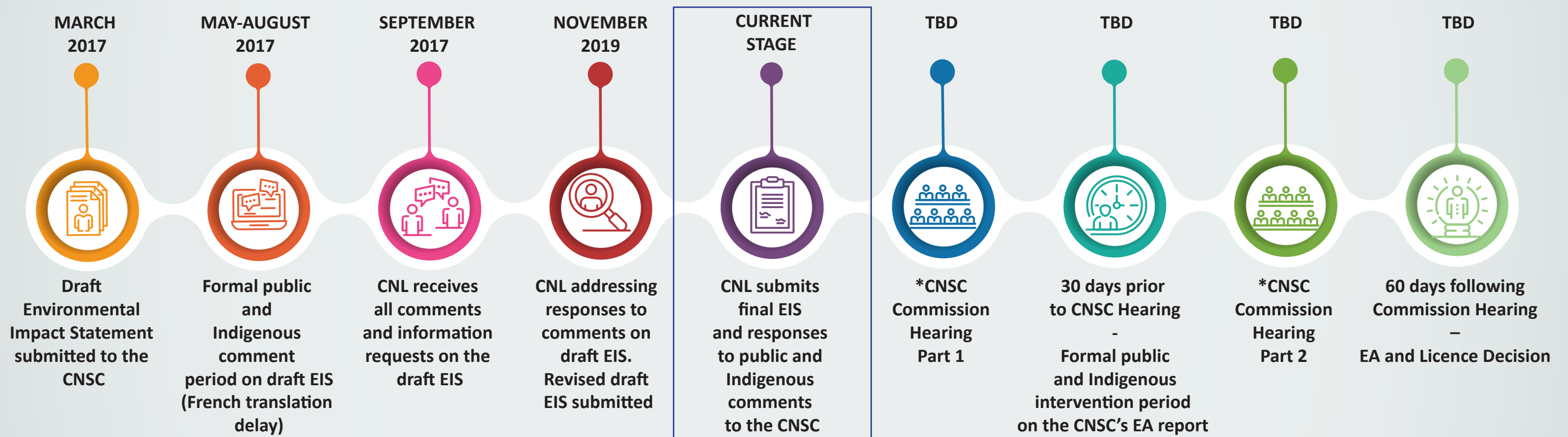
There will be multiple engineered barriers to enhance the safety & reliability of the NSDF.

- A complex cover system to protect against erosion, provide drainage and prevent intrusion of plant roots and burrowing animals.
- A double composite base liner system with primary & secondary liners that will fully encapsulate the waste and restrict the movement of water, precluding the release of contaminants to the environment.
- A leachate collection system to collect and convey leachate generated in the ECM to the Waste Water Treatment Plant.
- A leak detection system to ensure the primary composite liner is functioning as designed.
- Performance monitoring systems to confirm the integrity and effectiveness of the wastewater treatment process and to enable repairs.
- Environmental monitoring systems (ground, surface, water, air) to verify compliance for at least 100 years following the end of operation.

### BASE LINER SYSTEM CROSS SECTION



# Near Surface Disposal Facility Regulatory Timeline



*\*The Commission hearing dates will be determined by the CNSC Secretariat. Please refer to the CNSC website for further information on participating in public hearings at <http://nuclearsafety.gc.ca/eng/the-commission/hearings/participate/index.cfm>.*