



# **STRAY VOLTAGE WORKING GROUP**

RECOMMENDATIONS TO THE GOVERNMENT OF ONTARIO

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APRIL 2022

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# Executive Summary

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This report has been developed by the Stray Voltage Working Group (SVWG). The SVWG's task was to examine the issue of stray voltage and its effects on Ontario's farming community, and to provide recommendations to the Government of Ontario for developing best practices to protect people and livestock. In response to the concerns raised by the farming community regarding stray voltage, the Ontario Legislature carried a motion on May 3, 2021, to "create a working group to examine the issue of ground current and to provide recommendations about developing best practices in order to protect people and livestock from stray voltage."

Stray voltage is a phenomenon which can occur as a result of the way the electricity distribution system is designed and operated. Animals can be highly

sensitive to the effects of stray voltage and can experience tingling sensations when exposed, which may affect the behaviour and health of livestock.

The SVWG identified three key themes that must be addressed: the need for greater communication and information sharing; a need for more action to reduce the likelihood and frequency of stray voltage; and new processes to identify, address and contain stray voltage when it occurs. The SVWG stresses the need for the government to respond clearly and immediately and implement the recommendations in this report.

## Background

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### I. Stray Voltage Overview

Stray voltage exists when two objects have an unexpected difference in electrical potential between them. It may be present between two conductive surfaces that can allow unwanted current to flow through an animal that comes in contact with these surfaces. Examples of conductive surfaces include metal stabling, milk pipelines, water bowls and troughs.

This report focuses on those instances of stray voltage that are caused by human activity, including electricity distribution and the purposeful grounding of electricity systems. Grounding electricity service

provides a route for excess electricity to enter the earth. However, it can also create a voltage that, in the right conditions, can cause current to flow through the earth and then through a body. Unintentional stray voltage can be caused by either on-the-farm or off-the-farm sources. On-the-farm causes can include insulation failure, electrical fence operation, and neutral wire and ground wire connections in more than one location. Off-the-farm sources can include phase unbalances and inadequate grounding.

Animals can be highly sensitive to the effects of stray voltage. Even at low voltages, animals can experience tingling sensations that may affect their behaviour and health.

## II. Impact on Farming Community

The impacts of stray voltage on farmers are a barrier to maintaining production levels and herd health. The SVWG heard about struggles faced by the farming community when their farm is impacted by this issue. They include:

- Animal health effects – Stray voltage can affect all animals. Symptoms observed by Ontario’s dairy farmers with their cows, as an example, include nervousness, uneven milk production, increases in inflammation and/or infection of the mammary gland, a reluctance to drink water and consume feed. Members of the SVWG reported cases where cows became sterile or died.;
- Reduced income – reduced production rates have resulted in farmers losing income. This decrease in revenue can also prevent farmers from investing in improvements to livestock quality of life. Reduction in the quality of milk can result in dairy producers having their license revoked and ultimately being unable to sell their product; and
- Emotional impact – farmers care deeply about the welfare of their animals. When something negatively affects their animals, it also affects farmers and their families. The significant emotional stress has caused some farmers to conclude there is no path to prosperous dairy production and they exit the industry.

## III. Regulatory Oversight and Available Resources

The Ontario Energy Board (OEB) is the province’s independent regulator of the electricity sector. It is responsible for setting electricity rates and protecting the interests of electricity consumers. The OEB’s Distribution System Code (DSC) contains many of the rules that Local Distribution Companies (LDCs) must follow in serving their customers. Through the DSC’s Appendix H (Farm Stray Voltage Distributor Investigation Procedure), the OEB requires LDCs to investigate where a livestock farm customer provides the distributor with information that reasonably indicates that farm stray voltage may be adversely affecting the operation of the customer’s farm. The LDC is required to mitigate their stray voltage contribution if the animal contact current exceeds 2.0 milliamperes or animal contact voltage exceeds 1.0 volt.

The Electrical Safety Authority (ESA) regulates, promotes, and improves electrical safety for the well-being of Ontarians. The ESA has an interest in the management of farm stray voltage from a public safety perspective and has regulatory oversight for both the safety requirements of local distribution companies and the safety of on-farm installations. The ESA has a guide that provides farmers with basic troubleshooting of on-farm stray voltage issues. The guide aims to help farmers identify and mitigate the customer contribution to stray voltage.

Hydro One Networks is the primary but not exclusive electricity distributor to farms in Ontario. In response to customer concerns about stray voltage, Hydro One Networks established a Farm Rapid Response Team to raise awareness and help farmers identify, assess and mitigate stray voltage problems on livestock farms throughout Ontario. This specialized approach better serves the needs of the farming community and provides farming customers a single point of contact to manage their specific on-farm concerns.

## IV. Development of the Stray Voltage Working Group

On May 3, 2021, the Ontario Legislature carried a motion to “create a working group to examine the issue of ground current and to provide recommendations about developing best practices in order to protect people and livestock from stray voltage.”

As a result, the Ministry of Energy convened the SVWG, consisting of members of the Ontario farming community and key stakeholders from across the electricity sector, including:

- Electrical Safety Authority
- Ontario Energy Board
- Hydro One Networks
- Electricity Distributors Association
- Electrical Contractors Association of Ontario
- Ontario Federation of Agriculture
- Christian Farmers Federation of Ontario
- Dairy Farmers of Ontario

Observing member organizations included the Ministry of Government and Consumer Services and the Ministry of Agriculture, Food and Rural Affairs.

The purpose and objectives of the SVWG were to discuss the issue of stray voltage from the perspective of both customers and electricity distribution professionals, as well as to inform the government of opportunities to help Ontarians identify resources to help address stray voltage. The SVWG met five times from October 2021 to April 2022. Presentations were provided to the SVWG from the OEB, the ESA, Hydro One and the farming community, including the veterinarian perspective. These presentations provided an overview of the standards and current practices for tackling stray voltage and direct insight into the customers’ experience in dealing with the issue.

Based on the comments from the working group, an issues list was circulated in early 2022 to the SVWG for input to solicit feedback on the wording and content of the recommendations for this report.

## V. Findings of the Stray Voltage Working Group

Through the consultation process and written responses, the SVWG heard that despite existing regulatory frameworks and resources, stray voltage continues to impact farmers. Ontario’s farmers may struggle to identify stray voltage on their farm and be unaware of the resources available to them. When issues are identified, farmers can be caught between different areas of jurisdiction as they try to determine the source of the voltage and who is responsible for addressing the issue. Farmers may not have access to experienced professionals who can address and contain stray voltage arising from on-farm resources. This disjointed and segregated approach has resulted in some farmers being unable to resolve stray voltage issues, while the health of their animals and their livelihoods are affected. As farming operations continue to become more sophisticated and automated, there is an increasing disconnect between existing rules and what is currently happening on the farm.

As a result of these experiences, the SVWG identified several broad themes that the government should address:

- The need for communication and an education strategy to reach all of Ontario’s farmers;
- Prioritizing animal welfare;
- Taking action to prevent stray voltage before it occurs;
- Ensuring a co-ordinated approach across the electricity sector to prevent or contain stray voltage when it occurs; and
- A review of current standards and procedures to ensure they reflect the requirements of future demands on the electricity grid and the future demands of farms.

The SVWG calls on the government to act quickly on these themes by implementing the recommendations below.

# Stray Voltage Working Group Recommendations

The SVWG developed a list of 10 comprehensive recommendations to the Government of Ontario for developing best practices to protect people and livestock from stray voltage. These recommendations are summarized below:

<b>Communication and Information Sharing</b>	
<b>1</b>	The SVWG recommends that the government and the sector develop a communications strategy for how information on stray voltage resources can be distributed to reach all farmers, including the participation of marketing boards and community associations.
<b>2</b>	The SVWG recommends that the government and its agencies ensure that documentation and advice on stray voltage include the health and safety of animals as a desired outcome. The participation of veterinarians must be considered in developing all stray voltage guidance, and veterinarians must be provided with information on the operation of electricity systems and the possible adverse effects on animal health.
<b>3</b>	The SVWG recommends that the Government ensure that the education and training of new and existing electrical contractors includes information about how to detect, address, and contain stray voltage.
<b>Reducing Likelihood and Frequency of Stray Voltage</b>	
<b>4</b>	The SVWG recommends that the Government or its agencies provide financial assistance for stray voltage issues, including: <ol style="list-style-type: none"><li>Promoting research and innovation in addressing stray voltage issues;</li><li>The development of general guidance to explore innovative solutions; and,</li><li>Education for electricians/inspectors.</li></ol>
<b>5</b>	The SVWG recommends, in areas where the existence of or potential for stray voltage has been identified, that local distribution companies prioritize identifying and implementing actions that ensure utility contributions to stray voltage are contained. These actions could include upgrading utility equipment and/or implementing customer-side solutions, as appropriate. The SVWG further recommends that the Government make financial support available where such support could help avoid more costly ratepayer-funded investments.

6	The SVWG recommends that the Government review their various codes, rules and standards to ensure they, where appropriate, include measures to prevent and contain stray voltage that originates from customer-owned electrical equipment. The SVWG further recommends that the Government of Ontario call on the Government of Canada to conduct the same review.
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## Identifying and Addressing Instances of Stray Voltage

7	The SVWG recommends that Government or its agencies enhance standard stray voltage testing protocols for all specialized electrical contractors to follow when performing farm stray voltage troubleshooting or testing. The SVWG further recommends that this protocol be based on current research, expert review, and options for testing for stray voltage in different areas and different surfaces on a farm.
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8	The SVWG recommends that the Ontario Energy Board conduct a full review of Appendix H to the Distribution System Code to ensure it meets the realities of the modern farm and the health of animals. This review needs to include any new testing protocols and compliance mechanisms.
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9	<p>The SVWG recommends that the Government or its agencies establish a formalized escalation protocol to be followed when an instance of stray voltage is identified or suspected, regardless of where on the farm the issue occurs. This protocol needs to:</p> <ol style="list-style-type: none"> <li>a. Provide easy communication options for farmers, operating through a “one window” approach where it is not left to the farmer to contact and co-ordinate multiple parties;</li> <li>b. Encourage “one visit,” calling on local distribution companies and electrical contractors to work together to inspect the farm at the same time;</li> <li>c. Engage existing resources and experts (e.g., Hydro One’s Farm Rapid Response Team, the Electrical Safety Authority, contractors) on both sides of the utility demarcation point with new processes that foster collaboration across all relevant parties to identify the source of the issue and steps for mitigation;</li> <li>d. Encourage collaboration and the sharing of best practices/lessons learned among these parties;</li> <li>e. Include a provision for the participation of a neutral third party who could mitigate disagreements between electrical professionals on the source of stray voltage;</li> <li>f. Provide opportunities for farmers to have their facilities inspected more frequently by an electrical contractor prior to stray voltage issues arising; and</li> <li>g. Develop a centralized and dedicated team of professionals/resources that would assist farmers and investigate persistent instances of stray voltage where either the measured level is below the threshold (of animal contact current of 2.0 milliamperes and animal contact voltage of one volt) or ongoing efforts at mitigation have not been effective.</li> </ol>
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## Actioning Recommendations

10	The SVWG recommends that the Government respond to this report and its recommendations before the end of 2022.
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# Conclusion

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The OEB notes that it acknowledges and supports the discussions of the SVWG. If requested by the government, the OEB would seek to further the recommendations in this report in a manner consistent with its objectives and its role as the sector's independent regulator.

The impacts and symptoms resulting from stray voltage on Ontario farmers have been identified for decades. Despite the work of farmers, contractors

and the electricity sector, there are still barriers to addressing stray voltage on farms. Through its work, the SVWG has identified several actions that the government and the sector must take to address these barriers. Implementing these recommendations will support the health and safety of farm animals, protect the livelihood and emotional well-being of farmers and their families, reduce red tape, and ensure a more prosperous farming community for Ontario.