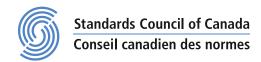






Erosion and sedimentation management for northern community infrastructure





Legal Notice for Standards

Canadian Standards Association (operating as "CSA Group") develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document's fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party's intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document's compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group's and/or others' intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



Standards Update Service

CSA W205:19 November 2019

Title: Erosion and sedimentation management for northern community infrastructure

To register for e-mail notification about any updates to this publication

- go to store.csagroup.org
- click on Product Updates

The List ID that you will need to register for updates to this publication is 2427431.

If you require assistance, please e-mail techsupport@csagroup.org or call 416-747-2233.

Visit CSA Group's policy on privacy at www.csagroup.org/legal to find out how we protect your personal information.

Canadian Standards Association (operating as "CSA Group"), under whose auspices this National Standard has been produced, was chartered in 1919 and accredited by the Standards Council of Canada to the National Standards system in 1973. It is a not-for-profit, nonstatutory, voluntary membership association engaged in standards development and certification activities.

CSA Group standards reflect a national consensus of producers and users — including manufacturers, consumers, retailers, unions and professional organizations, and governmental agencies. The standards are used widely by industry and commerce and often adopted by municipal, provincial, and federal governments in their regulations, particularly in the fields of health, safety, building and construction, and the environment.

Individuals, companies, and associations across Canada indicate their support for CSA Group's standards development by volunteering their time and skills to Committee work and supporting CSA Group's objectives through sustaining memberships. The more than 7000 committee volunteers and the 2000 sustaining memberships together form CSA Group's total membership from which its Directors are chosen. Sustaining memberships represent a major source of income for CSA Group's standards development activities.

CSA Group offers certification and testing services in support of and as an extension to its standards development activities. To ensure the integrity of its certification process, CSA Group regularly and continually audits and inspects products that bear the CSA Group Mark.

In addition to its head office and laboratory complex in Toronto, CSA Group has regional branch offices in major centres across Canada and inspection and testing agencies in eight countries. Since 1919, CSA Group has developed the necessary expertise to meet its corporate mission: CSA Group is an independent service organization whose mission is to provide an open and effective forum for activities facilitating the exchange of goods and services through the use of standards, certification and related services to meet national and international needs.

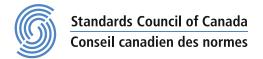
For further information on CSA Group services, write to CSA Group 178 Rexdale Boulevard Toronto, Ontario, M9W 1R3 Canada A National Standard of Canada is a standard developed by a Standards Council of Canada (SCC) accredited Standards Development Organization, in compliance with requirements and guidance set out by SCC. More information on National Standards of Canada can be found at www.scc.ca.

SCC is a Crown corporation within the portfolio of Innovation, Science and Economic Development (ISED) Canada. With the goal of enhancing Canada's economic competitiveness and social wellbeing, SCC leads and facilitates the development and use of national and international standards. SCC also coordinates Canadian participation in standards development, and identifies strategies to advance Canadian standardization efforts.

Accreditation services are provided by SCC to various customers, including product certifiers, testing laboratories, and standards development organizations. A list of SCC programs and accredited bodies is publicly available at www.scc.ca.

Standards Council of Canada 600-55 Metcalfe Street Ottawa, Ontario, K1P 6L5 Canada





Cette Norme Nationale du Canada est disponible en versions française et anglaise.

Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users to judge its suitability for their particular purpose.

 $^{\$}$ A trademark of the Canadian Standards Association, operating as "CSA Group"

National Standard of Canada

CSA W205:19

Erosion and sedimentation management for northern community infrastructure



*A trademark of the Canadian Standards Association, operating as "CSA Group"



Published in November 2019 by CSA Group A not-for-profit private sector organization 178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

To purchase standards and related publications, visit our Online Store at store.csagroup.org or call toll-free 1-800-463-6727 or 416-747-4044.

ICS 93.010 ISBN 978-1-4883-2368-3

© 2019 Canadian Standards Association All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

This is a preview. Click here to purchase the full publication.

Contents

Technica	al Committee on Northern Water and Waste 4
Subcom	mittee on Erosion Protection 6
Preface	7
0 Intro 0.1 0.2	Plain language summary 8 General 9
1 Scop 1.1 1.2 1.3 1.3.1 1.3.2 1.4	General 10 Users 10 Application 11
	rence publications 12
	nitions and abbreviations 17
4 Risk 4.1	assessment 26 General 26
4.1	Procedures for assessing infrastructure risk 26
4.2	
4.3	Identifying infrastructure characteristics 27 Identifying drivers of erosion and sedimentation hazards 27
4.4.1	Coastal and lakeshore environments 27
4.4.1	Open-channel environments 30
4.4.3	Terrestrial environments 33
4.5	Assessing probability of hazard occurrence 36
4.6	Assessing the consequences of the damage 36
4.6.1	Vulnerability of infrastructure 36
4.6.2	Potential changes impacting future vulnerability 36
4.7	Impact of hazards 37
4.8	Risk prioritization 37
4.9	Land use planning 37
5 Buffe	er zones, setbacks, and siting 37
5.1	General 37
5.2	Buffer zones and setback implementation 38
5.3	Siting 38
6 Eros	ion and sedimentation management for coastal and lakeshore environments 39 General 39
6.2	Site-specific evaluation and risk assessment 39
6.3	Planning and design 41
5.5	Training and acagn 71

6.3.1	General 41
6.3.2	Strategies to address coastal and lakeshore erosion and sedimentation 41
6.4	Structural measures 42
6.4.1	Implications of choices in structural measures 42
6.4.2	Typical structural measures 43
	·"
7 Eros	sion and sedimentation management for open-channel environments 44
7.1	General 44
7.1.1	Background and objectives 44
7.1.2	Creating an ESCP 45
7.2	Site-specific evaluation and risk assessment 45
7.2.1	Site-specific evaluation 45
7.2.2	Qualitative risk assessment 46
7.3	Planning and design 46
7.3.1	General 46
7.3.2	Strategies to address erosion and sedimentation in open-channel environments 46
7.4	Structural measures 47
	sion and sedimentation management for terrestrial environments 49
8.1	General 49
8.2	Site-specific evaluation and risk assessment 49
8.3	Planning and design 50
8.3.1	General 50
8.3.2	Strategies to address erosion and sedimentation in terrestrial environments 51
8.4	Structural measures 52
9 Best	t practices for managing erosion and sedimentation 53
9.1	General 53
9.2	Erosion and sediment control plans 53
9.3	Environmental considerations 54
9.4	Site management 55
9.4.1	Site access planning 55
9.4.2	Site access 55
9.4.3	Site grading 56
9.4.4	Stockpiles and trenching 56
9.5	Erosion control measures 57
9.5.1	General 57
9.5.2	Thermal and physical erosion 57
9.5.3	Mitigating soil loss during construction 58
9.6	Sedimentation control measures 61
9.6.1	General 61
9.6.2	Protecting stormwater infrastructure and receiving streams against sedimentation 62
9.7	Mitigating air pollution 63
9.7.1	General 63
9.7.2	Dust control and retaining eroded materials on-site 63
9.7.3	Other best management practices 64
-	
10 Ins	pections, monitoring, and ESC measure maintenance 64
10.1	General 64

10.2 Inspection and monitoring plans 65 10.3 Inspection and monitoring during winter months 65 10.4 ESC measure inspections 65 10.5 ESC measure monitoring 66 10.6 Environmental inspections 66 10.7 Environmental monitoring 66 10.8 Documentation and communication 67 10.8.1 Documentation requirements 67 10.8.2 Communication protocol 67 10.9 Selecting a maintenance response 68		
11 Adaptive management 68		
11.1 General <i>68</i>		
11.2 Approaches to adaptive management 69		
 12 Responsibilities of the ESC coordinator 69 13 Emergency response and contingency planning 70 		
14 Community-based processes for addressing erosion and sedimentation impacts to		
infrastructure 71 14.1 General 71		
14.1 General 71 14.2 Encouraging community involvement 72		
14.3 Framework for community processes 72		
14.5 Traniework for community processes 72		
Annex A (informative) — Background information on permafrost 73 Annex B (informative) — Role of the ESC coordinator 82 Annex C (informative) — Design and construction of ESC measures and best management practices 84		
Annex D (informative) — Approaches to adaptive management 89		
Annex E (informative) — Glossary of translated terms 92		
Annex F (informative) — Additional reference publications 96		

Technical Committee on Northern Water and Waste

J. Arsenault Government of the Northwest Territories,

Yellowknife, Northwest Territories, Canada

Category: Regulatory Authority

R. G. Campbell Town of Inuvik,

Inuvik, Northwest Territories, Canada Category: Owner/Operator/Producer

J. Hazenberg Government of the Northwest Territories,

Yellowknife, Northwest Territories, Canada

Category: Regulatory Authority

R. Jamieson Dalhousie University,

Halifax, Nova Scotia, Canada Category: General Interest

K. R. Johnson AECOM Canada Ltd.,

Edmonton, Alberta, Canada Category: General Interest

R. Kors-Olthof Arnica Consultants,

Golden, British Columbia, Canada

Category: General Interest

J. Lywood PlusArctic,

Halifax, Nova Scotia, Canada Category: General Interest

E. Murphy National Research Council of Canada,

Ottawa, Ontario, Canada Category: General Interest

H. Scott Mackenzie Valley Land and Water Board,

Yellowknife, Northwest Territories, Canada

Category: Regulatory Authority

W. Westwell Government of Nunavut Department of Community

and Government Services, Iqaluit, Nunavut, Canada

Category: Owner/Operator/Producer

M. Pinatton CSA Group,

Toronto, Ontario, Canada

Project Manager