IMPROVING COMMUNITY DRAINAGE

CATCHMENT AREA

ROADS

CREEKS

BUILDINGS

DITCHES

DECLINE

DECLINE

INCLINE

CULVERTS

MAP OUT YOUR COMMUNITY:

FOLLOW NATURE'S LEAD WHEN DESIGNING YOUR GRAVITY ASSISTED DRAINAGE PLAN.

WATER SHOULD FLOW AWAY FROM BUILDINGS AND COMMUNITY ASSETS.

GOOD DRAINAGE

INCLUDES WETLANDS AND WATER STORAGE

MIMICS NATURE

CARRIES AWAY WATER IN THE HEAVIEST STORMS

REDUCES EROSION

DRAINS BY GRAVITY

ALLOWS FOR FISH PASSAGE

INDICATORS OF POOR DRAINAGE

STAGNANT WATER

SNOW ISN'T MANAGED WELL

CULVERTS ARE BLOCKED

DITCHES AREN'T MAINTAINED

CONSEQUENCES OF STANDING WATER



A HAZARD TO HEALTH AND INFRASTRUCTURE!

MAINTENANCE SCHEDULE

WINTER

Monitor snow levels

Transport snow to an area where it won't be an issue during spring melt

SPRING

Busiest season due to snow and ice melt and still-frozen ground

Thaw culverts and clear snow

Identify areas of poor drainage

Fix immediate issues

Plan repairs for summer and fall

SUMMER

Make needed repairs

Install erosion control

Monitor ditches and culverts for problem areas

Trim overgrown vegetation

FALL

Usually the lowest water levels of the year

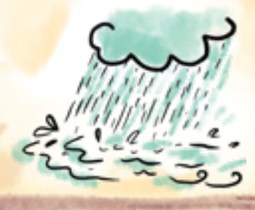
Best time to do repairs or replacements

CULVERTS ARE KEY TO GOOD DRAINAGE.

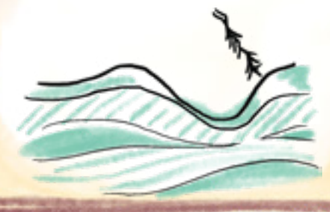
THEY HELP PREVENT ROAD AND DRIVEWAY WASHOUTS.

CLIMATE CHANGE IS INCREASING DRAINAGE CHALLENGES

MORE INTENSE RAIN, MORE OFTEN



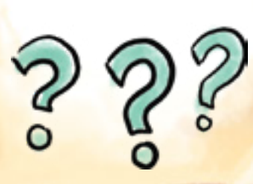
PERMAFROST THAW



MORE FREEZE/ THAW EVENTS



UNPREDICTABLE WEATHER



HAVE A STRONG DRAINAGE PLAN IN PLACE TO BE PREPARED FOR THE CHANGING CLIMATE

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Relations Couronne-Autochtones et Affaires du Nord Canada



This is a user-friendly outline of CAN/CSA S503-15 Community drainage system planning, design, and maintenance in northern communities.

Together with climate change, our long winters, short springs, and frozen ground can create complex issues with surface drainage. This guide will help you develop an effective drainage plan for your community.

Ecology North adapted this guide for use by community administrators, building and land owners, asset managers, regulators, and policy makers across the north.



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Ecology North is a charitable organization, founded in 1971 to support sound environmental decision-making on an individual, community, and regional level.

Contact us or visit our website for information and other guides in this series.

Poster on the inside

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COMMUNITY DRAINAGE

Moving water safely and efficiently through the community

The purpose of a drainage system is to collect surface water and move it away from buildings, roads, and other community infrastructure. The goal is to minimize impacts from flooding, washouts, slides, and other drainage problems.

A GOOD DRAINAGE PLAN WILL:

- Outline the flow path water should take
- Work with natural drainage where possible
- Identify current drainage structures
- Protect important community infrastructure

Use the drainage plan to help decide where to put new infrastructure and how to build it.



EROSION CONTROL

Water is powerful

Erosion happens when water (or wind) moves soil and other surface materials from one place to another. Erosion depends on the type of soil, the amount of water (or wind), and how fast it is moving.

Flowing water can have a lot of force. It can undercut roads, bridges, and buildings.

Erosion control techniques can help absorb the force of water and control erosion. These methods help reduce problems before flooding happens.



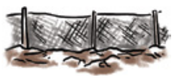
Vegetation: grass and bushes slow water flow.



Riprap: loose stone below culverts, foundations, or steep ditches that dispel the force of water.



Sediment traps: a basin-like area that holds water short term, so sediment can settle.



Silt curtains: a short-term barrier that traps sediment.

CLIMATE CHANGE

Huge impacts on surface water

With climate change, weather is less stable. Extreme rain/weather events are more common. These events can create huge and costly problems with drainage.

SOME EFFECTS OF CLIMATE CHANGE:

- Faster melting in spring
- More intense precipitation, more often
- Unexpected rain
- Rain in winter
- Warming and degrading permafrost
- Erosion, slumping, and landslides

Consider climate forecasts when you plan new drainage structures or maintain old ones. Be prepared for the unexpected, and be proactive with maintenance.



POOR DRAINAGE

Things to watch for

SIGNS OF PROBLEMS:

- Standing water
- Flooding
- Overland flow
- Damaged, plugged, or frozen culverts
- Ground sinking or eroding

Record this information. Fix issues immediately if possible, otherwise schedule maintenance in low-water periods in the summer and fall before they become serious.

Poor or slow drainage can create hazards for community infrastructure and human health.

STANDING WATER

- Promotes permafrost thaw
- Is a breeding ground for mosquitoes
- Can be a safety hazard for children
- Promotes waterborne odours
- Can contribute to flooding

UNDERSTANDING DRAINAGE

Collect info for your drainage plan

USE DIFFERENT SOURCES:

- Local and traditional knowledge
- Topographic data
- Legal land surveys
- Engineering reports
- Subsurface geotechnical studies
- Aerial/satellite imagery

GATHER INFORMATION ON:

Water sources, **flow paths** through the community, where water ends up.

Current **drainage structures**, such as ditches, berms, and culverts.

Natural drainage features, like streams, ponds, lakes, and rivers.

Community **infrastructure**, such as roads and buildings.

Places to protect, such as the airport, health station, water treatment and power plants, and key roads.

Background information on the geology, terrain, vegetation, permafrost, climate, and weather data.

REGULAR INSPECTIONS

Keep records

Inspect and list all drainage structures. Note the condition. Do upkeep and repairs or replace them as needed. Check culverts and ditches before, during, and after spring freshet and summer downpours.

CULVERTS

- Location and size
- Condition: shifted, plugged, or damaged

DITCHES

- Standing water
- Erosion
- Too much/not enough vegetation
- Unnatural obstacles

DRAINAGE AND PERMAFROST

Keep permafrost frozen when building drainage infrastructure.

- Ponded water can thaw permafrost
- Avoid building where water is known to pond
- Consider berms instead of ditches
- Disturb the ground as little as possible
- Minimize erosion





SPRING CHALLENGES

- Culverts can thaw and freeze-up again
- Ditches and other drainage structures erode
- Surface water pools and overflows
- Frozen ground can't absorb rain water

THE FOUR SEASONS

Maintaining drainage year-round

WINTER

- Identify areas where snow piles up
- Monitor year after year to record changes
- Pick a good place to pile the snow

SPRING

- Note any issues during peak melt
- Clear snow properly
- Thaw culverts blocked with snow and ice
- Clean debris from drainage pathways
- Identify repairs that need to be done
- Fix any immediate issues

SUMMER

- Inspect ponding in ditches
- Find and trim overgrown vegetation
- Replace or fix culverts as needed
- Flush gravel from culverts (a fire hose works)
- Build walkways through wet areas

FALL

- Check on problem drainage areas
- Maintain, repair, replace as needed

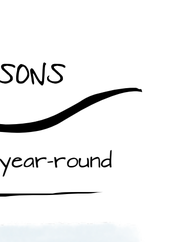
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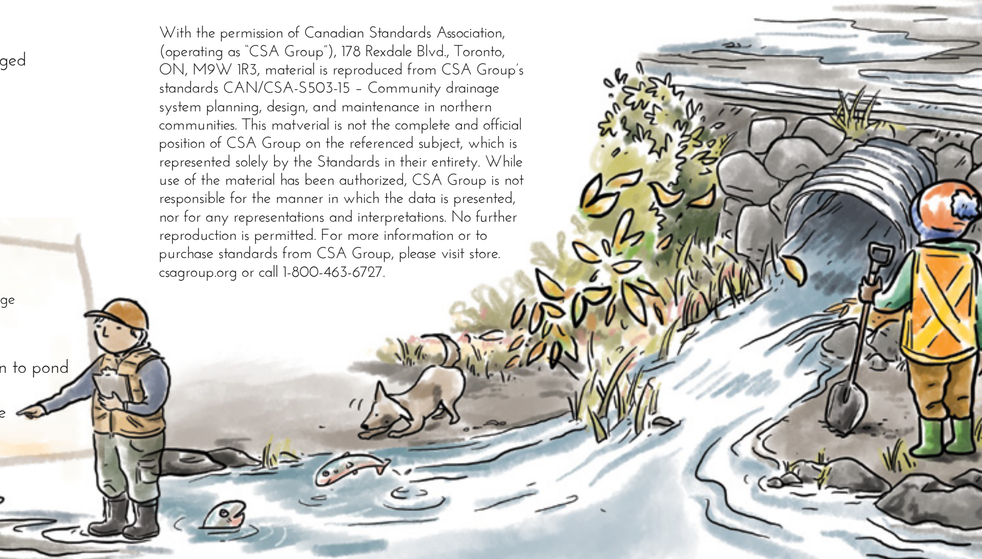
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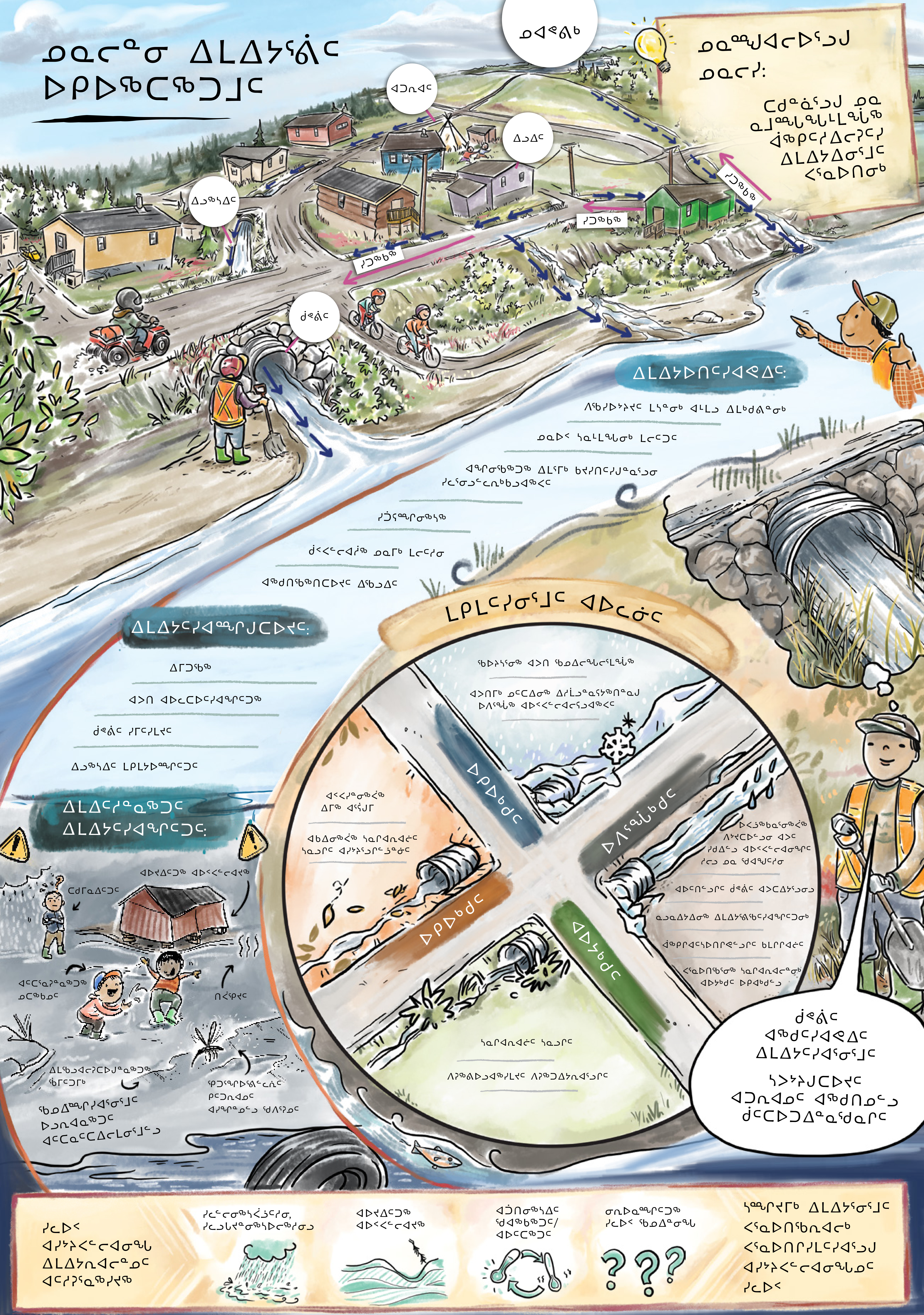
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Ċᵊᓇ ᐊᑐᖏᑐᓂ ᓄᓪᓕᐊᔪᖏᑕᖏᑐᓂ *CAN/CSA S503-F* ᐅᓇᓕᕆᓂ ᑯᕐᓇᑎᓂᖅ ᐊᐅᓚᓂᐅᔪᓂ ᐸᓐᓇᓂ, ᐊᖏᑕᓯᐊᓂᖅ, ᒪᑭᓯᓯᐊᓂᖅ ᐅᑎᖅᑕᖏᑐᓂ.

ᐊᑕᐅᓯᑯᓂᖏᓐᓂᖅᓂ ᓯᓚᐅᑉ ᐊᓯᔾᔨᓴᓕᕐᓂᖅᓄᑦ, ᐅᐱᕐᖓᓂᖅᓄᑦ ᐅᓇᓱᐊᓂᖅ ᓄᓇᕗᒻᒥ ᐅᓇᓱᐊᓂᖅ ᓄᓇᕗᒻᒥ ᐃᓚᖓ ᐊᑐᐃᓐᓇᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑐᑦ ᐃᓚᖓ

IHUAQHAIDJUTIKHAINNIK NUNANI IMMAP QURLUARVIIT

IMAP QURLUARNIANIT KATITIRNIA

APQUTIT

IGLUQPAIT

KUUTIRUT

ITIQHAIT

MIKHIVALLIAJUQ

MIKHIVALLIAJUQ

MIKHIVALLIAJUQ

TURHUAT

NUNAUJALIURLUGU NUNAGIJAT:
MALIKLUGU NUNAP HIVUNIKHAA
PILIURUVIT NUTTUNGNIANUT
IKAJUUTAUJUNIK QURLUAVIIT
UPALUNGAIJAUTIKHANIK.

IMAQ QURLUAQTUKHAQ
IGLUQPANGNIT
NUNALLAANI
PIQUTINILLU.

NAKUUJUT IMMAP QURLUARVIIT

ILAUJUT IMARLAVALUIT IMAQARVIILLU

AADJILIUQTA HILAKPUT NUNAKPUT

IMARMIK QURLUAQTITIVAKTUQ
HILARLUGJUARANGAT

MIKHITIVAKTUQ NUN'NGUVALLIANIANUT

QURLUARVIIT NUTTUKTAUJUT

IQALUIT APQUTIKHANIK

NAUNAITKUTIT NAKUUNGITTUT QURLUARVIIT

NUTQANGAJUQ IMAQ

APUT MUNARITTIAQTAUNGITTUQ

TURHUAT HIMIKHIMAJUT

ITIQHAIT IHUAQHAQTAUNGITTUT

PIDJUTINGIT NUTQANGAJUP IMAP

Takujuminaittuq nakun'ngittuq

Nunap qiqumaninga auktuqpalianinga

Qajangnaqtun nutaqqanun

Mamaittut

Imaukkakpallarutaulajut

Ivaviuvaktun kikturidjanit aallanillu qupilrunit

HIVURANAQTUN AANNIAQTUNUN NAPPAQTIQTAKHANULLU!

MUNARIJAUJUKHANUN NAUNAITKUTIKHAIT

Munarilugit apinniit

Agjarlugit aputit apquutaujuittunut upin'ngami mahaktirnakhikpat

UKIUQ

Mikinikhauvaktut imaqarniit ukiungani

Ihuaqhaivikhaq imaaluuniit himmauhiktukhanik hanavikhaq

UPIN'NGAAQ

Atuqtaulluakpaktun pidjutigiplugit aput hikullu mahaktilirangat kihimi nuna qiqumatitlugu

Aukhirlugit turhuat aputaijarlugillu

Naunaikhilutit nakungittunik qurluarvikhanik

Ihuaqharnariglugit ihuinnirit

Ihuaqhaidjutikhaliurlugi aujami ukiakhamikllu

UKIAQ

AUJAQ

Ihuaqhailuhi ihuaqhaqtakhanik

Munarilugit itikhait turhuallu nakuhuirutaunaklhajut

Iliurailutik hinani imap nuna nungulaitkutikhainnik

Nunap nauvallarniit un'ngavaqtirlugit

TURHUAT NAKUUJUT IMMAP QURLUARVIINNUT.

APQUTIT AKHALUUTIT AULLAVIIT NUN'NGUQHUQTAILIVAGAIT.

HILAUP AALLANGUQTIRNINGANUT AJURNAUTAUJUQ IMMAP QURLUAVIINNUN

NIPALURURJUAJUKHIJURLU, NIPALIQATTAINALIRQTURLU

NUNAP PUVITQUUMANINGA MAHAKTIRNIQ

QIQIRJUAQPALIQTUQ/ AUKTUQPANGNIT QAKUGUN'NGURANGAT

HILA AALLNGUQQATTAINALIQTUQ

NAKUUKPIAKTUMIK QURLUARVIIT UPALUNGAUJAUTIKHANIK IMAALU HANAIQHIMALUTIT HILAUP AALLANGUQTIRNIANUN

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Nunavut

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NUNANI QURLUARVIIT

Aullavikhanik imap ihuaqtumik nunangjjaffingni

Qurluarvikhangit nunap qannganit imaijagvikhainnik ahianit igluqapangnit,apqutinit, aallanitlu nappaqtiqhimajunit. Tikinnahuaqtakhat ikiglitikhanik ihuidjutaujunik imaukkautivaktut, imakpallarnirmit nun'nguhurniit, hituarniit, imaalu aallanik qurluarniinnit ajuqhautit.

IMMAP QURLUARVIIT PARNAUTIKHAT PINIAQTUT:

- Naunairlugit imap qurluarvikhangit
- Havaglutit maliklugit qurluarviqaqqata
- Naunairlugit tadja qurluarviujut hanahimajut
- Pittailiugit anginiqaqtut nunangni nappaqtiqhimajut

Aturlugit qurluarviujut parnautit ikajuutikhat humut nutaanik nappaqtirivikhainnik qanuqtullu hanavikainnik.

Hamna aturuminaqtuq naunaijautikha CAN/CSA S503-15 Nunani qurluavikhanun atuqtaujunun upalungaijautikhanik, qanurinnikhainnik, munaqhidjutikhainiklu ukiuqtaqtumi nunallaani.

Atauttikkut unalu hilaup allanguqtirninga, hivituniit ukiup, hivikittut upin'ngami, imaalu qiqumania nunap ajurnaqhitivaktun ilaani nunap qanngani qurlurvikhainnut. Hamna maliktakhaq ikajuutauniaqtuq ilingnut piliurnirmik ihuaqtunik qurlurvikhanik upalungaijautiliurutikhanik nunangni.

Ecology North ihuaqhaqtaat hamna maliktakhaq atuqtaunikhanik nunani atan'ngujanit, igluqpaqaqtunit nunamiklu nanminiqaqtunit, puqutinik ataniit, malirualiuqtit atugakhaliuqtit tamainni ukiuqtaqtumi.



HILAUP AALLANGUQTIRNINGANUT

Akhut pidjutaujut nunap qangani imamit

Hilaup allanguqtirninganit, hila nalunaqhivaliqtuq. Nipaliqpallajukhijuq/hilakput aallanguqtaliqhunillu. Hapkuat ilangit akittuutirjuakhungujut ajurnaqhitilutiklu qurluarvikhanut.

ILANGIT PIDJUTAUJUTHILAUP AALLANGUQTIRNINGANIT:

- Mahangnariqpaliqhuni upin'ngakhami
- Nipalukhanikpalikhunillu, natatquqattakpalikhunillu, kininnakhivaliqturlu
- Nipalliqpaliqtuq nahuuringnaittumik
- Nipaliqpaliqhuni ukiumi
- Mahaktiqpaliqtuq nun'nguvallialikhunillu nunap puvitquumaninga
- Nunap hina nunguvalliajuq, uvikpalliajuq, imaalu nuna akhaarniq

Ihumagilugithilaup aallanguqtirnia ihumagijaujut upalungaijautikhaliulirutit nutaamik qurluarviit qanurinniit ihuaqhailiruvit uttuqqarnik. Upalungaikhimavaktuhaujutin nahurinnaittunik imaalu ihuarninganun pinahuarlutit ihuaqhaqtakhanun.



KANGIKHILUGIT QURLUARVIIT

Katikhilutit naunaitkutikharnik qurluarvikhanik upalungaijautikhaliuruvit

ATURLUTIT AALLATQIKTUNIK ATUQTAKHANIK:

- Nunangit pitquhirmiklu qaujimajanik
- Nunap qanngata qanuriningaa
- Maligatigut nunat naunaijautingit
- Hanajiujunit unniudjutaiit
- Nunap qulaaniittunik naunaijaidjutit
- Qilangmit/satellite-kut piksaliuqhimajut

KATIKHILUTIT NAUNAITKUTIKHARNIK HAPKUTIGUUNA:

Imakharvikhat, **kuvivagvingit** through the community, where water ends up.

Tadja **qurluarviit qanurinniit**, imaatut ukharjuit, algangniit itiqhait, hapummitjutikhallu, imaalu turhuat.

Qurluarviuvangniit, kuugajaat, tahiqqat, tattit, kuukkallu.

Nunani **nappaqtiqhimajut**, imaittut apqutit igluqpaillu.

Munarijakhatit, hapkuat milviit, munaqhiqarviit, imiqtarvikhanik haluumaqhiviit ukuallu pauwaqarvingit, ukuallu atuqtaulluaqtu apqutit.

Qaujimadjutimut naunaiqhitikhat nunap qanurinniagut, maniqqap hivitunia, nunami nauhimajut, nunap puvitquumaninga, hilap qanurinnia, imaalu hilap qanurinnianik tutquumaviit.



UPIN'NGAAMI AJUQHAUTIT

- Turhuat mahaktiqtut qiqiffaakhutiklu
- Itiqhait aallallu qurluarviit qanurinniit nunguvalliajut
- Nunap qanngani imangnirit imaalu ulipkaaktuq
- Qiqumajumut nunamut nipalungmit imaq iluunmulimaittuq itialimaittuq

HTAMAUJUT HLAM AALLANGURNIT

Munaqhitikhangit qurluarvingnik ukiuraalungmi

UKIUQ

- Naunaijarlugit apiviuvangniit aputtaanguqpangniit
- Munarivaglugit ukiumit ukiumut titirarlugillu aallangurningit
- Pick a good place to pile the snow

UPIN'NGAAQ

- Naunaiqhilutin qanuqtun ajuqhautaujunik mahaktirnahijarangat
- Ihuaqtumik aputaijaivaglutin
- Aukhirlugit turjhuat himikhimajut apunmik hikumiklu
- Haluummaqtiqpaglugit haluummailruvalluit qurluarviujunit tuqhuanitluuniit
- Naunaiqpaklugit ihuaqhaqtaujukhat
- Ihuaqharlugit qilamik ajukhautaujut ihuidjutaujullu

AUJAQ

- Ihivriurlugit imarlavaluit tahiqqat itiqhainni
- Nanilugit nunap nauvallarniit un'ngavaqtirlugit
- Himmauhirlugit ihuaqharlugit turhuat ihuaqharijakhanguqqata
- Hiuraijarlugit ujaraijaglugillu turhuat (qaptirutit turhuangit nakuujun)
- Pihugviliurlutit imaqarniittigun

UKIAQ

- Takuuqattaqpaglugit ajukhautaujut qurluarvikhat
- Munarilugit, ihuaqharlugit, himmauhirlugillu pijariaqaqqata



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Ecology North maniliungittut tiqutaujuq, piliuqtauhimajuq 1971 ikajuutikhanik ihuaqtut avatilirinirmut ihumaliurutikhainnik inungmut, nunamut imaalu avikturniannut.

Hivajarlutata kuluguluunnit qaritaujakkurvikput nauunairumajarnik imaalu aallanik maliktakhanik hapkutiguuna.

Nivingajukhat Taiguagakhat

Titiranguqtiqhimajut atuqtauffaaqhimajunut makpiaanut 2020

ILIURAILUTIK HINANI IMAP NUNA NUNGULAITKUTIKHAINNIK

Imaq hakugiikpiaktuq

Nunap hina nunguvalliavaktuq imarmit (annuqqimitluuniit) ingutaarangat hiurraq ujaraliarluuniit imap natqarut. Nunap hinanut nunguvalliadjutauvaktuq qanuriinnianit nunap iluatta, aktilangata imap (anuqqipluuniit), imaalu kajumingninga ingilraniata aullaniata.

Imaq aullajuq hakugikpiaktuq. Nunngudjutillajuq apqutinik, ikaarvingnik, imaalu igluqpangnik.

Nunap hina nunguvalliajunut ihuaqqutikhat ikajuutaulajut nutqaqtivjaglugu hakugingninganun imap pittailitikhaniklu nunap hinanik nunguvalliadjutaununut. Hapkuat atuqtakhat ikajuutikhangit ajuqhautaujunut imaukkaktinnagit.



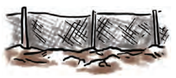
Nunap nauvallarniit: iviit uqpigaillu kajuumirutaullajut imap aullaninanik.



Ujaqqan: ujaqqan ataaniittut turhuat, tun'ngaviit, ukharjuit itiqhait kuviviujut qurkluarnianit imarmit.

Pijurluvaluit katiqhivikhat: uarviktun ittuq imap kuvivikhaa hivikittumi, marluvaluk katiqhariangani.





Hiuravallungnik piijaivikhat: hivikittumun piijaivikhanik hiuravallungnik imarmit.

NAKUNGITTUT QURLUAVIIT

Hapkuat munarijakhatit

TAKKUNNAQTUN IHUIDJUTAUJUT:

- Nutqangainnaqtuq imaq
- Imaukkakpallarutaulajut
- Nunap qanngagut ulipkaaqtuq
- Ahirruqtuq, himiktitpat imaaluuniit hikukpata turhuat
- Nuna anmukpalliajuq imaaluuniit nunguvallapluni imarmit

Titirarlugit hapkuat naunaiqtatit. Ihuirnirit ihuaqharnariqpaklugit qilamiupjaklutit, naunaiqhilutit ihuaqhaivikharnik imakhigaikpat imaq aujami imaalu ukiuakhami ingattaapiaktinnagit.

Nakuulluangittut kajuumiittullu qurluarviit qajangnautauhungujut nunani nappaqtiqhimajunut imaaluuniit inungnut aannialaqinnaqtumik.

NUTQANGAINNAQTUQ IMAQ

- Pidjutaujuq nunap puvitquumaninga auktuqpalianinga
- Ivaviuvaktun kikturidjanit
- Hamna qajangnarniaqtuq nutaqqanun
- Pidjutauvaktuq imarmit tipituutijut mamaittunik
- Imaukkakpallarutauvaktut



IHIVRIUQQATTAQPAKLUGIT

Pihimalutit titiraqtarnik ihuinniinnik

Ihivriukpaklugit imaalu titirarlugit tamaita qurluarviit qanurinniit. Naunairlugu qanurinninga. Ihuaqharlugit himmauhirlugillu pijariaqaqqata. Ihivriurlgit turhuat ukuallu itiqhait hivuagut, mahaktiliqqallu imaalu kinguagut upin'ngakhami mahaktiqqat imaalu aujami nipallirjuaraikpat.

TURHUAT

- Humiitpa aktilangallu
- Idjuhiit: qan'nguqqata, himiktitpat ahiruqqataluuniit

ITIQHAIT

- Nutqangainnaqtuq imaq
- Nunap hina nunguvalliajuq
- Nauvallaaqtuq/nauvallangittut nauttiat
- Himiutivaktun

QURLUARVIIT NUNAP PUVITQUUMANINGA

Nunap puvitquumaninga qiqumapkarlugunappaktiriguvit qurluarvikhanik.

- Tahiqqat imait auktutuutaullajut nunap puvitquumaninganik
- Igluqpihuirlutit imajungnirmi
- Ihumagilugit hapummitjutikhallu itiqhaungittunik
- Ingutaaqtailinahuavjaglugu nuna
- Ikiglinahuarlugit Nunap hina nunguvalliajuq



Standards Council of Canada
Conseil canadien des normes

Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

CSA GROUP

Nunavut

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