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Transformer Technical Specification

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Taltson Road Operating Rules

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Taltson Winter Road Map Book

Taltson GS Substation

22 MVA Transformer

Technical Specification

Revision 0
April, 2023

Project No. S13402B

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Taltson GS Substation

22 MVA Transformer

Technical Specification

Project no. S13402B

PREPARED AND APPROVED BY:

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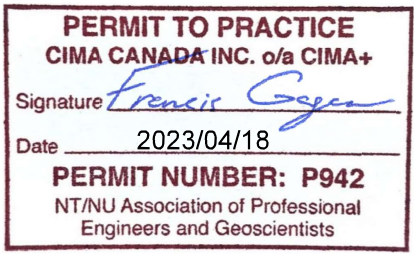

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April, 2023

PREPARATION AND REVIEW LOG			
Version	Revised By	Date	Description
0	FG	2023-04-18	Issued for Tender

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Liste of Appendices

Glossary

ANSI stands for American National Standards Institute.

CSA stands for Canadian Standards Association.

EEMAC stands for Electrical Equipment Manufacturers Association of Canada.

IEC stands for International Electrotechnical Commission.

IEEE stands for Institute of Electrical and Electronics Engineers.

HMI stands for Human Machine Interface.

HVAC stands for Heating, Ventilation and Air-Conditioning.

NEMA stands for National Electrical Manufacturers Association.

SCADA stands for Supervisory Control And Data Acquisition.

UPS stands for Uninterruptible Power Supply.

FAT stands for Factory Acceptance Testing.

FIT stands for Factory Integration Testing.

The Vendor refers to the manufacturer selling parts to the Owner.

The Owner refers to the group submitting calls for tenders.

1. Scope

This specification covers the quality of material and workmanship requirements for the design, manufacturing, testing and delivery of two (2) 22 MVA step-up oil transformers. These transformers must be designed to be installed at Taltson Generation Station Substation (60°25'8.01"N 111°23'35.00"W), Northwest Territories, Canada, a location with arctic temperatures and harsh conditions. Transformers shall be designed to be operated in parallel.

They shall be assembled and tested in the factory. As described on section 4, the proponent shall submit two (2) options for the transformers, 22 MVA ONAN and 12.5/16.5/22 MVA ONAN/ONAF/ONAF. Sealed tank design is perfered to a oil conservator given the remote location. However, if sealed tank design is not suitable for the application or constraints, NTPC shall be advised and a design with oil conservator shall be proposed.

The transformer design must consider the weight constraints listed in section 5.2. Shipping from the proponent facility to Fort Smith, NT shall be quoted as an option.

2. Codes and Standards

The electrical characteristics and mechanical features of the equipment supplied under this specification shall be capable of meeting all the requirements specified herein and shall conform to the latest revisions of applicable ANSI, CSA, IEC, IEEE, NEMA, EEMAC standards, including, but not limited to, the following:

ANSI/IEEE C57.12.00	General Requirements for Distribution, Power and Regulating Transformers
ANSI/IEEE Std 32	Standard Requirements, Terminology and Test Procedure for Neutral Grounding Devices
CAN/CSA C22.2 No. 94	Special Purpose Enclosures
CAN/CSA C88 – 16	Power Transformers and Reactors
CSA CAN3-C308-M80	The Principles and Practice of Insulation Coordination
CAN/CSA C61869-1:14	Instrument transformers — Part 1: General requirements
CAN/CSA C61869-2:14	Instrument transformers — Part 2: Additional requirements for current transformers

CSA C22.1-18	Canadian Electrical Code, Part 1
CSA C88	Power transformers and reactors
IEEE C57.12	Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.90	Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C62.11	Standard for Metal-Oxide Surge Arresters for AC Power Circuits
IEEE C62.22	Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems
IEEE C62.82.1	Standard for Insulation Coordination--Definitions, Principles, and Rules
IEEE 1313.2	Guide for the Application of Insulation Coordination
NEMA TRI	Transformers, Regulators and Reactors

CSA shall take precedence over ANSI/IEEE unless otherwise specified. In the absence of CSA Standards certification, the Supplier shall pay all costs associated with obtaining on-site review and inspection by the CSA authority having jurisdiction. The Supplier shall pay for all costs to modify his equipment as directed by the CSA. In case of conflict between standards, CSA Standards take precedence in the interpretation of the requirement over other standards.

If any of the requirements in this specification are in conflict with the standards, the Supplier shall notify the Owner. The equipment that does not comply with this specification shall be rejected and credited, replaced, or brought into full compliance at the Supplier's expense.

3. Service Conditions

3.1 Environmental Conditions

Supplied equipment shall be designed for the following conditions:

Site Location		Taltson GS, NWT, Canada
Application		Outdoors
Terrain		Hilly Tundra
Average Ambient Temperature	°C	5
Maximum Ambient Temperature	°C	30
Minimum Ambient Temperature	°C	-52
Minimum Storage Temperature	°C	-55
Humidity		High
Site Elevation		<300 m above sea level
Average Wind Speed		3.6 m/s
Maximum Gust Wind		32 m/s, 1/15 years
Maximum Snow Depth	cm	150
Seismic Requirements		As per National Building Code for Fort Smith
Pollution Level / Creepage Distance		High / 44 mm/kV

Table 1 Environmental Conditions

3.2 Electrical Conditions

The transformer shall be designed to respect the following conditions:

Nominal Voltage (HV side)	kV	115
Rated Maximum Voltage	kV	123
Nominal Voltage (LV side)	kV	6.9
Frequency	Hz	60
Frequency Difference	Hz	±0.5
Voltage Unbalanced	%	< 2
Harmonic Distortion Factor	%	< 5
Total Short-Circuit from Generator (@ 6.9 kV)	kA	7
Total Short-Circuit from grid (@115 kV)	kA	2.5

Table 2: Electrical Conditions

3.3 Auxiliary Supply

The available auxiliary power supply for the transformer equipment is 120/208 VAC 3 phase and 125 VDC.

4. Electrical Requirements

4.1 Transformer Characteristics

		Option #1	Option #2
Nominal Rating	MVA	22 ONAN	12.5/16.5/22 MVA ONAN/ONAF/ONAF
Type		Step-up sealed tank mineral oil-filled transformer	
Primary Voltage	kV	115	
Secondary Voltage	kV	6.9	
Impedance	%	7.0	
Short Circuit Withstand (at 6.9 kV)	kA	10	
Winding material		Copper	
Winding Configuration		YNd1	
Primary Winding Connection (115 kV)		Grounded Wye	
Secondary Winding Connection (6.9 kV)		Delta	
BIL (at 115 kV)	kV (crest)	550	
BIL (at 6.9 kV)	kV (crest)	95	
BSL (at 115 kV)	kV (crest)	460	
Nominal Temperature Rise	°C	65	
Temprature Rise Hottest Spot	°C	80	
Tap Changer (at 115 kV)		Off-circuit tap changer	
Tap Settings		Voltage regulation range of ±5%. 4 taps of 2.5% increment and a centre tap.	
Primary Connection Bushing Type (115 kV)		Line on top of the transformer	

Secondary Connection Bushing Type (6.9 kV)		Line on top of the transformer
Bushing CT Ratio on High Voltage (115 kV)		Multi-Ratio 200:5 A, Class C200 Qty: Six (6) / two (2) per phase
Bushing CT Ratio on Low Voltage (6.9 kV)		Multi-Ratio 2500:5 A, Class C200 Qty: Three (3) / one (1) per phase
Bushing CT Ratio on Neutral		One (1) Multi-Ratio 100:5 A, Class C100

Table 3: Transformer Characteristics

The transformers will normally be energized from the low-voltage side but under specific conditions, they may be energized from the high-voltage side. The construction of the transformers must be able to accommodate this condition.

All components of the transformer shall be capable of short-time emergency loading to a limit of 140°C hottest spot temperature as calculated by the method described in IEEE C57.115.

The transformers shall be capable of operating continuously at a low-voltage input of 5% below the rated voltage on any tap at the maximum MVA rating.

The transformers shall have a reduced flux density design to allow continuous no-load excitation at the LV terminals of 120% of rated voltage.

The transformer shall have the ability to withstand the stresses of an out-of-step condition or out-of-phase energization persisting for 160 ms, 20 events over expected lifetime.

The transformer shall have the ability to withstand a sudden load rejection of the generator. It shall be capable of withstanding 1.4 times the rated voltage for 5 seconds.

The transformer shall have a design life of 50 years.

4.2 Short-Circuit Rating

The transformer windings and other parts shall withstand, without damage or permanent deformation, the effects of a 3-phase short-circuit at the transformer terminals for a duration of 2 seconds. Calculate the short-circuit currents using the minimum anticipated transformer impedance (including the effect of tap changing equipment), the ultimate system short-circuit level and the rated (maximum) voltage as the pre-fault voltage. The transformer shall be designed to be operated in parallel. This should be considered in the short-circuit rating. The nameplate shall indicate the admissible number of short-circuits per hour.

5. Construction

5.1 Tank and Base

Provide a transformer with a base arrangement suitable for skidding or rolling in either axial direction and hoisting eyes on cover and lifting lugs for transportation. Transformers shall have pulling eyes on each side of the transformer so it can be moved in any direction. The pulling eyes, lifting lug and skid shall be suitable for manipulation once the transformer is filled with oil. The transformer will be installed on a concrete base. The transformer base shall have the required provision for appropriate anchor designed to withstand the forces applied to them by the interaction of the inertia of the mass of the transformer and cooler.

The transformer must be designed so the tap changing mechanisms, tank oil gauge and temperature gauge can be inspected from the ground.

The transformer must be equipped with a ladder to access the transformer's top, anchor points and fall protection systems.

The top of the tank shall be sloped to shed water and should have a durable non-slip coating.

One or more manholes or handholes in the cover sized to afford access to terminals and upper portion of the coils, and to enable the replacement of bushings and current transformers without removing the cover or lowering the oil below the top of the core and coil assembly.

A valve and necessary fittings to perform oil samples shall be easily accessible on the transformer.

Valves for the radiator and oil conservator (if required) shall be provided for proper isolation of devices for maintenance purpose.

Provide two tank ground pads with compression type lugs for 4/0 AWG bare copper conductors.

5.2 Transformer Weight Constraint

Transportation of heavy components from Fort Smith to Taltson powerhouse site can only be achieved via a winter (ice) road, which is available from mid-February to mid-March. The winter road maximum capacity is 70 000 lbs (31 750 kg). The transformer construction and shipping method shall consider this limitation. Oil and accessories (radiators, bushings, etc.) will likely have to be removed and shipped separately from the tank and core in order to respect the road limitations.

If a 22 MVA ONAN (Option #1) transformer design and construction cannot meet this limitation, NTPC shall be promptly advised. Same apply for a the sealed tank design, transformer with oil conservators shall be considered and proposed.

If transformer oil is shipped separately, procedures for long-term storage, assembly, filling and degassing of transformer oil shall be provided.

5.3 Breather System

The transformer shall be provided with a smart transformer breather Qualitrol STB000 series or similar. The breather system shall dehydrate the air in the transformer and monitor in real-time the moisture level. If the moisture level is high, the breather system shall trigger a regeneration cycle of the desiccant.

The breather system shall be able to operate under harsh weather conditions (arctic option) and be powered from 120 VAC.

5.4 Bushings

H0 bushing preferred location should, as mentioned in CSA-C88, on the right side of H1. Alternatively, to keep the transformer tank as small as possible, it could be placed on the opposite side of the transformer.

High-voltage bushings shall be provided with C2 taps for testing.

5.5 Off-Circuit Tap Changer

Supply the transformer with off-circuit tap changer equipped with external operating handle operable from ground level, with provision for padlocking and position indicator visible from a

standing position on the ground. Provide four (4) 2.5% Taps and a centre position. Tap position shall be 2 above and 2 below plus one centre tap.

An interlocking device shall be provided to prevent the operation of the tap changer while the transformer is energized.

5.6 Insulation Liquid

The insulating liquid shall be Exxon Mobil VOLTESSO N36 oil.

5.7 Surge Arresters

Provide a set of three (3) metal-oxide surge arresters, on the primary side (115 kV) to be mounted on the transformer. Provide suitable mounting bases and supports for their installation.

Provide a set of three (3) metal-oxide surge arresters, on the secondary side (6.9 kV) to be mounted on the transformer. Provide suitable mounting bases and supports for their installation.

All surge arresters must be polymer station class and conform to the latest version of the relevant standards: IEEE C62.11, IEEE C62.22, IEEE C62.82.1 and IEEE 1313.2. Consider unshielded overhead lines at 115 kV and 6.9 kV.

The surge arresters' maximum continuous operating voltages shall be chosen considering the power system grounding type and the power system maximum operating voltages at 115 kV and 6.9 kV sides of the power transformer as per the IEEE C62.11 and IEEE C62.22 standards.

Surge arrestors shall be outfitted with a surge counter for each phase that shall be mounted about 1.5 m (5 ft) above ground level.

The bare grounding conductors of the surge arrestors shall individually connect to the ground grid and insulated from the tank.

5.8 Control and Fans Cabinet

Provide control cabinets that are adapted to the local weather, NEMA-4X type, stainless steel, fixed to the transformer tank wall for housing all auxiliary equipment associated with the cooling control system where applicable (disconnect switch c/w HRC fuses for incoming power supply, fans starters, control switches required for the various modes of operation and all other accessories). The fans shall have a manual activation selector switch so they can be activated for routine maintenance check. Cabinets shall also house all alarm leads, current transformer

leads and other control device leads. The mounting height shall be suitable for the operation of switches and the reading of indicating instruments from a standing position on the ground.

Cabinets shall be rigidly braced, constructed, and located so as not to add to or amplify the sound level of the transformer. Cabinets shall be equipped with two (2) full-size hinged doors. It shall house all the low-voltage components. The cabinet doors shall have padlockable handles. Where reading of indication and meter inside the control cabinet is required, waterproof window shall be provided on the door to allow reading without opening the door. Top of control cabinet should be no higher than 2 metres from the ground.

The control cabinets, the wiring and all accessories shall be CSA approved and the CSA label shall be affixed to the control cabinets.

Paint the inside with an oil-proof white paint having anti-condensation properties.

Equip each control cabinet with a light fixture, a light switch, an inside non-GFCI duplex receptacle (Hubbel, NEMA 5-15 R, cat no HBL 52621 with wall plates P8) and a thermostatically controlled heater, all operated at 120 V AC.

Terminal blocks for customer use shall be rated 750 V, of the compression type, AWG #10 for all C.T. circuits and 14 AWG for other circuits. Provide 10% spare terminals for customer use.

All wiring shall be TEW or SIS copper 14 AWG minimum (10 AWG for CT lead) and shall be protected and supported within the control cabinet to prevent it from damages. All wiring shall be identified with Brady Permasleeve wire markers or an equivalent accepted.

All wiring to devices on the transformer and fans shall be connected by the Vendor. The Owner will reconnect wiring where shipment dictates disconnection. All wiring shall be of stranded wire and shall conform to CSA.

All wire on devices shall be terminated with compression insulated type connectors. Do not use spade lugs or soldered terminals. Do not connect more than two wires to anyone stud or terminal.

Each safety switch, breaker and motor starter shall be individually padlockable in open position.

All identification tags and nameplates for control cabinets accessories (push-button, selector switch, relay, etc.) shall be in English.

All safety switches, breakers, starters and relays shall be from the Schneider Electric manufacturer or equivalent.

All breakers shall have auxiliary contacts (1 N.O.).

CT test blocks shall be installed in the control cabinet. When multi-ratio CT are used, all ratio shall be wired to appropriate terminal blocks inside the control cabinet.

All non-current carrying metal parts in the control cabinet shall be bonded in accordance with CSA C22.1.

The control cabinet grounding with connection of conductors and cable shields to a copper grounding bar shall be provided. The grounding bar shall be provided with tapped holes for size #10-32 THD screws and be located near the cable entry panel. The grounding points shall be reasonably spaced to allow for terminal connections, and the bar shall have a clearance of at least 140 mm on each side of the length of the bar. The bar shall be connected directly, or via a AWG No. 2 wire, to a ⅜-inch bolt assembly (bolt, lug connectors, lock washers and nuts) for external station ground connection.

5.9 Transformer Mechanical Protection

Include temperature sensors with gauges for winding and oil with two levels each (alarm + trip).

Include a transformer pressure gauge with two levels (alarm + trip) indication contacts.

Include a pressure relief device near the edge of the tank with an integrated directional shield and piping to direct the oil discharge downward and away from the control cabinet. After a pressure relief operation, the device shall positively reseal so that further loss of oil and ingress of water is prevented.

Include tank oil gauge with alarm and trip signals to sense low oil level.

Include a sudden pressure relay with two levels (alarm + trip) to sense low-level internal faults.

Include a Buchholz relay (if applicable) with trip contact.

Provision to install an online gas-in-oil monitoring system in the future.

All indicated above devices shall have two (2) NO contacts for the trip signal.

The transformer shall be equipped with a calibrated/adjusted simulated winding temperature indication supplied by a properly sized CT.

5.10 Instrument Monitoring

Temperature monitoring shall be performed by microprocessor based electronic temperature monitoring (ETM) instruments of a reputable brand (i.e. Qualitrol 509) and shall be installed in the main control cabinet. The ETM shall have data communication with Ethernet. It provides four (4) sets of contacts which one is to start cooler fans, one for alarming, one for tripping, and one wired to terminal blocks in the control cabinet.

Fibre-optic temperature probes shall be required to determine the winding hotspot temperatures, the top and bottom oil temperatures, and the internal core temperature. In addition, one resistance temperature detector (RTD) shall be mounted in the oil well.

5.11 Sound

Select the transformer so is sound level does not exceed the requirement of CSA C57.12.00 and C57.12.90 standards.

5.12 Vibration

Install an accelerometer on the transformer during the transportation to evaluate the vibrations.

The chosen equipment should accommodate the vibration caused by transportation, installation and operation.

5.13 Toxic materials

The manufacturer should consider the environmental recommendations of the Government of Canada in the choice of the materials and components.

Prohibit all materials and components that are unsafe for workers or damageable for the environment.

5.14 Paint Finish

The paint finish shall take into consideration the local weather. If additional measures are to be recommended, provide full details in a paint specification to be included in the proposal. As a minimum, provide an epoxy finish with anti-skidding properties on the top of the transformer.

The transformer paint finish colour shall be ANSI Gray #70.

Provide finish paint for touch-ups on site.

6. Shipping

Shipping cost shall be provided as a separate price as an option. The price shall for pickup from the manufacturer facility and for delivery to Fort Smith (NT) whether it is only by truck or by boat and then by truck.

7. Nameplates

Supply rating plates made of stainless steel and fixed to the transformer with non-rusting screws, showing:

- On the transformer's main nameplate, the data listed in the latest revision of CAN/CSA-C88 Standard.
- On bushing nameplates, the type, designation, and catalogue number.
- On the cover, besides each bushing: indicate the bushing terminal marking.
- On valve nameplates, their function along with the usual data.

8. Performance and Maintenance

The expected lifetime of the transformer must be at least 50 years.

Maintenance plan shall be provided in order to operate and maintain the equipment properly.

All parts of the transformer should be easily accessible for maintenance.

Recommended spare part list shall be provided as an option.

9. Testing and Test Reports

Testing shall comply with the latest revision of CSA C88. If the unit is a new designed transformer, type test shall be performed, if not the previous type test report shall be performed. A sweep frequency response analysis (SFRA) testing shall be performed prior to shipping.

Copies of all the electrical and oil tests should be provided prior to shipping in order to use them as a baseline during the SAT.

Accelerometers and impact recorder with GPS should be installed in the factory prior to loading and shipping.

9.1 Witness

The Owner reserves the right to witness any or all tests plus any quality control dielectric tests performed. Sufficient notification shall be given to allow the Owner's Representative(s) to be present for the tests. A minimum of fifteen (15) working days should be allowed.

9.2 Failure to Pass Tests

If the equipment fails to meet the test requirements of the standards, the Owner shall be notified immediately and reserves the right to refuse the equipment.

9.3 Evaluation of Tenders for Losses

In order to choose the most economic system, the bids will be evaluated while taking into consideration the capital cost and the operating cost (losses evaluated at nominal natural convection or forced convection fundamental rating).

The transformer losses will be evaluated as follows (in CAN$):

- 4 000 $/kW for no-load losses
- 2500 $/kW for load losses

The following formula will be used to establish comparative bid prices:

- Ca = C + 4000 Pv + 2500 Pc where
- Ca = Comparative bid price in Canadian dollars
- C = Bid price in Canadian dollars
- Pv = No-load losses in kW (guaranteed) at nominal rating
- Pc = Load losses in kW (guaranteed) at rated fundamental current

Losses as tested shall not exceed the losses as guaranteed.

The Supplier shall notify the Owner 14 days prior to the tests. The Owner or his representative reserves the right to inspect the equipment and/or witness the tests at the factory at no additional cost to the Owner.

Certified electronic copies of the test results and reports shall be provided to the Owner.

10. Spare Parts

The manufacturer's proposal on the spare parts list shall be effective for the duration of the contract. A decision on the spare equipment will be taken later.

11. Manufacturer Data and Documentation Requirements

The manufacturer shall include the following documents in an electronic version for the bid :

- Supplier preliminary schedule – Equipment delivery schedule
- Quality plan
- Tender form and price list
- Technical questionnaires and/or datasheets
- Catalogue information (mechanical & electrical)
- Price list of recommended spares
- Instrument list
- List of similar installations
- Preliminary description operation
- General arrangement drawings including dimensions and weights (core & windings, Tank & Fittings, Oil and total mass.)
- Foundation & support loading and forces diagram

The manufacturer shall include a lump sum price with the bid.

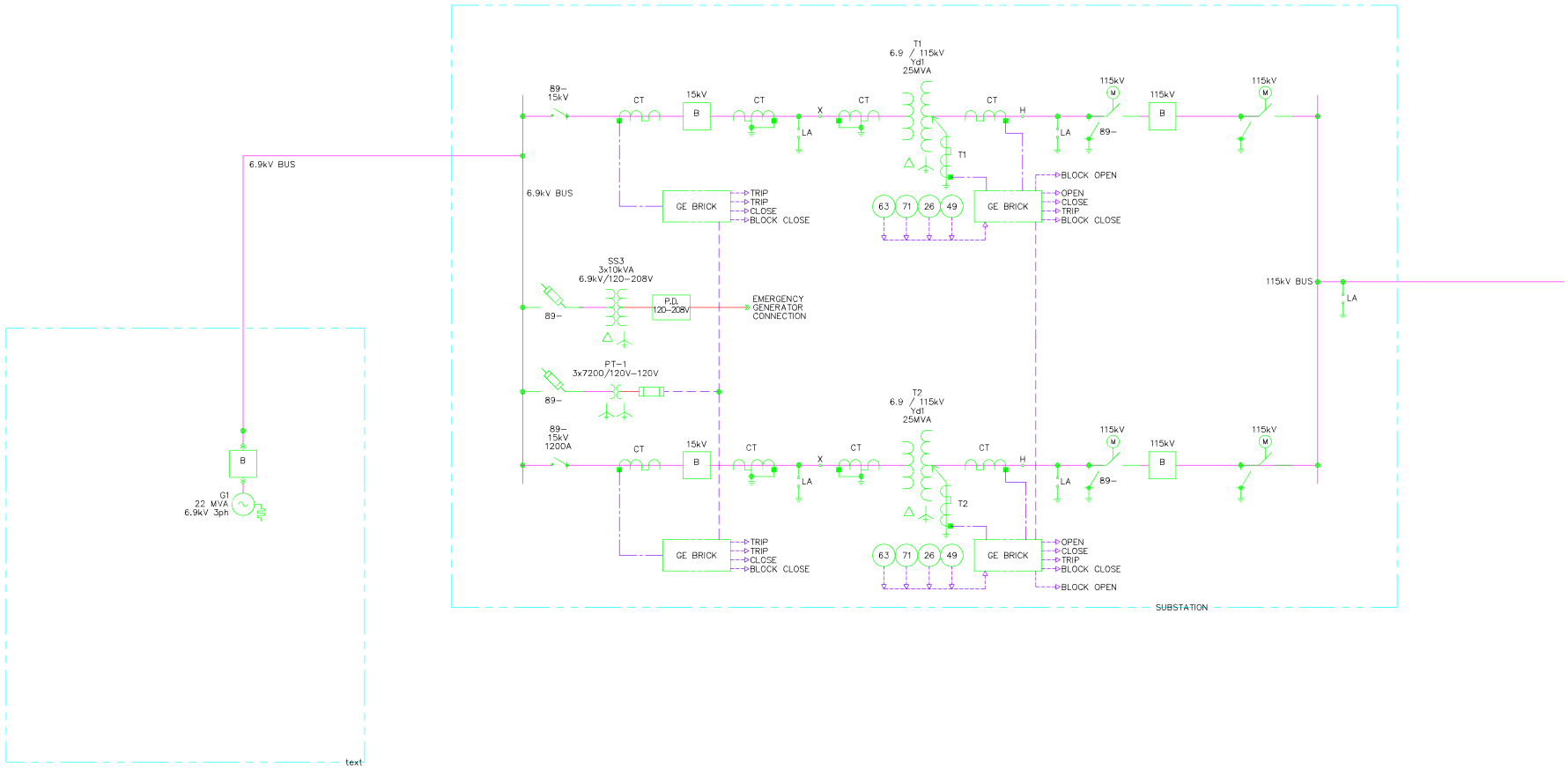
The manufacturer shall include the following documents in electronic version after the award, for review and final :

- Information list from supplier
- Supplier preliminary schedule – Equipment delivery schedule
- Technical questionnaires and/or datasheets
- Typical P&ID
- Electrical schematic diagram in CAD format
- Manufacturer interface junction box layout & wiring schematics in CAD format
- Price list of recommended spares
- Instrument list
- Bill of materials

- Material safety data sheets (MSDS)
- Operation, maintenance and installation manuals
- Rigging and unloading procedures
- QA manual & inspection plan
- Inspection and tests reports/plan (ITP)
- Certificate of conformance
- Certificate of guarantee
- Mill test certificates
- Lifting apparatus certificate
- Tap changer
- General arrangement drawings
- Foundation & support outline drawings
- Outline draw. And/or dimensional data sheets
- Nameplate drawings
- Bushing characteristics and layout drawings.
- Performance curves
- Code test certificates (originals)
- Thermal damage curve
- Transformer V/Hz curve

A

Appendix A
Single Line Diagram



NOT FOR CONSTRUCTION

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PROFESSIONAL STAMP

PERMIT STAMP

LOCATION
TALTSON
N.W.T.

NORTHWEST TERRITORIES POWER CORPORATION

TITLE
NEW 6.9/115KV TALTSON SUBSTATION S163
SWITCHING DIAGRAM

SCALE	SHEET 1 OF 1	DRAWING NO.	REV.
NTS		S109–XXXX–E01	0

AUTOCAD FILE: C:\WORK FILES\CAD\TALTSON\S109–XXX–E01.DWG

PLOT SCALE: 1 : 1

SUBMITTED BY CIMA CANADA INC.
3385 King Street West
Sherbrooke, QC J1L 1P8
T 819 5653385 F 819 821 4283
cima.ca

Taltson Winter Road- 2023 Operating Rules

1. Twenty-four hour notification to the WR Maintenance Supervisor is required for all loads entering Taltson Winter Road.
2. NTPC Taltson winter road is radio controlled on “LADD 1” radio channel. Vehicles must call in location using KM markers and direction (north travelling to site, south travelling back to Fort Smith)
3. Loaded trucks MAXIMUM speed is 40KM/hour on portages
4. Loaded trucks MAXIMUM speed is 15km/hour on ice bridges
5. Pick-up trucks MAXIMUM speed is 60KM/hour on portages
6. Pick-up trucks MAXIMUM speed is 35KM/hour on ice bridges
7. All loaded trucks travelling to site from Fort Smith will chain up for ascent of Slave River North Bank, remove chains at top of Slave River North Bank, chain up again at KM 28
8. All loaded trucks travelling to Fort Smith from site will chain up leaving the Taltson site, remove chains at KM 28, chain up at the top of the Slave River North Slope and remove chains at the top of the Slave River South Slope
9. Loaded trucks must maintain minimum 350m separation between each vehicle
10. Entry notification to Taltson site to be provided on NTPC “South Slave” radio channel
11. If daytime temperature is warmer than -10^{o} C traffic will be restricted to nighttime travel on Taltson Winter Road for all truck/trailer units.
12. All axle weights must be communicated to Field Supervisor twelve hours prior to loads arriving at site. Axle weights will be verified by government scale tickets.
13. Load security will be inspected at staging area Slave River, South Bank
14. All loaded truck/trailer units are to be escorted by a Pilot Truck operated by the WR Maintenance contractor.
15. Pilot Truck operator will inform loaded trucks of critical transit sections and other features of note for drivers
16. If oncoming traffic is encountered in the one lane sections of the road the Pilot Truck will direct traffic to the nearest turnaround to allow passage for the loaded trucks
17. Stopping a loaded truck on a lake in prohibited unless authorized by the Pilot Truck
18. White-out conditions may occur on the Taltson WR; in such conditions turn on emergency flashers, beacon lights, stop driving, stay in your vehicle and wait for white-out condition to subside before proceeding.

19. Vehicles should have Emergency kit, First Aid kit, cold weather clothing and fire extinguisher on board.
20. Drivers should have good winter driving experience.
21. The possession of drugs, alcohol or firearms on the WR and at all camps is strictly prohibited as per NTPC standard policy.
22. Vehicles should have full tank of fuel, well serviced and have good winter tires.
23. Directions of Winter Road Maintenance Supervisor and Pilot Truck operator must be followed.
24. If drivers see traffic signs or markers damaged or missing please notify Winter Road Maintenance Supervisor.
25. If drivers see any abnormality with winter road condition wet or dry cracks in ice, depressed ice, heaving/hanging ice, trees down or interfering with safe passage on winter road; please notify Winter Road Maintenance Supervisor.
26. All drivers operating on the WR shall report any spill, property damage/injury accident or other dangerous/emergency situation to the Winter Road Maintenance Supervisor.
27. If a spill occurs on the WR the Pilot Truck operator will implement the Taltson WR Spill Response protocols presented in Appendix J of the Taltson Facility Spill Contingency Plan
28. As per the Taltson WR Wildlife Management and Monitoring Plan there is strict no chase policy for any wildlife encounter along the WR and all traffic must yield to any wildlife till it is clear of the WR. Feeding wildlife while operating/travelling on or near the WR is strictly prohibited.
29. The Taltson Winter Road Rules will be applied in addition to the existing Health & Safety Management System and NTPC standard policies

Taltson Winter Road Maintenance Supervisor:

- Mr. Wayne Thompson (306) 750-0320, alternate Ron Schaub (867) 876-1049

Name: _____

Signature: _____

Date: _____

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NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

0 500 m

N

1 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support

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KM-10

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NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

0 500 m

N

2 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support

458000 459000 460000 461000 462000

6670000 6669000 6668000 6667000 6666000 6665000 6664000 6663000

KM-15

P-2

0 500 m

N

Water Source

Lake Section

Portage Section

All-Season Road

NOR-EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

PROJECT NO.: 2019-6044.200.201

DATE: December 2020

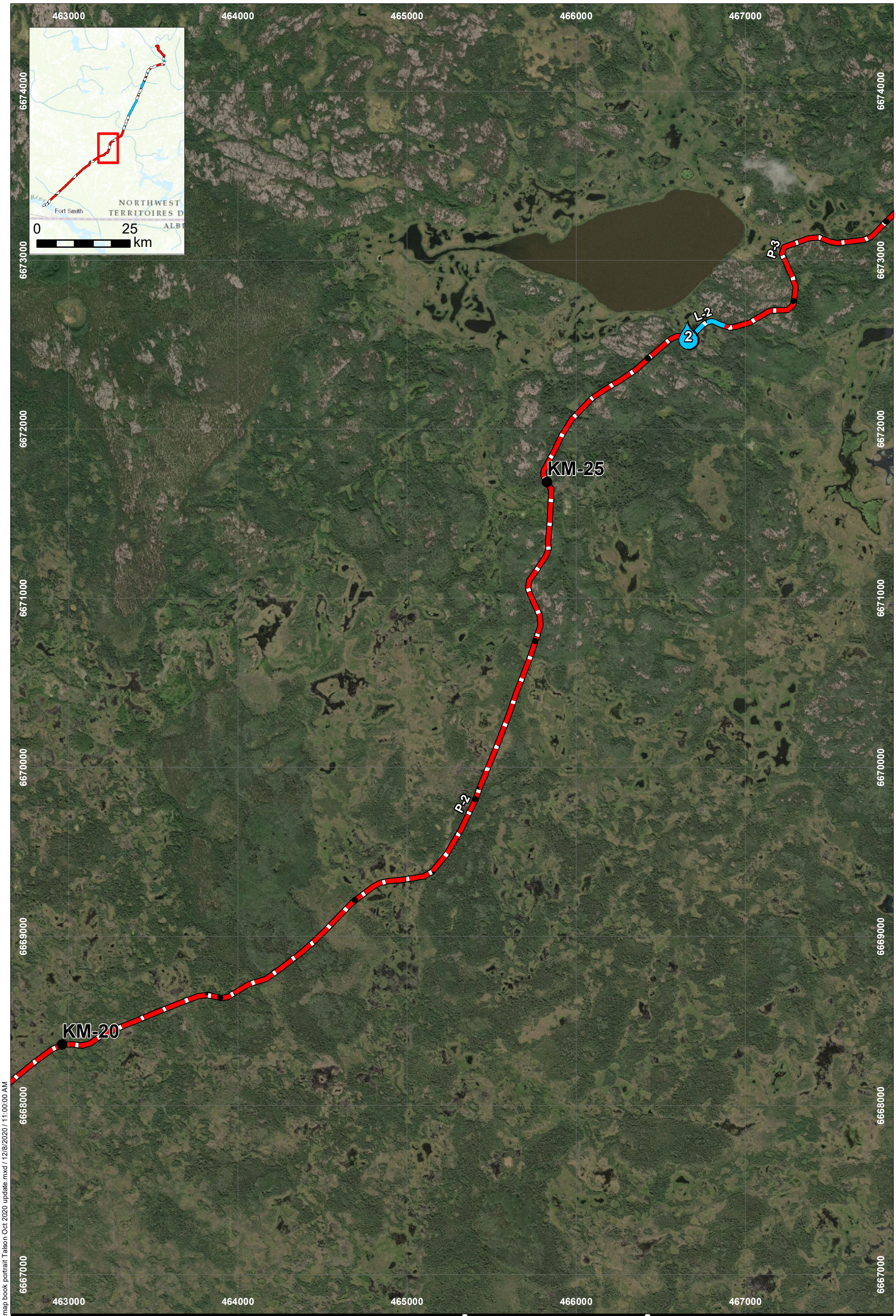
DRAWN BY: DA

3 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support

map book portrait Talson Oct 2020 update.mxd / 12/8/2020 / 10:59:54 AM



map book portrait Talson Oct 2020 update.mxd / 12/8/2020 / 11:00:00 AM

NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

0 500 m

N

4 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support

467000 468000 469000 470000 471000

6679000 6678000 6677000 6676000 6675000 6674000 6673000

KM-35

L-5

6S

P-5

L-4

5

P-4

L-3

4

3

KM-30

P-3

L-2

map book portrait Talson Oct 2020 update.mxd / 12/8/2020 / 11:00:05 AM

NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

0 500 m

N

5 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support

470000 471000 472000 473000 474000

6685000 6684000 6683000 6682000 6681000 6680000 6679000 6678000

P-7 L-6 P-6 6N KM-40 L-5 KM-35 6S P-5 L-4 P-4

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NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

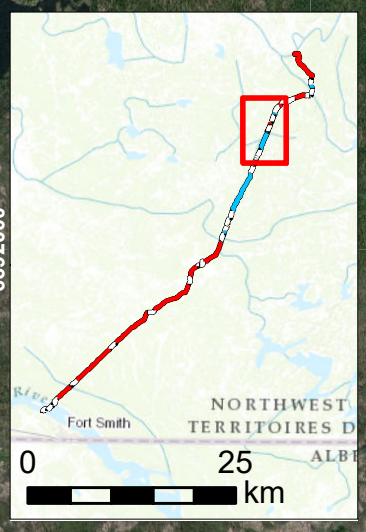
0 500 m

N

6 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support



473000 474000 475000 476000 477000

6692000 6691000 6690000 6689000 6688000 6687000 6686000

L-10
KM-50
8
P-10
L-9
7.1
P-9
7N
KM-45
L-8
7S
P-8
L-7
P-7

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NOR·EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

0 500 m

N

7 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support

478000 479000 480000 481000 482000

6697000 6696000 6695000 6694000 6693000 6692000 6691000

Taltson Air Strip

KM-55

L-12

L-11

P-12

9

P-11

L-10

478000 479000 480000 481000 482000

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NOR-EX Engineering Ltd. | an ASSOCIATED ENGINEERING COMPANY

Water Source
Lake Section
Portage Section
All-Season Road

PROJECT NO.: 2019-6044.200.201
DATE: December 2020
DRAWN BY: DA

0 500 m

N

8 of 8 (1:20,000) - Updated

Northwest Territories Power Corporation

Taltson WR Mapping Support