Village of Mayo meeting

June 5, 2024

In attendance:

- Trevor
- Michael
- Tom
- Margrit
- Simeon
- One other councillor
- Clerk
- Public Works staff member at Village of Mayo

Key messages from YEC

- **Mayo Secondary Thermal – generator use in winter 2023-24**

In March 2023, delays in the delivery of equipment for our thermal replacement project and our utility-scale battery forced us to find another site for temporary diesel generators to meet winter peak loads for winter 2023-24.

The location needed existing transformation capacity, because post-COVID, a transformer now has a 2-year delivery timeline. Wareham Dam had the transformer capacity.

So we engaged VoM and FNNND and then assessed and permitted 4.9MW of generation at Wareham (Mayo Secondary) to meet that winter demand. As part of that process, we committed to share how the generators at that site were used over the winter.

Portable rental generators are less reliable than installed generators, so we installed five generators at Mayo Secondary in case units failed/wouldn't start or if we had an emergency (two emergency/spares for a total generation capacity of 9MW). We had problems with YM34 and didn't use it most of the winter (see run time summary below). Last winter we did not exceed our permitted limit of 4.9MW of generation operating at Mayo Secondary.

The run time (total time in days) of each of the units per month is below:

Days	YM30	YM31	YM32	YM33	YM34
Dec	<1	<1	<1	<1	<1
Jan	2.6	3.8	5.6	5.6	1.6
Feb	4.2	3.5	1.7	2.9	0.0
March	1.2	1.3	0.8	0.1	0.0
April	0.0	0.0	0.0	0.0	0.0

Total	**8.0**	**8.6**	**8.1**	**8.6**	**1.6**
Total Site	**34.9**				

Even though we ran each of the available generators for a total of only about 8 days each during the winter, this is important capacity to meet our winter peak loads. Yukon winter electricity demand is over twice that of summer. Since we do not have enough hydro to meet peak winter demand, we use thermal (LNG/diesel) generation in Whitehorse, Faro, Mayo and Dawson to meet winter needs.

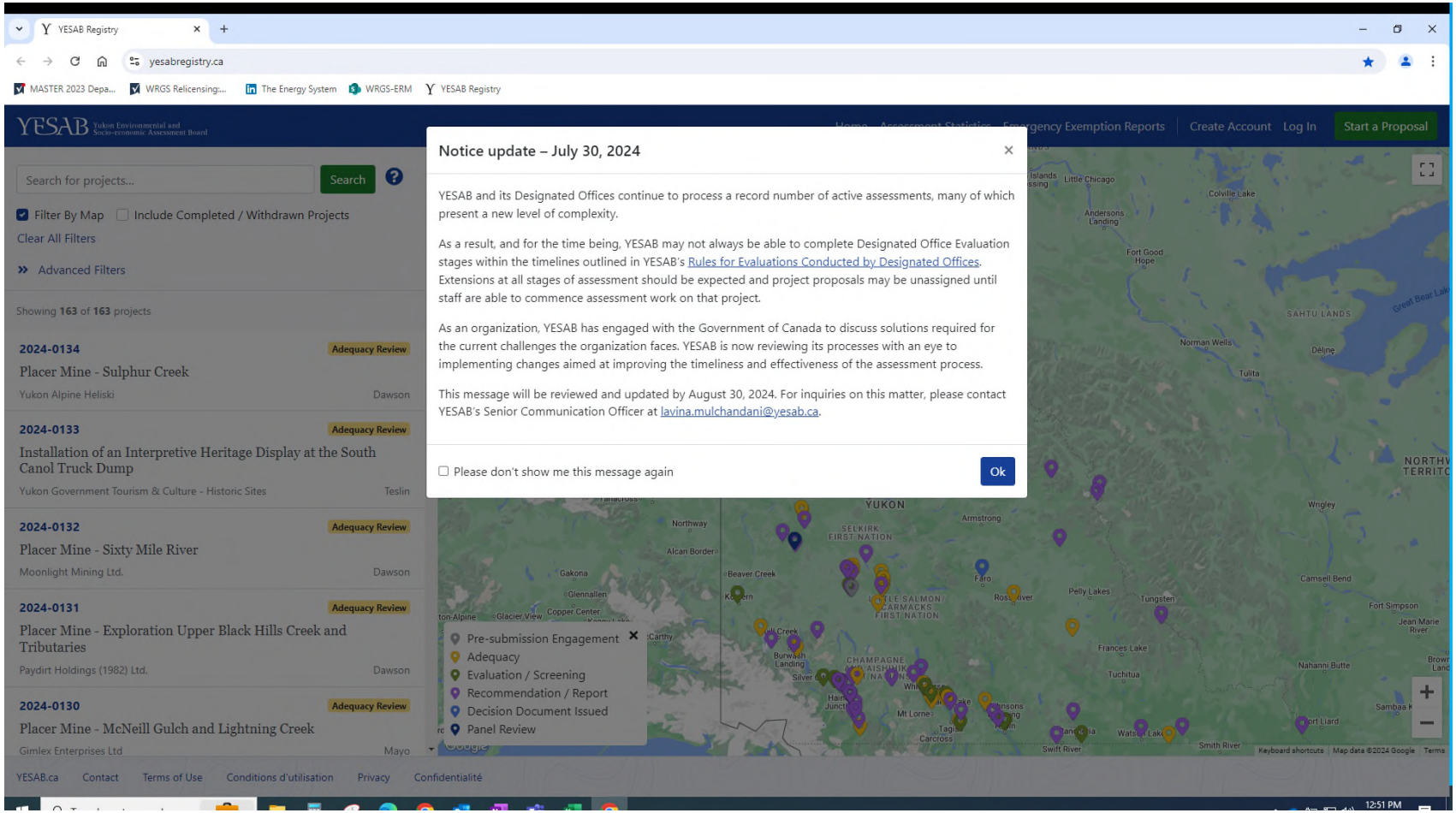
- **Permitting Emergency Spares at Mayo Secondary**

Late in 2023, we learned from YG-Environment, the regulator for our thermal generator air emissions permits, that they will require us to permit emergency capacity, even if we don't use the generators. As a result, we are planning to assess and permit the two additional generators installed at Mayo Secondary. We are proposing to submit a YESAA project proposal to the Mayo DO and then air emissions permit application for the additional two generators. We would be doing that later this year.

- **Questions about the use of the generators at Mayo Secondary last winter?**
- **Thoughts or questions about permitting emergency capacity there?**

Questions/notes from Village of Mayo

- What do you need from us to do this project?
    - We appreciated your support last year, would look for similar support.
- We didn't hear any concerns or complaints from the community about the rental diesels out there.
    - Noise, fumes, smoke – we didn't hear any of that
- No issues from us, we understand the need for the rentals.
- Good working relationship with YEC these past few years
    - Have been responsive to our needs, especially on the Mayo river
- Would you go over and above the amount of generation at Mayo secondary? (question from Simeon)
    - We can only put 7 MW through there anyways, because of transformer capacity
    - Would become a bigger project that we are prepared for at this time
- VoM willing to write a letter/email of support for permitting emergency capacity
    - Better than running diesels in town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2024-0134
Adequacy Review
Placer Mine - Sulphur Creek
Yukon Alpine Heliski
Dawson
2024-0133
Adequacy Review
Installation of an Interpretive Heritage Display at the South Canol Truck Dump
Yukon Government Tourism & Culture - Historic Sites
Teslin
2024-0132
Adequacy Review
Placer Mine - Sixty Mile River
Moonlight Mining Ltd.
Dawson
2024-0131
Adequacy Review
Placer Mine - Exploration Upper Black Hills Creek and Tributaries
Paydirt Holdings (1982) Ltd.
Dawson
2024-0130
Adequacy Review
Placer Mine - McNeill Gulch and Lightning Creek
Gimlex Enterprises Ltd
Mayo
Create Account
Log In
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Notice update – July 30, 2024
YESAB and its Designated Offices continue to process a record number of active assessments, many of which present a new level of complexity.
As a result, and for the time being, YESAB may not always be able to complete Designated Office Evaluation stages within the timelines outlined in YESAB's Rules for Evaluations Conducted by Designated Offices. Extensions at all stages of assessment should be expected and project proposals may be unassigned until staff are able to commence assessment work on that project.
As an organization, YESAB has engaged with the Government of Canada to discuss solutions required for the current challenges the organization faces. YESAB is now reviewing its processes with an eye to implementing changes aimed at improving the timeliness and effectiveness of the assessment process.
This message will be reviewed and updated by August 30, 2024. For inquiries on this matter, please contact YESAB's Senior Communication Officer at lavina.mulchandani@yesab.ca.
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12:51 PM

yukon energy

permitting emergency capacity at the Faro diesel plant

Yukon Energy's current air emissions permit allows us to generate up to 15.5 megawatts of electricity from the diesel plant in Faro. In addition, we have emergency capacity installed for backup purposes. We have not had to use this emergency capacity in Faro since it was installed.

Recently, the Department of Environment has asked us to permit the emergency capacity at all our diesel facilities. In response, we will be submitting a proposal to YESAB to permit up to a total of 20.4 megawatts of electricity at the Faro diesel facility.

Until we receive our amended air emissions permit, we can continue to generate up to 15.5 megawatts of electricity at the Faro plan under our existing permit. We would only exceed that permitted capacity if necessary to prevent immediate harm to public welfare, health or safety during an emergency.

frequently asked questions

1. Will the site be louder once you are permitted to generate more electricity?

   Although we are seeking to permit 20.4 megawatts, we can currently only run just over 19 megawatts at the Faro plant because of transformer constraints. The new permanent generators we are installing to replace one of the older, permanent generators (as part of our thermal replacement project) are new and therefore quieter. They also meet EPA Tier 4 emission standards so these will be the cleanest units in Yukon Energy's diesel fleet.

   As such, there should not be a noticeable increase in sound levels from the generators.

2. What are you doing to reduce noise from the diesel generators?

   In summer 2023, we installed two sound monitoring stations on the Upper and Lower Bench based on community suggestions. These stations will help us understand the noise residents hear. We are also building a sound wall around one of the permanent diesel generators (FD7). We expect it to be completed by the end of August.

3. Why didn't you permit all 20.4 megawatts of electricity to start with? Did you do this to avoid a more stringent Executive Committee screening through YESAB?

   We initially permitted 10.6 megawatts of electricity for Faro based on need and project timelines. Due to increased electricity demand and to help ensure reliability during winter peaks and emergencies, we increased it to 15.5 megawatts. Now, after regulatory feedback and delays with our battery and Callison diesel project, we aim to permit up to 20.4 megawatts. Both Executive Committee and Designated Office screenings undergo careful environmental and socio-economic assessments with public participation.

4. What is the future of the rental diesel generators in Faro?

   We initially planned to move two of the seven rental diesel generators out of Faro once the two new permanent units are operational later this fall. However, due to delays with the battery and diesel generators in the Callison industrial area near Dawson City, all seven rental generators will stay in Faro this winter.

   The rental diesel generators in Faro meet Tier 2 emission standards, which are stricter than pre-tier standards, producing fewer emissions than older generators. The rental generators in Faro are also used infrequently. From January to April 2023, the rental generators in Whitehorse and Faro produced about 2.7 GWh of electricity – less than 2% of Yukoners' usage during that time.

5. What are Yukon Energy's plans for the future?

   We are researching and planning the right mix of resources for the next 5 to 10 years, and beyond, to meet growing winter electricity demands, reduce emissions in Yukon's transportation and heating sectors, and generate an average of 93% renewable electricity annually.

why do we need the Faro diesel plant?

- While over 90% of our electricity comes from renewable sources, the Faro diesel plant ensures reliable service during winter peaks, emergencies and times when renewable resources are not available.

- The Faro diesel generators prevented power outages when we unexpectedly had to shut down the Aishihik Generating Station, our largest winter electricity source, in February 2024.

two ways to get involved

1. Give your feedback. Once our proposal has been submitted to YESAB, you are invited to provide feedback through the YESAA process by visiting **yesabregistry.ca**.

2. We will be hosting a community open house in Faro this fall. Details will be provided to the community later this summer.

Photo: Government of Yukon

more questions?

More information will be available in our project proposal, which will be submitted to YESAB in the coming weeks.

@yukonenergy

communications@yec.yk.ca

yukonenergy.ca

yukon energy

update on Yukon Energy's Whitehorse Thermal Permitting Project

In the winter of 2022, we began sharing information and gathering feedback about renewing our air emissions permit in Whitehorse. This project involves re-permitting the total production capacity of our Whitehorse facility: roughly 13 megawatts from LNG generators and 29 megawatts from diesel generators, including 12 megawatts of emergency-only diesel.

While over 90% of our electricity, on average, comes from renewable sources, our diesel and LNG generators ensure reliable service during winter peaks, emergencies and when renewable resources are not available. It is crucial we have the necessary authorizations to continue operating these generators.

project update

In May 2024, we submitted our proposal to the Yukon Environmental and Socio-economic Board (YESAB) to renew our air emissions permit. Originally, the project was to go through a Yukon Environmental and Socio-economic Assessment Act (YESAA) Executive Committee Screening. However, since we are not looking to change the existing operations at our Whitehorse facility, the YESAB Executive Committee has determined that this project should proceed through a Designated Office Evaluation.

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what we heard

1. Noise

Concern: Some residents near the facility were worried about noise from diesel generators and questioned previous noise impact assessments.

Response: We hired WSP Canada Inc. to conduct a new noise impact assessment, which considered how we use our thermal units during typical operations versus in emergency situations. Results showed noise levels were below permissible sound levels in most locations except in a spot closest to our power plant (200 m away) during the night. In response, we are exploring noise reduction like large silencers or acoustic louvers for the older diesel generators and plan to implement a solution by 2026.

2. Air quality

Concern: Some residents were concerned about emissions and their impacts on health and the environment.

Response: An air quality assessment was undertaken by WSP Canada Inc. The assessment evaluated two different scenarios, both of which present the air quality impacts based on the facility's maximum operating conditions under the worst-case meteorological conditions (i.e., conditions that do not occur often).

Here is what we learned:

- Levels of sulphur dioxide and carbon monoxide are well below standard levels
- Fine, coarse and suspended particulates are higher in the immediate area of the power plant but nowhere else
- Levels of nitrogen dioxide are already elevated in the area

A Human Health Risk Assessment indicated no significant health risks. More details are available in our project proposal.

3. Use of LNG and diesel

Concern: Some residents preferred renewable energy projects over reliance on diesel or LNG.

Response: We are planning and researching the right mix of resources to meet demand and lower emissions. However, thermal resources are essential for reliability during winter peaks and emergencies.

get involved

Review our proposal and provide feedback through the YESAA evaluation process at yesabregistry.ca, Project Assessment Number 2024-0103.

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For more information, visit **yukonenergy.ca/thermalpermit**.

Faro Generating Station

YESAA Project Proposal Supporting Document

August 2024

yukon energy
the power of yukon

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APPENDICES

List of Abbreviations, Acronyms, and Units

Abbreviation, Acronym, or Unit	Definition
BC AQDMG	British Columbia Air Quality Dispersion Modelling Guidelines
BC MoECCS	British Columbia Ministry of Environment and Climate Change Strategy
BC OGC	BC Oil and Gas Commission
CAC	criteria air contaminant
CO	carbon monoxide
GWh	gigawatt-hour
L	litre
MW	megawatt
NAPS	National Air Pollution Surveillance
NO_2	nitrogen dioxide
O_3	ozone
$PM_{2.5}$	fine particulate matter
PM_{10}	coarse particulate matter
SO_2	sulphur dioxide
TSP	total suspended particulate
VC	valued component
YAAQS	Yukon Ambient Air Quality Standards
Yukon Energy	Yukon Energy Corporation
YESAA	*Yukon Environmental and Socio-economic Assessment Act*
YESAB	Yukon Environmental and Socio-economic Assessment Board

Abbreviation, Acronym, or Unit	Definition
YG	Government of Yukon
YIS	Yukon Integrated System

1 INTRODUCTION

1.1 Project Overview and Document Structure

The Yukon Energy Corporation (Yukon Energy) is applying under Parts 6 and 9 of the Environment Act (RSY 2002, c. 76) and Part V of the Air Emissions Regulations (YOIC 1998/207) for an amendment of Air Emissions Permit No. 60-010-01 authorizing Yukon Energy to modify the thermal generating component (the Project) of its Faro Generating Station (the Site).

Yukon Energy seeks an amendment of the permit to allow for the addition of up to 4.9 MW of additional operational capacity (to a maximum total of 20.4 MW) for the diesel electricity generators, including burning and storage of diesel fuel for a total site capacity of up to 615,000 L of diesel fuel. The Site is currently permitted to operate at a capacity of 15.5 MW and total fuel storage capacity of 410,000 L. This document provides supporting information for the permit amendment process and the associated environmental and socio-economic assessment, and includes detailed information referenced in the YESAA Designated Office Evaluation Form 1, which has also been completed and filed on the YESAB Online Registry.

Section 1 of this document contains general proposal information including the following:

- The intent and structure of this document and related information;
- The proponent, Yukon Energy Corporation; and
- Project Location.

Section 2 contains information corresponding to Part 4 – Project Purpose and Details of the YESAA Designated Office Evaluation Form 1 including the following:

- Purpose of the Project; and
- Significance of the Project to providing electricity grid stability in the Yukon.

Section 3 contains information corresponding to Part 5 – Project Description of the YESAA Designated Office Evaluation Form 1 including the following:

- Project activities and components; and
- Required authorizations and regulatory approvals.

Section 4 contains information corresponding to Part 6 – Existing Environmental and Socio-economic Conditions of the YESAA Designated Office Evaluation Form 1 including the following:

- Environmental conditions (Vegetation, wildlife, fish and aquatic ecosystems, air quality, and noise); and

- Socio-economic conditions.

Section 5 contains information corresponding to Part 7 – Existing Environmental and Socio-economic Conditions of the YESAA Designated Office Evaluation Form 1 including the following:

- Identification of the Valued Components (VC) for this Project;
- Potential effects and effects characterization of each VC;
- Mitigation measures of effects for each VC; and
- Significance determination of effects for each VC.

1.2 Proponent Information

Yukon Energy is the Project proponent. The proponent's contact information is provided in the YESAA Designated Office Evaluation Form 1.

Yukon Energy is a publicly owned electrical utility and the main generator and transmitter of electricity in the Yukon. Yukon Energy is owned by the Government of Yukon (YG) through the Yukon Development Corporation (a Crown corporation) and is subject to rate regulation by the Yukon Utilities Board under the Public Utilities Act (RSY 2002, c. 186).

Yukon Energy is incorporated under, and is regulated by, the Business Corporations Act (RSY 2002, c. 20), the Public Utilities Act (RSY 2002, c. 186), and the Yukon Waters Act (SY 2003, c. 19).

1.3 Project Location

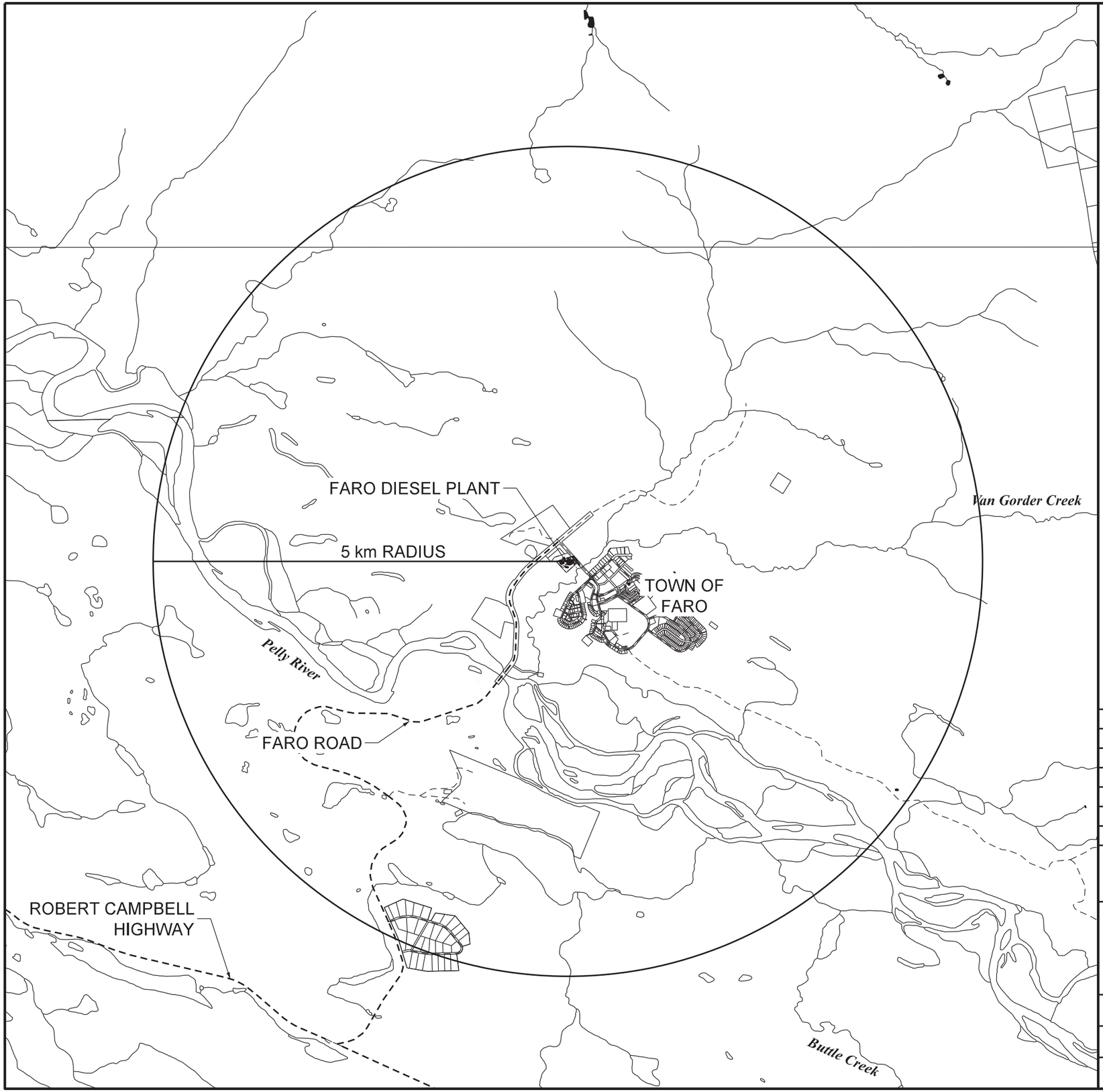
The Project is located in the community of Faro, Yukon, near the town entrance. A map of the Project location is presented on the following page (Figure 2-1). The Project is within the unceded traditional territory of the Ross River Dena Council and Liard First Nation. The proposed Project activities are located within the existing generating station boundaries. No new land or site clearing is required.

The legal description of the property is as follows:

- Lot 114, Plan 49716 LTO OCT No. 93Y377
- NTS Map Sheet# 105 K/03

Approximate UTM coordinates are as follows:

- UTM Zone: 8
- Northing: 6901266.50
- Easting: 585174.54



LEGEND

DIGITAL DATA SOURCES AND DISCLAIMERS:

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Yukon Community Cadastral Information and First Nations Settlement Lands compiled by Legal Surveys, Natural Resources Canada.

UTM Zone 8 NAD83

Scale 1:50,000

0.5 0 2 Kilometers

Rev. No.	Date	Description	Approv'd
1	SEPT 4, 2008	INITIAL REVIEW	TR
2	SEPT 19, 2008	FINAL	TR
3	AUGUST 1, 2024	2024 YESAA	-

YUKON ENERGY CORPORATION

FIGURE 2-1: FARO GENERATING STATION SITE MAP

FARO GENERATING STATION
YESAA PROJECT PROPOSAL
SUPPORTING DOCUMENTATION

Drawn: C.McGILLIVRAY	Date: SEPTEMBER 2008
Scale: 1:50000	Map Sheet No. 105K03
Revision Number: 3	Dwg Name: FARO

2 PART 4- PROJECT PURPOSE AND DETAILS

Electricity is essential to Yukoners' quality of life. We use electricity to store our food in fridges and to cook our meals. Electricity lights and heats our homes, enables education in our schools, and powers health care equipment in our hospitals and nursing stations. We use electricity to power the machines that help us to communicate with our friends and family, and that allow our governments and businesses to function. Every day, all day, electricity enables Yukon society and connects us with the rest of the world. We understand how important electricity is when the electricity system fails. During an outage, especially in the winter, there are risks to public safety and infrastructure. So much so, that governments and utilities continue to collaborate on developing and refining emergency procedures in the event of a prolonged outage in very cold temperatures.

The backbone of Yukon Energy's generation resources is three hydro-electric and five thermal generation resources (diesel- and natural gas-fired) that, when connected with our transmission, form the electric grid of the Yukon Integrated System (YIS). Historically, Yukon Energy has met over 90% of the Yukon's electricity needs with generation from our renewable hydro-electric facilities. The hydroelectricity Yukon Energy generates keeps the Yukon's electricity system stable, reliable, renewable, and inexpensive compared to other jurisdictions across northern Canada. In the winter, the Yukon's peak electricity demand is over twice as high as in the summer and we supplement the hydro-electric generation with thermal generation to meet winter demand. As the Yukon is not connected to the rest of the North American electrical grid, we cannot rely on electricity imports during peak load periods. On the coldest winter days, when electricity demand peaks, Yukon Energy must be self-sufficient to meet the electricity needs of the territory. The Yukon has a cold climate and electricity is critical to the safety and wellbeing of our customers: as more and more Yukoners depend on electricity to heat their homes in winter, power outages in wintertime become a greater risk to public safety. Having access to winter dispatchable diesel generators ensures that Yukon Energy can continue to provide reliable service in the event of an emergency or extreme weather event in the wintertime. An emergency event causing extended power outage has a low probability, but the high consequences require Yukon Energy to be prepared to immediately restore supply of electricity to customers on the grid to avoid rolling blackouts.

Increasingly across Canada and in the Yukon, we are looking to electricity as the primary driver for climate action. We are replacing fossil fuels with electricity to heat our homes and power our vehicles, increasing the amount of electricity we need. This, coupled with a growing population, is putting demands on our aging electrical infrastructure that was built many decades ago.

The additional generation capacity that Yukon Energy is proposing will act as insurance during emergency scenarios where Faro may be isolated from the rest of the Yukon's electricity grid and electricity from our other generation resources (hydro-electric and LNG facilities) may not be available for maintenance or repair purposes. These diesel electricity generating units at the Site would typically be at the bottom of stacking order and would only be operated when our hydro-electricity and LNG facilities cannot meet demands, in the case of an emergency, grid

separation, planned and unplanned outages for maintenance, and for short durations for monthly exercise to confirm operational readiness.

The generation stacking order changes based on available information at the time of generation, including demand, available resources, condition of resources, and system stability requirements. The approximate stacking order for thermal generation dispatch is as follows: (1) LNG facility, (2) Whitehorse diesel rentals, (3) Faro diesel rentals, (4) Mayo diesel rentals, (5) Whitehorse permanent diesel, (6) new Callison permanent diesel (subject to YESAB assessment 2023-0150), (7) Faro permanent diesel, (8) Dawson permanent diesel, and (9) Mayo permanent diesel. The thermal stacking order is subject to (a) total thermal operation at each site not exceeding air emissions permit under normal operation conditions, and (b) where feasible, maintain each rental operational hours under 500 hours/28 days allowance as per Yukon Energy's contract.

3 PART 5 – PROJECT DESCRIPTION

The Site is currently permitted for 15.5 MW of operational capacity and Yukon Energy is seeking an amendment of the existing Air Emissions Permit (60-010-01) to allow for the addition of 4.9 MW of operational capacity to a maximum site total of 20.4 MW. The Site's operational capacity will be provided by three permanent diesel generator units (existing FD7 and new FD8 and FD9 units) and seven temporary units (YM20 to YM26), as described in Table 3-1 below. Yukon Energy de-commissioned diesel unit FD1 in 2023, which had a name plate capacity of 5.15 MW. The project activities will also include burning and storage of diesel fuel for a total Site capacity of up to 615,000 L of diesel fuel.

We are seeking an evaluation of socio-economic and environmental effects as a result of the additional 4.9 MW of generation capacity from the Designated Office for an estimated project life (temporal scope) of 20 years, or potentially to the end of 2044. The assessment does not include the activities already undertaken, including installation and operation of the existing fuel storage tanks, and installation and operation of the generator units providing an operational capacity of 15.5 MW that were previously authorized by the Government of Yukon, Environment.

The Project is located within the fenced area of the existing Faro Generating Station. This property is registered to Yukon Energy Corporation.

The existing facility includes the following infrastructure:

- A fenced yard;
- Generator Building for unit FD7;
- Stations for seven portable rental diesel generators installed in 2020;

- Fuel storage tanks (existing storage tanks for permanent generators, temporary storage for rental generators);
- Substation;
- Office; and
- Control Building.

Figure 3-1 provides an overview of the Site and locations of the proposed generator units and fuel storage tanks.

Figure 3-1: Faro Generating Station Site Overview

Table 3-1: Summary of Diesel Generator Units at the Site

Unit No.	Manufacturer	Operating Capacity (MW)
FD7	Caterpillar 3612	2.8
FD8 (Proposed)	Caterpillar C175-16	2.5
FD9 (Proposed)	Caterpillar C175-16	2.5
YM20	Caterpillar 3612C	1.8
YM21	Caterpillar 3612C	1.8

Unit No.	Manufacturer	Operating Capacity (MW)
YM22	Caterpillar 3612C	1.8
YM23	Caterpillar 3612C	1.8
YM24	Caterpillar 3612C	1.8
YM25	Caterpillar 3612C	1.8
YM26 (Proposed)	Caterpillar 3612C	1.8

Table 3-2: Summary of Fuel Storage Tanks at the Site

Tank No.	Volume (L)	Fuel Supply for Unit(s)
1	110,000 (Existing)	FD7 Unit
2	75,000 (Existing)	Temporary Units
3	75,000 (Existing)	Temporary Units
4	75,000 (Existing)	Temporary Units
5	65,000 (Proposed)	FD8 & FD9 Units
6	65,000 (Proposed)	FD8 & FD9 Units
Total Fuel Volume (L)	**465,000**	

The Site is operated infrequently and typically only for very short durations under the following specific conditions:

1. The need to meet demand for electricity during those times when hydro-electric and LNG facilities are taken offline for routine maintenance;
2. The need to meet demand for electricity during those times when hydro-electric and LNG facilities are offline as a result of an emergency condition;
3. The need to meet demand for electricity during those times when there is a grid separation (i.e., transmission outage) and electricity from some of our generation resources may not be available;
4. The need to exercise a particular diesel unit as a part of routine maintenance;
5. The need to meet demand for electricity during those times when hydro-electric and LNG facilities are otherwise unable to meet current demand for energy.

While Yukon Energy could operate the generators at the Site for the five (5) reasons above, generation data from the past five years provided in Table 3-3 below, demonstrates the annual energy generated from the Site is relatively immaterial compared to our larger thermal facilities that generate the majority of the Yukon's electricity

from thermal resources. By way of comparison, the Whitehorse Rapids Diesel Generating Station generated over 40 GWh of energy in 2023.

As presented in Table 3-3, the annual energy generation at the Site is consistent in the last five years with the exception of 2022. The annual operating hours at the Site in 2022 were higher in comparison to other years because the Yukon experienced an atypical cold winter that year and a new peak demand was reached in December 2022. Between September and December 2022, Yukon Energy utilized the diesel generation facilities across the territory, including the Faro Generating Station, to supplement hydro-electric and LNG generation and meet demand for electricity. In the following year of 2023, the annual energy generation and operating time at the Site are more consistent with previous years' records.

Table 3-3: Historical Annual Energy Generation at the Faro Generation Station (2019 – 2023)

Year	Annual Energy Generation (GWh/year)	Total Annual Operating Time (hours)
2023	2.5	1,354
2022	4.7	2,851
2021	2.1	1,261
2020	1.5	899
2019	0.8	525

Section 5.1 of this proposal discusses the maximum potential impacts of emissions from the site's generators on air quality. The assessment is based on a highly conservative and unlikely scenario where all ten diesel generators operate continuously and simultaneously for 365 days a year. However, operation data in Table 3-4 shows that between 2019 and 2023, the units were operated infrequently: FD1 unit was in use between 1-5% of the total 365 days each year, and the FD7 and rental units were operated 18% or less of the time during the year. Therefore, the actual operation times of the Faro Generating Station and the associated typical emissions are expected to be much lower in magnitude and more infrequent and intermittent than the maximum loads and emission rates modelled in the air quality assessment.

Table 3-4: Number of Days Units Were Turned On from 2019 – 2023 by Generator Unit

Year	FD1 Unit[1]		FD7 Unit		Combined YM Units	
	Number of Operation Days in a Year	Percentage of Operation Days in Each Year	Number of Operation Days in a Year	Percentage of Operation Days in Each Year	Number of Operation Days in a Year	Percentage of Operation Days in Each Year
2023	5	1%	35	10%	41	11%
2022	17	5%	56	15%	64	18%

Year	FD1 Unit[1]		FD7 Unit		Combined YM Units	
	Number of Operation Days in a Year	Percentage of Operation Days in Each Year	Number of Operation Days in a Year	Percentage of Operation Days in Each Year	Number of Operation Days in a Year	Percentage of Operation Days in Each Year
2021	20	5%	43	12%	57	16%
2020	9	2%	62	17%	3	1%
2019	5	1%	12	3%	-	-

[1]FD1 is retired at the time of this proposal.

3.1 Required Authorizations and Regulatory Approvals

Yukon Energy requires an amendment of the existing Air Emissions Permit No. 60-010 to have the ability to operate additional thermal generation resources and ensure the continuity of a reliable supply of power to Yukoners as described in Section 2 of this proposal. A permit can be issued by the Minister responsible for the Department of the Environment pursuant to Section 12 of the Air Emissions Regulations under the Environment Act. It is expected that the existing permit will be amended to allow the requested modification to the Faro Generating Station.

To amend the Permit in this manner, the Yukon Government must issue a decision document based on the environmental and socio-economic assessment of the amendment application under YESAA. An environmental and socio-economic assessment is required under Schedule 1, Part 4, Item 2(b) of the Assessable Activities, Exceptions and Executive Committee Projects Regulations under YESAA, because the Permit is for the "operation ... of ... a fossil fuel-fired electrical generating station".

While the amendment request is to authorize changes to the Faro Generating Station to have up to 20.4 MW of back-up diesel generating capacity, the activity is an expansion (< 5MW) to an existing facility and does not involve the construction, decommissioning, or abandonment of a fossil-fuel fired electrical generating station, as such the proposed activity is not immediately assessable at the Executive Committee level.

As noted in Section 1.1 Project Overview, Yukon Energy is requesting a recommendation by the Designated Office to allow the Permit amendment to proceed, on the basis that the Project will not have a significant adverse environmental or socio-economic effect within the meaning of section 56(1)(a) of YESAA, and the Project is operated in accordance with the terms and conditions of the amended Permit and the applicable provisions of the Environment Act, Air Emissions Regulations, and Storage Tank Regulations.

4 PART 6 - EXISTING ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

4.1 Environmental Conditions

The Town of Faro is situated on the Traditional Territories of the Ross River Dena and Liard First Nation, and is geographically located in the Pelly River Valley in the Anvil Mountains, which is 356 km northeast of Whitehorse on the 450 km long Tintina Trench fault line on the edge of the Yukon Plateau-North Ecoregion. It is located at an elevation of approximately 690 m above sea level. The soil surrounding the facility is composed of sand and gravel layers with some silt. Permafrost is discontinuous in the Yukon Plateau-North Ecoregion and it is dependent on factors such as ground surface moisture content and organic-layer thickness.

The existing conditions associated with vegetation, wildlife, fish and aquatic ecosystems, air quality, and noise are discussed in the following sections.

4.1.1 Vegetation

The Project is located within the Yukon Plateau-North Ecoregion of the Boreal Cordillera ecozone. The vegetation ranges from boreal to alpine, with northern boreal forest reaching elevations up to 1,500 m. The dominant forest type of the boreal zone is characterized by open canopy black spruce with a moist or drier lichen understory. White spruce forests, occasionally with aspen or lodgepole pine, occur in warmer and better-drained sites. Various willows, sedges, and aquatic plants are present in or around wetland areas.

The Site is located within the existing Faro Generating Station and has been previously cleared.

4.1.2 Wildlife

The Yukon Plateau-North Ecoregion provides habitat for a variety of wildlife and bird species typical of the boreal forest. The ecoregion supports populations of grizzly and black bears, caribou, moose, wolverine, marten, wolf, Stone and Fannin sheep, lynx, red fox, beavers, and other small mammals.

There is a large abundance of grizzlies in the Faro area. The Tintina Trench serves as an important migratory corridor for large numbers of sandhill cranes that breed in Alaska. The region's wetlands are also used as breeding grounds for raptors, songbirds, forest birds, and waterfowl. There are no known Wildlife Key Areas and species of conservation concern that overlap with the Project Site.

4.1.3 Fish and Aquatic Ecosystems

The Site is located within the Pelly River watershed. The Project is located approximately 2 km away from the Pelly River. Van Gorda Creek is the closest waterbody and is located approximately 0.15 km to the southeast.

Some of the fish species inhabiting the Pelly River are Chinook, Coho, and Chum salmon, lake trout, Arctic grayling, northern pike, burbot, and whitefish. The fish species in Vangorda Creek include Chinook salmon, Arctic grayling, round whitefish, longnose sucker, burbot, slimy sculpin, and lake chub.

4.1.4 Air Quality

The Project's existing air quality conditions are discussed in this section. Section 5.1 of this proposal discusses the air quality assessment (Air Assessment) completed by WSP (2024a) for this Project and the associated potential effects to air quality. See Appendix B for the full assessment report.

Since there is no air dispersion modelling guideline in Yukon, the Air Assessment followed recommendations of the British Columbia Air Quality Dispersion Modelling Guideline (AQDMG), which considers baseline air quality be the concentrations from emissions of both natural and anthropogenic sources, excluding the source being modelled.

Based on the emission characteristics of the Faro Generating Station's diesel generators, a total of six (6) criteria air contaminants (CACs) were evaluated in the Air Assessment, including carbon monoxide (CO), coarse and fine particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), and total suspended particulate (TSP).

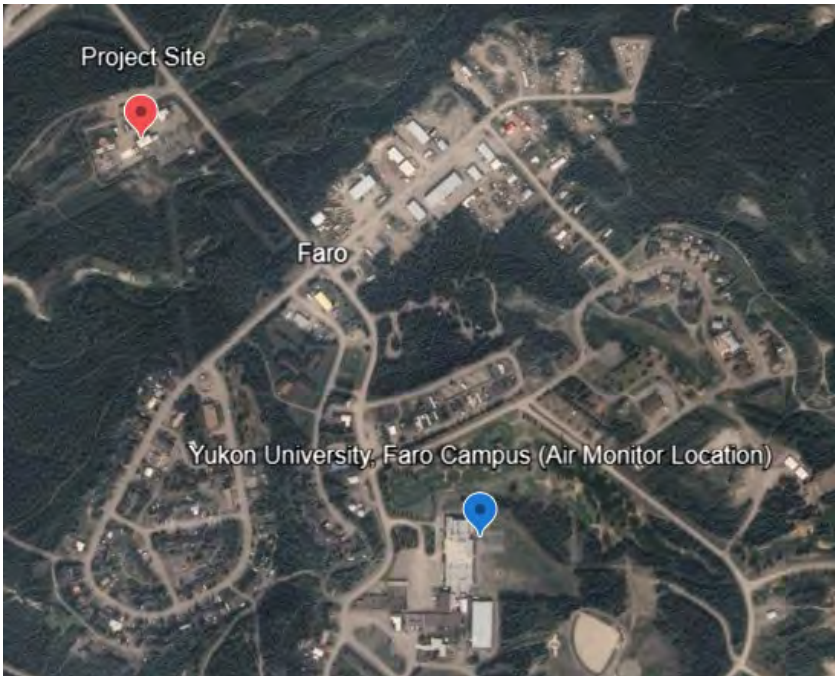
For the Air Assessment, WSP (2024a) assessed baseline air quality for the Site. Typically, this is done within the modelled airshed; however, in the Yukon, ambient air quality monitoring data is only available for one station located in downtown Whitehorse. Environment Canada operates an air quality monitoring station located at 1091 - 1st Avenue, as part of the National Air Pollution Surveillance (NAPS) network. The available air quality data from Whitehorse was not considered representative to evaluate ambient air quality conditions for the Project, due to the significantly greater anthropogenic activities and emission sources in Whitehorse as compared to the remote Project location in Faro.

Following the recommendations of BC AQDMG (BC MoECCS, 2022a), monitoring data from other rural and remote locations was used to determine the ambient air quality baseline for the Air Assessment. Baseline CO, $PM_{2.5}$, PM_{10}, and SO_2 concentrations were calculated from monitoring data for the three most recent years (2019 to 2021) obtained from Inuvik, Northwest Territories. There is no hourly TSP monitoring data available for the Project location, so it was not included in the Air Assessment. Following recommendations of the Guidance for NO_2 Dispersion Modelling in British Columbia (BC MoECCS, 2022b), ambient NO_2 monitoring data from Farmington, BC, is used to estimate the NO_2 baseline in rural areas with no notable sources of nitrogen oxides (NOx), which is applicable in this case to Faro.

Furthermore, a comparison was made between the baseline NO_2 concentrations and ambient NO_2 monitoring data collected at the continuous ambient air quality monitoring location within Faro (installed on August 16, 2023 by Yukon Energy). The air quality monitor was installed at the Yukon University Faro Campus, approximately 800 m southeast of the Site, as shown in Figure 4-1. At the time the Air Assessment was completed, approximately eight

months of continuous NO_2 monitoring data was collected and summarized (August 16, 2023 to April 30, 2024). The ambient NO_2 levels measured at the monitoring station in Faro are much lower compared to the levels monitored at Farmington station, approximately 45-65% lower than the levels at the Farmington station. Compared to the Yukon Ambient Air Quality Standards (YAAQS), the actual NO_2 levels measured in Faro are very low (25% of the 2025 1-hour NO_2 YAAQS and 7% of the 2025 annual NO_2 YAAQS). See Tables 3-1 and 3-2 in Appendix B for a summary of baseline air quality concentrations and NO_2 monitoring data from Faro.

Figure 4-1: Map of Air Quality Monitor Location



4.1.5 Noise

Yukon Energy implemented a noise monitoring program that measures ambient sound levels from existing noises in the community to establish baseline levels of noise. Two noise monitors were deployed in Faro at two residential locations close to the Site on December 11th, 2023, as shown in Figure 5-1 in Section 5.2. The results of the noise monitoring program and discussion of the potential noise impact from the generators at the Site are presented in Section 5.2.

4.2 Socio-economic Conditions

The Project is located within the Traditional Territories of the Ross River Dena and Liard First Nation. The Ross River Dena and Liard First Nation are a part of the Kaska Nation, which is a transboundary Nation, with traditional territory in British Columbia, Yukon, and Northwest Territories. The Kaska Dena, including the Ross River Dena and Liard First Nation have existed from time immemorial and have occupied and used the lands, waters, and resources

of their traditional territory throughout history. The Kaska language is a part of the Athapaskan language family and there are many regional dialects. The confluence of the Ross and Pelly Rivers, known to the Kaska as *Tu Lidlini*, has long been used as gathering place for First Nation Peoples, particularly in the late summer.

The Town of Faro is located 10 km off the Robert Campbell Highway, 358 km northeast of Whitehorse and 423 km northwest of Watson Lake. The Town of Faro was established in 1969 to service a lead-zinc mine 22 km North of the town. The mine was a vital contributor to the territorial economy for many years until 1998 when the last mine operator declared bankruptcy. Since 2009, the Government of Yukon has been responsible for the care and maintenance of the abandoned mine site and has provided training and employment opportunities to Faro residents.

In 2024, the population of Faro was 447 (Yukon Bureau of Statistics, 2024) and the Town of Faro is developing as a tourism, arts, and retirement community. Essential services in Faro include a municipal landfill; an RCMP detachment; the Faro Nursing Station; guest house accommodations; schools; Yukon University Faro Campus, an airport; volunteer fire, ambulance and search-and-rescue services; and other businesses, including a bank and restaurant.

4.2.1 Land Use Activities and Boundaries

Administrative boundaries that overlap with the project include game management area #4-51, group trapline concession #405 and outfitting concession #9. Hikers and other recreational users may occasionally frequent the wooded areas surrounding the Project. Land uses near the community include mining, recreation, hunting, trapping, and other traditional land uses.

5 PART 7 - ENVIRONMENTAL AND SOCIO-ECONOMIC EFFECTS AND MITIGATIONS

Three Valued Components were identified for this Project as having the potential for significant adverse effects: air quality, noise quality and environmental quality.

In addition to potential adverse Project-related effects, the Faro Generating Station has a beneficial effect on Human Health and Safety given that diesel facilities, including the Faro Generating Station, are essential to Yukon Energy's ability to provide a reliable supply of electricity to customers on those occasions when Yukon Energy is unable to satisfy total customer demand through hydro generation alone, i.e., in emergency situations, as well as during periods of planned maintenance or when there is peak demand during cold winter temperatures. If Yukon Energy were not able to use and rely on its thermal generation facilities to provide a reliable supply of back-up power to customers in these circumstances, this would put both human health and safety and infrastructure at serious risk, particularly during the cold winter months.

Notwithstanding the potential effects of not being able to meet customer demand in such circumstances, it is essential that electricity generating activities do not put other human, community, and/or environmental values at risk of serious irreversible harm. The following sections discuss the Project's potential effects on air quality, noise quality, and environmental quality.

5.1 Air Quality

5.1.1 Potential Effects

This Project includes increasing the operational capacity of diesel generators from the current capacity of 15.5 MW to 20.4 MW. As a result, there may be an increase in air emissions from the additional diesel burn. The potential effects on air quality include the following:

- Intermittent and infrequent effects that may reduce local air quality for short durations; and,
- Potential adverse effects to human health resulting from exposure to airborne contaminants.

The potential for significant adverse effects to Human Health and Safety as a result of project-related activities have been assessed by Yukon Energy and was based on the Air Quality Dispersion Modeling Assessment that was completed for the Project (WSP 2024a). The report for this assessment is provided in Appendix B.

5.1.2 Effects Characterization

The adverse effects of short-term exposure to diesel-fired generator combustion gas contaminants are generally associated with irritation of the tissues of the eyes, and upper and lower respiratory systems. The toxicity is dependent on the chemical concentration in the air rather than the total internal dose received by multiple exposure pathways. For CACs in combustion gases such as CO, PM_{10}, $PM_{2.5}$, NO_2 and SO_2, exposure limits are represented by air quality standards/guidelines/objectives and are used as exposure limits to assess potential health effects. In the Yukon, the Ambient Air Quality Standards (YAAQS) are used to determine allowable exposure limits and to regulate emission rates. The 2025 YAAQS was used as the air quality criteria to compare the assessment results against since the temporal scope of the Project is beyond 2025. Since the YAAQS does not have air quality criteria for carbon monoxide (CO), the British Columbia Pollution Control Objective (BC MoECCS 2021) were referenced for the CO air quality criteria in the Air Assessment.

The effects of diesel generation emissions on human health result from the cumulative interaction of emissions from Yukon Energy and all other sources of contaminants in the airshed, including community sources such as local vehicular traffic, home heating (using either fuel oil or wood stoves), and other (non-Yukon Energy) industrial activity. Those other sources, which are not within Yukon Energy's control, collectively produce the majority of contaminants in the community. Any potential effects on human health would be as a result of overall ambient air quality.

The spatial scope in which potential cumulative effects on air quality were assessed consists of a 5 km radius around the Site to capture existing properties and activities. Nearby activities that may contribute to residual effects on air quality within the spatial scope include existing highway traffic on the Robert Campbell Highway, heating of nearby residences and businesses, and other industrial activity such as the Faro Solid Waste Disposal Facility and an existing quarry.

A map of the locations of sensitive receptors is presented in Figure 5-15 of WSP's report (WSP 2024a) (see Appendix B). The sensitive receptors are identified as follows:

- The nearest residence to the Site is approximately 380 m to the southeast;
- The nearest business is located approximately 360 m to the east-southeast;
- The nearest childcare facility (Bubble's Faro Daycare) is 785 m to the southeast;
- The nearest school is 825 m to the southeast; and
- The health care facility is 860 m to the southeast.

The Air Assessment for the Project Site completed by WSP (2024a; Appendix B), includes a thorough and comprehensive dispersion modelling analysis to assess the potential effects within the Faro airshed of six CACs produced from the proposed diesel generator expansion including the following:

- Fine particulate matter ($PM_{2.5}$);
- Course particulate mater (PM_{10});
- Total suspended particulate (TSP);
- Nitrogen dioxide (NO_2);
- Sulphur dioxide (SO_2), and
- Carbon monoxide (CO).

To evaluate the predicted air quality impacts from the Site's proposed expansion, one (1) modelling scenario was conducted in this Air Assessment – the Expanded Capacity Scenario (21 MW). To reflect the worst-case air quality impacts from the Site, the emission scenario assumed that all generators are operating continuously at the maximum rated capacity, and the estimated emission rates were applied to all hours during the 2016-2018 modelling years. This conservative approach is common in air dispersion modelling assessments as it allows for emission sources to be assessed at maximum air contaminant emission rates under all meteorological condition combinations to predict the potential worst-case air contaminant concentrations. However, this conservative assessment of potential air quality impacts did not account for seasonal load variations whereby the generators

run mostly in the wintertime to meet peak electricity demand, and most of the time operate well below their nameplate or total capacity. The actual Site's loads and associated typical emissions are expected to be much lower than the maximum loads/emission rates modelled in the assessment completed by WSP (2024a).

As shown in Table 3-4 in Section 3, the operation data shows that from 2019 to 2023, the generators were operated infrequently, 64 days or less out of 365 days (18% of the time) each year. Therefore, the typical emissions from the Project are expected to be much lower in magnitude and more infrequent and intermittent than the maximum emission rates modelled in the air quality assessment.

Additionally, Yukon Energy installed a continuous ambient air quality monitoring station at the Yukon University, Faro Campus (see Figure 4-1) to collect data on the actual air quality levels in Faro and compare with the model results. Actual NO_2 monitoring data collected between August 2023 and April 2024 has measured very low levels of NO_2 (25% of the 2025 1-hour NO_2 YAAQS, and 7% of the 2025 annual NO_2 YAAQS). At the time of data collection, the Site had a unit capacity of 16 MW and is comparable to the "Future Expanded Emission Capacity" scenario modeled in the previous air quality assessment (WSP 2020). The monitored concentrations are well below the predicted NO_2 concentrations from the previous modeling assessment which suggests the conservative nature of the previous modelling assessment using similar but generally less conservative NO_2 modelling methodologies. Given that much of the additional capacity being added (FD8 and FD9) are Tier 4 generators, the increase in NO_x emissions is relatively small compared to the existing generators. Therefore, its expected that actual NO_2 concentrations will remain below the model predicted NO_2 concentrations and the YAAQS.

The full report on air dispersion modelling results can be found in Appendix B and a summary of the results is discussed in this document. The modelling results showed that the maximum predicted cumulative concentrations for the air contaminants $PM_{2.5}$, TSP, SO_2, and CO were below their respective ambient air quality criteria (2025 YAAQS and BC MoECCS criteria).

The modelling results indicate that the receptors in Faro that are most impacted from emissions of the Project are located at the North and Northwest edge of the town where there are existing businesses and a gas station (see Figures 6-5, 6-6, and 6-9 in Appendix B). Exceedances of the YAAQS for NO_2 (1-hour and annual) and PM_{10} (24-hour) cumulative concentrations are predicted at the nearest receptors to the Site. Exceedances of the 24-hour PM_{10} are primarily driven by the high baseline value for background concentration, which accounts for 99% of the YAAQS limit. The frequency of model predictions exceeding the 1-hour 2025 YAAQS is 14.2% of the three-year modeling period (3,740 out of 26,304 hours) at the receptor with the maximum impacts. The nearest receptors where maximum concentrations are predicted are located in an industrial area of Faro, consisting of businesses and a gas station, where outdoor human activity is expected to be limited and for short periods of time. Therefore, there is limited adverse effects and intermittent human exposure to air contaminants. Considering these factors, that the mitigation measures proposed by Yukon Energy are implemented, and that the model predictions are conservative and represent a highly unlikely operating scenario of the generators at the Site, the predicted air quality impacts

from the proposed generation capacity expansion are not anticipated to cause adverse effects to human health and residents of the Town of Faro.

The characterization of potential effects of air emissions as a result of the Project is described in Table 5-1. If the mitigation measures presented in Section 5.1.3 are implemented, the significance of potential effects on air quality is expected to be not significant.

Table 5-1: Characterization of Potential Effects of Air Emissions

Potential Effect	Potential Pathway	Impact Characterization Following Mitigation
Changes in air quality	Emissions generated by operation of the generators.	**Direction:** Negative **Magnitude:** Low **Geographic extent:** Local **Duration/reversibility:** Short term **Frequency/timing:** Infrequent **Likelihood:** Possible **Significance:** Not significant

5.1.3 Mitigation Measures

Yukon Energy's operational practices for management of potential air quality effects and emissions of GHG include the following:

- Generators will be operated and maintained regularly in accordance with manufacturer's specifications;
- Ultra-low sulphur diesel fuel will be used conforming to the latest Sulphur in Diesel Fuel Regulations;
- All associated personnel (employees, contractors or volunteers) will receive appropriate training and wear the appropriate personal protective equipment (PPE);
- Yukon Energy will run the generator units at the Site in order of highest possible efficiency in the circumstances, except for maintenance or test purposes which will be for short durations;
- Yukon Energy is developing a resource plan that will investigate a suite of renewable generation resources. We expect that over time, depending on the future load scenario, the frequency of use of the diesel generators may decline;
- Educate residents in the Yukon about reducing electricity consumption in day-to-day electricity use; and
- The new permanent generator units, FD8 and FD9, are outfitted with best available technology to reduce emissions and comply with the best available Tier 4 emission standards.

Yukon Energy's use and reliance on its diesel facilities will be constrained by the terms and conditions of its Air Emissions Permit, as well as the requirements of relevant legislation that applies to the project, including the Environment Act and the Air Emissions Regulations.

Compliance with the following conditions of the renewed Air Emissions Permit (Permit) is expected to mitigate the potential for further environmental and/or human health effects that may result from Yukon Energy's occasional use of the thermal generators at the Site:

- Yukon Energy is required to provide written notice to an environmental protection analyst before any significant change of circumstances at the site, including, without limitation, discontinuation of any regulated activity at the site, or any change of ownership of the site or any of the sources (paragraph 2.4);
- Yukon Energy is required to obtain approval from an environmental protection analyst before adding, modifying, removing or replacing any equipment or components relating to the release, abatement, control or treatment of air emissions, and before any change in location of the source(s);
- If an inspection reveals that the site or source(s) is in any way not in compliance with the Permit, Yukon Energy is required to repair the damage or take other actions required to bring the site or source(s) into compliance;
- Yukon Energy is required to develop and maintain a fire safety/emergency plan and a current site plan in accordance with the Permit and any requirements established by the Environmental Programs Branch of Environment Yukon; such plans (and any amendments) must be approved by an environmental protection analyst, and Yukon Energy is also required to implement approved plans, and to ensure all associated personnel are familiar with them;
- Yukon Energy is required to maintain and operate the sources, as well as any stand-alone air pollution control equipment and testing and monitoring equipment, in accordance with manufacturers recommendations and best management practices, as necessary to provide optimum control of air contaminant emission during all operating periods;
- Yukon Energy is prohibited from allowing visible emissions from any source to exceed an opacity of 20% as measured by an environmental protection officer, and must comply with further requirements to notify an environmental protection officer of any measured exceedance within 15 days or such time as may be directed by an environmental protection officer, and to take reasonable measures to reduce opacity of emissions within 5 days of any measured exceedance, or in such time as may be directed by an environmental protection officer;
- Yukon Energy must ensure that particulates collected using emission control equipment are contained so that there is no release of contaminants into the atmosphere or any open body of water;

- Yukon Energy is required to conduct visual inspections and maintenance on all source components as per manufacturer's instructions;
- Yukon Energy is required to contact either an environmental protection officer or the Yukon Spill Report Centre as soon as possible under the circumstances in the event of an unauthorized release or emission, such as fugitive emissions or emissions resulting from burning fuel other than that allowed under the Permit;
- Yukon Energy is required to maintain records for at least three years in a format acceptable to an environmental protection officer, and to make them available on request for inspection by an environmental protection officer, including every plan developed under the Permit, summaries of all inspections carried out under the Permit, notes concerning any spills, leaks or unauthorized emissions, any deficiencies identified in an inspection and how and when they were remedies, and notes concerning any instance where the most efficient source was not used, and the reason for use of the less efficient source.
- Yukon Energy's operation of the facilities will also continue to be subject to all applicable requirements and prohibitions under the Environment Act and Air Emissions Regulations, including:
- The general prohibition under the Regulations against Yukon Energy releasing or allowing the release of any contaminant to such extent or degree as may: (a) cause or be likely to cause irreparable damage to the natural environment; or (b) in the opinion of a health officer, cause actual or imminent harm to public health or safety;
- Yukon Energy's obligation under section 12(3) of the Regulations to provide written notice to the Minister, as soon as is reasonably feasible, of any significant change of circumstances involving the permitted activity;
- The authority of an environmental protection officer under section 12(4) of the Regulations to conduct periodic inspections of Yukon Energy's facilities to ensure compliance with the terms and conditions of the Permit;
- The authority of an environmental protection officer to issue a hold order under section 153 of the Act, or an environmental protection order under section 159 of the Act, in any of the circumstances described in those sections;
- The authority of the Minister to issue an environmental protection order under section 160 of the Act; and
- The overriding authority of the Minister to suspend or cancel the Permit under section 91 of the Act, if Yukon Energy contravenes a term or condition or the Permit or a provision of the Act or Regulations, or if, in the Minister's opinion, Yukon Energy's operation of its diesel facilities has caused or is likely to cause irreparable or costly damage to the natural environment, or if, on the advice of a health officer, it is the

Minister's opinion that Yukon Energy's operation or its diesel facilities has caused or is likely to cause a threat to public health or safety.

It should be emphasized that if, during the term of the renewed Permit, a situation arises in which the continuing operation of the Site could ever cause actual or imminent harm to public health or safety because of any change in circumstances or operating conditions that is not contemplated at this time, the Environment Act and Regulations will give overriding authority to an environmental protection officer and/or the Minister, in the circumstances specified, to require Yukon Energy to cease operating one or more of the diesel units, or take other action that may be deemed necessary to prevent, remedy or otherwise mitigate that harm.

Other relevant legislative requirements include the following:

- Section 27 of the Occupational Health Regulations, which stipulates workers exposure limits for airborne contaminants, usually based on an 8-hour permissible exposure limit;
- Sections 46 to 50 of the Canadian Environmental Protection Act, 1999, which speaks to the reporting requirements of the National Pollutant Release Inventory (NPRI);
- Yukon Special Waste Regulations;
- Yukon Contaminated Site Regulations; and
- Yukon Storage Tank Regulations.

5.1.4 Significance Determination

Considering the Air Quality Assessment report (WSP 2024a) attached to this proposal, the discussion of potential effects and effects characterization above, and the noted mitigation measures, no likely significant adverse effects in air quality and human health are expected to result from the Project.

5.2 Noise Quality

5.2.1 Potential Effects

There is potential for increase in noise levels as a result of the Project and from the additional 4.9 MW of operational capacity. The increase in noise levels has the potential to lead to disturbances for receptors close to the Site.

5.2.2 Effects Characterization

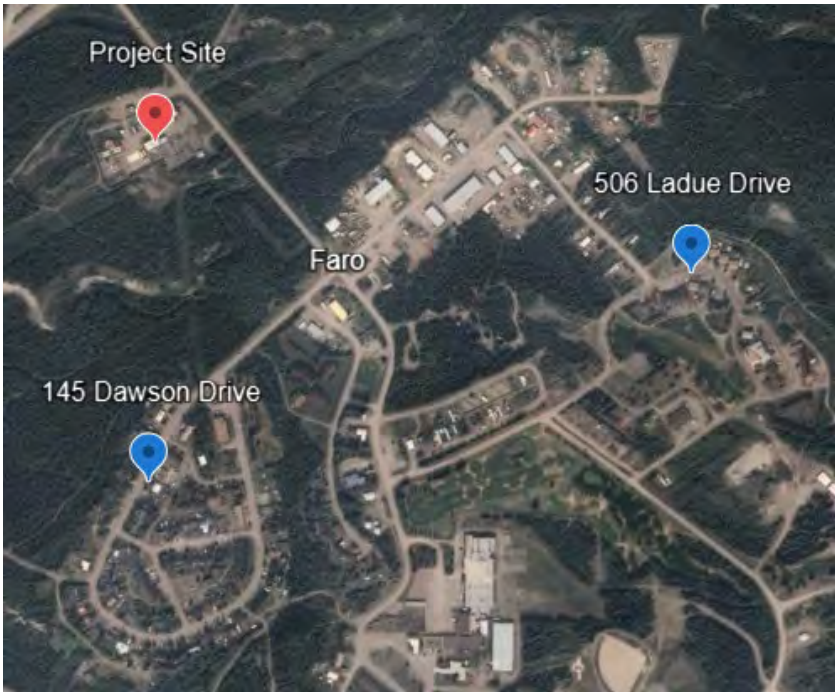
The two new generator units, FD8 and FD9, will be outfitted with permanent sound attenuation mufflers and the increase in noise levels is expected to be minimal and insignificant. Additionally, a sound barrier is designed and proposed for generator unit FD7. Acoustical modelling results (SLR 2023) indicate that there is a reduction of up to

1.2 Dba in the sound pressure levels perceived at critical residential receptors, with the addition of the sound barrier at FD7.

As a mitigation measure and to reduce the impact of noise generated by the Site, Yukon Energy has moved the rental units to new locations at the Site, as shown in Figure 1 of the SLR report (see Appendix C). Historically, the rental units were aligned along the south side of the property. SLR completed sound propagation modelling of the existing conditions and the proposed scenario (rental units at the new locations, sound wall at FD7 and new FD8 and FD9 units). The modelling results indicated that a maximum reduction of 3.6 dBA is achieved from the scenarios that were modelled (SLR 2023). See report provided in Appendix C for more details on the modelling results.

Comments from the community of Faro that were received during previous assessments (YESAB 2021-0115) indicated that the residents' noise complaints and concerns were mainly regarding the noise generated from the temporary, rental generators. In response, Yukon Energy implemented a noise monitoring program that measured the noise impact of all the diesel generators at the Site. At the time of implementation of the monitoring program, the generators that were in use included FD7 and the rental units. In consideration of feedback received from the community and stakeholders, two noise monitors were deployed, one each at the residences: (1) 145 Dawson Drive and (2) 506 Ladue Drive, on the upper and lower bench of Faro as shown in Figure 5-1.

Figure 5-1: Map of Two Noise Level Monitor Locations



Yukon Energy engaged with WSP to prepare a summary and analysis of the noise monitoring program results (WSP 2024b) for the monitoring period of December 11, 2023 to May 31, 2024. For the purpose of the analysis, sound

level data were grouped in hourly periods for the duration of a day. Then for the same hourly periods, the maximum, minimum, and average sound levels were determined for when the generators were operational (one or more generators were on) and not operational (ambient).

For each monitoring location, the sound levels for when the generators were operational were compared to the ambient sound levels to determine any changes in sound within Faro and potential noise impacts to the community when the generators are operating. A summary of the average sound levels at the monitoring locations and number of operational and non-operational hours is presented in Table 5-2.

The average and maximum sound levels for when generators were operational are compared to the ambient sound levels for monitoring location 1 (145 Dawson Drive) (see Figure 5-2), and monitoring location 2 (506 Ladue Drive) (see Figure 5-3). The average ambient sound level data set are plotted with error bars representing for two standard deviations from the mean, representing 95% of ambient sound level measured in that hour without generators running. The average, maximum, and minimum sound levels observed for each hour when the generators were running were also plotted (shown shaded in orange in Figure 5-2 and Figure 5-3). The graphs illustrate that in most hours that generators were running during the monitoring period, the sound levels with generators running fall within the 95th percentile of the ambient sound levels.

The analysis of the noise monitoring program completed by WSP, resulted in the following observations (WSP 2024b):

- Based on the data collected during the monitoring period of six months, the generators only operated for 881 hours out a total 4152 hours (21%) of the time during the reporting period.
- Out of the 881 hour period that the generators were operating, the generators ran 96% of the time (849 out of 881 hours) between 6:00 AM and midnight.
- Between the hours of 12:00 AM and 6:00 AM, the generators were only operated for 32 hours out of the 6-month monitoring period, which represents 4% of the 881 operational hours and 0.8% of the total 4,152 measurement hours.
- For monitoring location 1 at 145 Dawson Drive, the average sound levels for when the generators were running were within two standard deviations of the average ambient sound levels for majority of the day, with the exception between the hours of 5:00 PM to 10:00 PM and 1:00 AM to 9:00 AM. During the overnight hours of 10:00 PM and 5:00 AM and throughout the day, the maximum ambient sound levels were higher than when the generators were running. The data suggests that the community is exposed to similar levels of sound with or without the generators operating. Furthermore, the generators were only run for a total of 485 hours during the monitoring period (12% of the total 4152 hours) between 10:00 PM and 5:00 AM, indicating that the noise from the generators is infrequent, intermittent, and the potential effects are insignificant.

- Similarly, for monitoring location 2 at 506 Ladue Drive, the average sound levels for when the generators were running are also within two standard deviations of the average ambient sound levels, with the exception between 9:00 PM and 9:00 AM. During these times, the generators were run for 302 hours during the monitoring period (7% of the total 4152 hours), indicating that the noise from the generators is infrequent and intermittent. Additionally, the maximum sound levels with generators running were below the maximum ambient levels measured during the monitoring period. Similar to monitoring location 1, the data suggests that the community is exposed to similar levels of sound at this location with or without the generators operating.

- Since there are no applicable standards for noise in the Yukon, relevant standards from other jurisdictions including the British Columbia Oil and Gas Commission "Noise Control Best Practices Guideline" (BC OGC 2021) are referenced. The recommended limit for sound levels in Faro based on the BC OGC guideline is 53 dBA in the daytime and 43 dBA in the nighttime. These limits are based on the following assumptions: (a) an estimated dwelling density in the Project area of 9 to 160 dwellings per 451 m radius section of land and (b) dwellings are more than 500 metres from heavily travelled roads). As shown in Figures 5-2 and 5-3, the maximum ambient sound levels with no generators running are always above the daytime and nighttime limits at 145 Dawson Drive, and above the daytime and nighttime limits at 506 Ladue Drive for most of the hours.

- Based on the noise monitoring data, the generators may be audible above ambient sound levels within the community at certain times. For most of the measured data, between 6:00 AM and midnight, the difference in average sound levels were within 3 dBA. Therefore, it is possible that the sound levels with the generators running are comparable to the ambient sound levels that the community regularly experiences. Additionally, the maximum sound levels with no generators are typically higher than the maximum levels with generators running, suggesting that there are other sources contributing to noise in the community.

- Based on these results and observations, there is reason to expect that the incremental impact of sound levels from the generators is insignificant and there are no predicted adverse effects on community wellness from the noise generated from the Project.

Figure 5-2: Comparison of Sound Levels (Generators Running vs. No Generators Running) at Monitoring Location 1

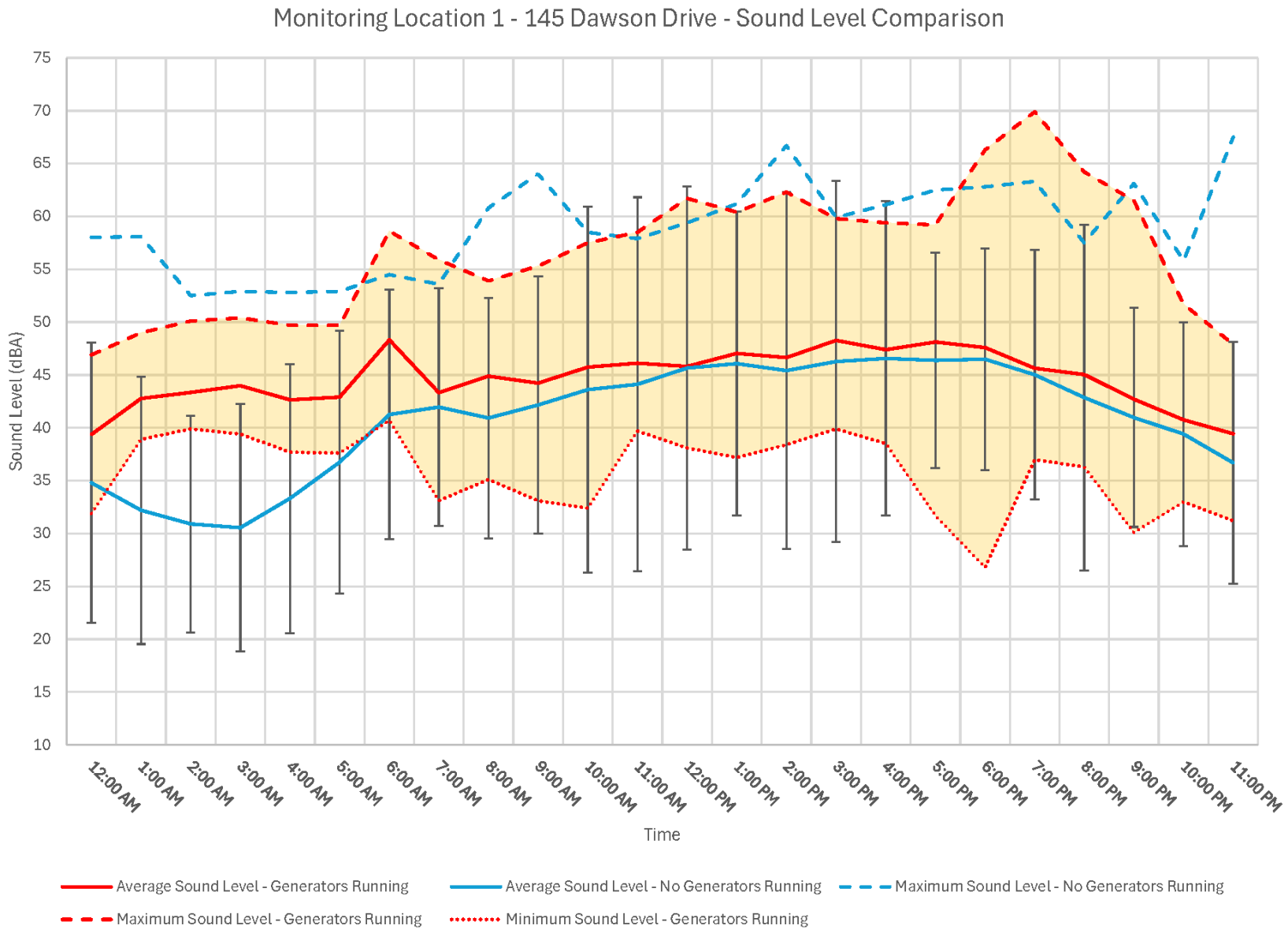


Figure 5-3: Comparison of Sound Levels (Generators Running vs. No Generators Running) at Monitoring Location 2

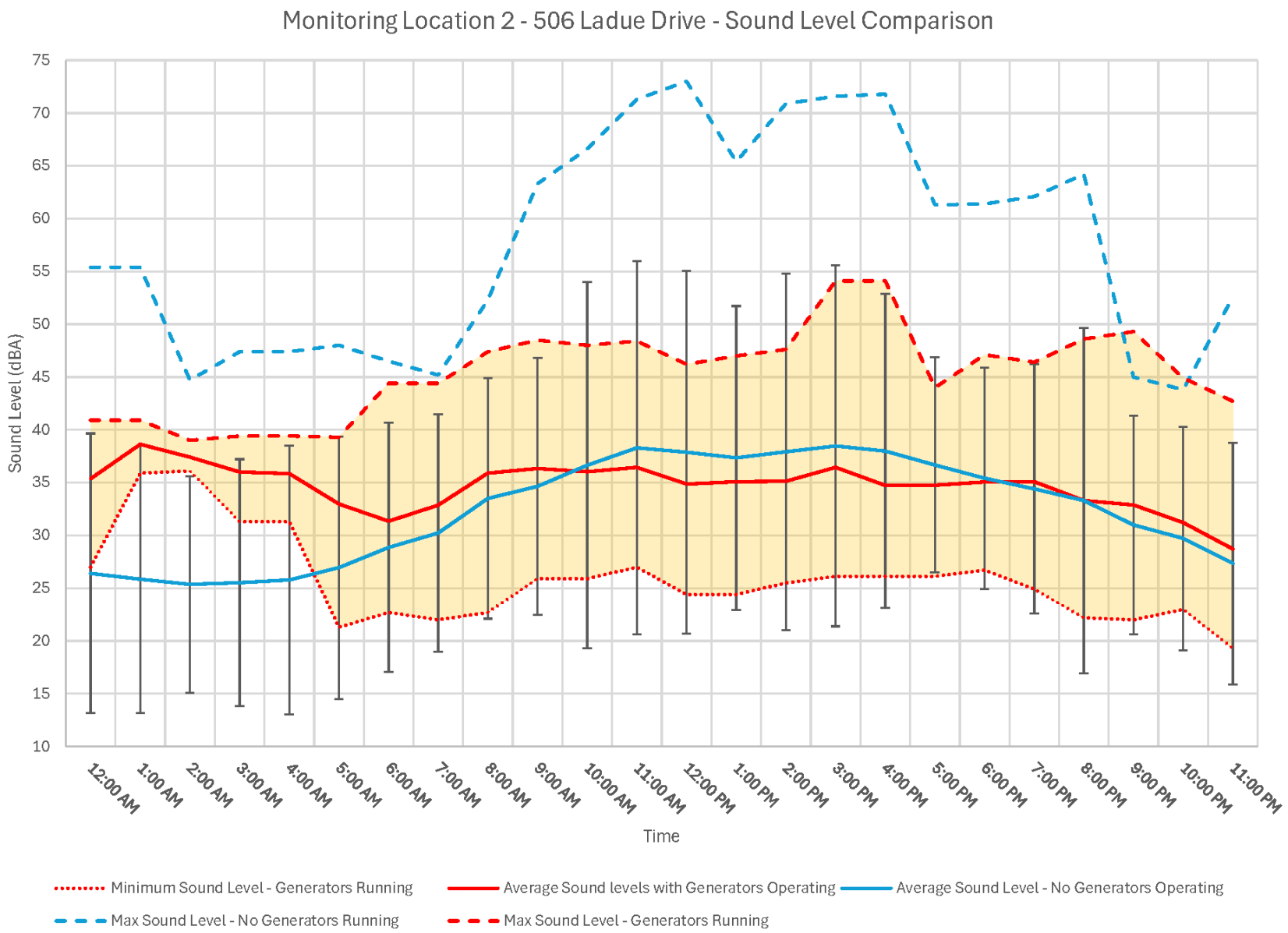


Table 5-2: Summary of Average Sound Levels at Monitoring Locations and Number of Operational and Non-Operational Hours

Time	Average Sound Levels (dBA)						Number of Hours	
	Monitoring Location 1 (145 Dawson Drive)			Monitoring Location 2 (506 Ladue Drive)				
	Ambient	Generators Running	Difference	Ambient	Generators Running	Difference	No Generator Running	Generators Running
12:00 AM	35	39	5	26	35	9	167	6
1:00 AM	32	43	11	26	39	13	169	4
2:00 AM	31	43	12	25	37	12	169	4
3:00 AM	31	44	13	26	36	10	169	4
4:00 AM	33	43	9	26	36	10	169	4
5:00 AM	37	43	6	27	33	6	163	10
6:00 AM	41	48	7	29	31	2	138	35
7:00 AM	42	43	1	30	33	3	127	46
8:00 AM	41	45	4	33	36	2	119	54
9:00 AM	42	44	2	35	36	2	118	55
10:00 AM	44	46	2	37	36	-1	117	56
11:00 AM	44	46	2	38	36	-2	113	60
12:00 PM	46	46	0	38	35	-3	114	59
1:00 PM	46	47	1	37	35	-2	115	58
2:00 PM	45	47	1	38	35	-3	116	57
3:00 PM	46	48	2	38	36	-2	125	48
4:00 PM	47	47	1	38	35	-3	121	52
5:00 PM	46	48	2	37	35	-2	120	53
6:00 PM	46	48	1	35	35	0	123	50
7:00 PM	45	46	1	34	35	1	127	46
8:00 PM	43	45	2	33	33	0	133	40
9:00 PM	41	43	2	31	33	2	137	36
10:00 PM	39	41	1	30	31	1	144	29
11:00 PM	37	39	3	27	29	1	158	15

The characterization of potential effects of noise as a result of the Project is described in Table 5-3. If the mitigation measures presented in Section 5.2.3 are implemented, the significance of potential effects on noise quality is expected to be not significant.

Table 5-3: Characterization of Potential Effects of Noise

Potential Effect	Potential Pathway	Impact Characterization Following Mitigation
Increases in noise	Noise generated by operation of the generators.	**Direction:** Negative **Magnitude:** Low **Geographic extent:** Local **Duration/reversibility:** Short term **Frequency/timing:** Infrequent **Likelihood:** Possible **Significance:** Not significant

5.2.3 Mitigation Measures

Yukon Energy's operational practices and engineering controls for mitigation of the potential noise quality effects include the following:

- The new generator units (FD8 and FD9) proposed for this Project are outfitted with permanent sound attenuation mufflers to reduce noise and significant disturbance to receptors close to the Site.
- A sound attenuation wall was designed for the permanent generator unit, FD7, to act as a noise barrier and reduce the level of noise generated by the unit.
- The generator units are installed with enclosures that act as a mitigation measure to reduce the level of noise generated. Yukon Energy will maintain the enclosures and ensure this measure is in good working order.
- Yukon Energy has a complaint management plan in place that includes the following:
    - Signage with contact information is provided for visitors and the public on the front gate of the Site should they have complaints or comments;
    - Yukon Energy maintains ongoing communication with the Town of Faro Chief Administrative Office;
    - Yukon Energy releases periodic public communications and holds events to share information about Yukon Energy operations and upcoming projects; and

- Yukon Energy endeavors to respond to complaints in a timely and responsive manner, consistent with any regulatory requirements and commitments Yukon Energy has made to reporting to the environmental protection officer.

- Generators will be operated and maintained regularly in accordance with manufacturer's specifications;
- Yukon Energy is developing a resource plan that will investigate a suite of renewable generation resources. We expect that over time, depending on the future load scenario, the frequency of use of the diesel generators may decline; and
- Educate residents in the Yukon about reducing electricity consumption in day-to-day electricity use.

5.2.4 Significance Determination

Considering the results of the noise level survey report (WSP 2024b), the discussion of potential effects and effects characterization above, and the noted mitigation measures, no likely significant adverse effects in noise quality are expected to result from the Project.

5.3 Environmental Quality

5.3.1 Potential Effects

Several hazardous materials (e.g., fuel, lubricants, coolants) and wastes are generated at the facility. For example, waste oil, waste solvents, waste coolants, and used absorbents are all commonly generated. The key pathway for potential effects to environmental quality to occur are associated with hazardous material releases to the environment, which would result in contaminated soils and water, and may further lead to adverse impacts to plants and animals, including humans. Examples of some mechanisms for such effects to occur could include improper filling of the fuel tanks, leakage of the stored fuel, loss of fuel as it is conveyed from storage to the diesel engines (i.e., piping, fitting leaks), loss of engine lubricant containment due to material or mechanical failure, improper storage and/or handling of stored lubricants, and/ vandalism that results in material loss to ground/water.

5.3.2 Effects Characterization

The magnitude of the character of the effects would be high relative to background conditions. The geographic extent of such releases would be limited to the local site area, so this attribute is considered local or low. The duration of such effects is likely to be low given that non-discretionary legislation requires recovery and restoration of hazardous material spills immediately and there is sufficient inspections and enforcement power to compel proponents (as necessary) to address such releases promptly. The frequency of an event occurring that would have such effects is also low, based on Yukon Energy's log of past incident reports at the Faro Generating Station and other similar Yukon Energy diesel plants. Reversing the effects of the event can be completed in a short time (i.e., restoration could occur in less than 1 year) given contemporary recovery and restoration technologies and the

effect mechanisms and pathways. Resilience to such short-term potential effects is also high for the biophysical and socio-economic environments at risk. Yukon Energy also assessed the probability or likelihood of such effects occurring is low for the following reasons:

1. Yukon Energy's commitment to adhere to permit requirements and applicable regulations (Environment Act, Special Waste Regulations); and
2. Programs, practices, and procedures of Yukon Energy.

The characterization of potential effects of spills and hazardous material releases to the environment as a result of the Project is described in Table 5-4. If the mitigation measures presented in Section 5.3.3 are implemented, the significance of potential effects on environmental quality is expected to be not significant.

Table 5-4: Characterization of Potential Effects of Spills and Hazardous Material Releases to the Environment

Potential Effect	Potential Pathway	Impact Characterization Following Mitigation
Reduced soil quality	Spills originating from fuel storage, refuelling equipment, or accidents and malfunction.	**Direction:** Negative **Magnitude:** Negligible **Geographic extent:** Local **Duration/reversibility:** Short term **Frequency/timing:** Infrequent **Likelihood:** Unlikely **Significance:** Not significant
Changes in water quality	Spills originating from fuel storage, refuelling equipment, or accidents and malfunction. Surface runoff from hazardous waste, special waste, or general waste.	**Direction:** Negative **Magnitude:** Negligible **Geographic extent:** Local **Duration/reversibility:** Short term **Frequency/timing:** Infrequent **Likelihood:** Unlikely **Significance:** Not significant

5.3.3 Mitigation Measures

Yukon Energy enacts engineering controls and operational programs, practices, and procedures to mitigate the risks of environmental quality impacts.

Engineering controls include the following:

1. Proposed fuel storage tanks and future permanent tanks will have secondary containment. The proposed permanent fuel tanks are double walled and designed with integral secondary containment;
2. Protected material storage facilities; and
3. Fuel tanks are operated within the range of 20% to 80% of its total capacity.

The operational programs, practices, and procedures include the following:

1. Spill response plan (see Appendix A).
2. Spill response equipment on site;
3. Regular inspections; and
4. Personnel training.

Pursuant to the requirements of Part 7 of the Environment Act and the Special Waste Regulations, storage and handling of these materials follows Yukon Energy's Special Waste Permit and industry best practice. All wastes are disposed of annually, or more often, through permitted commercial recycling, reuse, and/or disposal contractors, such as the Yukon Government Special Waste Collection and Disposal Program, permitted waste oil collectors, and approved waste disposal facilities in the community or in Whitehorse, as required.

5.3.4 Significance Determination

In consideration of the above effect characterization and the noted mitigation measures, no likely significant environmental quality adverse effects are expected to result from the project.

6 ACKNOWLEDGEMENT AND CERTIFICATION

The information submitted in this Project Proposal supporting document is required for the purpose of conducting an evaluation under the *Yukon Environmental and Socio-economic Assessment Act*.

I acknowledge that a copy of this Project Proposal supporting document and any additional proposal information that I submit will be placed on the YESAB Online Registry and will be made available to any member of the public to review.

I certify that the information provided is true and correct to the best of my knowledge and belief.

Dorothy Mung, P.Eng. August 26, 2024

Resource Planning Engineer

Yukon Energy Corporation

7 REFERENCES

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APPENDIX

Appendix A: Spill Response Plan

File # 2500-00-01

		DEPARTMENT:	INQUIRIES TO:	TOPIC:	Last Review Date
yukon energy	**SPILL RESPONSE PLAN-FARO**	Operations	VP, Operations	Spill Response/Hazardous Material Location Page 1 of 65	April 20, 2022
		ISSUED:	REVIEW DATE:	**APPROVED BY:**	**Revision #**
		May 2000	Annually	VP, Operations	8

FARO DIESEL/SUB-STATION

SPILL RESPONSE PLAN

Yukon Energy Corporation
Box 220
Faro, YT
Y0B 1K0

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1.0 EMERGENCY CONTACT INFORMATION

SCC (Available 24/7)

Phone: **867-393-5324, 867-393-5355**

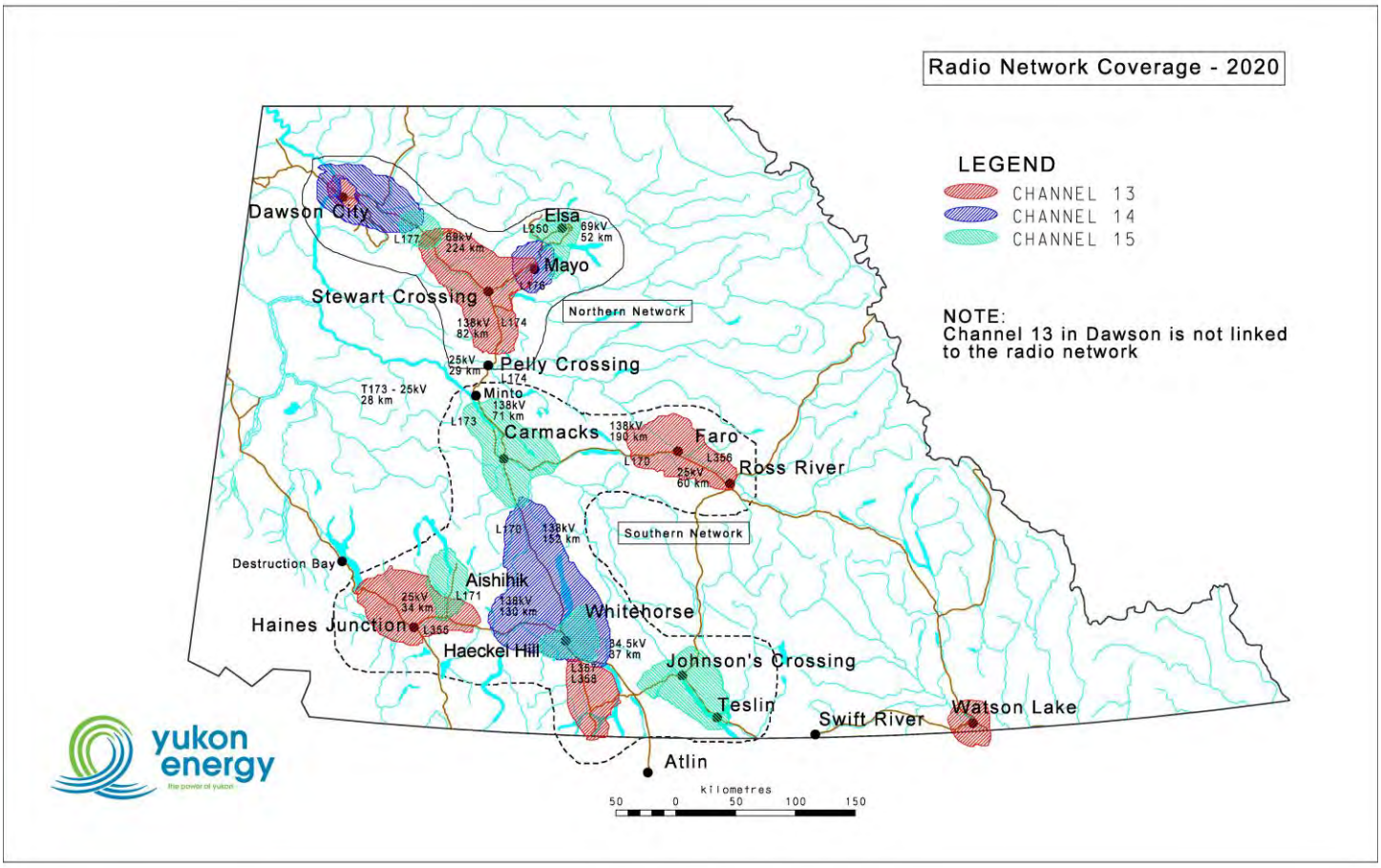
YEC Radio:

1. Ensure your radio is on the correct channel for your area.
2. Press and hold the "push to talk (PTT)" button (large button on left hand side of the mic)
3. While pressing the PTT button dial 1111 on the mic.
4. Voicecall your party.

If you are in the Faro Area, use channel 13

YEC Radio Notes:

- The link can be enabled/disabled from the northern or the southern radio network.
- The link will automatically be disabled after five minutes of inactivity.
- When in the Carmacks area you will hear a beep-beep after enabling the link and a beep-beep-beep after disabling the link. Unfortunately these acknowledgment tones are not transmitted in other areas of the radio network.
- The radio link between the southern and northern networks is very long and heavy snow or ice fog between Carmacks and Stewart Crossing may render the link inoperable at times.



2.0 INITIAL ACTION/SAFE APPROACH GUIDELINES

The following are intended as guidelines. Consider the circumstances of each event and act accordingly.

NOTIFY SSC and SUPERVISOR IF AVAILABLE **SCC Phone# 867-393-5324, 867-393-5355**

- Arrange Call-Back time, if appropriate.

ALERT OTHER EMPLOYEES/PERSONS IN AREA

- Approach spill site from up-wind or, if indoors, ensure you have a clear escape route
- Establish Perimeter Security
- Evacuate, if necessary
- Eliminate Ignition Sources
- Commence documentation

USE THE BUDDY SYSTEM

IDENTIFY MATERIAL, SPILL SOURCE, ESTIMATE QUANTITY SPILLED AND POTENTIAL FATE

- Block Potential Escape Routes, if appropriate

IF SPILL CONTINUING, CONTROL SOURCE, IF SAFE TO DO SO

- **SUBSTATION SPILLS. DO NOT ENTER UNLESS AUTHORIZED. HIGH VOLTAGE: CONTACT SCC then LEADHAND ELECTRICAL MAINTENANCE**
- Develop Spill Site Safety Plan located on page 9 and 10 of this document.

Refer to product MSDS. Wear appropriate PPE.

- (See “Fast Fact Sheets” at the back pages of this plan for spills of specific products.)

SUMMON RESPONSE RESOURCES, AS APPROPRIATE

UPDATE SCC and SUPERVISOR ON PROGRESS

Note: In some instances, initial on-scene personnel will only be able to monitor and/or contain the spill with resources at hand until assistance arrives.

DO NOT PUT YOURSELF at RISK

3.0 PURPOSE AND SCOPE

At this time this Spill Contingency Plan covers situations related to a spill or other unintended release of a liquid, solid and/or gas that may present a threat to those in a YEC facility or to the environment.
This spill contingency plan applies to all spills that occur at Yukon Energy's diesel facilities located in Faro, Yukon. The VP of Operations will approve the plan yearly and the Environment and Resource Analyst with Supervisors of Hydro, Thermal and Electrical Maintenance will review the plan yearly to ensure the information is current.

Purpose

The purpose of Yukon Energy's Spill Contingency Plan is to provide a plan of action for every foreseeable hazardous material spill event at the Faro Generating Facility. It defines the responsibilities of key response personnel and outlines the procedures for responding to spills in a way that will minimize potential health and safety hazards, environmental damage, and clean-up costs. The plan has been prepared to provide easy access to all the information needed in dealing with a spill.

It is the policy of Yukon Energy to initiate clean up activity when, in the opinion of its management, Yukon Energy is clearly associated, or likely to be associated with the spilled material. As well it is our company policy:

- To meet or surpass regulatory requirements;
- To provide protection of the environment using all of YEC's resources; when practicable
- To cooperate with other groups working on protection of the environment;
- To minimize the adverse effects of our activities on the natural and social environment;
- To keep employees, government officials and the public informed.

Scope

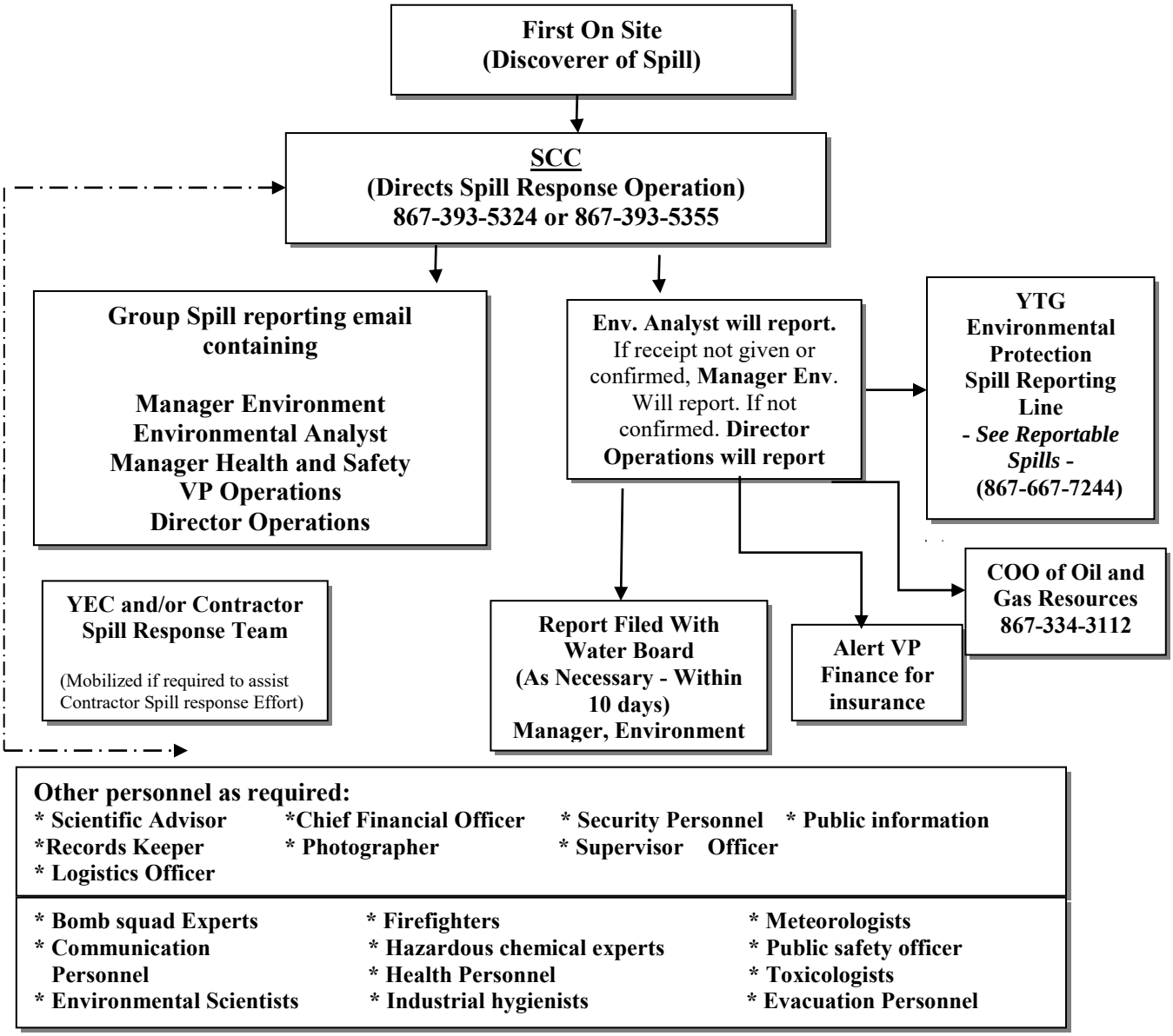
The Faro Diesel/Substation Spill Contingency Plan, Reporting Procedures and Hazardous Materials Locations document covers all hazardous materials stored and used at the Faro Diesel Generating Station and Substation sites. This document covers both spills on land as well as in adjacent watercourses (e.g., the Yukon River).

4.0 NOTIFICATIONS

Figure 1. Contact/Reporting Flow Chart
Contact flow chart in the event of a fuel, oil or other hazardous material spill. Qualified alternates will be contacted in the event someone is unavailable.

All spills of petroleum products oil or other hazardous materials to permeable surface and any amount to the Manager, Environment to insure that an investigation may be undertaken. In the event of a LNG or natural gas near miss event, the Chief Operating Officer of the Oil and Gas Branch must be informed. Quantities over 0.5L of waste oil and over 200L of fresh fuel or oil must be reported to the 24hr Spill Reporting Line.

The specific information requested when a spill is reported to government is outlined in Yukon Energy's Incident Reporting Safe Work Practice SWP-006 and Environmental Work Practice EWP-006 found on the Health and Safety and Environment EMS Sharepoint Site



SCC SPILL REPORTING EMAIL

Once a spill has been called into SCC, SCC will email the following staff to report the spill:

1. Environmental Analyst
2. Manager Environment
3. VP Operations
4. Director Operations
5. Manager Health and Safety

The email should contain:

- Date and time of the spill.
- Location of the spill
- Staff member on scene
- What was spilled
- How much was spilled
- Current situation
- Cause of spill

The email will prompt the Environmental Analyst to report the spill to the spill report line. If the Environmental Analyst does not respond to the email in 10hrs, the Manager of Environment of VP Operations will report the spill.

5.0 RESPONSE ORGANIZATION

Response organization Structure (s) by Classification Level of Response

MINOR: Level 1 INCIDENT COMMANDER: **RESPONDER/SUPERVISOR**

Is a spill of a minor nature that presents no significant threat to employees, property or the environment and absolutely no risk to the public. It can be cleaned up and remediated using workers and equipment available at the facility or site.

Example: A litre of varsol was spilled on the impermeable shop floor. The spiller alerts those around him of the occurrence, that the incident has occurred and cleans the product up using a small spill kit. Waste is disposed of in an appropriately labelled hazardous material waste container manner. No need to report externally or internally unless an equipment deficiency is raised. . In this example if the solvent had been in use (i.e., was not fresh) and/or had been spilled to a dirt floor, or other permeable surface, internal and external reporting would be required.

MODERATE: Level 2 INCIDENT COMMANDER: **SUPERVISOR** or delegate

A medium spill event where there is potential risk to employees, property or the environment but no risk to the public. This level may require external assistance to contain, recover or remediate.

Example: A vehicle entering the Whitehorse facility has impacted and punctured several barrels of waste oil stored directly on the ground with no spill tray to catch any release.

MAJOR: Level 3 INCIDENT COMMANDER: **VP, OPERATIONS** or delegate

A major spill event where there is a significant risk to employees, property, the environment and/or the public. Considerable internal and possibly external resources may be required to effectively respond.

Example: The 160,000L fuel tank in the yard of the Whitehorse facility has leaked and the product is escaping through a previously unidentified crack low on the secondary containment wall. The spill is spreading around the yard and entering the unpaved area adjacent to the property fence.

Responsibility to summon/manage external resources:

First Responders: SCC or personnel at the scene

External Emergency Responders/Regulators: Manager, Environment or Delegate. VP of Operations
Spill Response Contractors: SCC, Manager of Environment, VP of Operations, Lead hands

6.0 SPILL SITE SAFETY PLAN

Incident Name _____ ***Operational Period*** From _____ To _____

1. DESCRIBE THE INCIDENT AND SPECIFY THE SITE ENTRY OBJECTIVES

Description _____

Location _____

Incident Type

- ☐ Spill
- ☐ Gas release
- ☐ Explosion
- ☐ Fire
- ☐ Other _____
- ☐ Unknown

Site Entry Objectives under this Site Safety Plan

- ☐ Initial assessment or reconnaissance
- ☐ Account for personnel and/or rescue victims
- ☐ Source control
- ☐ Fire suppression
- ☐ Spill containment
- ☐ Spill recovery and/or cleanup

2. IDENTIFY PRODUCT HAZARDS

Consult MSDS; if no MSDS call CANUTEC at 613-996-6666 or "*666" (in Canada only)

Product Properties

Name _____
Estimated Amount _____
MSDS on Hand? _____
Gas / Liquid / Solid (circle)
Water soluble? _____
Specific gravity or vapor density _____

Product Hazards *(check all that apply)*

- ☐ Flammable (flash point _____ °C)
- ☐ Explosive (LEL range _____ to _____ %)
- ☐ Corrosive (corrodes _____)
- ☐ Reactive (reacts with _____)
- ☐ Toxic (IDLH _____; TLV _____)
- ☐ Carcinogenic

Potential Routes of Exposure to the Product *(check all that apply)*

☐ Inhalation ☐ Ingestion ☐ Eye contact ☐ Skin contact

3. IDENTIFY PHYSICAL SITE HAZARDS AND CONDITIONS

Physical Site Hazards

- ☐ Confined space
- ☐ Elevated area
- ☐ Pit or trench
- ☐ On or near water
- ☐ Unstable structure
- ☐ Electrocution
- ☐ Wildlife encounter
- ☐ Noise/vibration
- ☐ Extreme temperatures
- ☐ Low visibility
- ☐ Slip or trip hazards

Site Conditions *(as applicable)*

Air temperature _____
Wind chill temperature _____
Water temperature _____
Wind speed & direction _____
Precipitation _____
Humidity _____
Visiblity _____
Wave ht. (avg & max) _____
Speed of current _____
Direction of current _____
High/low tide times _____
High/low tide heights _____
Forecast _____

Wind Chill Temperature Chart

Wind Speed (km/hr)

Effective temperature (°C)	0	10	15	20	25	30	35	40	45	50	55	60
10	8.6	7.9	7.4	6.9	6.6	6.3	6	5.7	5.5	5.3	5.1	
5	2.7	1.7	1.1	0.5	0.1	-0	-1	-1	-1	-2	-2	
0	-3	-4	-5	-6	-7	-7	-7	-8	-8	-9	-9	
-5	-9	-11	-12	-12	-13	-14	-14	-15	-15	-15	-16	
-10	-15	-17	-18	-19	-20	-20	-21	-21	-22	-22	-23	
-15	-21	-23	-24	-25	-26	-27	-27	-28	-29	-29	-30	
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-25	-33	-35	-37	-38	-39	-40	-41	-42	-42	-43	-43	
-30	-39	-41	-43	-45	-46	-47	-48	-48	-49	-50	-50	
-35	-45	-48	-49	-51	-52	-53	-54	-55	-56	-57	-57	
-40	-51	-54	-56	-57	-59	-60	-61	-62	-63	-63	-64	
-45	-57	-60	-62	-64	-65	-66	-68	-69	-70	-70	-71	
-50	-63	-66	-68	-70	-72	-73	-74	-75	-76	-77	-78	

4. CHOOSE CORRECT LEVEL OF PPE (personal protective equipment)

Responders
- ☐ LEVEL A
- ☐ LEVEL B
- ☐ LEVEL C
- ☐ LEVEL D

Decon Team
- ☐ LEVEL A
- ☐ LEVEL B
- ☐ LEVEL C
- ☐ LEVEL D

A	B	C	D	*Equipment Requirement (*depends on situation)*
x	x			SCBA (self-contained breathing apparatus) or positive pressure supplied air respirator with escape SCBA
		x		Full-face or half-face respirator with appropriate cartridges
		x	x	Escape mask*
x				Encapsulating suit (chemical protective with vapor barrier)
x	x	x		Outer gloves (chemically resistant)
x	x	x		Inner gloves (chemically resistant)
x	x	x	x	Boots (chemically resistant, steel-toe and shank)
x				Disposable protective suit worn over entire ensemble
x	x	x	x	Disposable outer boot covers, chemically-resistant*
x	x	x	x	Hard hat
	x	x	x	Face shield*
		x	x	Safety glasses or chemical splash goggles
x	x	x	x	Coveralls*
x	x	x	x	Hearing protection*
x	x	x	x	Personal flotation device*
x	x	x	x	Cold weather gear*

5. SPECIFY MONITORING REQUIREMENTS

Site Safety Officer or designee is responsible for monitoring the following parameters (indicated by checked boxes) at the appropriate frequency and for immediately communicating levels requiring action to the On-Scene Commander. Action levels based on TLVs published by ACGIH.

Parameter	*Frequency*	*Action Level*	*Required Action*
☐ Oxygen		<19.5%	Wear SCBA
		>23.5%	Fire potential; stop monitoring, leave area
☐ Flammable gas		≥10% LEL	Explosion hazard; leave area
☐ Benzene		>25 ppm	Wear SCBA
		0.5 - 25 ppm	Use full-face air purifying respirator with organic vapor cartridges
☐ Carbon dioxide		>50,000 ppm	Wear SCBA
		5,000 - 50,000 ppm	Use half-face air purifying respirator with appropriate cartridge
☐ Hydrocarbons		50 to 500 ppm	Use half-face air purifying respirator with appropriate cartridge
		>500 - 2,500 ppm	Use full-face air purifying respirator with appropriate cartridge

6. BRIEF ALL PERSONNEL

Site Diagram attached? ☐ Yes ☐ No

***Reviewed with all team members** (check all applicable items)*

- ☐ Buddy system
- ☐ Hazards / conditions on site
- ☐ Emergency hand signals
- ☐ Evacuation alarm
- ☐ Evacuation / escape route
- ☐ Criteria for immediate evacuation
- ☐ Radio communications
- ☐ Location of first aid/rescue gear
- ☐ Required PPE
- ☐ Safe access route to site

Prepared by Site Safety Officer — ***Approved by*** On-Scene Commander

Signature Date/Time Signature Date/Time

7.0 MATERIAL/EQUIPMENT

MSDS

Refer to the SDS binder that is available in all control rooms at each plant location and is updated every 3 years by the Health and Safety Department. In the diesel plant for Aishihik, Faro, Whitehorse and Dawson, the SDS binder is located in the Operators office.

PPE

Use/wear the appropriate PPE as recommended by the SDS sheet. The appropriate PPE is mandatory.

Location: Faro

Glycol	5,100L
Diesel Fuel	112,250L
Oil	6,000L
Oil – Voltesso	12,900L

Location: Faro FD1
Container: Spill Response Kit - Rocky Mountain Small, wheeled

Quantity	Description	Size
1	White Oil/Gas sheets (bag of 100)	17"x19" ea
6	White Oil/Gas Small pillows	8"x18"
2	White Oil/Gas Large pillows	18"x18"
5	Grey universal Socks	3"x8'
2	Grey universal Socks	3"x4'
1	Plug n' Dike (Leak Repair Putty)	1 lbs Jar
1	Multi-Zorb Granular Sorbent	25lb bag
2	Drain covers: Neoprene	
1 box	Gloves Nitrile	Pairs XL
2	Splash Goggles	One fits all
2	Disposable poly coated overalls	One fits all
1	Disposal bags (6mil plastic) industrial waste	6mil plastic, box of 50
1	Shovel, small foldable	
1	Meter tag on spill kit after restocked	
100	Grey sheets -full bag	
5	Grey pillows 18x18	

Location: Faro FD7

Container: Spill Response Kit - Large box Outside FD7 plant

Quantity	Description	Size
1	White Oil/Gas sheets (bag of 100)	17"x19" ea
4	White Oil/Gas small pillows	8”x18”
5	White Oil/Gas Large pillows	18"x18"
6	White Oil/Gas only socks	3”x4”
6	White Oil/Gas only socks	3”x3”
5	Grey universal Socks	3"x8'
2	Grey universal Socks	3"x4'
1	Plug n’ Dike (Leak Repair Putty)	10 lbs bag
1	Multi-Zorb Granular Sorbent	25lb bag
1	Drain covers: Neoprene	
1	Gloves Nitrile	Pairs XL
2	Splash Goggles	One fits all
2	Disposable poly coated overalls	One fits all
2	Disposal bags (6mil plastic) industrial waste	6mil plastic
1	Shovel	
1	Grey sheets -full bag	100 sheet bag
5	Grey pillows 8x8	
1	Tarp	
1	Meter tag on spill kit after restocked	

Location: Whitehorse Spill trailer

Quantity	Description
Box 1 - PPE	
1	Rain suit
1	Organics respirator
3	Protective Goggles
1	Gloves, Nitrile, box of 100
4	Rubber gloves, Latex 12"
4	High visibility safety vests
6	Pairs Rubber Boots
12	Disposable Coveralls
1	Emergency Response guide
Box 2 - Emergency equipment	
2	Headlamps
3	Hand lanterns battery operated
2	Paint orange aerosol
2	Blankets
1	Polyester 100’ rope

Shelving - Spill equipment		
1	Oil Skimmer	
1	White, Oily only Absorbent rolls (new)	
1	150 Gallon pop-up pool	
1	20 gallon pop up pool	
1	3' by 3" absorbent sock	
1	33lb bag granular "floor dry"	
2	25lb bags granular oil absorbent	
3	Soild waste barrels, poly over packs	
1	ft 10'x8" boom (new)	
1	Putty, jar for drum and tank leaks	
100	Garbage bags, industrial waste	
1	Plastic sheeting	
1	Rubbermaid bins for dirty equipment	
2	Wire flags, bundles	
Other Tools/Equipment		
1	Camera (disposable)	
1	Pick-axe	
1	Rake	
1	Shovel	
1	Push Broom	
1	Nylon hand broom	
1	4L container of solvent	
1	Plastic dust pan	
2	Spades	
4	Pylons	
1	Air Horn	
1	Fire extinguisher	

***Edits of this inventory will be catalogued and sent to the Environmental coordinator.**

8.0 EQUIPMENT/SERVICES

Table 1. Inventories/services supplied by contractor/consultant in the Faro area

NAME	PHONE/ADDRESS	EQUIPMENT/SERVICES AVAILABLE	SERVICE AREA
Town of Faro Public Works Department	(867)-689-0679 (867) 994-2762	Spill clean up services, excavator and skidsteer services, dump truck/trailer	Faro, Yukon
Pilgrims	(867) 994-3101 (250) 279 3101	Bobcat service Transport materials Snow removal	Faro, Yukon
Boreal Engineering	(867) 335-0211	Equipment Services, dump truck/trailer, engineering services, Vac and Water Truck	Faro, Yukon
Van Gorda Enterprises	(867) 689-0679, (867) 994-2762	Spill clean up services, excavation and skidsteer services, dump truck/trailer	Faro, Yukon

9.0 CONTACT DIRECTORY

Yukon Energy SCC **867-393-5324**
867-393-5355

Emergency Services	Fire	Ambulance	Police
Dawson City	993-2222	993-4444	993-5555
Faro	994-2222	994-4444	994-5555
Mayo	996-2222	996-4444	996-5555
Whitehorse	911	911	911
Aishihik (Haines Junction)	634-2222	634-4444	634-5555

Yukon Energy Contacts

Yukon Energy VP of Engineering and Capital Projects	867-393-5317 (w) 867-336-0317 (cell)
Yukon Energy VP of Operations	867-393-5366 (w) 867-334-6904 (cell)
Yukon Energy Director, Operations	867-393-5383(w) 867-334-6586 (cell)
Yukon Energy Supervisor, System Control Operations	867-393-5399(w) 867-334-6759 (cell)
Yukon Energy Supervisor, Transmission & Distribution	867-667-6213 (w) 867-336-4050 (cell)
Yukon Energy Supervisor, Thermal Maintenance	867-393-5384 (w) 867-335-2863(cell)
Yukon Energy Supervisor, Electrical Maintenance	867-393-5362 (w) 867-332-3407 (cell)
Yukon Energy Supervisor, Hydro Maintenance	867-393-5362 (w) 867-332-3407 (cell)
Yukon Energy Manager, Environment	867-393-5350 (w) 867-333-0300 (cell)

Yukon Energy Manager, Health and Safety	867-393-5353 (w) 867-334-2073(cell)

External Agency Contacts

Department of Environment, YTG, Whitehorse. Yukon	Phone: (867) 667-7244 (24 Hour Spill Report Line) Fax: (867) 667-7962
Oil and Gas Resources	Toll Free: 1-800-661-0408 ext 5087
Oil and Gas Resources Chief Operations Officer	Phone: (867) 667-3565 Cell: 867-334-3112
CANUTEC National Advisory Centre offering advice On dangerous goods emergencies	Phone (613) 996-6666
Fire Marshall National Fire Code (fuel storage)	Phone: (867) 667-5417 (work)
EMS Supervisor - Faro	Phone: (867) 994-2442
Environmental Protection Spill Regulations	Phone: (867) 667-3436 (work)
Water Inspections Section Yukon Government Yukon Waters Act	Phone (867) 667-3227 (work)
Canadian Environmental Protection Agency Fisheries Act PCB Regulations	Phone (867) 667-3470 (work)
Department of Fisheries and Oceans	Phone (867)-393-6722

10.0 SITE SPECIFIC INFORMATION: FARO

The Facility

The Faro Diesel/Substation site is located in the town of Faro. The Faro Diesel/Substation facility includes the following structures:

- Diesel generating plant
- Diesel fuel storage tank
- Substation

The map on the following page shows the existing layout of the Yukon Energy's area at the Faro Generating Facility.

- YEC and its contractors shall maintain reports of all spill or unauthorized discharge occurrences, including spills that are less than the reportable quantities under the Yukon *Spills Regulations*. The log book shall be made available at the request of the inspector. The reports shall include, but not necessarily be limited to:
    - Date and time of the spill;
    - Substance spilt or discharged;
    - Approximate amount spilled or discharged;
    - Distance between the spill or discharge and the nearest watercourse; and
    - Remedial measures taken to contain and clean-up the spill area or to cease the discharge

These are written in the reports by the first responder, Lead Hand Supervisor or VP of Operations depending on the severity of the spill. See page 6 for response organization structure.

Location of temporary storage tanks and temporary diesel generators.

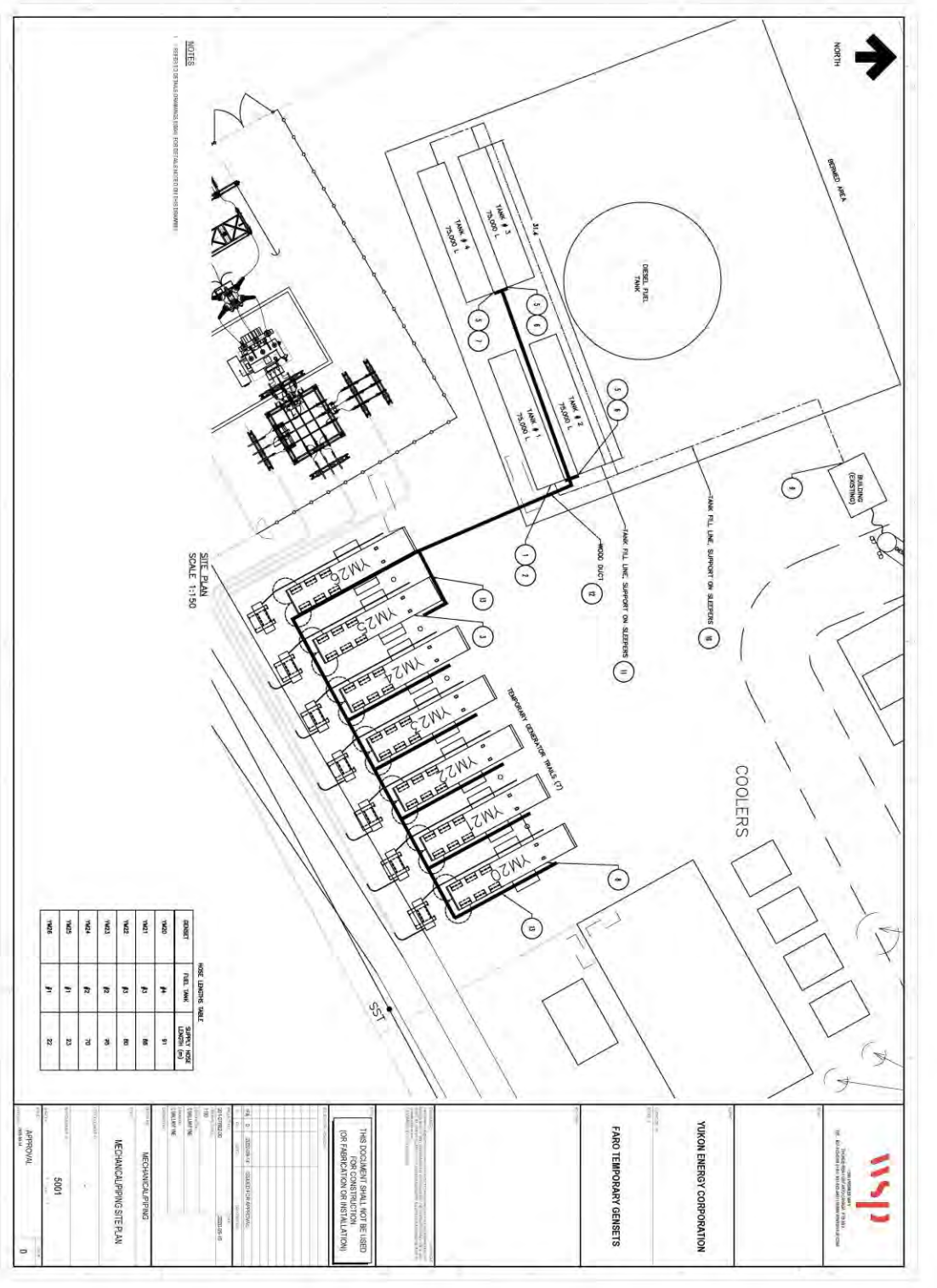
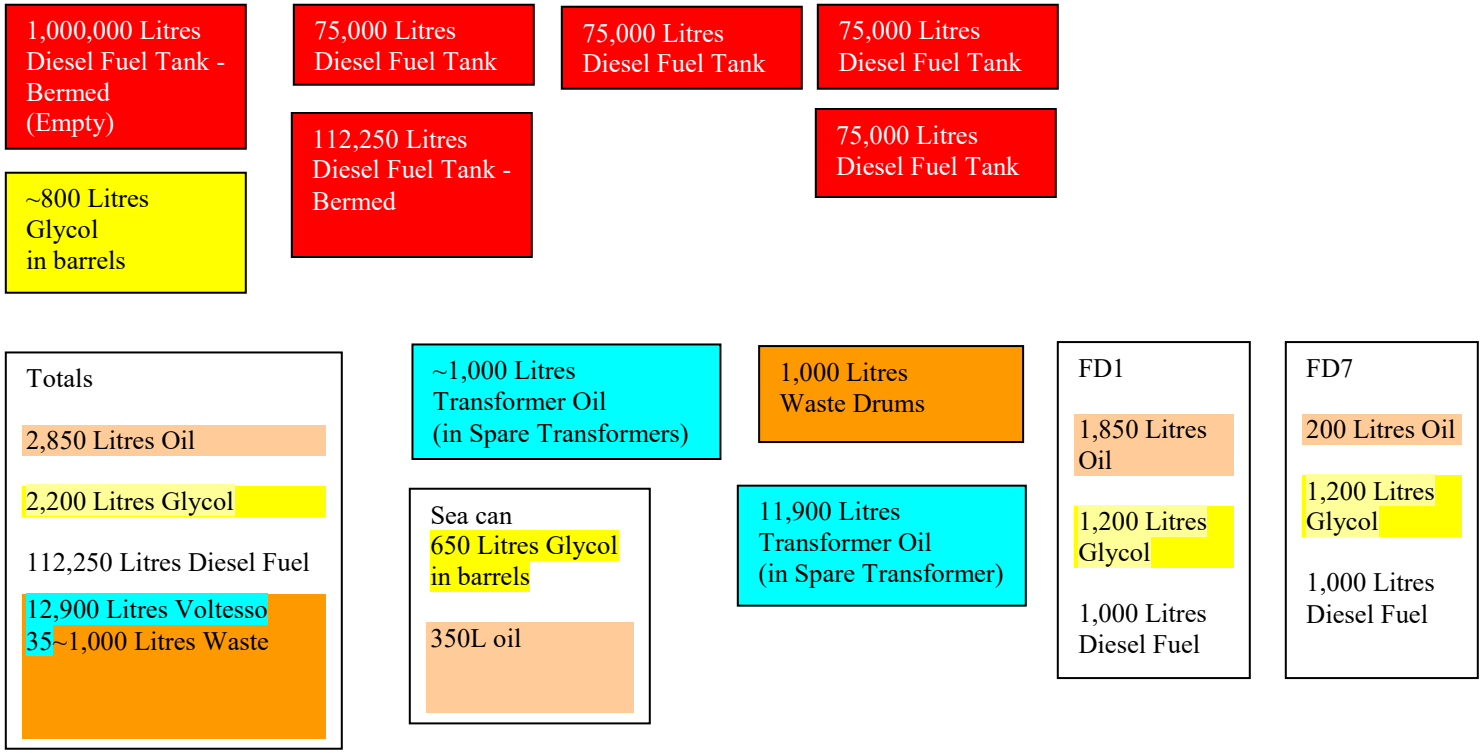


Table 2. Fuel, Petroleum Product and other Hazardous Materials Brought On-Site or Generated On-Site

Hazardous Material Name	Est. Max. Amount of Material On-Site at Any One Time	Material Staging, Use, and Storage Location(s), & Material Storage and Secondary Containment Practices and Structures[1]	Distance of Material Staging, Use, and Storage Locations from Nearby Waterways[2] and Sensitive Areas[3]
Glycol	6,050L		~400m
Diesel Fuel	412,250L	A 4 ft high concrete secondary containment berm was constructed around the main fuel tank, with a plastic liner. Sand covers the liner	~400m
Oil	5,250 L	Operators walk through the building once every 24 hours during plant operation and visually check for spills in process.	~400m
Oil – Voltesso 35 Diesel plant	25,835L	Operators walk through the building once every 24 hours during plant operation and visually check for spills in process.	~400m
Oil – Voltesso 35 Faro substation S146	40,286L	Operators walk through the building once every 24 hours during plant operation and visually check for spills in process.	~400m
Oil – Voltesso 35 Faro substation S162	30,600L	Operators walk through the building once every 24 hours during plant operation and visually check for spills in process.	~400m
Waste Oil	2,000L	Operators walk through the building once every 24 hours during plant operation and visually check for spills in process.	~400m

Figure 2. Total Volumes of Hazardous Materials at the Faro Generating Station



Note: No PCB's On Site

Figure 3. Sub-station 870S/S146

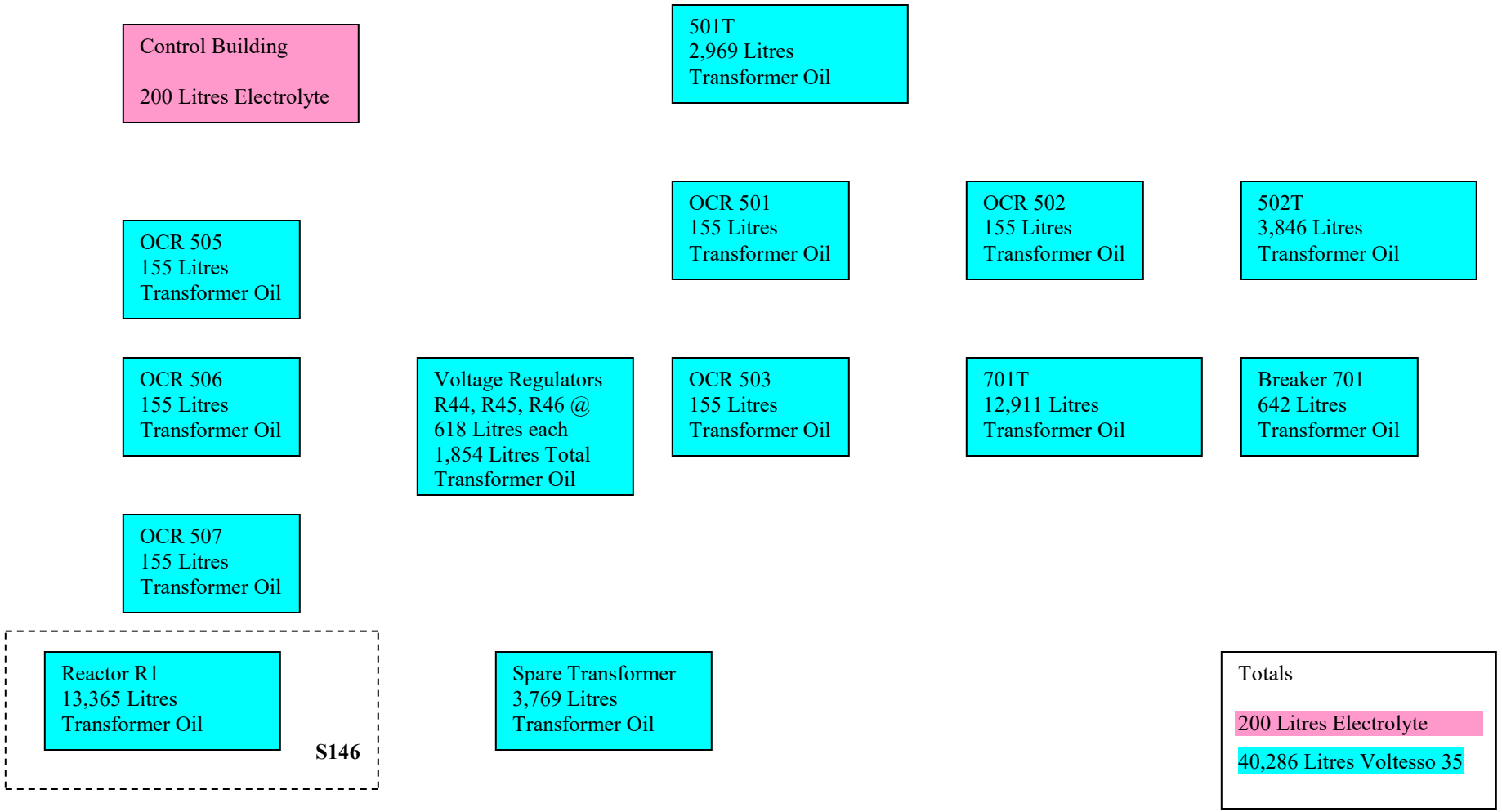
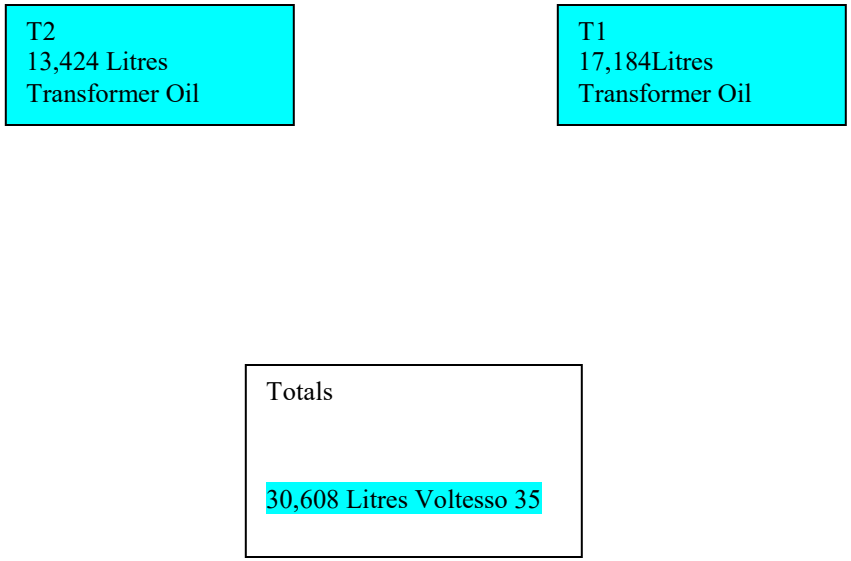


Figure 4. Faro Sub-station S162



11.0 RESOURCES AT RISK

Table 3. Site Description

A.	**Site Locations**	Running of Diesels to produce Electricity.
B.	**The site location and boundaries:**	Faro, Yukon, Canada. Yukon Energy Diesel Generating site
C.	**The drainage pathways from the site:**	Pelly River
D.	**Nearby waterways and sensitive areas:**	Pelly River, Town of Faro Residents

Table 4. Nearby Waterways[1] and Sensitive Areas[2]

Waterway[1] or Sensitive Area[2]	Distance from Project Site	Direction of Flow from Project Site
Creek	70m from waterway	South, into the Pelly River

It is very unlikely that Yukon Energy would affect any water resources as diesel fuel tanks are located inside berms and the facility is not located adjacent to a waterway. As well sumps are located under the plant floors to intercept oils from going to ground.

12.0 SITE SPECIFIC SCENARIOS

SCENARIO 1

During a short break, employees were in the parking lot at the Faro Diesel Generating Station.
They observed a tank truck enter the main gate, hit what they took to be a patch of ice and hit the main diesel storage tank and create a crack in the wall of the main diesel tank. The students saw the driver stumble from the tank truck cab and collapse against the perimeter fence adjacent to the tank.
The PLT onsite took command of the incident.

1. **NOTIFY SUPERVISOR OR SSC**

- Call SCC and VP of Operations
- Arrange Call-Back time, if appropriate.
- Incident commander will call all emergency response teams

2. **ALERT OTHER EMPLOYEES/PERSONS IN AREA**

- Approach spill site from up-wind or, if indoors, ensure you have a clear escape route
  - Check to see if tanker truck is intact and not spilling onto ground
  - Check on the person that stumbled from the truck and remove him from the scene
  - Check cab of truck for any other passengers
  - Call YEC advanced first aiders to tend to the driver
  - Check inside berm for any YEC employees

- Establish Perimeter Security. Stop people from going in and out of the YEC gate. Call police to do this or other YEC group. Use danger tape around the area, restricting access. Keep everyone inside buildings until clean-up is complete

- Evacuate main corporate building and diesel plants, if necessary

- Eliminate Ignition Sources. Shut off power going to tank fed from inside. SCC will call contractor with a vacuum truck to pump the diesel out of the tanker truck. Pads and absorbents are thrown down where liquid has spilled.

- Commence documentation

USE BUDDY SYSTEM

3. **IDENTIFY MATERIAL, SPILL SOURCE, ESTIMATE QUANTITY SPILLED AND POTENTIAL FATE**

- Block Potential Escape Routes, if appropriate

4. **IF SPILL CONTINUING, CONTROL SOURCE, IF SAFE TO DO SO**

- Develop Initial Incident Response Plans (Defensive, Offensive or Non-Intervention)

- Refer to product SDS. Wear appropriate PPE.
  (See “Fast Fact Sheets” in this Plan for spills of specific products.)

5. SUMMON RESPONSE RESOURCES, AS APPROPRIATE

6. UPDATE SUPERVISOR AND/OR SCC ON PROGRESS

7. COMPLETE DETAILED INCIDENT REPORT

Table 5. Other Possible Scenarios

Hazardous Materials and Location	Spill Response Task			
	Assess the Spill	**Secure the Area**	**Contain and Eliminate the Spill Source**	**Clean Up Spilled Material Decontaminate Equipment Dispose of Spilled & Contaminated Material[1]**
Diesel Plant Storage – Mobilgard 312, Delvac 1340, Diesel, Varasol, Anti-Freeze	• Any considerable losses in the dip readings from one check to the next • Any fuel/lubricants smells or any pools on the floor	Inside the diesel plant	• Cover drains with the drain covers from the spill kit. • Use leak filler if leak is accessible and if it is safe to do so	• Use granular sorbents and sorbent sheets to mop up the spill • Hydrocarbon soiled materials will be disposed of in barrels and sealed. Barrels are located in the spill trailer. • Special waste is picked up is once a year by Environment Yukon
Waste oil	• Oil smells or any pools outside the waste oil containment	Outside the diesel plant in waste oil containment	• Use the spill kit located next to WD3 • Use oilwik boom around the spill site	• Use granular sorbents and sorbent sheets • Dig up the area to assess the extent of the spill • Place the contaminated soil in a poly lined temporary containment or a metal bin. • Attain a contaminated soil removal permit and transport to a land treatment facility
Any hazardous material	• See material flowing in the Whitehorse YEC yard	Cover the man holes immediately and contain the spill	• Use the Spill response trailer. Use man hole covers and a sorbent boom	• Clean up material with sorbents and discard appropriately

13.0 APPENDIX A: FORMS

ICS 201 –BREIFING DOCUMENT
ICS 214A – INDIVIDUAL LOG
Safe action/Initial Action Checklists by Substance

- **Diesel Fuel**
- **Delvac 1340**
- **Coolant- CAT EC-1 (238-8650)**
- **Mobilgard 312**
- **Teresso 46**
- **Varsol**
- **Waste Oil**
- **Voltesso 35**
- **SF6**

Appendix A1: **ICS 201-BRIEFING DOCUMENT**

Purpose. The Incident Briefing form provides the Incident Commander (YEC Site Supervisor) with basic information regarding the incident situation and the resources allocated to the incident. It also serves as a permanent record of the initial response to the incident.

Preparation. The briefing form is prepared by the Incident Commander (YEC Site Supervisor) for presentation to the incoming Incident Commander along with a more detailed oral briefing. Proper symbology should be used when preparing a map of the incident.

Distribution. After the initial briefing of the Incident Commander (YEC Site Supervisor) and General Staff members, the Incident Briefing is duplicated and distributed to the Command Staff, Section Chiefs, Branch Directors, Division/Group Supervisors, and appropriate Planning and Logistics Section Unit Leaders. The sketch map and summary of current action portions of the briefing form are given to the Situation Unit while the Current Organization and Resources Summary portion are given to the Resources Unit.

1. Incident Name:	2. Prepared by: Date: Time:	INCIDENT BRIEFING ICS 201-OS (pg 1 of 4)

3. Map/Sketch (include maps drawn here or attached, showing the total area of operations, the incident site/area, overflight results, trajectories, impacted shorelines, or other graphics depicting situational and response status)

INCIDENT BRIEFING	June 2000	ICS 201-OS (pg 1 of 4)

1. Incident Name:	2. Prepared by: Date: Time:	INCIDENT BRIEFING ICS 201-OS (pg 2 of 4)

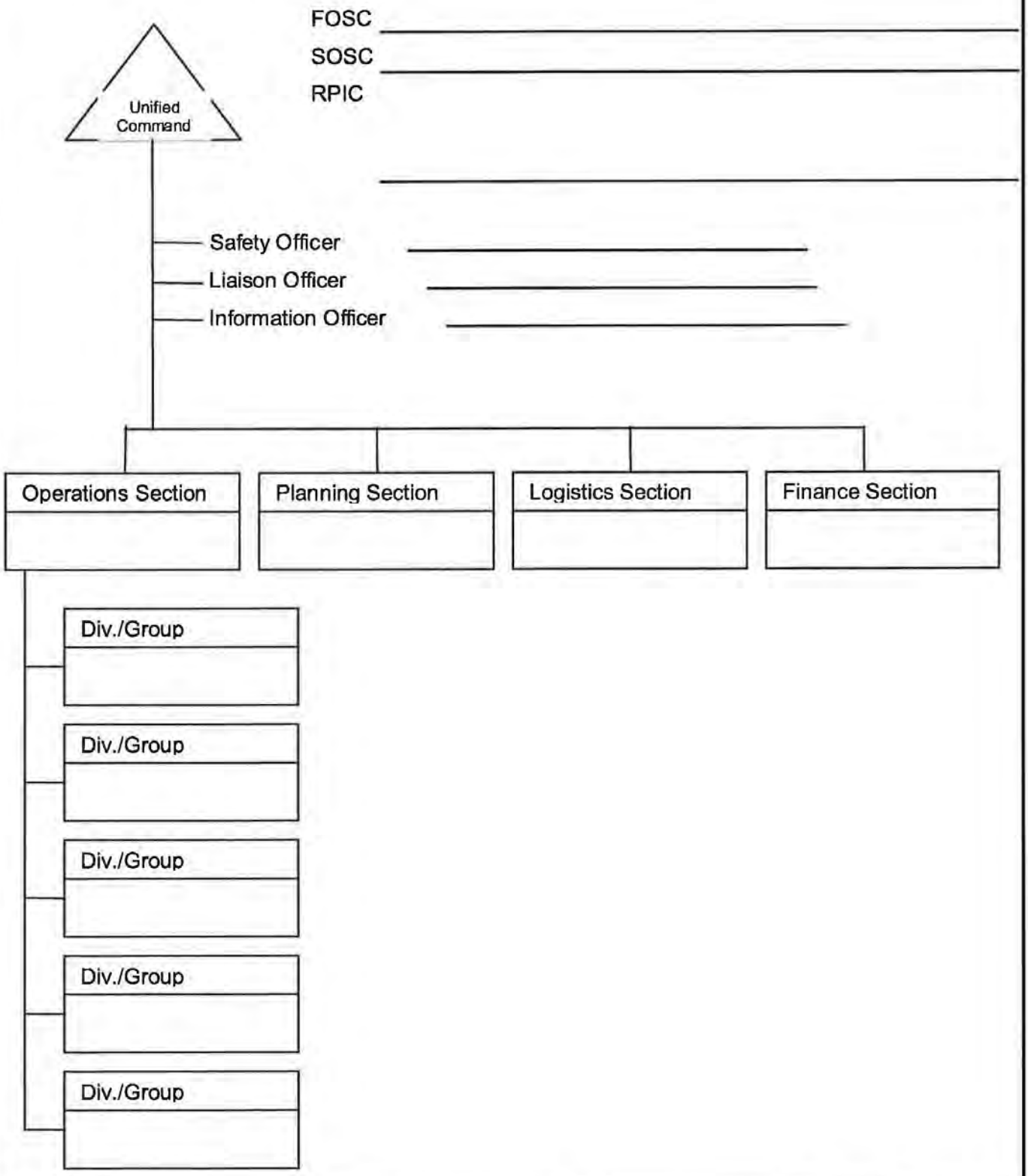
4. Initial Incident Objectives

5. Summary of Current Actions

Time	Action/Note

1. Incident Name:	2. Prepared by: Date: Time:	INCIDENT BRIEFING ICS 201-OS (pg 3 of 4)

3. Current Organization



INCIDENT BRIEFING	June 2000	ICS 201-OS (pg 3 of 4)

1. Incident Name:	**2. Prepared by:** Date: Time:	INCIDENT BRIEFING ICS 201-OS (pg 4 of 4)

7. Resources Summary

Resources Needed	Time Ordered	Resources Identifier	ETA	On-Scene?	NOTES: (Location/Assignment/Status)

INCIDENT BRIEFING June 2000 ICS 201-OS (pg 4 of 4)

Appendix A2-: **ICS 214A – INDIVIDUAL LOG**

Purpose. The Unit Log is used to record details of unit activity including strike team activity. The file of these logs provides a basic reference from which to extract information for inclusion in any after-action report.

Initiation of Log. A Unit Log is initiated and maintained by head of the spill response effort.

1. Incident Name	2. Operational Period (Date / Time) From: To:	INDIVIDUAL LOG ICS 214a-OS
3. Individual Name	4. ICS Section	5. Assignment / Location

6. Activity Log	Page of

Time	Major Events

7. Prepared by:	Date / Time

INDIVIDUAL LOG June 2000 ICS 214a-OS

Record all personal activity --> Supervisor at end of shift --> Documentation Unit

Appendix A3-9: **SAFE ACTION/INITIAL ACTION CHECKLISTS BY SUBSTANCE**

Purpose. The purpose of the Safe Action/Initial Action Checklists by substance are to provide safety measures, PPE to be worn, first aid, emergency response, physical and chemical properties of a particular substance.

Use: These checklists are to be used as initial first action by the first responder.

Appendix A3: **DIESEL FUEL -SAFETY MEASURES**

- May cause eye, respiratory and skin irritation, headache, nausea, mental confusion, unconsciousness and death
  - Wear appropriate PPE
- Combustible liquid, may form explosive vapours
  - Eliminate ignition sources and monitor for combustible gases
- May accumulate static electricity
  - Ground and bond during transfers
- Vapours heavier than air
  - Stay out of low areas and confined spaces

Personal Protection

- If there is a high level of fumes during a spill, ventilate area before entering
- Wear required PPE, as appropriate

First Aid

- **Eyes**
  - Flush eyes immediately with fresh warm water (40C-45C) for at least 15 minutes holding lids open. DO NOT USE excessively hot or cold water
  - Get medical attention
- **Skin**
  - Remove contaminated clothing
  - Wash contaminated skin thoroughly with soap and warm water
  - Obtain medical attention if irritation or redness develops
- **Inhalation**
  - Move person to fresh air
  - Administer oxygen therapy, as necessary
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
  - If swallowed, DO NOT INDUCE VOMITING and obtain immediate medical attention
  - Small amounts of materials that enter the mouth should be rinsed out until taste of substance is eliminated. Remove dentures and rinse well, if applicable

For Further Information Consult Product SDS

Appendix A3: **DIESEL FUEL –EMERGENCY RESPONSE**

Spill

- Isolate area, restrict access and evacuate if necessary
- Eliminate ignition sources
- Advise SCC and/or Supervisor (867) 393 5324/ 393 5355
- Request assistance
- Attempt to limit escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO2, foam and/or H20 fog. DO NOT use a direct stream of water as it may spread the fire

Physical & Chemical Properties

Appearance:	Clear white to pale/bright yellow liquid
Odour:	Petroleum
Flashpoint:	Approximately > + 37.8C
Solubility in water:	Insoluble
Specific Gravity:	0.78 – 0.85
Vapour Density:	> than 1 (Air = 1)

For Further Information Consult Product SDS

Appendix A6: **DELVAC 1340- SAFETY MEASURES**

- Excessive exposure may result in eye, skin, or respiratory irritation. Wear appropriate PPE
- Material will not burn unless preheated. Avoid excessive heat as it may cause formation of vapours or mists in which case SCBA must be worn
  - Eliminate ignition sources
- Spilled material may create a slipping hazard

Personal Protection

- Wear required PPE, as appropriate

First Aid

- **Eyes**
  - Flush eyes immediately with fresh warm water (40C-45C) for 15 minutes holding lids open
  - Get medical attention if irritation occurs and persists
- **Skin**
  - Wash contaminated skin with mild soap and warm water. Remove contaminated clothing
  - Get medical attention if irritation occurs and persists
- **Inhalation**
  - Remove from further exposure.
  - For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection.
  - If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
  - Not normally a factor.
  - If swallowed, DO NOT INDUCE VOMITING and get immediate medical attention
  - If vomiting occurs, keep the head low to prevent product entering the lungs

For Further Information Consult Product SDS

Appendix A6: **DELVAC 1340- EMERGENCY RESPONSE**

Spill

- ISOLATE AREA, restrict access and evacuate if necessary
- Eliminate ignition sources
- Spill may create slipping hazard
- Advise Supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Attempt to limit product escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using sorbent materials and/or vacuum truck

Fire

- Evacuate and isolate area, restrict access
- Advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO_2, foam and/or H_20 fog. DO NOT use direct stream of water as it may spread fire

Physical & Chemical Properties

Appearance:	Liquid. Brown
Odour:	Hydrocarbon odour
Flashpoint:	+ 230 C (446ºF)
Solubility in water:	Negligible
Specific Gravity:	< 1 (Water = 1)
Vapour Density:	Not available

For Further Information Consult Product SDS

Appendix A7: **COOLANT- CAT EC-1 (238-8650) - SAFETY MEASURES**

- DO NOT taste or swallow antifreeze. DO NOT breathe vapours or fumes
  - Wear appropriate PPE
- Material is unlikely to burn unless preheated
- It may possibly accumulate static electricity
  - Ground and bond containers during transfer

Personal Protection

- If high level of fumes are present during a spill, ventilate area before entering
- Wear other required PPE, as appropriate

First Aid

- **Eyes**
  - Flush eyes immediately with fresh warm water (40C-45C) for 15 minutes holding lids open
  - Obtain medical attention if irritation persists
- **Skin**
  - Wash contaminated area with plenty of mild soap and water. Remove contaminated clothing
  - If irritation occurs and persists, obtain medical attention
- **Inhalation**
  - Move exposed person to fresh air
  - Administer oxygen therapy, as necessary and only if trained
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
  - If symptoms occur, obtain medical attention
- **Ingestion**
  - Remove dentures, if any, and rinse. Rinse out mouth until taste of product dissipates
  - If swallowed, DO NOT INDUCE VOMITING. Get immediate medical attention
  - If vomiting occurs, keep the head low to prevent product entering the lungs.

For Further Information Consult Product SDS

Appendix A7: COOLANT- CAT EC-1 (238-8650) - EMERGENCY RESPONSE

Spill

- ISOLATE area, restrict access and evacuate if necessary
- Eliminate ignition sources though substance unlikely to ignite
- Advise Supervisor and/or SCC # (867) 393 5324/SCC Cell. (867) 393 5355
- Request assistance
- Attempt to limit product escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using appropriate sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO_2, foam and/or H_20 fog DO NOT use a direct stream of water as it may spread fire

Physical & Chemical Properties

Appearance:	Liquid. Yellow Colour
Odour:	Faint or mild
Flashpoint:	+ 127 C
Solubility in water:	Soluble
Lower/Upper Explosive Limits:	Lower 3.2% Upper: Not stated
Vapour Density:	2.1 (Air = 1)

For Further Information Consult Product SDS

Appendix A8: **MOBILGARD 312 – SAFETY MEASURES**

- Excessive exposure may result in eye, skin, or respiratory irritation.
- Exposure most likely to occur through skin contact or from inhalation of mechanically or thermally generated oil mists. Normally, product has a low level of toxicity
    - Wear appropriate PPE
- Material will not burn unless preheated. Avoid excessive heat as it may cause formation of vapours or mists
    - Eliminate ignition sources
- Spilled material may create a slipping hazard

Personal Protection

- If high level of fumes are present during a spill, ventilate area before entering
- Wear other required PPE, as appropriate
- If contact is likely with eyes, then safety glasses should be worn.

First Aid

- **Eyes**
    - Flush eyes immediately with fresh warm water (40C-45C) for 15 minutes holding lids open
    - Get medical attention if irritation occurs and persists
- **Skin**
    - Wash contaminated skin with mild soap and water. Remove contaminated clothing
    - Get medical attention if symptoms occur and persist
- **Inhalation**
    - Move exposed person to fresh air
    - Administer oxygen therapy, as necessary and only if trained
    - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
    - Remove dentures, if any. Wash out mouth with water. Substance has low oral toxicity
    - First Aid is normally not required. Seek medical attention if discomfort occurs

For Further Information Consult Product SDS

Appendix A8: **MOBILGARD 312 – EMERGENCY RESPONSE**

Spill

- Isolate area, restrict access and evacuate if necessary
- Eliminate ignition sources
- Spill may create slipping hazard
- Advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Request assistance
- Attempt to limit product escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO_2, foam and/or H_20 fog. DO NOT use direct stream of water as it may spread the fire

Physical & Chemical Properties

Appearance:	Liquid. Brown colour
Odour:	Hydrocarbon odour
Flashpoint:	> + 225 C (437 F)
Solubility in water:	Insoluble
Specific Gravity:	< 1 (Water = 1)
Vapour Density:	Not available

For Further Information Consult Product SDS

Appendix A9: **TERESSO 46 – SAFETY MEASURES**

- Low order of toxicity. Excessive exposure may result in eye, skin or respiratory inhalation
  - Wear appropriate PPE
- Material will not burn unless preheated. Avoid excessive heat as it may cause formation of vapors or mists
  - Eliminate ignition sources
- Spilled material may create a slipping hazard

Personal Protection

- If high levels of fumes are present during the event of a spill, ventilate area before entering
- Wear other required PPE, as appropriate

First Aid

- **Eyes**
  - Flush eyes immediately with fresh water (40C-45C) for 15 minutes holding lids open. DO NOT USE excessively hot or cold water
  - Get medical attention if irritation occurs
- **Skin**
  - Wash contaminated skin with mild soap and water. Remove contaminated clothing
  - Get medical attention if symptoms occurs or the substances comes in contact with an open wound
- **Inhalation**
  - Move exposed person to fresh air
  - Administer oxygen therapy, as necessary and only if trained
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
  - First aid is not normally required. Seek medical attention if discomfort occurs
  - Remove dentures, if any, and rinse before replacing. Rinse out mouth with water until taste of product dissipates. Substance has low oral toxicity

For Further Information Consult Product SDS

Appendix A9: **TERESSO 46 – EMERGENCY RESPONSE**

Spill

- Isolate area, restrict access and evacuate if necessary
- Eliminate ignition sources
- Spill may create slipping hazard
- Advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Attempt to limit product escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO_2, foam and/or H_20 fog. DO NOT use direct stream of water as it may spread fire

Physical & Chemical Properties

Appearance:	Liquid. Amber in colour
Odour:	Lubricating oil odour
Flashpoint:	+ 200 C
Solubility in water:	Negligible
Specific Gravity:	< 1 (Water = 1)
Vapour Density:	> 2 (Air = 1)

For Further Information Consult Product SDS

Appendix A10: **VARSOL – SAFETY MEASURES**

- May cause mild irritation to eyes and skin upon contact, drowsiness, lack of coordination, headache and nausea.
    - Wear appropriate PPE
- Combustible liquid. May form explosive vapours. Use in adequately ventilated area
    - Eliminate ignition sources
- Vapours heavier than air
    - Stay out of low areas and confined spaces
- May accumulate static electricity
    - Ground and bond containers during transfer

Personal Protection

- If high level of fumes are present during a spill, ventilate area before entering
- Wear other required PPE, as appropriate

First Aid

- **Eyes**
    - Flush eyes immediately with fresh warm water (40C-45C) for 15 minutes holding lids open
    - Get medical attention if irritation occurs
- **Skin**
    - Flush contaminated skin with plenty of water. Remove contaminated clothing
    - Get medical attention if symptoms occur
- **Inhalation**
    - Move exposed person to fresh air
    - Administer oxygen therapy, as necessary and only if trained
    - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
    - Get medical attention if adverse health effects persist or are severe
- **Ingestion**
    - Remove dentures, if any, and rinse with water. Rinse out mouth with water
    - Obtain medical attention if symptoms occur
    - If swallowed, DO NOT INDUCE VOMITING. Give small quantities of water or milk to drink and get immediate medical attention
    - If vomiting occurs, keep the head low to prevent product entering the lungs

For Further Information Consult Product SDS

Appendix A10: **VARSOL – EMERGENCY RESPONSE**

Spill

- Isolate area, restrict access and evacuate if necessary
- Eliminate ignition sources
- Advise Supervisor and/or SCC # (867) 393 5324/. (867393 5355
- Request assistance
- Attempt to limit product escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO_2, foam and/or H_20 fog. DO NOT use direct stream of water as it may spread fire

Physical & Chemical Properties

Appearance:	Clear liquid
Odour:	Petroleum distillate
Flashpoint:	> + 37.8 C (Combustible liquid)
Solubility in water:	Insoluble
Lower/Upper Flammability Limits:	1% - 13%
Vapour Density:	5 (Air = 1)

For Further Information Consult Product SDS

Appendix A11: **VOLTESSO 35 - SAFETY MEASURES**

- May cause eye, respiratory and skin irritation. Frequent or prolonged contact may de-fat and dry the skin
  - Wear appropriate PPE
- Combustible liquid, may form explosive vapours
  - Eliminate ignition sources and monitor for combustible gases
- May accumulate static electricity
  - Ground and bond during transfers
- Vapours heavier than air
  - Stay out of low areas and confined spaces

Personal Protection

- If high level of fumes are present during a spill, ventilate area before entering
- Wear other required PPE, as appropriate

First Aid

- **Eyes**
  - Flush eyes immediately with fresh warm water (40C-45C) for at least 15 minutes holding lids open. DO NOT USE excessively hot or cold water
  - Get medical attention
- **Skin**
  - Remove contaminated clothing
  - Wash contaminated skin thoroughly with soap and warm water
  - Obtain medical attention if irritation or redness develops
  - Launder contaminated clothing before reuse
- **Inhalation**
  - Move person to fresh air
  - Administer oxygen therapy, as necessary and only if trained
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
  - If swallowed, DO NOT INDUCE VOMITING and obtain immediate medical attention
  - Small amounts of materials that enter the mouth should be rinsed out until taste of substance is eliminated. Remove dentures and rinse well, if applicable

For Further Information Consult Product SDS

Appendix A11: **VOLTESSO 35–EMERGENCY RESPONSE**

Spill

- Isolate area, restrict access and evacuate if necessary
- Eliminate ignition sources
- Advise Supervisor and/or SCC (867) 393 5324/ 867 393 5355 to request assistance
- Attempt to limit escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO2, foam and/or H20 fog. DO NOT use a direct stream of water as it may spread the fire

Physical & Chemical Properties

Appearance:	Pale Yellow, liquid
Odour:	N/D
Flashpoint:	Approximately > 145C
Solubility in water:	Negligible
Specific Gravity:	-
Vapour Density:	> N/D (Air = 1)

For Further Information Consult Product SDS

Appendix A12: **SF6 GAS- SAFETY MEASURES**

- May cause eye, respiratory and skin irritation. Frequent or prolonged contact may de-fat and dry the skin
- Escaping gas may cause frostbite injury
  - Wear appropriate PPE
  - Eliminate ignition sources and monitor for combustible gases
- May accumulate static electricity
  - Ground and bond during transfers
- Vapours heavier than air
  - Stay out of low areas and confined spaces

Personal Protection

- General mechanical ventilation must be worn
- Rubber gloves
- ANSI approved Chemical Workers Goggles
- Coveralls

First Aid

- **Eyes**
  - Flush eyes immediately with fresh warm water (40C-45C) for at least 15 minutes holding lids open. DO NOT USE excessively hot or cold water
  - Get medical attention if pain or sensitivity to light persists
- **Skin**
  - Wash exposed area extremely thoroughly, but gently in cases of frostbite –like injury, with soap and water
- **Inhalation**
  - Move person to fresh air
  - Administer oxygen therapy, as necessary and only if trained
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
  - If swallowed, DO NOT INDUCE VOMITING and obtain immediate medical attention
  - Contact MD immediately

For Further Information Consult Product SDS

Appendix A12: **SF6 GAS –EMERGENCY RESPONSE**

Spill

- Evacuate personnel to safe areas. Wear PPE and self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ventilate the area. Monitor oxygen level
- Stay upwind
- If possible, stop the flow of product
- Advise Supervisor and/or SCC (867) 393 5324/ 867 393 5355 Request assistance

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO2, foam and/or H20 fog. DO NOT use a direct stream of water as it may spread the fire

For Further Information Consult Product SDS

Appendix A13: **WASTE OIL – SAFETY MEASURES**

- Mixture of water, oil and lubricant additives. Concentrations of components will vary. The product is not expected to be irritating and has a low level of toxicity under normal use. Exposure most likely to occur through skin or eye contact
  - Wear appropriate PPE
  - Spill may create slipping hazard
- Material is unlikely to burn unless preheated. Spilled material may produce a slipping hazard
  - Vapour pressure will vary dependent on the composition
- It may possibly accumulate static electricity
  - Ground and bond containers during transfer

Personal Protection

- If high level of fumes are present during a spill, ventilate area before entering
- Wear other required PPE, as appropriate

First Aid

- **Eyes**
  - Flush eyes immediately with fresh warm water (40C-45C) for 15 minutes holding lids open
  - Get medical attention if irritation persists
- **Skin**
  - Wash contaminated area with plenty of mild soap and water for 15 minutes. Remove contaminated clothing
  - If irritation occurs and persists, obtain medical attention
- **Inhalation**
  - Move exposed person to fresh air. Additional First Aid treatment is not usually required
  - Administer oxygen therapy, if necessary and/or obtain medical assistance
  - WHEN OXYGEN IS IN USE, ENSURE NO SMOKING
- **Ingestion**
  - Remove dentures, if any, and rinse with water. Rinse out mouth with water
  - If swallowed, DO NOT INDUCE VOMITING. Get immediate medical attention
  - If vomiting occurs, keep the head low to prevent product entering the lungs. Obtain medical attention

For Further Information Consult Product SDS

Appendix A13: **WASTE OIL – EMERGENCY RESPONSE**

Spill

- Isolate area, restrict access and evacuate if necessary
- Eliminate ignition sources though substance unlikely to ignite
- Spilled material make create a slipping hazard
- Advise Supervisor and/or SCC # (867) 393 5324/ (867) 393 5355
- Request assistance
- Attempt to limit product escape routes and shut off source – IF SAFE TO DO SO
- Contain and recover using appropriate sorbent materials and/or vacuum truck

Fire

- Isolate area, restrict access and evacuate if necessary
- Call Fire Department, advise supervisor and/or SCC # (867) 393 5324/ 393 5355 to request assistance
- Shut off fuel to fire, IF SAFE TO DO SO
- If qualified, extinguish with dry chemical extinguisher, CO_2, foam and/or H_20 fog. DO NOT use a direct stream of water as it may spread fire

Physical & Chemical Properties

Appearance:	Liquid. Colour will vary depending on composition
Odour:	Hydrocarbon
Flashpoint:	Will vary depending on composition. Unlikely to burn
Solubility in water:	Insoluble
Lower/Upper Explosive Limits:	Will vary
Vapour Density:	Will vary

For Further Information Consult Product SDS

14.0 WASTE MANAGEMENT

All equipment and/or material used in clean-up (e.g. used sorbents, oil containment materials etc.) must be disposed of in accordance with Environment Yukon requirements.

Accidental spills may produce special wastes (e.g., material with > 3% used oil) and contaminated soil. All waste disposal must comply with the *Yukon Special Waste Regulations* of the *Yukon Environment Act.*

Compliance with these regulations generally requires:

- Classification of the waste
- Packaging requirements (proper labeling and suitable storage containers)
- Transportation documentation
- All transporters must be properly trained
- Disposal in accordance with the regulations at an appropriate facility
- Spill reporting requirements must also be followed
- Waste sorbent material may not be disposed of in a landfill without prior approval from YTG Environment and the landfill operator.
- Contaminated soil must be treated and dealt with as required on a site specific basis and must comply with the requirements of the Yukon Contaminated Sites and Special Waste Regulations. At a minimum, the contractor must consider soil relocation agreement standards and obtain soil relocation permit as required.

Specific clean up requirements

Fuels and lubricants/Waste oil

After clean up, soiled sorbent materials will be placed inside an over pack or sealed metal drums and contained securely until organized special waste disposal can be coordinated.

Liquid wastes will be contained in a separate over pack or sealed metal drum.

Contaminated soils will be removed by an authorized contaminated soil receptor and transported to a land treatment facility.

All other products

All other products are to be contained in over packs or sealed metal drums separately from other products. Do not mix soiled materials. These materials are also to be picked up by Environment Yukon special wastes pick up, which occurs annually or another organized special waste disposal program at Yukon Energy. Contact the Manager of Environment for further information.

15.0 PLAN ADMINISTRATION

The following table must be filled out when changes are made to the plan.
YEC shall review the spill contingency plan annually and provide a summary of that review, including any revisions to the plan, as a component of the annual report.

Document Release and Revision History

Revision #	Revised Section/Page #	Purpose of Release: Details of Revisions/Amendments	Approved By:	Effective Date
00		New document	Director, Operations	May 2000
01	New cover page #1, #2	New cover page #1, added revision history page #2, updated contact info as required	Director, Operations	March 2004
02	Page #7, #10, #11, #12	Updated contact info as required & updated fuel day tank amounts	Director, Operations	May 2007
03	Pages 5,7, 8, and 11	Updated contact info and reporting chain as required	Manager, Environment	December 2009
04	All	Added site specific spill response procedures, updates contact information, added list of contractors for external resources, added resources at risk, updated on site spill response resources inventory. Added spill classification and clean-up plan. Added Spill Plan acknowledgement form, added sample incident report form. Added CFO to YEC reporting chain	Environmental Coordinator	June 20, 2012
05	Page #'s 6, 10-21, 24, 27, 31	Updated notifications, spill equipment inventory, contacts, site information and forms.	Environmental Coordinator	March 6, 2014
06	Page 3,5, 8,20,27, 35	Referenced Spill Safety Plan instead of Initial Incident Response Plan, Some general changes in wording to improve readability, added details about reporting, added spill response equipment located a Whitehorse Gas facility, added Aishihik Water License details, used the title Site Specific Hypothetical Scenarios. In Hypothetical scenarios changed sequence of response to correspond to proper action	Environmental Coordinator	August 13, 2015
07	Page 3, 4, 7, 11-22, 36	Removed mobile radio information, added map of radio coverage, updated contact flow chart, updated spill kit inventory lists, removed superfluous map of LNG plant	Environmental Coordinator	July 21, 2017
08	Pages, 4,6,7,11-13,16,18,21,22,24	Updated Radio map, purpose and scope, materials and equipment, equipment and services, contact directory, site plan, hazardous materials amounts	Env.and Resource Analyst	Sept 24, 2020
09	Pages 6, 7, 20, 22, 23, 37	Updated scope to remove redundancy, updated text to Supervisor, updated amount of hazardous materials to report	Env.and Resource Analyst	Nov 2, 2021
10	Page 7, 16, 19	Updated Faro site plans to include rental diesels, updating response contacts	Env.and Resource Analyst	March 10, 2022
11	Page 65	Updated responsibility for Mock Spill exercise	EMS Manager	April 20, 2022

Name:	Signature:	Review Date:
VP, Operations		March 10/22
EMS Manager		March 10/22

Distribution List- Via YEC EMS SharePoint

This document is a Yukon Energy Environmental Management System (EMS) Environmental Work Plan (EWP), A hard copy of this document must be maintained in the operational area to which it refers (e.g., hydro plant) and replaced after the annual document review or whenever a revision is made to the plan.

References:

EMS-MP-011	Emergency Response
HS-000-E	MP-4 Incident Reporting & Investigation Procedures
HS-000-E-A	Incident Investigation Form
HS-000-E-B	Incident Reporting Form
EMS-MP-001	Environmental Management System Scope and Structural Overview

For additional copies of this plan please visit the YEC Sharepoint site
https://sp2010.yec.yk.ca/Departments/env/Spill%20Contingency%20Plans/Forms/AllItems.aspx

APPENDIX

Appendix B: Air Dispersion Modelling Assessment

YUKON ENERGY CORPORATION

AIR DISPERSION MODELLING ASSESSMENT FOR FARO GENERATING STATION

CONFIDENTIAL

August 23, 2024

AIR DISPERSION MODELLING ASSESSMENT FOR FARO GENERATING STATION

YUKON ENERGY CORPORATION

FINAL REPORT

PROJECT NO.: CA0033855.4836

DATE: AUGUST 23, 2024

WSP REF: CA0033855.4836-001-R-REV0

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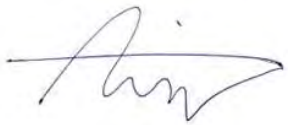

Amin Engarnevis, Ph.D.
Lead Air Quality Scientist
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EXECUTIVE SUMMARY

WSP Canada Inc. conducted an air quality dispersion modelling and impact assessment for Yukon Energy Corporation's diesel-fuelled electricity generating facility in Faro, Yukon (the "Faro Generating Station" or "the Facility") to evaluate the predicted air quality impacts of increasing the facility capacity to 21 megawatts (MW). The Faro Generating Station's existing permitted capacity is 15.5 MW.

A total of six (6) criteria air contaminants were evaluated based on the emission characteristics of the Faro Generating Station genset engines and diesel fuel use – fine particulate matter ($PM_{2.5}$), coarse particulate matter (PM_{10}), total suspended particulate (TSP), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), and carbon monoxide (CO). Three years (2016-2018) of meteorological data were used as input for the refined CALPUFF dispersion modelling system in accordance with the requirements of a comprehensive air quality dispersion modelling assessment as stipulated in the British Columbia Air Quality Dispersion Modelling Guideline (BC AQDMG) (BC MoECCS, 2022a). Predicted modelling results with baseline air quality concentrations were compared to the 2025 Yukon Ambient Air Quality Standards (YAAQS) (Government of Yukon, 2019) and the British Columbia Pollution Control Objective (used for reference purposes) for CO (BC MoECCS, 2021) for one (1) modelling scenario – the Expanded Capacity Scenario (21 MW).

The Expanded Capacity Scenario was evaluated assuming maximum emissions from the generators based upon maximum operating conditions and name-plate capacities. The modelling also conservatively assumed that all generators are emitting simultaneously and continuously at the name-plate capacity year-round.

Despite these conservative assumptions, the predicted ambient air quality dispersion modelling results showed that, with the exception of short-term (1-hour) and long-term (annual) NO_2 results and short-term (24-hour) PM_{10} results, the maximum cumulative predicted concentrations for all air contaminants ($PM_{2.5}$, TSP, SO_2, and CO) were well below their respective ambient air quality criteria. The maximum points of impingement (MPOI) (i.e. worst-case receptors) were all found near the Faro Generating Station.

While the dispersion modelling results predicted short-term and long-term NO_2 exceedances, the primary objective of the air quality assessment was to evaluate the predicted impacts on the human population residing near the Faro Generating Station in the Town of Faro. The modelling results at the maximally impacted receptor within the Town of Faro showed that the cumulative predicted concentrations occur at the edge of Faro Town (north and northwest), with NO_2 (1-hour and annual) and PM_{10} (24-hour) cumulative concentrations predicted to exceed the YAAQS.

The predicted air quality impacts for all the other air contaminants – including both fine particulate matter and total suspended particulate ($PM_{2.5}$ and TSP), SO_2, and CO – were below the YAAQS. With regards to the 24-hour PM_{10} exceedances, it is important to note that the exceedances are primarily driven by the high baseline value which accounts for 99% of the YAAQS. With regards to the NO_2 predicted short-term (1-hour) and long-term (annual) NO_2 exceedances, it is important to note that the YAAQS for NO_2 considered were reduced from current levels to 2025 levels (113 µg/m^3 to 79 µg/m^3 and 32 µg/m^3 to 23 µg/m^3, respectively). When compared to the 2025 NO_2 YAAQS, the maximum cumulative predicted 1-hour NO_2 concentration was 357% of the YAAQS for NO_2 at the maximally impacted Faro Town receptor. However, it is important to note the highly conservative nature of the dispersion model which assumes that all generators are operating at maximum capacity during all hours of the 3-year modelling period (2016-2018), which is not reflective of typical operating conditions at the Faro Generating Station.

The frequency of model predictions exceeding the 1-hour 2025 NO_2 YAAQS is 35.1% (9238 out of 26304 hours) at the MPOI and 14.2% (3740 out of 26304 hours) at the maximally impacted Faro Town receptor). Furthermore, recent NO_2 monitoring within Faro (August 16, 2023, to April 30, 2024) has measured very low levels of NO_2 (25% of the 2025 1-hour NO_2 YAAQS and 7% of the 2025 annual NO_2 YAAQS), which also highlights the extremely conservative nature of the air dispersion model. The continuation of the NO_2 monitoring program is recommended to confirm low ambient levels of NO_2 and the Faro Generating Station's impact on air quality within the Town of Faro.

Finally, it is important to note that the modelling results represent the worst-case predicted air quality impacts based on the Faro Generating Station's maximum operating conditions. As such, the model predicted air contaminant concentrations are considered conservative. Though modeling predicted short-term (1-hour) and long-term (annual) NO_2 exceedances and short-term (24-hour) PM_{10} exceedances, the conditions giving rise to predicted exceedances would be very unlikely to happen because the emission sources are highly unlikely to operate continuously year-round at the maximum emission rates. The expected operations at the Faro Generating Station is to run in winter to meet peak demand. The typical emissions are expected to be much lower than modeled and are not anticipated to result in adverse air quality impacts given the conservative assumptions. With model predictions indicating highly conservative short-term and long-term NO_2 impacts and low predicted impacts from the other air contaminants, the overall air quality impacts from the Expanded Capacity Scenario are not anticipated to cause adverse air quality impacts to the Town of Faro.

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1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Yukon Energy Corporation (Yukon Energy) to perform an air dispersion modelling and impact assessment in support of a permit amendment with the Yukon Environmental and Socio-economic Assessment Board (YESAB). The permit amendment is required to increase capacity at the diesel-fuelled electricity generating facility in Faro, Yukon (the "Project" from the existing permitted capacity of 15.5 MW to 21 MW.

While the existing permit allows the Faro Generating Station to operate up to a capacity of 15.5 MW, the Faro Generating Station has been and is currently operating much below the permitted capacity of 15.5 MW with only one existing permanent diesel generators (Caterpillar (CAT) 3612 (Genset ID: FD7) and six mobile rental CAT 3516C diesel generators (Genset ID: YM20, YM21, YM22, YM23, YM24, and YM25) on-site. Once expanded, the Faro Generating Station will continue to operate the existing permanent diesel generator FD7 and six mobile rental generators, and the proposed capacity expansion to 21 MW would see the installation of two (2) CAT C175-16 with SCR diesel generators (Genset ID: FD8 and FD9) and one (1) CAT 3516C diesel generator (Genset ID: YM26).

Since there is no air dispersion modelling guideline in Yukon, the air dispersion modelling and impact assessment for the Project (the "Air Assessment") followed recommendations of the British Columbia Air Quality Dispersion Modelling Guideline (BC MoECCS, 2022a). The dispersion modelling was completed following the requirements of a Level 3 Comprehensive Assessment as defined by the BC AQDMG and was conducted using the refined dispersion model called CALPUFF.

The following sections describe the assessment methodology and inputs considered for the dispersion modelling, as well as the model prediction results and findings evaluated for the modelling scenario associated with the Expanded Capacity Scenario.

2 AIR QUALITY CRITERIA

Based on the emission characteristics of the Faro Generating Station's diesel generators, a total of six (6) criteria air contaminants (CACs) were evaluated in the Air Assessment (Table 2-1). The 2025 Yukon Ambient Air Quality Standards (YAAQS) (Government of Yukon, 2019) were used as the air quality criteria against which modelling results are assessed. Since there are no YAAQS established for Carbon Monoxide (CO), the British Columbia Pollution Control Objective (used for refence purposes) (BC MoECCS, 2021), was chosen as the air quality criteria for CO in this Air Assessment.

The YAAQS were updated by the Yukon Government Department of Environment on October 23, 2019 (Government of Yukon, 2019), to match the more stringent Canadian Ambient Air Quality Standards (CAAQS) adopted by the Canadian Council of Ministers of the Environment (CCME) to drive air quality improvements across the country. In particular, both CAAQS and YAAQS reduced the 1-hour NO_2 Standard from 401 µg/m^3 previously to 113 µg/m^3 presently, where the 2025 standard is further reduced to 79 µg/m^3.

Table 2-1 Air Quality Criteria for Air Contaminants Evaluated

Air Contaminant	Jurisdiction	Air Quality Criteria (µg/m^3)		Statistical Form of Standard
Fine Particulate Matter ($PM_{2.5}$)	Yukon	24-Hour	27	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.
		Annual	8.8	The 3-year average of the annual average of all 1-hour concentrations.
Coarse Particulate Matter (PM_{10})	Yukon	24-Hour	50	The maximum 24-hour block average concentration.
Total Suspended Particulate (TSP)	Yukon	24-Hour	120	The maximum 24-hour block average concentration.
		Annual	60	The average over a single calendar year of all 1-hour average concentrations.
Nitrogen Dioxide (NO_2)	Yukon	1-Hour	79	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.
		Annual	23	The average over a single calendar year of all 1-hour average concentrations.
Sulphur Dioxide (SO_2)	Yukon	1-Hour	170	The 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations.
		Annual	11	The average over a single calendar year of all 1-hour average concentrations.
Carbon Monoxide (CO)	British Columbia	1-Hour	14,300	The maximum 1-hour block average concentration.
		8-Hour	5,500	The maximum 8-hour block average concentration.

3 BASELINE AIR QUALITY

Baseline air contaminant concentrations are determined in dispersion modelling assessments in order to estimate cumulative impacts to air quality. In this context, the BC AQDMG (BC MoECCS, 2022a) states that "baseline" is meant to be the concentrations due to emissions from both natural and anthropogenic sources. In other words, it is intended to be the result of the contribution from all sources except the source(s) being modelled. To compare against the YAAQS, baseline air quality concentrations are added to the dispersion model predictions resulting in a predicted cumulative air contaminant concentration.

It is common practice to determine the baseline from historical air quality monitoring data considered representative of the modelling domain. Continuous ambient air quality monitoring data is limited in Faro, and other data is only available from one station in Yukon located in Downtown Whitehorse (the "Whitehorse AQ Station") and operated by Yukon's Department of Environment as part of Canada's National Air Pollution Surveillance (NAPS) program (NAPS ID: 119004). This data was not considered representative to evaluate ambient air quality conditions for the Project, due to the significantly greater anthropogenic activities and emission sources in Whitehorse as compared to the remote Project location in Faro. Following the BC AQDMG (BC MoECCS, 2022a) recommendations, monitoring data from other rural and remote locations was used to determine the ambient air quality baseline for this assessment. Baseline CO, $PM_{2.5}$, PM_{10}, and SO_2 concentrations were calculated from monitoring data for the three most recent years (2019 to 2021) obtained from Inuvik, Northwest Territories (Northwest Territories Air Quality Monitoring Network, 2024). There is no hourly TSP monitoring data available for the Project location, so it was not included in this assessment.

Ambient ozone (O_3) baseline concentrations are required to estimate NO_2 concentrations using nitrogen oxides (NO_x) to NO_2 conversion methods (described in detail in Section 5.4 below). Following recommendations of the Guidance for NO_2 Dispersion Modelling in British Columbia (BC GNDM) (BC MoECCS, 2022b) for determining ambient NO_2, monitoring data from Farmington, BC (Farmington Community Hall) (BC Environmental Monitoring and Analysis Branch. BC Data Catalogue, 2024) for the three most recent years (2019 to 2021) were used. The Farmington Community Hall station is recommended to estimate the NO_2 baseline in rural areas with no notable sources of nitrogen oxides (NO_x). With regards to O_3, since a representative O_3 monitoring station is not available for the Project location, the rural ozone dataset for Northeast British Columbia (Table C-1) was used for NO_x to NO_2 conversion methods as per the BC GNDM document.

Table 3-1 presents the summary of 2019-2021 baseline concentrations calculated from the Inuvik and Farmington stations. The estimated baseline concentrations for Faro were added to the dispersion modelling results to predict the cumulative air contaminant concentrations for the Air Assessment.

Furthermore, to provide contextual information on the recent levels of ambient NO_2 within the Faro community, ambient NO_2 monitoring data collected at the new continuous ambient air quality monitoring location within Faro (installed at Del Van Gorder School (Yukon University Faro Campus), commissioned on August 16, 2023) is presented in Table 3-2 below. At the time of writing this report, approximately eight months of continuous NO_2 monitoring data was considered and summarized (August 16, 2023 to April 30, 2024). The ambient NO_2 levels monitored at the Faro station are much lower compared to the levels monitored at Farmington station. However, due to the short monitoring period (less than 2 years) available at the Faro station at this time, this air dispersion modelling assessment considered the baseline NO_2 values calculated at Farmington station for calculation of the cumulative NO_2 predictions. This approach is consistent with guidance and is considered a more conservative approach.

Table 3-1 Summary of Baseline Air Quality Concentrations

Air Contaminant	Averaging Time	Ambient Air Quality Standard (µg/m³)	Statistical Form for Baseline Concentrations	Monitoring Station	Baseline Concentration (2019 to 2021)	
					µg/m³	% of Criteria
$PM_{2.5}$	24-hour	27	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.	Inuvik	10.2	38%
	Annual	8.8	The 3-year average of the annual average of all 1-hour concentrations.	Inuvik	4.3	48%
PM_{10}	24-hour	50	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.	Inuvik	49.5	99%
NO_2	1-hour	79	The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.	Farmington	35.8	45%
	Annual	23	The 3-year average of the annual average of all 1-hour concentrations.	Farmington	4.8	21%
SO_2	1-hour	170	The 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations.	Inuvik	2.3	1%
	Annual	11	The 3-year average of the annual average of all 1-hour concentrations.	Inuvik	0.8	8%
CO	1-Hour	14,300	The 3-year average of the annual 98th percentile of the 1-hour average concentrations.	Inuvik	391.2	3%
	8-Hour	5,500	The 3-year average of the annual 98th percentile of the 8-hour average concentrations.	Inuvik	372.1	7%

Table 3-2 Summary of NO_2 Monitoring Data from Faro

Air Contaminant	Averaging Time	Ambient Air Quality Standard (µg/m³)	Statistical Form	Monitoring Station	Concentration	
					µg/m³	% of Criteria
NO_2	1-hour	79	The 98th percentile of the daily maximum 1-hour average concentrations between August 16, 2023, and April 30, 2024.	Faro	19.6	25%
	Annual	23	The average of all 1-hour concentrations between August 16, 2023, and April 30, 2024.	Faro	1.7	7%

4 MODELLED EMISSIONS

4.1 MODELLING SCENARIOS

To evaluate the predicted air quality impacts from the Faro Generating Station's proposed expansion, one (1) modelling scenario was conducted in this Air Assessment – the Expanded Capacity Scenario (21 MW).

The emission scenario assumed that the generators are operating continuously at the maximum rated capacity. To reflect the worst-case air quality impacts from the Faro Generating Station, the estimated emission rates were applied to all hours during the 2016-2018 modelling years. This conservative approach is common in air dispersion modelling assessments as it allows for emission sources to be assessed at maximum air contaminant emission rates under all meteorological condition combinations to predict the potential worst-case air contaminant concentrations.

However, this conservative assessment of potential air quality impacts did not account for seasonal load variations whereby the generators run mostly in the wintertime to meet peak electricity demand, and most of the time operate well below their nameplate or total capacity. The actual Faro Generating Station loads and associated typical emissions are expected to be much lower than the maximum loads/emission rates modelled in this assessment.

Table 4-1 summarizes the capacity and genset configurations for the Expanded Capacity Scenario. This scenario evaluated a capacity of 21 MW using the existing FD7 combined with two (2) CAT C175-16 with SCR diesel generators (Genset ID: FD8 and FD9), and seven (7) CAT 3516C diesel generators (Genset IDs: YM20, YM21, YM22, YM23, YM24, YM25, and YM26).

Table 4-1 Summary of the Expanded Capacity Scenario Evaluated for the Project

Modelling Scenario	Genset Configuration	Genset Unit Output and Faro Generating Station Capacity
Expanded Generator Capacity	FD7	2.8 MW
	FD8	2.6 MW
	FD9	2.6 MW
	YM20	1.825 MW
	YM21	1.825 MW
	YM22	1.825 MW
	YM23	1.825 MW
	YM24	1.825 MW
	YM25	1.825 MW
	YM26	1.825 MW
	TOTAL	**20.775 MW (~ 21 MW)**

4.2 SOURCE PARAMETERS AND MODELLED EMISSION RATES

The genset engine exhausts were simulated as vertically-oriented (for FD7 and the seven rental mobile YM units), and horizontally-oriented (for FD8 and FD9) point or stack sources in the CALPUFF model. Table 4-2 below summarizes the genset types and source characteristics modelled for the Faro Generating Station. The stack parameters were compiled from a combination of data sources, including manufacturer's specification sheets and drawings, as well as the previous Yukon Energy air assessments (SENES, 2011 and WSP, 2020). Building downwash effects on these point sources were analyzed according to the genset configurations specified in Table 4-1 for the Expanded Capacity Scenario using the Building Profile Input Program (BPIP-PRIME) as recommended by the BC AQDMG (BC MoECCS, 2022a). The buildings and structures digitized for the Faro Generating Station are based on the layout drawings provided by Yukon Energy and genset enclosure drawings from the manufacturers.

To evaluate the predicted worst-case air quality impacts resulting from the maximum emissions for the Expanded Capacity Scenario, all of the gensets considered are conservatively assumed to be releasing simultaneously in a continuously emitting fashion. Emission estimates with respect to the existing genset FD7 was provided by Yukon Energy using stack sampling data from the previous 2011 Yukon Energy air assessment (SENES, 2011). The FD8 and FD9 genset (CAT C175-16 with SCR) emission rates were estimated using the emissions data at full engine load from the genset's manufacturer specifications. Lastly, the rental mobile genset (CAT 3516C) emission rates were extracted from the previous 2020 Yukon Energy assessment (WSP, 2020), where they were estimated using the greater of the maximum or name-plate operating capacity from the gensets manufacturer's specifications (such as full-load sustained output and emission performance data), or the applicable stationary combustion source emission factors from published reference documents (such as the United States Environmental Protection Agency's Compilation of Air Emissions Factors referred to as the AP-42). The estimated air contaminant emission rates and source characteristics modelled for each genset unit in this assessment are detailed in Table 4-2 below.

Table 4-2 Source Parameters Modelled in CALPUFF for the Expanded Capacity Scenario

Genset ID:		FD7	FD8	FD9	YM20	YM21	YM22	YM23	YM24	YM25	YM26
Fuel Type:		Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Manufacturer and Model:		Caterpillar 3612	Caterpillar C175-16 with SCR	Caterpillar C175-16 with SCR	Caterpillar 3516C	Caterpillar 3516C	Caterpillar 3516C	Caterpillar 3516C	Caterpillar 3516C	Caterpillar 3516C	Caterpillar 3516C
Unit Power Generation:		2.8 MW	2.6 MW	2.6 MW	1.825 MW	1.825 MW	1.825 MW	1.825 MW	1.825 MW	1.825 MW	1.825 MW
Source Type		Point	Point	Point	Point	Point	Point	Point	Point	Point	Point
Stack Orientation		Vertical	Horizontal	Horizontal	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
Stack Location (NAD 1983 UTM Zone 8N)	(mE)	585,193	585,127	585,129	585,145	585,141	585,110	585,133	585,138	585,142	585,147
	(mN)	6,901,304	6,901,235	6,901,231	6,901,237	6,901,234	6,901,252	6,901,285	6,901,288	6,901,290	6,901,293
Base Elevation	(mASL)	710	708	708	707	707	710	710	710	710	710
Stack Height	(m)	8.9	9.5	9.5	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Stack Diameter	(m)	0.43	0.71	0.71	0.508	0.508	0.508	0.508	0.508	0.508	0.508
Stack Exit Volumetric Flow	(ft^3/min)	10,982	20,140	20,140	14,412	14,412	14,412	14,412	14,412	14,412	14,412
	(m^3/min)	311	570	570	408.1	408.1	408.1	408.1	408.1	408.1	408.1
	(m^3/s)	5.2	9.5	9.5	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Stack Exit Velocity	(m/s)	35.69	23.93	23.93	67.12	67.12	67.12	67.12	67.12	67.12	67.12
Stack Exhaust Gas Temperature	(°C)	430.8	444.0	444.0	382.8	382.8	382.8	382.8	382.8	382.8	382.8
	(°F)	807.4	831.2	831.2	721.0	721.0	721.0	721.0	721.0	721.0	721.0
	(°K)	704.0	717.2	717.2	656.0	656.0	656.0	656.0	656.0	656.0	656.0
Air Contaminant Model Emission Rates:											
$PM_{2.5}$	(g/s)	0.049	0.019	0.019	0.027	0.027	0.027	0.027	0.027	0.027	0.027
PM_{10}	(g/s)	0.055	0.019	0.019	0.027	0.027	0.027	0.027	0.027	0.027	0.027
TSP	(g/s)	0.331	0.019	0.019	0.027	0.027	0.027	0.027	0.027	0.027	0.027
NOx (as NO_2)	(g/s)	6.531	0.484	0.484	4.118	4.118	4.118	4.118	4.118	4.118	4.118
SO_2	(g/s)	0.004	0.012	0.012	0.008	0.008	0.008	0.008	0.008	0.008	0.008
CO	(g/s)	0.191	0.484	0.484	0.333	0.333	0.333	0.333	0.333	0.333	0.333

5 MODELLING METHODOLOGY

Air dispersion modelling was conducted following the methods recommended in the BC AQDMG (BC MoECCS, 2022a), which is referenced by *YESAB Proponent's Guide: Model Documentation Report* (YESAB, 2016) as an exemplary guideline for air dispersion modelling. The CALPUFF air dispersion modelling suite was used to predict air quality impacts. CALPUFF is a suite of numerical models (CALMET, CALPUFF, and CALPOST) that are used in series to predict the impact of emissions in the vicinity of a source or group of sources.

Detailed three-dimensional meteorological fields were produced by the diagnostic computer model CALMET Version 6.5.0 (Level 150223), based on digital land use data and terrain data, as well as observed surface and upper air data that are available for the Project domain. In accordance with the BC AQDMG (BC MoECCS, 2022a), three years (2016-2018) of meteorological data were modelled in CALMET. The three-dimensional meteorological fields produced by CALMET were used by CALPUFF Version 7.2.1 (Level 150618), a three-dimensional, multi-species, non-steady-state Gaussian puff dispersion model that can simulate the effects of time and space varying meteorological conditions on air contaminant transport. Finally, post-processing utilities were used to post-process and summarize the modelling output from CALPUFF.

5.1 CALMET – METEOROLOGICAL MODELLING

CALMET Version 6.5.0 (Level 150223), associated with the latest CALPUFF System Version 7, was used to generate the meteorological fields for the time period from January 1, 2016 through December 31, 2018. The CALMET model was run in Observation-only mode. Surface weather observations were extracted from the nearest observational weather station situated at the international airport in Faro – "Faro (AUT)" station operated by Environment and Climate Change Canada (ECCC) (WMO ID: 71949). In addition, upper air soundings were retrieved from the only upper air station located in Yukon, namely the Whitehorse International Airport Station (WMO ID: 71964) – operated by NAV Canada – for meteorology in the vertical layers above the surface in order to resolve the three-dimensional meteorology in the CALMET modelling.

The meteorological data input and CALMET output for the modelling period was assessed following the Quality Assurance and Quality Control (QA/QC) procedures outlined in Section 9 of the BC AQDMG (BC MoECCS, 2022a). A description of the CALMET modelling methodology and data sets follows.

The Universal Transverse Mercator (UTM, NAD 83) coordinate system was used for this model application. The CALMET domain for the Project was a 12 km by 12 km domain as presented in Figure 5-1. The CALMET model was run with a 200 m horizontal grid resolution. The modelling domain and grid resolution were chosen such that the main topographical features expected to influence the three-dimensional diagnostic meteorological fields around the Project are adequately captured.

5.1.1 OBSERVED METEOROLOGICAL DATA

Surface weather stations that record hourly meteorological data within the Project's CALMET domain include one station – "Faro (AUT)" – operated by ECCC (WMO ID: 71949). The available meteorological data collected from January 1, 2016, through December 31, 2018 at this surface station was used as input to the CALMET model executed in Observation-only mode. Upper air data from the Whitehorse International Airport Station (WMO ID: 71964) was retrieved for the aforementioned modelling period and used as meteorological input to resolve three-dimensional meteorology in the CALMET modelling. The locations of these meteorological stations are displayed as part of Figure 5-1 below.

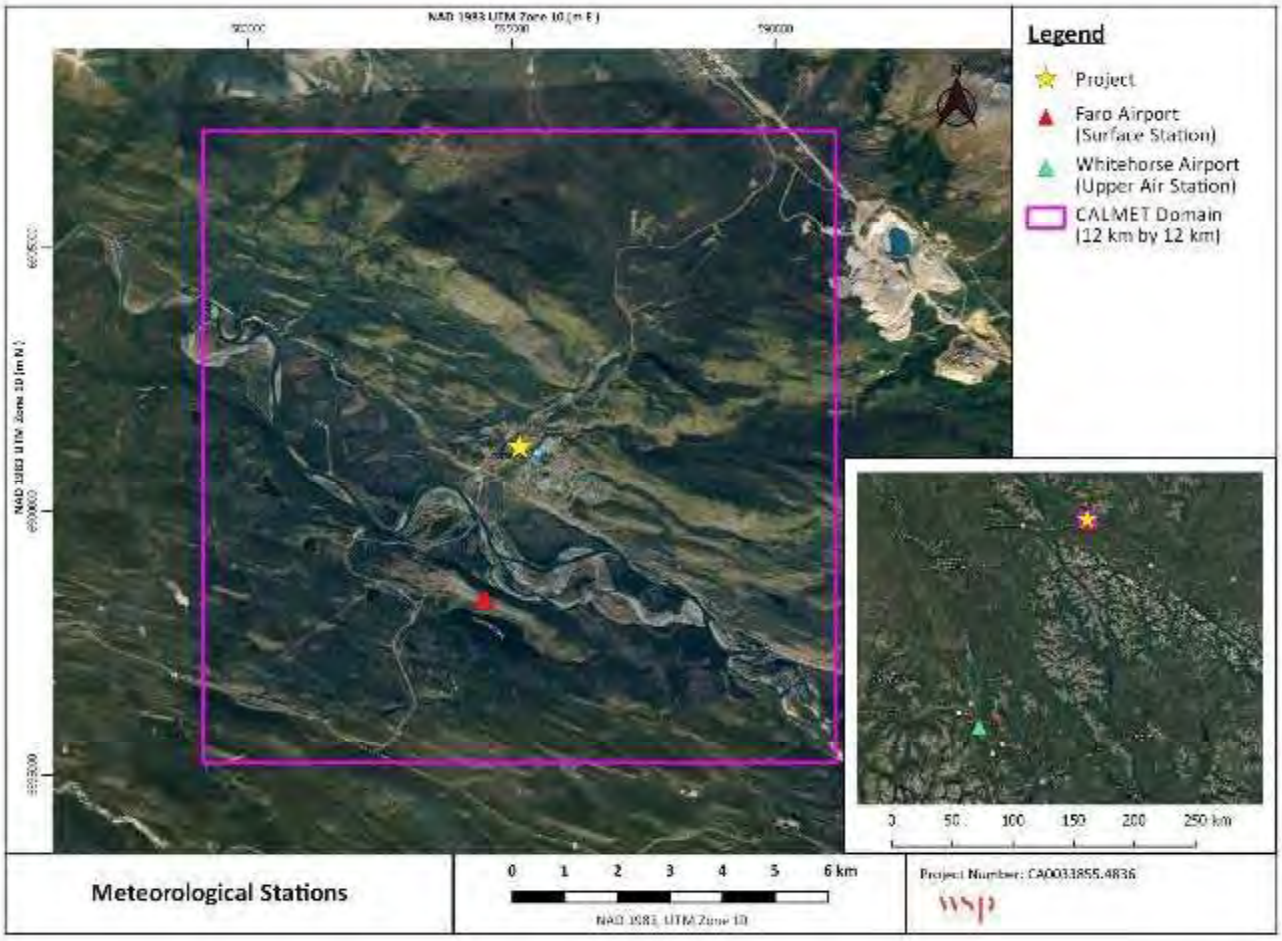

Figure 5-1 Meteorological Stations within CALMET Domain

CALMET requires a measured data value for every hour from at least one meteorological station in order to simulate the three-dimensional fields. Missing data procedures were implemented, when required, according to the BC AQDMG (BC MoECCS, 2022a). The basic meteorological parameters required by the CALMET model were gathered from the surface station and prepared into a CALMET-ready surface data file (SURF.DAT) which includes the following meteorological parameters: wind speed, wind direction, temperature, relative humidity, and station pressure.

Figure 5-2 below illustrates the windrose compiled from the surface wind data observed at the airport in Faro from 2016 to 2018, which shows the prevailing wind patterns.

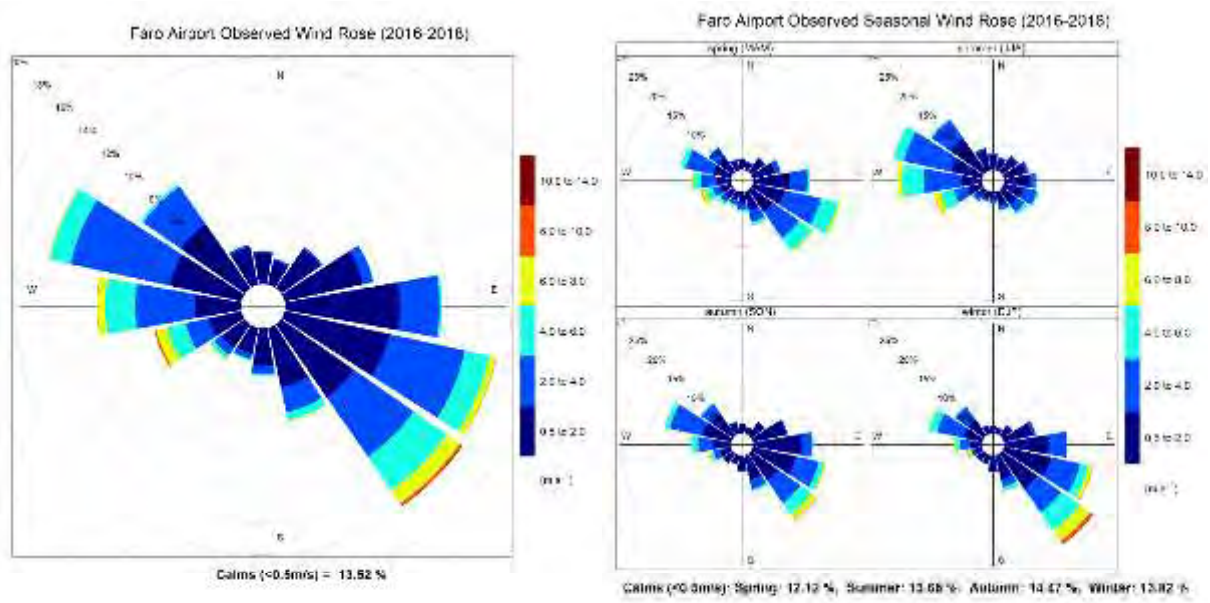

Figure 5-2 Windroses for the Surface Weather Station at Faro International Airport (2016-2018)

5.1.2 GEOPHYSICAL DATA – TERRAIN ELEVATION AND LAND USE

Digital terrain elevation and land use data covering the CALMET model domain was used to simulate effects of the topography and land use on the meteorological conditions in the model. In accordance with the BC AQDMG (BC MoECCS, 2022a), the Canadian Digital Elevation Data (CDED) provided by Natural Resources Canada in a 1:50,000 scale was used to generate the terrain elevation inputs for each CALMET grid point, as well as the base elevations of the model emission sources and receptors. Land use characteristics for each grid cell were gathered from 2015 Canada Land Use dataset provided by Natural Resources Canada. Figure 5-3 and Figure 5-4 below show the terrain elevation and land use data used in the CALMET modelling.

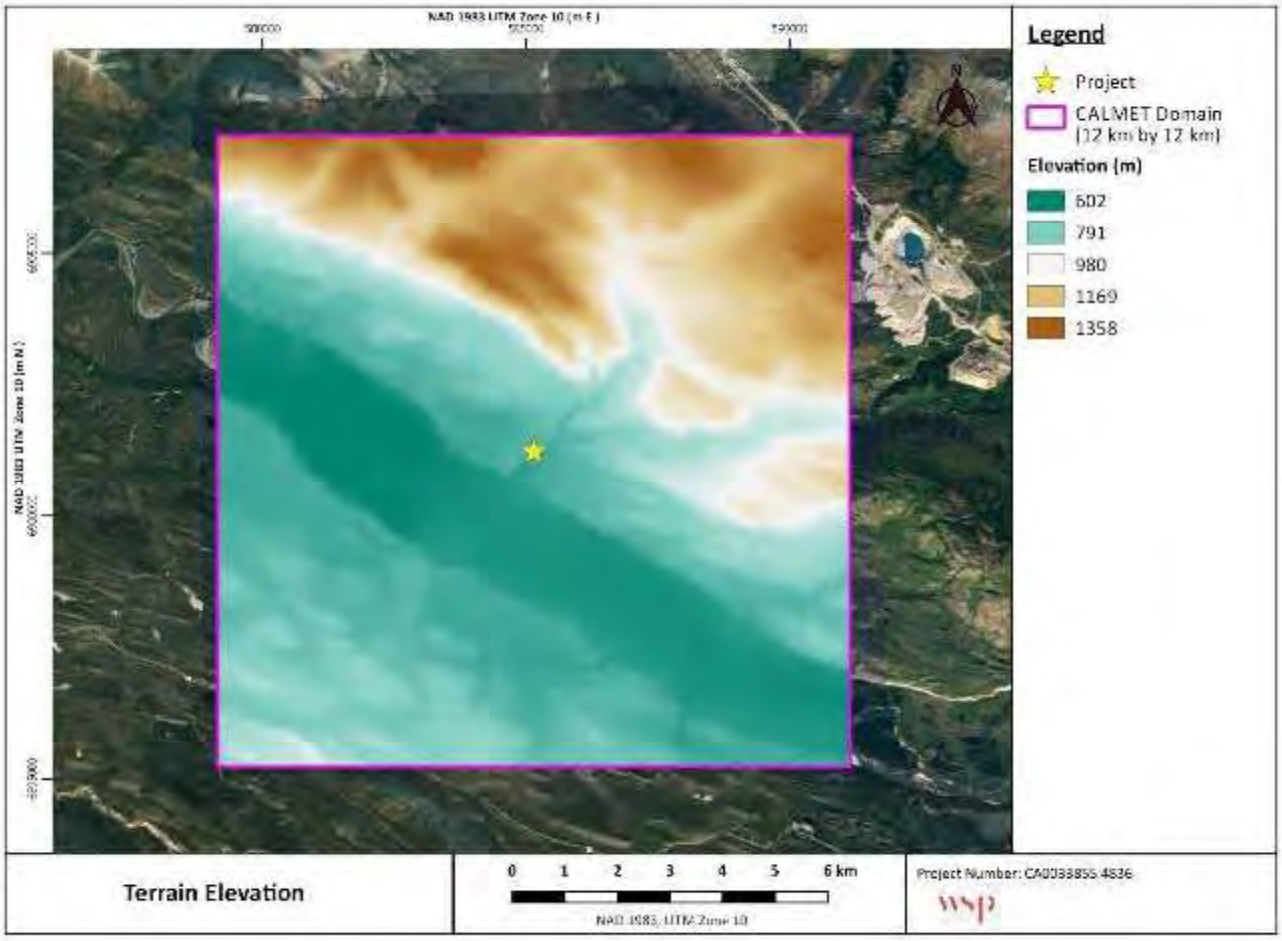

Figure 5-3 Terrain Elevation Data used in CALMET

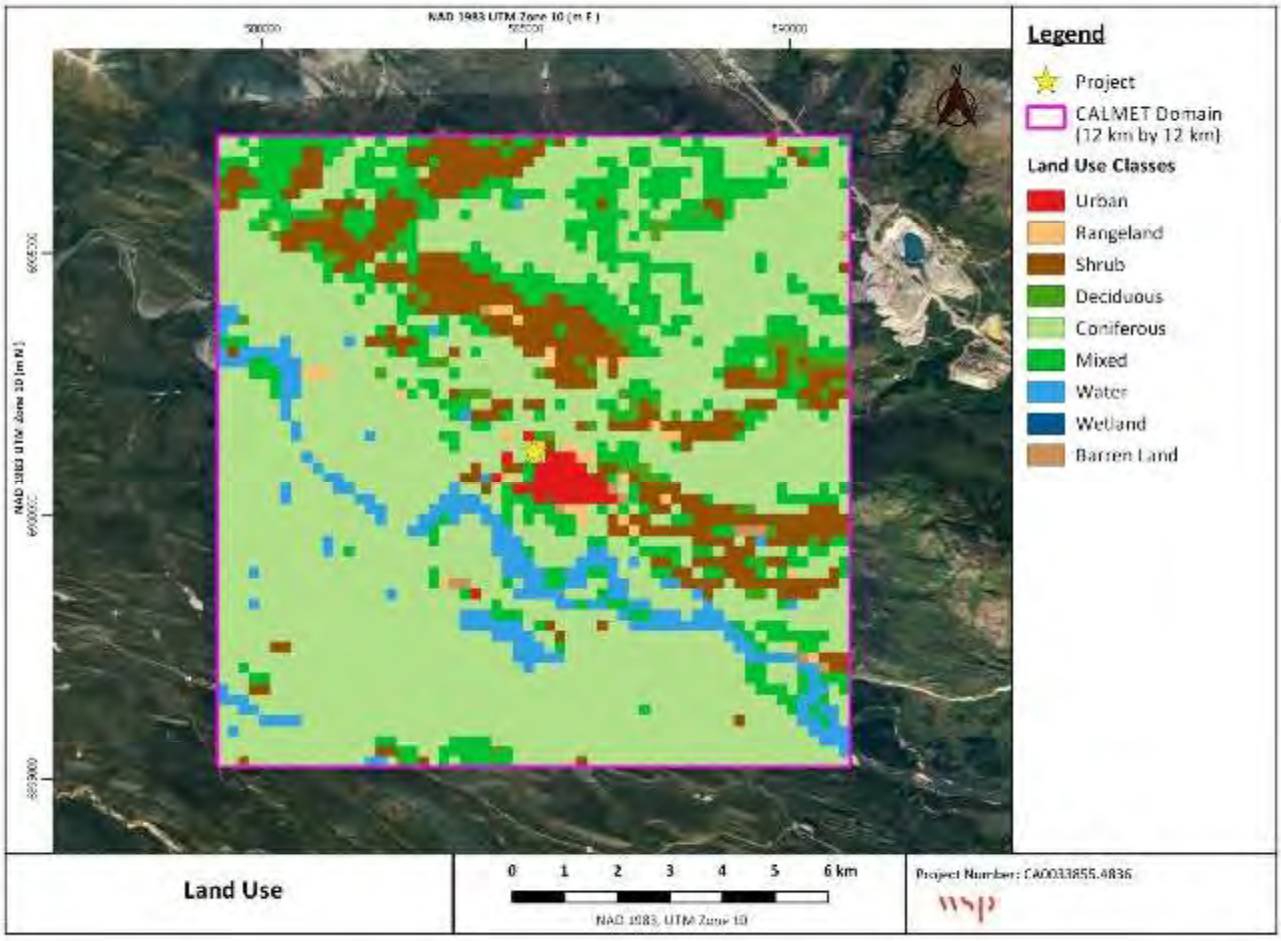

Figure 5-4 Land Use Data used in CALMET

Seasonal parameters were specified for each month based on the seasonal categories outlined in Table 5-1. According to the BC AQDMG (BC MoECCS, 2022a), the seasonal categories are defined as follows:

- Season 1: Midsummer with lush vegetation
- Season 2: Autumn with cropland that has not been harvested
- Season 3: Winter 1, late autumn after frost, no snow on the ground
- Season 4: Winter 2, snow on the ground and subfreezing
- Season 5: Transitional spring with partially green short annuals

Table 5-1 Seasonal Categories for GEO.DAT used in CALMET

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seasonal Category	4	4	4	4	4	5	1	2	2	3	4	4

5.1.3 CALMET MODEL SWITCHES

The CALMET model has a number of user-specified input switches that determine how the model handles terrain effects, interpolation of observational input data, and so forth. The differences in the modelled and measured meteorological fields were examined as part of quality assurance / quality control (QA/QC), and this analysis was utilized to refine and adjust the model options as appropriate. Table 5-2 outlines the options selected in CALMET modelling. The BC AQDMG (BC MoECCS, 2022a) default parameters were used wherever applicable.

Table 5-2 Selected CALMET Model Options

CALMET Model Switch	Parameter	Option Selected	BC AQDMG Default
Determines whether observation data are used, or in combination with NWP model output, or NWP data only	NOOBS	0 (Observation Only mode)	No default
Cloud Data Option: 1,2,3,4	MCLOUD	1 (Clouds data generated from surface observations)	No default
Wind field model selection variable	IWFCOD	1 (Yes)	✓
Compute Froude number adjustment effects?	IFRADJ	1 (Yes)	✓
Compute kinematic effects?	IKINE	0 (No)	✓
Use O'Brien procedure for adjustment of the vertical velocity?	IOBR	0 (No)	✓
Compute slope flows?	ISLOPE	1 (Yes)	✓
Extrapolate surface wind observations to upper layers?	IEXTRP	-4 (Extrapolate surface observations using similarity theory)	✓
Extrapolate calm winds aloft?	ICALM	1 (Yes)	No default
Layer-dependent biases	BIAS	-1, -1, -1, -1, -1, -1, -1, -1, -0.5, 0, 0, 0	No default
Minimum distance between upper air station and surface station for which extrapolation of surface winds will be allowed	RMIN2	-1	✓
Gridded prognostic wind field model output fields	IPROG	0 (No, do not use wind fields from MM5/3D.dat file as initial guess field)	✓
Time step (hrs) of the NWP output used as input data	ISTEPPGS	3600	✓
Use coarse CALMET fields as initial guess fields?	IGFMET	0 (Off)	✓
Use varying radius of influence?	LVARY	F (No, stations outside of RMAX1 are excluded)	✓
Maximum radius of influence over land of the surface layer	RMAX1	4.5 km	No default
Maximum radius of influence over land aloft	RMAX2	4.5 km (Set equal to RMAX1)	No default
Maximum radius of influence over water	RMAX3	Not used	No default

CALMET Model Switch	Parameter	Option Selected	BC AQDMG Default
Minimum radius of influence used in the wind field interpolation	RMIN	0.1	✓
Radius of influence of terrain features	TERRAD	5 km	No default
Distance from a surface station at which the station observations and 1st guess field are equally weighted	R1	4 km	No default
Distance from an upper air station at which the observations and 1st guess field are equally weighted	R2	4 km (Set equal to R1)	No default
Relative weighting of the prognostic wind field data	RPROG	0	No default
Maximum acceptable divergence in the divergence minimum procedure.	DIVLIM	$5*10^{-6}$	✓
Maximum number of iterations in the divergence minimum procedure.	NITER	50	✓
Number of passes in the smoothing procedure	NSMTH	2, 4, 4, 4, 4, 4, 4, 4, 4, 4, 0, 0	✓
Maximum number of stations used in each layer for the interpolation of data to a grid point	NINTR2	99	✓
Critical Froude number	CRITFN	1	✓
Empirical factor controlling the influence of kinematic effects	ALPHA	0.1	✓
Multiplicative scaling factor for extrapolation of surface observations to upper layers	FEXTR2	Not used	✓
Number of barriers to interpolation of the wind fields	NBAR	0	✓
Level (1 to NZ) up to which barriers apply.	KBAR	10	✓
X and Y coordinates of barriers	XBBAR, YBBAR, XEBAR, YEBAR	Not used	✓
Diagnostic module surface temperature option	IDIOPT1	0 (Compute internally from hourly surface observations or prognostic fields)	✓
Diag module sfc station to use for the sfc temp (stn ID).	ISURFT	-1 (2-D spatially varying surface temperatures)	✓
Diagnostic module domain-averaged lapse rate option	IDIOPT2	0 (Compute internally from prognostic fields)	✓
Diagnostic module upper air station to use for lapse rate to use	IUPT	-1 (2-D spatially varying potential temperature lapse rate)	✓

CALMET Model Switch	Parameter	Option Selected	BC AQDMG Default
Depth through which the domain-scale lapse rate is computed	ZUPT	200	✓
Initial guess field wind components	IDIOPT3	0 (Computed internally from observations or NWP output wind fields)	✓
Upper air station to use for domain-scale winds	IUPWND	-1 (Use 3-D initial guess fields)	✓
Bottom and top of layer through which the initial guess winds are computed	ZUPWND	1,1000	✓
Observed surface wind components for wind field module.	IDIOPT4	0 (Read wind speed and wind direction from SURF.DAT. DIAG.DAT not used.)	✓
Observed upper air wind components	IDIOPT5	0 (Read wind speed and wind direction from upper air data file UP.DAT. DIAG.DAT not used.)	✓
Use Lake Breeze Module?	LLBREZE	F (No, do not use Lake Breeze Module)	✓
# of boxes defining region	NBOX	Not used	✓
X Grid line 1 and line 2 defining the region of interest	XG1, XG2	Not used	✓
Y Grid line 1 and line 2 defining the region of interest	YG1, YG2	Not used	✓
X Point defining the coastline	XBCST	Not used	✓
Y Point defining the coastline	YBCST	Not used	✓

5.2 CALMET QUALITY ASSURANCE / QUALITY CONTROL

The QA/QC process for CALMET/CALPUFF modelling was conducted in accordance with the guidelines in Section 9 of the BC AQDMG (BC MoECCS, 2022a). Key results of the quality tests that were applied to the CALMET modelling are documented and presented in the sections below. The CALMET model outputs at the nearest grid point to the Project's emission sources were extracted and used to represent the Project, which is referred to as the "Facility". In addition, the nearest surface meteorological station ("Faro Airport") was selected for this CALMET QA/QC analysis. Specifically, the observed meteorological data at Faro Airport was used to compare with the CALMET modelled meteorological data extracted at the nearest CALMET grid point to Faro Airport.

5.2.1 TEMPERATURE

Figure 5-5 shows the average monthly surface temperatures at observed and CALMET extracted points. Figure 5-6 shows the average hourly temperatures binned into hour intervals of a day. Both temporal plots show good agreement between the predicted and observed temperature values.

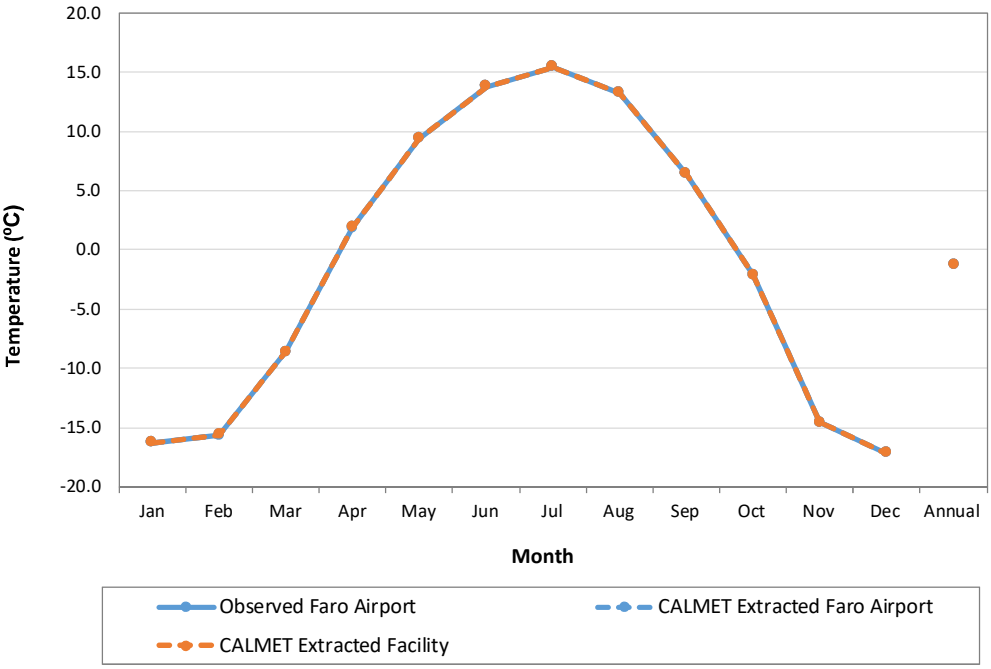

Figure 5-5 Monthly Temperature Variation

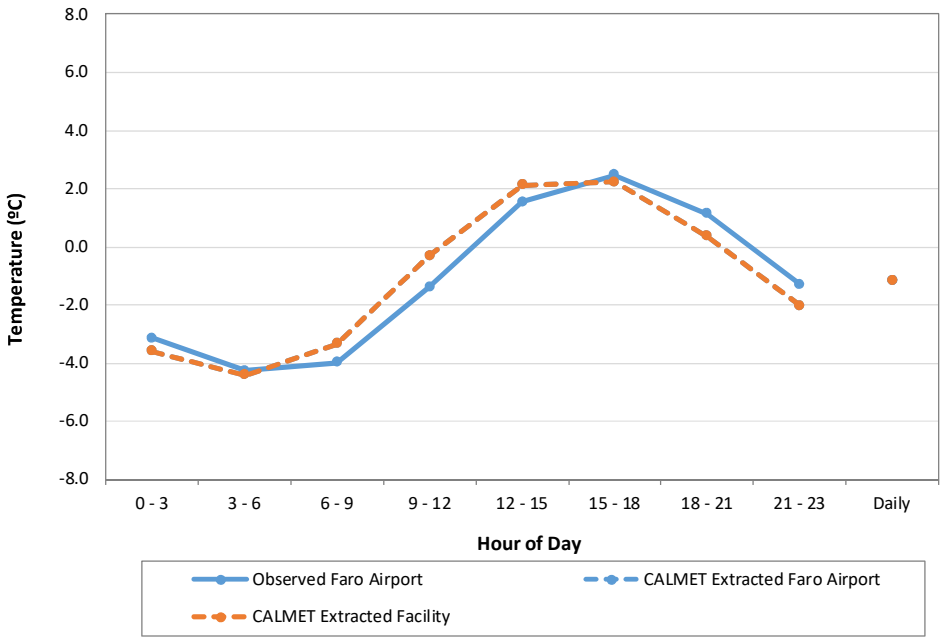

Figure 5-6 Diurnal Temperature Variation

5.2.2 WIND SPEED

The frequency distribution of wind speed at the observed and CALMET extracted points are shown below in Figure 5-7. The modelled wind speeds show good agreement with the observed wind speed data.

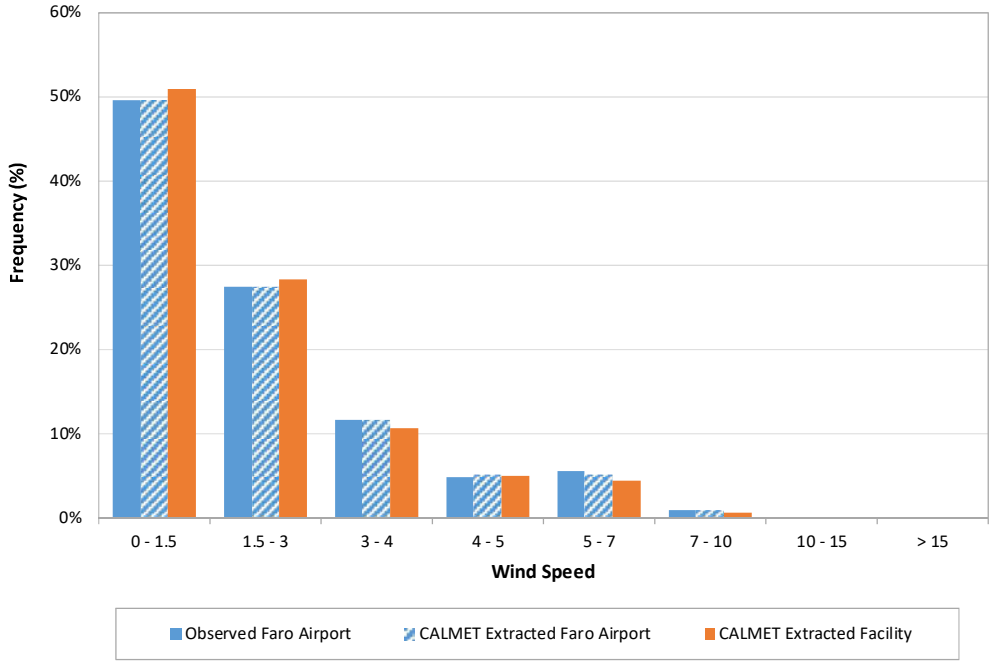

Figure 5-7 Wind Speed Frequency

5.2.3 WIND ROSE

The following figures show full-period and seasonal wind roses for the observed wind data at the selected surface meteorological station (Faro Airport), modelled CALMET wind data extracted at the nearest grid point to Faro Airport, and modelled CALMET wind data extracted at the nearest point to the Facility. The observed and modelled CALMET wind roses show good agreement at Faro Airport station. The wind roses indicate that the predominant winds are from the west-northwest, southeast, and east-southeast directions at Faro Airport station, and east and east-southeast directions at the Facility, which are expected considering the surrounding valley orientation shaped by the Pelly River. Predominant winds during the winter at the Facility are from the east and east southeast. Peak generation capacity is required during the winter period, and the predominant winds would transport emissions away from Faro.

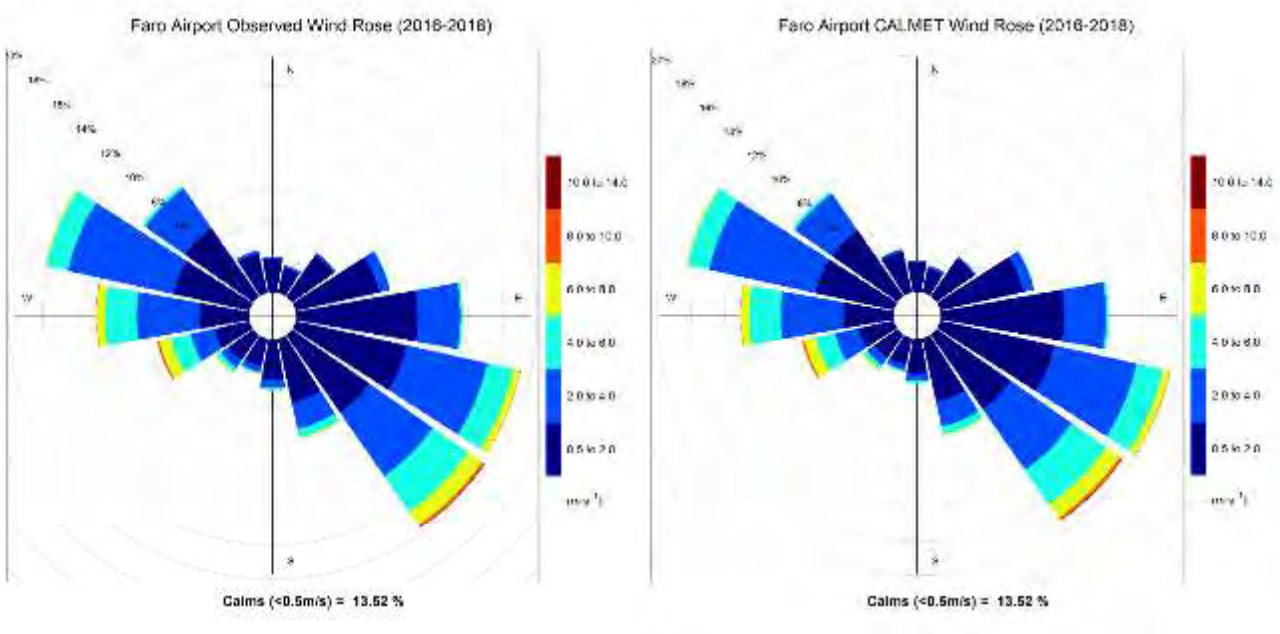

Figure 5-8 Wind Roses at Faro Airport Station

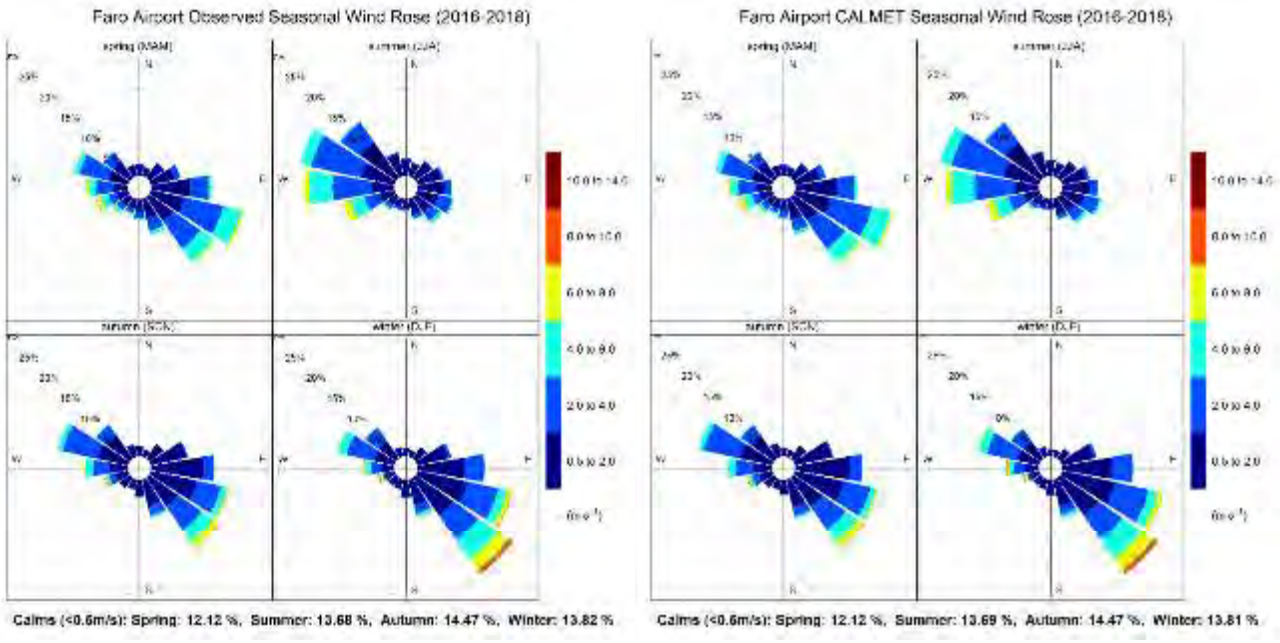

Figure 5-9 Seasonal Wind Roses at Faro Airport Station

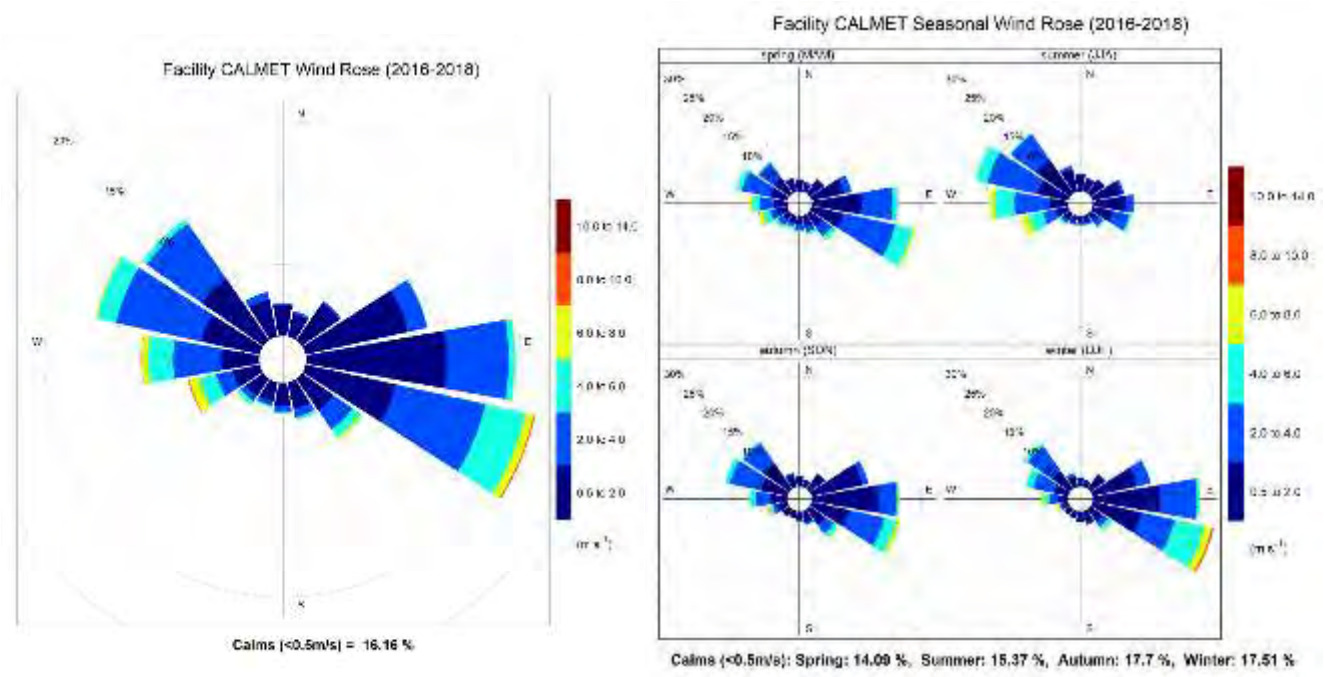

Figure 5-10 Annual and Seasonal Wind Rose at the Facility Location

5.2.4 ATMOSPHERIC STABILITY

Model predicted stability classes are provided in Figure 5-11. The distribution shows higher occurrences of neutral (stability class 4) and stable (stability class 6) conditions near to the Facility and Faro Airport station. There are no observations of atmospheric stability for comparison.

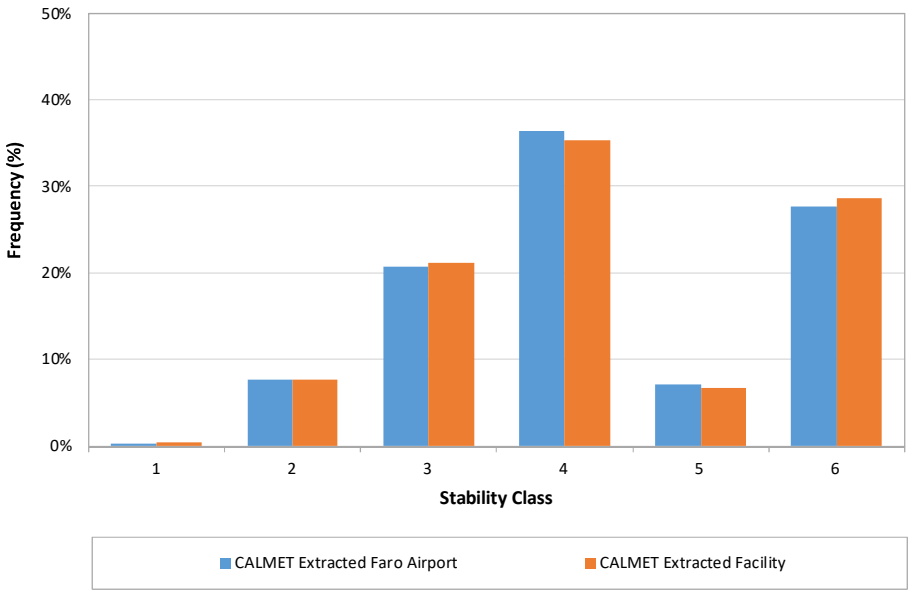

Figure 5-11 Frequency Distribution of Stability Classes

5.2.5 MIXING HEIGHT

Predicted mixing height statistics from CALMET meteorological outputs are below for selected CALMET extracted points. The monthly mixing height variation is shown in Figure 5-12. Figure 5-13 shows the diurnal mixing height variation, illustrating the expected pattern of increasing mixing heights during the daytime and decreasing mixing heights into the nighttime. Figure 5-14 shows the frequency distribution of all the mixing heights predicted by the CALMET model at the selected CALMET extract points. There are no observations of mixing height for comparison.

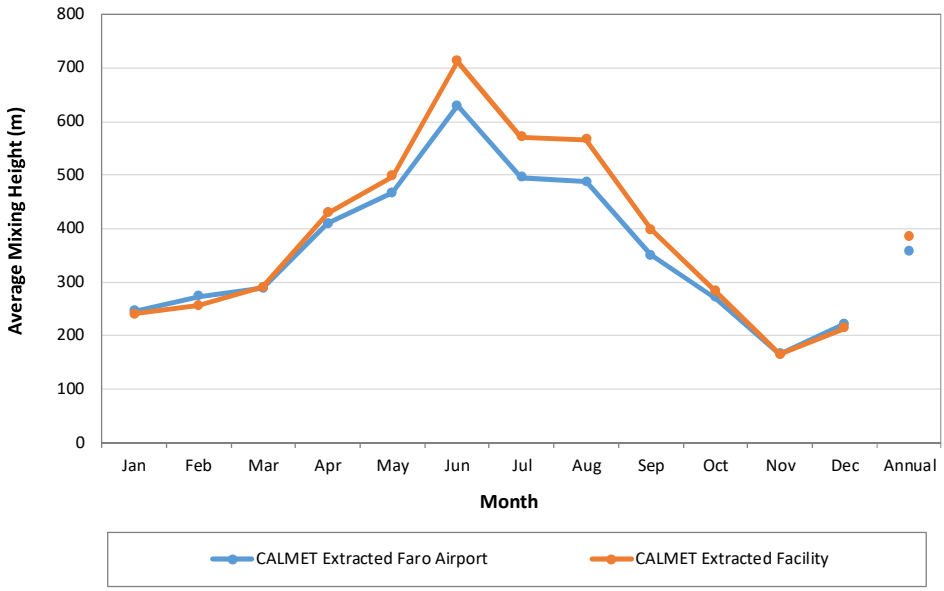

Figure 5-12 Monthly Mixing Height Variation

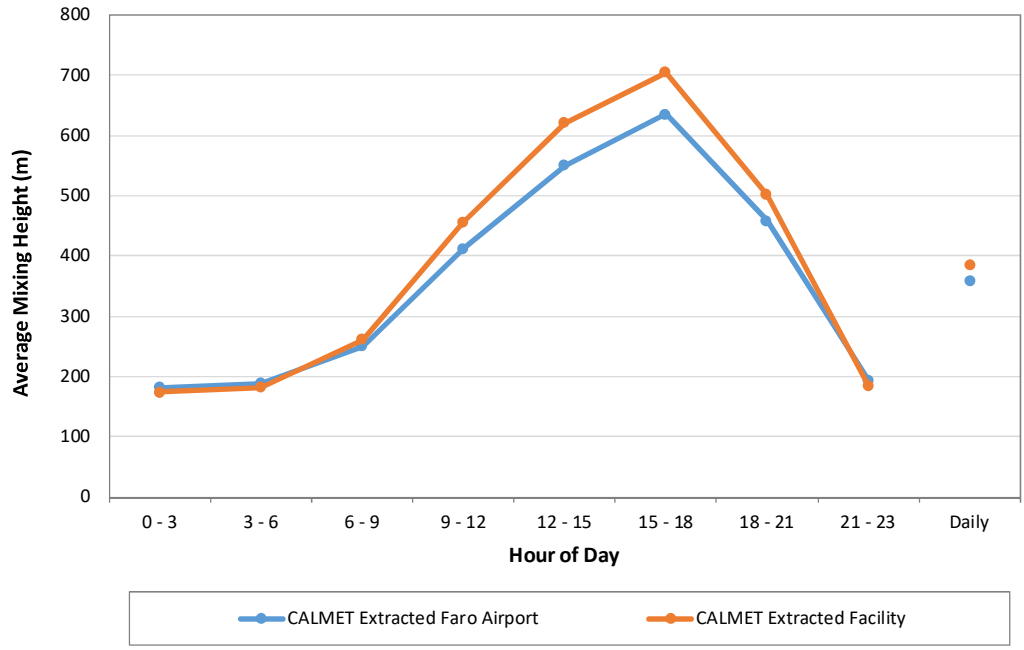

Figure 5-13 Diurnal Mixing Height Variation

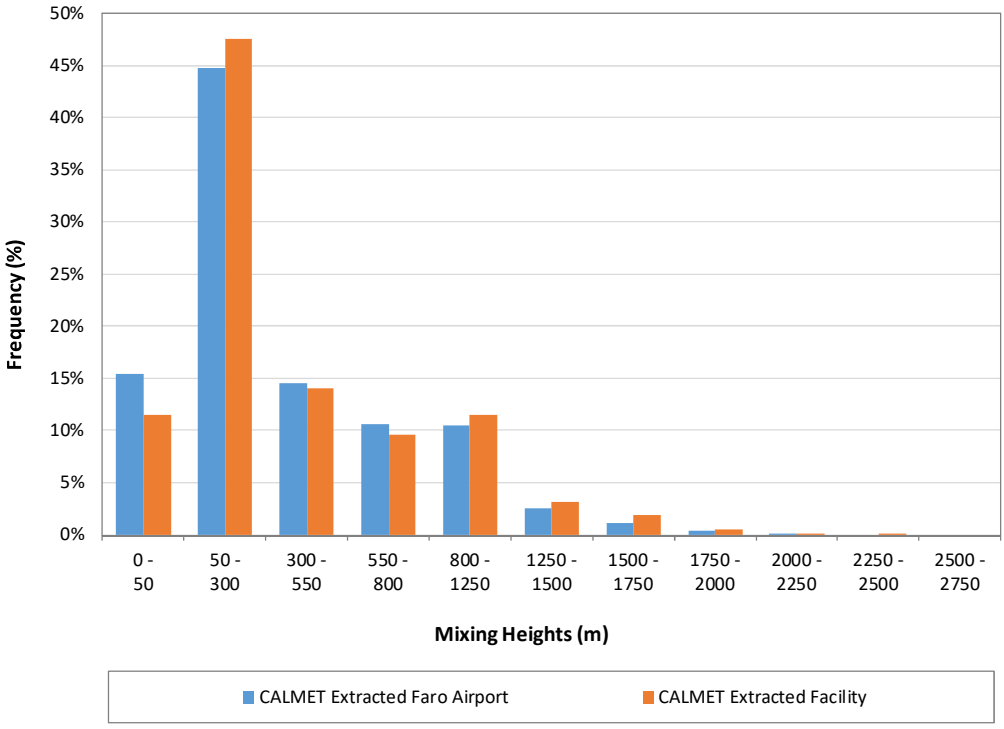

Figure 5-14 Mixing Height Frequency Distribution

5.3 CALPUFF – DISPERSION MODELLING

CALPUFF Version 7.2.1 (Level 150618) was executed for the three-year time period from January 1, 2016 through December 31, 2018. The CALPUFF model uses the meteorological fields generated from CALMET and simulates the dispersion of air emissions from the Project's point sources described in Section 4.

5.3.1 CALPUFF MODEL SWITCHES

Table 5-3 outlines the selected CALPUFF model options. Unless otherwise stated in Table 5-3, the BC AQDMG (BC MoECCS, 2022a) default parameters are used wherever applicable.

Table 5-3 Selected CALPUFF Model Options

CALPUFF Model Switch	Parameter	Option Selected	BC AQDMG Default
Vertical distribution used in the near field	MGAUSS	1 (Gaussian)	✓
Terrain adjustment method	MCTADJ	3 (Partial plume path adjustment)	✓
Subgrid-Scale complex terrain flag	MCTSG	0 (Not used)	✓
Near-field puffs modelled as elongated?	MSLUG	0 (No)	✓
Transitional Plume Rise modelled?	MTRANS	1 (Yes)	✓

CALPUFF Model Switch	Parameter	Option Selected	BC AQDMG Default
Stack-tip downwash?	MTIP	1 (Yes)	✓
Method selected to compute plume rise for point sources not subject to downwash.	MRISE	1 (Briggs plume rise)	✓
Method used to simulate building downwash?	MBDW	2 (PRIME)	✓
Vertical wind shear modelled above stack top?	MSHEAR	0 (No)	✓
Puff splitting allowed?	MSPLIT	0 (No)	✓
Chemical Transformation Scheme?	MCHEM	0 (Not modelled)	✓
Aqueous phase transformation flag (only used in MCHEM =1 or 3)	MAQCHEM	Not used	✓
Wet removal modelled?	MWET	0 (No)	✓
Dry deposition modelled?	MDRY	0 (No)	✓
Gravitational settling (plume tilt)?	MTILT	0 (Not used)	✓
Method used to compute dispersion coefficients	MDISP	2 (Internally calculated)	✓
Sigma measurements used?	MTURBVW	Not used	✓
Back-up method used to compute dispersion when measured turbulence data are missing	MDISP2	Not used	✓
Method used for Lagrangian time scale for σy	MTAULY	0 (Lagrangian time scale)	✓
Advective-Decay timescale for turbulence	MTAUADV	0 (No turbulence advection)	✓
Method used to compute turbulence σv and σw profiles	MCTURB	1 (CALPUFF defaults)	✓
PG sigma y,z adjusted for roughness	MROUGH	0 (Yes)	✓
Partial plume penetration of elevated inversion?	MPARTL	1 (Yes)	✓
Partial plume penetration from buoyant area sources	MPARTLBA	Not used	✓
Strength of temperature inversion provided in PROFILE.DAT extended records?	MTINV	0 (No)	✓
Probability Distribution Function used for dispersion under convective conditions?	MPDF	1 (Yes)	✓
Sub-grid TIBL module used for shoreline?	MSGTIBL	Not used	✓
Boundary conditions (concentration) modelled?	MBCON	0 (No)	✓
Configure for FOG Model output?	MFOG	0 (No)	✓
Test options specified to see if they conform to regulatory values?	MREG	0 (No)	✓
Minimum turbulence velocities, sigma v and sigma w for each stability class over land and water	SVMIN, SWMIN	CALPUFF defaults	✓

5.3.2 CALPUFF MODEL DOMAIN AND RECEPTORS

A 12 km by 12 km CALMET model domain and a 10 km by 10 km CALPUFF model domain were defined (Figure 5-15). Receptor grids were then produced for the Project following the instructions established by BC AQDMG (BC MoECCS, 2022a). Sensitive receptors - including health care facility, school, childcare facility, nearest business, and nearest residential location - were also identified and incorporated into the receptor grid. The names and locations of these sensitive receptors are displayed in Figure 5-15.

Model receptors were established according to the receptor spacing and extent requirements as set out in BC AQDMG (BC MoECCS, 2022a) within the CALPUFF domain. The model receptors created for the Project not only met the minimum requirements outlined in the BC AQDMG (BC MoECCS, 2022a), but also included additional dense receptors at 50 m spacing placed over the entire Town of Faro to allow for more model predictions within the community. Receptors representing the sensitive human populations found nearby the Facility were also included in the model receptor grid.

The complete receptor grid used in CALPUFF were generated as follows and also presented in Figure 5-15 below:

- 20 m spacing along the Facility boundary (or fenceline);
- 50 m spacing within 1.75 km of the Project stack locations, including those encapsulating the entire Faro Town area;
- 250 m spacing within 2 km of the Project stack locations;
- 500 m within 5 km of the Project stack locations;
- Nearest residence (situated approximately 380 m southeast of the Project);
- Nearest business (situated approximately 360 m east-southeast of the Project);
- Nearest childcare facility (Bubble's Faro Daycare, situated approximately 785 m southeast of the Project);
- Nearest school (Del Van Gorder School, situated approximately 825 m southeast of the Project), and,
- Nearest health care facility (Faro Health Centre, situated approximately 860 m southeast of the Project).

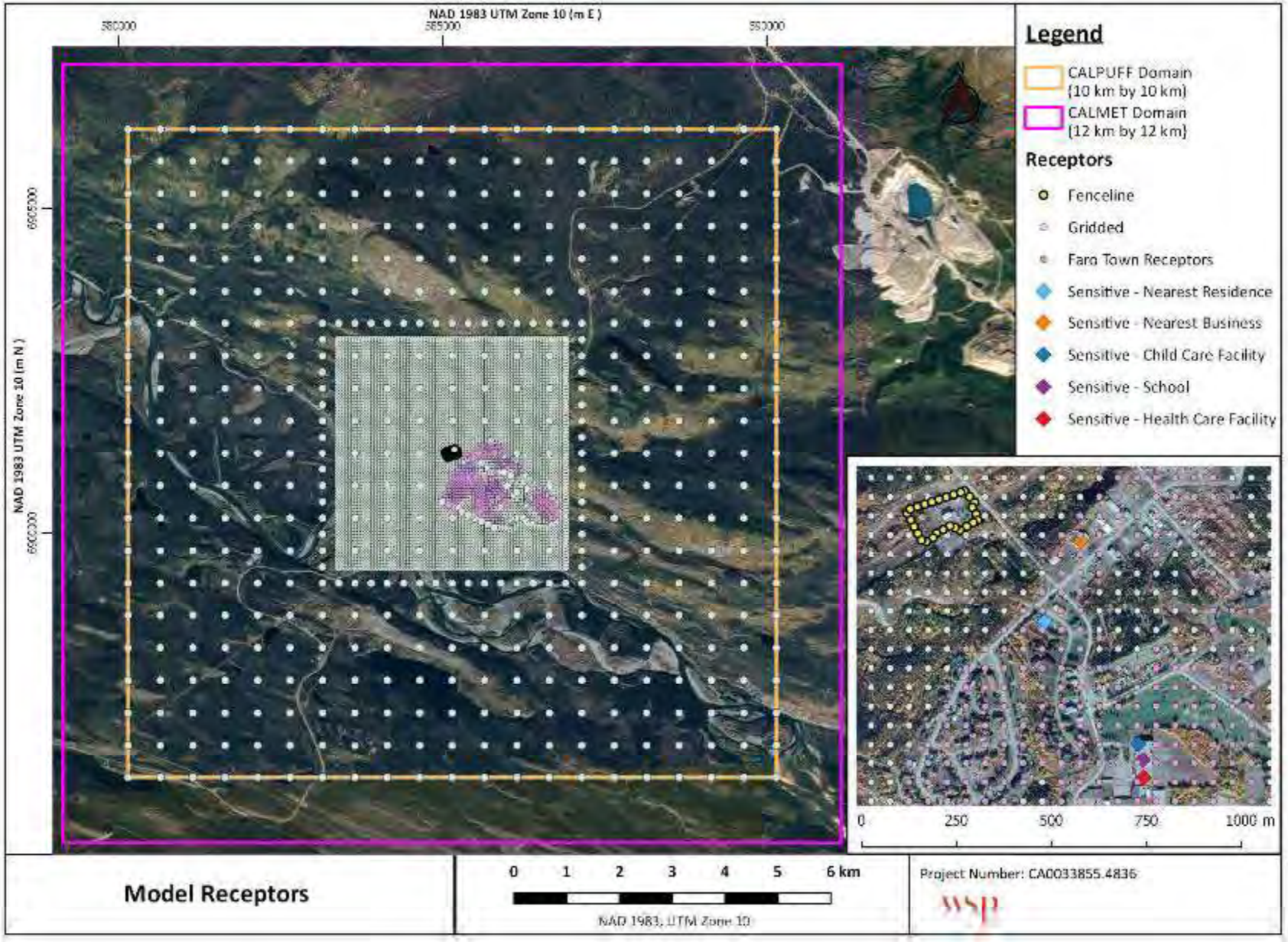

Figure 5-15 Modelled Receptors and Domains

5.3.3 BUILDING DOWNWASH

Buildings or other solid structures may impact air flows in the vicinity of a stack or point source due to the formation of turbulent eddies on the downwind side of the building. On the downwind side of a structure, a recirculating cavity of air forms and it does not mix with other air efficiently. This cavity has the potential to reduce plume rise and impact dispersion. The flow that is affected by the obstruction is known as the "wake".

The CALPUFF model accounts for building downwash with enhanced plume dispersion coefficients due to the turbulent wake and reduced plume rise caused by a combination of the descending streamlines in the lee of the building and the increased entrainment on the wake. Building downwash was considered in this Air Assessment using the US EPA Building Profile Input Program (BPIP-PRIME).

The buildings or structures and their corresponding heights included in the building downwash analysis using BPIP-PRIME are shown in Figure 5-16 and Table 5-4, respectively.

Table 5-4 Building and Structure Heights used in BPIP-PRIME

Building or Structure Name	Building ID	Building Height (m)
FD7 Building	1	9.8
Building #1	2	2.6
YM26 Enclosure	3	4.3
YM25 Enclosure	4	4.3
YM24 Enclosure	5	4.3
YM23 Enclosure	6	4.3
Diesel Fuel Tank #2	7	4.6
Building #2	8	3.0
New Fuel Tank #3	9	4.0
Diesel Fuel Tank #1	10	7.4
Rental Fuel Tank #3	11	4.0
Rental Fuel Tank #4	12	4.0
New Fuel Tank #2	13	4.0
New Fuel Tank #1	14	4.0
YM22 Enclosure	15	4.3
FD8 and FD9 Enclosure	16	4.4 (tier 1) to 7.3 (tier 2)
YM21 Enclosure	17	4.3
YM20 Enclosure	18	4.3
FD1 Building	19	8.9
Office	20	4.9
Control Building	21	4.3
Storage Building	22	5.3

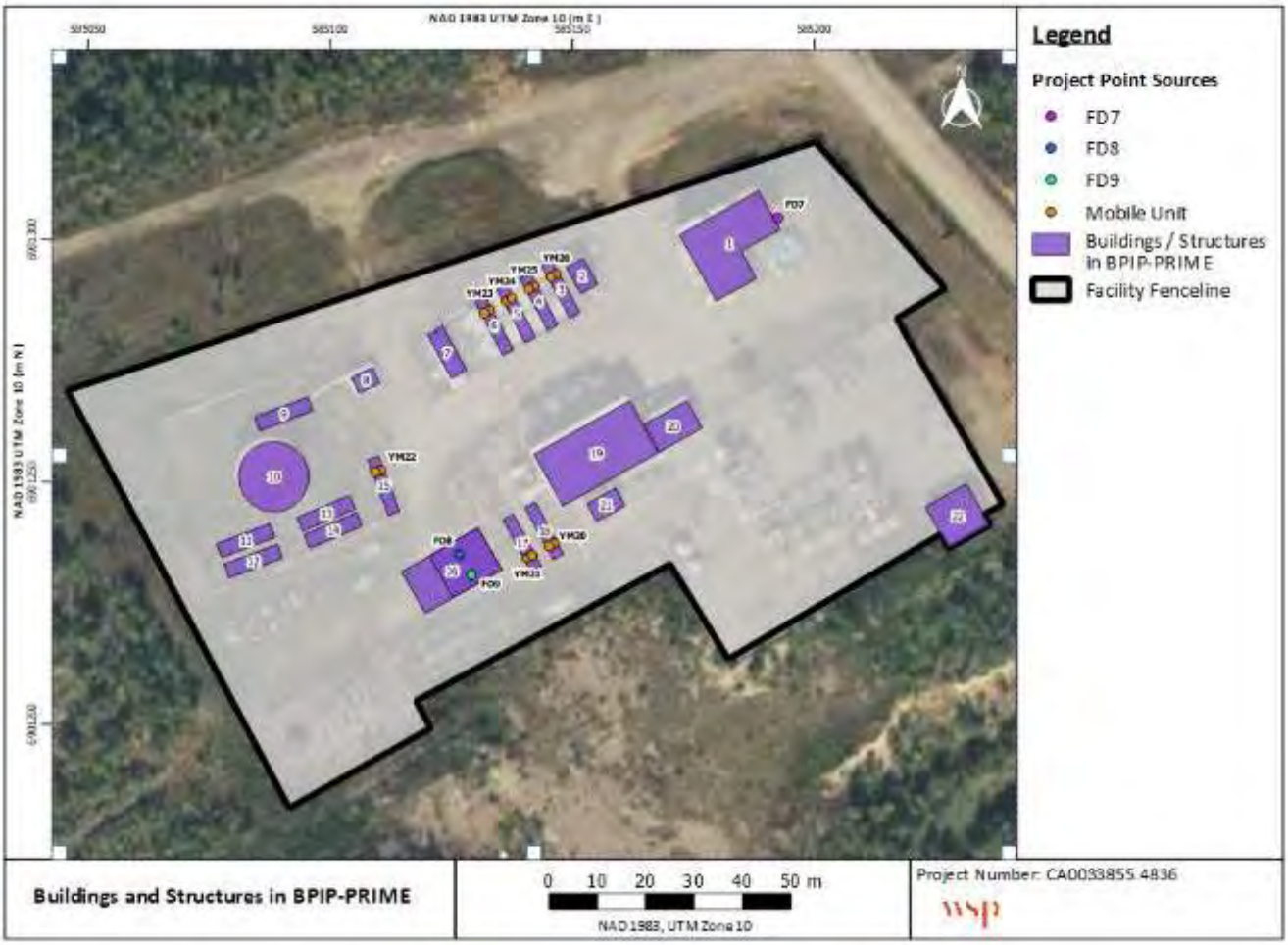

Figure 5-16 Buildings and Structures included in BPIP-PRIME

5.4 NO_X TO NO_2 CONVERSION

As dispersion models only compute and output NO_x concentrations, model predicted NO_x concentrations need to be converted to NO_2 concentrations using estimation methods in order to compare with the established NO_2 criteria. In August 2022, the British Columbia Ministry of Environment and Climate Change Strategy (BC MoECCS) released the "Guidance for NO_2 Dispersion Modelling in British Columbia" document (BC MoECCS, 2022b) to be used in conjunction with the BC AQDMG (BC MoECCS, 2022a), which focuses on the modelling of ambient NO_2 concentrations from NO_x emissions to supplement and replace aspects of the existing modelling guidance. The following subsections outline three NO_x to NO_2 conversion methods from the new BC MoECCS NO_2 guidance document, in order of increasing complexity of implementation, that were utilized in this dispersion modelling assessment.

5.4.1 TIER 1: TOTAL CONVERSION METHOD

The Total Conversion Method (TCM) assumes that 100% of NO_x emissions resulting from a given project are converted to NO_2. This conservative method determines the worst-case NO_2 concentrations from a source by assuming complete conversion of NO_x to NO_2, which can then be used as an initial screening value to compare with AAQOs. If the TCM results in NO_2 predictions that exceed the AAQO, then other, more refined conversion "Tiers" are used to determine modelled NO_2 concentrations. However, the TCM must be presented as part of all model reports so that the upper-bound NO_2 model results can be identified by reviewers.

5.4.2 TIER 2: AMBIENT RATIO METHOD

The Ambient Ratio Method (ARM) estimates NO_2 concentrations based on modelled NO_x concentrations by applying a ratio of NO_2 to total NO_x in the atmosphere. The new BC MoECCS NO_2 guidance document (BC MoECCS, 2022b) provides a BC-specific "ARM2" curve 6th order polynomial equation. The equation was developed by Trinity Consultants and is based on BC monitoring data[1] and the methodology used by RTP Environmental Associates, Inc., the consultants that originally prepared the ARM2 equation as a model refinement for NO_2 1-hour modelling in AERMOD for the American Petroleum Institute and the U.S. EPA (RTP Environmental Associates, Inc., 2013).

This ARM2 method expands on the previously used ARM, for a Tier 2 model for NO_2 concentrations with a 1-hour averaging period, refining the ARM approach by applying a varying ambient NO_2/NO_x ratio as a function of the total NO_x concentration in the atmosphere as opposed to the previous applicated of a fixed ambient NO_2/NO_x ratio to total NO_x of 0.8. Furthermore, the ambient monitoring data demonstrates that the NO_2/NO_x ratio changes with respect to the total NO_x concentration in the atmosphere, where the ratio decreases with increasing NO_x concentrations.

There are five variations of the BC-specific ARM2 curve, classified by five site categories (Industrial, Urban, Rural, Coastal and All). Due to the characteristics of the area where the Facility is located, the "Rural" ARM2 curve was utilized for this dispersion modelling assessment:

$$NO_2/NO_x = -1.4534E\text{-}14*NO_x^6 + 2.0910E\text{-}11*NO_x^5 - 1.1639E\text{-}08*NO_x^4 + 3.1248E\text{-}06*NO_x^3 - 4.0219E\text{-}04*NO_x^2 + 1.8014E\text{-}02*NO_x + 7.0908E\text{-}01$$

When using the ARM, the 6th order polynomial equation describing the Rural ARM2 curve is applied to all hourly NO_x model predictions. The NO_2 baseline concentrations (see Section 3) are added to modelled NO_2 concentrations after applying the ARM2 equation.

With respect to the calculations of the annual NO_2 predictions, the Rural ARM2 curve equation is applied to all modelled hourly NO_x predictions, prior to calculating the annual average and then adding the annual NO_2 baseline concentration. This is repeated for each of the three model years, where the final cumulative annual NO_2 prediction is the maximum of the three cumulative annual NO_2 averages.

5.4.3 TIER 3: OZONE LIMITING METHOD

The Ozone Limiting Method (OLM) incorporates ambient O_3 concentrations for the conversion of NO to NO_2 by assuming that O_3 is the limiting reagent in the photochemical reaction of O_3 and NO to form NO_2. As such, at all receptor locations and any given model hour, the amount of NO_2 formed by the reaction of NO and O_3 in the atmosphere is determined by the ambient O_3 concentration along with an equilibrium constant. The amount of NO emitted from a modelled source is determined using the NO_2 to NO_x in-stack-ratio (ISR), with the remaining percentage of NO_x emissions assumed to be NO.

[1] *36 monitoring stations within a 10-year period between 2009 and 2018*

According to the BC MoECCS NO_2 guidance document, the NO_2 concentration can be determined using the following OLM equation:

$$NO_2 = ISR \times NO_x + \text{the lesser of } (O_3 \text{ or } (ER\text{-}ISR) \times NO_x) + \text{baseline } NO_2$$

where

- "ISR" refers to the in-stack ratio of NO_2 to NO_x. For this dispersion modelling assessment, an ISR value of 0.083 was utilized, corresponding to the recommended ISR value for Reciprocating IC Engines using Diesel/Kerosene in Table B-1 of the BC MoECCS NO_2 guidance document (BC MoECCS, 2022b);
- "ER" refers to the equilibrium ratio. Following the recommendation from the BC MoECC NO_2 guidance document (BC MoECCS, 2022b), the default ER value of 0.9 was utilized for this dispersion modelling assessment.

The NO_2 baseline concentration (see Section 3) is added to modelled NO_2 concentrations after applying the OLM equation because the OLM equation is based on the concentrations of NO_x within the plume.

The above equation assumes the concentrations for all constituents are in vol/vol units (e.g., ppmv). Since the CALPUFF model outputs NO_x predictions in micrograms per cubic metre ($\mu g/m^3$), a unit conversion was required to be applied to the NO_x predictions from $\mu g/m^3$ to ppb prior to application of the OLM equation. As per the BC MoECCS NO_2 guidance document (BC MoECCS, 2022b), the conversion was applied by the following equation:

$$C[\mu g/m^3] = ppb * 1.880$$

With respect to ambient O_3 data, due to the lack of a representative O_3 monitoring station near the Project, the selection of O_3 concentrations to be used in the OLM equation follows "Option 2" under "Appendix C: Ozone Data" of the BC MoECCS NO_2 guidance document (BC MoECCS, 2022b):

> *Option 2: A dataset developed by BC ENV or a dataset developed by the applicant using the methods outlined in this appendix.*

As such, the hourly by month O_3 data within "Table C-1: Rural Ozone Dataset (ppb) for Northeast British Columbia" of the BC MoECCS NO_2 guidance document (BC MoECCS, 2022b) was utilized in the OLM conversion (outlined in Table 5-5 below).

The OLM equation is applied to all hourly NO_x model predictions and then the NO_2 baseline concentrations (see Section 3) are added to modelled NO_2 concentrations after applying the OLM equation. For calculations of the annual NO_2 predictions, the OLM equation is applied to all modelled hourly NO_x predictions, prior to calculating the annual average and then adding the annual NO_2 baseline concentration. This is repeated for each of the three model years, where the final cumulative annual NO_2 prediction is the maximum of the three cumulative annual NO_2 averages.

Table 5-5 Rural Ozone Dataset (ppb) for Northeast British Columbia

Hour	Month											
	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec
24:00 AM	43.9	46.7	55	51.8	54	50.5	39	36	39.3	42	41	43.1
1:00 AM	43.3	46.9	57	52.2	51	49.1	39	36.8	41.2	41.9	41.1	43.6
2:00 AM	44	46.7	54.5	53.8	50	45	37	34.1	38.1	41.3	41.1	43.9
3:00 AM	45	46.7	52	53.7	48	46	34	37	36.7	44	42	43.5
4:00 AM	44.9	47.3	51	51	47	45	33.4	36	35.7	45	42	43.6
5:00 AM	46.2	47.4	47.5	49.3	40.5	41.8	29.5	31.4	34.6	39.7	40.2	42.3
6:00 AM	45	48.2	49	50	44.1	44.9	35	34	35	47.4	42	42.6
7:00 AM	46.1	47.9	49	51	45.4	45.8	34	32	35	45	41.5	42.5
8:00 AM	45.9	46.9	46.8	54.1	48.6	47	35.2	34.4	34.9	42	42	42.6
9:00 AM	45	48.1	47.1	56	51.8	48.4	38	36	36.7	42	41.6	42.4
10:00 AM	45	48.2	47.3	54.9	54.1	61	41	43.2	38	42	41.7	42.3
11:00 AM	44.9	48.4	49	55.1	60.8	61	42.9	45.6	40.7	41.3	41.6	43
12:00 PM	44.9	48.5	51.7	59	64	63	43	47	42.4	46	42.2	43.5
1:00 PM	45	48.7	55.8	57.3	71	60.3	45	47	48.1	48	42.3	44.1
2:00 PM	45.2	48.5	59	59	69	61	49	46.3	50.5	46	42.4	42.6
3:00 PM	44.5	47.8	60	59	69	62	50	47	49.4	44.8	42.6	43.7
4:00 PM	45	47.4	62	60	67	65	50	48.2	53	44	42.4	43.8
5:00 PM	44	47	62.1	60	66	62	46	53.3	51	46	42.3	43.4
6:00 PM	44.9	46.5	60	60	65	60	50	47	52	45	41.4	44.8
7:00 PM	44	46.2	58	58.3	62.4	57	51	45	46	45	41	43.3
8:00 PM	43.9	47	56.8	57.8	60	56	46.4	43	46.7	43.3	41	43.4
9:00 PM	43.9	47	58.3	55.7	56	53.5	46.6	40	46	42	41	42.6
10:00 PM	43.5	47.1	58.4	53.9	55	52	47	38.4	41	41	41.5	42.3
11:00 PM	44	46.2	55.1	52.8	54	51.9	49	39	39.7	41.4	41.5	42.8

Note: The values within this table were extracted from Table C-1 of the BC MoECCS NO_2 guidance document (BC MoECCS, 2022b)

6 POST-PROCESSING AND RESULTS

The CALPOST utility from the CALPUFF System Version 7 was used to post-process the CALPUFF dispersion modelling outputs for all air contaminants (NO_2, TSP, PM_{10}, $PM_{2.5}$, SO_2, and CO) according to the statistical forms and averaging periods of the applicable ambient air quality criteria chosen for the Air Assessment (Section 2). The following sections outline the maximum predicted air contaminant concentrations resulting from the modelling scenario defined in Section 4.1. Maximum predicted concentrations are presented in summary tables (Table 6-1 and Table 6-2), summarized by averaging periods (1-hour, 8-hour, 24-hour, and annual) and receptor types. The receptor types are categorized as follows:

- Maximum Point of Impingement (MPOI) – the receptor with the highest predicted ambient concentration across all modelled receptors;
- Faro Town – the receptor with the highest predicted ambient concentration within the Town of Faro;
- Nearest residence (situated approximately 380 m southeast of the Faro Generating Station);
- Nearest business (situated approximately 360 m east-southeast of the Faro Generating Station);
- Nearest childcare facility (Bubble's Faro Daycare, situated approximately 785 m southeast of the Faro Generating Station);
- Nearest school (Del Van Gorder School, situated approximately 825 m southeast of the Faro Generating Station), and,
- Nearest health care facility (Faro Health Centre, situated approximately 860 m southeast of the Faro Generating Station).

The maximum predicted air contaminant concentrations are outlined in Section 6.1 below. Tabular summaries of the model predictions at the MPOI are provided in Table 6-1, while Table 6-2 presents predictions at the sensitive receptors. The tables present the total (cumulative) Project concentrations derived by summing the model predicted concentrations with baseline concentrations, where available. Values highlighted in yellow indicate the occurrence of cumulative model predictions exceeding ambient air quality criteria.

In order to illustrate the magnitude compared to the ambient air quality standards considered, percentages of predicted concentrations relative to the applicable standard are also provided in the modelling results summary tables (Table 6-1 and Table 6-2). The spatial distribution and pattern of the dispersion modelling results are depicted by contour plots (isopleths) of maximum predicted concentrations for each air contaminant and averaging period in Figure 6-1 through Figure 6-11. Where appropriate, frequency of exceedances of the applicable ambient air quality criteria are presented. A more in-depth analysis and discussion by each air contaminant are presented in the subsections below.

With respect to NO_2 results, it is important to note that, although the ARM conversion method was utilized in this assessment, only the most conservative (TCM) and most refined (OLM) NO_X to NO_2 conversion methods have been presented in this report. Furthermore, the NO_2 predictions resulting from the TCM conversion method are meant to show the predicted worst-case NO_2 concentrations by assuming complete conversion of NO_x to NO_2, which is highly conservative and not representative of realistic atmospheric chemistry conditions. However, as per the BC MoECCS NO_2 guidance document (BC MoECCS, 2022b), TCM NO_2 predictions are presented in this assessment so that the upper-bound NO_2 model results can be identified, but they have been highlighted in grey within the tables below as they are not meant to represent realistic levels of ambient NO_2 concentrations.

Table 6-1 Summary of Maximum Cumulative Modelling Results at the MPOI from the Expanded Capacity Scenario

AIR CONTAMINANT	AVERAGING PERIOD	AMBIENT AIR QUALITY STANDARD ($\mu g/m^3$)	JURSIDICTION	BASELINE CONCENTRATION		MAXIMUM CUMULATIVE MODEL PREDICTED CONCENTRATION AT THE MPOI	
						Expanded Capacity Scenario	
				Value ($\mu g/m^3$)	% of Criteria	Value ($\mu g/m^3$)	% of Criteria
Nitrogen Dioxide (NO_2) - TCM	1-hour	79	Yukon	35.8	45%	6013.1	7612%
	Annual	23	Yukon	4.8	21%	468.4	2036%
Nitrogen Dioxide (NO_2) - OLM	1-hour	79	Yukon	35.8	45%	585.8	742%
	Annual	23	Yukon	4.8	21%	72.3	314%
Total Suspended Particulate (TSP)	24-hour	120	Yukon	N/A*	N/A*	91.7	76%
	Annual	60	Yukon	N/A*	N/A*	8.5	14%
Coarse Particulate Matter (PM_{10})	24-hour	50	Yukon	49.5	99%	75.8	152%
Fine Particulate Matter ($PM_{2.5}$)	24-hour	27	Yukon	10.2	38%	22.7	84%
	Annual	8.8	Yukon	4.3	48%	7.2	82%
Sulphur Dioxide (SO_2)	1-hour	170	Yukon	2.3	1%	15.4	9%
	Annual	11	Yukon	0.8	8%	1.8	17%
Carbon Monoxide (CO)	1-hour	14300	BC	391.2	3%	1104.2	8%
	8-hour	5500	BC	372.1	7%	773.9	14%

***Note:** There is no hourly TSP monitoring data available for the Project location, so no baseline TSP value was included in the calculation of cumulative TSP predictions.

Table 6-2 Summary of Maximum Cumulative Modelling Results from the Expanded Capacity Scenario by Sensitive Receptor Type

AIR CONTAMINANT	AVERAGING PERIOD	AMBIENT AIR QUALITY STANDARD (µg/m³)	JURISDICTION	MAXIMUM CUMULATIVE MODEL PREDICTED CONCENTRATION AT THE SENSITVE RECEPTORS											
				Expanded Capacity Scenario											
				Most Impacted Faro Town Receptor		Nearest Residence		Nearest Business		Nearest Childcare Facility		Nearest School		Nearest Health Care Facility	
				Value (µg/m³)	% of Criteria	Value (µg/m³)	% of Criteria	Value (µg/m³)	% of Criteria	Value (µg/m³)	% of Criteria	Value (µg/m³)	% of Criteria	Value (µg/m³)	% of Criteria
Nitrogen Dioxide (NO_2) – TCM	1-hour	79	Yukon	2326.1	2944%	1184.1	1499%	1264.1	1600%	798.2	1010%	776.3	983%	792.2	1003%
	Annual	23	Yukon	91.2	396%	63.8	278%	65.0	283%	37.7	164%	35.2	153%	33.0	144%
Nitrogen Dioxide (NO_2) – OLM	1-hour	79	Yukon	281.9	357%	187.8	238%	189.2	239%	155.3	197%	153.2	194%	154.3	195%
	Annual	23	Yukon	27.8	121%	23.2	101%	24.4	106%	19.0	83%	18.5	80%	17.9	78%
Total Suspended Particulate (TSP)*	24-hour	120	Yukon	16.2	14%	8.2	7%	7.0	6%	6.8	6%	6.2	5%	5.6	5%
	Annual	60	Yukon	1.3	2%	0.8	1%	1.0	2%	0.5	1%	0.5	1%	0.4	1%
Coarse Particulate Matter (PM_{10})	24-hour	50	Yukon	56.1	112%	52.7	105%	52.2	104%	52.0	104%	51.9	104%	51.7	103%
Fine Particulate Matter ($PM_{2.5}$)	24-hour	27	Yukon	12.7	47%	11.8	44%	11.8	44%	11.1	41%	11.1	41%	11.0	41%
	Annual	8.8	Yukon	4.8	55%	4.6	53%	4.7	53%	4.5	51%	4.5	51%	4.4	51%
Sulphur Dioxide (SO_2)	1-hour	170	Yukon	7.3	4%	5.1	3%	5.2	3%	3.9	2%	3.9	2%	3.9	2%
	Annual	11	Yukon	1.0	9%	1.0	9%	1.0	9%	0.9	8%	0.9	8%	0.9	8%
Carbon Monoxide (CO)	1-hour	14300	BC	751.0	5%	554.6	4%	555.4	4%	482.9	3%	488.8	3%	505.3	4%
	8-hour	5500	BC	450.1	8%	423.7	8%	419.1	8%	412.8	8%	412.0	7%	411.4	7%

***Note:** There is no hourly TSP monitoring data available for the Project location, so no baseline TSP value was included in the calculation of cumulative TSP predictions.

6.1 RESULTS FOR EXPANDED CAPACITY SCENARIO

The Expanded Capacity Scenario considered the ambient air quality impact of the existing FD7 2.8 MW genset, two (2) CAT C175-16 with SCR 2.6 MW diesel generators (Genset ID: FD8 and FD9) and seven (7) CAT 3516C 1.825 MW diesel generators (Genset ID: YM20, YM21, YM22, YM23, YM24, YM25, and YM26). The air dispersion modelling results for each air contaminant and averaging period are discussed below, along with the associated contour plots.

6.1.1 GASEOUS AIR CONTAMINANTS (SO_2, CO, AND NO_2)

The predicted concentrations of SO_2 and CO for both short-term and long-term averaging periods are very low compared to the ambient air quality criteria. The predicted cumulative concentrations were found to be well below the ambient air quality criteria, where the maximum predicted cumulative concentrations for each receptor category are as follows:

- SO_2
  - MPOI
    - 15.4 µg/m^3, or 9% of the 1-hour SO_2 YAAQS;
    - 1.8 µg/m^3, or 17% of the annual SO_2 YAAQS;
  - Faro Town
    - 7.3 µg/m^3, or 4% of the 1-hour SO_2 YAAQS;
    - 1.0 µg/m^3, or 9% of the annual SO_2 YAAQS;
  - Nearest Sensitive Receptors
    - range from 3.9 µg/m^3 to 5.2 µg/m^3 (2% to 3%) of the 1-hour SO_2 YAAQS; and,
    - range from 0.9 µg/m^3 to 1.0 µg/m^3 (8% to 9%) of the annual SO_2 YAAQS.
- CO
  - MPOI
    - 1104.2 µg/m^3, or 8% of the 1-hour CO ambient air quality criteria;
    - 773.9 µg/m^3, or 14% of the 8-hour CO ambient air quality criteria;
  - Faro Town
    - 751.0 µg/m^3, or 5% of the 1-hour CO ambient air quality criteria;
    - 450.1 µg/m^3, or 8% of the 8-hour CO ambient air quality criteria;
  - Nearest Sensitive Receptors
    - range from 482.9 µg/m^3 to 555.4 µg/m^3 (3% to 4%) of the 1-hour CO ambient air quality criteria; and,
    - range from 411.4 µg/m^3 to 423.7 µg/m^3 (7% to 8%) of the 8-hour CO ambient air quality criteria.

These results indicate that the contribution of the emissions from the Expanded Capacity Scenario to ambient SO_2 and CO is low. The contour plots (Figure 6-1 to Figure 6-4) show that the predicted concentrations significantly decrease with increased distance from the Faro Generating Station.

As discussed in Section 5.4, the TCM, ARM, and OLM methods were used to convert model predictions from NO_x to NO_2 values. However, in this section, only the NO_2 predictions using the OLM conversion method will be discussed in detail. The baseline ambient concentrations considered in the assessment are relatively elevated, with the 1-hour baseline at 32% of the current YAAQS and 45% of the 2025 YAAQS. When baseline NO_2 concentrations (as defined in Section 3) are included, the cumulative NO_2 predicted concentrations at the various receptor types are as follows:

- NO_2
  - MPOI
    - 585.8 µg/m^3, or 742% of the 1-hour NO_2 YAAQS;
    - 72.3 µg/m^3, or 314% of the annual NO_2 YAAQS;
  - Faro Town
    - 281.9 µg/m^3, or 357% of the 1-hour NO_2 YAAQS;
    - 27.8 µg/m^3, or 121% of the annual NO_2 YAAQS;
  - Nearest Sensitive Receptors
    - range from 153.2 µg/m^3 to 189.2 µg/m^3 (194% to 239%) of the 1-hour NO_2 YAAQS; and,
    - range from 17.9 µg/m^3 to 24.4 µg/m^3 (78% to 106%) of the annual NO_2 YAAQS.

Figure 6-5 and Figure 6-6 show that the short-term exceedances are predicted across most of the modelling domain, while the long-term exceedances are predicted only within a relatively small area surrounding the Faro Generating Station. These exceedances were expected considering the significant decreases in the YAAQS from current levels to the 2025 levels, and more importantly the conservative nature of the dispersion model, which assumes all generators are operating at maximum capacity during every hour of the three-year period (2016-2018).

6.1.2 NO2 PREDICTED EXCEEDENCES DISCUSSION

Maximum emissions from all operating sources are only expected to occur for a small number of hours each year; however, the conservative modelling approach employed in this study assessed the impact of these maximum emissions occurring in every hour of the year. This ensured that the worst-case combination of emissions and meteorology were assessed.

Since the primary objective of the air quality assessment is to evaluate the potential impacts on the human population residing near the Faro Generating Station in the Town of Faro, rather than at the point of maximum impingement, further analysis of the predicted short-term NO_2 exceedances was conducted for the maximally impacted receptor within the Town of Faro (referred to as “Maximum Receptor (Faro Town)” in Figure 6-5).

To assess the potential impact, it is important to quantify the percentage of time in a year that the combination of worst-case emissions and prevailing meteorological conditions produce an exceedance of the YAAQS. The contingent frequency of exceedance was calculated for the 1-hour averaging period. The highest number of exceedances predicted at any one-year modelling period for the receptor (including the baseline concentrations) was used. This contingent frequency of exceedance is conservative as it does not take into account the actual operational frequency of the various units.

The contingent frequency of exceedance, using the 98th percentile of 1-hour NO_2 predictions (excluding top 526 hours out of 26,304 total hours of the 3-year modelling period), was determined to be 35.1% (9,238 hours out of 26,304 total hours) at the MPOI and 14.2% (3740 hours out of 26304 total hours) at the maximally impacted Faro Town receptor.

To further illustrate the conservative nature of air dispersion modeling, a comparison between recent NO_2 monitoring data within the Town of Faro and the model predicted levels at the location of the monitor was conducted (Table 6-3). NO_2 monitoring has occurred within Faro at the Del Van Gorder School (Yukon University Faro Campus) between August 16, 2023, and April 30, 2024, and has measured very low levels of NO_2 (25% of the 1-hour NO_2 YAAQS and 7% of the annual YAAQS). Although the monitoring data collected so far does not meet the completeness criteria and exceptions (availability of two of the three annual 98th percentiles of the 1-hr NO_2 data) outlined in the Guidance Document on Achievement Determination for Canadian Ambient Air Quality Standards for Nitrogen Dioxide (CCME, 2020), the monitoring data demonstrates the NO_2 concentrations measured over the course of one winter, while the Faro Generating Station was operational, are lower than the baseline concentrations used in the dispersion model. This highlights the highly conservative nature of the air dispersion model.

Table 6-3 Actual Monitoring Data versus Model Predictions for Nearest School

Parameter	Actual Monitoring Data (as percent of YAAQA)1	Baseline concentration Used in Modeling (as percent of YAAQS)	Modelled Data at Nearest School / Location of Monitoring Station (as percent of YAAQS)
1-hour NO_2	25%	45%	194%
Annual NO_2	7%	21%	80%

[1]Based on data collected between August 16, 2023, and April 30, 2024.

Based on model predictions, there is a potential for the operations to impact the local ambient air quality during periods when maximum station loads and associated maximum emissions coincide with periods of prevailing meteorology that limit effective dispersion of air contaminants. But evaluation of the maximum predicted concentrations should consider that the modeling methodology is highly conservative, the generators are not run consistently at full capacity, and that actual air monitoring data indicates NO_2 concentrations are much lower than previous modelling predictions for the Faro Generating Station.

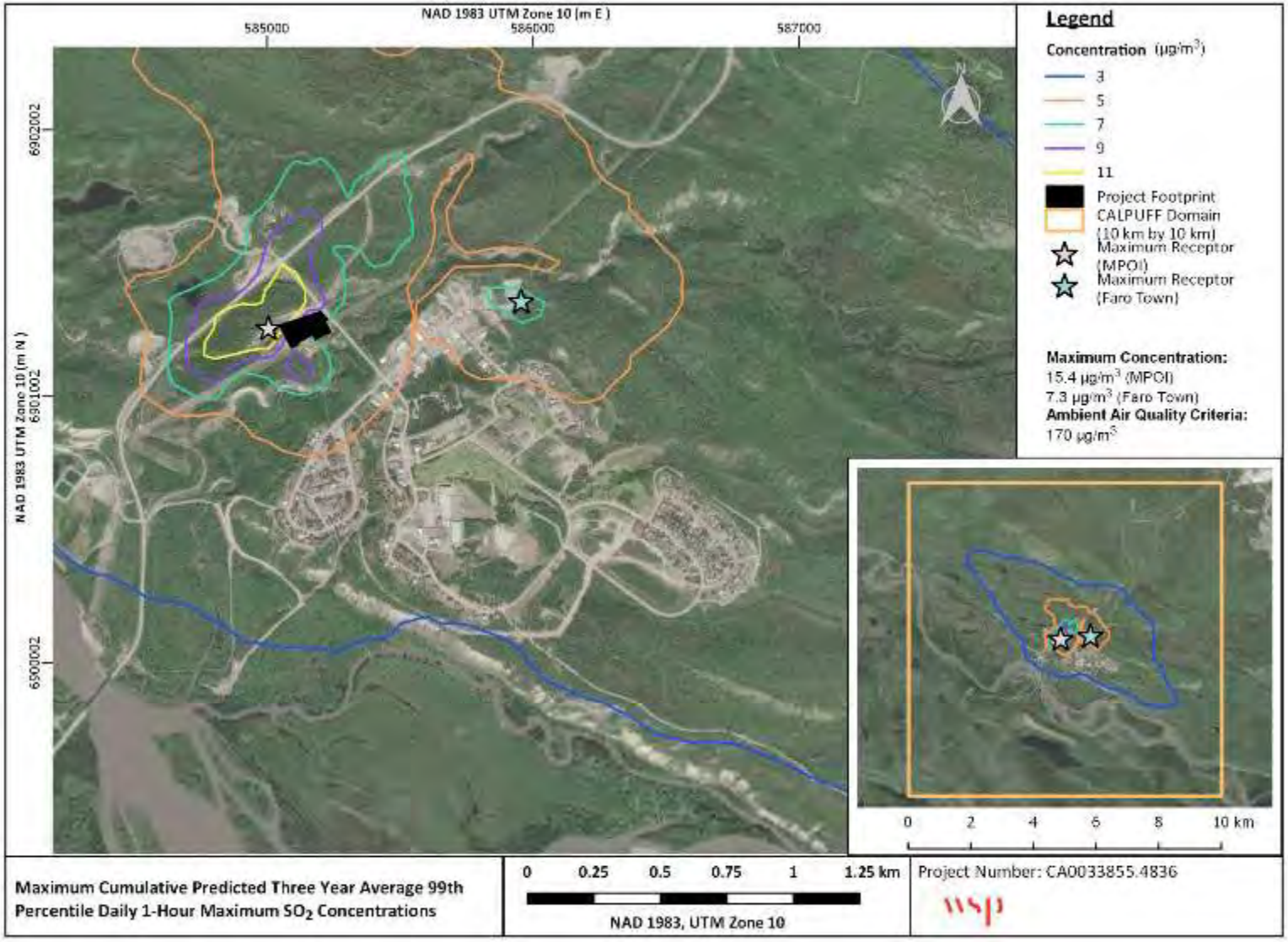

Figure 6-1 Contour Plot of Predicted 1-Hour SO_2 Concentrations for the Expanded Capacity Scenario

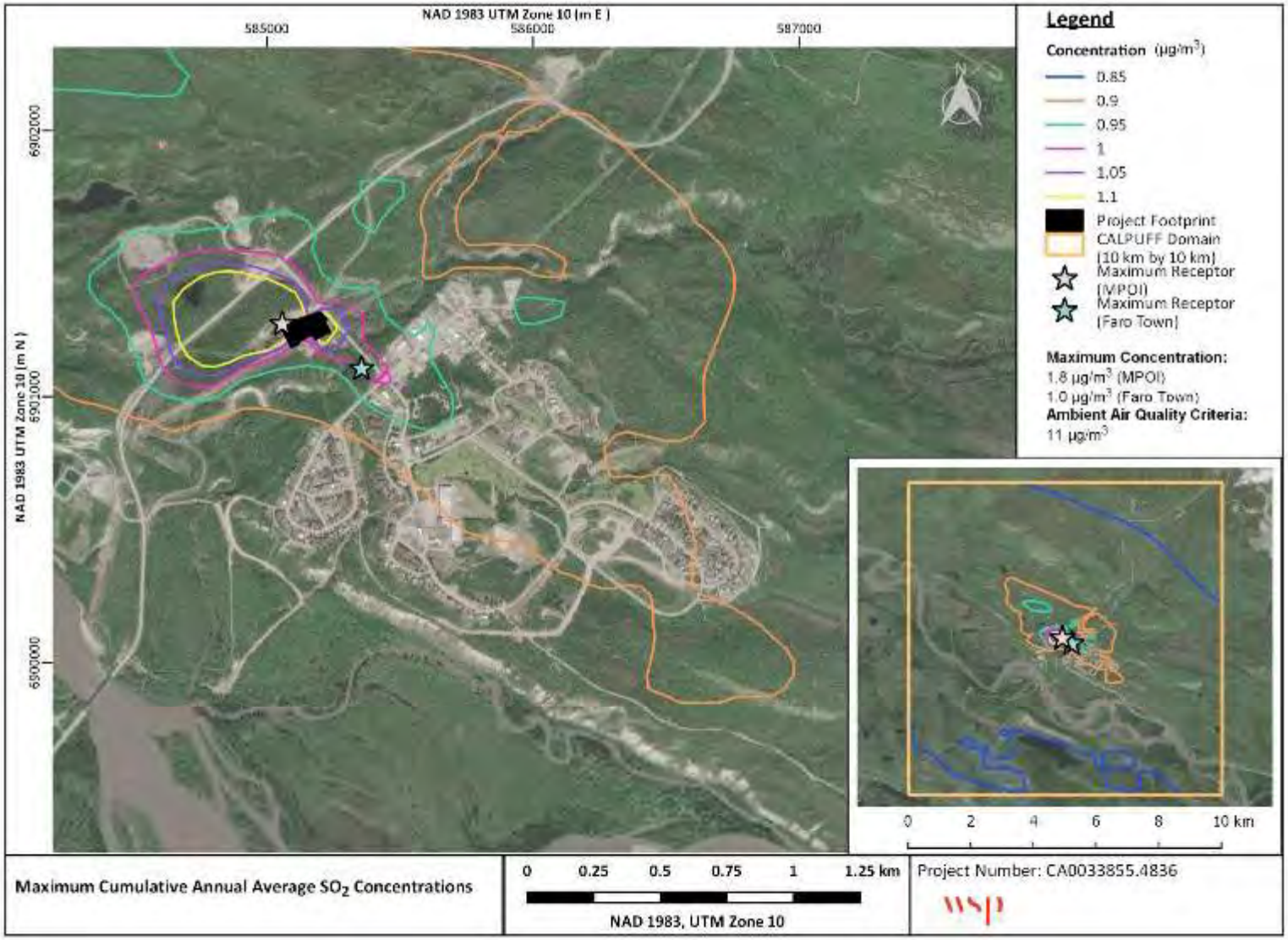

Figure 6-2 Contour Plot of Predicted Annual SO_2 Concentrations for the Expanded Capacity Scenario

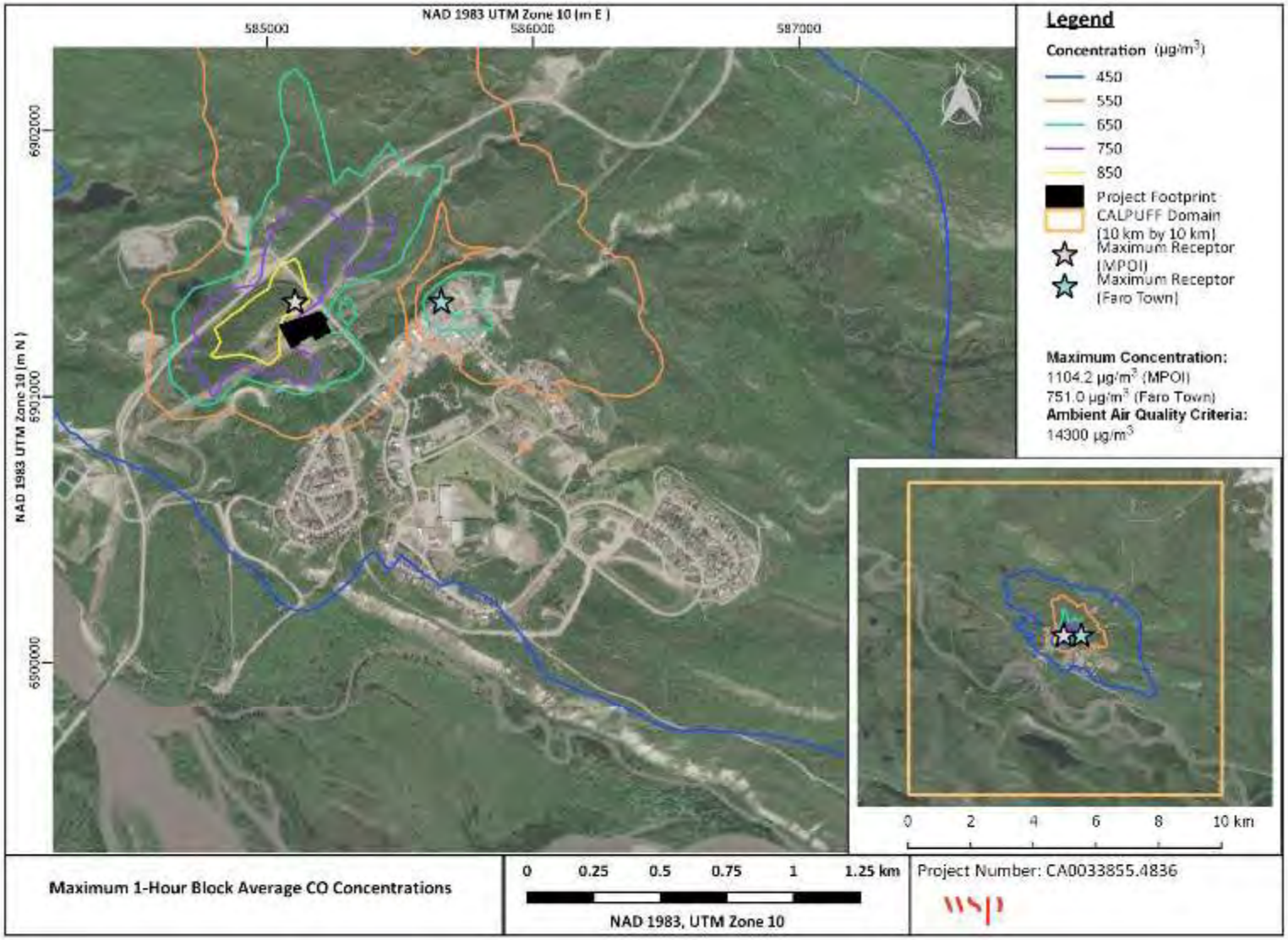

Figure 6-3 Contour Plot of Predicted 1-Hour CO Concentrations for the Expanded Capacity Scenario

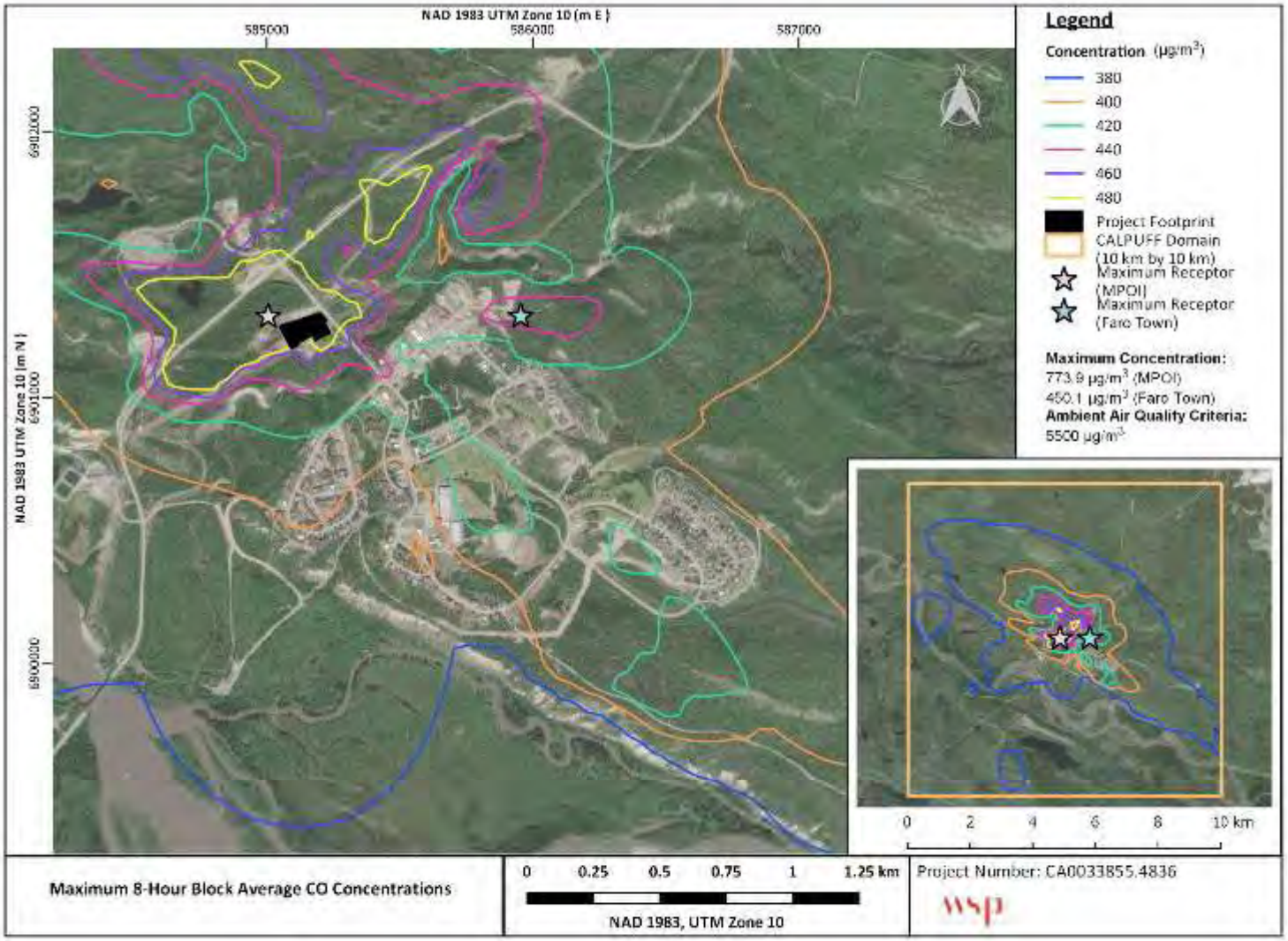

Figure 6-4 Contour Plot of Predicted 8-Hour CO Concentrations for the Expanded Capacity Scenario

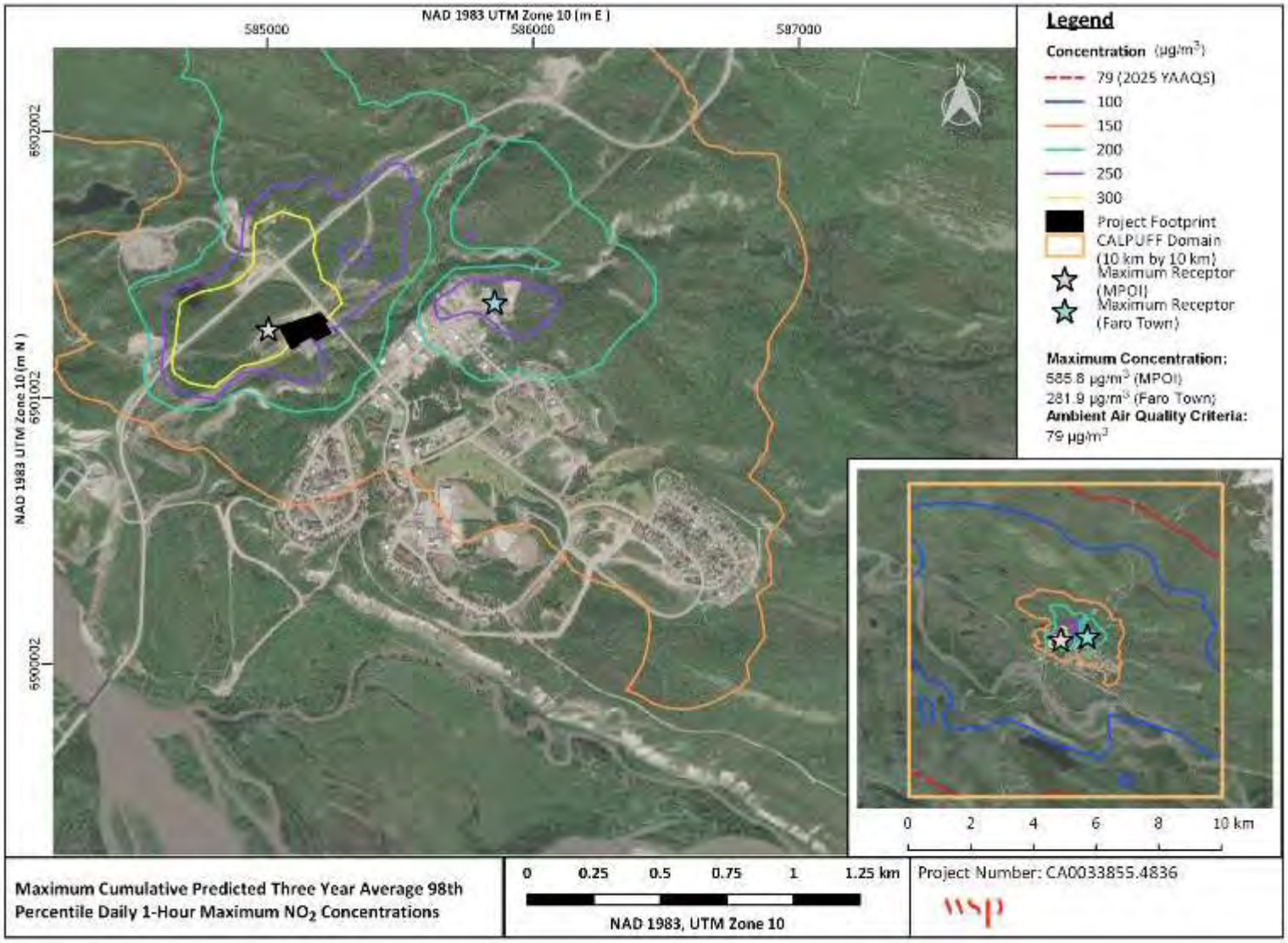

Figure 6-5 Contour Plot of Predicted 1-Hour NO_2 Concentrations for the Expanded Capacity Scenario

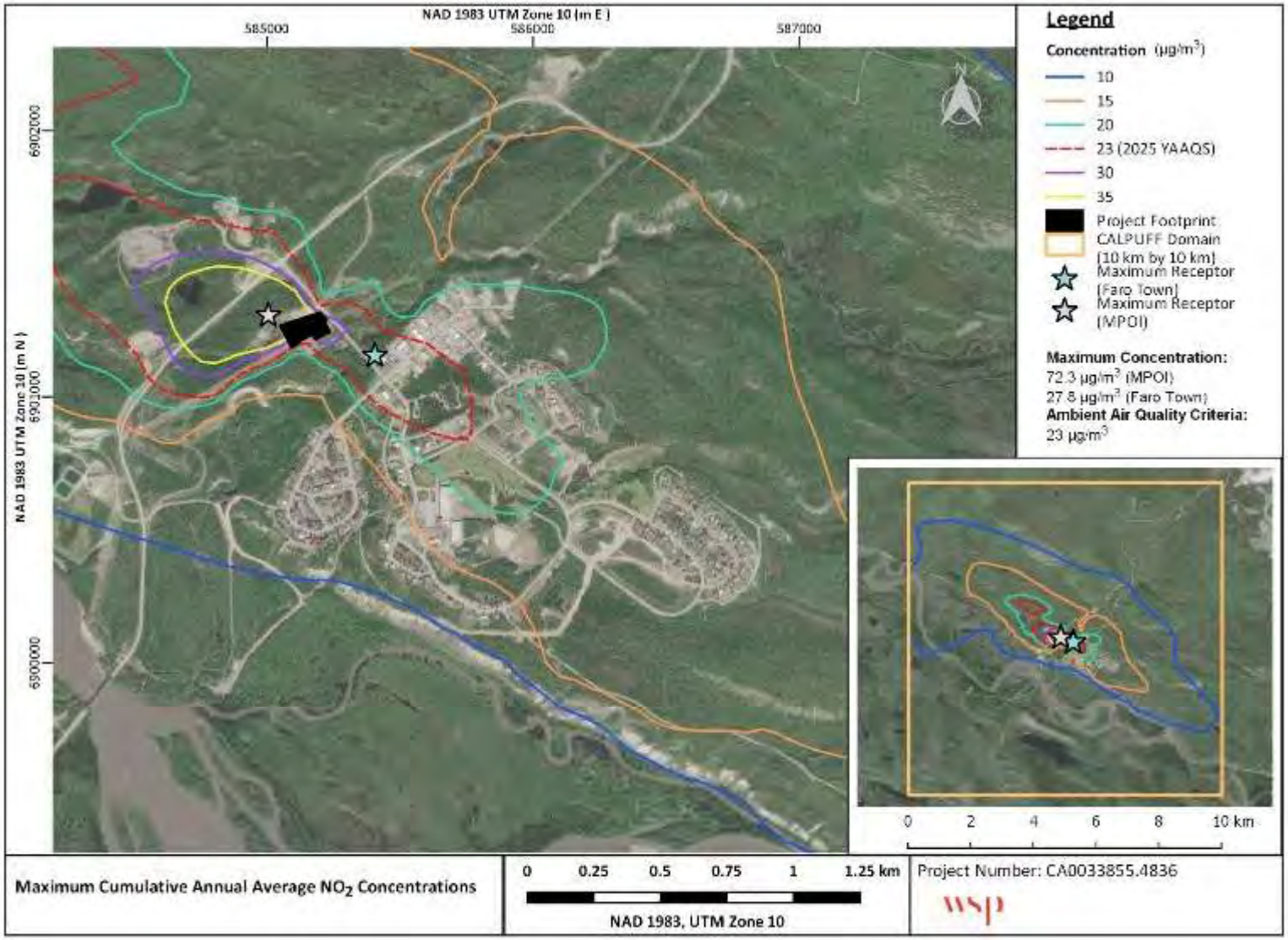

Figure 6-6 Contour Plot of Predicted Annual NO_2 Concentrations for the Expanded Capacity Scenario

6.1.3 PARTICULATE MATTER ($PM_{2.5}$, PM_{10}, AND TSP)

With regards to $PM_{2.5}$ and TSP, the predicted concentrations for both short-term and long-term periods showed no exceedances of the associated air quality criteria (YAAQS). For PM_{10}, the predicted concentrations for the short-term period (24-hour) slightly exceed the YAAQS. When baseline air quality is considered ($PM_{2.5}$ and PM_{10} only), the cumulative $PM_{2.5}$, PM_{10}, and TSP predicted concentrations are summarized as follows:

- $PM_{2.5}$
  - MPOI
    - 22.7 µg/m^3, or 84% of the 24-hour $PM_{2.5}$ YAAQS;
    - 7.2 µg/m^3, or 82% of the annual $PM_{2.5}$ YAAQS;
  - Faro Town
    - 12.7 µg/m^3, or 47% of the 24-hour $PM_{2.5}$ YAAQS;
    - 4.8 µg/m^3, or 55% of the annual $PM_{2.5}$ YAAQS
  - Nearest Sensitive Receptors
    - range from 11.0 µg/m^3 to 11.8 µg/m^3 (41% to 44%) of the 24-hour $PM_{2.5}$ YAAQS; and
    - range from 4.4 µg/m^3 to 4.7 µg/m^3 (51% to 53%) of the annual $PM_{2.5}$ YAAQS.
- PM_{10}
  - MPOI
    - 75.8 µg/m^3, or 152% of the 24-hour PM_{10} YAAQS;
  - Faro Town
    - 56.1 µg/m^3, or 112% of the 24-hour PM_{10} YAAQS; and
  - Nearest Sensitive Receptors
    - range from 51.7 µg/m^3 to 52.7 µg/m^3 (103% to 105%) of the 24-hour PM_{10} YAAQS.
- TSP
  - MPOI
    - 91.7 µg/m^3, or 76% of the 24-hour TSP YAAQS;
    - 8.5 µg/m^3, or 14% of the annual TSP YAAQS;
  - Faro Town
    - 16.2 µg/m^3, or 14% of the 24-hour TSP YAAQS;
    - 1.3 µg/m^3, or 2% of the annual TSP YAAQS
  - Nearest Sensitive Receptors
    - range from 5.6 µg/m^3 to 8.2 µg/m^3 (5% to 7%) of the 24-hour TSP YAAQS; and
    - range from 0.4 µg/m^3 to 1.0 µg/m^3 (1% to 2%) of the annual TSP YAAQS.

These results indicate that the contribution of the emissions from the Expanded Capacity Scenario to ambient concentrations of particulate matter remains below the YAAQS for $PM_{2.5}$ and TSP (not considering background) and is slightly above the YAAQS for PM_{10}. It is important to note that the slight exceedances in 24-hour PM_{10} are primarily attributable to the high baseline PM_{10} concentration (49.5 µg/m^3, equal to 99% of the YAAQS). The baseline PM_{10} concentration is derived from taking the 3-year average of the 98th percentile daily averages (i.e., the 8th highest daily average PM_{10} concentration) per calendar year (2019 to 2021), which is a conservative estimate of the ambient PM_{10} concentration.

To provide additional context, as there are no representative PM_{10} monitoring stations within Yukon, a comparison of four different daily average PM_{10} percentiles (98^{th}, 95^{th}, 90^{th}, and 75^{th}) from Inuvik, Northwest Territories against the average of all monitoring stations within BC (data downloaded from the BC Data Catalogue website (BC Environmental Monitoring and Analysis Branch. BC Data Catalogue, 2024)) shows that the levels of ambient PM_{10} concentrations from Inuvik are quite comparable to BC monitoring stations (Table 6-4). These higher concentrations of PM_{10} are only expected to occur for a fraction of the time during the year (i.e., top 8 daily averages, top 19 daily averages, top 37 daily averages, and top 92 daily averages for the 98^{th}, 95^{th}, 90^{th}, and 75^{th} percentiles, respectively), so there is no long-term exposure to high concentrations of PM_{10} for the human population. Thus, the resulting cumulative PM_{10} predictions are highly conservative considering the conservative nature of the statistical form of the PM_{10} baseline value. Furthermore, the impact of the Faro Generating Station emissions on PM_{10} levels within the Town of Faro, without considering baseline, is predicted to be 6.6 $\mu g/m^3$ which is equal to 13% of the YAAQS value.

In addition, the contour plots (Figure 6-7 through Figure 6-11) show that the predicted concentrations significantly decrease with increased distance from the Faro Generating Station.

Table 6-4 Daily Average PM_{10} Concentration Comparison

Percentile	3-Year Average (2019 to 2021) at Inuvik, NWT Station	Average of All B.C. Monitoring Stations
98^{th}	49.5	48.5
95^{th}	36.2	33.8
90^{th}	29.0	25.3
75^{th}	16.0	16.7

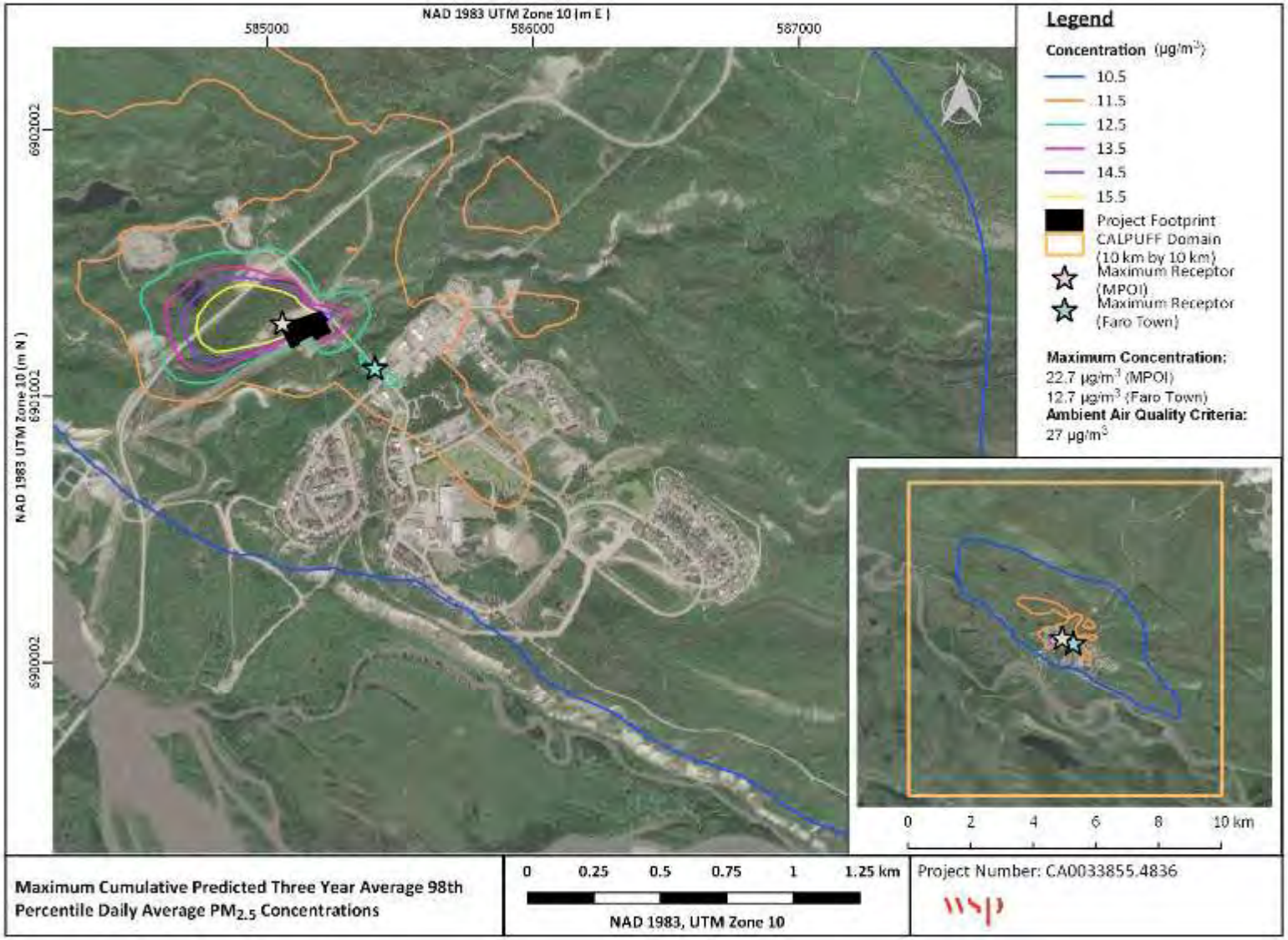

Figure 6-7 Contour Plot of Predicted 24-Hour $PM_{2.5}$ Concentrations for the Expanded Capacity Scenario

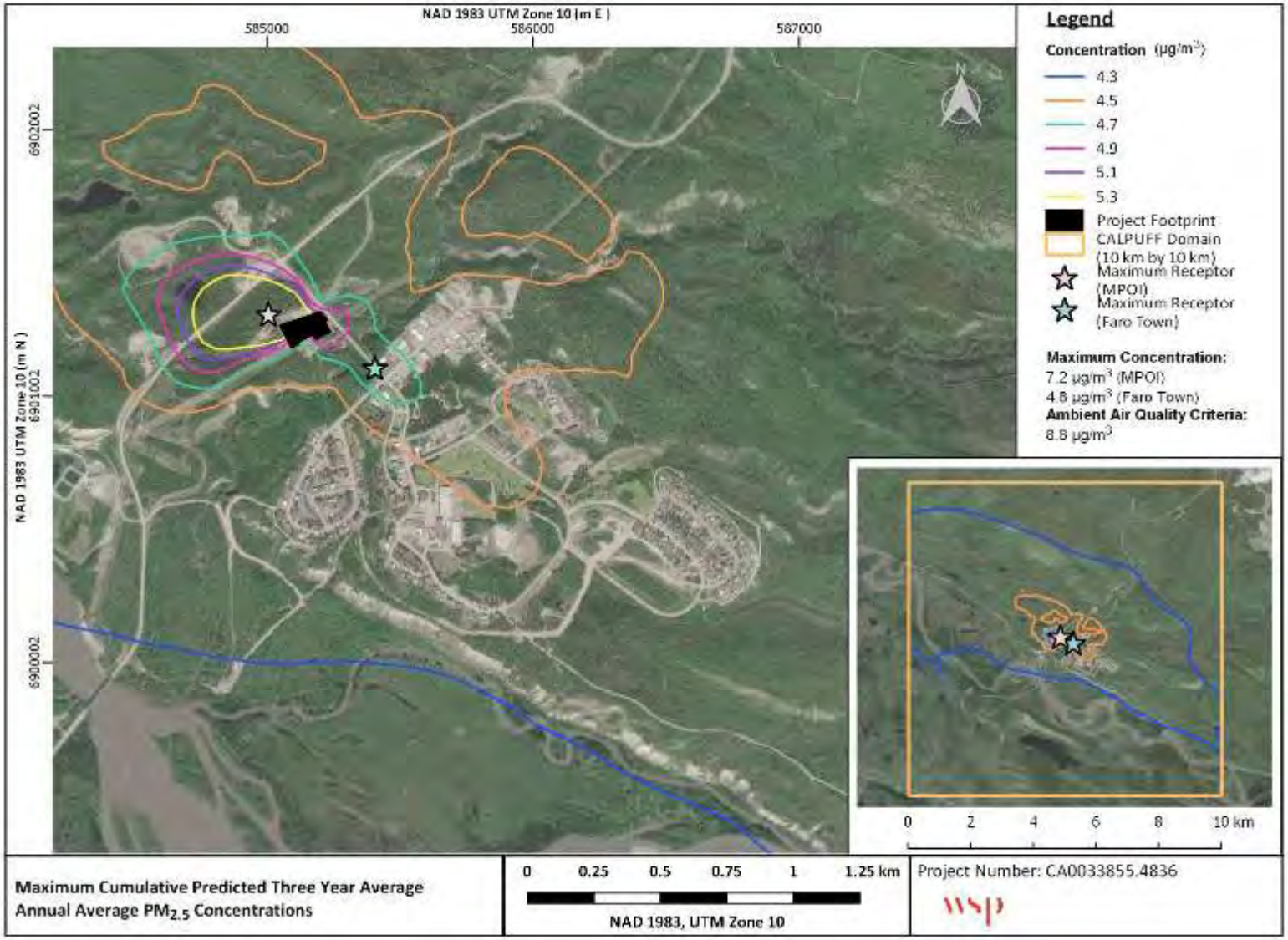

Figure 6-8 Contour Plot of Predicted Annual $PM_{2.5}$ Concentrations for the Expanded Capacity Scenario

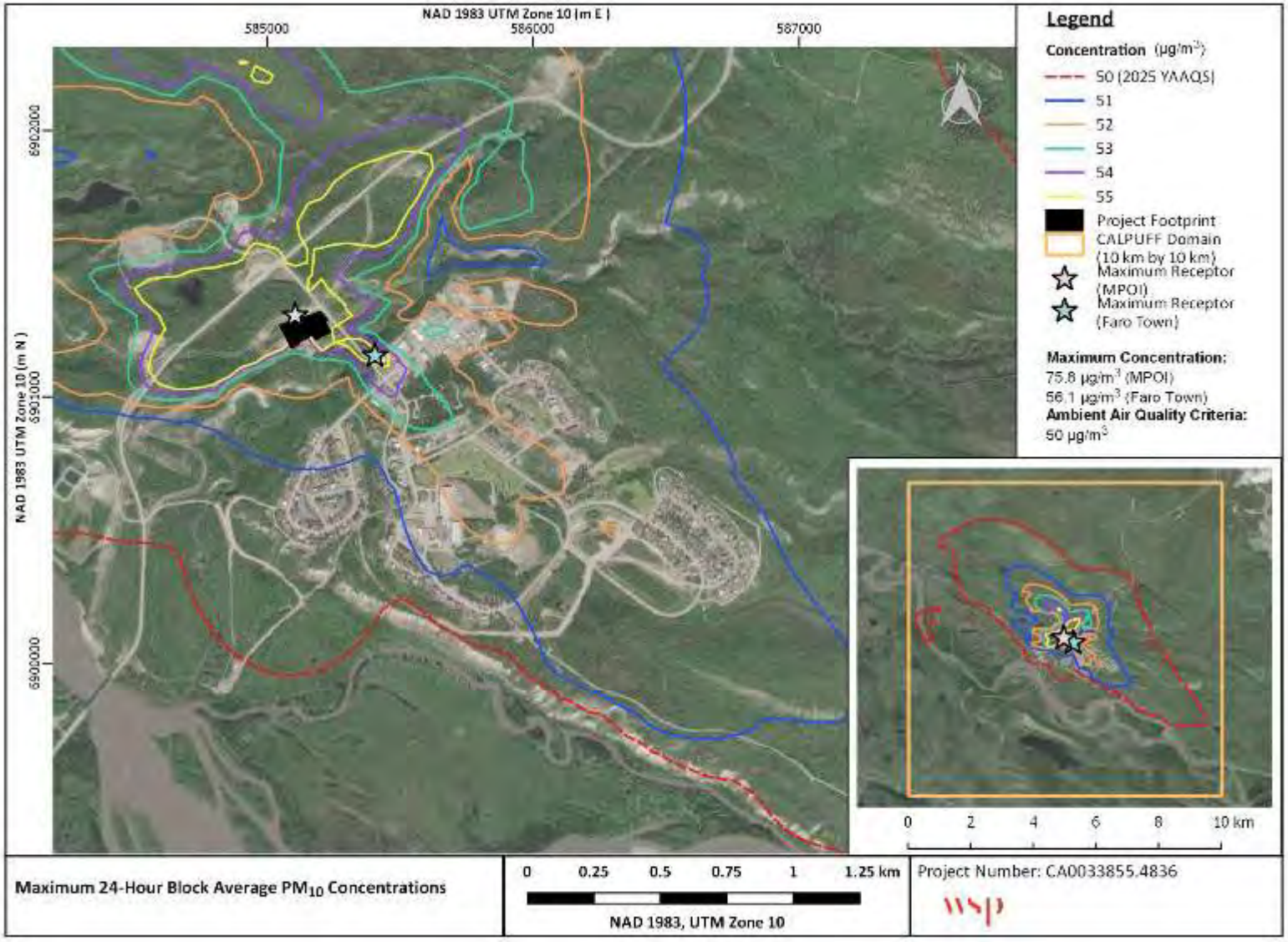

Figure 6-9 Contour Plot of Predicted 24-Hour PM_{10} Concentrations for the Expanded Capacity Scenario

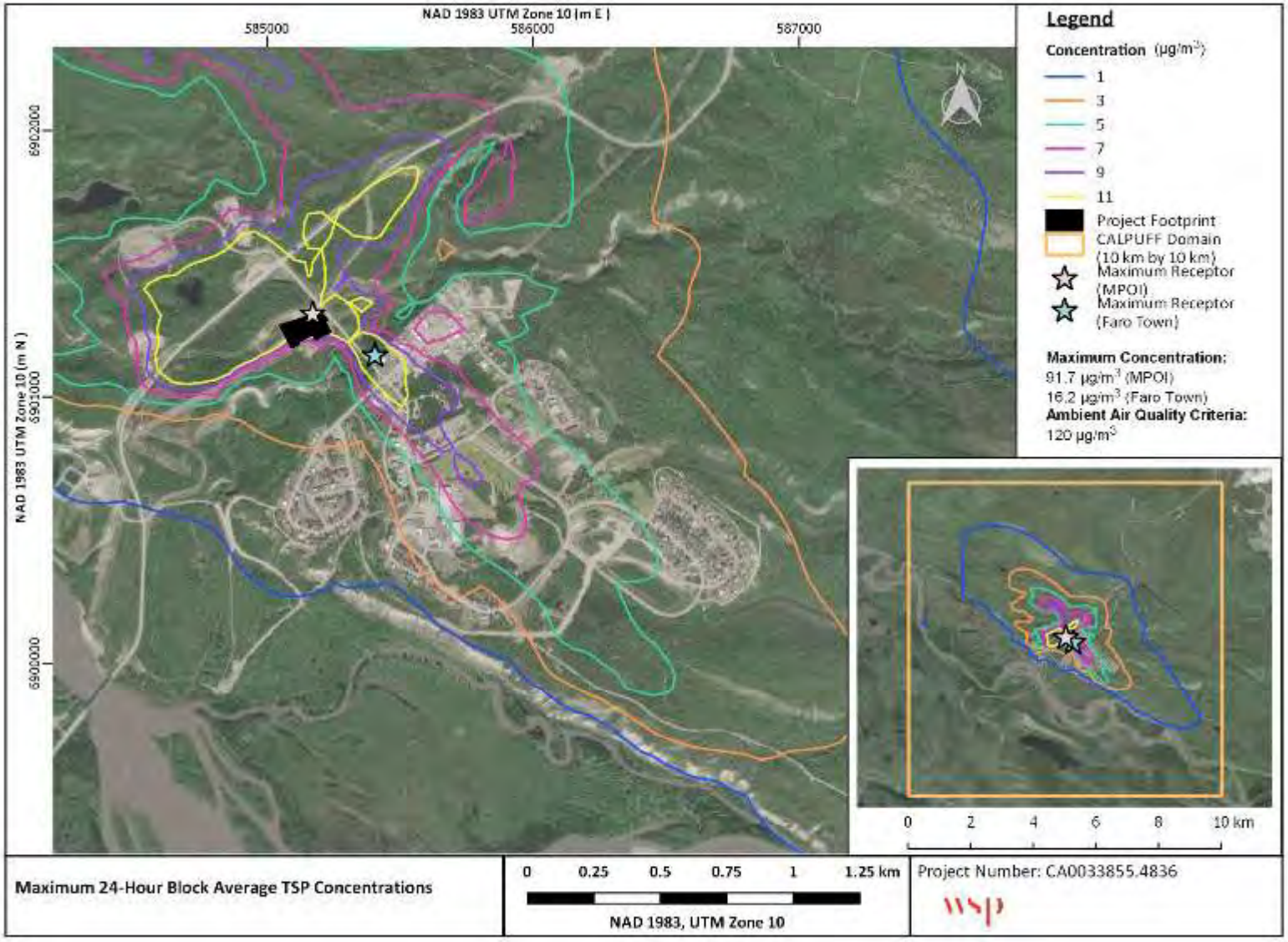

Figure 6-10 Contour Plot of Predicted 24-Hour TSP Concentrations for the Expanded Capacity Scenario

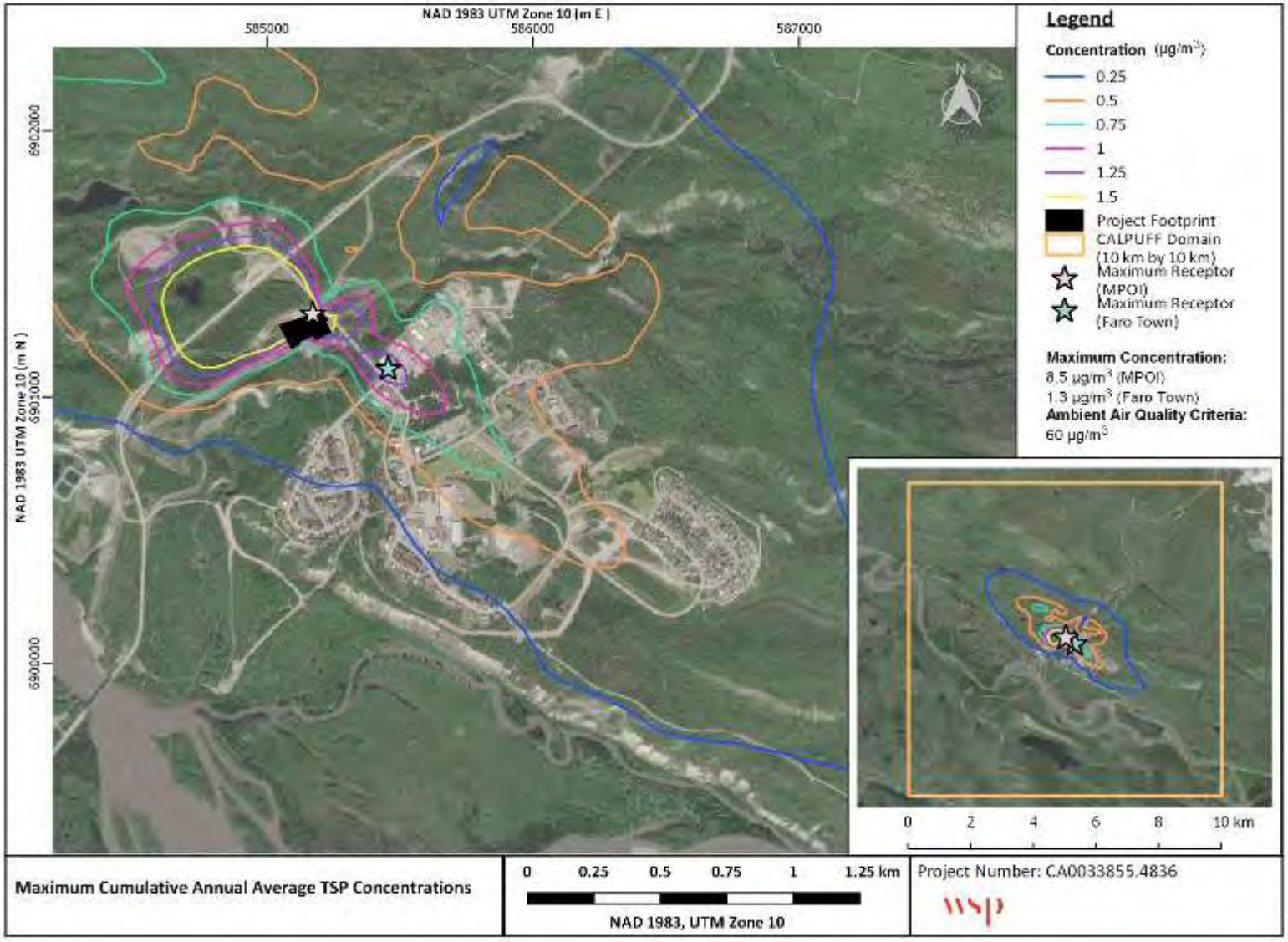

Figure 6-11 Contour Plot of Predicted Annual TSP Concentrations for the Expanded Capacity Scenario

7 CONCLUSION

The air dispersion modelling results showed that, with the exception of short-term (1-hour) and long-term (annual) NO_2 and short-term (24-hour) PM_{10} results, the maximum cumulative predicted concentrations for all air contaminants ($PM_{2.5}$, TSP (baseline data was not available), SO_2, and CO) were below their respective ambient air quality criteria. The maximum points of impingement (worst-case receptors) were all found near the Faro Generating Station for the Expanded Capacity Scenario (21 MW).

While the dispersion modelling results predicted both short-term and long-term NO_2 exceedances, the primary objective of the air quality assessment was to evaluate the predicted impacts on the human population residing near the Faro Generating Station in the Town of Faro. The modelling results at the maximally impacted receptor within the Town of Faro showed that the cumulative predicted concentrations occur at the edge of the Town of Faro (north and northwest), with only NO_2 (1-hour and annual) and PM_{10} (24-hour) cumulative concentrations predicted to exceed the YAAQS.

For the Expanded Capacity Scenario, the predicted air quality impacts for all of the other air contaminants – including both fine particulate matter and total suspended particulate ($PM_{2.5}$ and TSP), SO_2, and CO – were below the air quality criteria considered (YAAQS and British Columbia Pollution Control Objective (used for reference purposes) for CO (BC MoECCS, 2021).

With regards to the 24-hour PM_{10} exceedances, the exceedances are primarily driven by the high baseline value which accounts for 99% of the YAAQS. With regards to the NO_2 predicted short-term (1-hour) and long-term (annual) NO_2 exceedances, the more stringent 2025 NO_2 YAAQS were used: 113 µg/m^3 compared to 79 µg/m^3 and 32 µg/m^3 compared to 23 µg/m^3, respectively. When compared to the new 2025 NO_2 YAAQS, the maximum cumulative predicted 1-hour NO_2 concentration was 357% of the Yukon Ambient Air Quality Standards for NO_2 at the maximally impacted Faro Town receptor. The frequency of model predictions exceeding the 1-hour 2025 NO_2 YAAQS is 35.1% (9,238 out of 26,304 hours) at the MPOI and 14.2% (3,740 out of 26,304 hours) at the maximally impacted Faro Town receptor).

It is important to consider the following:

1) The air dispersion modeling is highly conservative and assumes that all generators are operating at maximum capacity every hour of the 3-year modelling period (2016-2018), which is not reflective of typical operating conditions at the Faro Generating Station.

2) Actual NO_2 monitoring data collected within Faro between August 2023 and April 2024 has measured very low levels of NO_2 (25% of the 2025 1-hour NO_2 YAAQS and 7% of the 2025 annual NO_2 YAAQS). At the time of data collection, the Facility had a unit capacity of 16 MW and is comparable to the "Future Expanded Emission Capacity" scenario modeled in the air quality assessment completed in 2020 (WSP, 2020). The monitored concentrations are well below predicted NO_2 concentrations from the previous modeling assessment suggestive of the conservative nature of the previous modelling assessment using similar, but generally less conservative NO_2 modelling methodologies. Given that much of the additional capacity being added (FD8 and FD9) are Tier 4 generators the increase in NOx emissions is relatively small compared to the existing generators. Therefore, it would be anticipated that monitored concentrations would remain well below the model predicted NO_2 concentrations and the YAAQS.

The continuation of the NO_2 monitoring program is recommended to confirm low ambient levels of NO_2 and the Faro Generating Station's impact on air quality within the Town of Faro.

Finally, it is important to note that the modelling results represent the worst-case predicted air quality impacts based upon the maximum operating conditions. As such, the model predicted air contaminant concentrations are likely conservative. Furthermore, the conditions giving rise to predicted short-term NO_2 exceedances would be very unlikely to happen because the emission sources are highly unlikely to operate continuously year-round at the maximum emission rates. The typical emissions are expected to be much lower and would not be anticipated to result in adverse air quality impacts given the predicted exceedances and conservative assumptions. With conservative model predictions indicating short-term and long-term NO_2 impacts and low predicted impacts from the other air contaminants, the overall air quality impacts from the Expanded Capacity Scenario are not anticipated to cause adverse air quality impacts to the Town of Faro.

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APPENDIX

Appendix C: Noise Modelling Report

SLR Consulting (Canada) Ltd.
6940 Roper Road NW, Edmonton, AB T6B 3H9

November 23, 2023

Attention: Travis Ritchie
Yukon Energy Corporation
#2 Miles Canyon R.
Box 5920, Whitehorse, YT Y1A 6S7

SLR Project No.: 201.V38355.00000

RE: Faro Generating Station – Noise Modelling Results MEMO

SLR Consulting (Canada) Ltd. (SLR) has completed an acoustical modelling assessment of the proposed changes to Yukon Energy's Faro Generating Station (the Facility). The current facility has 9 diesel-fired generating units, one of which is no longer in service. Yukon Energy is proposing the addition of two new units and the relocation of some of the rental units within the site footprint.

- FD1 Mirrless KV16 2.4 MW genset located within a permanent building – Retired
- FD7 Caterpillar 3612 2.8 MW genset located within a permanent building
- YM20-YM26 Caterpillar 3516 1.8 MW (each) trailer mounted gensets, "Rental Units"

Proposed Units:

- FD8 & FD9 Caterpillar C175-16 2.6 MW gensets (each) located within modularized acoustic enclosures.

The nighttime noise target for this project is 43 dBA at surrounding residential receptors. Further discussion on the noise target and community receptor locations are described in SLR's prior Noise Survey Report[1].

Operational Scenarios

This assessment has evaluated the following operational scenarios. A site plan showing the unit locations is included below in Figure 1. Note the rental units shown are in the new locations. Historically, 7 rental units were aligned along the south side of the property, adjacent to the 2 south rental units shown in the sketch. In addition, sketches showing the layout and dimensions of the sound barriers are attached.

0 Historical Operations

a) 7 rental units (historical locations) + FD7 (no sound barrier)

1 2023/2024 Winter Scenarios

a) 7 rental units + FD7 (no sound barrier)

b) 7 rental units + FD7 (with sound barrier)

[1] 201.38355.00000 Yukon Energy Faro Generating Station Noise Survey Report - FINAL 2022-10-05.pdf

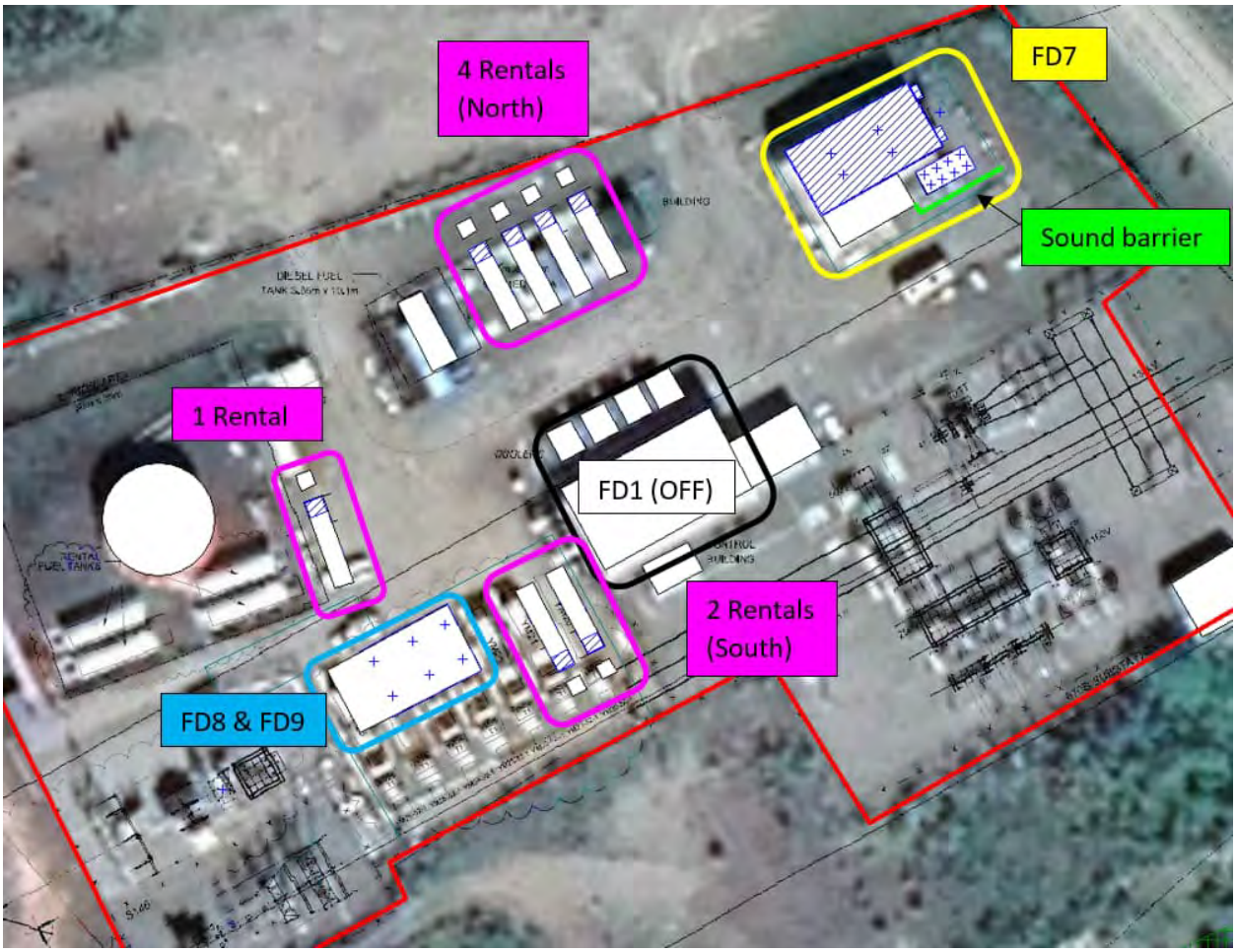
2 After 2023/2024 Winter Scenarios

a) 5 rental units (4 North, 1 South) + FD7 (with sound barrier) + FD8, FD9

b) 4 rental units (North) + FD7 (with sound barrier) + FD8, FD9

c) 6 rental units (4 North, 2 South) + FD8, FD9

Figure 1 Site layout



Sound Propagation Modelling

A three-dimensional computer sound model was constructed using CadnaA, version 2023, an environmental sound propagation program developed by DataKustik GmbH. The ISO 9613-2 calculation method for outdoor sound propagation from industrial facilities was used and accounts for geometric spreading, ground attenuation, atmospheric absorption, barrier attenuation, and reflection from surfaces.

Predicted sound levels were calculated for a temperature of 0°C and a relative humidity of 70%. ISO 9613-2 standard meteorological conditions conservatively assume each receptor is downwind from every sound source. Downwind conditions produce downward refraction of air-borne sound, resulting in enhanced sound propagation between the source and receptor.

The terrain was modeled using elevation data from Natural Resources Canada with a 1 m height resolution between contour lines.

The default ground factor was set to G = 1 across the study area to represent acoustically absorptive ground, simulating snow-covered winter conditions. The site area was assigned a ground factor of G = 0.3. Foliage was included in the modelling at a height of 11m for the forested areas between the generating station and the receptors.

Sound levels were calculated at a height of 1.5 m.

Source Sound Power Levels

Sound power levels of the existing genset units were determined from on-site sound level measurements conducted on March 29-30, 2022. Sound power levels of the proposed FD8 & FD9 units were determined from manufacturer's data and information provided by Yukon Energy. Overall sound power levels per unit are shown in Table 1.

Table 1: Facility Sound Power Levels

Equipment	Octave Band Sound Level, dB									dBA
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
YM Rental Unit (each)	115	116	118	115	113	112	110	107	108	117
FD7	113	117	117	116	116	114	111	108	103	119
FD8 & FD9 (each)	116	117	112	101	96	95	91	92	107	107

Modelling Results

Modelled sound levels at the surrounding community receptors are shown below in Table 2. All scenarios show a reduction in the sound levels in comparison with the historical operations. The critical receptor is R4 which represents the residences along Kitza Ave. This location is elevated and has direct line of sight to the Facility. Nevertheless, a reduction of 3.6 dBA from the historical scenario (0a) to the future scenario 2c) is achieved.

Table 2: Modelling Results

Operational Scenario	Sound Pressure level (dBA)					
	R2 130 Dawson Dr.	R3 RCMP Office	R4 146 Kitza Ave.	R5 356 Campbell St.	R6 504 Douglas Dr.	R7 502 Ladue Dr.
0a) 7 rental units (old locations) + FD7 (no sound barrier)	50.3	55.5	51.4	44.9	42.0	43.7
1a) 7 rental units + FD7 (no sound barrier)	48.4	53.9	50.2	43.5	42.1	43.7
1b) 7 rental units + FD7 (with sound barrier)	47.9	53.3	49.6	42.3	41.9	43.6
2a) 5 rental units (4 North, 1 South) + FD7 (with sound barrier) + FD8, FD9	46.0	51.5	47.5	40.3	41.0	42.5

Operational Scenario	Sound Pressure level (dBA)					
	R2 130 Dawson Dr.	**R3 RCMP Office**	**R4 146 Kitza Ave.**	**R5 356 Campbell St.**	**R6 504 Douglas Dr.**	**R7 502 Ladue Dr.**
2b) 4 rental units (North) + FD7 (with sound barrier) + FD8, FD9	44.3	49.4	46.0	38.4	39.8	41.5
2c) 6 rental units (4 North, 2 South) + FD8, FD9	46.6	51.5	47.8	41.0	40.8	42.3

Statement of Limitations

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Closure

Regards,

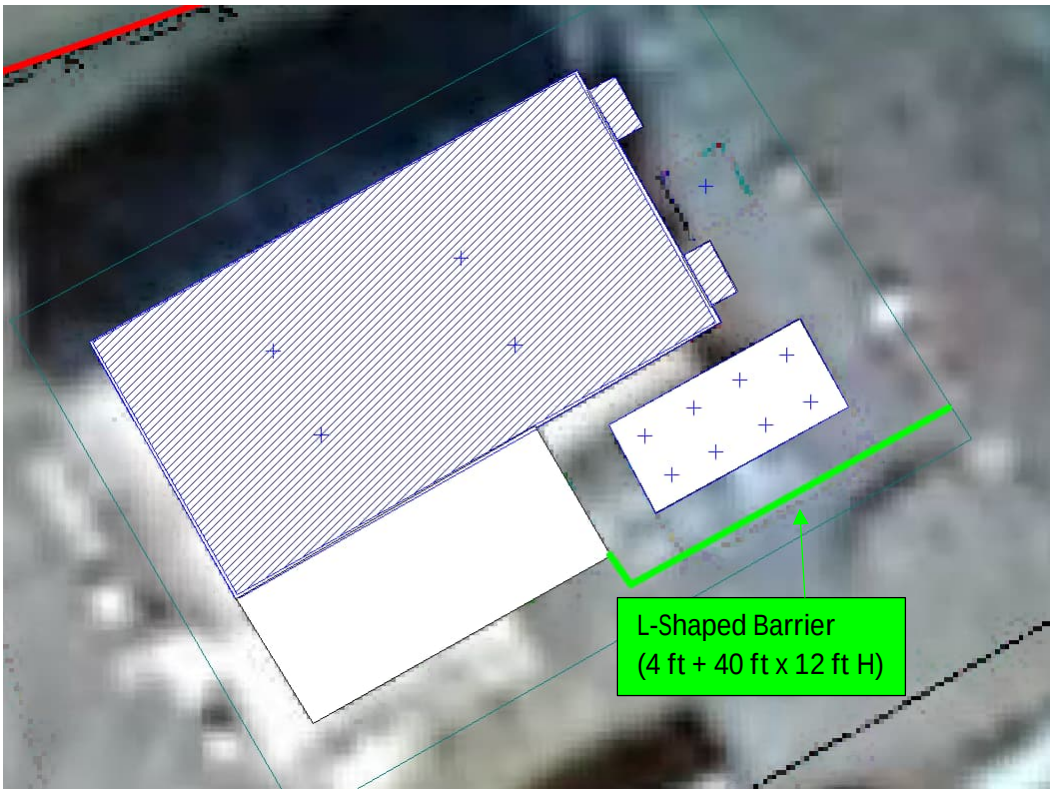
SLR Consulting (Canada) Ltd.

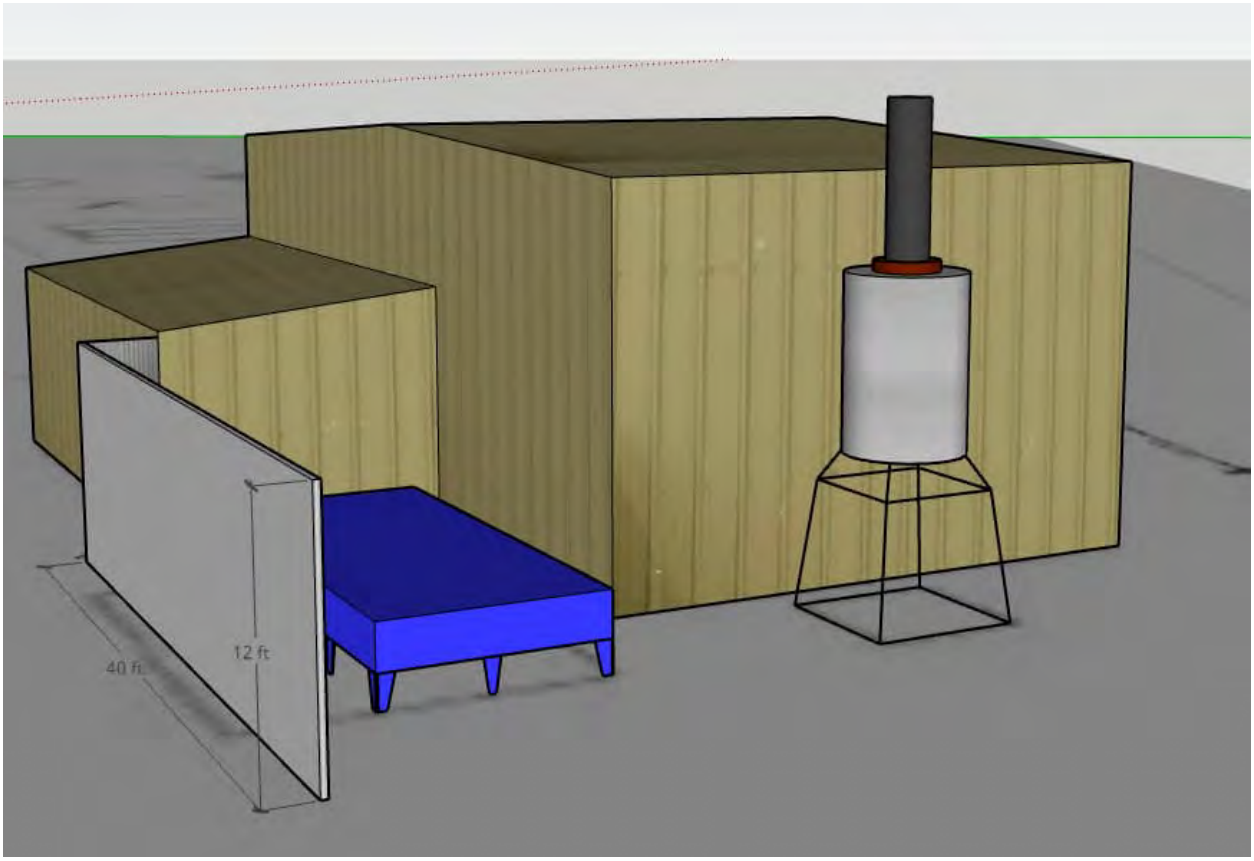
Arthur (Art) Küpper, P.Eng.
Principal Engineer & Environmental Team Lead -
Acoustics & Vibration

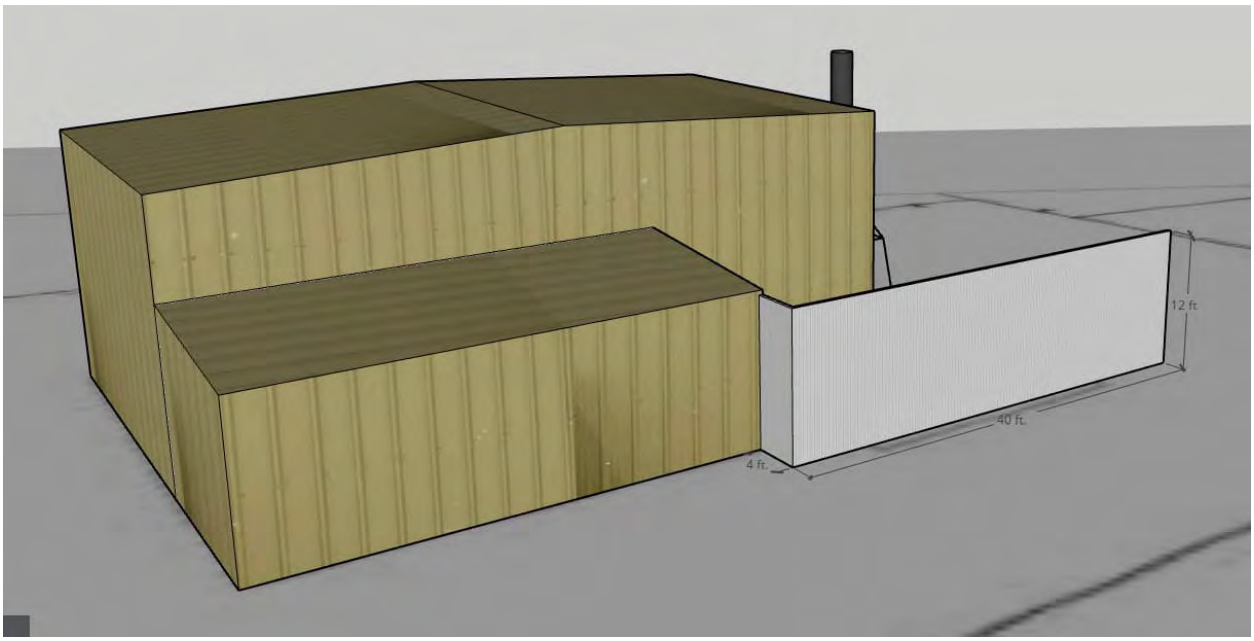
Attachments Sound Barrier Sketches

cc Emmanuel Ogemuno

Acoustical Barrier Sketches – FD7






12 ft.
40 ft.
4 ft.