ENVIRONMENT
& HEALTH

Department of Ecology
4601 N. Monroe St.
Spokane, WA 99205-1295

Delivered via email to karin.baldwin@ecy.wa.gov, andy.kruse@ecy.wa.gov, jenny.filipy@ecy.wa.gov

NOTICE OF CONSTRUCTION APPLICATION FOR HOUSE GENERATOR TECHNICAL AMENDMENT CYRUSONE QUINCY, WASHINGTON

May 9, 2024

To Whom It May Concern,

CyrusOne owns and operates a data center in Quincy, WA (PNW1) under Approval Order No. 19AQ-E052, issued by Ecology on October 23, 2019. The permit allows for construction and operation of 40 MTU Model 16V4000G84S diesel engines rated 2.25-MW and two (2) MTU Model 12V2000G85-TB diesel engines rated 750-kW used to power emergency electrical generators. Rolls Royce (the manufacturer of MTU engines) no longer manufactures 750-kW Model 12V2000G85-TB diesel engines and is providing CyrusOne with two (2) MTU Model 12V1600G71S diesel engines instead. Therefore, Ramboll is submitting this permit amendment request on behalf of CyrusOne to approve construction and operation of the new engine model. The following sections provide an analysis of the emissions, regulatory applicability, and dispersion modeling for the proposed change.

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USA

https://ramboll.com

The Notice of Construction (NOC) application form and Check No. 194011247 in the amount of $1,190 for payment of the application complex change initial fee are provided in Attachment A.

1. AIR POLLUTANT EMISSION ESTIMATES AND GENERATOR SPECIFICATIONS

(Sections V and VI of NOC application form)

Specification sheets for the updated engine model are provided in Attachment B. Air pollutant emission rates were calculated for the house generators per the requirements of WAC 173-400-103 and WAC 173-460-050. Detailed emission calculations are provided in Attachment C. Emissions are calculated using the same methodology outlined in the original NOC application dated December 26, 2018, including operating hours, operating scenarios, and "black-puff" emissions scaling for cold start-up.

As shown in Table C-1 in Attachment C, the not-to-exceed (NTE) emission rates provided by the manufacturer differ between the two models. Nitrogen oxides (NO_X) emission rates decreased for each load except the 75% load, which increased by 3%. However, the full-variable load emission rate decreased by 11%. Emission rates for particulate matter (PM) and condensable hydrocarbons (HC) increased for almost every load. Maximum fuel consumption decreased; therefore, the fuel-based emissions for sulfur dioxide (SO_2) and toxic air pollutants decreased compared to the original model (see Table C-2 in Attachment C). The potential emissions from the two proposed 750-kW generators and change from previous model are provided in Table C-6 in Attachment C and summarized in Table 1 below. As shown, the change due to the engine update is negligible.

Table 1. Comparison of Annual Potential Emissions

Pollutant	Previous Model (tpy)	Proposed Model (tpy)	Change due to Engine Update (tpy)
NO_X	0.60	0.54	-0.067
Carbon monoxide (CO)	0.082	0.088	0.0063
SO_2	4.7E-04	4.1E-04	-5.4E-05
PM	0.023	0.046	0.024
Nitrogen dioxide (NO_2)	0.060	0.054	-0.0067
Diesel engine exhaust particulate (DEEP)	0.0049	0.0054	0.00050

Although the maximum hourly emission rates for the house generators increased for some pollutants, the increase is negligible, and the new model will comply with all permit limits specified in Condition 5.3. Additionally, the new house generator engine model is still Tier II compliant, thus the emission limits under Condition 5.2, which are based on Tier II limits, are still applicable.

In addition to changes in the emission rate, the exhaust parameters of the house generator have changed compared to those submitted in the permit application. The exhaust temperature and exhaust flow have changed, and the stack diameter decreased from 12 to 10 inches. See Table C-1 in Attachment C for a comparison of the exhaust temperature, flow rate, and fuel consumption between the two models.

2. REGULATORY APPLICABILITY

The new generator model will comply with all regulatory requirements and emission limits of the old generator model.

2.1. NSPS/NESHAP

(Section VII of NOC application form)
The emergency diesel house generators are subject to the emission control requirements under NSPS Subpart IIII, "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines." Additionally, the emergency diesel house generators are subject to the NESHAP requirements under Subpart ZZZZ, "National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICEs)." The new house generator engine model will continue to be subject to NSPS and NESHAP and continue to comply with these requirements through certification to Tier II standards.

2.2. Best Available Control Technology

(Section VIII of NOC application form)

The December 26, 2018 NOC application contained a Best Available Control Technology (BACT) analysis. The application concluded that the Tier IV diesel engine controls, while technically feasible, were not cost-effective. Thus, BACT was determined to be certification to Tier II emission standards of through combustion controls and the use of ultra-low sulfur diesel fuel. Costs for compliance with Tier IV emission standards have increased significantly since 2018. Therefore, Tier IV level controls remain cost-prohibitive and the conclusions of the 2018 BACT analysis are valid for the new generator model. Thus, BACT remains certification to Tier II standards and use of ultra-low sulfur fuel.

3. MODELING ANALYSIS

(Section IX of NOC application form)

The new house generator engine model did not result in any permit changes to the emissions, changes to the generator operations, or changes to the regulatory compliance. Although the project change results in a decrease in emissions, which would not normally trigger a modeling analysis several exhaust characteristics have changed. In addition, Environmental Protection Agency (EPA) and Ecology implemented several methodology updates since the 2018 modeling analysis. Therefore, Ramboll is providing an updated analysis to ensure compliance with the National Ambient Air Quality Standards (NAAQS) and toxic air pollutants (TAPs) assessment. The following sections describe these modeling methodology updates as well as the modeling results.

3.1. Modeling Methodology Updates

Since the submission of the original application in 2018, numerous updates may affect air quality dispersion modeling analyses, comprising updates in modeling software, new availability of local data, changes in the regulatory environment, and new requirements from Ecology. A summary of these updates is provided below.

In 2018, Ecology required nearby sources to be included in cumulative modeling in addition to a regional background concentration from monitoring data. However, since then, refined regional background concentrations were deemed by Ecology to be sufficiently representative of existing conditions without including nearby sources in the model itself. Therefore, this updated analysis does not include modeled impacts from nearby sources. Regional background concentrations are still added to modeled concentrations to predict cumulative concentrations for comparison with the NAAQS. In the 2018 analysis regional background concentrations were derived from data produced by Northwest International Air Quality Environmental Science and Technology Consortium (NW-AIRQUEST) which were based on 2009 to 2011 monitoring and modeling data. Since then, new, more representative data is available. The following sources of data were reviewed to identify the most representative values for modeled pollutants:

- Updated regional design values from monitored and modeled data for July 2014 to June 2017 from the NW-AIRQUEST. [1]
- The most recent reports form Ecology's air monitoring network for each pollutant.[2]

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[1] Idaho Department of Environmental Quality website (formerly housed by the NW-AIRQUEST at Washington State University): https://idahodeq.maps.arcgis.com/apps/MapSeries/index.html?appid=0c8a006e11fe4ec5939804b873098dfe (accessed April 2024)

[2] Ecology's website https://enviwa.ecology.wa.gov/report/MonitorReport (accessed April 2024)

Ecology established a meteorological monitor in Quincy, WA in June 2017. This monitor now has five full years of local meteorological data. Ecology now requires these to be used for modeling analyses in Quincy.

EPA updated model processors AERSURFACE (Version 20060), AERMET (Version 23132), and AERMOD (Version 23132) since the original analysis was conducted. In addition to these updated versions, 2016 land cover, impervious, and tree canopy data were used in the AERSURFACE processing to calculate and refine the surface parameters.

The 2018 modeling included receptors within the property boundary (onsite receptors) to account for multiple tenants potentially leasing the property. However, now that a single tenant agreement is in place, the facility is considered a single source per WAC 173-400-030(84), and the general public is prevented from accessing the property, these onsite receptors were not included in the updated modeling analysis.[3]

Ecology has required consideration of the effect that stack rain caps have on the vertical momentum of the plume at low loads in more recent applications submitted for data centers in Quincy. At low loads, the rain cap flapper does not fully open, which impedes vertical momentum of the plume and reduces vertical velocity. The current analysis for runs dependent on 10% loads incorporate this reduced velocity. For the analyses of pollutants assessed on an annual averaging period, Ramboll performed an annual weighted average of the stack velocity and stack diameter considering 18 hours of maintenance at 10% load, 2 hours of load bank testing at 100% load, and 24 hours for power outages at 48% load. The 2018 analysis used the lowest temperature and velocity of all loads in all modeling for annual averaging periods as a conservative assumption.

Lastly, the new annual particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) standard of 9.0 micrograms per cubic meter ($\mu g/m^3$) becomes effective May 6, 2024.

3.2. Load screening

A screening analysis was completed to assess how the combination of new emission rates and new release parameters (stack diameter, exhaust temperature, and exhaust flow rate) and modeling methodology updates impact the results of the NAAQS and TAPs analyses. This screening analysis is also used to identify the worst-case operating load for each modeled scenario.

As shown in Table C-2 in Attachment C, although the dispersion factor decreased for all loads except 50%, 75%, and 100%, pollutant-specific results increased for 1-hour CO, 24-hour $PM_{2.5}$, 24-hour particulate matter less than 10 microns in diameter (PM_{10}), and annual $PM_{2.5}$. For these pollutants, the dispersion factors both increased and decreased, while the pollutant emission rates increased.

Within Table C-2 in Attachment C, highlighted cells indicate the worst-case load for each pollutant and averaging period. The worst-case load did not change from the previous model for all pollutants and averaging periods except for 24-hour $PM_{2.5}$ and PM_{10}, which changed from the 25% load to the 10%

[3] EPA Memorandum "Interpretation of 'Ambient Air' in Situations Involving Leased Land Under the Regulations for Prevention of Significant Deterioration". June 22, 2007.

load, primarily due to the increased emission rates in both hydrocarbons and PM (Table C-1 in Attachment C) and reduced velocity due to consideration of the rain cap.

Given the screening analysis showed increases in CO, PM_{10}, and $PM_{2.5}$ compared to the 2018 analysis, further analysis was warranted and is summarized in the following sections.

3.3. NAAQS

NAAQS have been promulgated for six (6) criteria air pollutants. Each pollutant standard is categorized as health-based and/or public welfare-based, primary and/or secondary, respectively. According to the load screening analysis (Table C-2 in Attachment C), modeled concentrations increased for only the following pollutants: 24-hour PM_{10}, 24-hour and annual $PM_{2.5}$, and 1-hour CO.

3.3.1. Regional Background Concentrations

For demonstrations of compliance with the NAAQS, regional background concentrations are added to model predicted concentrations. As discussed in Section 3.1 above, several resources were reviewed to determine the most representative regional background for the facility location for each modeled pollutant.

For $PM_{2.5}$, recent monitoring data from Ecology's air quality station in Quincy, WA provides the most representative background for the $PM_{2.5}$ demonstration.

The closest and most active air quality monitor measuring PM_{10} is in Yakima, WA. The high-first-high measurement with exceptional events excluded from the most recent full year of data (2023) serves as a conservative basis for the Quincy, WA background concentrations. The monitor location is also considered conservative, as $PM_{2.5}$ measurements in Yakima are higher than those measured at the Quincy, WA.

The Spokane, WA air quality monitor measured CO through 2016 and is the nearest monitor to Quincy, WA that measured CO. Since more recent measurements are not available, these values were compared to NW-AIRQUEST's modeling and monitoring data from 2014 to 2017 and the maximum of the two resources was used to provide a conservative value.

3.3.2. 24-hour $PM_{2.5}$

While there was an increase in 24-hour $PM_{2.5}$ load screening concentrations, the operating scenario applicable to this NAAQS demonstration is a maintenance scenario with a single generator operating at the worst-case load. Since the 2.25-MW generators produce higher concentrations, it is more conservative to assume one of the 2.25 MW generators is running. Therefore, this pollutant was not remodeled, as this project only considers changes to the house generator.

3.3.3. 24-hour PM_{10}

The operating scenario modeled for the 24-hour PM_{10} is the second day of an unplanned power outage where all generators are concurrently operating for a period of 3 hours at the worst-case load. This updated modeling analysis for 24-hour PM_{10} used the same operating scenario as the December 26, 2018 analysis. Because the house generators are included in the modeled scenario and the concentrations in the house generator load screening runs increased (Table C-2 in Attachment C), the 24-hour PM_{10} model was updated. There was a small increase in the resulting modeled project concentrations. Ramboll presumes this is due to updated modeling methodology, increased emissions from the updated house generator model, and reduced velocity due to consideration of the rain cap. The regional background concentration decreased by 1 μg/m^3 compared to the background used in the 2018 analysis which was based on 2009 to 2011 data. With all of this in consideration, the cumulative concentration for 24-hour PM_{10} decreased and remains below the NAAQS standard.

3.3.4. Annual $PM_{2.5}$

The operating scenario modeled for the annual $PM_{2.5}$ is a theoretical maximum year with commissioning, where each generator would run for 14 hours for maintenance, 72 hours for power outages, and 18 hours for startup and commissioning. Exhaust parameters are based on the weighted-average of hours of operation at each load as described in Section 3.1 above. The updated modeling analysis for annual $PM_{2.5}$ used the same modeling operating scenario as the December 26, 2018 analysis. Ramboll remodeled annual $PM_{2.5}$ for comparison with the NAAQS due to the increase in modeled concentration in the house generator load screening runs (Table C-2 in Attachment C). The annual $PM_{2.5}$ project concentration increased compared to 2018, likely due to a combination of the emission rate increase from the updated house generators, the updated modeling methodology, and the decrease in stack velocity due to consideration of the rain cap. However, the regional background concentration for annual $PM_{2.5}$ decreased, leading to an overall decrease in the annual $PM_{2.5}$ cumulative concentration.

3.3.5. 1-hour and 8-hour CO

The operating scenario modeled for CO is an unplanned power outage where all generators are concurrently operating for the entire averaging period at the worst-case load. The updated modeling analysis for 1-hour and 8-hour CO used the same modeling operating scenario as the December 26, 2018 analysis. Ramboll remodeled both 1-hour and 8-hour CO for comparison with the NAAQS due to the increase in the CO 1-hour concentration in the load screening analysis. The estimated cumulative concentrations for both the 1-hour and 8-hour CO decreased, likely due to the updated modeling methodology. However, the regional background for both the 1-hour and 8-hour CO increased since the last assessment in 2018. Even so, the estimated cumulative concentrations for both CO standards are under their respective ambient standards, as shown in Table 2.

3.3.6. Updated Results

As shown in Table 2 below, the updated modeling shows the new 750-kW engine model does not affect compliance with the NAAQS. Contour plots of each modeled pollutant are provided in Attachment D. Dispersion modeling input and output files will be provided via an electronic download link emailed concurrently with this letter, labeled in this letter as Attachment E.

Table 2. Modeled Cumulative Impacts Compared to Air Quality Standards and Previous Values

Pollutant and Averaging Period	NAAQS (µg/m^3)	Modeled Operating Scenario	Concentration (µg/m^3)			
			2024 Modeled Project	2024 Regional Background[1]	2024 Cumulative	2018 Cumulative
PM_{10} 24-hour	150	3-hour power outage (2nd Day)	74.6	61	136	147
$PM_{2.5}$ Annual	12/9[2]	Theoretical Max. Year	2.4	5.4	7.8	9.4
CO 1-hour	40,000	Unplanned power outage	6,947	1,321	8,268	13,266
CO 8-hour	10,000	Unplanned power outage	4,770	923	5,693	8,196

1. The regional background for 24-hour PM_{10} is the 2023 Yakima, WA monitor high-first-high value. The regional background for Annual $PM_{2.5}$ is from the Quincy, WA monitor average of 2021 to 2023 annual values. The regional background for CO from model and monitoring data from NW-AIRQUEST (July 2014 through June 2017) obtained from IDEQ.
2. EPA promulgated a new $PM_{2.5}$ Annual NAAQS of 9.0 µg/m^3 which becomes effective on May 6, 2024.

4. REQUESTED AMENDMENT

CyrusOne requests an amendment to the house generator model number listed in the permitted equipment (first page of Approval Order No. 19AQ-E052), Conditions 2.4, 2.5, and 10.4 of the permit, which should all now list 12V1600G71S. CyrusOne also requests an amendment to the stack diameter in Condition 2.4 of the permit, which should all now state 10 inches.

CyrusOne also requests an addition and clarification to the fuel monitoring provision in Condition 4.6 to allow two methods of recording fuel consumption in each engine. The options would allow fuel monitoring through direct measurement by a fuel meter or calculation from engine load. The existing and requested condition is as follows:

> Existing Condition 4.6:
> Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records the amount of fuel consumed by that engine.
>
> Proposed Condition 4.6:
> Each engine shall be connected to a properly installed and maintained fuel flow monitoring system that records or calculates the amount of fuel consumed by that engine. The fuel monitoring system may consist of: 1) a fuel meter incorporated into each engine control module; or 2) a system that calculates fuel consumption based on the maximum engine load measured during each run, using manufacturer-provided load-based fuel consumption rates.

* * *

If you have any questions regarding this submittal, please feel free to contact Eri Ottersburg at eottersburg@ramboll.com or 206-336-1677.

Sincerely,

Steven Branoff
Principal
D 415-796-1942
sbranoff@ramboll.com

Eri Ottersburg
Managing Consultant
D 206-336-1677
eottersburg@ramboll.com

cc:
Laura Cottrell, CyrusOne
Jeff Devine, CyrusOne
Danny Cowser, CyrusOne
Mike Lake, CyrusOne
Chris Napier, CyrusOne

ATTACHMENT A: DEPARTMENT OF ECOLOGY NOTICE OF CONSTRUCTION APPLICATION FORM AND FEE

Notice of Construction Application

A notice of construction permit is required before installing a new source of air pollution or modifying an existing source of air pollution. This application applies to facilities in Ecology's jurisdiction. Submit this application for review of your project. For general information about completing the application, refer to Ecology Forms ECY 070-410a-g, "Instructions for Ecology's Notice of Construction Application."

Ecology offers up to two hours of free pre-application assistance. We encourage you to schedule a pre-application meeting with the contact person specified for the location of your proposal, below. If you use up your two hours of free pre-application assistance, we will continue to assist you after you submit Part 1 of the application and the application fee. You may schedule a meeting with us at any point in the process.

Upon completion of the application, please enclose a check for the initial fee and mail to:

Department of Ecology
Cashiering Unit
PO Box 47611
Olympia, WA 98504-7611

For Fiscal Office Use Only: 0299-3030404-B00-216--001--000404

Check the box for the location of your proposal. For assistance, call the appropriate office listed below:

Check box	Ecology Permitting Office	Contact
☐	**Chelan, Douglas, Kittitas, Klickitat, or Okanogan County** Ecology Central Regional Office (509) 575-2490	Lynnette Haller (509) 457-7126 lynnette.haller@ecy.wa.gov
☑	**Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, or Whitman County** Ecology Eastern Regional Office (509) 329-3400	Karin Baldwin (509) 329-3452 karin.baldwin@ecy.wa.gov
☐	**San Juan County** Ecology Northwest Regional Office (206) 594-0000	David Adler (425) 649-7267 david.adler@ecy.wa.gov
☐	**For actions taken at Kraft and Sulfite Paper Mills and Aluminum Smelters Only** Ecology Industrial Section (360) 407-6900	James DeMay (360) 407-6868 james.demay@ecy.wa.gov
☐	**For actions taken on the US Department of Energy Hanford Reservation Only** Ecology Nuclear Waste Program (509) 372-7950	Lilyann Murphy (509) 372-7951 lilyann.murphy@ecy.wa.gov

Check the box below for the fee that applies to your application.

New project or equipment:

- ☐ **$1,904: Basic project** initial fee covers up to 16 hours of review.
- ☐ **$12,614: Complex project** initial fee covers up to 106 hours of review.

Change to an existing permit or equipment:

- ☐ **$357: Administrative or simple change** initial fee covers up to 3 hours of review. Ecology may determine your change is complex during the completeness review of your application. If you project is complex, you must pay the additional xxx before we will continue working on your application
- ☑ **$1,190: Complex** change initial fee covers up to 10 hours of review
- ☐ **$350flat fee**: Replace or alter control technology equipment under WAC 173-400-114. Ecology will contact you if we determine your change belongs in another fee category. You must pay the fee associated with that category before we will continue working on your application.

Read each statement below, then check the box next to it to acknowledge that you agree.

- ☑ The initial fee you submitted may not cover the cost of processing your application. Ecology will track the number of hours spent on your project. If the number of hours Ecology spends exceeds the hours included in your initial fee, Ecology will bill you $119 per hour for the extra time.
- ☑ You must include all information requested by this application. Ecology may not process your application if it does not include all the information requested.
- ☑ Submittal of this application allows Ecology staff to visit and inspect your facility.

Part 1: General Information

I. Project, Facility, and Company Information

1. Project Name: House Generator Technical Amendment
2. Facility Name: CyrusOne PNW1
3. Facility Street Address:
   1025 D Street NW, Quincy, WA 98848
4. Facility Legal Description: Data center
5. Company Legal Name (if different from Facility Name):
   CyrusOne LLC
6. Company Mailing Address (street, city, state, zip)
   2850 North Harwood Street, Suite 2200, Dallas, TX 75201

II. Contact Information and Certification

1. Facility Contact Name (who will be onsite): Thomas Head
2. Facility Contact Mailing Address (if different than Company Mailing Address:
   1025 D Street NW, Quincy, WA 98848

3. Facility Contact Phone Number: 425-219-2953

4. Facility Contact E-mail: thead@cyrusone.com

5. Billing Contact Name (who should receive billing information): Laura Cottrell

6. Billing Contact Mailing Address (if different Company Mailing Address):

7. Billing contact Phone Number: 603-793-0534

8. Billing Contact E-mail: lcottrell@cyrusone.com

9. Consultant Name (optional – if 3rd party hired to complete application elements): Eri Ottersburg

10. Consultant Organization/Company: Ramboll Americas Engineering Solutions, Inc.

11. Consultant Mailing Address (street, city, state, zip): 901 5th Avenue #3900, Seattle, WA 98164

12. Consultant Phone Number: +1 206-336-1677

13. Consultant E-mail: eottersburg@ramboll.com

14. Responsible Official Name and Title (who is responsible for project policy or decision making): Chris Napier, SVP US Operations

15. Responsible Official Phone: 480-800-9207

16. Responsible Official E-mail: cnapier@cyrusone.com

17. Responsible Official Certification and Signature:

    I certify that the information on this application is accurate and complete.

    Signature: Chris Napier Date: 5/7/2024

Part 2: Technical Information

The Technical Information may be sent with this application form to the Cashiering Unit, or may be sent directly to the Ecology regional office with jurisdiction along with a copy of this application form.

For all sections, check the box next to each item as you complete it.

III. Project Description

- ☑ Written narrative describing your proposed project.
- ☑ Projected construction start and completion dates.
- ☑ Operating schedule and production rates.
- ☑ List of all major process equipment and manufacturer and maximum rated capacity.
- ☐ Process flow diagram with all emission points identified.
- ☐ Plan view site map.
- ☑ Manufacturer specification sheets for major process equipment components
- ☑ Manufacturer specification sheets for pollution control equipment.
- ☑ Fuel specifications, including type, consumption (per hour and per year) and percent sulfur.

IV. State Environmental Policy Act (SEPA) Compliance

Check the appropriate box below.

- ☑ SEPA review is complete. Include a copy of the final SEPA checklist and SEPA determination (e.g., DNS, MDNS, and EIS) with your application.
- ☐ SEPA review has not been conducted:
  - ☐ If review will be conducted by another agency, list the agency. You must provide a copy of the final SEPA checklist and SEPA determination before Ecology will issue your permit. Agency reviewing SEPA: ____
  - ☐ If the review will be conducted by Ecology, fill out a SEPA checklist and submit it with your application. You can find a SEPA checklist online at https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-document-templates

V. Emissions Estimations of Criteria Pollutants

Does your project generate criteria air pollutant emissions? ☑ **Yes** ☐ **No**

If yes, please proved the following information regarding your criteria emissions in the application.

- ☑ The names of the criteria air pollutants emitted (i.e., NO_X, SO_2, CO, $PM_{2.5}$, PM_{10}, TSP, VOC, and Pb)
- ☑ Potential emissions of criteria air pollutants in tons per hour, tons per day, and tons per year (include calculations)
- ☐ If there will be any fugitive criteria pollutant emissions, clearly identify the pollutant and quantity

VI. Emissions Estimations of Toxic Air Pollutants

Does your project generate toxic air pollutant emissions? ☑ **Yes** ☐ **No**

If yes, please provide the following information regarding your toxic air pollutant emissions in your application.

- [x] The names of the toxic air pollutants emitted (specified in WAC 173-460-150[1])
- [x] Potential emissions of toxic air pollutants in pounds per hour, pounds per day, and pounds per year (include calculations)
- [ ] If there will be any fugitive toxic air pollutant emissions, clearly identify the pollutant and quantity

VII. Emission Standard Compliance

- [x] Provide a list of all applicable new source performance standards, national emission standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under Chapter 70A.15 RCW.

Does your project comply with all applicable standards identified? ☑ **Yes** ☐ **No**

VIII. Best Available Control Technology

- [x] Provide a complete evaluation of Best Available Control Technology (BACT) for your proposal.

IX. Ambient Air Impacts Analyses

Please provide the following:

- [x] Ambient air impacts analyses for Criteria Air Pollutants (including fugitive emissions)
- [x] Ambient air impacts analyses for Toxic Air Pollutants (including fugitive emissions)
- [x] Discharge point data for each point included in air impacts analyses (include only if modeling is required)
  - [x] Exhaust height
  - [x] Exhaust inside dimensions (ex. diameter or length and width)
  - [x] Exhaust gas velocity or volumetric flow rate
  - [x] Exhaust gas exit temperature
  - [x] The volumetric flow rate
  - [x] Description of the discharges (i.e., vertically or horizontally) and whether there are any obstructions (ex., raincap)
  - [x] Identification of the emission unit(s) discharging from the point
  - [x] The distance from the stack to the nearest property line
  - [x] Emission unit building height, width, and length
  - [x] Height of tallest building on-site or in the vicinity and the nearest distance of that building to the exhaust
  - [x] Whether the facility is in an urban or rural location

Does your project cause or contribute to a violation of any ambient air quality standard or acceptable source impact level? ☐ **Yes** ☑ **No**

To request ADA accommodation, call Ecology at (360) 407-6800, 711 (relay service), or (877) 833-6341 (TTY)

[1] http://apps.leg.wa.gov/WAC/default.aspx?cite=173-460-150

ATTACHMENT B: EQUIPMENT SPECIFICATION SHEETS

Diesel Generator Set

mtu 12V1600 DS750

750 kWe/60 Hz/Standby/208 - 600V
Reference *mtu* 12V1600 DS750 (690 kWe) for Prime Power for Stationary Emergency Rating Technical Data

System ratings

Voltage (L-L)	208V †	240V †	380V †	480V †	600V
Phase	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60
kW	750	750	750	750	750
kVA	937	937	937	937	937
Amps	2,602	2,255	1,424	1,127	902
skVA@30% voltage dip	2,450	2,450	2,310	2,575	2,525
Generator model	LSA 49.3 L9	LSA 49.3 L9	LSA 49.3 M8	LSA 49.3 M8	LSA 49.3 M8
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	12 LEAD WYE	12 LEAD DELTA	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

† UL 2200 offered

Certifications and standards

- Emissions
  - EPA Tier 2 certified
  - South Coast Air Quality Management District (SCAQMD)
- Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004
- Seismic certification – optional
  - 2021 IBC certification
  - HCAI pre-approval
- UL 2200 - optional (refer to *System ratings* for availability)
- CSA - optional
  - CSA C22.2 No. 100
  - CSA C22.2 No. 14
- Performance Assurance Certification (PAC)
  - Generator set tested to ISO 8528-5 for transient response
  - Verified product design, quality, and performance integrity
  - All engine systems are prototype and factory tested
- Power rating
  - Accepts rated load in one step per NFPA 110
  - Permissible average power output during 24 hours of operation is approved up to 85%.

A Rolls-Royce solution

Standard features*

- Single source supplier
- Global product support
- Two (2) Year/3,000 Hour Basic Limited Warranty
- 12V1600 diesel engine
  - 22.44 liter displacement
  - Common rail fuel injection
  - 4-cycle
- HVO and GtL fuels meeting fuel specification EN15940
- Engine-generator resilient mounted
- Complete range of accessories
- Cooling system
  - Integral set-mounted
  - Engine-driven fan
- Generator
  - Brushless, rotating field generator
  - 2/3 pitch windings
  - Permanent Magnet Generator (PMG) supply to regulator
  - 300% short circuit capability
- Digital control panel(s)
  - UL recognized, CSA certified, NFPA 110
  - Complete system metering
  - LCD display

Standard equipment*

Engine

- Air cleaners
- Oil pump
- Oil drain extension and shut-off valve
- Full flow oil filter
- Closed crankcase ventilation
- Jacket water pump
- Thermostats
- Blower fan and fan drive
- Radiator - unit mounted
- Electric starting motor - 24V
- Governor - electronic isochronous
- Base - formed steel
- SAE flywheel and bell housing
- Charging alternator - 24V
- Battery box and cables
- Flexible fuel connectors
- Flexible exhaust connection
- EPA certified engine

Generator

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self-ventilated
- Superior voltage waveform
- Digital, solid state, volts-per-hertz regulator
- Brushless alternator with brushless pilot exciter
- 4 pole, rotating field
- 130 °C maximum standby temperature rise
- 1-bearing, sealed
- Flexible coupling
- Full amortisseur windings
- 125% rotor balancing
- 3-phase voltage sensing
- ± 0.25% voltage regulation no load to full load
- 100% of rated load - one step
- 5% maximum total harmonic distortion

Digital control panel(s)

- Digital metering
- Engine parameters
- Generator protection functions
- Engine protection
- CANBus ECU communications
- Windows®-based software
- Multilingual capability
- Communications to remote annunciator
- Programmable input and output contacts
- UL recognized, CSA certified, CE approved
- Event recording
- IP 54 front panel rating with integrated gasket
- NFPA 110 compatible

* Represents standard product only. Consult the factory/***mtu*** Distributor for additional configurations.

Application data

Engine

Manufacturer	***mtu***
Model	12V1600G71S
Type	4-cycle
Arrangement	12-V
Displacement: L (cu in)	22.44 (1,369)
Bore: cm (in)	12.6 (4.96)
Stroke: cm (in)	15 (5.91)
Compression ratio	15.89:1
Rated rpm	1,800
Engine governor	electronic isochronous (ADEC)
Maximum power: kWm (bhp)	836 (1,121)
Steady state frequency band	± 0.25%
Air cleaner	dry

Liquid capacity

Total oil system: L (gal)	73 (19.3)
Engine jacket water capacity: L (gal)	65 (17.2)
System coolant capacity: L (gal)	109 (28.8)

Electrical

Electric volts DC	24
Cold cranking amps under -17.8 °C (0 °F)	1,050
Batteries: group size	4D
Batteries: quantity	2

Fuel system

Fuel supply connection size	-10 JIC 37° female
Fuel return connection size	-6 JIC 37° female
Maximum fuel lift: m (ft)	3 (10)
Recommended fuel	diesel #2/HVO
Total fuel flow: L/hr (gal/hr)	328 (86.7)

Fuel consumption

At 100% of power rating: L/hr (gal/hr)	193.3 (51.1)
At 75% of power rating: L/hr (gal/hr)	144.1 (38.1)
At 50% of power rating: L/hr (gal/hr)	107.3 (28.3)

Cooling - radiator system

Ambient capacity of radiator: °C (°F)	50 (122)
Maximum restriction of cooling air: intake and discharge side of radiator: kPa (in. H_2O)	0.2 (0.8)
Water pump capacity: L/min (gpm)	517 (137)
Heat rejection to coolant: kW (BTUM)	285 (16,208)
Heat rejection to after cooler: kW (BTUM)	215 (12,227)
Heat radiated to ambient: kW (BTUM)	71.2 (4,049)
Fan power: kW (hp)	29 (38.9)

Air requirements

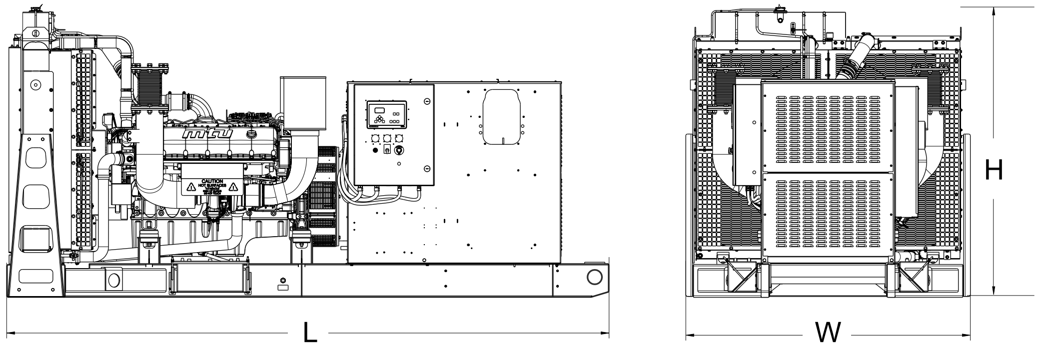
Aspirating: *m^3/min (SCFM)	68.4 (2,416)
Air flow required for radiator cooled unit: *m^3/min (SCFM)	1,007 (35,579)
Remote cooled applications; air flow required for dissipation of radiated generator set heat for a maximum of 25 °F rise: *m^3/min (SCFM)	260 (9,244)

* Air density = 1.184 kg/m^3 (0.0739 lbm/ft^3)

Exhaust system

Gas temperature (stack): °C (°F)	481 (898)
Gas volume at stack temperature: m^3/min (CFM)	161 (5,686)
Maximum allowable back pressure at outlet of engine, before piping: kPa (in. H_2O)	8.5 (34.1)

Weights and dimensions



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight
Open Power Unit (OPU)	4,521 x 2,135 x 2,179 mm (178 x 84.1 x 85.8in)	4,774-5,829 kg (10,524-12,850 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

Sound data

Unit type	Standby full load
Level 0 (OPU): dB(A)	94.9

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

Emissions data

NO_x + NMHC	CO	PM
8.07	0.83	0.04

- All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA standards.

Rating definitions and conditions

- Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 85%.
- Nominal ratings at standard conditions: 25 °C and 300 meters (77 °F and 1,000 feet).
- Deration factor:
  - Consult your local ***mtu*** Distributor for altitude derations.
  - Consult your local ***mtu*** Distributor for temperature derations.

C/F = Consult Factory/***mtu*** Distributor

ATTACHMENT C: DETAILED EMISSION CALCULATIONS AND MODELING DATA

Table C-1
House Generator 2018 to 2024 Percent Change of Emission Rates and Exhaust Parameters
CyrusOne
Quincy, Washington

Parameter/Load	Old NTE Rate	New NTE Rate	Change	Percent Change
CO Emissions (lb/hr)				
10% Load	1.2	1.7	0.53	44%
25% Load	1.2	2.1	0.93	79%
50% Load	1.2	1.2	0.060	5%
75% Load	1.2	1.8	0.59	50%
100% Load	2.0	1.9	-0.030	-2%
Full-variable Load[1]	2.0	2.1	0.14	7%
HC Emissions (lb/hr)				
10% Load	0.38	1.0	0.65	171%
25% Load	0.45	0.61	0.16	36%
50% Load	0.37	0.33	-0.040	-11%
75% Load	0.22	0.30	0.080	36%
100% Load	0.14	0.35	0.21	150%
Full-variable Load[1]	0.45	1.0	0.58	129%
NO_X Emissions (lb/hr)				
10% Load	3.2	1.6	-1.6	-50%
25% Load	4.4	2.6	-1.8	-41%
50% Load	6.4	5.2	-1.2	-19%
75% Load	9.7	10	0.30	3%
100% Load	16	14	-1.8	-11%
Full-variable Load[1]	16	14	-1.8	-11%
PM Emissions (lb/hr)				
10% Load	0.055	0.14	0.081	147%
25% Load	0.12	0.042	-0.081	-66%
50% Load	0.098	0.085	-0.013	-13%
75% Load	0.074	0.11	0.035	47%
100% Load	0.059	0.088	0.029	49%
Full-variable Load[1]	0.12	0.14	0.013	11%
Exhaust Flow (cfm)				
10% Load	1,390	1,401	11	1%
25% Load	2,218	2,237	19	1%
50% Load	3,758	3,471	-287	-8%
75% Load	5,237	4,496	-741	-14%
100% Load	6,332	5,706	-626	-10%

Table C-1
House Generator 2018 to 2024 Percent Change of Emission Rates and Exhaust Parameters
CyrusOne
Quincy, Washington

Parameter/Load	Old NTE Rate	New NTE Rate	Change	Percent Change
Exhaust Temp. (°F)				
10% Load	473	592	119	25%
25% Load	666	772	106	16%
50% Load	795	865	70	9%
75% Load	878	878	0	0%
100% Load	993	883	-110	-11%
Fuel Flow (gal/hr)				
50% Load	29.4	28.3	-1.1	-4%
75% Load	43.5	38.1	-5.4	-12%
100% Load	57.8	51.1	-6.7	-12%

Notes:
1. "Full-variable load" is the pollutant-specific worst-case emission rate at any load ≤100 percent load.

Abbreviations:
cfm - Cubic feet per minute
CO - Carbon monoxide
°F - degrees Fahrenheit
HC - Hydrocarbons
gal/hr - Gallons per hour
NO_X - Nitrogen oxides
PM - Particulate matter

Table C-2
Load Screening Results and Comparison
CyrusOne
Quincy, Washington

Proposed 750-kW House Generator Load Screening Model Results

Load	Dispersion Factor			Model Results[1]								
	1-hour	24-hour	Annual	NO_X 1-hour	CO 1-hour	SO_2 and TAPs 1-hour	$PM_{10}/PM_{2.5}$ 24-hour	TAPs 24-hour	$PM_{2.5}$ Annual	NO_X Annual	DEEP Annual	TAPs Annual
	(µg/m³ per lb/hr)			(µg/m³)								
10%	66	19	--	103	115	--	22	--	--	--	--	--
25%	49	13	--	127	104	--	8.7	--	--	--	--	--
50%	38	12	--	198	47	0.23	4.9	0.071	--	--	--	--
75%	32	11	--	323	57	0.26	4.5	0.088	--	--	--	--
100%	27	10	--	383	52	0.30	4.4	0.11	--	--	--	--
Annual	--	--	2.0	--	--	--	--	--	2.3	28	0.27	0.022

RAMBOLL

Table C-2
Load Screening Results and Comparison
CyrusOne
Quincy, Washington

2018 to 2024 Percent Change Load Screening Modeling Results

Load	Dispersion Factor			Model Results								
	1-hour	24-hour	Annual	NO_X 1-hour	CO 1-hour	SO_2 and TAPs 1-hour	$PM_{10}/PM_{2.5}$ 24-hour	TAPs 24-hour	$PM_{2.5}$ Annual	NO_X Annual	DEEP Annual	TAPs Annual
	($\mu g/m^3$ per lb/hr)			($\mu g/m^3$)								
10%	-6%	-6%	--	-54%	36%	--	153%	--	--	--	--	--
25%	-2%	-6%	--	-43%	75%	--	8%	--	--	--	--	--
50%	3%	1%	--	-16%	9%	-1%	-10%	-2%	--	--	--	--
75%	12%	5%	--	15%	69%	-2%	48%	-8%	--	--	--	--
100%	8%	4%	--	-4%	6%	-5%	132%	-8%	--	--	--	--
Annual	--	--	-17%	--	--	--	--	--	69%	-27%	-9%	-27%

Notes:

1. Highlighted cells indicate which operating load correlates to the highest modeled impact for each pollutant and averaging period.

Abbreviations:

CO - Carbon monoxide
DEEP - Diesel engine exhaust particulate matter
NO_X - Nitrogen oxides
PM - Particulate matter
$PM_{2.5}$ - PM with an aerodynamic diameter less than 2.5 microns
PM_{10} - PM with an aerodynamic diameter less than 10 microns
SO_2 - Sulfur dioxide
TAP - Toxic air pollutant

Table C-3
Manufacturer Specifications and Not-To-Exceed Emissions
CyrusOne
Quincy, Washington

Pollutant/ Parameter	Load-Specific					Full-variable Load[1]
	10%	25%	50%	75%	100%	≤ 100%
NO_X (lb/hr)	1.6	2.6	5.2	10	14	14
Primary NO_2[2] (lb/hr)	0.16	0.26	0.52	1.0	1.4	1.4
CO (lb/hr)	1.7	2.1	1.2	1.8	1.9	2.1
HC (lb/hr)	1.0	0.61	0.33	0.30	0.35	1.0
DEEP[3] (lb/hr)	0.14	0.042	0.085	0.11	0.088	0.14
PM (FH+BH)[4] (lb/hr)	1.2	0.65	0.42	0.41	0.44	1.2
Exhaust Temp. (°F)	592	772	865	878	883	592
Exhaust Flow (cfm)	1,401	2,237	3,471	4,496	5,706	1,401
Fuel Flow (gal/hr)	--	--	28.3	38.1	51.1	51.1

Notes:
1. "Full-variable load" is the pollutant-specific worst-case emission rate at any load ≤100 percent.
2. Primary NO_2 is assumed to be 10% of the NO_X.
3. DEEP is assumed equal to front-half NTE particulate emissions, as reported by the vendors.
4. PM attributable to front-half and back-half emissions is assumed equal to the sum of vendor NTE values for PM and HC.

Abbreviations:
BH - "Back-half" condensable emissions
cfm - Cubic feet per minute
CO - Carbon monoxide
DEEP - Diesel engine exhaust particulate matter
°F - degrees Fahrenheit
FH - "Front-half" filterable emissions
gal/hr - gallons per hour
HC - Hydrocarbons
lb/hr - pounds per hour
NO_2 - Nitrogen dioxide
NO_X - Nitrogen oxides
NTE - Not to exceed
PM - Particulate matter

Table C-4
"Black-Puff" Emissions for Cold Start-Up
CyrusOne
Quincy, Washington

Black-Puff Emissions Test Data [1]

Pollutant	Spike Duration (seconds)	Measured Concentration (ppm)		Cold-Start Emission Factor
		Cold-Start Emission Spike	Steady-State (Warm) Emissions	
PM+HC	14	900	30	4.3
NO_X [2]	8.0	40	38	0.94
CO	20	750	30	9.0

Hourly Rate During Warm and Cold Conditions

Pollutant	Worst-Case Emission Rate (lb/hr)	
	Warm	Cold-start
HC	1.0	4.4
NO_x	14	14
CO	2.1	19
DEEP	0.14	0.58
PM (FH+BH)	1.2	5.0

Maximum Emission Rate for Each Hour Including Startup

Pollutant	Single Hour Emissions [3] (lb/hr)		
	Startup (1 min)	Warm (59 min)	Total (1 hr)
HC	0.073	1.0	1.1
NO_X	0.24	13.9	14
CO	0.32	2.1	2.4
DEEP	0.010	0.13	0.14
PM (FH+BH)	0.083	1.1	1.2

Notes:

1. See Appendix B of Notice of Construction Application Report, December 26, 2018.
2. Although the cold-start emission factor derived for NO_X is less than 1 (i.e., decreased emissions), this evaluation will conservatively assume a factor of 1.0.
3. Cold-start emission factor applies to the first 60 seconds of emissions after engine startup.

Abbreviations:

BH - "Back-half" condensable emissions
CO - Carbon monoxide
DEEP - Diesel engine exhaust particulate matter
FH - "Front-half" filterable emissions
HC - Hydrocarbons
lb/hr - Pounds per hour
NO_X - Nitrogen oxides
NTE - Not to exceed
PM - Particulate matter
ppm - Parts per million

Table C-5
Fuel-Based Emission Calculations
CyrusOne
Quincy, Washington

Fuel-Based Generator Parameters

Parameter	Units	Value
Generator Size	MW	0.75
No. of Generators	--	2
Fuel Usage (per genset)	gph	51
Fuel Type	--	ULSD
Fuel Density	lb/gallon	7.1
Fuel Heat Content	Btu/gallon	137,000
Fuel Sulfur Content	ppm weight	15

Annual Hours of Operation

Scenario	Duration (hour)
Average	38
Theoretical Maximum Year	86
Max. Year with Commissioning	136

Generator Inputs Per Period

Generator Input	Units	Per Hour	Per Day	Per Year (average)	Per Year (Theoretical)	Per Year (Theoretical + Commis.)
Fuel Usage (per period)	Gallon	102	2,453	3,884	8,789	13,899
Heat Input (per period)	MMBtu	14	336	532	1,204	1,904

Table C-5
Fuel-Based Emission Calculations
CyrusOne
Quincy, Washington

Toxic Air Pollutant Emission Rates

Pollutant	CAS Number	Emission Factor	Peak Emission Rate[1]		Annual Emission Rate[1]		
			Hourly (lb/hr)	Daily (lb/day)	Average (tpy)	Theoretical Maximum (tpy)	Theoretical Max. + Commis. (tpy)
SO_2	7446-09-5	0.0015% w Sulfur	2.2E-02	5.2E-01	4.1E-04	9.3E-04	--
Benzene	71-43-2	7.8E-04 lb/MMBtu [2]	1.1E-02	2.6E-01	2.1E-04	4.9E-04	7.7E-04
Toluene	108-88-3	2.8E-04 lb/MMBtu [2]	4.1E-03	9.5E-02	7.8E-05	1.8E-04	2.8E-04
Xylenes	95-47-6	1.9E-04 lb/MMBtu [2]	2.8E-03	6.5E-02	5.3E-05	1.2E-04	1.9E-04
1,3-Butadiene	106-99-0	3.9E-05 lb/MMBtu [2]	5.8E-04	1.3E-02	1.1E-05	2.4E-05	3.9E-05
Formaldehyde	50-00-0	7.9E-05 lb/MMBtu [2]	1.2E-03	2.7E-02	2.2E-05	4.9E-05	7.8E-05
Acetaldehyde	75-07-0	2.5E-05 lb/MMBtu [2]	3.7E-04	8.5E-03	7.0E-06	1.6E-05	2.5E-05
Acrolein	107-02-8	7.9E-06 lb/MMBtu [2]	1.2E-04	2.7E-03	2.2E-06	4.9E-06	7.8E-06
Benzo(a)pyrene	50-32-8	2.6E-07 lb/MMBtu [2]	3.8E-06	8.7E-05	7.1E-08	1.6E-07	2.5E-07
Benz(a)anthracene	56-55-3	6.2E-07 lb/MMBtu [2]	9.2E-06	2.1E-04	1.7E-07	3.9E-07	6.2E-07
Chrysene	218-01-9	1.5E-06 lb/MMBtu [2]	2.3E-05	5.2E-04	4.2E-07	9.6E-07	1.5E-06
Benzo(b)fluoranthene	205-99-2	1.1E-06 lb/MMBtu [2]	1.6E-05	3.7E-04	3.1E-07	7.0E-07	1.1E-06
Benzo(k)fluoranthene	207-08-9	2.2E-07 lb/MMBtu [2]	3.2E-06	7.3E-05	6.0E-08	1.4E-07	2.2E-07
Dibenz(a,h)anthracene	53-70-3	3.5E-07 lb/MMBtu [2]	5.1E-06	1.2E-04	9.6E-08	2.2E-07	3.4E-07
Ideno(1,2,3-cd)pyrene	193-39-5	4.1E-07 lb/MMBtu [2]	6.1E-06	1.4E-04	1.1E-07	2.6E-07	4.1E-07
Naphthalene	91-20-3	1.3E-04 lb/MMBtu [2]	1.9E-03	4.4E-02	3.6E-05	8.1E-05	1.3E-04
Propylene	115-07-1	0.0028 lb/MMBtu [2]	4.1E-02	9.4E-01	7.7E-04	1.7E-03	2.8E-03

Notes:

1. Fuel-based emission rates also account for cold-start emissions.
2. EPA emission factor document AP-42, Section 3.4, "Large Stationary Diesel and All Stationary Dual-fuel Engines". October 1996.

Abbreviations:

Btu - British thermal unit
CAS - Chemical Abstracts Service
Commis. - Commissioning
gph - Gallons per hour
lb - Pounds
lb/hr - Pounds per hour
Max. - Maximum
MMBtu - Million British thermal units
MW - Megawatts
No. - Number
ppm - Parts per million
tpy - Tons per year
ULSD - ultra-low sulfur diesel
%w - percent by weight

Table C-6
Summary of Potential Emission Rates
CyrusOne
Quincy, Washington

Pollutant	Potential Emission Rates[1]			
	Peak Hourly	Yearly Average	2018 Yearly Average	2018-2024 Change in Yearly Average
	(lb/hr)	(tpy)	(tpy)	(tpy)
Criteria Pollutants				
NO_X	28	0.54	0.60	-0.067
CO	4.8	0.088	0.082	0.0063
SO_2	0.022	4.1E-04	4.7E-04	-5.4E-05
$PM_{2.5}/PM_{10}$	2.5	0.046	0.023	0.024
VOCs	2.2	0.041	0.018	0.023
Toxic Air Pollutants				
Primary NO_2[2]	2.8	0.054	0.060	-0.0067
DEEP	0.29	0.0054	0.0049	0.00050
CO	4.8	0.088	0.082	0.0063
SO_2	0.022	4.1E-04	4.7E-04	-5.4E-05
Acrolein	1.2E-04	2.2E-06	2.5E-06	-2.9E-07
Benzene	1.1E-02	2.1E-04	2.4E-04	-2.8E-05
Propylene	4.1E-02	7.7E-04	8.7E-04	-1.0E-04
Toluene	4.1E-03	7.8E-05	8.8E-05	-1.0E-05
Xylenes	2.8E-03	5.3E-05	6.0E-05	-7.0E-06
Formaldehyde	1.2E-03	2.2E-05	2.5E-05	-2.9E-06
Acetaldehyde	3.7E-04	7.0E-06	7.9E-06	-9.1E-07
1,3-Butadiene	5.8E-04	1.1E-05	1.2E-05	-1.4E-06
Naphthalene	1.9E-03	3.6E-05	4.1E-05	-4.7E-06
Benz(a)anthracene	9.2E-06	1.7E-07	1.9E-07	-2.3E-08
Chrysene	2.3E-05	4.2E-07	4.8E-07	-5.6E-08
Benzo(b)fluoranthene	1.6E-05	3.1E-07	3.5E-07	-4.0E-08
Benzo(k)fluoranthene	3.2E-06	6.0E-08	6.8E-08	-7.9E-09
Benzo(a)pyrene	3.8E-06	7.1E-08	8.0E-08	-9.3E-09
Indeno(1,2,3-cd)pyrene	6.1E-06	1.1E-07	1.3E-07	-1.5E-08
Dibenz(a,h)anthracene	5.1E-06	9.6E-08	1.1E-07	-1.3E-08

Table C-6
Summary of Potential Emission Rates
CyrusOne
Quincy, Washington

Notes:

[1] Cold-start emissions are accounted for in the project emissions.
[2] NO_2 is assumed to be 10% of the NO_X.

Abbreviations:

CO - Carbon monoxide
Commis. - Commissioning
DEEP - Diesel engine exhaust particulate matter
lb/hr - Pounds per hour
NO_2 - Nitrogen dioxide
NO_X - Nitrogen oxides
PM - Particulate matter
$PM_{2.5}$ - PM with an aerodynamic diameter less than 2.5 microns
PM_{10} - PM with an aerodynamic diameter less than 10 microns
SO_2 - Sulfur dioxide
tpy - Tons per year
VOCs - Volatile organic compounds

Table C-7
Modeled Emission Rates
CyrusOne
Quincy, Washington

1-Hour & 8-Hour CO NAAQS: Power Outage Scenario

Operating Condition	Cold-start	Warm
Number of events	1	1
Duration of each event (hours)	0.017	0.983
Hours at each runtime mode	0.017	0.983
Maximum Generators Concurrently Operating	2	
Modeled Parameters[1]	**Values**	
Emission Rate per Genset (lb/hr)	2.39	
Worst-Case Exhaust Temp. (°F)	592	
Worst-Case Exhaust Flow (cfm)	1,401	

Annual $PM_{2.5}$ NAAQS: Theoretical Maximum Year with Commissioning

Modeled Parameters[2]	Values
Emission Rate per Genset (lb/hr)	0.0142
Weighted-Average Exhaust Temp. (°F)	754
Weighted-Average Exhaust Flow (cfm)	2,726

Table C-7
Modeled Emission Rates
CyrusOne
Quincy, Washington

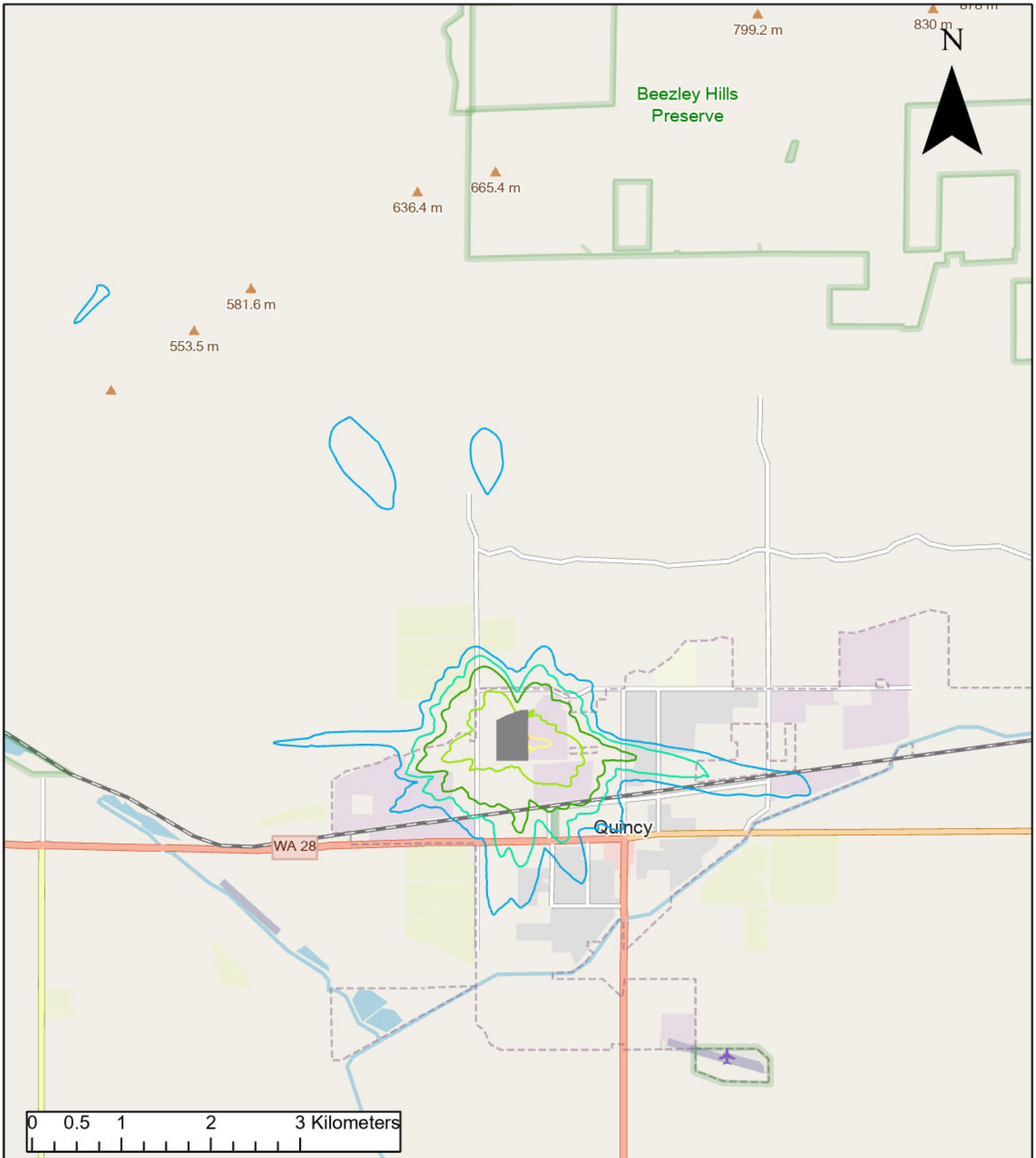
24-Hour PM_{10} NAAQS: Unplanned power outage 2nd Day (3-hr limit)

Operating Condition	Cold-start	Warm
Daily Hours of Operation	3	
Number of events	1	1
Duration of each event (hours)	0.017	2.983
Hours at each runtime mode	0.017	2.983
Maximum Generators Concurrently Operating	2	
Modeled Parameters[1]	**Values**	
Emission Rate per Genset (lb/hr)	0.148	
Worst-Case Exhaust Temp. (°F)	592	
Worst-Case Exhaust Flow (cfm)	1,401	

Notes:
1. All operations are assumed to run at worst-case load.
2. Annual emissions based on theoretical maximum year. Temperature and flow based on weighted average of expected hours of operation at each load per year.

Abbreviations:
cfm - Cubic feet per minute
CO - Carbon monoxide
°F - degrees Fahrenheit
hr - Hour
lb/hr - Pounds per hour
NAAQS - National Ambient Air Quality Standards
PM - Particulate Matter
PM_{10} - PM with an aerodynamic diamter less than 10 microns
Temp. - Temperature

ATTACHMENT D: AIR DISPERSION MODELING PLOTS



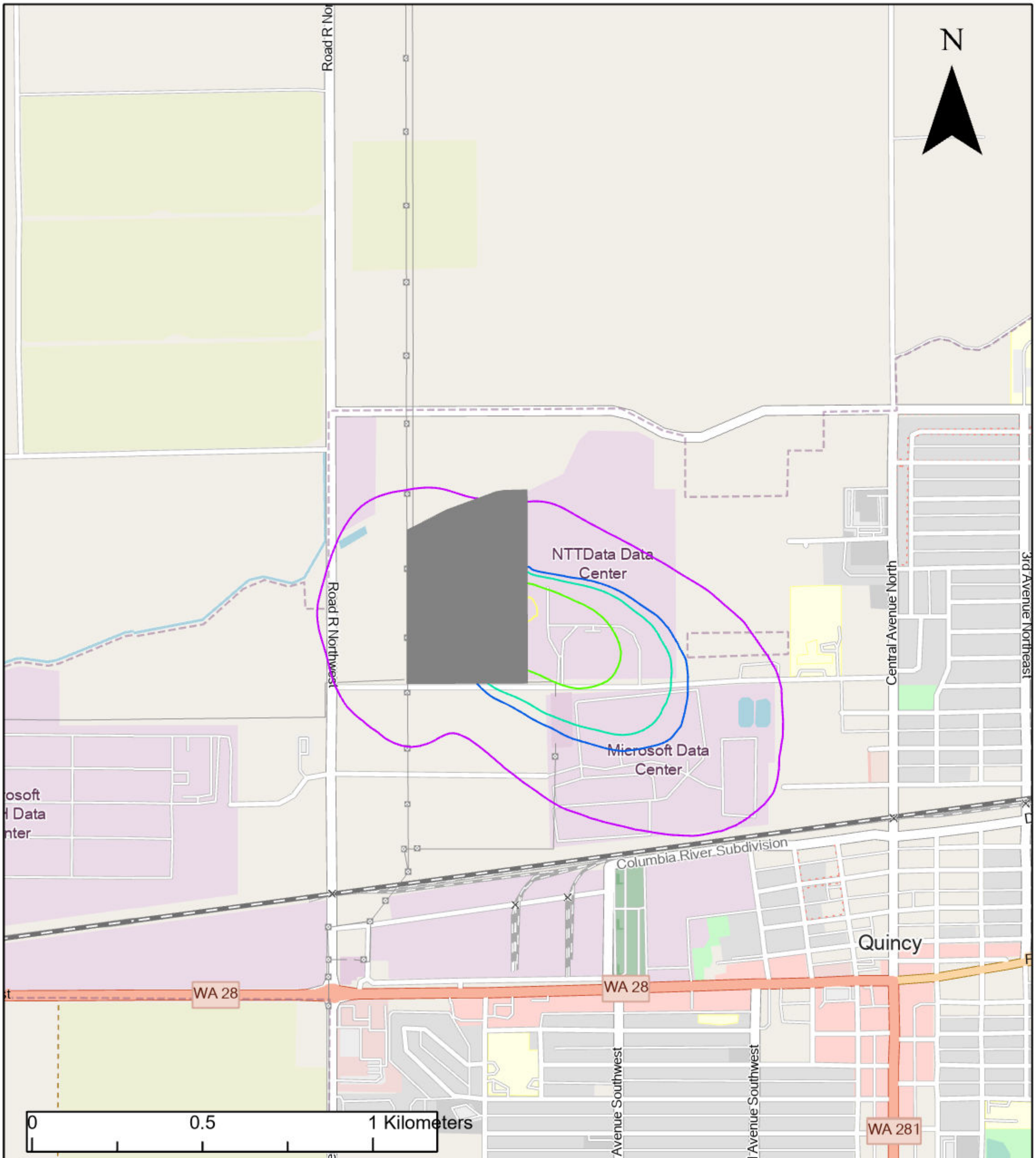
Property Boundary
5.0 ug/m3
7.0 ug/m3
10.0 ug/m3
20.0 ug/m3
50.0 ug/m3
70.0 ug/m3

RAMBOLL

DRAFTED BY: ET | DATE: 5/2/2024

Project-only 24-Hour PM_{10} Concentration Contour Map

CyrusOne Data Center
Quincy, Washington



Legend
Property Boundary
0.20 ug/m3
0.50 ug/m3
0.60 ug/m3
1.00 ug/m3
2.00 ug/m3

RAMBOLL

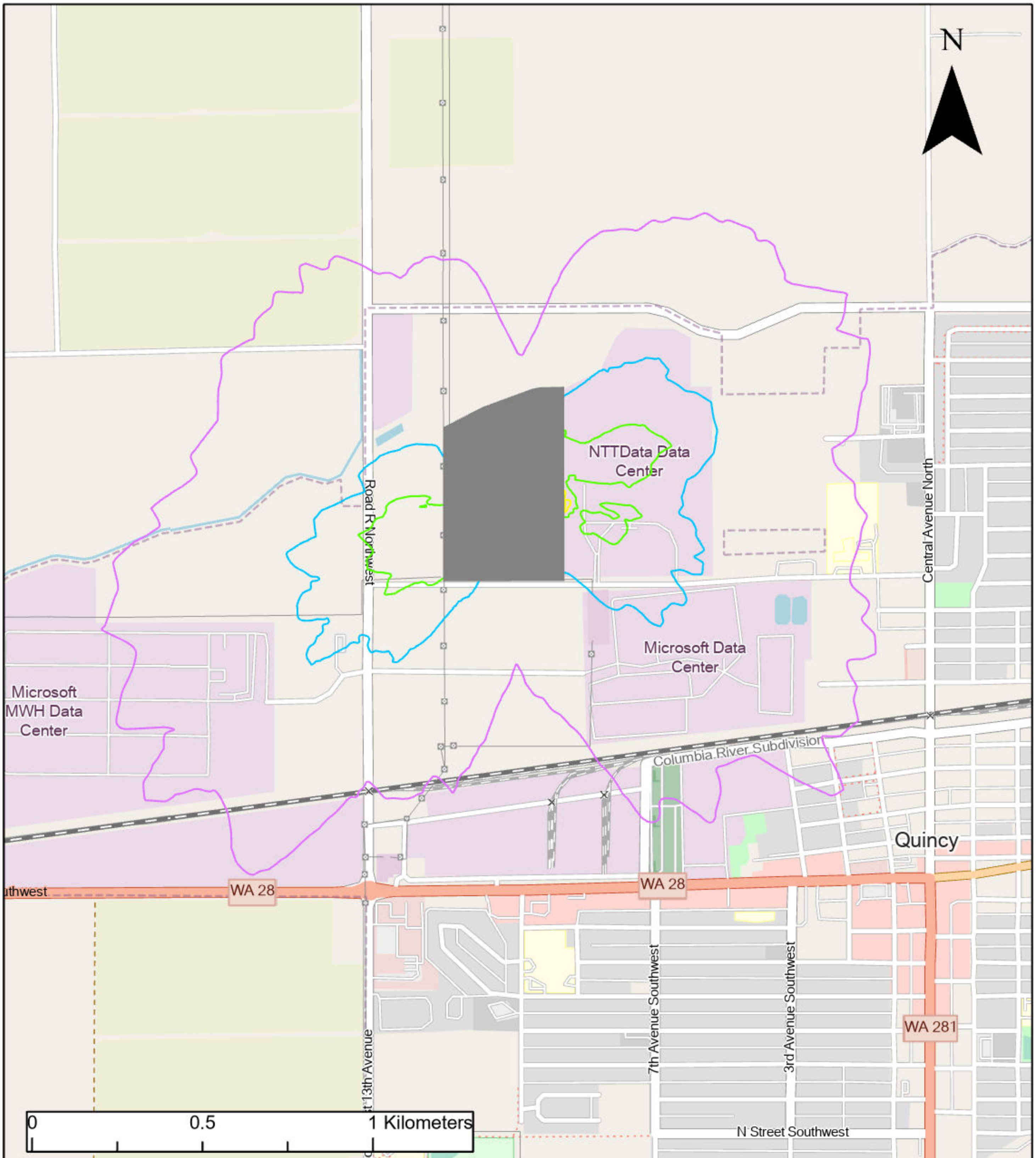
DRAFTED BY: ET

DATE: 4/27/2024

Project-only Annual $PM_{2.5}$ Concentration Contour Map

CyrusOne Data Center

Quincy, Washington



Property Boundary
2000 ug/m3
4000 ug/m3
5000 ug/m3
6500 ug/m3

RAMBOLL

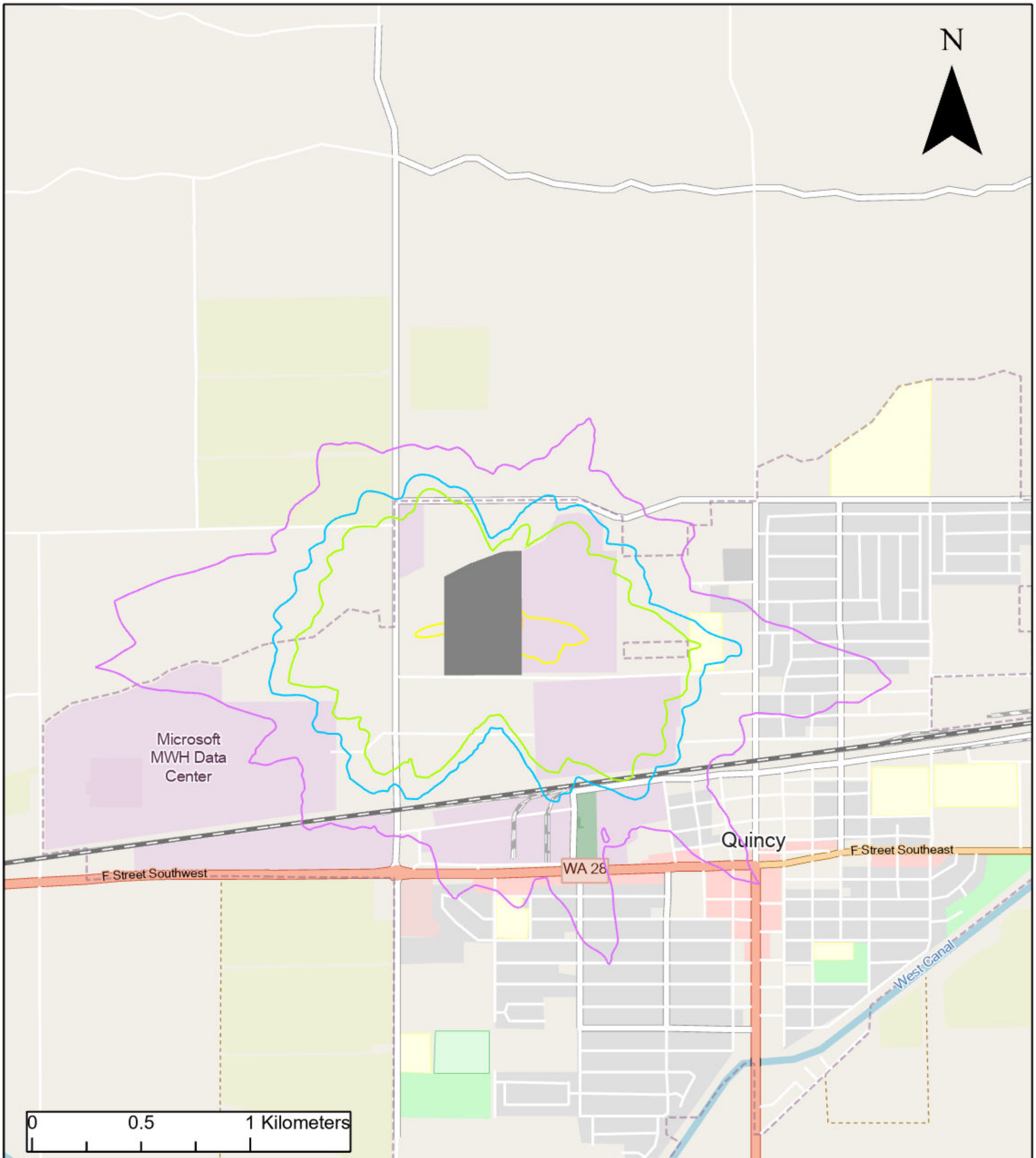
DRAFTED BY: ET

DATE: 5/2/2024

Project-only 1-Hour CO Concentration Contour Map

CyrusOne Data Center

Quincy, Washington



Property Boundary
500 ug/m3
800 ug/m3
1000 ug/m3
3000 ug/m3
4500 ug/m3

RAMBOLL

Project-only 8-Hour CO Concentration Contour Map

CyrusOne Data Center

Quincy, Washington

ATTACHMENT E: AIR DISPERSION MODELING FILES

Electronic access to the air dispersion files will be submitted to the Department of Ecology.