STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

October 14, 2025

Karin Baldwin
Department of Ecology
Air Quality Program
Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295

Re: Second Tier Toxics Review Petition for Sabey Intergate Quincy Data Center Building E Expansion – 13 New Generators

Dear Karin:

We have completed our review of the health risks posed by diesel engine exhaust particulate (DEEP) and oxides of nitrogen (NO_X) emissions from 13 proposed diesel-powered emergency generators at Building E of the Sabey Intergate Quincy Data Center in Quincy, WA.

The Sabey Intergate Quincy Data Center currently consists of five buildings (A, B, C, D, and E) and is permitted to operate up to 109 generators. The proposal would increase the permitted total by adding 13 generators at Building E.

The increased DEEP emissions from both planned and unplanned generator use could result in an increased cancer risk of less than one in one million (< 1.0 x 10-6) for maximally impacted receptors near Sabey.

We also considered long- and short-term non-cancer hazards associated with Sabey's proposed diesel engine emissions. We determined that non-cancer health effects are not likely to occur from long-term exposure to DEEP emissions. Short-term respiratory hazards posed by peak emissions of NO_X during power outage scenarios could occur in some areas near the facility, but the Grant County Public Utility District reports very stable power. Therefore, the likelihood of infrequent high-emission scenarios coinciding with unfavorable pollutant dispersion conditions is very low.

We find that Sabey's project-related health risks are permissible under WAC 173-460-090 because:

- The increase in emissions of toxic air pollutants is not likely to result in an increased cancer risk of more than one in one hundred thousand (10 in one million), which is the maximum risk allowed by a Second Tier review.
- The non-cancer hazard is acceptable.

The applicant has satisfied all requirements of a second tier analysis.

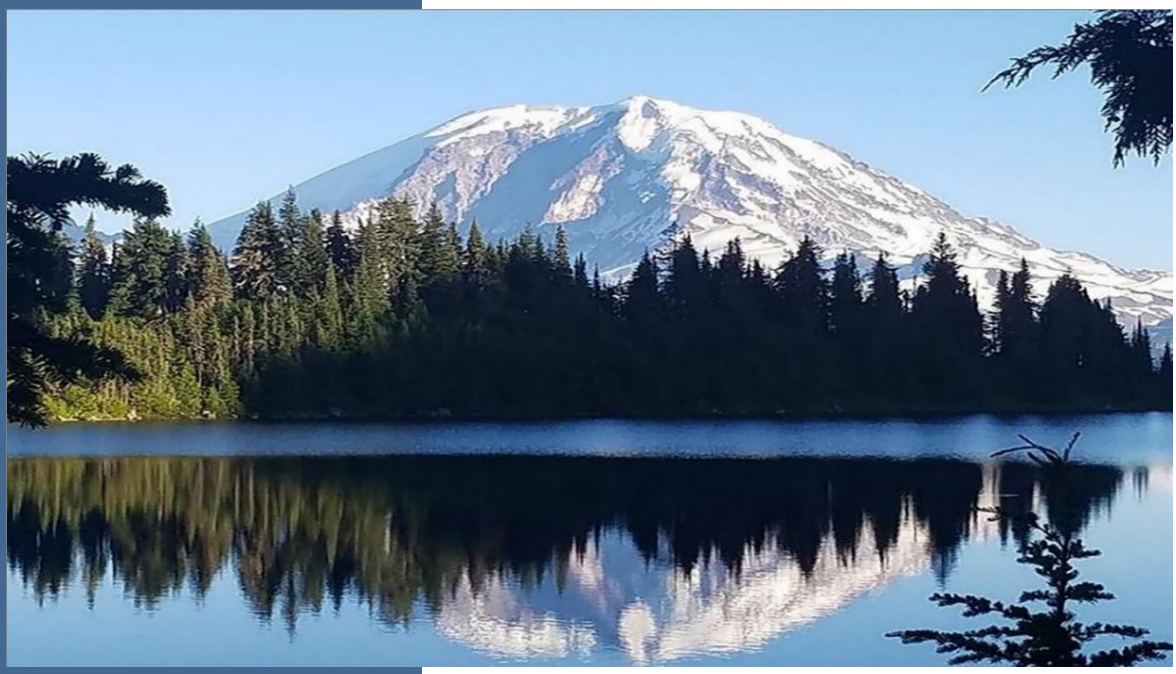
If you would like to discuss this project further, please contact Gary Palcisko at gary.palcisko@ecy.wa.gov or 360-995-3447.

Sincerely,

Chris Hanlon-Meyer
Science and Analysis Section Manager
Air Quality Program

ch-m/tm

Enclosure



Health Impact Assessment Review

Second Tier Recommendation for Sabey Intergate Quincy Data Center – Building E Expansion: 13 New Diesel-Powered Generators

Air Quality Program
Washington Department of Ecology
Olympia, Washington
October 2025

DEPARTMENT OF ECOLOGY
State of Washington

Contact Information

Air Quality Program

PO Box 47600
Olympia, WA 98504-7600
360-407-6800
https://ecology.wa.gov/contact

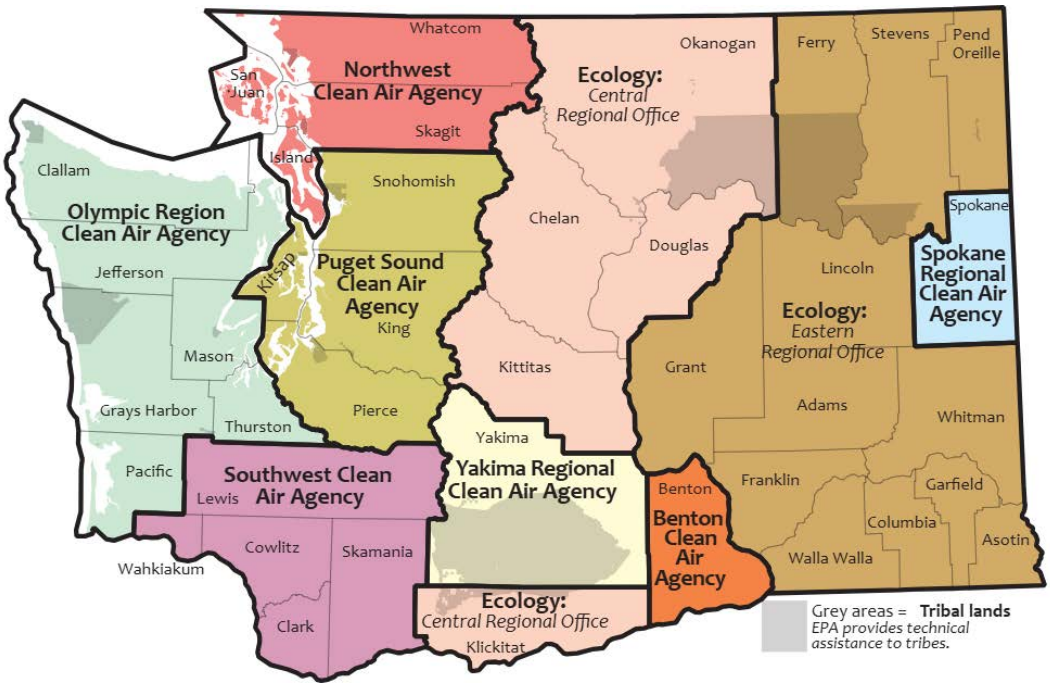
ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Sections 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request ADA accommodation, email gary.palcisko@ecy.wa.gov or call 360-995-3447, 711 (relay service), or 877-833-6341 (TTY).

Department of Ecology's Regional Offices and Washington Clean Air Agencies

Map of Counties Served



Agency	Counties Served
Benton Clean Air Agency	Benton
Ecology – Central Regional Office	Chelan, Douglas, Kittitas, Klickitat, Okanogan
Ecology – Eastern Regional Office	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Stevens, Walla Walla, Whitman
Ecology – Industrial Section	Statewide: Pulp mills, aluminum smelters
EPA Region 10	Tribal lands
Northwest Clean Air Agency	Island, San Juan, Skagit, Whatcom
Olympic Region Clean Air Agency	Clallam, Grays Harbor, Jefferson, Mason, Pacific, Thurston
Puget Sound Clean Air Agency	King, Kitsap, Pierce, Snohomish
Southwest Clean Air Agency	Clark, Cowlitz, Lewis, Skamania, Wahkiakum
Spokane Regional Clean Air Agency	Spokane
Yakima Regional Clean Air Agency	Yakima

Health Impact Assessment Review
Second Tier Recommendation for
Sabey Intergate Quincy Data Center
Building E Expansion
13 New Diesel-Powered Generators

Air Quality Program
Washington Department of Ecology
Olympia, WA

This page is purposely left blank.

Table of Contents

Page

List of Tables and Figures vii
Tables vii
Figures vii
Executive Summary viii
Conclusions viii
Ecology's recommendation ix
Second Tier Review Processing and Approval Criteria 1
Second tier review processing requirements 1
Second tier review approval criteria 1
tBACT determination 2
Health Impact Assessment Review 3
Health effects summary 3
DEEP health effects summary 3
Toxicity reference values 4
Community/receptors 6
Background concentrations of TAPs in ambient air 6
Increased cancer risk 7
Non-cancer hazard 9
Other Considerations 14
Short-term exposures to DEEP 14
Frequency of short-term NO_2 hazards 14
Uncertainty 15
Exposure uncertainty 15
Emissions uncertainty 15
Air dispersion uncertainty 16
Toxicity uncertainty 16
Conclusions and Recommendations 18
References 20

List of Tables and Figures

Page

Tables

Table 1: Toxicity Values or Comparison Values Considered in Assessing and Quantifying Non-cancer Hazard and Cancer Risk 5

Table 2: Estimated Annual Average DEEP and Maximum 1-hr NO_2 Project-related Concentrations at Key Receptor Locations 6

Table 3: Estimated "Background" Concentrations of Average DEEP and 1-hr NO_2 Levels near Sabey Intertage-Quincy Data Center 7

Table 4: Estimated Increased Cancer Risk for Residential and Commercial Receptors Attributable to Sabey Building D&E DEEP Emissions and Background Concentrations . 9

Table 5: Estimated Short-term NO_2, Formaldehyde, and Other Non-cancer Respiratory Hazards Attributable to Sabey – Building E Expansion Emissions 11

Table 6: Estimated Long-term Non-cancer Hazard Quotients Attributable to Sabey Building E Expansion DEEP Emissions and Background Levels 12

Table 7: Estimated Long-term Respiratory Non-cancer Hazard Indices Attributable to Sabey's Increased Building E Expansion Emissions 13

Table 8: Qualitative Summary of How Uncertainty Affects the Quantitative Estimate of Risks or Hazards Attributable to Sabey's Project-related Emissions 15

Figures

Figure 1: Average DEEP concentrations attributable to Sabey's proposed diesel-powered generators and key receptor locations evaluated in the HIA 22

Figure 2: Maximum NO_2 concentrations attributable to Sabey's project-related outage emissions and key receptor locations evaluated in the HIA 23

Executive Summary

This document presents and summarizes a review of health risk from pollutants emitted by 13 new diesel-powered generators at Sabey Intergate Quincy Data Center (Sabey) in Quincy, WA. Sabey petitioned Ecology to review a proposal to install and operate these engines at Building E of their data center campus in Quincy, WA. Ecology concludes that the health risk from emissions of toxic air pollutants from these engines is acceptable and recommends approval of the project.

Sabey hasn't selected the exact manufacturer and model of these 13 generators yet, but they evaluated emissions from the following six different models:

- Cummins Inc., QSK60-G26, 2,500 kWe Standby Generator Set
- Cummins Inc., QSK60-G14, 2,250 kWe Standby Generator Set
- Caterpillar 3516C, 2,500 kWe Standby Generator Set
- Caterpillar 3516C, 2,250 kWe Standby Generator Set
- Rehlko KD2250, 2,500 kWe Standby Generator Set
- Rehlko KD2500, 2,700 kWe Standby Generator Set

The engines powering the proposed generator sets must be certified to meet the Environmental Protection Agency's Tier 2 emission standards.

Based on emissions and exhaust specifications for each generator set model, Sabey used dispersion modeling to identify the generator set model and operating load that causes the highest ambient impact of each pollutant. They determined that engines that operate up to 25 hours per engine may emit two toxic air pollutants—diesel engine exhaust particles and nitrogen dioxide—at rates triggering a requirement to prepare a health impact assessment. A health impact assessment describes the increased health risks from exposure to toxic air pollutants.

Sabey hired Trinity Consultants to prepare a health impact assessment. Trinity Consultants estimated the health risks associated with Sabey's increased diesel particle, nitrogen dioxide, and other toxic air pollutant emissions.

Conclusions

- Long-term impacts:
    - Sabey's increased diesel particle emissions result in a lifetime cancer risk of less than one in one million. The maximum risk occurs for commercial receptors at a location along Sabey's southern fence line. This is likely to be an overestimate of risk as the location along the fence line is unlikely to be developed for commercial activities.

    - The maximum increased cancer risk for residential receptors is also less than one in one million. The maximally impacted residence is about 1000 meters east of Sabey.
        - Cancer risk can be expressed either as an increase in an individual's risk of disease or as the number of cancers that might occur in addition to those normally expected in a population of one million people. The estimated diesel particle-related cancer risk represents increases above a baseline lifetime cancer risk of about 40 percent in the United States.
    - Exposure to "background" levels of diesel particles in the area results in a risk of about 42 in one million.
    - Exposure to diesel particles in the area is not likely to result in long-term non-cancer health effects.
- Short-term impacts:
    - Nitrogen dioxide emitted from Sabey's new and existing diesel-powered generators that operate during a power outage could rise to levels of short-term concern for people with respiratory problems.
        - The occurrence of high concentrations of nitrogen dioxide depends on the frequency of line power interruptions coinciding with unfavorable dispersion. We do not expect power outages affecting Sabey to occur frequently; therefore, concentrations responsible for these hazards probably will not occur frequently or last long.

Ecology's recommendation

Ecology recommends approval of the project because:

- Emission controls for the new and modified emission units represent best available control technology for toxics.
- The applicant demonstrated that the increase in emissions of toxic air pollutants is not likely to result in an increased cancer risk of more than one in one hundred thousand (10 in one million), which is the maximum risk allowed by a second tier review.
- The non-cancer hazard is acceptable.
- Grant County Public Utility District's power system is reliable.

Second Tier Review Processing and Approval Criteria

The health impacts assessment (HIA) for Sabey submitted by Trinity Consultants is part of the second tier toxics review process under WAC 173-460 (Trinity Consultants, 2025). Ecology is responsible for processing and reviewing second tier review petitions statewide.

Second tier review processing requirements

For Ecology to review the second tier petition, each of the following regulatory requirements under Chapter 173-460-090 must be satisfied:

(a) The permitting authority has determined that other conditions for processing the Notice of Construction Order of Approval (NOC) have been met and has issued a preliminary approval order.

(b) Emission controls contained in the preliminary NOC approval order represent at least best available control technology for toxics (tBACT).

(c) The applicant has developed an HIA protocol that has been approved by Ecology.

(d) The ambient impact of the emissions increases of each toxic air pollutant (TAP) that exceeds acceptable source impact levels (ASILs) has been quantified using refined air dispersion modeling techniques as approved in the HIA protocol.

(e) The second tier review petition contains an HIA conducted in accordance with the approved HIA protocol.

Acting as the "permitting authority" for this project, Ecology's project permit engineer satisfied item (a) and verified item (b) above on August 1, 2025. Ecology approved an HIA protocol (item (c)), and the final HIA (item (e)) was received by Ecology on September 18, 2025.[1] Ecology's air dispersion modeler determined that Trinity Consultants conducted the refined modeling (item (d)) appropriately.

All five processing requirements above are satisfied.

Second tier review approval criteria

As specified in WAC 173-460-090(7), Ecology may recommend approval of a project that is likely to cause an exceedance of ASILs for one or more TAPs only if it:

[1] The HIA document was submitted on July 14, 2025, and additional information requested by Ecology was submitted on September 18, 2025.

(a) Determines that the emission controls for the new and modified emission units represent tBACT.

(b) The applicant demonstrates that the increase in emissions of TAPs is not likely to result in an increased cancer risk of more than one in one hundred thousand.

(c) Ecology determines that the non-cancer hazard is acceptable.

tBACT determination

Ecology's permit engineer determined that Sabey's proposed pollution control equipment satisfies the BACT and tBACT requirements for diesel engines powering backup generators (Ecology, 2025). BACT and tBACT for nitrogen oxides (NO_X) and diesel particles were determined to be met through restricted operation of EPA Tier-2 certified engines operated as emergency engines as defined in 40 C.F.R. 60.4219, and compliance with the operation and maintenance restrictions of 40 C.F.R. Part 60, Subpart IIII.

Health Impact Assessment Review

As described previously, the applicant is responsible for preparing the HIA under WAC 173-460-090. Ecology's project team, consisting of an engineer, a toxicologist, and a modeler, reviews the HIA to determine if the methods and assumptions are appropriate for assessing and quantifying risks to the surrounding community from a new project.

For the Sabey Intergate-Quincy Data Center, Buildings E Expansion project, the HIA focused on health risks attributable to diesel engine exhaust particulate (DEEP) and nitrogen dioxide (NO_2) exposure because the modeled ambient air concentrations exceeded respective ASILs. Trinity Consultants briefly described emissions and exposure to other TAPs (acrolein, arsenic, cadmium, chromium, hexavalent chromium, formaldehyde, hydrogen chloride, manganese, mercury, and carbon monoxide) because emissions exceeded a small quantity emission rate (SQER).

Health effects summary

The HIA prepared by Trinity Consultants quantifies the non-cancer hazards and cancer risks attributable to Sabey's increased TAP emissions. The HIA focused on potential exposure to diesel particles and NO_2, as these were the two TAPs with emissions causing an exceedance of an ASIL.

DEEP health effects summary

Diesel engines emit very small fine (<2.5 micrometers [µm]) and ultrafine (<0.1 µm) particles. These particles can easily enter deep into the lungs when inhaled. Mounting evidence indicates that inhaling fine particles can cause or contribute to numerous adverse health effects.

Studies of humans and animals specifically exposed to DEEP show that diesel particles can cause both acute and chronic health effects, including cancer. Ecology has summarized these health effects in "Concerns about Adverse Health Effects of Diesel Engine Emissions" (Ecology, 2008).

NO_2 health effects summary

NO_2 is present in diesel exhaust. It forms when nitrogen, present in diesel fuel and as a major component of air, combined with oxygen to produce oxides of nitrogen.

NO_2 and other oxides of nitrogen are of concern for ambient air quality because they are part of a complex chain of reactions responsible for the formation of ground-level ozone. Additionally, exposure to NO_2 can cause both long-term (chronic) and short-term (acute) health effects.

Long-term exposure to NO_2 can lead to chronic respiratory illnesses such as bronchitis and increase the frequency of respiratory illness due to respiratory infections.

Short-term exposure to extremely high concentrations (>180,000 µg/m^3) of NO_2 may result in serious effects, including death (National Research Council, 2012). Moderate levels (~ 30,000 µg/m^3) may severely irritate the eyes, nose, throat, and respiratory tract, and cause shortness of breath and extreme discomfort. Lower level NO_2 exposure (<1,000 µg/m^3), such as that experienced near major roadways, or perhaps downwind from stationary sources of NO_2, may cause increased bronchial reactivity in some asthmatics, decreased lung function in patients with chronic obstructive pulmonary disease, and increased risk of respiratory infections, especially in young children (CalEPA, 2008).

For the Sabey proposed project, emissions from diesel-powered generators during a utility power interruption present the greatest potential for producing high enough short-term concentrations of NO_2 to be of concern for respiratory health effects.

Toxicity reference values

Agencies develop toxicity reference values for use in evaluating and characterizing exposures to chemicals in the environment. As part of the HIA, Trinity Consultants identified appropriate toxicity values for DEEP and NO_2.

DEEP toxicity values

Trinity Consultants identified toxicity values for DEEP from California EPA's Office of Environmental Health Hazard Assessment (OEHHA) (CalEPA, 1998). OEHHA derived toxicity values from studies of animals exposed to a known amount (concentration) of DEEP, or from epidemiological studies of exposed humans. These values represent a level at or below which we do not expect adverse non-cancer health effects and a metric by which to quantify increased risk from exposure to a carcinogen. Table 1 shows the appropriate DEEP non-cancer and cancer toxicity values identified by Trinity Consultants.

OEHHA derived a unit risk factor (URF) for estimating cancer risk from exposure to DEEP. They based the URF on a meta-analysis of several epidemiological studies of humans occupationally exposed to DEEP. In these studies, researchers based exposure on measurements of elemental carbon and respirable particulate representing fresh diesel exhaust. Therefore, we define DEEP as the filterable fraction of particulate emitted by diesel engines.[2] The URF is expressed as the upper-bound probability of developing cancer, assuming continuous lifetime exposure to a substance at a concentration of one microgram per cubic meter (1 µg/m^3) and is expressed in units of inverse concentration [i.e., (µg/m^3)$^{-1}$]. OEHHA's URF for DEEP is 0.0003 per µg/m^3, meaning that a lifetime of exposure to one µg/m^3 of DEEP results in an increased

[2] Condensable particulate does not represent DEEP for the purposes assessing health risks from DEEP exposure; however, we consider both the filterable and condensable fractions of particulate when determining compliance with NAAQS for the purposes of the NOC application.

individual cancer risk of 0.03 percent or a population cancer risk of 300 excess cancer cases per million people exposed.

For evaluating non-cancer effects, OEHHA based its reference exposure level (REL) for diesel engine exhaust (measured as DEEP) on dose-response data on inflammation and changes in the lung from rat inhalation studies. They established a level of five $\mu g/m^3$ as the concentration of DEEP in air at which long-term exposure is unlikely to cause adverse non-cancer health effects.

EPA promulgated National Ambient Air Quality Standards (NAAQS) and other regulatory toxicological values for short- and intermediate-term exposure to particulate matter, but values specifically for DEEP exposure at these intervals do not currently exist.

NO_2 toxicity values

OEHHA developed an acute reference exposure level for NO_2 based on inhalation studies of asthmatics exposed to NO_2. These studies found that some asthmatics exposed to about 0.25 ppm (i.e., 470 $\mu g/m^3$) experienced increased airway reactivity following inhalation exposure to NO_2 (CalEPA, 2008). Not all exposed subjects experienced an effect.

The acute REL derived for NO_2 does not contain any uncertainty factor adjustment and therefore does not provide any additional buffer between the derived value and the exposure concentration at which effects may occur in sensitive populations. This implies that exposure to NO_2 at levels equivalent to the acute REL (which is also the same as Ecology's ASIL) could result in increased airway reactivity in a subset of asthmatics. People without asthma or other respiratory disease are less likely to experience effects at NO_2 levels at or below the REL. OEHHA intended for acute RELs to be "for infrequent one-hour exposures that occur no more than once every two weeks in a given year" (CalEPA, 2015).

Finally, the EPA developed an annual and 1-hour NAAQS for NO_2. Landau Associates demonstrated compliance with these NAAQS as part of the NOC application process (Ecology, 2024a).

Table 1: Toxicity Values or Comparison Values Considered in Assessing and Quantifying Non-cancer Hazard and Cancer Risk

Pollutant	Agency	Non-cancer	Cancer
DEEP	California EPA–Office of Environmental Health Hazard Assessment	Chronic REL[1] = 5 $\mu g/m^3$	URF[2] = 0.0003 per $\mu g/m^3$
NO_2	California EPA–Office of Environmental Health Hazard Assessment	Acute REL = 470 $\mu g/m^3$	NA

[1] REL – Reference Exposure Level

[2] URF – Unit Risk Factor

Community/receptors

Sabey's proposed expansion to the Intergate-Quincy Data Center is in an industrially zoned area surrounded largely by other data center properties and agricultural land uses. Air dispersion modeling indicated that proposed DEEP emissions could result in long-term concentrations in excess of the ASIL out to about 500 meters from the facility fence line (Figure 1). No residential land uses are located within the area where project-related DEEP concentrations exceed the ASIL.

Relevant to short-term impacts, levels of NO_2 could exceed the ASIL in a very small area near the west boundary of Sabey Intergate Quincy Data Center (Figure 2).

For the purpose of assessing increased cancer risk and non-cancer hazards, Trinity Consultants identified receptor locations where the highest exposure to project-related air pollutants could occur at the maximally impacted location (maximally impacted boundary or extra-boundary receptor), nearby residences, and nearby commercial locations (Table 2, Figures 1 and 2). Trinity Consultants identified and considered other sensitive receptors, such as children at schools, but no schools or other sensitive land uses were in the area in which Sabey's ambient impacts exceed ASILs.

Ecology's review of the HIA found that Trinity Consultants identified appropriate receptors to capture the highest Sabey attributable exposures for residential, commercial, and maximally impacted receptors.

Table 2: Estimated Annual Average DEEP and Maximum 1-hr NO_2 Project-related Concentrations at Key Receptor Locations

Receptor	UTM Coordinates Zone 11N	Annual DEEP Concentration ($\mu g/m^3$)	UTM Coordinates Zone 11N	Maximum 1-hr NO_2 Concentration ($\mu g/m^3$)
MIRR	288079.4, 5235871.7	0.00128	288079.4, 5235871.7	237
MICR	286791.9, 5235971.7	0.0137	285629.4, 5238921.7	654
MIBR	286806.6, 5235973.3	0.0137	286519.4, 5236096.7	658

MIRR – Maximally impacted residential receptor

MICR – Maximally impacted commercial receptor

MIBR – Maximally impacted boundary receptor (or maximally impacted receptor)

Note: Concentrations based on assumed operation of each generator up to 25 hours per year

Background concentrations of TAPs in ambient air

When reviewing increases in TAP emissions under second tier review, WAC 173-460-090 specifies that:

- Background concentrations of TAPs will be considered as part of a second tier review. Background concentrations can be estimated using:
    - The latest National Air Toxics Assessment data for the appropriate census tracts; or
    - Ambient monitoring data for the project's location; or
    - Modeling of emissions of the TAPs subject to second tier review from all stationary sources within 1.5 kilometers of the source location.

Table 3 shows the background levels considered by Trinity Consultants in the HIA. For background DEEP, Trinity Consultants determined background concentrations from Ecology's 2020 cumulative analysis of diesel engine exhaust in Quincy (Ecology, 2020). These estimated levels include emissions from locomotives, trucks, agricultural equipment, construction equipment, and existing data center emergency diesel-powered generators. Trinity based background levels of NO_2 on data available from a Quincy air monitor from August 2017 through September 2018. Trinity used seasonal hourly concentrations calculated as the third-highest monitored result for each hour in each season.

Table 3: Estimated "Background" Concentrations of Average DEEP and 1-hr NO_2 Levels near Sabey Intertage-Quincy Data Center

Average Annual Diesel Particulate Concentration ($\mu g/m^3$)*	1-hr NO_2 Concentration ($\mu g/m^3$)
0.14	Time-varied seasonal averages

* Levels based on cumulative analysis of diesel engine exhaust in the Quincy area (Ecology 2020). The levels reported in this table represent the average of modeled values within 300 meters of the perimeter of Sabey Data Center.

Increased cancer risk

Trinity Consultants assessed the increased risk of cancer from lifetime exposure to DEEP emitted from Sabey's diesel-powered generators. They characterized cancer risk in a manner consistent with EPA guidance for inhalation risk assessment (EPA, 2009) using the following equations:

Risk = IUR x EC

Where:

IUR $(\mu g/m^3)^{-1}$ = inhalation unit risk (i.e., unit risk factor); and

EC ($\mu g/m^3$) = exposure concentration

EC = (CA x ET x EF x ED)/AT

Where:

EC ($\mu g/m^3$) = exposure concentration;

CA ($\mu g/m^3$) = contaminant concentration in air;

ET (hours/day) = exposure time;

EF (days/year) = exposure frequency;

ED (years) = exposure duration; and

AT (ED in years x 365 days/year x 24 hours/day) = averaging time

Cancer risk attributable to Sabey project-related DEEP and "background" DEEP levels

Table 4, adapted from the HIA, shows the estimated increased cancer risk per million for residential, commercial, and boundary (bystander) receptors. These receptors received the highest exposure to Sabey's project-related diesel emissions. Figure 1 shows the location of these receptors relative to Sabey. The highest increase in risks attributable to Sabey's increased emissions is less than one per million[3] for people living on a residential parcel about one kilometer east of Sabey. Commercial and boundary receptors also have increased cancer risks of < one per million.

Continuous lifetime exposure to estimated "background" levels of DEEP near Sabey results in a cancer risk of about 42 per million.

[3] Number per million represents an upper-bound theoretical estimate of the number of excess cancers that might result in an exposed population of one million people compared to an unexposed population of one million people. Alternatively, an individual's increase in risk of one in one million means a person's chance of getting cancer in their lifetime increases by one in one-million or 0.0001 percent.

Table 4: Estimated Increased Cancer Risk for Residential and Commercial Receptors Attributable to Sabey Building D&E DEEP Emissions and Background Concentrations

Exposure Parameter	MIRR	MICR	MIBR
CA Sabey – concentration in air from Sabey's increased emissions (µg/m^3)	0.00128	0.0136	0.0137
CA background – concentration in air from "background" sources (µg/m^3)	0.14	0.14	0.14
ET - Exposure Time (hours per day)	24	8	2
EF - Exposure Frequency (days per year)	365	250	250
ED - Exposure Duration (years)	70	40	30
AT - Averaging Time (hours)	613200	613200	613200
EC Sabey – Sabey project-related exposure concentration (µg/m$^{3)}$	0.00128	0.00177	0.000335
EC background - Background source-related exposure concentration (µg/m^3)	0.14	0.018	0.003
IUR - Inhalation Unit Risk (µg/m^3)-1	0.0003	0.0003	0.0003
Cancer risk from Sabey's increased emissions	**3.8E-07**	**5.3E-07**	**1.0E-07**
Cancer risk from "background" sources	4.2E-05	5.5E-06	1.0E-06

Notes:

- Concentration based on assumed operation of each generator 25 hours per year.
- Trinity Consultants also calculated risks posed by other project-related carcinogenic TAPS (i.e., arsenic, cadmium, hexavalent chromium, and formaldehyde). They estimated a negligible increased risk attributable to these other TAPs of < 0.04 per million.

Non-cancer hazard

Trinity Consultants assessed the acute non-cancer hazards from exposure to NO_2 and chronic non-cancer hazards from DEEP exposure. They estimated non-cancer hazards consistent with EPA guidance for inhalation risk assessment (EPA, 2009) using the following equations:

HQ = EC/Toxicity Value

Where:

HQ (unitless) = hazard quotient;

EC (µg/m^3) = exposure concentration;

Toxicity Value (µg/m^3) = inhalation toxicity value (e.g., REL) that is appropriate for the exposure scenario (acute, subchronic, or chronic).

EC = CA

Where:

EC ($\mu g/m^3$) = exposure concentration;

CA ($\mu g/m^3$) = contaminant concentration in air.

To assess the overall potential for non-cancer effects posed by more than one chemical, Trinity Consultants estimated additive acute effects from several TAPs that exceeded SQERs. They used EPA's hazard index (HI) approach, in which the HI is equal to the sum of the hazard quotients (HQs) pertaining to the same health endpoint or impacted organ system (EPA, 1986). When the HI exceeds unity, there may be concern for potential health effects, but health effects may not actually occur. The level of concern rises the more an HQ or HI exceeds unity.

HI (respiratory) = HQ (nitrogen dioxide) + HQ (formaldehyde) + HQ (etc.)

Acute non-cancer hazards attributable to Sabey's worst-case project-related NO_X emissions and "background" NO_2 levels

Trinity Consultants evaluated short-term (acute) exposures to NO_2 emitted during power outage scenarios[4] and determined HQs could exceed unity (HQ > 1) at locations near the west fence line (Table 5, Figure 2). This indicates that there is potential for short-term respiratory hazards from exposure to NO_2.

Trinity Consultants also considered the combined effects of NO_2 and other TAPs emitted during power outage scenarios, assuming engines operate at the load resulting in the highest impacts. Hazard indices exceed unity for the MIBR/MICR but remain below unity for the MIRR. This indicates that there is potential for short-term respiratory hazards from exposure to NO_2 and other TAPs at a location near the fence line. We present and discuss the likelihood of these potential occurrences under the "Other Considerations" heading of this document.

[4] Power outage scenario means that all 13 engines operate at the same time at worst-case loads.

Table 5: Estimated Short-term NO_2, Formaldehyde, and Other Non-cancer Respiratory Hazards Attributable to Sabey – Building E Expansion Emissions

Receptor	Pollutant	Engine Load (%)	Maximum 1-hr Concentration ($\mu g/m^3$)	REL	HQ
MIBR	NO_2	100	658	470	1.40
MIBR	CO	---	393	23000	0.02
MIBR	Formaldehyde	100	16.2	55	0.29
MIBR	Acrolein	100	0.32	2.5	0.13
MIBR	Arsenic	100	0.02	0.2	0.10
MIBR	Chromium	100	0.006	0.48	0.01
MIBR	Hydrogen chloride	100	1.75	2100	<0.01
MIBR	Manganese	100	0.029	0.17	0.17
MIBR	Mercury	---	0.019	0.6	0.03
MIBR	All combined	100	NA	NA	HI = 2.2
MIRR	NO_2	100	237	470	0.50
MIRR	CO	---	80.9	23000	<0.01
MIRR	Formaldehyde	100	3.3	55	0.06
MIRR	Acrolein	100	0.07	2.5	0.03
MIRR	Arsenic	100	0.003	0.2	0.02
MIRR	Chromium	100	0.001	0.48	<0.01
MIRR	Hydrogen chloride	100	0.36	2100	<0.01
MIRR	Manganese	100	0.006	0.17	0.04
MIRR	Mercury	---	0.004	0.6	0.01
MIRR	All combined	100	NA	NA	HI = 0.65

Note: Reported NO_2 levels include background levels that vary based on season and time of day.

Chronic non-cancer hazards attributable to Sabey's project-related allowable DEEP emissions and "background" DEEP levels

Trinity Consultants also evaluated chronic non-cancer hazard associated with long-term exposure to DEEP emitted from Sabey's proposed emergency diesel-powered generators. Long-term exposure to DEEP in the area results in HQs much lower than unity (Table 6). Additionally, HQs would remain low even when considering "background" exposures. This indicates that chronic non-cancer hazards are not likely to occur because of exposure to DEEP near Sabey.

Table 6: Estimated Long-term Non-cancer Hazard Quotients Attributable to Sabey Building E Expansion DEEP Emissions and Background Levels

Receptor	Sabey Project - Max Annual DEEP (µg/m^3)*	Annual DEEP "Background" (µg/m^3)	DEEP Chronic REL	Project-related HQ	"Background" Related HQ	Total HQ
MIRR	0.00128	0.14	5	< 0.01	0.03	0.03
MICR	0.0136	0.14	5	< 0.01	0.03	0.03
MIBR	0.0137	0.14	5	< 0.01	0.03	0.04

* Concentrations based on assumed operation of each generator 25 hours per year.

Trinity Consultants also considered the combined effects of DEEP and other TAPs (Table 7). Hazard indices for all key receptors are well below unity, which indicates long-term noncancer hazards related to emissions from the proposed 13 engines are unlikely.

Table 7: Estimated Long-term Respiratory Non-cancer Hazard Indices Attributable to Sabey's Increased Building E Expansion Emissions

Receptor	Pollutant	Maximum Average Annual Concentration (µg/m^3)	REL	HQ
MIBR	DEEP	0.0137	5	2.7E-03
MIBR	Formaldehyde	3.1E-03	9	3.4E-04
MIBR	Acrolein	6.0E-05	0.35	1.7E-04
MIBR	Arsenic	2.9E-06	0.015	1.9E-04
MIBR	Cadmium	2.7E-06	0.02	1.4E-04
MIBR	Chromium	1.1E-06	0.06	1.8E-05
MIBR	Hexavalent chromium	1.8E-07	0.02	9.0E-06
MIBR	Hydrogen chloride	3.3E-04	9	3.7E-05
MIBR	Manganese	5.5E-06	0.09	6.1E-05
MIBR	Mercury	3.6E-06	0.03	1.2E-04
MIBR	All combined	NA	NA	HI = < 0.01
MIRR	DEEP	0.0013	5	2.6E-04
MIRR	Formaldehyde	2.9E-05	9	3.2E-06
MIRR	Acrolein	5.1E-06	0.35	1.5E-05
MIRR	Arsenic	2.4E-07	0.015	1.6E-05
MIRR	Cadmium	2.3E-07	0.02	1.2E-05
MIRR	Chromium	9.1E-08	0.06	1.5E-06
MIRR	Hexavalent chromium	2.0E-08	0.02	1.0E-06
MIRR	Hydrogen chloride	3.1E-06	9	3.4E-07
MIRR	Manganese	4.7E-07	0.09	5.2E-06
MIRR	Mercury	3.0E-07	0.03	1.0E-05
MIRR	All combined	NA	NA	HI = < 0.01

Other Considerations

Short-term exposures to DEEP

Exposure to DEEP can cause both acute and chronic health effects. However, as discussed previously, reference toxicity values specifically for DEEP exposure at short-term or intermediate intervals do not currently exist. Therefore, Trinity Consultants did not quantify short-term risks or hazards from DEEP exposure. Generally, Ecology assumes that compliance with the 24-hour $PM_{2.5}$ NAAQS indicates acceptable short-term health effects from DEEP exposure. Ecology's Technical Support Document for the draft preliminary NOC approval concludes that Sabey's emissions are not expected to cause or contribute to an exceedance of any NAAQS (Ecology, 2025).

Frequency of short-term NO_2 hazards

Sabey's diesel-powered emergency generators could emit a high rate of NO_X if required to supply power during a line power interruption. Trinity submitted statistics from Grant County Public Utility District (Grant County PUD) reliability indices from 2007 through 2019. These indices show that the average customer experienced about two hours of outage per year over the same timeframe, with a maximum annual average of four hours per year.

Trinity Consultants evaluated short-term NO_X emissions as part of the second tier review. The analysis showed that while NO_2 levels could indeed rise to levels of concern[5] during a line power interruption, the interruption would have to occur at a time when the dispersion conditions were optimal for concentrating NO_2 at a given location. Trinity Consultants estimated the combined probability of Sabey Intergate Quincy Data Center experiencing a power outage that coincides with unfavorable meteorology. They determined that emissions from the 13 engines would not likely cause frequent or sustained impacts that exceed levels of concern. Similarly, a previous analysis by Trinity Consultants for earlier permitting projects at Sabey Intergate Quincy Data Center also demonstrated that impacts from emergency engine emissions are unlikely to cause levels of concern very often (Trinity Consultants, 2022).

While it is unlikely to occur frequently, impacts would be more likely to occur at locations near the Sabey Data Center fence line. These impacts that could occur during power outage scenarios may affect sensitive individuals with existing respiratory conditions, such as asthma, resulting in chest tightness or labored breathing with exercise. Symptoms related to these high-exposure episodes would improve once cleaner air conditions resume.

[5] The level of concern in this case is 470 µg/m^3. This represents California OEHHA's acute reference exposure level of 470 µg/m^3.

Uncertainty

Many factors of the HIA are prone to uncertainty. Uncertainty relates to the lack of exact knowledge regarding many of the assumptions used to estimate the human health impacts of Sabey's emissions. The assumptions used in the face of uncertainty may tend to over- or underestimate the health risks estimated in the HIA. Key aspects of uncertainty in the HIA for Sabey's proposed data center are exposure assumptions, emissions estimates, air dispersion modeling, and toxicity of DEEP.

Table 8: Qualitative Summary of How Uncertainty Affects the Quantitative Estimate of Risks or Hazards Attributable to Sabey's Project-related Emissions

Source of Uncertainty	How Does it Affect Estimated Risk from this Project?
Exposure assumptions	Assuming continuous lifetime exposure among area residents is likely an overestimate of DEEP exposure.
Emissions estimates	Possible overestimate of emissions because Trinity Consultants used worst-case emission rates to estimate DEEP and NO_2 emissions.
Air modeling methods	Possible over- or underestimate of ambient concentrations
Toxicity of DEEP at low concentrations	Possible overestimate of cancer risk, possible underestimate of non-cancer hazard for sensitive individuals.

Exposure uncertainty

We can only estimate the amount of time people will be exposed to Sabey's DEEP emissions. To ensure public health protection, Trinity Consultants and Ecology assumed a residential receptor is at one location 24 hours per day, 365 days per year for 70 years. These assumptions tend to overestimate an individual's exposure and risk.

Emissions uncertainty

The exact amount of DEEP emitted from Sabey's diesel-powered generators is uncertain. Trinity Consultants evaluated emissions from a variety of engine makes and models but based the ambient impact analysis assuming engines would operate only at loads that produce the highest impacts. They also assumed that diesel-powered generators would operate for the full extent of hours allowed in the draft permit. In reality, the engines will operate at a variety of loads in which emissions and impacts may be lower than assumed, and Sabey may not use their full allotment of operating hours every year. Sabey may also install generators powered by engines with lower emissions than the worst-case assumed for the ambient impact analysis. Trinity Consultants also attempted to account for higher emissions that would occur during initial start-up. We consider the resulting values an appropriately conservative estimate of DEEP emissions.

Trinity Consultants also assessed short-term NO_X impacts assuming that each of the 13 proposed diesel-powered generators operates at worst-case loads during a power outage. Engine loads during an outage are likely to be much lower than assumed because it is not likely that Sabey would design their facility to require generators to operate at the highest possible loads. If engines operate at around 75 percent load instead, NO_2 impacts would be about 40 to 72 percent of those at 100 percent load (Trinity Consultants, 2025b). Therefore, estimated NO_X emissions and impacts are likely overestimated.

Forecasting the amount of time Sabey uses their diesel-powered engines under emergency conditions is also uncertain. While we cannot predict future outages, Grant County PUD reports a stable power supply, so we do not anticipate frequent use of these generators during unplanned power interruptions.

Air dispersion uncertainty

The transport of pollutants through the air is a complex process. Agencies develop regulatory air dispersion models to estimate the transport and dispersion of pollutants as they travel through the air. They update these models when new techniques are developed. Generally, agencies develop these models to avoid underestimating the modeled impacts. Even if we confidently know all the numerous input parameters to an air dispersion model, random effects found in the real atmosphere will introduce uncertainty.

Toxicity uncertainty

One of the largest sources of uncertainty in any risk evaluation is associated with the scientific community's limited understanding of the toxicity of most chemicals in humans following exposure to the low concentrations generally encountered in the environment. To account for uncertainty when developing toxicity values, regulatory agencies apply "uncertainty" factors to observed doses or concentrations that cause adverse non-cancer effects in animals or humans. Agencies apply these uncertainty factors so that they derive a toxicity value considered protective of humans, including susceptible populations. In the case of DEEP exposure, OEHHA derived non-cancer reference values used in this assessment from animal studies. EPA also developed a similar reference value (i.e., reference concentration) based on these same studies. This reference value is probably protective of most of the population, including sensitive individuals, but:

> "…the actual spectrum of the population that may have a greater susceptibility to diesel exhaust (DE) is unknown and cannot be better characterized until more information is available regarding the adverse effects of diesel particulate matter (DPM) in humans."

Quantifying DEEP cancer risk is also uncertain. Although EPA classifies DEEP as probably carcinogenic to humans, they have not established a URF for quantifying cancer risk. In their health assessment document, EPA determined that "human exposure-response data are too uncertain to derive a confident quantitative estimate of cancer unit risk based on existing studies." However, EPA suggested that a URF based on existing DEEP toxicity studies would range from 1 $x10^{-5}$ to 1 x 10^{-3} per $\mu g/m^3$. OEHHA's DEEP URF (3 x 10^{-4} per $\mu g/m^3$) falls within this range. Regarding the range of URFs, EPA states in their health assessment document for diesel exhaust (EPA, 2002):

> "Lower risks are possible, and one cannot rule out zero risk. The risks could be zero because (a) some individuals within the population may have a high tolerance to exposure from [diesel exhaust] and therefore not be susceptible to the cancer risk from environmental exposure, and (b) although evidence of this has not been seen, there could be a threshold of exposure below which there is no cancer risk."

Other sources of uncertainty cited in EPA's health assessment document for diesel exhaust are:

- Lack of knowledge about the underlying mechanisms of DEEP toxicity.
- The question of whether toxicity studies of DEEP based on older engines are relevant to current diesel engines.

Conclusions and Recommendations

The project review team has reviewed the HIA and determined that:

(a) The TAP emissions estimates presented by Trinity Consultants represent a reasonable and conservative estimate of the project's future emissions.

(b) Emission controls for the new and modified emission units meet the tBACT requirement.

(c) The ambient impact of the emissions increases of each TAP that exceeds ASILs has been quantified using appropriate refined air dispersion modeling techniques.

(d) The HIA submitted by Trinity Consultants on behalf of Sabey adequately assesses project-related increased health risk attributable to TAP emissions.

In the HIA, Trinity Consultants estimated lifetime increased cancer risks attributable to Sabey-related DEEP and other TAP emissions. DEEP emissions resulted in an increased cancer risk of less than one in one million at maximally impacted receptors.

Trinity Consultants also assessed chronic and acute non-cancer hazards attributable to the project's emissions added to "background" concentrations attributable to other nearby sources and determined that long-term adverse non-cancer health effects from exposure to DEEP are not likely to occur. Acute respiratory hazards, however, are possible from exposure to NO_2 during power outage scenarios that occur during periods of unfavorable pollutant dispersion. If they do happen, these impacts could occur for short periods at locations near Sabey. These impacts may affect sensitive individuals with existing respiratory conditions such as asthma, resulting in chest tightness or labored breathing with exercise. Symptoms related to these high-exposure episodes would improve once cleaner air conditions resume. Because we do not anticipate frequent or sustained power outages affecting Sabey Intergate Quincy Data Center, we do not expect concentrations responsible for these hazards to occur frequently.

Finally, Trinity Consultants and Ecology assessed the cumulative health risk by adding estimated concentrations attributable to Sabey emissions to an estimated background DEEP concentration. The maximum cumulative cancer risk from residents' exposure to DEEP near Sabey is approximately 42 in one million.

Because the increase in cancer risk attributable to the new data center alone is less than the maximum risk allowed by a second tier review, which is 10 in one million, and the non-cancer hazard is acceptable, the project is approvable under WAC 173-460-090.

The project review team concludes that the HIA represents an appropriate estimate of potential increased health risks posed by Sabey TAP emissions. The risk manager may recommend approval of the permit because:

- The cancer risk from Sabey's TAP emissions is less than the maximum risk (10 in one million) allowed by a second tier review.
- Ecology determined that the non-cancer hazard is acceptable.
- The likelihood of frequent or sustained power outages is low based on the reported reliability of the Grant County PUD power system.

References

CalEPA, California Environmental Protection Agency: Air Resources Board and Office of Environmental Health Hazard Assessment, Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant, 1998, <http://www.arb.ca.gov/toxics/dieseltac/staffrpt.pdf>.

------, Office of Environmental Health Hazard Assessment, "Technical Support Document for Noncancer RELs Appendix D2: Acute RELs and toxicity summaries using the previous version of the Hot Spots Risk Assessment guidelines," December 2008, <http://www.oehha.ca.gov/air/hot_spots/2008/AppendixD2_final.pdf>.

------, Office of Environmental Health Hazard Assessment, "Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments," February 2015, <http://www.oehha.ca.gov/air/hot_spots/2015/2015GuidanceManual.pdf>.

Ecology, Washington State Department of Ecology, Concerns about Adverse Health Effects of Diesel Engine Emissions: White Paper, December 3, 2008, <https://fortress.wa.gov/ecy/publications/publications/0802032.pdf>.

-----, Quincy DPM and NO_2 analyses, 2020, <https://waecy.maps.arcgis.com/apps/MapSeries/index.html?appid=12d296d4ce9c41ffba73175b76ad8716>

-----, Technical Support Document for Draft NOC Approval Order No. 25AQ-E05, submitted August 1, 2025.

EPA, United States Environmental Protection Agency, Guidelines for the Health Risk Assessment of Chemical Mixtures, EPA/630/R-98/002, September 1986.

------, Health Assessment Document for Diesel Exhaust, EPA/600/8-90/057F, May 2002.

------, Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment), January 2009, <https://www.epa.gov/sites/production/files/2015-09/documents/partf_200901_final.pdf>.

------, United States Environmental Protection Agency, Air Toxics Screening Assessment: 2019 AirToxScreen Results, Released December 2022, <https://www.epa.gov/AirToxScreen/2019-airtoxscreen>.

National Research Council: Committee on Acute Exposure Guideline Levels; Committee on Toxicology; Board on Environmental Studies and Toxicology; Division on Earth and Life Studies (2012), The National Advisory Committee for the Development of Acute Exposure Guideline Levels for Hazardous Substances (AEGL Committee), Acute Exposure Guideline Levels for Selected Airborne Chemicals: Volume 11 <http://www.epa.gov/sites/production/files/2015-09/documents/nitrogen_oxides_volume_11_1.pdf>

Trinity Consultants, Sabey Data Center Properties > Quincy, WA, Building E Expansion – Health Impact Assessment Report, March 2022.

-----, Sabey Data Center Properties > Quincy, WA, Intergate Quincy Building E – Health Impact Assessment Report, Addition of Gensets, July 2025.

-----, Sabey Data Center Properties > Quincy, WA, Intergate Quincy Building E – Notice of Construction Application, Addition of Gensets, March 2025b.

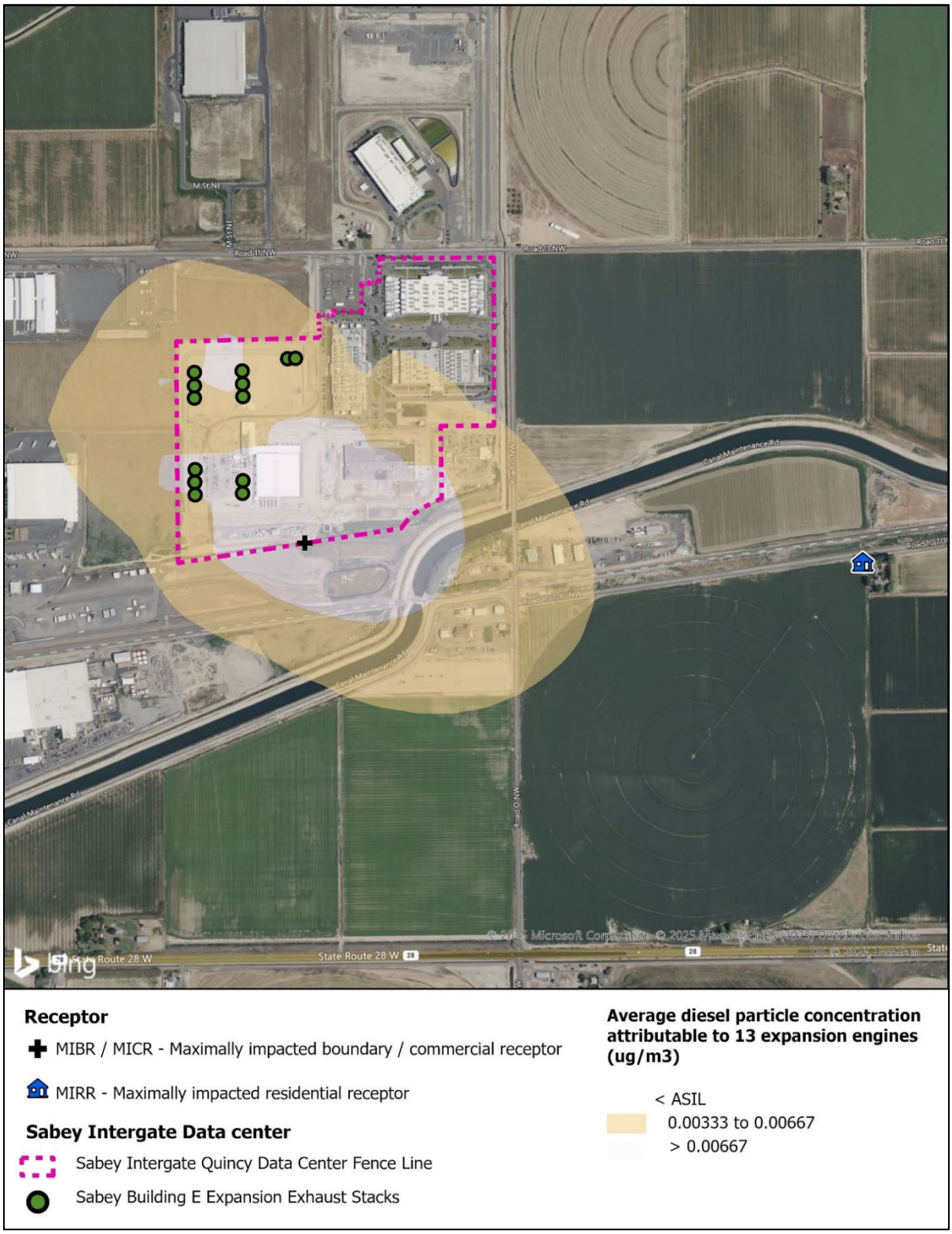


Figure 1: Average DEEP concentrations attributable to Sabey's proposed diesel-powered generators and key receptor locations evaluated in the HIA

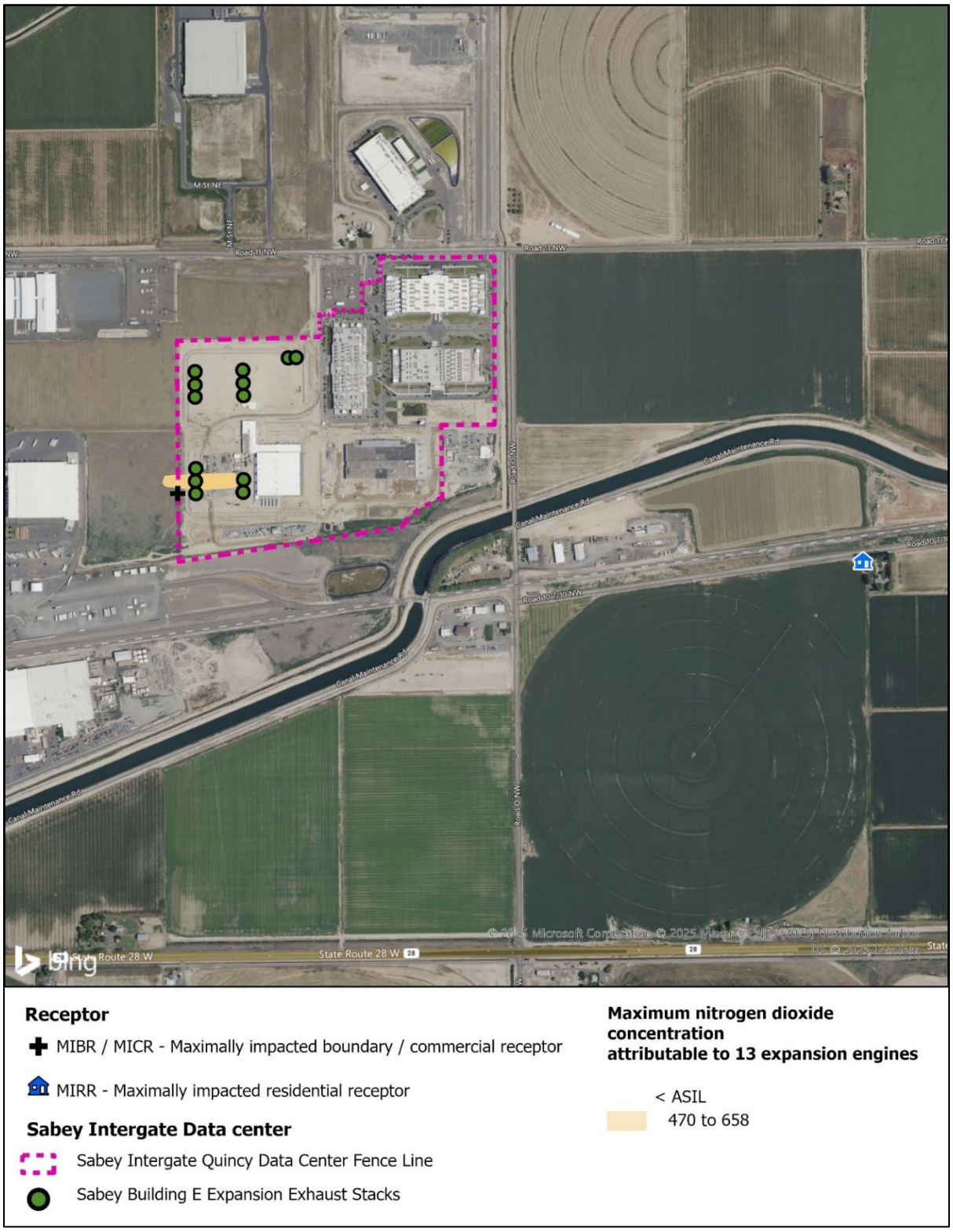


Figure 2: Maximum NO_2 concentrations attributable to Sabey's project-related outage emissions and key receptor locations evaluated in the HIA