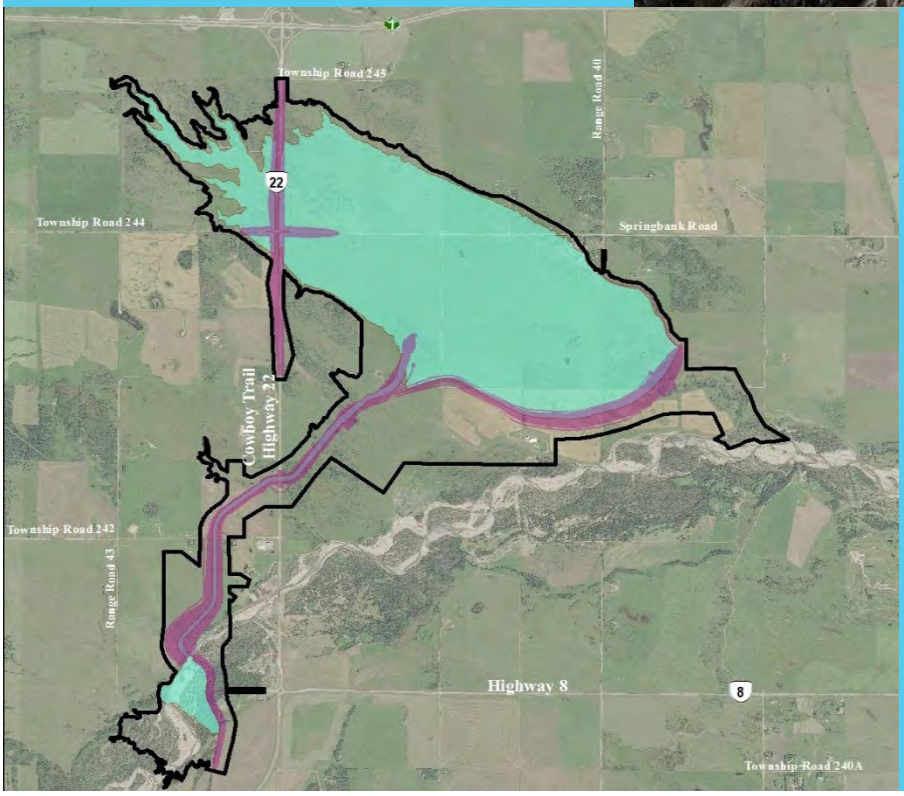
Springbank Off-stream Reservoir Project



Impact Assessment Agency of Canada Annual Report - 2022/2023 Reporting Year

October 2023

Alberta Transportation and Economic Corridors

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Executive Summary

The Springbank Off-stream Reservoir Project (the Project; SR1) is a flood mitigation Project under construction to help reduce the effects of future extreme floods on infrastructure, water courses and people in the City of Calgary and downstream communities. The Project is located approximately 15 kilometres (km) west of Calgary in Rocky View County.

Alberta Transportation and Economic Corridors (TEC) received the Impact Assessment Agency of Canada (IAAC) Decision Statement in July 2021 and the Natural Resources Conservation Board (NRCB) Approval in October 2021. TEC holds all approvals for the Project until construction completion, thereafter approvals will transfer to Alberta Environment and Protected Areas (AEPA) for operation and maintenance. In addition to the IAAC Decision Statement and NRCB approvals, TEC obtained all required Provincial and Federal approvals and authorizations prior to the start of construction activities with the exception of temporary construction approvals/permits being obtained by the contractor as needed.

TEC is committed to constructing SR1 in accordance with all regulatory approvals, ongoing communications with Indigenous groups, local landowners, and stakeholders. This report comprises a summary of construction activities and environmental monitoring completed during the 2022/2023 reporting year (July 1, 2022, to June 30, 2023) as it pertains to the IAAC approval conditions.

Construction Activities during 2022/2023 Reporting Year

Construction Activities continued during 2022/2023 with Mobilization of heavy equipment to site, soil stripping, concrete works, mass excavation of subsoil, mass hauling and placement of subsoils. The stripped soils were generally stockpiled within the vicinity of the area being stripped and, in some instances, relocated to other places for longer storage. Topsoil and subsoil were stockpiled separately to prevent mixing. Temporary wildlife fence was also installed in various locations.

Environmental Management and Mitigation

To manage and minimize impacts to the surrounding environment as a result of construction activities, best management practices were implemented and adhered to provincial and federal requirements. Sediment and erosion control measures were installed in Project construction areas that were most sensitive to construction activities (e.g., adjacent to Elbow River, wetlands). These were and continue to be routinely inspected and replaced or augmented as necessary.

Water

Two Sondes were installed (one each at an upstream location and downstream location of the Project) to collect continuous turbidity samples between October 21, 2022 to June 20, 2023.

Three increases in total suspended solids (TSS) concentration were recorded by the turbidity sondes during the 2022/2023 reporting period. These elevated readings were investigated and determined to not be associated with Project related activities. The three recorded increases in TSS concentrations were as follows:

- April 3, 2023 - a sediment transport event from streamflow increase was recorded, which resulted in an increase in concentrations at the Elbow River downstream sonde location.
- April 16 and April 17, 2023 - a smaller increase in TSS concentrations was observed at the Elbow River upstream location as a result of silt that was caked onto the sensor. The sonde was later moved to a more appropriate location (i.e., closer into the thawleg and away from the bank).
- May 17 and May 19, 2023 – an increase in TSS concentrations was recorded due to a suspected sonde malfunction.

Dewatering activities were conducted during the 2022/2023 reporting year to manage water within the construction site after rain events occurred. Turbidity monitoring was conducted during dewatering activities.

Monitoring and management of planned river activities that had the potential to release sediment followed the Alberta Special Provision – Turbidity document (Government of Alberta [GoA] 2021). All of the reported sediment releases were part of planned river diversion activities. Releases were reported to appropriate regulator (i.e. AEPA) as per the Alberta Special Provision – Turbidity document.

Terrestrial

Wildlife surveys were completed in accordance with IAAC approval conditions. Vegetation removal was completed prior to April 1, 2023, and pre-construction wildlife sweeps were completed in areas where construction activities were planned during the migratory bird breeding period.

Three active Canada goose nests were discovered in May 2023 within the Project area. One nest was found near Highway 22 around the driveway of an adjacent landowner in April 2023 (11 N 677360 566 1145). The second nest was discovered on a stockpile east of the low-level outlet structure, north of the constructed Unnamed Creek channel (11 N 681515 5658840), and the third nest was observed on the cliff north of the Elbow River on the west edge of the construction site (11N 676637 5655682). A 30 metre (m) buffer was established around all three nests and a mitigation plan, including monitoring, was completed. The second and third nest were later determined to be inactive due to predators, which resulted in nest abandonment. No other active nests or dens were identified in the Project construction area prior to tree removal and mulching activities.

In addition to the Canada goose nests, a Brewer's blackbird and an American robin nest were observed within the construction area, in a ditch on the west side of Range Road 41. A buffer zone was established using stakes and flagging, around both nests.

An osprey nest was also observed east of Highway 22 near the Highway 22 and Highway 8 traffic circle. As the nest was located outside of the construction area, no construction mitigative action was required.

Further, a wildlife monitor was present to observe the nests while construction was taking place. No other active nests or dens were identified in the Project construction area prior to tree removal and mulching activities.

Wildlife sweeps also included amphibian surveys in wetlands and waterbodies located within the construction boundary. Areas were surveyed using auditory methods, and visual survey methods. No amphibians were identified during the survey.

Air and Noise

The air quality monitoring network was established in June 2022. Supply chain and logistical issues around power supply and land agreements prevented earlier deployment of the Springbank air quality monitoring station during the 2022/2023 reporting year. During the 2022/2023 reporting year, the air monitoring stations at SR1 continued to collect data. Any concentrations of total suspended particulates (TSP), coarse particulate matter (PM_{10}), or fine particulate matter ($PM_{2.5}$) above the Alberta Ambient Air Quality Objectives (AAAQO) were investigated and when necessary, dust mitigation measures were implemented. Dust and emission control mitigations that were implemented included the application of water or calcium chloride to roads to suppress dust generation, speed limit reductions on roads within the Project construction areas, a no-idling policy, visual inspection of roads and Project construction areas for dust, and adaptive mitigation in response to dust complaints and elevated ambient particulate monitoring concentrations at the monitoring stations.

During the 2022/2023 reporting year, two noise complaints were received; one on February 1, 2023 and one on February 11, 2023. A review of the construction activities determined that there was hauling and unloading of materials from the diversion outlet to the Highway 22 work area. Neighbors were contacted and provided feedback soon after the noise complaint was received, and concerns were resolved. In both instances, sound levels were found to be below the noise limits set out in United States Environmental Protection Agency Office of Noise Abatement and Control document identified in the Decision Statement.

Indigenous Monitor and Independent Environmental Monitor

In accordance with IAAC Condition 9.1, Indigenous Monitors were retained prior to construction to observe, record, and report to TEC and Indigenous groups on the implementation, throughout construction, of requirements set out in the Decision Statement.

Additionally, a third-party Independent Environmental Monitor was retained for the construction phase. The Independent Environmental Monitor and Indigenous Monitors observed Project activities for adherence to IAAC approval conditions.

Monitoring Plans

Mitigation and monitoring measures were developed, which were outlined in various Monitoring Plans for SR1. The monitoring plans that were required to be finalized prior to the start of construction were sent to Indigenous groups and appropriate regulators (e.g., IAAC, Health Canada, Environment and Climate Change Canada (ECCC)) for review prior to implementation. Monitoring during construction was and continues to be completed, and mitigation measures are implemented as necessary. No updates to Monitoring Plans were required during the 2022/2023 reporting year.

Résumé

Le projet de réservoir hors cours d'eau de Springbank (le projet; SR1) consiste en la conception d'une infrastructure d'atténuation des crues destinée à prévenir les effets d'éventuels événements extrêmes sur les infrastructures, les cours d'eau et la population de la ville de Calgary et des villes en aval. Le projet est situé à environ 15 kilomètres à l'ouest de Calgary, dans le comté Rocky View.

L'agence Transportation and Economic Corridors de l'Alberta (TEC) a reçu la déclaration de décision de l'Agence d'évaluation d'impact du Canada (AEIC) en juillet 2021, et les autorisations de l'organisme Natural Resources Conservation Board (NRCB), en octobre 2021. La TEC a obtenu toutes les autorisations pour la construction du réservoir, après quoi, l'organisme Alberta Environment and Protected Areas (AEPA) devra obtenir les autorisations relatives à l'exploitation et à l'entretien de l'infrastructure. En plus de la déclaration de décision de l'AEIC et des autorisations du NRCB, la TEC a obtenu tous les permis et toutes les autorisations nécessaires des autorités provinciales et fédérales avant le début des travaux de construction, sauf les permis et autorisations de construction temporaires que doit obtenir au besoin l'entrepreneur.

La TEC s'est engagée à construire SR1 dans le respect de toutes les autorisations réglementaires et à entretenir des communications continues avec les groupes autochtones, les propriétaires fonciers locaux et les intervenants. Le présent document dresse un résumé des travaux de construction et des activités de surveillance environnementale réalisés au cours de la période de déclaration 2022-2023 (1er juillet 2022 au 30 juin 2023) conformément aux conditions d'autorisation de l'AEIC.

Travaux de construction réalisés au cours de la période de déclaration 2022-2023

Les travaux de construction se sont poursuivis en 2022-2023, avec le déploiement de la machinerie lourde sur le site, les activités de décapage du sol, les travaux de bétonnage, l'excavation de masse, le transport de masse et le placement du déblai. Les sols excavés ont été en majeure partie entassés à proximité, sinon transportés à d'autres endroits à des fins de stockage à plus long terme. La terre végétale et les matériaux du sous-sol ont été entassés séparément pour éviter tout risque de mélange. Des clôtures temporaires ont aussi été installées à divers endroits pour tenir à l'écart les animaux sauvages.

Gestion environnementale et mesures d'atténuation

Pour gérer et minimiser les effets sur les milieux environnants des travaux de construction, des pratiques exemplaires de gestion ont été mises en œuvre et les exigences des autorités provinciales et fédérales ont été respectées. Des mesures d'atténuation de l'érosion et du transport des sédiments ont été mises en place dans les zones du projet les plus sensibles aux travaux de construction (par exemple, les zones adjacentes à la rivière Elbow et les milieux humides). Ces mesures ont fait (et font toujours) l'objet d'une surveillance régulière, et ont été augmentées ou modifiées au besoin.

Eau

Deux sondes ont été installées (un en amont et un en aval du site du projet) pour recueillir des données de turbidité en continu entre le 21 octobre 2022 et le 20 juin 2023.

Trois hausses de la concentration des matières en suspension (MES) ont été enregistrées par les sondes de turbidité au cours de la période de déclaration 2022-2023. Ces valeurs élevées ont fait l'objet d'une analyse et il a été déterminé qu'elles n'étaient pas associées aux travaux liés au Projet. Les trois hausses enregistrées des concentrations de MES sont les suivantes :

- 3 avril 2023 – un épisode de transport de sédiments dû à l'augmentation du débit de la rivière a été enregistré, ce qui a entraîné une augmentation des concentrations à l'emplacement de la sonde aval.
- 16 et 17 avril 2023 – une hausse moindre de la concentration de MES a été observée à l'emplacement de la sonde amont, en raison de la vase qui s'est accumulée sur la sonde. Celle-ci a par la suite été déplacée à un endroit plus approprié (plus près du thalweg et loin de la rive).
- 17 et 19 mai 2023 – une hausse de la concentration de MES a été enregistrée en raison d'un dysfonctionnement présumé de la sonde.

Des activités d'assèchement ont été menées au cours de l'année de référence 2022-2023 sur le site de construction après des épisodes de pluie. Un suivi de la turbidité des eaux a été mené durant les activités d'assèchement.

La surveillance et la gestion des activités fluviales planifiées susceptibles de produire des sédiments ont été réalisées conformément à la disposition spéciale de l'Alberta sur la turbidité (gouvernement de l'Alberta, 2021). Tous les rejets de sédiments signalés faisaient partie d'activités planifiées de détournement de cours d'eau. Les rejets ont été signalés à l'organisme de réglementation compétent (l'AEPA) conformément à la disposition spéciale de Alberta sur la turbidité.

Environnement terrestre

Des relevés fauniques ont été réalisés, conformément aux conditions d'autorisation de l'AEIC. De la végétation a été retirée avant le 1er avril 2023, et dans les zones où des activités de construction étaient prévues durant la période de nidification des oiseaux migrateurs, des relevés fauniques préconstruction ont été réalisés.

Trois nids actifs de bernache du Canada ont été découverts en mai 2023 dans la zone du Projet. Un nid a été découvert près de la route 22 et de l'allée d'une propriété adjacente en avril 2023 (11 N 677360 566 1145). Le deuxième a été découvert sur un dépôt en tas à l'est de l'ouvrage de sortie de bas niveau, au nord du chenal d'un ruisseau artificiel sans nom (11 N 681515 5658840). Le troisième a été observé sur une falaise au nord de la rivière Elbow, à la limite ouest du site de construction (11 N 676637 5655682). Une zone tampon de 30 mètres a été établie autour des trois nids et un plan d'atténuation, comprenant des activités de surveillance, a été mis en place. Les deuxième et troisième nids ont ensuite été jugés inactifs en raison de la présence de prédateurs, ce qui a entraîné l'abandon du nid. Aucun autre nid et aucune tanière avec activité visible n'ont été trouvés dans les zones de construction du projet avant les activités d'enlèvement des arbres et de débroussaillage.

En plus des nids de bernache du Canada, un nid de quiscale de Brewer et un nid de merle d'Amérique ont été observés dans la zone de construction, dans un fossé du côté ouest du chemin de rang 41. Une zone tampon a été mise en place à l'aide de piquets et de drapeaux autour des deux nids.

Un nid de balbuzard a également été observé à l'est de la route 22, près du rond-point de la route 22 et de la route 8. Le nid étant situé en dehors de la zone de construction, aucune mesure d'atténuation n'a été nécessaire.

De plus, un agent de la faune était présent pour observer les nids pendant les travaux de construction. Aucun autre nid et aucune tanière avec activité visible n'ont été trouvés dans les zones de construction du Projet avant les activités d'enlèvement des arbres et de débroussaillage.

Des relevés des amphibiens ont aussi été réalisés dans les milieux humides et les plans d'eau situés à l'intérieur du périmètre de construction. Les zones ont été observées à l'aide de méthodes auditives et visuelles. Aucun amphibien n'a été repéré au cours de l'étude.

Bruit et qualité de l'air

Le système de surveillance de la qualité de l'air a été mis en place en juin 2022. Des problèmes d'approvisionnement et logistiques concernant l'alimentation électrique et les ententes au sujet des terrains ont empêché la mise en place de la station de surveillance de la qualité de l'air de Springbank durant l'année de déclaration 2022-2023. Au cours de l'année de déclaration 2022-2023, des données ont continué à être collectées par les stations de surveillance de la qualité

de l'air de SR1. Dans tous les cas où la concentration des particules totales en suspension (PTS), des particules en suspension < 10 µm (PM10) ou des particules fines (PM2,5) a dépassé les limites fixées dans les lignes directrices Alberta Ambient Air Quality Objectives (AAAQO), une enquête a été menée et des mesures de réduction des poussières ont été prises au besoin. Les mesures de réduction des poussières et des émissions mises en place comprenaient l'établissement de limites de vitesse sur les routes du Projet, une politique interdisant le fonctionnement des moteurs au ralenti, l'application d'eau ou de chlorure de calcium comme abat-poussière, l'inspection visuelle des routes et des zones de construction du projet relativement aux poussières, ainsi que des mesures d'atténuation particulières en réponse aux plaintes relatives à la poussière et aux concentrations élevées de particules en suspension mesurées aux stations de surveillance.

Deux plaintes relatives au bruit ont été reçues pour la période de déclaration 2022-2023 : l'une le 1er février 2023 et l'autre le 11 février 2023. Un examen a permis de déterminer que des activités de transport et de déchargement de matériaux entre l'ouvrage de dérivation et la zone de travaux près de la route 22 avaient eu lieu. Peu après la réception de la plainte relative au bruit, les voisins ont été contactés et ont fait part de leurs commentaires, et les problèmes ont été résolus. Dans les deux cas, les niveaux sonores se sont avérés inférieurs aux limites établies dans le document de l'Office of Noise Abatement and Control (qui relève de l'Agence américaine de protection de l'environnement), mentionné dans la déclaration de décision.

Surveillance environnementale effectuée par les communautés autochtones et une tierce partie indépendante

Avant la construction, conformément à la condition 9.1 de l'AEIC, la TEC a retenu les services de surveillants autochtones pour observer et documenter la mise en œuvre des conditions énoncées dans la déclaration de décision et en rendre compte à la TEC et aux groupes autochtones.

De plus, les services d'un surveillant environnemental indépendant tiers ont été retenus pour effectuer la surveillance pendant la construction. Le surveillant environnemental indépendant et les surveillants autochtones observent les activités du projet relativement au respect des conditions énoncées dans la déclaration de décision de l'AEIC.

Programmes de suivi

Des mesures d'atténuation et des activités de surveillance qui figurent dans les différents programmes de suivi du projet SR1 ont été élaborées. Les programmes de suivi qui devaient être finalisés avant le début des activités de construction ont été transmis aux groupes autochtones et aux autorités réglementaires appropriées (AEIC, Santé Canada, Environnement et Changement climatique Canada) pour examen avant leur mise en œuvre. Depuis le début de la construction, la surveillance est réalisée de manière continue et les mesures d'atténuation nécessaires ont été mises en œuvre. Aucune mise à jour des programmes de suivi n'a été requise pour la période de déclaration 2022-2023.

Abbreviations

%	percent
°C	degrees Celsius
µg/m^3	microgram per cubic metre
AAAQG	Alberta Ambient Air Quality Guidelines
AAAQO	Alberta Ambient Air Quality Objectives
AACSW	Alberta Arts, Culture and Status of Women
AEPA	Alberta Environment and Protected Areas
AMD	Air Monitoring Directive
AQMP	Air Quality Monitoring Plan
AQMS	Air Quality Monitoring Station
ATV	all-terrain vehicle
AVC	Animal-vehicle collision
BTEX	benzene, toluene, ethylbenzene, xylenes
BV	Bureau Veritas
CAAQS	Canadian Ambient Air Quality Standards
Calalta	Calalta Amusements Ltd.
CCME	Canadian Council of Ministers of the Environment
CEAA	*Canadian Environmental Assessment Act, 2012*
CRAZ	Calgary Region Air Zone
dB	decibel
DFO	Fisheries and Oceans Canada
DO	Dissolved oxygen
DOC	dissolved organic carbon

EBAM	environmental beta-attenuation mass monitors
EC	Electrical conductivity
ECCC	Environment Climate Change Canada
EIA	Environmental Impact Assessment
FNLUAC	First Nations Land Use Advisory Committee
FNLUCC	First Nations Land Use Collaboration Committee
GoA	Government of Alberta
GWMP	Groundwater Monitoring Plan
HADD	harmful alteration, disruption, and destruction
HRA	*Historical Resources Act*
HRA Section 31	*Historical Resources Act* Section 31 Chance Find
hrs	hours
IAAC	Impact Assessment Agency of Canada
IM	Indigenous Monitors
km	kilometre
km/h	kilometres per hour
kPa	kilopascal
KWBZ	Key Wildlife Biodiversity Zone
LAA	Local Assessment Area
LOC	Licenses of Occupation
m	metre
m^3	cubic metre
mg/L	milligrams per litre
NO	Nitric oxide
NO_2	Nitrogen dioxide

NO_X	Oxides of Nitrogen or Nitrogen Oxides
NRCB	Natural Resources Conservation Board
NTU	Nephelometric Turbidity Units
ORP	oxidation-reduction potential
PLA	*Public Lands Act*
PM_{10}	Course particulate matter with an aerodynamic diameter of 10 µm or less
$PM_{2.5}$	Fine particulate matter with an aerodynamic diameter of 2.5 µm or less
ppbv	parts per billion volume
QA/QC	quality assurance and quality control
QAES	Qualified Aquatic Environmental Specialist
RAP	Restricted Activity Period
SARA	*Species at Risk Act*
SIR	Supplemental Information Requests
SR1; Project	Springbank Off-stream Reservoir Project
SWMP	Surface Water Monitoring Plan
TDL	Temporary Diversion License
TEC	Alberta Transportation and Economic Corridors
TFA	Temporary Field Authorization
TSP	Total suspended particulate; with an aerodynamic diameter 100 µm or less
TSS	Total Suspended Solids
WMMP	Wildlife Mitigation and Monitoring Plan
WSC	Water Survey of Canada

1.0 INTRODUCTION

The Springbank Off-stream Reservoir Project (the Project; SR1) is located in the Springbank area of Rocky View County 15 kilometres (km) west of the City of Calgary, Alberta (see Figure 1.1). The Project is a flood diversion system that will divert excess flood water from Elbow River to an off-stream reservoir where it will be held until the risk of flooding has passed. At that time, the retained flood water will be returned to Elbow River in a controlled manner.

Alberta Transportation and Economic Corridors (TEC) received Project approvals for SR1 from the Impact Assessment Agency of Canada (IAAC) in July 2021, and the Natural Resources Conservation Board (NRCB) in October 2021. The Government of Alberta Order in Council was signed in October 2021. IAAC approval conditions for Project construction and operations outline federal reporting requirements to be carried out during all phases of the Designated Project.

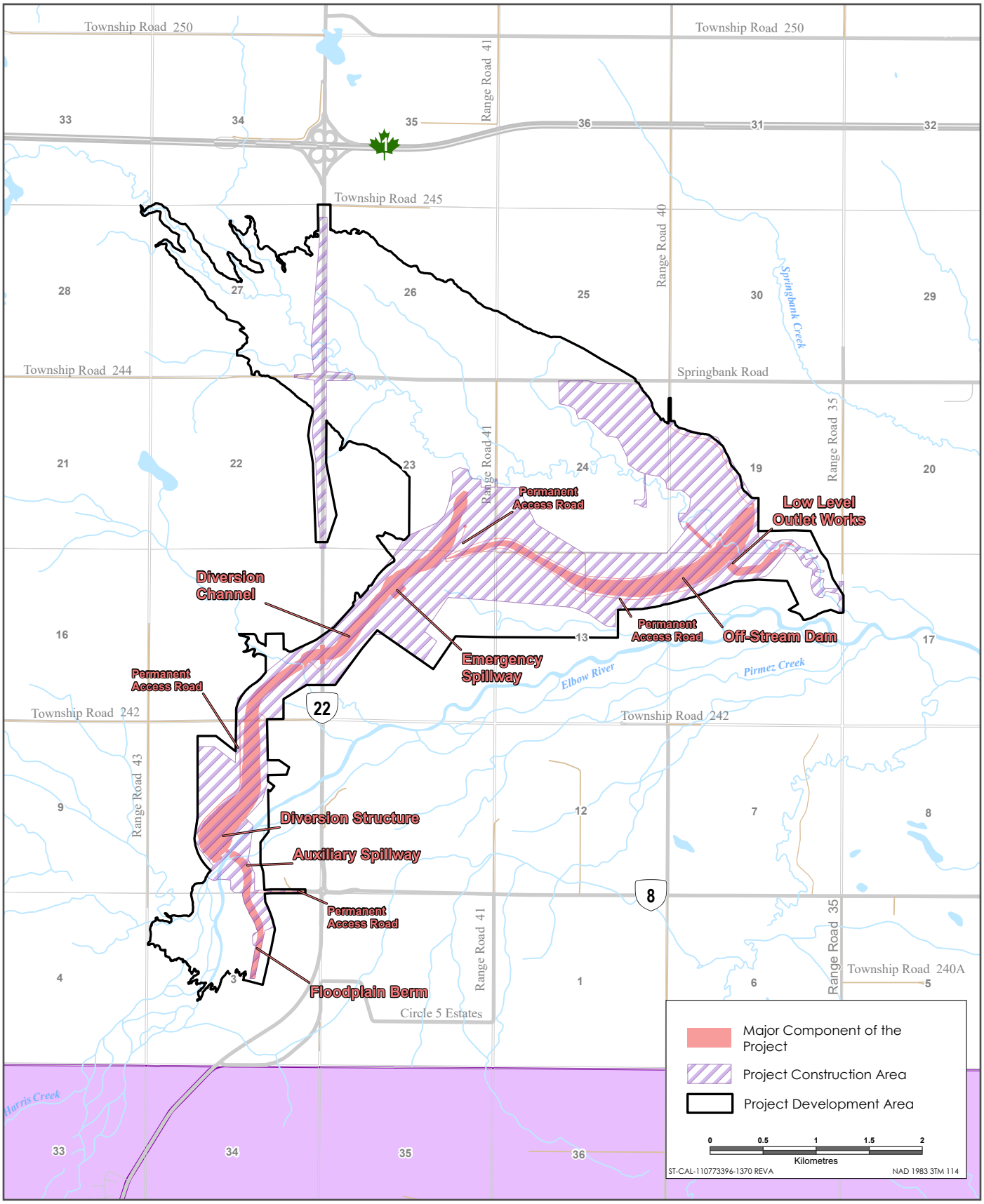
TEC submitted the IAAC 2021/2022 Annual Report on October 31, 2022, which captured pre-construction and early construction activities during the 2021/2022 reporting year. Construction activities continued during the 2022/2023 reporting year and were restricted to the construction footprint (see Figure 1.1). During the 2022/2023 reporting year, the Elbow River was temporarily diverted as per the construction design and approvals and work commenced on the diversion inlet structure. Additionally, excavation of the Diversion Channel, the low-level outlet structure, placement of fill at the dam, and roadwork at Highway 22 and Township Road 242 began during the 2022/2023 reporting year.

A concordance table in Appendix A provides a summary of the IAAC approval conditions and indicates the sections of this report where these conditions are addressed.

1.1 REPORT STRUCTURE

TEC is committed to regulatory compliance. As required by IAAC approval condition 2.11, the following annual report provides a summary of all activities completed for SR1 undertaken by TEC during the 2022/2023 reporting year (July 1, 2022, to June 30, 2023) of the construction period. The report has been organized into the following sections:

- Regulatory Update
- Monitoring Update
- Project Activities and Status



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta
Service Layer Credits:

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.
10/25/2022

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Project Location

Figure 1.1

2.0 REGULATORY UPDATE

TEC holds all regulatory permits and approvals for the Project. Should they be required, the Prime Contractor is responsible for obtaining any additional temporary permits required to complete construction activities in accordance with provincial and federal regulations.

2.1 PROJECT APPROVALS

Table 2.1 summarizes the Project approvals, authorizations, and notifications received prior to the start of construction activities.

Table 2.1 SR1 Project Approvals

Subject Matter/Commitment	Approval Number	Approval Received	Approval Expiry
***Canadian Environment Assessment Act, 2012* (CEAA)**			
IAAC Decision Statement	139551E	8-Jul-21	N/A
***Natural Resources Conservation Board Act* (NRCB)**			
Decision Statement	NR-2021-1	19-Oct-21	N/A
Alberta Environment and Protected Areas (AEPA)			
Water Act Approval for Wetland Disturbance	DAUT008702	08-Feb-22	31-Dec-72
Temporary Field Authorization (TFA) - Watercourse Realignment/Reconstruction	TFA221088	13-Aug-21	31-Mar-25
TFA Incidental Activity – Temporary Workspace	TFA221119	13-Aug-21	31-Mar-25
Public Lands Act (PLA) Licences of Occupation (LOC) – Water Diversion – Outfall	DLO210186	09-Feb-22	08-Feb-47
PLA LOC - Water Diversion – Water Intake	DLO200141	09-Feb-22	08-Feb-47
Fisheries and Oceans Canada			
Fisheries Act Authorization also Acting as a Permit under the *Species at Risk Act* (Elbow River)	16-HCAA-00537	18-Mar-22	31-Mar-32
Transport Canada			
Canadian *Navigable Waters Act*	2021-604875	14-Dec-21	N/A
Alberta Culture and Status of Women			
Historical Resources Act[1]	4825-15-0004-009	11-Feb-22	N/A

NOTE:

[1] One archaeological site has outstanding *Historical Resources Act* (HRA) requirements for further investigation; it was identified prior to the start of construction and no construction activity has taken place at the site location. Work is ongoing to address the outstanding requirements in order to receive approval under the HRA.

2.2 PERMITS RECEIVED

In addition to the approvals, authorizations and notifications, the Prime Contractor, on behalf of TEC obtained the following permits for temporary construction activities:

- Temporary Diversion License (TDL) DAUT0011866 from 19.04.2023 to 18.04.2024 to withdraw water from the Elbow River at the Diversion Point called "North 2"
- TDL DAUT0010783 from 25.11.2022 to 23.11.2023 to withdraw water from the Elbow River at the well 1023595
- TDL DAUT0010784 from 25.11.2022 to 23.11.2023 to withdraw water from the Elbow River at the well 1023594
- TDL DAUT0009542 expiring on 10.06.2023 will be renewed on 09.06.2023 and will cover the period up to 10.06.2024
- Approval DAUT0010134 from 26.08.2022 to 31.12.2025 to store water in 3 dugouts
- Research Permit #23-192 from 27.03.2023 to 31.12.2023 to capture amphibians within the Springbank Dam Project Area and translocate amphibians to identified release sites
- TDL DAPP00448922 to operate a works and to divert up to the volume(s) of water from the source(s) of water at the point(s) of diversion at a maximum rate.

3.0 MONITORING UPDATE

Mitigation and monitoring measures developed and captured in various plans for SR1 (see Table 3.1 below for a list of plans) that are consistent with the measures identified in the Environmental Impact Assessment (EIA), Supplemental Information Requests (SIRs) and in accordance with approval conditions identified by IAAC and the NRCB.

Table 3.1 provides a summary of activities and results pertaining to the monitoring plans for the Project.

Table 3.1 Summary of Activities

Monitoring Plans	Summary of Activities
Air Quality Monitoring Plan (AQMP) *(IAAC Approval Condition(s) 6.4, 7.10)*	An Air Quality Management Plan was prepared based on the final decision documents from IAAC and NRCB. As per the AQMP the air quality monitoring network was established in June 2022 using temporary rental equipment. Supply chain and logistical issues around power supply and land agreements prevented earlier deployment of the monitoring network. The data is being collected and assessed continuously since inception of the monitoring network. Any concentrations of total suspended particulates (TSP), coarse particulate matter (PM_{10}), or fine particulate matter ($PM_{2.5}$) above the Alberta Ambient Air Quality Objectives (AAAQO) were investigated and when necessary, dust mitigation measures were implemented. Monthly calibration and maintenance were conducted. See Section 4.9 for details on air quality monitoring during the 2022/2023 reporting year.
Wildlife Mitigation and Monitoring Plan (WMMP) *(IAAC Approval Condition(s) 4.1 to 4.10; 4.11; 5.1; 5.2 to 5.5; 8.1; 8.3 to 8.5)*	In areas where construction activities were planned during the migratory bird breeding period, pre-construction wildlife sweeps were completed by qualified wildlife biologists to reduce potential disturbance to nesting birds and appropriate setback buffers were implemented where necessary, consistent with conditions 4.6 and 4.8 as well as direction provided in the WMMP. In accordance with IAAC approval condition 4.11.1, and the Bank Swallow Mitigation Plan, bank swallow use was monitored during Project construction where active residences were checked twice yearly between May 1 and August 31. The 2023 monitoring focused on bank swallow colonies identified on Elbow River during the 2022 monitoring period. The results of the 2022 bank swallow monitoring were discussed in the Year 1 Annual Report. See Section 4.7.2 and Appendix B.1 for details on the WMMP during the 2022/2023 reporting year.

Monitoring Plans	Summary of Activities
Surface Water Monitoring Plan (SWMP) *(IAAC Approval Condition 3.19)*	During the 2022/2023 reporting year, turbidity samples were hand collected and will continue to be until the continuous turbidity sondes can be procured and installed in the sampling locations specified in the SWMP. Installation of turbidity sondes at the Bragg Creek, Highway 22 bridge and Sarcee bridge locations did not occur in the 2022/2023 reporting year. During the 2022/2023 reporting year, turbidity sampling was conducted daily in the Elbow River at two locations (upstream and downstream) during construction activities, and at a third location at Unnamed Creek when flows were present. See Section 4.8.1.1 for details of the surface water quality monitoring completed during the 2022/2023 reporting year.
Fish Tissue Program *(IAAC Approval Condition 7.8)*	This condition pertains to post flood operations and thus was not initiated in the 2022/2023 reporting year.
Fish Rescue and Fish Health Monitoring and Mitigation *(IAAC Approval Condition 3.18)*	This condition pertains to post flood operations and thus was not initiated in the 2022/2023 reporting year.
Fish Passage *(IAAC Approval Condition 3.17)*	Construction of the fish passage v-weirs has not been initiated in the 2022/2023 reporting year. Fish passage monitoring will be conducted following the installation of these structures.
Vegetation and Wetland Mitigation, Monitoring and Revegetation Plan *(IAAC Approval Condition 8.13)*	In accordance with IAAC approval conditions 3.5, 8.1, 8.2 and 9.8, equipment arrived clean and free of debris at site and soil stockpiles were monitored for weeds and erosion. Erosion and sediment control measures were adjusted when required; for example, additional silt and sediment fencing was installed around topsoil stockpiles. Fuel and other harmful substances have been stored and re-fueling conducted a minimum of 100 metres (m) from waterbodies and wetlands and spill containment measures were in place. Reclamation has not started as construction is on-going in disturbed areas. The southernmost portion of the floodplain berm had topsoil placed in October 2022. Approximately 200 m of topsoil was spread, and track packed to limit erosion potential. Disturbed areas will be monitored for a minimum of two years post-construction and a minimum of two to five years post-flooding. Monitoring will continue if targets are not achieved, or conditions are not reasonably stable by the end of the minimum monitoring period.

Monitoring Plans	Summary of Activities
Archaeological and Heritage Management Plan *(IAAC Approval Condition 9.3)*	Archaeological pre-impact investigation was completed for the Project as required by Alberta Arts, Culture and Status of Women (AACSW) and conditional approval was granted apart from one archaeological site and a requirement for paleontological construction monitoring. HRA approval will be obtained before construction occurs in the archaeological site area that is located within the construction area. Palaeontological construction monitoring is ongoing, as required. *Historical Resource Act* Section 31 (HRA Section 31) clause in the Plan has been enacted on several occasions. One HRA Section 31 Find identified a new archaeological site and was reported to AACSW, other finds were determined to be cultural sites and were communicated to Indigenous nations. HRA approval will be obtained before construction recommences in that area.
Groundwater Monitoring Plan (GWMP) (*IAAC Approval Condition 7.9*)	The GWMP was prepared in accordance with IAAC approval conditions 7.6, 7.9, and domestic well baseline testing commitments made during the NRCB hearing. Groundwater monitoring network development, monitoring and sampling was completed between July 2022 and June 2023. Monitoring network development included decommissioning and installation of Tier 2 and Tier 3 monitoring wells to continue to develop the monitoring network. Fall 2022 and Spring 2023 groundwater monitoring and sampling programs were completed and are summarized in Section 4.8.2 and Appendix B.2.

3.1 CONSULTATION

TEC is committed to ongoing communication with the Indigenous groups involved in the Project.

As required by IAAC approval conditions 2.4, 2.5, and 2.10 Indigenous groups were provided written notice of opportunities to present their views on monitoring plans, to participate in ceremonies prior to the start of construction activities and offered opportunities to observe historical resource pre-impact investigations. This communication took place in advance of construction starting in late 2021/early 2022. There were no updates to the monitoring plans during the 2022/2023 reporting year. TEC is in the process of updating the Monitoring Plans and will submit these for IAAC and Indigenous group review during the 2023/2024 reporting year.

During the 2022/2023 reporting year, Indigenous groups were informed of *Historical Resource Act* Section 31 (HRA Section 31) Finds, see Section 4.10.1 for additional details.

4.0 PROJECT ACTIVITIES AND STATUS

4.1 SUMMARY OF WORK COMPLETED ON SITE

The following pre-construction and construction activities took place during the 2022/2023 reporting year:

- Site Clean up
  - Demolition, salvage, recycling and disposal of existing buildings, roadways, drives, and utilities that fall within the active construction area.
- Site Clearing
  - Removal of trees and shrubs within the Project construction area. Note that tree and shrub clearing in wetlands took place only in the wetlands where provincial *Water Act* Approval (No. DAUT0008702 dated February 8, 2022) had been received.
  - Disposal of cleared debris (i.e., shrubs) by means of mulching and spreading over the cleared construction areas and other designated areas. Excess slash south of the Elbow River has been stockpiled for future disposal.
  - Controlled burning of the non-merchantable timber cleared in February 2022 took place within the period, in Winter, under the conditions of the dedicated Permit provided by Rocky View County.
- Soil Stripping and Stockpiling (see Section 4.1.1.1 for further details)
  - Installation of protection measures (i.e., fencing and erosion and sediment control measures) around environmentally and historically sensitive areas, vegetated areas that are to remain in place, fences/roadways, survey and monitoring stations.
- Construction of the following Project components were started during 2022/2023 reporting year:
  - Backfill of low-level outlet gate structure
  - Excavation of the Emergency Spillway and Concrete Works
  - Excavation of the Diversion Channel
  - Excavation of Debris Deflection Barrier Structure
  - Excavation of the Exit Channel
- Installation of wildlife friendly fencing along the Project area and Utility Right of Way east of Highway 22
- Creation of a portage route on the Elbow River, including the installation of signage

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Construction of the following Project components continued during the 2022/2023 reporting year:

- raising of Highway 22
- floodplain berm embankment fill
- Elbow River temporary diversion
- diversion structure excavation and concrete works
- low-level outlet gate structure excavation and concrete works
- Township Road 242 bridge over the Diversion Channel
- Highway 22 bridge over the Diversion Channel
- Auxiliary Spillway Excavation, concrete works and backfill
- Dam Embankment Fill
- Dug out excavations

All equipment and machinery were inspected daily for drips, leaks, and new or returning equipment and machinery to the construction area were inspected for the presence of invasive alien species and noxious weeds. A preventive maintenance schedule, based on the number of hours worked and the parts of the equipment, was in place. Drip trays were placed under idle equipment and machinery as well as fueling equipment. Monitoring was conducted to ensure drip tray use and deficiencies were reported to the Contractor and mitigated. See Section 4.4 for a summary of the accidents and malfunctions that occurred during the 2022/2023 reporting year.

Starting in late May 2023 night shifts began on-site; these comprised earthworks and concrete construction activities at the Dam, Grade Control Structure, Highway 22 Bridge and Township 242 Bridge. Lighting towers were installed in key areas such as the construction site office, Diversion Inlet, low-level outlet, bridges and intersections of the Haul road/light duty road to allow work to proceed during low light hours. All lighting installed complied with the International Commission on Illumination enforced by Labour Canada and Occupational Health and Safety Code, RA 87/2009 Part 12. Any portable lighting devices installed were pointed downwards towards the construction area and not towards public roads. Portable lighting devices were relocated daily to focus light on the active work areas only.

Additionally, utilities were installed at the Diversion Inlet structure for the Control Building, a power line along Highway 22 was relocated and a powerline utility was relocated at the Highway 22 Embankment Raise. Utility relocates were undertaken by the corresponding utility owners. The utility owners were responsible for managing and mitigating potential impacts to the environment for their works (e.g., erosion and sediment control, dust).

4.1.1 Construction Activities

4.1.1.1 Earthworks

Earthwork activities were ongoing during the 2022/2023 reporting year with the exception of the winter months when work earthwork activities were stopped due to frozen conditions and in the spring during snow/rain events. Topsoil and subsoil were removed from the following locations between April and June 2023:

- the north bank of the Elbow River (diversion inlet structure)
- Diversion Channel
- Dam area including the low-level outlet
- Auxiliary Spillway and floodplain berm
- Highway 22 in the area of road construction
- Approach Channel and Exit Channel for the low-level outlet
- Unnamed Creek in relation to the excavated channel

Excavation and other earthwork activities also occurred at the above locations.

Stripped soil was generally stockpiled in the vicinity of the area being stripped, and in some instances relocated to other places for longer storage. Stockpiles near Elbow River and unnamed creek were placed at least 50 metres (m) and 30 m respectively from the top of the bank. One instance of a stockpile being closer than 50 m from the top of the bank of unnamed creek was observed and the stockpile was moved back from the edge of slope and silt fencing was installed. Topsoil and subsoil were stockpiled separately to prevent mixing; stockpiles were spaced at least 3 m apart, in cases where stockpiles were closer than 3 m at the toe of the slope silt fencing was installed to prevent admixing. In order to place the stripped topsoil back in the same general area, or as required by IAAC approval condition 3.8, topsoil stockpile locations have been documented.

Topsoil stripped from the Diversion Channel was stockpiled along the channel within the construction boundary, stockpiled topsoil is to be used in the restoration of the Diversion Channel when excavation is completed, as required by IAAC approval condition 3.8.

Stockpiles were inspected to determine the appropriate erosion and sediment control measures. To protect the topsoil and subsoil from erosion and sediment discharge, silt fences were installed at the downstream side of stockpiles. In some locations, wattles were installed as a measure to protect from erosion and sediment release; for example, this occurred on the South bank of the Elbow River, on the cliff on the north bank of the Elbow River and at the low-level outlet.

A Soil Specialist conducted routine inspections of the Project construction area to assess the stripped areas and the stockpiles. The quality of the stripped soil was not impacted. It was noted that the stripping operations were performed with negligible admixing of soils, and that the topsoil recovery was excellent.

4.1.1.2 Civil Works

During the 2022/2023 reporting year, Civil Works construction activities started at the Highway 22 Embankment Raise, Highway 22 Bridge, Temporary Highway 22 Heavy Duty Crossing Bridge and Township Road 242 Bridge

- Highway 22 Bridge included excavation, backfilling and concrete works
- Township 242 Bridge included excavation, backfilling and concrete works
- The Temporary Highway 22 Heavy Duty Bridge Crossing included backfilling and concrete works
- Highway 22 Embankment Raise included culvert installation and backfilling

Each construction activity area was provided with various waste skips (receptacles) to collect construction wastes depending on their type (wood, metal, concrete) for further segregation and disposal. Each location where concrete was poured had a dedicated skip to collect the wastewater from cleaning the gully of the concrete truck at the end of the pouring.

Any equipment that was filled with fuel was provided with a drip-tray to contain spillage in case of incident; the drip-trays were appropriate size (able to collect 110 percent [%] of the main content of the hazardous substance container). All generators (diesel powered) at the Auxiliary Spillway were provided with drip-trays and replaced as required. Spill-kits of suitable size were also available should they have been required.

Equipment fueling, cleaning, and maintenance activities maintained a distance of 100 m from waterbodies and wetlands and utilized secondary containment.

4.1.1.3 Structure

During the 2022/2023 reporting year, Structural works construction activities started at the Diversion Structure, low-level outlet, Grade Control Structure, Auxilliary Spillway and Emergency Spillway.

Each construction activity area was provided with waste skips (receptacles) to collect construction wastes depending on their type (wood, metal, concrete) for further segregation and disposal. Each location where concrete was poured had a dedicated skip to collect the wastewater from cleaning the gully of the concrete truck at the end of the pouring.

Any equipment that was filled with fuel was provided with a drip-tray to contain spillage in case of incident; the drip-trays were appropriate size (able to collect 110% of the main content of the hazardous substance container). For example, all generators (diesel powered) at the Auxiliary Spillway were provided with drip-trays and replaced as required. Spill-kits of suitable size were also available should they have been required.

Equipment fueling, cleaning, and maintenance activities maintained a distance of 100 m from waterbodies and wetlands and utilized secondary containment.

4.2 EROSION AND SEDIMENT CONTROL

Specific erosion and sediment control measures are described in Section 4.1 above and 4.3.1 below. In general, erosion and sediment control measures included:

- Installation of straw wattles
- Installation of silt/sediment fences
- Leaving a natural vegetative buffer
- Installation of fiber rolls
- Covering of exposed areas using geotextile or other suitable material
- Placing stockpiles at least 50 m from the Elbow River and 30 m from Unnamed Creek
- Separating topsoil and subsoil piles by at least 3 m; in areas where space was limited, sediment fencing was installed in between topsoil and subsoil piles to prevent admixing of soil
- Erosion control measures were revised and implemented prior to winter shutdown and additional measures were taken to insulate/cover drainage pipes and installation of additional silt fencing to manage snow drifts and snowmelt/surface run off during the spring
- Installation of control devices that are winter melt and spring runoff appropriate

In the low-level outlet work zone, a driveable fjord was constructed over Unnamed Creek to allow construction vehicles to cross Unnamed Creek without impacting potential water flow. Erosion and sediment control measures, such as straw wattles, were installed to reduce the potential for sediment from the fjord to enter Unnamed Creek.

A combination of the above measures were used to control erosion and sedimentation as and where needed. These measures were inspected routinely and replaced or augmented when necessary. Inspections were increased following snow melt or rain events.

Additional erosion and sediment control supplies and equipment were available onsite to be used as required.

4.3 WATER MANAGEMENT

4.3.1 Surface Drainage/Runoff

Surface water and runoff within the Project construction area was managed as follows:

- Where water pooled naturally, and there were no potential impacts to the surrounding environment, it was left to naturally seep into the ground. In the event of potential impacts to surrounding environments, pooled water was pumped into nearby dug-outs (see Section 4.3.2 for details surrounding dewatering activities).
- Silt fences were installed at the perimeter of wetlands where there was the potential for water to flow into the wetland from the Project. For areas where the topography sloped away from a wetland, a 10-m vegetated buffer was maintained.
- Along the Unnamed Creek, erosion and sediment control measures (i.e., straw wattles) were installed to direct water away from the Unnamed Creek.
- Surface water (from drainage and runoff) was collected in small dug-outs and drained via tube away from the construction site to a vegetated buffer
- Straw wattles were installed parallel to the Elbow River to control potential surface water flows into Elbow River.
- A 500 m long earthen berm was constructed along the top of the north bank of the Elbow River to prevent water and debris from falling into the Elbow River by directing rainfall towards the diversion structure.

4.3.2 Dewatering

Dewatering occurred throughout the 2022/2023 reporting year (except in winter when the ground was frozen). Water entering the Auxiliary Spillway from the excavation was pumped into nearby sedimentation ponds.

Dewatering Activities at the Diversion Structure occurred continually through the entire 2022/2023 reporting year. Water entering the Diversion structure excavation was pumped to a settling pond located to the East of the Diversion Structure

After rainfall events, dewatering activities were required at the Grade control structure construction area. Water was pumped from the low-lying areas to a collection pond which had a secondary pump and hose outfitted with a silt bag at the outlet. An overflow channel was installed at the collection pond with multiple straw wattles in the channel to prevent any overflow run off carrying sediment to the Unnamed Creek. A vegetated buffer between the pumped water and Unnamed Creek was also utilized as an additional erosion and sediment control measure.

Dewatering at the Diversion structure occurred continually during the 2022/2023 reporting year due to work below the water table as well as seeping water from the surrounding land. The dewatering process involved pumping into a collecting basin where water was then pumped into a settling pond.

The Dam area dewatering occurred after rainfall events and involved pumping water into nearby dugouts when possible or pumping into vegetated areas. Water was not discharged directly to a waterbody.

Water accumulation at the Highway 22 Grade Raise was dewatered throughout the 2022/2023 reporting year by pumping water accumulating on the west side of Highway 22 to the east side via a hose. The hose was passed through the existing cattle culvert under Highway 22 towards Unnamed Creek. Wattles and a vegetated buffer were installed as additional erosion and sediment control mitigation measures.

Snow was actively removed from construction sites with the use of tracked equipment and runoff from snowmelt was collected in low laying areas then pumped into dugouts. Excessive water pooling at the low-level outlet from spring snowmelt was pumped into a newly constructed dugout to be used for construction and dust management in the spring and summer months.

4.3.3 Work in River

On July 12, 2022, berms were placed upstream and downstream of the Unnamed Creek to isolate dam construction activities. A fish rescue was completed by a Qualified Aquatic Environment Specialist (QAES) within the isolated workspace prior to dewatering the area. Fish rescue was conducted by electrofishing after fish barriers were in place, all fish collected were identified, tallied, and released approximately 800m downstream from the construction area. Water was pumped to a vegetated area downstream of the site to accommodate sediment filtration. Sediment filtration was also supported by straw wattles for added filtration capacity.

The diversion of the Elbow River to the temporary channel occurred over 17 days between August 2022 to September 17th, 2022. Work in river started with the construction of berms associated with the temporary Elbow River diversion channel. A temporary berm was constructed upstream and downstream of the temporary Elbow River diversion channel tie-in locations. A turbidity curtain was installed at the downstream end of the berm locations to minimize downstream transport of sediment during berm material placement. Turbidity was monitored and recorded downstream of the work; see section 4.8.1 for details on the turbidity monitoring. The berms were comprised of bulk bags. The initial diversion of the Elbow River started with a small portion being opened to allow minimal flow through the temporary fish passage channel. After the initial diversion was opened, bulk bags were placed within the Elbow River with a long arm excavator to continue to divert the water. A fish rescue was completed and monitored by a QAES within the isolated portion of the original Elbow River channel and

water was pumped from the isolated workspace using intake screens as per Fisheries and Oceans Canada's (DFO's) *Interim code of practice: end-of-pipe fish protection screens for small water intakes in freshwater* (DFO 2020). Fish rescue was conducted daily as the water level decreased within the original Elbow River Channel. In all, over 600 fish were captured and released downstream, including one species at risk (Bull trout, *Salvelinus confluentus*).. Once the upstream bulk bags were in place earthen berms were constructed. The earthen berms were completed on September 17, 2022. To minimize impacts to fish and fish habitat (and in consultation with DFO) the bulk bags were removed in November, during frozen conditions.

4.3.4 Dug-Outs

During the 2022/2023 reporting year five dugouts were approved and four were constructed with a total capacity of 200,000 m^3. The fifth dug out was not completed due to unsuitable material. TDLs were obtained to divert water from the Elbow River at three locations. A license to utilize groundwater for use in construction activities was also obtained. Water diverted from both sources was stored within the dugouts to be used during construction for Earthworks moisture conditioning and dust control across site. Pumping rates were kept within licensed amounts. Section 2.2 lists the permits that were obtained during the 2022/2023 reporting year include the TDLs described above.

4.4 ACCIDENTS AND MALFUNCTIONS

As required by IAAC approval condition 11.2, Accident and Malfunction measures that TEC was proposing for the construction phase were presented to Indigenous groups in a letter for review and comment. No feedback on the proposed accident and malfunction measures were received. TEC used the measures to develop the Construction Spill Response and Communications Plan which was submitted to IAAC and Indigenous groups in March 2022. The Plan outlines the following information:

- Types of spills that could result at the Project site
- Hazardous materials spills, handling, and containment procedures & practices
- Reporting requirements

There were no updates or revisions to the Construction Spill Response and Communication Plan during the 2022/2023 reporting year.

In the 2021/2022 annual report, a fuel and hydraulic spill that took place in May 2022 was reported and a summary provided of the spill. Follow-up reports were submitted to IAAC and Indigenous groups. As required by IAAC approval condition 11.5.4, the 90-day post spill report was provided to IAAC on August 26, 2022. Nothing further is required regarding this spill.

During the 2022/2023 reporting year, several minor leaks or spills of substances were reported internally. No spills during the 2022/2023 reporting year exceeded the threshold limit for external reporting to IAAC or posed a risk to the environment. All minor leaks and spills were documented internally including the date, time, location, equipment/machinery, substance, quantity, reason for the release and follow up actions.

All contaminated soil and materials were contained, and the contaminated materials were removed and placed within a labeled waste bin for disposal at an appropriate waste facility. All equipment and machinery that experienced a leak or were malfunctioning were repaired or removed from the construction site for replacement. Equipment and machinery re-entering the construction site were inspected prior to re-use.

4.5 ONSITE MONITORS

4.5.1 Indigenous Monitoring Program

In accordance with IAAC approval condition 9.1, Indigenous Monitors were retained prior to construction to observe, record, and report to TEC and Indigenous groups on the implementation, throughout construction, of requirements set out in the Decision Statement including the Archeological and Heritage Management Plan referred to in IAAC approval condition 9.3. During the 2022/2023 reporting years, Indigenous Monitors from Ermineskin Cree Nation, Louis Bull Tribe, Métis Nation of Alberta Region 3, Montana First Nation, and Samson Cree Nation participated.

During the 2022/2023 reporting year, discussions continued with the remaining Indigenous groups in an effort to finalize contracts and ultimately mobilize additional Indigenous Monitors.

All Indigenous Monitors, prior to mobilizing to the construction site, were provided onboarding training to discuss their role, review the Environmental Monitoring Plans, and the IAAC approval conditions to prepare for their role. They also attended a site safety orientation prior to entering the construction site.

The Indigenous Monitors worked onsite with an Indigenous Relations Coordinator to observe construction activities on a daily basis. Each day, the Indigenous Monitors recorded their observations of the implementation of requirements in an online tool. These daily field reports were shared with the respective contract holders. A Monthly Observation report was drafted by the Indigenous Relations Coordinator using observations from the Indigenous Monitors' daily field reports. The draft monthly report was verified by the Indigenous Monitors and provided to the contract holders for review and comment prior to being finalized. Once final, these reports were shared with TEC and each Indigenous group engaged on the Project.

4.5.2 Independent Environmental Monitor

A third-party Independent Environmental Monitor was retained for the construction phase of the Project. The Independent Environmental Monitor observed and recorded the implementation of the IAAC approval conditions and submitted monthly reports directly to IAAC. The monthly reports summarized observations and made recommendations with respect to implementation of the approval conditions.

4.6 SCHEDULES

Schedules required under IAAC approval conditions 12.1 (schedule for the IAAC approval conditions), and IAAC approval condition 12.2 (activities required to carry out the Project) were prepared and submitted to the Agency and Indigenous groups on December 14, 2021 providing adequate notice prior to commencing pre-construction activities (i.e., site clearing) in February 2022. Slight delays were observed as a result of challenges with procurement of construction material. As required by IAAC approval condition 12.3 and 12.4, see Appendix C for revised schedules.

On December 14, 2021, the Agency and Indigenous groups were provided figures illustrating the final project design and the Project construction area as part of IAAC approval conditions 8.7 and 9.6. There are no changes to the final Project design or construction area for the 2022/2023 reporting year.

4.7 TERRESTRIAL

4.7.1 Vegetation and Wetland Management

4.7.1.1 Weed Management and Invasive Species

In accordance with IAAC approval condition 3.5, all equipment and machinery that entered the construction area during the 2022/2023 reporting year of construction were inspected for the presence of invasive alien and noxious weeds, and soil debris. To access the areas that required tree and shrub clearing, existing roads and farm trails were used, and an all-terrain vehicle (ATV) sprayer was utilized to broadcast the application of herbicide.

The topsoil and subsoil stockpiles were monitored during the growing season for the presence of invasive alien and noxious weeds. Weed management was undertaken following the process outlined in the Vegetation and Wetland Mitigation, Monitoring and Revegetation Plan, Section 7.3 Table 7-4. Three areas were sprayed in September 2022. Control was conducted for plumeless thistle (*Carduss acanthoides*, prohibited noxious), Canada thistle (*Cirsium arvense*, noxious), perennial sow thistle (*Sonchus arvensis*, noxious), and nuisance non-native plants common dandelion (*Taraxacum officinale*)and hemp nettle (*Galeopsis tetrahit*). All herbicides were stored, used, and disposed of according to provincial regulations. No herbicides was applied within 30 m of wetlands or watercourses during the 2022/2023 reporting year.

4.7.1.2 Vegetation and Reclamation Monitoring

As discussed in Section 4.1.1.1, soil stripping activities commenced in February 2022 and continued for the duration of the 2022/2023 reporting year. During the 2022/2023 reporting year, key soil stripping and stockpiling mitigation measures included but were not limited to:

- applying stripping and stockpiling practices which prevent admixing with other soil horizons such as spacing stockpiles 3 m apart or installing sediment fencing between topsoil and subsoil stockpiles when workspace was limited
- placing stockpiles within the construction footprint area and at least 50 m from the top of the bank of the Elbow River
- sloping soil stockpiles (less than 70 degrees) to reduce the risk of erosion
- placing stockpiles within the construction footprint area at least 30 m from the top of Unnamed Creek and wetlands
- monitoring topsoil piles for erosion and weed growth
- Silt fencing was also used to limit dust generation from stockpiled soils

Vegetation removal and soil stripping was done in phases and soil handling was avoided during excessively windy conditions and inclement weather (e.g., heavy rain) to reduce the area of exposed soils vulnerable to wind and water erosion. Soil stockpiles were stabilized as soon as possible by track packing the top surface, and silt fences were installed at the toe side of several stockpiles. Silt fences were routinely inspected. Site specific conditions did not allow for the installation of silt fences at all stockpiles. For these stockpiles, other forms of erosion and sediment control measures (e.g., retaining a vegetated buffer, installing straw wattles) were implemented and/or installed. During the Migratory Birds Restricted Activity Period, wildlife sweeps were conducted in advance of all topsoil and subsoil stripped activities

The southernmost portion of the floodplain berm had topsoil placed in October 2022. Approximately 200 m of topsoil was spread and track packed as a form of mitigation measure for minimizing erosion potential during the winter. Natural revegetation was observed in summer 2023 and the vegetation growth is being evaluated.

4.7.1.3 Wetland

In fulfillment of IAAC approval conditions 5.8 and 5.9, IAAC and the Indigenous groups were provided with a figure prior to the start of construction (January 2022) showing the wetlands to be permanently removed as a result of construction activities.

During the 2022/2023 reporting year, existing roads farm trails were used to access the construction area.

As reported in the 2021/2022 Annual Report, two wetlands, W251 and W3189, were inadvertently disturbed beyond the approved construction footprint and Project *Water Act* approval boundary (Approval #DAUT0008702). As part of the disturbance, topsoil was stripped from the wetlands and stockpiled. The unauthorized disturbance was identified, and work was stopped and reported to Alberta Environment and Protected Areas (formerly Alberta Environment and Parks) the same day. A wetland restoration plan was developed and approved by Alberta Environment and Protected Areas (AEPA) and initiated in Fall 2022. Soils were replaced in October and November 2022 and, as approved in the restoration plan, wetland plants are being allowed to naturally re-establish. The wetlands will be monitored for a minimum of two years and additional mitigation measures implemented if needed. Mitigation measures in the immediate surroundings included installation of high visibility fences, silt fencing, signage, and implementing 10 m vegetation buffers.

Equipment fueling, cleaning, and maintenance activities maintained a distance of 100 m from waterbodies and wetlands and utilized secondary containment. Substances with potential to cause harmful effects to the environment were stored over 100 m from water bodies and wetlands.

4.7.2 Wildlife

4.7.2.1 Preconstruction Surveys

The results of the pre-construction surveys to meet IAAC approval conditions 5.1, 5.2, and 6.3 were presented in 2021/2022 Annual Report. No further work is required for these approval conditions.

4.7.2.2 Wildlife Sweeps

Pre-construction wildlife sweeps were completed from April to August 2023, as recommended in the WMMP to identify potential active wildlife features (e.g., nests, dens). Three active Canada goose nests were discovered in May 2023 directly adjacent to and inside the construction area. A 30 m buffer was established around all three nests using stakes and flagging, and the buffers were avoided until the geese (*Branta canadensis*) left the nests. Two of the nests were later determined to be inactive due to predators, which resulted in nest abandonment. For the active nest, a wildlife monitor was present to observe the goose daily while construction was taking pace.

In addition to the Canada goose nests, a Brewer's blackbird and an American robin nest were observed in a ditch on the west side of Range Road 41 within the construction area. A buffer zone was established using stakes and flagging, around both nests.

An osprey nest was also observed east of Highway 22 near the Highway 22 and Highway 8 traffic circle. As the nest was located outside of the construction area, no construction mitigative action was required.

No other active nests or dens were identified during the 2022/2023 reporting year in the Project construction area prior to tree removal and mulching activities.

Wildlife sweeps included amphibian surveys in wetlands, waterbodies and dug-outs located in several areas of the Project construction area and intersecting the Project construction area. No amphibians were observed during the surveys.

Site-specific mitigation measures were implemented in accordance with IAAC approval conditions related to migratory birds and amphibian species at risk including IAAC approval conditions 4.1, 4.6, 4.8, and 5.2. In general, wildlife mitigation measures included:

- Wildlife monitors completing consistent and continuous monitoring of the nesting birds to assess bird behaviour/response and ensure that the established buffers were adequately mitigating construction disturbances.
- Restricting access and/or reducing speed of construction vehicles near active buffers.
- Regular weekly check-in meetings with construction crew/operators to ensure operator awareness and caution during construction activities.

Incidental Observations by Construction Crew and Indigenous Monitors

In December 2022 Indigenous monitors and construction personnel started recording incidental observations of wildlife seen in or near the construction area. The list of wildlife species incidentally observed from December 2022 to June 2023 is located in Appendix D includes. A summary of incidental wildlife species observed, on or near the Project site, is provided below.

- Elk (*Cervus canadensis*)
- Mule deer (*Odocoileus hemionus*)
- White-tailed deer (*Odocoileus virginianus*)
- Coyote (*Canis latrans*)
- American mink (*Neovison vison*)
- Fox (V*ulpes vulpes*)
- Moose (*Alces alces*)
- Black bear (*Ursus americanus*)
- Cougar (*Puma concolor*)

The following additional observations were recorded from December 2022 to June 2023.

- Moose (*Alces alces*) pellets
- Elk (*Cervus canadensis*) pellets
- Deer pellets and pile of deer fur

- Northern pocket gopher (*Thomomys talpoides*) mounds
- Coyote (*Canis latrans*) den identified 400 m south of the end of Range Road 41, west of the farmhouse. A 100 m semi-circle was staked with orange flagging labelled "wildlife" to notify construction workers.

A section (1.6 km) of wildlife-friendly fencing was installed along the southern boundary of a utility-right-of way located in NW-26-24-4W5 and NE-26-24-4W5 during the 2022-2023 reporting year. As per IAAC condition 8.5, wildlife friendly fencing will be installed following design specifications described in the Alberta Landholder's Guide to Wildlife Friendly Fencing (Paige 2020) to prevent access by livestock and allow wildlife passage. Even so, a young elk was unfortunately entangled in the two middle barbed wires, which resulted in an accidental mortality. Wildlife use of wildlife friendly fencing and crossing success will continue to be monitored as part of the WMMP.

Migratory Birds

The majority of trees and shrubs that could provide suitable nesting habitat were cleared during the 2021/2022 reporting year to reduce the potential for migratory birds nesting within the Project construction area during the 2022/2023 reporting year. In accordance with IAAC approval condition 4.6, construction activities, such as vegetation clearing, that may affect migratory birds were scheduled to avoid the migratory bird breeding period (April 1 to August 31) where possible. The remaining tree and shrub clearing was completed prior to April 1, 2023. In areas where construction activities were planned during the migratory bird breeding period, pre-construction wildlife sweeps were completed to reduce potential disturbance to nesting birds by implementing an appropriate setback buffer consistent with IAAC approval conditions 4.6 and 4.8 as well as direction provided in the WMMP. See Section 4.7.2.2 for additional information on wildlife sweeps.

The birds listed below were incidentally observed during construction. Wildlife sweeps occurred between July 2022 and August 2023; none of the birds listed below are listed under Schedule 1 of the *Species at Risk Act* (SARA):

- Canada geese (*Branta canadensis*)
- American crow (*Corvus brachyrhynchos*)
- Western meadowlark (*Sturnella neglecta*)
- Brewer's blackbird (*Euphagus cyanocephalus*)
- American robin (*Turdus migratorius*)
- Chipping sparrow (*Spizella passerina*)
- Vesper sparrow (*Pooecetes gramineus*)
- Savannah sparrow (*Passerculus sandwichensis*)
- Lincoln's sparrow (*Melospiza lincolnii*)

- Yellow warbler (*Setophaga petechia*)
- Clay-colored sparrow (*Spizella pallida*)
- Red-winged blackbird (*Agelaius phoeniceus*)
- Trumpeter swan (*Cygnus buccinator*)
- Black-capped chickadee (*Poecile atricapillus*)
- Red-tailed hawk (*Buteo jamaicensis*)
- Osprey (*Pandion haliaetus*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Great blue heron (*Ardea herodias*)

The following nests were observed during the wildlife sweeps:

- Canada goose nest along the west side of Highway 22 construction area. A 50 m setback buffer was installed and maintained.
- A pair of Red-tailed hawks were observed displaying breeding behaviors along Unnamed Creek in a shrubby fenced area near a residence. The east-west barbed-wire fence along the former access road to Unnamed Creek was marked and a 50 m stretch with orange flagging was established and labelled to notify workers.
- An osprey nest was also observed east of Highway 22 near the Highway 22 and Highway 8 traffic circle. As the nest was located outside of the construction area, no construction mitigative action was required.
- Brewer's blackbird nests and an American Robin nest was observed in a ditch on the west side of Range Road 41. A buffer zone was established, which consisted of stakes and flagging.
- A wildlife monitor (Contractor) remained on site during construction activities.

Amphibians

As stated in Section 4.7.2.2 above, no amphibian species listed on Schedule 1 of SARA including northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) were observed in wetlands/waterbodies within the active Project construction area during 2022/2023 reporting year. During the April 2023 amphibian surveys, wood frogs (*Lithobates sylvaticus*) and boreal chorus frogs (*Pseudacris maculata*) were observed along the west side of Highway 22 construction area at two locations. Amphibian salvage was undertaken, as per the Research Permit #23-192 (see Section 2.2), and a silt fence barrier was utilized to prevent sediment from entering either location.

Amphibian sweeps were completed in wetlands located within the active construction boundary) from May 2022 through June 2023.

4.7.2.3 Remote Camera Program Summary

As part of the remote camera monitoring program, remote cameras continued to monitor wildlife use in the local assessment area (LAA) during during the 2022-2023 construction period. This Annual Report includes data collected during all four seasons: spring (April 1 to May 31); summer (June 1 to August 31); fall (September 1 to November 30); and winter (December 1 to March 31). Twenty-seven remote cameras were deployed during the 2022-223 construction period, however, the number of cameras that remained operational during each season varied: (spring, n =26; summer, n = 23; fall, n = 26; and winter, n = 25).

Remote cameras detected 8,673 wildlife images (independent events) over 9,455 camera-days across all four seasons during the 2022-2023 construction period (April 1, 2022 to March 31, 2023) (Appendix B.1). Of those, 80.1% of total detections were comprised of three species including white-tailed deer (46.5%), elk (23.4%), and coyote (10.2%). Other focal wildlife species detected included mule deer (4.3%), red fox (1.7%), moose (1.5%) as well as black bear and cougar both with less than 1%. The remainder of independent events included other wildlife (e.g., birds, small mammals) (6.6%), humans including vehicles and construction equipment (3.7%), cows (1.1%), and horses (0.3%).

Nine mammal species were detected during the 2022-2023 construction period including one bobcat during spring. Black bear was detected during summer and fall in upland areas and along Elbow River. Overall, elk had the highest relative abundance followed by white-tailed deer and coyote. Although elk and white-tailed deer were detected at similar photographic rates during spring and summer, there were fewer detections/100 camera-days for both species during fall and winter. Coyote was detected more frequently during spring and winter compared to summer and fall whereas mule deer and red fox photographic rates were relatively higher during winter compared to other seasons.

Although these results are similar to the 2021 pre-construction monitoring period, where white-tailed deer, elk and coyote were the most frequently detected wildlife species in the LAA, a comparison of relative abundance between the 2021 pre-construction and 2022-2023 construction periods indicated that the number of detections/100 cameras-days for elk, white-tailed deer and coyote was relatively lower during fall construction compared to fall pre-construction. The photographic rates for white-tailed deer showed the largest decrease (45%) in the number of detections/100 camera-days during construction compared to pre-construction. In contrast, mule deer were detected more frequently during fall construction compared to pre-construction.

An inspection of photographic rates at each camera station indicated relatively lower relative abundance of white-tailed deer at CAM-7, CAM-9b and CAM-24b during fall construction compared to pre-construction. Construction activities might have resulted in sensory disturbance (i.e., noise, artificial lights) and reduced use at these sites; however, other confounding factors (e.g., weather, food availability, predators) may have also contributed to the lower photographic rates for white-tailed deer during fall construction.

During winter, photographic rates for white-tailed deer and coyote were slightly lower during construction compared to pre-construction; however, elk relative abundance more than doubled during construction compared to pre-construction. Similar to fall, mule deer and red fox photographic rates were relatively higher during construction compared to pre-construction. Although cougars were detected relatively infrequently, cougar photographic rates were higher during fall pre-construction compared to construction but similar during winter pre-construction and construction periods.

During winter, ungulates were detected at eight remote camera stations deployed within the Key Wildlife Biodiversity Zone (KWBZ) along Elbow River. However, photographic rates varied by species, camera station and Project phase. White-tailed deer and mule deer were detected most frequently followed by elk and moose. Photographic rates for mule deer were higher during construction compared to winter 2021 pre-construction (e.g., CAM-01, CAM-07) whereas white-tailed deer relative abundance decreased at two stations (CAM-09b, CAM-18b), increased at CAM-17b and remained similar at other stations. Although moose were detected infrequently along Elbow River, photographic rates were relatively lower during construction compared to winter 2021 pre-construction. Overall, elk relative abundance was higher in upland areas compared to Elbow River.

Detailed methods and results of the remote camera monitoring program are provided in Appendix B.1.

4.7.2.4 Bank Swallow

In accordance with IAAC approval condition 4.11.1, and the Bank Swallow Mitigation Plan, bank swallow (*Riparia riparia*) activity was monitored at three previously identified colonies between May 1 and August 31, 2023.

Methods

The status of three bank swallow colonies previously identified on Elbow River during 2022 were visited twice on foot to determine colony status (i.e., active/inactive) and activity levels during the bank swallow nesting period for nesting zone B4 (early-May to mid-July) [Birds Canada 2023). The three colonies included BANS_BY01 located in NE-18-24-03-W5 as well as BANS_BY02, and BANS_BY03 located in NW-18-24-03-W5 (Figure 4.1). Other suitable (vertical) banks along Elbow River were also scanned using binoculars for new bank swallow nesting activity. Each bank swallow colony was observed for 20 minutes during each visit. The number of individuals (adults and juveniles) and number of active burrows (i.e., burrows with active excavation, adults entering or exiting, or nestlings visible) were recorded, where possible.

Results

Previously identified bank swallow colonies on Elbow River were surveyed on June 2, 2023, and July 14, 2023.

BANS_BY01 was visited on June 2, 2023, between 07:05 and 07:25 AM. Temperature was 8 degrees Celsius (°C), Wind was Beaufort 1, with 25% cloud cover and no precipitation. No swallows were observed foraging at this location, nor were there any visible swallow nests in the slope this year. The burrows identified during 2022 had eroded over the winter (Photo 1). This site was not revisited in July.

BANS_BY02 was visited on June 2, 2023, between 07:30 and 07:50 AM. Temperature was 7°C, wind ranged from Beaufort 1 to 2, with 20% cloud cover and no precipitation. A total of 41 adult bank swallows were observed during the monitoring period with individuals appearing to emerge from cavities extending approximately 100 m upstream and 100 m downstream. The number of active burrows could not be determined because it was difficult to find a suitable vantage point due to access constraints (unstable slopes, slumping, Elbow River). Northern rough-winged swallows (*Stelgidopteryx serripennis*) were also incidentally observed at this location. Twelve bank swallows were also observed excavating cavities along the south side of Elbow River opposite BANS_BY02, indicating both north and south banks support nesting activity at this location (Photo 2).

A second visit to BANS_BY02 was completed on July 14, 2023, between 06:18 and 06:38 AM, temperature was 13°C, skies were partly cloudy, with heavy smoke and no precipitation. A total of 26 adult bank swallows were observed and entering cavities with food. In addition, nine northern rough-winged swallows were incidentally observed at this location.

BANS_BY03 was visited on June 2, 2023, between 08:15 and 08:35 AM. Temperature was 8°C, wind was Beaufort 1, with 20% cloud cover and no precipitation. No bank swallows were observed nesting or flying near the banks at this location (Photo 3), however, six northern rough-winged swallows were observed at this location. At the end of the monitoring period, 14 bank swallows were observed in flight approximately 30 m above ground travelling west from BANS_BY02.

A second visit to BANS_BY03 was completed on July 14, 2023, between 06:49 and 07:09 AM, with temperatures ranging from 14°C -15°C, partly cloudy skies, with heavy smoke and no precipitation. No bank swallows were observed entering or exiting the burrows. However, 12 northern rough-winged swallows were observed entering burrows at this location as well as additional areas between BANS_BY03 and BY02.

An evaluation of wildlife monitoring results relative to performance indicators and targets identified in the WMMP is provided in Table 4.1, below.

Wildlife Monitoring Results, Performance Indicators, and Targets

Table 4.1 Summary of Wildlife Monitoring Outcomes, Performance Indicators and Targets used to Evaluate Mitigation Effectiveness during Construction 2023

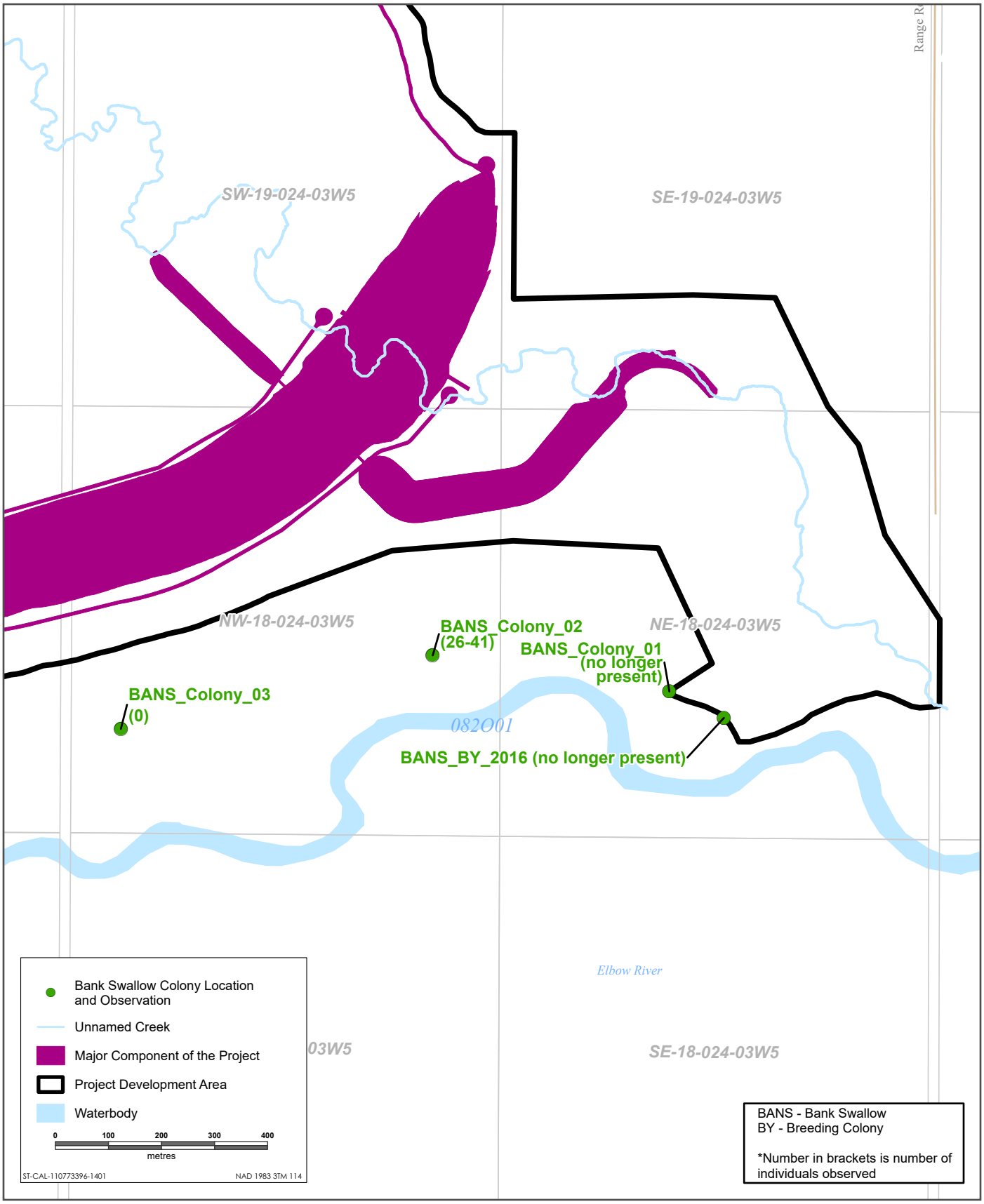
Residual Effect	Performance Indicator	Target	Monitoring Outcome
Change in Habitat (sensory disturbance)	• Number of active wildlife features that remain in use to meet species breeding needs (i.e., successful nesting, denning due to effective setback buffers)	• 100% of active wildlife features receive an effective setback buffer that results in nesting or denning success (i.e., evidence of fledging, or no den abandonment)	All active bird nests received appropriate setback buffers until the nests were complete (i.e., juvenile birds had fledged) One coyote den was identified during the February-June 2023 construction period. The den was protected using a 100 m setback buffer until the den was no longer occupied.

Table 4.1 Summary of Wildlife Monitoring Outcomes, Performance Indicators and Targets used to Evaluate Mitigation Effectiveness during Construction 2023

Residual Effect	Performance Indicator	Target	Monitoring Outcome
Change in Movement (Ungulate Movement/ Habitat Use)	• Number of days construction activities occur during the Restricted Activity Period (RAP) for the KWBZ along Elbow River (December 15 to April 30)	• Minimize the number of days construction activities occur during the RAP for the KWBZ along Elbow River (December 15 to April 30	Construction activity occurred during approximately 89.6% of the KWBZ RAP (120 of 135 days), primarily along Elbow River near Kamp Kiwanis. Based on the results of the remote camera monitoring program, relative abundance (photographic rates) of ungulates along Elbow River during winter was variable. White-tailed deer photographic rates, decreased at two stations, increased at one station, and the remaining stations had similar estimates of relative abundance compared to winter 2021 pre-construction. Mule deer photographic rates increased during construction compared to winter 2021 pre-construction. Although moose were detected infrequently along Elbow River, photographic rates were relatively lower during construction compared to winter 2021 pre-construction. Elk photographic rates were slightly higher at two remote camera stations and slightly lower at one station (see Appendix B.1). Overall, elk was detected more frequently in upland areas compared to Elbow River (Appendix B.1).
Change in Mortality Risk	• Number of active wildlife features (i.e., nests, dens, roost sites, hibernacula) destroyed	• Zero active wildlife features destroyed	Pre-construction wildlife sweeps were completed to reduce potential mortality risk. No active wildlife features were destroyed.
	• Number of animal-vehicle collisions (AVC) in the LAA (e.g., Hwy 22, Springbank	• Zero AVC in the LAA that can be attributed to the Project	There were no reports of AVC collisions due to the Project.

Table 4.1 Summary of Wildlife Monitoring Outcomes, Performance Indicators and Targets used to Evaluate Mitigation Effectiveness during Construction 2023

Residual Effect	Performance Indicator	Target	Monitoring Outcome
	Road) that can be attributed to the Project (i.e., construction traffic)		
	• Number of reported wildlife–human conflicts	• Zero wildlife-human conflicts	There were no wildlife-human conflicts during this reporting period. However, cougars were observed outside the construction area near the Diversion Inlet in the fall of 2022.
	• Number of problem (i.e., conflict) wildlife animals removed from the Project site	• Zero problem wildlife removed from the Project area due to human-wildlife conflicts • All workers (100%) on site receive wildlife awareness training (e.g., Bear Smart)	There was no problem wildlife removed from the Project area due to human wildlife conflicts. All workers on site received the appropriate safety training prior to all field surveys.



Sources: Thematic Data - Stantec. Base Data - Government of Alberta, Stantec

Bank Swallow Colony Locations and Observations Along Elbow River During 2023 Monitoring

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ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Figure 4.1

Photo 1 **Eroded bank along Elbow River where bank swallow colony (BANS_BY01) was previously identified during 2022**

Photo 2 **Occupied bank swallow colony (BANS_BY02) along Elbow River during 2023**

Photo 3 Unoccupied bank swallow colony (BANS_BY03) along Elbow River during 2023

Overall, of the three bank swallow colonies visited during the 2023 breeding season, one had collapsed and was subsequently abandoned (BANS_BY01), one was active and expanded to burrows on both sides of the Elbow River (BANS_BY02), and one was inactive and appeared to be occupied by nesting northern rough winged swallows (BANS_BY03). The maximum number of bank swallows at BANS_BY02 increased from 10 individuals observed in 2022 to 41 individuals observed in 2023. An evaluation of bank swallow monitoring results relative to performance indicators and targets identified in the WMMP is provided in Table 4.2.

Table 4.2 Summary of Bank Swallow Monitoring Outcomes, Performance Indicators and Targets – 2023 Construction

Performance Indicator	Target	Monitoring Outcomes
Number of breeding pairs and active bank swallow burrows in the Project area	• Continued use of the Project area each monitoring year as indicated by the number of breeding pairs of bank swallow and active burrows observed during construction and dry operations.	• Monitoring results for 2023 indicate continued use of suitable habitat along Elbow River in the vicinity of one previously identified colony. • Maximum number birds observed at BANS_BY02 was 26-41 individuals over two visits (~13 -20 pairs), which is an increase compared to the 10 individuals (~ 5 breeding pairs) observed during 2022. Number of burrows was undetermined in 2022 and 2023 due to access constraints/safety considerations. • BANS_BY03 was not active during 2023; however, approximately, 10 individuals were observed during 2022. Heavy rain during June 2022 might have resulted in slope failure along Elbow River where colonies existed – further slumping occurred along Elbow River during 2023.
Number of residences destroyed or created due to Project activities	• Zero residences destroyed	• No residences were destroyed due to Project activities

4.8 WATER AND AQUATICS

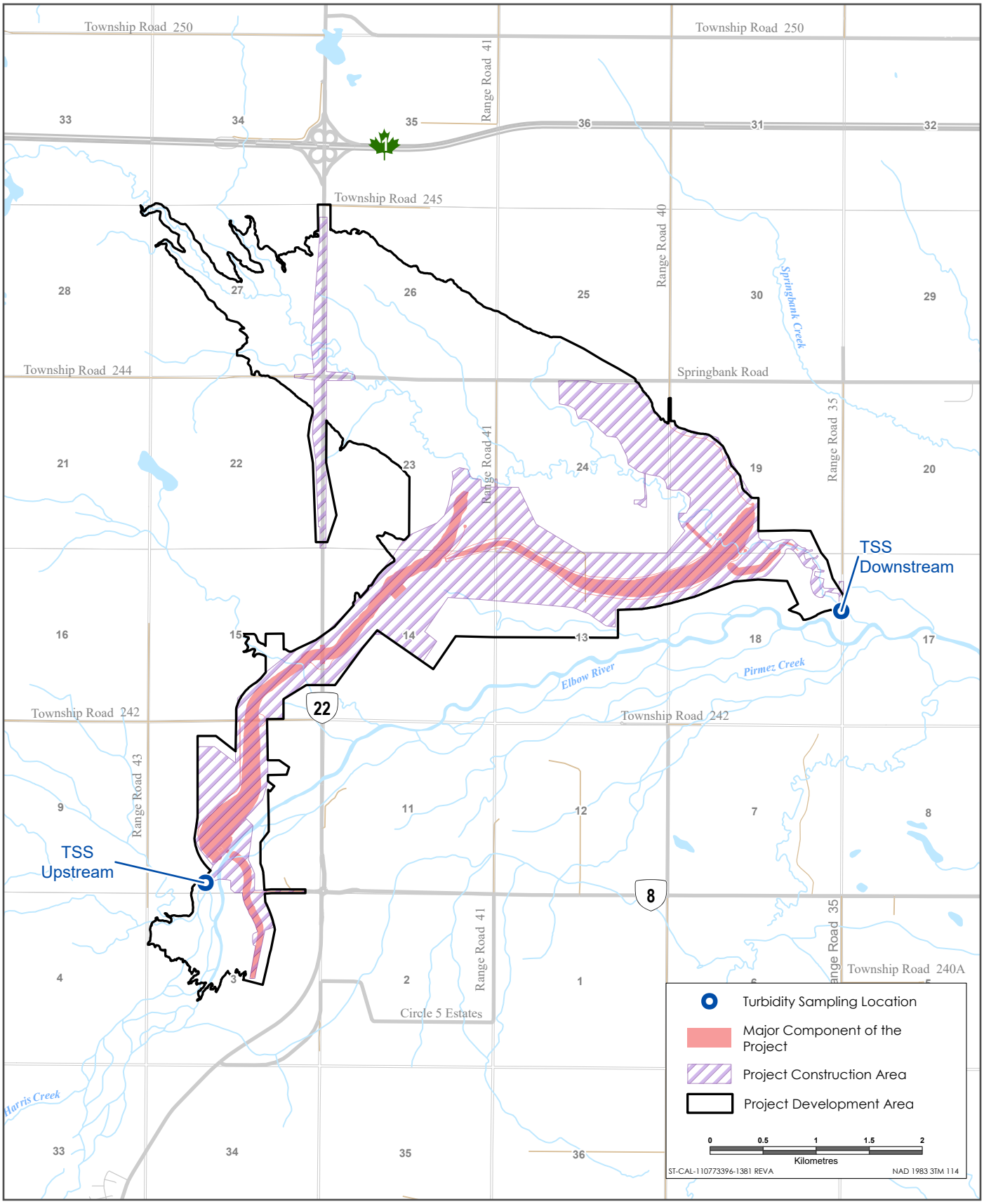
4.8.1 Water Quality

4.8.1.1 Turbidity Monitoring

Near-Field Turbidity Monitoring Locations and Frequency

Turbidity monitoring was conducted daily using manual measurements between July 1, 2022 and October 21, 2022 and once per hour using turbidity sondes from October 21, 2022 to June 30, 2023 in the Elbow River at two locations (see Figure 4.2):

- Elbow River upstream of construction activity
- Elbow River downstream of the entire Project boundary



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta
Service Layer Credits:

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.
9/12/2023

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Turbidity Sampling Location

Figure 4.2

The Elbow River sondes were affected by shore ice until mid-March 2023, which resulted in zero reading by the sondes occasionally. These zero values have been removed from result graphs presented below. Continuous data collection was halted during sonde maintenance/repair between April 24 and 28, 2023 and May 12-22, 2023, and during periodic cleaning periods when silt accumulation was removed from sensors. Daily manual samples were collected during sonde maintenance and repair.

In addition to the turbidity monitoring upstream and downstream of the Project site in the Elbow River, turbidity was monitored manually immediately upstream and downstream of construction activity during instream works and unplanned releases of sediment-laden water (refer to Section 4.8.1.2 Reported Releases).

Flow in the Unnamed Creek was observed on April 13, 2023, with turbidity measured at 17.20 Nephelometric Turbidity Units (NTU). No flow was observed in the Unnamed Creek after this date.

Near-Field Turbidity Monitoring Results

A Total Suspended Solids (TSS, milligrams per litre [mg/L]) – Turbidity (NTU) Curve was established in 2021 as per *Alberta Transportation Special Provision – Turbidity* (GoA 2021). The calculated relationship was used to determine the normally occurring linear relationship between TSS and turbidity in the watercourses as per the conversion relationship between NTU into mg/L. This relationship was used in the field to determine the TSS (mg/L) based on the turbidity measured. Turbidity monitoring has been collected in the field as NTU with a hand-held meter, and then converted to TSS (mg/L). The TSS/Turbidity regression curves are provided in Figure 4.3 and Figure 4.4 below.

Figure 4.3 Elbow River TSS-Turbidity Curve

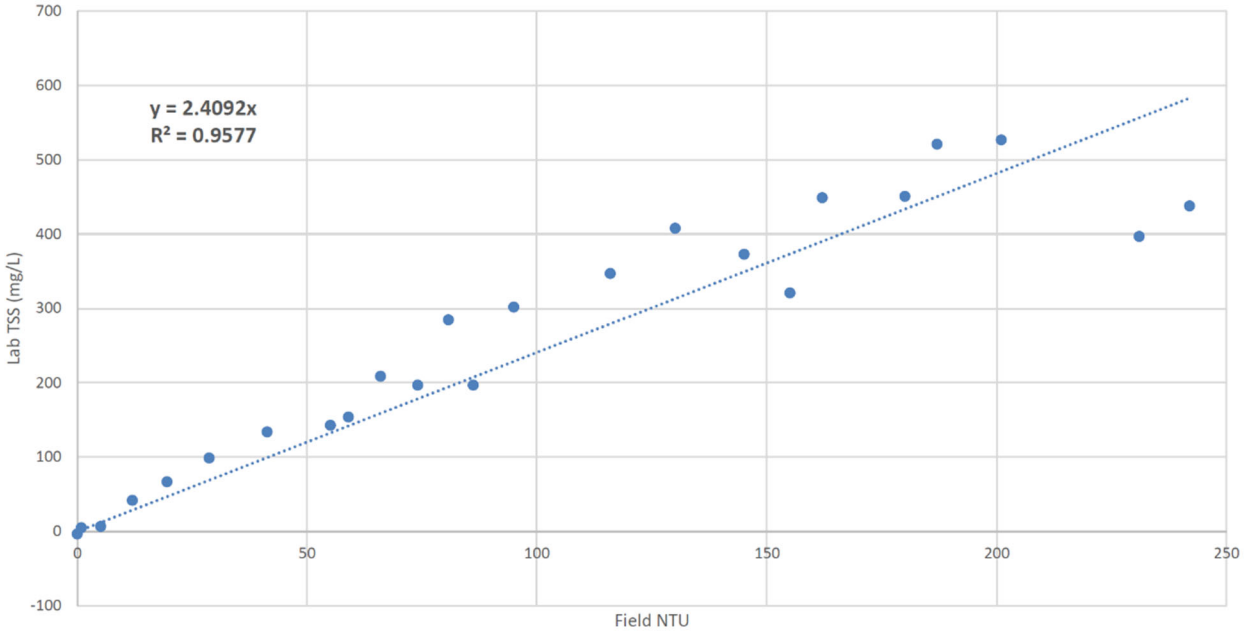
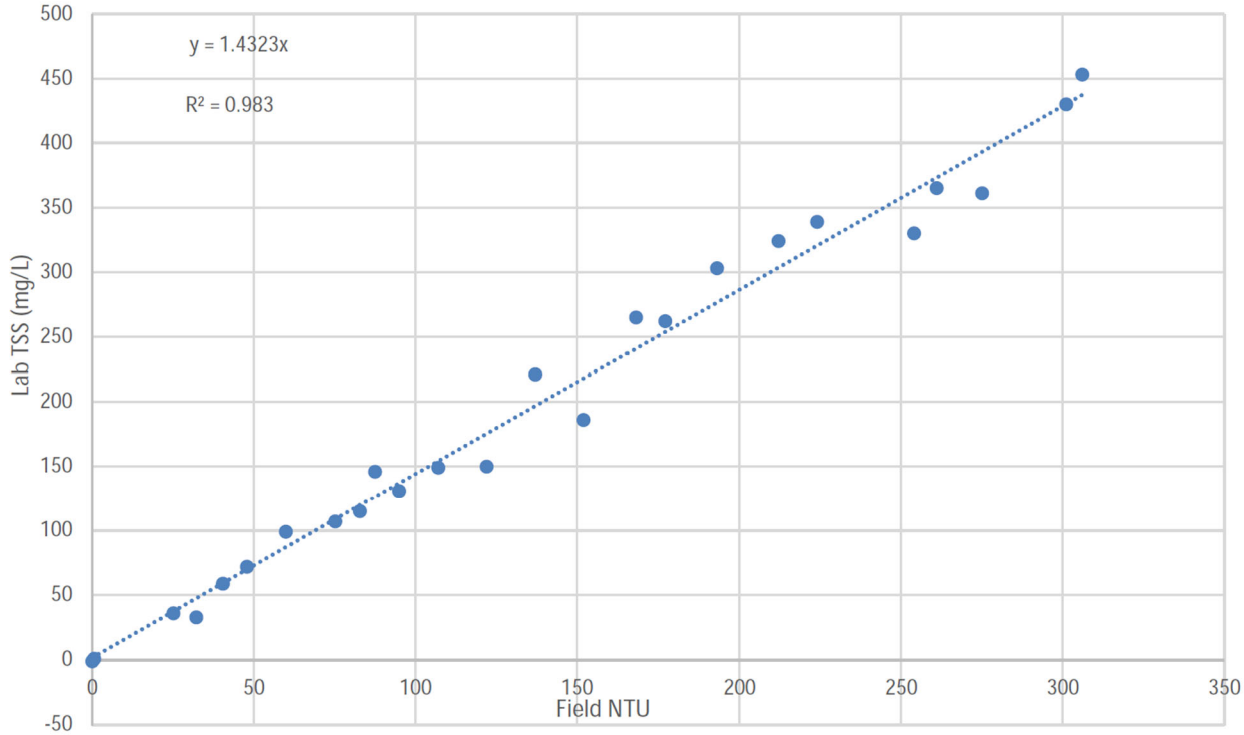


Figure 4.4 Unnamed Creek TSS-Turbidity Curve



Elbow River TSS monitoring results are provided in Figure 4.3 and Figure 4.4. The TSS concentrations were derived using the Elbow River TSS-Turbidity Curve in Figure 4.3. Similar to observations in 2021-2022, downstream Elbow River TSS concentrations were similar or lower than upstream concentrations throughout the year. Two exceptions occurred, when downstream TSS concentrations were substantially higher than upstream concentrations:

- TSS concentrations increased at the Elbow River downstream sonde location on April 3, 2023 from 6.90 mg/L (08:51 hours [hrs]) to 7,239 mg/L (23:51 hrs). TSS concentrations remained high until April 4, 2023 when concentrations dropped to 76.42 mg/L by 22:51 hrs. A smaller increase in TSS concentrations (less than 500 mg/L) was observed at the Elbow River upstream location between April 15 and 16, 2023. Based on field notes and a rising hydrograph at Bragg Creek, this appears to be is a sediment transport event from streamflow increase associated with snowmelt. However, the spike over upstream values may also represent silt caked on the sensor (which was noted after a later streamflow rise). This is partly due to the location of the sonde in a backwater eddy; field notes on March 28, 2023, indicate 'helical, turbid flow'. The sonde was later moved closer into the thalweg (away from the bank) when it was safe to do so. Project activity was not associated with this sonde-related increase in TSS concentrations.
- TSS concentrations also increased at the Elbow River downstream sonde location between May 17 and 19, 2023 with a maximum TSS concentration of 7,165 mg/L. A corresponding increase in upstream concentrations was not observed, although upstream concentrations increased temporarily on May 9-10, 2023. No explanation for this spike has been determined. However, Project activity was not associated with this increase in TSS concentrations, and a sonde malfunction is suspected.

Figure 4.5 Elbow River TSS Concentrations Upstream and Downstream of the Project Site, Full Dataset

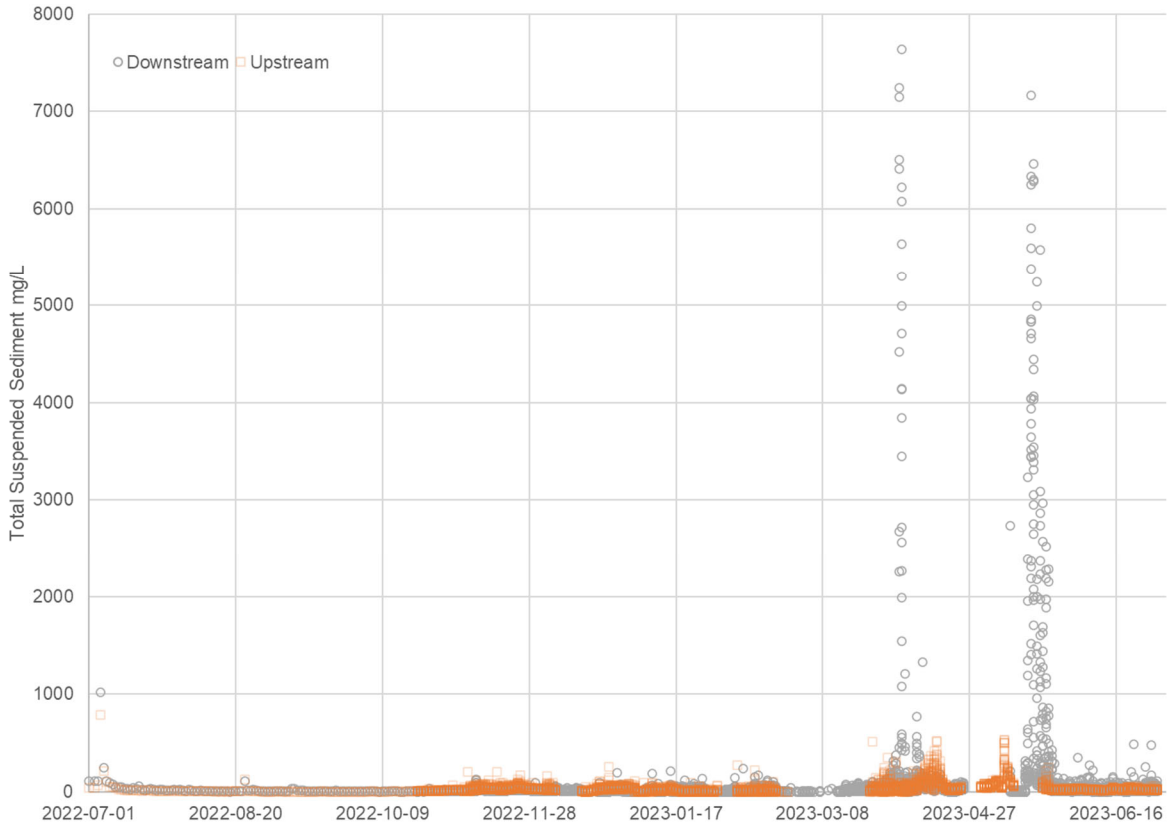
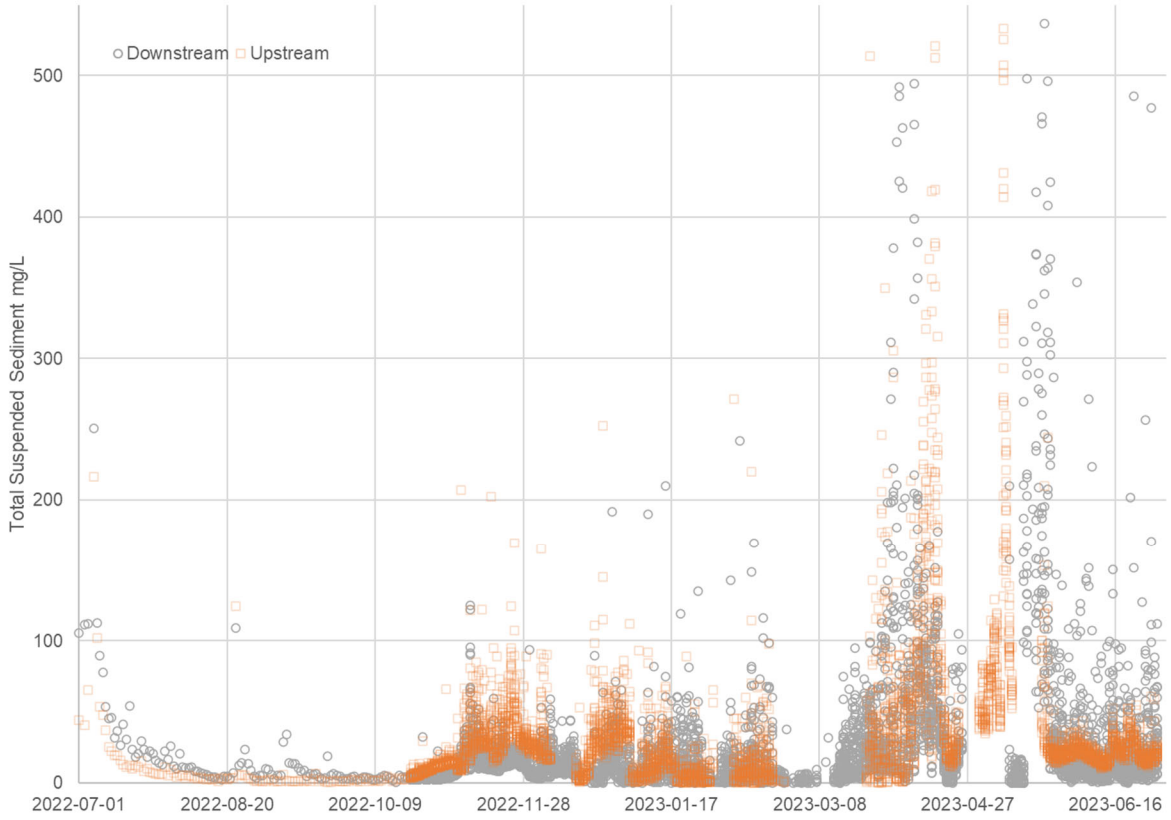


Figure 4.6 Elbow River TSS Concentrations Upstream and Downstream of the Project Site, Subset of Data Showing Concentrations up to 550 mg/L



Far-Field Turbidity Monitoring

A commitment was made during the Project regulatory process and in the SWMP to install continuous turbidity sensors at the existing Water Survey of Canada (WSC) Elbow River hydrometric stations at Bragg Creek (WSC Station 05BJ004) and Sarcee Bridge (WSC Station 05BJ010) during all phases of the Project.

The installation of turbidity monitoring equipment at these locations has not occurred during the 2022/2023 reporting year, as the installation requires coordination between multiple agencies, including AEPA, and Environment Climate Change Canada (ECCC). During the 2022/2023 reporting year the installation locations were investigated further to determine exact coordinates based on the hydraulic conditions, preferred installation method and proximity to available power source. Installation is planned during the 2023/2024 reporting year.

4.8.1.2 Reported Sediment Releases

Monitoring and management of planned river activities that had the potential to release sediment followed the Alberta Special Provision – Turbidity document (Government of Alberta [GoA] 2021). All of the reported sediment releases were part of planned river diversion activities. Releases were reported to the appropriate regulator (i.e., AEPA) as per the Alberta Special Provision – Turbidity document.

4.8.2 Groundwater

Groundwater monitoring network development and groundwater monitoring activities were completed during the 2022/2023 reporting year and are described in detail in the Groundwater Monitoring Report in Appendix B.2. The groundwater monitoring was completed based on the Groundwater Monitoring Plan (GWMP).

The monitoring network includes three monitoring tiers that are summarized below and described in detail in Appendix B.2:

- Tier 1 monitoring wells will be shallow and located within or immediately adjacent to Project infrastructure (dam, diversion structure and channel) and used for geotechnical monitoring and also to support groundwater monitoring.
- Tier 2 monitoring wells are shallow and within or very near the wetted perimeter of the off-stream reservoir and Diversion Channel. They are installed specifically for the Project in both the unconsolidated and shallow bedrock deposits. A subset of Tier 2a wells are also included specifically to monitor drawdown near the Diversion Channel during construction and dry operations to address NRCB approval condition 11.5 a[1]). The Tier 2a wells are domestic water wells and are based on voluntary participation (all landowners within the potential drawdown area were invited to participate).
- Tier 3 monitoring wells are situated beyond the area of predicted project effects at locations of some of the closest potential receptors to the Project. The main purpose of these monitoring wells is to provide early detection of potential effects on groundwater that are propagating outward from the LAA. Tier 3 wells are primarily domestic water wells where landowners wished to participate.

[1]"monitor water levels in domestic water wells west of the Diversion Channel to the boundary of the local assessment area that may be impacted by dewatering during the Project construction. During flood and dryland operation, monitoring of the wells should be continued by the Operator for a minimum of five years or until it can be demonstrated that permanent lowering of the water level does not significantly impact yields from the water wells,"

To support construction activities, Tier 2 well MW16-12-3 near the dam was decommissioned and will be replaced following construction. An additional Tier 3 monitoring well WS11-1 was also installed to further develop the monitoring network. Installation of Tier 2 monitoring wells RRMW16-17-X and RMW16-15-X were planned for November 2022 drilling however the locations could not be accessed with the drilling rig due to deep snow. The two wells were installed in August 2023; details will be captured in the 2023/2024 annual report.

Groundwater monitoring and sampling was completed in November 2022 and May 2023. The monitoring and sampling included the Tier 2 monitoring wells, Tier 2a monitoring wells, Tier 3 domestic wells, one-time domestic wells (NRCB hearing commitment), and the legacy EIA Project wells. The locations and descriptions of the monitoring tiers and additional Project and domestic wells are presented in Appendix B.2.

The monitoring programs included measurement of groundwater levels, field parameters (dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, electrical conductivity (EC)) and downloading and calibration of data logging pressure transducers. The transducers are deployed to measure and record near continuous water level, temperature, and electrical conductivity at the Tier 2, Tier 2a and Tier 3 monitoring wells. Groundwater samples were collected and submitted to an accredited laboratory for routine potability parameters, major ions, bacteriological parameters, dissolved organic carbon (DOC), dissolved metals, nutrients, benzene, toluene, ethylbenzene, xylenes (BTEX), and F1 to F2 fraction hydrocarbons.

Changes to groundwater levels were noted in some monitoring wells in the vicinity of the construction areas. Some changes may be attributed to construction activities (e.g., dewatering and dam building) while others are likely a result of natural variation. Regardless of the cause, the changes in groundwater levels are within the expected range predicted in the EIA and no groundwater quantity triggers were reached (i.e., increases resulting in flowing artesian conditions or decreases such that existing wells are no longer useable).

Groundwater quality in the 2022/2023 reporting year was consistent with historical results and, while there are numerous exceedances of the Guidelines for Canadian Drinking Water Quality (Health Canada 2022), no exceedances were attributed to Project effects.

The results of the monitoring and sampling events are presented in Appendix B.2.

4.8.3 Channel Morphology

Channel morphology will be monitored following a flood as required by IAAC approval condition 3.20.

4.8.4 Fish and Fish Habitat

4.8.4.1 Preconstruction (Baseline)

The results of the pre-construction surveys were presented in Annual Report 2021/2022. Several construction best management practices have been implemented during the 2022/2023 reporting year that pertain to the protection of fish habitat and aquatic life and measures that are listed in approval condition 3 of the IAAC Decision Statement. These are identified in detail below (Section 4.8.4.2 through 4.8.4.4). No further work is required for these approval conditions.

4.8.4.2 Fish Passage

It is expected that construction of the fish passage rock v-weirs (IAAC approval condition 3.13) will occur in the 2023/2024 reporting year; upon which fish passage evaluations will be completed.

Baseline pre-construction fish passage data was collected in 2021 and the results presented in the 2021/2022 annual report. Future monitoring programs (IAAC approval condition 3.17) will evaluate post-construction Elbow River velocities in the context of the baseline results presented in the 2021/2022 annual report.

4.8.4.3 Fish Tissue

The results of the pre-construction surveys to meet IAAC approval conditions 7.8 were presented in Annual Report 2021/2022. No further work is required for these approval conditions.

Future iterations of the invertebrate and fish tissue sampling program will be conducted as required by IAAC approval condition 7.8 following a flood event and results of those future studies will consider the baseline data described in the 2021/2022 annual report.

4.8.4.4 Offsetting

An Offset Measures Plan was prepared as part of the Application for Authorization under the *Fisheries Act* for the Project. The Offset Measures Plan included three conceptual offset measures for the Project that were approved by DFO in the Project Authorization dated March 18, 2022. The Authorization outlines Project activities that may result in the harmful alteration, disruption, and destruction (HADD) of fish habitat, including critical habitat for bull trout, a species at risk. The Authorization also outlines Project activities that may result in the death of fish, including bull trout, a species at risk (IAAC approval condition 3.9). The Offset Measures Plan addresses the effects of the Project through various habitat improvements, channel construction, and efforts to increase Bull Trout populations.

The Offset Measures Plan was driven by Project requirements, regulatory and fisheries management objectives, and stakeholder feedback, including feedback received from Indigenous groups and the AEPA fisheries management group. Offset measures are required in the Elbow River watershed to address provincial fisheries management objectives and objectives in the Recovery Strategy for the Bull Trout (*Salvelinus confluentus*), Saskatchewan-Nelson Rivers population, in Canada (GOC 2020). In addition, an adaptive management plan that addresses uncertainty associated with the death of fish that may result from Project operation was committed to. This adaptive management approach associated with the *Fisheries Act* Authorization states that the potential death of fish estimates based on an initial estimate proposed for the Project (and carried forward in the Authorization) will be offset. Post-flood monitoring will confirm whether initial estimates were appropriate. If post-flood monitoring suggests that the initial death of fish estimates were appropriate, no additional offsetting measures would be required. If post-flood monitoring suggests that the initial death of fish estimates were underestimated, additional offset measures will be instituted under authorization from DFO. Additional potential offsetting measures have been presented in the Application for *Fisheries Act* Authorization.

The Elbow River Side Channel design is currently in the final stages of development. Indigenous feedback has been received on this design (November 26, 2020 and January 26, 2021) and potential environmental effects associated with the offset measure (IAAC approval condition 3.10). TEC has obtained or has applied for supporting provincial and federal regulatory approvals for the construction of the Elbow River Side Channels including:

- Alberta *Historical Resources Act* approval (HRA #4956-21-0083-001)
- Alberta *Water Act* approval (currently under review with AEPA)
- Alberta *Public Lands Act* Department of Licence of Occupation
- *Canadian Navigable Waters Act* (currently under review with Transport Canada)

Additional baseline fish habitat assessments were completed between August and October 2022 to aid in works to mitigate sediment entering the upper and middle Elbow River and improve watershed conditions and Bull Trout productivity in some Elbow River tributaries. Fish and benthic invertebrate sampling was also conducted during the reporting year at Elbow Lake, Prairie Creek, and Quirk Creek. The fish and fish habitat and benthic invertebrate baseline data will be used to support the necessary provincial and federal regulatory applications required for the offsetting program.

Should the offsetting works differ from what has been provided to and discussed with Indigenous groups, additional engagement on potential environmental effects will be undertaken (IAAC approval condition 3.10)

4.9 AIR QUALITY, NOISE AND DUST

4.9.1 Air Quality and Dust

IAAC Approval Condition 6.1 – Vehicle Emissions

As per the Air Quality Monitoring Plan (AQMP), all vehicles and stationary equipment operating on the site meet or exceed the current emission standards. The construction contractor continued to ensure that all the equipment used in the Project is properly operated, regularly inspected, and maintained according to manufacture specifications. This included all equipment being operated by sub-contractors and consultants involved in the Project.

IAAC Approval Condition 6.2 – No-Idling Policy

As per the AQMP and the Project no-idling policy, vehicles were turned off when not being actively used within the Project areas unless there was a specific technical or safety reason for not doing so (e.g., extremely cold temperatures during the winter months).

IAAC Approval Condition 6.3 – Baseline Air Quality and CAAQS

Current State of the Air Quality Monitoring Network

As per the AQMP, an air quality monitoring network was established to monitor the concentrations of $PM_{2.5}$, PM_{10}, TSP at three sites located near the Project areas in June 2022.

- Between the construction access road and the diversion channel excavation work (Station 1) — Figure 4.7.
- At the dam construction site (Station 2) — Figure 4.8.
- At any borrow source site used and at the parking areas (Station 3) — Figure 4.9.

Site visits were conducted prior to installation to determine sites that meet the siting conditions outlined in Chapter 3 of the Air Monitoring Directive (AMD; (AEP 2016a)), access to reliable power, and could be accessible year-round. Each of these three sites are equipped with three environmental beta-attenuation mass monitors (EBAM) to measure $PM_{2.5}$, PM_{10}, and TSP. The $PM_{2.5}$ EBAM station is equipped with meteorological instrumentation to measure wind speed, wind direction, ambient temperature, relative humidity, and barometric pressure at station height.

An Air Quality Monitoring company, Bureau Veritas (BV) was retained to provide the monitoring equipment, setup of the equipment, maintenance and calibration, and collection of the monitoring data. The ambient and meteorological monitoring equipment was selected based on the guidance in Chapter 4 of the AMD (AEP 2017). Due to the supply-chain issues, the EBAM stations were rented from a provider until the permanent EBAM stations could be acquired in December 2022.

Site 1 was established on May 26, 2022. This site was relocated further south on December 9, -2022 as shown in Figure 4.7. The relocation was required as the original location was affected by the dust emissions from Township Road 242 due to non-project related haul traffic from the gravel operations west of the Project.

Site 2 was established with one PM_{10} EBAM station on June 1, 2022. The $PM_{2.5}$ and TSP EBAM stations were installed at Calaway Park rather than Site 2 as the supplier of the EBAM station rentals could not provide additional stations. The site lost power on August 26, 2022, which was not restored until September 15, 2022. On September 9, 2022, the PM_{10} EBAM Station was relocated to Calaway Park and converted to a TSP EBAM station as the Calaway Park TSP EBAM Station was returned to the rental company due to a malfunction of the equipment. After Calaway Park closed to the Public, the $PM_{2.5}$ and TSP EBAM Stations were relocated to Site 2 on October 28, 2022.

Site 3 was setup with three EBAM stations on April 28, 2022. Due to the lack of access to continuous reliable power, the stations were powered using a hybrid solar/diesel generator. This site was relocated on August 26, 2022, where access to power is now available.

An additional monitoring site is at Calaway Park with the cooperation of Calalta Amusements Ltd. (Calalta) as shown in Figure 4.10. Calalta is providing ongoing access to the site and power. Two EBAM stations were installed on June 3, 2022, to monitor $PM_{2.5}$, meteorology, and TSP. Due to issues with the TSP EBAM Station, the PM_{10} EBAM Station from Site 2 was reconfigured to measure TSP. On October 28, 2022, the equipment was removed from the site and relocated to Site 2. The EBAM stations were reinstalled at the same site prior to the opening of Calaway Park on May 1, 2023, for the season.

A site was selected, and agreements acquired with Rocky View County for an air quality monitoring station (AQMS) located in the community of Springbank. The AQMS site (Figure 4.11) is in the Springbank Lions Soccer Park on the northwest corner of Range Road 33 and Springbank Road (Township Road 244). The Springbank AQMS site was surveyed to determine the amount of site preparation required for a level gravel pad for the monitoring station. Fortis was contacted to install electrical service to the site. The installation and commissioning of the AQMS equipment was completed on July 7, 2023. Installation of the equipment was supposed to be completed in June, 2022, however this was postponed due to weather delays and power infrastructure installation at the site.

As a temporary alternative, meteorological data were collected from the Springbank Airport site (within the Springbank community) that is operated by Navigation Canada and ECCC. $PM_{2.5}$ and nitrogen dioxide (NO_2) concentration data are obtained from the closest regional ambient air quality monitoring stations managed by AEPA and the Calgary Region Air Zone (CRAZ). This data will continue to be collected during the construction phase for quality assurance and control purposes and comparison to the project monitoring data. Figure 4.12 shows the Project monitoring network in relation to the Springbank Airport meteorology station and the ambient air quality stations managed by CRAZ and AEPA.

The AQMS is equipped with $PM_{2.5}$, nitrogen oxides (NO_X), NO_2, and nitric oxide (NO) analyzers. A 10 m meteorological tower is co-located with the AQMS to measure wind speed and direction, vertical wind speed, ambient temperature, relative humidity, atmospheric pressure, solar radiation, and precipitation. The wind instruments are measured at 10 m above ground surface and the other instruments are measured at the height of the roof of the AQMS (i.e., approximately 3 m above the ground surface).

Monitoring Data Quality Assurance, Quality Control, and Storage

Data from the sites was initially collected as one-minute averaged data with quality assurance and quality control (QA/QC) of the data completed as per Chapter 6 of the AMD (AEP 2016b).

Data is currently obtained as daily and monthly data files of 1-hour averaged data for all the active sites. Level 0 QA/QC, with additional QA/QC processes are completed as per Chapter 6 of the AMD (AEP 2016b).

Monthly and Ad-hoc Site Visits

All the sites are visited monthly to conduct calibration audits as per Chapter 7 of the AMD (AEP 2018) and manufacture guidance. The site visit includes inspection of the site and stations to ensure that the grounds are accessible, and the ground cover does not interfere with the EBAM stations.

Additional site visits were required during the first year of operations by BV or the Indigenous Monitors (IM) for the Project to restart the EBAM stations when they were not communicating with the datacenters or to investigate power loss at the sites. Repairs were conducted as required. Site visits by Indigenous Monitors occurred when BV was unable to travel to the site to conduct the investigations and was limited to restarting the EBAM stations.

Results from the Air Quality Monitoring Program

These sites have been operated and maintained to collect the $PM_{2.5}$, PM_{10}, TSP, and NO_2 concentrations around the Project and downwind of the Project. The ambient concentration of these substances were compared to the applicable Alberta Ambient Air Quality Objectives and Guidelines (AAAQO and AAAQG) and the Canadian Ambient Air Quality Standards (CAAQS). Table 4.3 shows the current AAAQO and AAAQG and Table 4.4 shows the CAAQS.

Table 4.3 Summary of Current Alberta Ambient Air Quality Objectives and Guidelines for the Substance of Interest

Substance	Averaging Period	Concentration [1]	
		µg/m³ [2,3]	ppbv [4]
Nitrogen Dioxide (NO_2)	1-hour	300	159
	Annual	45	24
Fine Particulate Matter ($PM_{2.5}$)	1-hour [5]	80	—
	24-hour	29	—
Total Suspended Particulate Matter (TSP)	24-hour	100	—
	Annual [6]	60	—

NOTES:
1. Alberta Ambient Air Quality Objectives and Guidelines Summary (AEP 2019)
2. µg/m³ is the mass of the substance in micrograms per cubic metre of air.
3. Standard conditions of 25°C and 101.325 kilopascals (kPa) are used to convert from µg/m³ to ppbv.
4. ppbv is the volume of the substance (parts) per billion volumes of air.
5. Guideline values are used for planning, management, general performance indicators, and to assess local concerns but not for regulatory enforcement.
6. Based on annual geometric mean.

Table 4.4 Summary of Current Canadian Ambient Air Quality Standards for the Substance of Interest

Substance	Averaging Period	Concentration [1]			
		µg/m³ [2,3]		ppbv [4]	
		2020	2025	2020	2025
Nitrogen Dioxide (NO_2)	1-hour [5]	113	79	60	42
	Annual [6]	32	23	17.0	12.0
Fine Particulate Matter ($PM_{2.5}$)	24-hour [7]	27	— [8]	—	—
	Annual [9]	8.8	— [8]	—	—

NOTES:
1. Canadian Ambient Air Quality Standards (Canadian Council of Ministers of the Environment [CCME] 2021) for 2020 and 2025.
2. µg/m³ is the mass of the substance in micrograms per cubic metre of air.
3. Standard conditions of 25°C and 101.325 kPa are used to convert from µg/m³ to ppbv.
4. ppbv is the volume of the substance (parts) per billion volumes of air.
5. The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentration (CCME 2020).
6. The average over a single calendar year (CCME 2021).
7. The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations (CCME 2012).
8. Currently under review by the CCME.
9. The 3-year average of the annual average of the daily 24-hour average concentrations (CCME 2012).

The monitoring data was transmitted to a data center and regularly reviewed for potential concentrations near or above the AAAQO, AAAQG, and CAAQS. The equipment was programmed to automatically send alerts to designated persons for high concentrations, concentrations above the AAAQO and AAAQG, loss of communications with the EBAM station, or malfunctions with the equipment. Any events with measured concentrations above or near the AAAQO, AAAQG, or CAAQS were investigated to determine the potential cause of the high concentrations and, where needed, communicated to the Construction Manager to implement applicable mitigation measures. Instances where there was loss of communications or malfunctions with the equipment were investigated and any required maintenance or replacement of the EBAM stations was completed.

A summary of the monthly monitoring data is available in Appendix D for the period from June 1, 2022, to June 30, 2023. Each report provides summary statistics of the 1-hour and 24-hour averaged $PM_{2.5}$, PM_{10}, and TSP concentrations and 1-hour average meteorological parameters for each of the sites. Statistics are available for the meteorological data for the Springbank Airport for comparison to the meteorology collected at each of the sites.

This includes an indication how many hours per month the sites measured concentrations above the two thirds of the AAAQO or AAAQG or above the AAAQO or AAAQG. For AAAQO with only 24-hour average criteria, a 1-hour average equivalent was scaled using the methodology described in the Alberta Air Modelling Guideline (AEP 2021). This is used for alert levels for PM_{10} and TSP during the monitoring program as a warning that concentrations may result in concentrations above the 24-hour objectives. Comparison to the CAAQS is not completed as part of the monthly reports.

Calgary Region Air Zone (CRAZ) 1-hour average $PM_{2.5}$ data was downloaded from their website for comparison to the $PM_{2.5}$ data collected at each of the sites (Figure 4.12). Daily (24-hour) averages from the 1-hour average data were calculated for each of the CRAZ sites and compared to the 24-hour averages from the Sites.

Figures were generated for each of the parameters measured at the sites, Springbank Airport, and CRAZ monitoring stations. The following figures were generated in the reports:

- Wind Roses to show the distribution of wind speeds and directions measured at the sites and the Springbank Airport for each month.
- Histogram of the wind speeds measured at the sites and the Springbank Airport.
- Histograms of the ambient air temperatures, relative humidity, and barometric pressure measured at the sites and Springbank Airport.
    - Note that relative humidity and barometric pressure was not available from the sites when the rental EBAM Stations were deployed (June – December)
    - Note that no meteorological data was available at Site 2 until the Calaway Park rental EBAM Stations were deployed to Site 2 in October.

- Time-series of the 1-hour average $PM_{2.5}$ concentrations measured at the sites.
- Time-series of the 1-hour average $PM_{2.5}$ concentrations measured at the sites and at the CRAZ monitoring stations.
- Time-series of the 24-hour average $PM_{2.5}$ concentrations measured at the sites.
- Time-series of the 24-hour average $PM_{2.5}$ concentrations measured at the sites and at the CRAZ monitoring stations.
- Time-series of the 24-hour average PM_{10} concentrations measured at the sites.
- Time-series of the 24-hour average TSP concentrations measured at the sites.

Results Summary

The monitoring program findings for the June 2022 to June 2023 period are as follows:

- Monitoring program was successfully implemented at the three near-Project sites and Calaway Park. Monitoring is continuing to operate effectively to monitor Project impacts on air quality and inform mitigation of fugitive dust.
- Measured concentrations of $PM_{2.5}$ at Sites 1, 2, 3 and Calaway Park were typically like, or less than, concentrations measured in the City of Calgary. Occasionally elevated concentrations were measured associated with wildfire smoke.
- Occasionally, there were elevated concentrations of TSP and PM_{10} at Sites 1, 2, 3 and Calaway Park (for TSP) measured associated with Project earth works (i.e., some unmerchantable timber was burnt in January and February 2023 at the floodplain berms), wildfire smoke, fall harvesting, spring seeding, and activities from other projects in the region. Episodes of elevated concentration associated with Project activities occurred infrequently and for limited durations. Where elevated concentrations persisted, mitigation was employed to reduce concentrations.

Table 4.5 shows a summary of the 1-hour average particulate matter monthly average, maximum, median, percent complete and number of hours when the measured $PM_{2.5}$ 1-hour average concentrations were above the AAAQG for June to December of 2022. Similar summary of the 24-hour average statistics is shown in Table 4.6, Table 4.7, and Table 4.8 shows the same statistics for the 1-hour and 24-h averages for the January to June 2023 period.

Table 4.5 Summary of Monthly 1-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (June - December 2022)

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
June	Monthly Average	11.4	17.2	31.3	—	57.0	—	11.6	14.9	24.9	12.8	26.4
	Maximum 1-hour Average	51.7	211	340	—	1,053	—	51.9	71.1	148	51.0	230
	Median 1-hour Average	9.52	13.7	20.9	—	18.7	—	9.92	13.3	20.8	10.6	18.6
	% Complete	98.8%	99.3%	99.3%	0.0%	93.8%	0.0%	99.6%	99.4%	99.6%	90.6%	89.7%
	Hours Above 1-hour AAAQG	0			0			0			0	
July	Monthly Average	11.5	23.6	54.4	—	46.8	—	10.8	14.6	27.5	11.8	27.9
	Maximum 1-hour Average	46.8	177	656	—	2,310	—	40.7	69.9	193	53.2	240
	Median 1-hour Average	9.75	17.9	33.8	—	14.6	—	9.36	12.4	23.8	9.53	23.2
	% Complete	97.4%	99.5%	99.6%	0.0%	89.4%	0.0%	99.2%	86.7%	99.3%	99.5%	73.5%
	Hours Above 1-hour AAAQG	0			0			0			0	
August	Monthly Average	12.3	48.1	111	—	119	—	13.2	17.1	28.4	13.4	27.1
	Maximum 1-hour Average	93.1	1,607	1,746	—	5,728	—	53.0	114	440	98.0	133
	Median 1-hour Average	9.17	23.8	45.8	—	22.9	—	11.7	15.0	25.4	10.3	23.2
	% Complete	99.9%	99.7%	99.6%	0.0%	73.9%	0.0%	99.7%	72.6%	99.6%	99.9%	97.0%
	Hours Above 1-hour AAAQG	1			0			0			2	
September	Monthly Average	14.3	26.7	65.4	—	—	—	18.0	21.0	32.0	17.1	33.7
	Maximum 1-hour Average	70.9	262	854	—	—	—	75.6	117	363	308	125
	Median 1-hour Average	11.0	19.5	32.8	—	—	—	14.8	17.8	27.0	12.5	29.6
	% Complete	99.6%	99.4%	99.3%	0.0%	0.0%	0.0%	99.7%	88.8%	99.6%	99.4%	98.3%
	Hours Above 1-hour AAAQG	0			0			0			5	

Table 4.5 Summary of Monthly 1-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (June - December 2022) – Continued

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
October	Monthly Average	9.23	29.5	65.8	5.74	—	17.0	11.6	18.2	31.9	11.5	34.8
	Maximum 1-hour Average	64.2	2,430	2,284	23.2	—	318	47.1	415	804	43.0	750
	Median 1-hour Average	7.17	15.2	24.0	4.33	—	8.08	9.92	14.1	22.4	9.67	26.4
	% Complete	99.9%	94.2%	99.7%	10.6%	0.0%	10.5%	99.9%	94.4%	99.9%	88.2%	88.3%
	Hours Above 1-hour AAAQG	0			0			0			0	
November	Monthly Average	8.54	27.8	36.7	9.22	—	30.1	11.1	19.6	27.4	—	—
	Maximum 1-hour Average	44.0	898	1,310	50.5	—	973	58.4	295	634	—	—
	Median 1-hour Average	5.82	11.0	11.8	6.43	—	13.8	8.25	10.6	12.6	—	—
	% Complete	99.4%	98.8%	96.1%	99.2%	0.0%	99.0%	98.6%	92.2%	96.8%	0.0%	0.0%
	Hours Above 1-hour AAAQG	0			0			0			0	
December	Monthly Average	7.03	19.2	18.9	8.27	11.3	23.6	7.05	9.05	15.6	—	—
	Maximum 1-hour Average	89.0	580	1,215	226	440	749	46.3	62.7	408	—	—
	Median 1-hour Average	4.00	7.32	7.50	5.00	6.00	12.0	5.00	6.57	8.33	—	—
	% Complete	92.5%	68.7%	72.2%	69.6%	37.4%	76.5%	95.8%	69.4%	84.0%	0.0%	0.0%
	Hours Above 1-hour AAAQG	1			2			0			0	

Table 4.6 Summary of Monthly 24-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (June - December 2022)

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
June	Monthly Average	11.4	17.3	31.3	—	54.7	—	11.6	14.9	24.8	12.8	26.2
	Maximum 24-hour Average	16.7	37.0	73.3	—	258	—	18.7	22.9	44.6	22.9	76.0
	Median 24-hour Average	11.0	15.5	27.4	—	26.7	—	11.2	14.5	21.8	12.8	19.5
	% Complete	100%	100%	100%	0.0%	90.0%	0.0%	100%	100%	100%	90.0%	90.0%
	Days Above 24-hour AAAQO [1]	0	0	0	0	11	0	0	0	0	0	0
July	Monthly Average	11.5	23.6	54.5	—	47.5	—	10.8	14.6	27.4	11.8	28.2
	Maximum 24-hour Average	15.3	56.4	183	—	286	—	14.8	22.9	69.9	18.7	60.4
	Median 24-hour Average	11.7	23.1	49.2	—	16.3	—	10.5	13.9	24.8	11.5	26.1
	% Complete	96.8%	100%	100%	0.0%	87.1%	0.0%	100%	83.9%	100%	100%	67.7%
	Days Above 24-hour AAAQO [1]	0	1	4	0	6	0	0	0	0	0	0
August	Monthly Average	12.3	48.1	111	—	123	—	13.2	17.2	28.4	13.4	27.2
	Maximum 24-hour Average	21.7	154	402	—	797	—	17.7	25.7	48.5	29.7	46.8
	Median 24-hour Average	12.3	35.3	92.2	—	28.3	—	14.1	17.9	28.8	12.1	26.3
	% Complete	100%	100%	100%	0.0%	67.7%	0.0%	100%	61.3%	100%	100%	96.8%
	Days Above 24-hour AAAQO [1]	0	11	15	0	6	0	0	0	0	1	0

NOTE:
24-hour Average PM_{10} concentrations were evaluated based on the value of 50 µg/m^3 which is used by other Canadian jurisdictions but just to indicate if the PM_{10} concentrations were potentially high and that mitigation measures should be applied.

Table 4.6 Summary of Monthly 24-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (June - December 2022) – Continued

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
September	Monthly Average	14.3	26.7	65.2	—	—	—	18.0	21.6	32.0	17.1	34.2
	Maximum 24-hour Average	29.2	79.6	273	—	—	—	32.6	39.0	50.1	46.5	55.7
	Median 24-hour Average	11.0	23.0	53.5	—	—	—	15.1	19.7	29.7	13.0	33.4
	% Complete	100%	100%	100%	0.0%	0.0%	0.0%	100%	80.0%	100%	100%	96.7%
	Days Above 24-hour AAAQO [1]	2	1	5	0	0	0	4	0	0	4	0
October	Monthly Average	9.23	30.1	65.9	5.49	—	17.8	11.6	18.1	31.9	11.5	35.1
	Maximum 24-hour Average	18.3	151	474	7.99	—	32.4	18.2	34.9	93.0	19.2	147
	Median 24-hour Average	9.11	19.6	42.9	5.28	—	13.1	12.1	18.3	29.9	12.8	31.1
	% Complete	100%	93.5%	100%	9.7%	0.0%	9.68%	100%	93.5%	100%	87.1%	87.1%
	Days Above 24-hour AAAQO [1]	0	4	5	0	0	0	0	0	0	0	1
November	Monthly Average	8.54	27.6	39.4	9.22	—	30.1	11.1	19.6	27.3	—	—
	Maximum 24-hour Average	15.4	210	330	19.0	—	120	24.3	92.0	110	—	—
	Median 24-hour Average	8.69	13.6	17.6	9.09	—	18.9	10.2	12.3	17.2	—	—
	% Complete	100%	100%	96.7%	100%	0.0%	100%	100%	93.3%	96.7%	0.0%	0.0%
	Days Above 24-hour AAAQO [1]	0	4	2	0	0	2	0	3	2	0	0

NOTE:

24-hour Average PM_{10} concentrations were evaluated based on the value of 50 µg/m^3 which is used by other Canadian jurisdictions but just to indicate if the PM_{10} concentrations were potentially high and that mitigation measures should be applied.

Table 4.6 Summary of Monthly 24-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (June - December 2022) – Continued

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
December	Monthly Average	6.79	18.4	15.7	8.50	11.5	23.4	7.01	9.17	15.4	—	—
	Maximum 24-hour Average	18.8	73.5	66.2	25.0	28.3	75.1	21.7	19.9	58.5	—	—
	Median 24-hour Average	4.52	13.4	7.67	6.16	7.71	21.5	4.72	7.83	10.6	—	—
	% Complete	93.5%	67.7%	67.7%	67.7%	35.5%	74.2%	96.8%	64.5%	80.6%	0.0%	0.0%
	Days Above 24-hour AAAQO [1]	0	2	0	0	0	0	0	0	0	0	0

NOTE:

24-hour Average PM_{10} concentrations were evaluated based on the value of 50 µg/m^3 which is used by other Canadian jurisdictions but just to indicate if the PM_{10} concentrations were potentially high and that mitigation measures should be applied.

Table 4.7 Summary of Monthly 1-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (January – June 2023)

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
January	Monthly Average	2.98	4.19	6.45	2.99	4.49	7.35	3.44	7.89	15.5	2.73	7.51
	Maximum 1-hour Average	62.0	75.0	136	62.0	69.0	136	82.0	190	888	23.0	133
	Median 1-hour Average	2.00	2.00	4.00	2.00	3.00	4.00	2.00	3.00	5.00	2.00	5.00
	% Complete	92.1%	91.4%	89.2%	90.9%	91.3%	90.5%	89.9%	90.9%	91.4%	43.3%	47.7%
	Hours Above 1-hour AAAQG	0			0			1			0	
February	Monthly Average	3.85	5.44	9.04	3.98	11.1	15.4	4.52	8.47	15.2	—	—
	Maximum 1-hour Average	28.0	78.0	71.0	53.0	621	223	54.0	217	467	—	—
	Median 1-hour Average	3.00	3.00	5.00	2.00	5.00	8.00	3.00	5.00	7.00	—	—
	% Complete	90.3%	88.4%	84.1%	88.4%	90.8%	88.2%	91.5%	86.3%	95.2%	0.0%	0.0%
	Hours Above 1-hour AAAQG	0			0			0			0	
March	Monthly Average	9.16	14.5	22.0	8.23	13.0	19.4	8.63	13.3	14.3	—	—
	Maximum 1-hour Average	94.0	232	437	94.0	127	554	46.0	132	188	—	—
	Median 1-hour Average	7.00	11.0	15.0	7.00	10.0	13.0	7.00	11.0	12.0	—	—
	% Complete	94.2%	93.5%	94.5%	91.8%	91.9%	95.3%	97.4%	94.4%	97.2%	0.0%	0.0%
	Hours Above 1-hour AAAQG	1			1			0			0	
April	Monthly Average	3.99	7.17	15.3	3.16	7.30	19.0	3.74	6.92	13.4	—	—
	Maximum 1-hour Average	38.0	284	1,046	31.0	117	577	29.0	146	647	—	—
	Median 1-hour Average	3.00	5.00	8.00	2.00	5.00	8.00	3.00	5.00	7.00	—	—
	% Complete	92.2%	94.2%	95.7%	88.9%	89.9%	92.2%	96.5%	95.7%	97.2%	0.0%	0.0%
	Hours Above 1-hour AAAQG	0			0			0			0	

Table 4.7 Summary of Monthly 1-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (January – June 2023) – Continued

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
May	Monthly Average	21.4	27.6	40.2	20.8	32.1	63.9	21.4	28.6	42.1	23.0	46.2
	Maximum 1-hour Average	395	424	430	396	441	725	396	424	443	389	452
	Median 1-hour Average	8.00	13.0	23.0	7.00	13.0	26.0	7.50	14.0	23.0	7.00	28.0
	% Complete	93.1%	93.0%	92.6%	90.7%	92.5%	92.2%	98.4%	98.1%	99.1%	87.0%	84.0%
	Hours Above 1-hour AAAQG	51			52			58			66	
June	Monthly Average	10.7	19.3	29.3	9.90	21.3	48.8	11.1	18.3	27.6	9.22	24.5
	Maximum 1-hour Average	112	132	230	106	475	624	117	205	269	106	335
	Median 1-hour Average	8.00	15.0	22.0	7.00	15.0	29.5	7.00	12.0	18.0	6.00	19.0
	% Complete	84.0%	83.3%	83.5%	90.6%	91.7%	91.7%	96.5%	96.8%	98.1%	95.7%	92.5%
	Hours Above 1-hour AAAQG	7			8			10			7	

Table 4.8 Summary of Monthly 24-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (January – June 2023)

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
January	Monthly Average	3.05	3.77	6.46	2.84	6.78	15.5	3.73	5.95	7.67	—	—
	Maximum 24-hour Average	12.8	11.3	18.5	15.4	34.4	114	23.0	25.3	27.7	—	—
	Median 24-hour Average	2.19	3.11	6.11	1.71	4.20	8.26	2.36	4.12	5.78	—	—
	% Complete	93.5%	90.3%	90.3%	83.9%	90.3%	90.3%	90.3%	90.3%	93.5%	0.0%	0.0%
	Days Above 24-hour AAAQO [1]	0	0	0	0	0	1	0	0	0	0	0
February	Monthly Average	3.72	5.10	8.69	3.98	10.6	15.8	4.44	8.02	15.3	—	—
	Maximum 24-hour Average	13.4	14.0	25.0	12.8	51.7	28.1	13.3	33.0	75.4	—	—
	Median 24-hour Average	2.77	3.63	6.42	2.64	5.38	13.8	3.43	6.10	12.4	—	—
	% Complete	85.7%	85.7%	82.1%	89.3%	89.3%	85.7%	92.9%	85.7%	96.4%	0.0%	0.0%
	Days Above 24-hour AAAQO [1]	0	0	0	0	1	0	0	0	0	0	0
March	Monthly Average	9.23	14.6	22.2	8.51	13.1	19.5	8.68	13.5	14.4	—	—
	Maximum 24-hour Average	22.7	47.5	53.9	19.6	28.0	49.8	17.2	33.5	30.6	—	—
	Median 24-hour Average	10.0	13.3	19.5	8.56	12.4	15.8	8.83	12.4	13.3	—	—
	% Complete	100%	100%	100%	90.3%	96.8%	96.8%	100%	100%	100%	0.0%	0.0%
	Days Above 24-hour AAAQO [1]	0	0	0	0	0	0	0	0	0	0	0
April	Monthly Average	4.04	7.07	15.0	3.23	7.58	19.4	3.72	6.90	13.4	—	—
	Maximum 24-hour Average	8.70	28.6	88.6	7.70	19.5	87.3	8.08	13.7	39.9	—	—
	Median 24-hour Average	4.09	5.32	10.6	2.85	6.89	11.2	3.62	6.13	9.44	—	—
	% Complete	96.7%	100%	100%	86.7%	86.7%	90.0%	100%	100%	100%	0.0%	0.0%
	Days Above 24-hour AAAQO [1]	0	0	0	0	0	0	0	0	0	0	0

Table 4.8 Summary of Monthly 24-hour Average Particulate Matter Statistics, Percent Complete, and Hours Concentrations Measured Above AAAQG (January – June 2023) – Continued

Month	Statistic	Site 1			Site 2			Site 3			Calaway Park	
		$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	PM_{10}	TSP	$PM_{2.5}$	TSP
May	Monthly Average	21.5	27.4	39.0	22.7	32.2	62.5	21.2	28.3	41.9	23.7	45.4
	Maximum 24-hour Average	141	157	171	156	156	279	145	159	176	143	174
	Median 24-hour Average	7.51	15.1	24.7	7.06	16.8	38.8	7.22	15.0	26.7	6.60	27.9
	% Complete	90.3%	90.3%	90.3%	90.3%	90.3%	90.3%	100%	100%	100%	83.9%	83.9%
	Days Above 24-hour AAAQO [1]	4	4	2	4	4	6	5	4	4	5	3
June	Monthly Average	11.4	20.3	30.8	10.2	20.8	47.0	11.1	18.0	27.4	9.06	23.5
	Maximum 24-hour Average	48.5	55.4	57.5	49.1	52.5	151	53.7	58.3	69.2	50.6	67.0
	Median 24-hour Average	8.35	19.4	29.0	7.59	19.3	45.2	8.79	13.2	20.5	6.17	20.5
	% Complete	76.7%	76.7%	76.7%	83.3%	86.7%	86.7%	100%	100%	100%	96.7%	96.7%
	Days Above 24-hour AAAQO [1]	1	1	0	1	1	1	2	1	0	2	0
	Monthly Average	21.5	27.4	39.0	22.7	32.2	62.5	21.2	28.3	41.9	23.7	45.4

NOTE:

24-hour Average PM_{10} concentrations were evaluated based on the value of 50 µg/m^3 which is used by other Canadian jurisdictions but just to indicate if the PM_{10} concentrations were potentially high and that mitigation measures should be applied.

IAAC Approval Condition 6.4 & 7.10 – Verification of the Accuracy of the Environmental Assessment

The AQMP was designed to collect the information for a verification study and was reviewed by ECCC and Health Canada. Specific to each sub-condition:

- Monitoring locations were located at the perimeter of the planned Project area as per the AQMP. The site location at Calaway Park was selected based on the consultation with Calalta, the owner and operator of the park. The location of the Springbank AQMS site was discussed with Rocky View County and Springbank Park for all Seasons.
- Ambient air quality analyzer to monitor NO_X, NO_2, and NO will be part of the Springbank AQMS.
- $PM_{2.5}$, PM_{10}, and TSP are being monitored by EBAM stations located at three sites around the Project area and will be operated throughout the construction phase at:
  - Site 1: between the permanent access road and diversion channel.
  - Site 2: south of the dry dam construction site.
  - Site 3: east side of dry dam area near borrow source sites.
- Meteorological parameters of wind speed, wind direction, and temperature are being collected at each of the three monitoring sites and the Calaway Park site at instrument height (i.e., approximately 2 m above ground surface). Meteorological data is also being collected from the Springbank Airport site that is operated by Navigation Canada and ECCC to supplement the monitoring program.
- CAAQS are part of the evaluation of the $PM_{2.5}$ and NO_2 ambient air quality data collected by the EBAM stations and Springbank AQMS.
- The 1-hour average $PM_{2.5}$ concentrations are being evaluated with the AAAQG (80 µg/m^3). The 24-hour average $PM_{2.5}$ and TSP concentrations are being evaluated with the AAAQO (29 µg/m^3 and 100 µg/m^3 respectively. The annual average TSP concentrations are evaluated using the AAAQO (60 µg/m^3).
- As there are no Alberta objective or guidelines or CAAQS for PM_{10}, a 24-hour average concentration of 50 µg/m^3 is being used to evaluate the PM_{10} concentrations. This value is used by other jurisdictions in Canada. It will not be used as an enforceable criterion but to determine whether the concentrations are considered high.
- The results of the evaluation of the AAAQO, AAAQG, or CAAQS are used to determine the application of mitigation strategies or changes to the air quality monitoring network using adaptive management.

IAAC Approval Condition 6.5 & 7.11 – Indigenous Group Plain Language Bi-Annual Reporting

The twice annual air quality report, capturing the June 2022 to December 2022 time period, was distributed to Indigenous groups on August 24, 2023.

IAAC Approval Condition 7.5 – Fugitive Dust Emission Mitigation

Speed limits were implemented as per the AQMP on roads within the Project construction areas. The speed limit of Highway 22 was reduced to 60 kilometres per hour (km/h) from 100 km/h. Volker Stevin regularly cleans the highway to remove dirt and dust using street sweepers.

The heavy haul roads have a speed limit of 50 km/h except for the service spillway, which is further reduced to 30 km/h. During extreme hot, dry, and windy conditions the haul road speed limit is reduced to 30 km/h. The speed limits were monitored by the Contractor's safety team and the foreman on site. Light duty vehicle service roads had a speed limit of 30 km/h.

Water trucks applied water on the project roads 24 hours a day, seven days a week. Aqua Eco Ramp water nozzles (designed and patented by Vinci Construction) were installed on two of the water trucks to direct the water spray downward to concentrate the application of water onto the road surfaces to make the mitigation measure more effective. During high winds or if increased generation of dust is observed, additional water mitigation is applied, and vehicle speed limits are imposed. Table 4.9 shows the volume of water applied to the Project roads between June 2022 to June 2023. Water was not applied if the ground was frozen, or snow covered or if the air temperature was below 0°C.

Dugouts were used to store water in the Project construction area for soil conditioning and dust mitigation. This water is sourced from the Elbow River, groundwater wells, precipitation, and overland water flow; see Section 4.3.4 for details on the dugouts.

Stockpiles and other disturbed surfaces were monitored for dust generation and when necessary re-contoured and track-packed to limit wind erosion, silt fencing was also used to limit dust generation from disturbed soils. These areas were also left to naturally re-vegetated starting the spring of 2023 as a form of dust erosion and sediment control measure.

Two separate dust complaints were made in May 2022. Upon investigation, it was determined that the dust was associated with work being completed by a third-party company within the Project area. Following discussions and confirmation with Rocky View County and the third-party company, calcium chloride was applied along Range Road 41 to suppress the dust. Calcium chloride was applied as needed in areas prone to dust generation.

The construction office is powered by the local power grid and all light towers were switched to solar power in May 2023. The generators and other equipment at the Diversion Inlet were switched from diesel fuel to propane in October 2022. All this equipment is now electrically powered.

Table 4.9 Summary of Monthly Water Mitigation Applied to Haul and Light-duty Roads

Month	Volume of Water Applied (m^3)
June 2022	576
July 2022	2,160
August 2022	19,940
September 2022	12,240
October 2022	1,900
November 2022 [1]	0
December 2022 [1]	0
January 2023 [1]	0
February 2023 [1]	0
March 2023 [1]	0
April 2023 [1]	0
May 2023	4,926
June 2023	6,608

NOTE:
1. Roads were frozen or snow covered.

4.9.2 Noise

4.9.2.1 Noise Monitoring

During the 2022/2023 reporting year, TEC received two noise complaints. Noise monitoring was conducted following both complaints to confirm the attenuation of noise from the closest construction activity and in both instances, noise measurements were less than the short-term noise exposure levels detailed in United States Environmental Protection Agency Office of Noise Abatement and Control document.

Noise was monitored throughout the 2022/2023 reporting year; noise measurements were taken at various locations near the active Project site and compared against the noise exposure levels detailed in United States Environmental Protection Agency Office of Noise Abatement and Control document. All measurements were below the noise exposure levels. Noise

measurements demonstrated that the noise (decibel; dB) produced by the night shift activities in 2022/2023 were not above the approved threshold (in this case, sleep disturbance threshold as stated by Health Canada is 53 dB). Using the relation noise at source / distance (sound level drops off 6 dB per doubling the distance), it was demonstrated that noise was below the above-mentioned threshold of 53 dB before reaching the location of the complainant (over 1,500 m from the source).

Noise complaints occurred on February 1, 2023, and February 11, 2023. A review of the construction activities determined that there was hauling and unloading of materials from the diversion outlet to the Highway 22 work area. Neighbors were contacted and provided feedback soon after the noise complaint was received, and concerns were resolved.

There were no blasting activities during the 2022/2023 reporting year.

4.10 ARCHAEOLOGICAL AND HERITAGE RESOURCES

In accordance with IAAC approval condition 9.2 and as required by Alberta Arts, Culture, and Status of Women (AACSW), archaeological impact assessment studies are ongoing. During the 2022/2023 reporting year, site-specific archaeological field studies were conducted, and conditional HRA approval was received for one site that was previously recorded and impacts mitigated. Field studies continued as required at one archaeological site, which included mitigative archaeological hand excavation. The majority of required hand excavations were completed during the 2022/2023 reporting year. The remaining required hand excavations will be completed in the next reporting year.

As required by IAAC approval condition 9.3 and 9.9, an Archaeological and Heritage Resource Management Plan was developed in late 2021 with involvement from Indigenous communities and AACSW. During First Nation Land Use Advisory Committee (FNLUAC) meetings in Q1 2023, feedback on the Archaeological and Heritage Resource Management Plan was provided by one Indigenous group; TEC is in the process of incorporating the feedback into the Archaeological and Heritage Resource Management Plan. The Plan will be re-issued to IAAC and Indigenous groups once edits have been made.

4.10.1 *Historical Resources Act* Section 31 Chance Finds

During the 2022/2023 reporting year, five *Historical Resource Act* Section 31 Finds (HRA Section 31 Finds) were identified by the Indigenous Monitors and one HRA Section 31 Find by the Palaeontologist monitor. As required and detailed in the Archaeological and Heritage Management Plan, the HRA Section 31 Find procedure was initiated and adhered to until it was determined that the buffer could be removed, and construction activities could re-start in the HRA Section 31 Find areas. No further activities were required for these finds.

For one HRA Section 31 find identified by Indigenous Monitors on June 5, 2023, additional activities were necessary. The HRA Section 31 Find Procedure as detailed in the Archeological and Heritage Resource Management Plan was initiated. A field assessment was conducted by an archeologist with Indigenous Monitors in attendance and participating in identifying additional items of interest. The HRA Find was determined to be protected under the HRA and further assessment is required (including shovel testing) to determine the extent of HRA Section 31 Find boundary. Results of the further assessment will be communicated to AACSW in which, next steps will be determined. Indigenous Monitors will continue to visit and maintain the buffer zone until further notice. Indigenous Monitors will be in attendance for the shovel testing.

4.10.2 Cultural Awareness Training

The Prime Contractor, who is responsible for the provision of all labor and materials, construction, and commissioning of the SR1, as part of their Construction contract, are required to organize cultural awareness sessions to comply with IAAC approval condition 9.4. In order for new hires and existing staff who have not attended a previous session to attend Indigenous Cultural Awareness sessions, the Prime Contractor, working collaboratively with Community Futures Treaty 7, Tsuut'ina Nation (due to proximity to the Project), Treaty 6 Nations and Métis Nation of Alberta Region 3, aim to schedule quarterly sessions. Community Futures Treaty 7, Treaty 6 Nations and Métis Nation of Alberta Region 3 have been provided opportunities to facilitate or provide the training. Two sessions were provided during the 2021/2022 reporting year and an additional two sessions were provided during the 2022/2023 reporting year.

Additionally, the Prime Contractor has prepared material in a PowerPoint presentation format that is included in the new hires orientation package and workplace orientation attended by new hires on their first day working on the Project. Community Futures Treaty 7, Tsuut'ina Nation, Treaty 6 Nations and Métis Nation of Alberta Region 3 were sent the material for review and to date no feedback has been received.

4.10.3 Palaeontology

As per IAAC approval condition 9.7 and as required by AACSW, palaeontological construction monitoring was completed where required during the 2022/2023 reporting year by a qualified palaeontologist. As per IAAC approval condition 9.7.1 and 9.7.2 monitoring occurred during bedrock excavation of the diversion inlet, diversion channel, and along Highway 22 and fluvial sediment excavations at the low-level outlet, diversion channel, and emergency spillway. During the 2022/2023 reporting year, seven fossil sites were reported to the Royal Tyrrell Museum of Palaeontology. Additional mitigation was required by the Royal Tyrrell Museum of Palaeontology for two sites, consisting of intensive collection and documentation. After the necessary work occurred, construction was allowed to continue.

4.11 LAND USE PLANNING

4.11.1 First Nation Land Use Advisory Committee

The following is an update of the work completed during the 2022/2023 reporting year specific to condition 8.8, 8.11, 8.12, and 8.14.

Condition 8.8 Progress to date

- Development of the land use plan is on schedule to meet the timelines in Condition 8.8. Public engagement on a draft land use plan is anticipated in fall 2023, and the final land use plan is anticipated to be ready for submission to the IAAC in spring 2024.
- Work continues with the First Nations Land Use Advisory Committee on development of the land use plan.
- The land use planning process is adhering to the Updated Draft Guiding Principles and Direction for Future Land Use document that was approved as part of the Springbank Off-Stream Reservoir application process.

Condition 8.11 Progress to date

- The Government of Alberta worked with the First Nations Land Use Advisory Committee on a Terms of Reference in early 2022, which was submitted to IAAC on May 4, 2022. This will remain a living document throughout the life of the project.
- The Government of Alberta continues to hold regular meetings with the First Nations Land Use Advisory Committee composed of Treaty 7 First Nations and Treaty 6 First Nations.
- Between July 1, 2022, and June 30, 2023, there were two on-line meetings and six in-person meetings that were up to three days in length. Meeting discussions included direction under the approval conditions to be considered in the land use plan, operational requirements of the project, the exercise of Treaty rights and traditional uses, the staging area, public use and access, and other related topics.
- In early 2023, the First Nations Land Use Advisory Committee requested a name change to the First Nations Land Use Collaboration Committee (FNLUCC) to better reflect the commitment to collaboration from all parties involved in the land use planning process. The committee's name was changed in February 2023.

Condition 8.12

- The eleven Treaty 7 First Nations and Treaty 6 First Nations identified in the IAAC Decision Statement continue to be invited to participate in the First Nations Land Use Collaboration Committee. In addition, the Government of Alberta has also invited Sunchild First Nation and O'Chiese First Nation to participate.
- IAAC identified four additional Indigenous communities for inclusion in the land use planning process (Ktunaxa Nation Council, Foothills Ojibway First Nation, Métis Nation of Alberta - Region 3, Métis Nation of British Columbia). These communities were invited to participate in the Joint Land Use Advisory Committee consisting of representatives from Indigenous communities, local municipal governments, non-governmental organizations, local landholders and other stakeholders. This committee completed their work and submitted a recommendations report to the Government of Alberta in January 2023 to be considered in the land use planning.

Condition 8.14

- The Preliminary Approach for Monitoring and Evaluation of the Land Use Plan submitted to IAAC in May 2022 will be refined to adhere to appropriate identified elements included in the final land use plan.

5.0 REFERENCES

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APPENDIX A
IAAC APPROVAL CONDITIONS CONCORDANCE TABLE

Table A.1 IAAC Approval Conditions Concordance Table

	Condition #	Summary of Condition	Annual Report Section
Definitions and General Conditions	**1.1 to 1.37**	Definitions	Definitions were reviewed and adhered to in the 2022/2023 Annual Report
	2.1 to 2.3	General conditions	General conditions were reviewed and adhered to in the 2022/2023 Annual Report
Consultation	**2.4**	2.4 The Proponent shall, where consultation is a requirement of a condition set out in this Decision Statement: 2.4.1 provide a written notice of the opportunity for the party or parties being consulted to present their views and information on the subject of the consultation; 2.4.2 provide all information available and relevant to the scope and the subject matter of the consultation and a period of time agreed upon with the party or parties being consulted, not to be less than 30 days for consultation pertaining to Current use of lands and resources for traditional purposes, Physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance, and Species at risk, and not less than 15 days for other consultation activities, to prepare their views and information; 2.4.3 undertake an impartial consideration of all views and information presented by the party or parties being consulted on the subject matter of the consultation; and 2.4.4 advise in a timely manner the party or parties being consulted on how the views and information received have been considered by the Proponent, including a rationale for why the views have, or have not, been integrated.	3.1
	2.5	The Proponent shall, where consultation with Indigenous groups is a requirement of a condition set out in this Decision Statement, communicate with each group with respect to the manner to satisfy the consultation requirements referred to in condition 2.4, including methods of notification, the type of information and the period of time to be provided when seeking input, the process to be used by the Proponent to undertake impartial consideration of all views and information presented on the subject of the consultation, and the period of time and the means to advise groups of how their views and information were considered by the Proponent.	3.1
Follow-up requirements	**2.6**	The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement, determine, as part of the development of each follow-up program and in consultation with the party or parties being consulted during the development, the following information: 2.6.1 the methodology, location, frequency, timing and duration of monitoring associated with the follow-up program; 2.6.2 the scope, content and frequency of reporting of the results of the follow-up program; 2.6.3 the frequency at which the follow-up program must be updated; 2.6.4 the levels of environmental change relative to baseline that would require the Proponent to implement modified or additional mitigation measure(s), including instances where the Proponent may require Designated Project activities to be stopped; and 2.6.5 the technically and economically feasible mitigation measures to be implemented by the Proponent if monitoring conducted as part of the follow-up program shows that the levels of environmental change referred to in condition 2.6.4 have been reached or exceeded.	TEC has reviewed and is in compliance with condition 2.6 (2.6.1 through 2.6.5). TEC developed monitoring programs and will revise them, as required (i.e., if there is an operation event and/or every 10 years)
	2.7	The Proponent shall update the information determined for each follow-up program pursuant to condition 2.6 during the implementation of each follow-up program, at the minimum frequency determined pursuant to condition 2.6.3 and in consultation with the party or parties being consulted during the development of each follow-up program.	Condition acknowledged. Follow-up programs were not updated during this reporting period. Follow-up programs will be updated as per the timing in each plan.
	2.8	The Proponent shall provide the follow-up programs referred to in conditions 3.17, 3.18, 3.19, 3.20, 4.11, 6.4, 7.8, 7.9, 7.10, 8.13, 8.14 and 9.9 to the Agency and to the party or parties being consulted during the development of each follow-up program prior to the implementation of each follow-up program. The Proponent shall also provide any update made pursuant to condition 2.7 to the Agency and to the party or parties being consulted during the development of each follow-up program within 30 days of the follow-up program being updated.	Condition acknowledged. Follow-up programs were not updated during this reporting period. Follow-up programs will be updated as per the timing in each plan.

	Condition #	Summary of Condition	Annual Report Section
Follow-up requirements (cont'd)	**2.9**	The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement: 2.9.1 implement the follow-up program according to the information determined pursuant to condition 2.6; 2.9.2 conduct monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure; 2.9.3 determine whether modified or additional mitigation measure(s) are required based on the monitoring and analysis undertaken pursuant to condition 2.9.2; and 2.9.4 if modified or additional mitigation measures are required pursuant to condition 2.9.3, develop and implement these mitigation measure(s) in a timely manner and monitor them pursuant to condition 2.9.2.	Condition acknowledged. Follow-up programs will be implemented according to the information determined pursuant to condition 2.6, monitoring and analysis conducted to verify accuracy of the environmental assessment as it pertains to the condition(s). If modified or additional mitigation measures are required pursuant to condition 2.9.3, mitigation measure(s) will be reviewed and revised in a timely manner and monitored pursuant to condition 2.9.2.
Annual reporting	**2.10**	Where consultation with Indigenous groups is a requirement of a follow-up program, the Proponent shall discuss the follow-up program with each group and shall determine, in consultation with each group, opportunities for their participation in the implementation of the follow-up program, including the conduct of monitoring, the analysis and reporting of follow-up results and whether modified or additional mitigation measure(s) are required, as set out in condition 2.9	Condition 2.10 has been reviewed and where possible, Indigenous labour will be recruited to assist with efforts to conduct regulatory follow-up monitoring for the Project. Indigenous monitors that were retained during the 2022/2023 reporting year is provided in Section 4.5.1.
	2.11	The Proponent shall prepare an annual report that sets out, for that reporting year (see sub-sections 2.11.1 - 2.11.8)	2.1, 3, Table 3.1, 3.1
	2.12	The first reporting year for which the Proponent shall prepare an annual report pursuant to condition 2.11 shall start on the day the Minister of the Environment issues the Decision Statement to the Proponent pursuant to subsection 54 (1) of the *Canadian Environmental Assessment Act, 2012*.	The condition was adhered to in the first annual report (2021/2022) submitted to the Agency on October 31, 2022.
	2.13	The Proponent shall submit to the Agency and the First Nation Land Use Committee referred to in condition 8.11 the annual report referred to in condition 2.11, including a plain language executive summary in both official languages, no later than October 31 following the reporting year to which the annual report applies.	See Executive summary
Information Sharing	**2.14**	The Proponent shall keep these documents publicly available for 15 years following their publication	The documents will be publicly available for 15 years, following their publication
	2.15	When the development of any plan is a requirement of a condition set out in this Decision Statement, the Proponent shall submit the plan to the Agency prior to construction, unless otherwise required through the condition.	3; 3.1, 4.4
Change in Proponent	**2.16**	The Proponent shall notify the Agency and Indigenous groups in writing no later than 30 days after the day on which there is any transfer of ownership, care, control of Management of the Designated Project in whole or in part	As required, TEC will notify the Agency and Indigenous groups in writing no later than 30 days after the day on which there is any transfer of ownership, care, control of Management of the Designated Project in whole or in part

Appendix A IAAC Approval Conditions Concordance Table
October 2023

	Condition #	Summary of Condition	Annual Report Section
Change to the Designated Project	**2.17**	If the Proponent is proposing to carry out the Designated Project in a manner other than described in condition 1.5, the Proponent shall notify the Agency in writing in advance. As part of the notification, the Proponent shall provide: 2.17.1 a description of the proposed change(s) to the Designated Project and the environmental effects that may result from the change(s); 2.17.2 any modified or additional measure to mitigate any environmental effect that may result from the change(s) and any modified or additional follow-up requirement; and 2.17.3 an explanation of how, taking into account any modified or additional mitigation measure referred to condition 2.18.2, the environmental effects that may result from the change(s) may differ from the environmental effects of the Designated Project identified during the environmental assessment.	This condition is acknowledged. The Agency will be notified in writing, in advance, should the Designated Project be proposed to be carried out in a manner other than described in condition 1.5. and will provide information as described in condition 2.17.1 through 2.17.3
	2.18	The Proponent shall submit to the Agency any additional information required by the Agency about the proposed change(s) referred to in condition 2.18, which may include the results of consultation with Indigenous groups and relevant authorities on the proposed change(s) and environmental effects referred to in condition 2.18.1 and the modified or additional mitigation measures and follow-up requirements referred to in condition 2.18.2	This condition is acknowledged. The Agency will be provided any additional information required by the about the proposed change(s) referred to in condition 2.18, which may include the results of consultation with Indigenous groups and relevant authorities on the proposed change(s) and environmental effects referred to in condition 2.18.1 and the modified or additional mitigation measures and follow-up requirements referred to in condition 2.18.2
Fish and fish habitat	**3.1**	The Proponent shall develop, prior to construction, and implement and maintain during all phases of the Designated Project, measures to control erosion and sedimentation within the project development area in a manner consistent with the *Fisheries Act* and its regulations.	4.2, 4.3.1
	3.2	The Proponent shall inspect all erosion and sediment control measures installed within the project development area pursuant to condition 3.1 including during flood operation and post flood operation, except when not feasible for safety reasons, and document and repair any defective or damaged control measure as soon as technically feasible such that any impacts to fish and fish habitat resulting from the defective or damaged control measures are minimized or avoided.	4.2
	3.3	The Proponent shall isolate in-water construction activities and shall use temporary access structures for any in-stream construction activity.	4.3.3
	3.4	The Proponent shall maintain machinery and construction equipment in working order and inspect all machinery and construction equipment for the presence of drips and leaks daily. If the presence of drips or leaks is found on any machinery or equipment, the Proponent shall remove the equipment or machinery from service immediately and not return it to service until the repairs have been completed by a certified mechanic.	4.1
	3.5	The Proponent shall inspect all vehicles machinery and construction equipment before it enters the project development area for the presence of invasive alien species and noxious weeds, taking into account Alberta's Decontamination protocol for work in or near water: quick reference guide. The Proponent shall remove all invasive alien species or noxious weeds found on any machinery or equipment before it enters the project development area.	4.1, 4.7.1.1
	3.6	The Proponent shall not deposit any debris in watercourses that may cause adverse environmental effects on fish and fish habitat during all phases of the Designated Project and shall remove, after each flood, debris accumulated at the debris deflector identified in Figure 5 of the environmental assessment report.	4.2; 4.3.1
	3.7	The Proponent shall implement measures to allow sediment to settle before releasing dewatering discharge from construction and post-flood maintenance activities into a water body.	4.2, 4.3.1, 4.3.2
	3.8	The Proponent shall remove, during construction, the topsoil from the diversion channel and store it for later use in the restoration of the diversion channel prior to operation.	4.1.1.1
	3.9	The Proponent shall finalise, prior to construction, in consultation with Indigenous groups and to the satisfaction of Fisheries and Oceans, an offsetting plan related to the bull trout (*Salvenlinus confluentus*) and the fish population of the Elbow River. When finalising the plan, the Proponent shall include the adaptive offset measures approach proposed in its Conceptual Offset Measures Plan (Canadian Impact Assessment Registry Reference Number 80123, Document Number 1366). The Proponent shall implement the plan. The Proponent shall submit any approved offsetting plan(s) to the Agency prior to implementation.	4.8.4.4
	3.10	The Proponent shall, for any fish habitat offsetting measure(s) proposed in any offsetting plan(s) referred to in condition 3.9 that may cause adverse environmental effects not considered in the environmental assessment, develop and implement measures to mitigate those effects. The Proponent shall submit these measures to the Agency before implementing them.	4.8.4.4

	Condition #	Summary of Condition	Annual Report Section
Fish and fish habitat (cont'd)	**3.11**	The Proponent shall conduct in-water project activities, including debris removal from the water diversion system, outside of the Government of Alberta restricted activity periods, unless required for safety or emergency reasons. If in-water project activities are required during of the Government of Alberta restricted activity periods for safety or emergency reasons, the Proponent shall develop additional mitigation measures.	Not applicable during the 2022/2023 reporting year. The GoA RAPs will be complied with and/or additional mitigation measures will be developed should Project activities be required during the RAP for safety or emergency reasons.
	3.12	The Proponent shall maintain fish passage in the Elbow River during all phases of the Designated Project. In doing so, the Proponent shall maintain flows downstream of the bypass channel.	Section 3.0, Table 3.1, and Section 4.8.4.2. Fish passage will continue to be maintained during all phases of the Project.
	3.13	The Proponent shall install, prior to operation and in consultation with Transport Canada and Fisheries and Oceans Canada, rock v-weirs between the service spillway and low-level outlet to mitigate the effects of the Designated Project on fish passage in the Elbow River stream.	Not applicable during the 2022/2023 reporting year. Rock v-weirs will be installed between the service spillway and the low-level outlet prior to operation.
	3.14	The Proponent shall design, install and operate the temporary water intake system used during construction in fish-bearing waterbodies in a manner which mitigates the incidental capture of fish by entrainment and impingement of fish through the use of an appropriately sized fish screen, taking into account Fisheries and Oceans Canada's Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater and in a manner consistent with the Fisheries Act and its regulations.	4.3.3
	3.15	The Proponent shall construct and maintain graded drainage areas within the reservoir during post-flood operation to prevent stranding of fish during release of stored floodwater from the reservoir. In doing so, the Proponent shall re-grade areas of the reservoir during post-flood operation as necessary.	Not applicable during the 2022/2023 reporting year. This condition will be adhered to during post-flood operation, as necessary.
	3.16	The Proponent shall develop and implement, prior to operation, a protocol to rescue juvenile and adult fish during post-flood operation. See 3.16.1 to 3.16.4 for conditions specific to the protocol.	Not applicable during the 2022/2023 reporting year. This condition will be adhered to during post-flood operation, as necessary.
	3.17	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to fish passage in the Elbow River. See 3.17.1 to 3.17.3 for conditions to be included in the program.	Table 3.1; 4.8.4.2
	3.18	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to fish rescue. See 3.18.1 to 3.18.2 for conditions to be included in the program.	Table 3.1, Not applicable during the 2022/2023 reporting years
	3.19	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to water quality. See sub-sections 3.19.1 to 3.19.6 for conditions to be included in the program.	4.8.1
	3.20	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to channel morphology. As part of the follow-up program, the Proponent shall monitor channel morphology of the Elbow River and outlet channel during post-flood operation.	Not applicable during the 2022/2023 reporting year. This condition will be adhered to during post-flood operation, as necessary.

	Condition #	Summary of Condition	Annual Report Section
Migratory Birds	**4.1**	The Proponent shall carry out the Designated Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the Proponent shall take into account Environment and Climate Change Canada's *Guidelines to reduce risk to migratory birds*. The Proponent's actions when carrying out the Designated Project shall be in compliance with the *Migratory Birds Convention Act, 1994, the Migratory Birds Regulations and with the Species at Risk Act.*	4.7.2.2
	4.2	The Proponent shall give preference to the use of existing access roads and disturbed areas for temporary workspaces and transportation activities over building new access roads and temporary workspace in undisturbed areas, and shall revegetate any area where native vegetation was removed for temporary workspace.	This condition is acknowledged, existing roads and trails have been utilized to the extent possible. Approved construction areas were also utilized for work areas and temporary workspaces.
	4.3	The Proponent shall control the lighting required for Designated Project activities throughout all phases of the Designated Project, including its direction, duration of use, intensity, spectrum colour and brightness, to mitigate the adverse effects of the Designated Project on migratory birds and species at risk caused by sensory disturbances due to light, while complying with operational health and safety requirements.	4.1
	4.4	The Proponent shall identify, in consultation with Indigenous groups and relevant authorities, dates of breeding season for migratory birds and notify the Agency of these dates prior to construction.	Condition is acknowledged and captured in the WMMP; 3.1
	4.5	The Proponent shall develop, prior to construction, in consultation with Environment and Climate Change Canada and taking into account Environment and Climate Change Canada's Description of Residence for bank swallow (Riparia riparia) in Canada, measures to mitigate the adverse environmental effects on bank swallow (Riparia riparia) attributed to the Designated Project. The Proponent shall establish a schedule for the implementation of the measures and shall, as part of these measures: 4.5.1 maintain foraging habitat within 500 metres of bank swallow residences. If it is not technically feasible for the Proponent to maintain a distance of 500 metres, the Proponent shall provide a rationale to relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid effects on bank swallow. The Proponent shall submit these measures to the Agency prior to implementing them; 4.5.2 install, prior to construction, and in consultation with Environment and Climate Change Canada, artificial nesting structures in suitable habitat to compensate for the loss of nesting sites within the project development area and identified in Appendix H, Figure 3- 1, of the Environmental Impact Statement. The Proponent shall perform maintenance on the nesting structures annually and maintain their accessibility and integrity during all phases of the Designated Project and shall ensure the presence of foraging habitat within 500 metres of the artificial nesting structures. If it is not technically feasible for the Proponent to ensure the presence of foraging habitat within a distance of 500 metres, the Proponent shall provide a rationale to relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid effects on bank swallow. The Proponent shall submit these measures to the Agency prior to implementing them; 4.5.3 maintain the slope of topsoil, soil and sediment stockpiles located within the project development area and not used as artificial nesting structures in accordance with condition 4.5.2 at less than 70 degrees; and 4.5.4 demonstrate how any other offsetting measures implemented by the Proponent will compensate for the adverse environmental effects on bank swallow (Riparia riparia) attributed to the Designated Project in the project development area.	Table 3.1; 4.7.2.4
	4.6	The Proponent shall conduct vegetation removal, and any other activity that could potentially disturb migratory birds, within the project development area outside of the breeding season(s) for migratory birds identified in condition 4.4. If vegetation removal or the conduct of other disturbance activity outside of the breeding season(s) is not technically feasible during any given year, the Proponent shall develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid harm to migratory birds and their nests or eggs. The Proponent shall submit these measures to the Agency prior to implementing them.	4.7.2.2
	4.7	The Proponent shall remove debris in the off-stream reservoir within seven days after the draining of the reservoir. If it is not technically feasible for the Proponent to remove debris within seven days after the draining of the reservoir, the Proponent shall provide a rational to Indigenous groups and relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid harm to migratory birds and their nests or eggs. The Proponent shall submit these measures to the Agency prior to implementing them.	Not applicable during the 2022/2023 reporting year. Following operation, condition 4.7 will be complied with.
	4.8	For any active migratory bird nests identified during construction or operation, the Proponent shall establish and implement, in consultation with relevant authorities, mitigation measures to avoid destroying, disturbing or taking the nest(s), including by implementing a disturbance setback buffer during construction and dry operation and by following the approach outlined in the Response to Information Request Round 2 Package 4 -01 to -04, IR4-03 (Canadian Impact Assessment Registry Reference Number 80123, Document Number 1311) during flood operation.	4.7.2.2

	Condition #	Summary of Condition	Annual Report Section
Migratory Birds (cont'd)	**4.9**	The Proponent shall develop and implement, in consultation with Indigenous groups and relevant authorities, a protocol to prevent harm to migratory birds, including migratory birds species at risk identified in Table 3 of the environmental assessment report, within the project development area. The Proponent shall develop the protocol prior to construction and implement it prior to flood operation. The protocol shall include: 4.9.1 flood forecasting undertaken prior to inventories conducted in accordance with condition 4.10; and 4.9.2 measures to rescue migratory birds chicks and eggs.	Not applicable during the 2022/2023 reporting year; protocol captured in the WMMP
	4.10*	The Proponent shall conduct, in consultation with Indigenous groups, inventories of potential migratory bird habitat, including the collection of information on breeding bird densities and the presence of ground nesting birds, as well as mapping of important habitat features, shrub lands, wetlands and grassland within the project development area every five years starting the first year of operation, and update the migratory bird protocol referred to in condition 4.9 based on the results of the inventories.	Not applicable during the 2022/2023 reporting year; protocol captured in the WMMP
	4.11	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of all mitigation measures to avoid harm to migratory birds, including migratory birds that are listed species at risk, their eggs and nests. The follow-up program shall include the mitigation measures used to comply with conditions 4.1 to 4.10. As part of the development of the follow-up program, the Proponent shall identify performance indicators that shall be used by the Proponent to evaluate the effectiveness of mitigation measures. The Proponent shall implement the follow-up program during all phases of the Designated Project. As part of the follow-up program, the Proponent shall: 4.11.1 monitor, annually during construction, for the first three years of operation and every five years thereafter, bank swallow use of the project development area.	Condition is acknowledged and captured in the WMMP; 4.7.2.2; 4.7.2.4
Species at Risk	**5.1**	The Proponent shall conduct pre-construction surveys to determine the presence of little brown myotis (*myotis lucifugus*) roosting sites in the project development area. The Proponent shall establish, in consultation with Indigenous groups and relevant authorities, buffer zones around little brown myotis (*myotis lucifugus*) active roosts identified during the pre-construction surveys or found by the Proponent or brought to the attention of the Proponent by an Indigenous group during any phase of the project. The Proponent shall maintain the buffer zones until it is determined the roosts are no longer active.	4.7.2.1
	5.2	The Proponent shall conduct, prior to construction breeding habitat surveys for the northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) within the project development area.	4.7.2.1
	5.3	For any construction activity within 100 metres of breeding habitat identified under condition 5.2 for the northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), or western tiger salamander (*Ambystoma mavoritium*) during the breeding season, the Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, measures to prevent northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) from accessing the active construction areas. See sub-sections 5.3.1 and 5.3.2 for measures.	Not applicable during the 2022/2023 reporting year; no breeding wetlands for the three species were identified during pre-construction surveys; 4.7.2.1; 4.7.2.2
	5.4	If the results of the monitoring conducted in accordance with condition 5.3.2 identify the presence of northern leopard frog (Lithobates pipiens), western toad (Anaxyrus boreas), or western tiger salamander (Ambystoma mavoritium) in active construction areas within 100 metres of their breeding habitat, the Proponent shall implement additional species-specific mitigation measures in consultation with Indigenous groups and relevant authorities.	Not applicable during the 2022/2023 reporting year; no breeding wetlands for the three species were identified during pre-construction surveys
	5.5	The Proponent shall develop and implement, in consultation with Indigenous groups and relevant authorities, a protocol to prevent the mortality of amphibians, including northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) during flood operation within the reservoir footprint. The Proponent shall develop the protocol prior to construction, taking into account the flood forecasting undertaken in accordance with condition 4.9.1. The protocol shall include measures to rescue and relocate northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) to suitable habitat outside the reservoir footprint.	Not applicable during the 2022/2023 reporting year; protocol captured in the WMMP
	5.6	The Proponent shall implement the Designated Project in a manner that avoids adverse environmental effects of the Designated Project on wetlands and wetland functions. To avoid adverse effects, the Proponent shall maintain wetlands and their functions over minimizing adverse effects on wetlands and their functions. When the loss of wetlands and their functions cannot be avoided, the Proponent shall mitigate the adverse effects on wetlands and their functions instead of compensating for affected wetlands and their functions.	4.7.1.3
	5.7	In the case of the adverse environmental effects of the Designated Project on wetlands and their functions located in the project development area that cannot be avoided or mitigated pursuant to condition 5.6, the Proponent shall develop, in consultation with Indigenous groups, Environment and Climate Change Canada and other relevant authorities, and taking into account the Alberta Wetland Policy, a wetland replacement plan to compensate for the loss of wetlands and their functions.	4.7.1.3

	Condition #	Summary of Condition	Annual Report Section
Species at Risk (cont'd)	**5.8**	The Proponent shall direct during construction any drainage pathway, constructed or modified as part of the Designated Project, away from wetlands and shall identify prior to construction wetlands where drainage pathway should not be directed during operation. The Proponent shall provide a map of the wetlands to be avoided to the Agency prior to construction.	4.3.1; 4.7.1.3
	5.9	The Proponent shall submit to the Agency, prior to construction, a map of all wetlands that will be permanently removed for the construction of the Designated Project and shall not grub vegetation when undertaking construction work in wetlands except for those wetlands that will be permanently removed.	4.7.1.3
	5.10	The Proponent shall maintain a distance of 100 metres from any water body and wetland when undertaking vehicle, machinery, and equipment cleaning, fueling, and maintenance, when storing substances with the potential to cause harmful effects to the receiving environment, including fuel and lubricant storage tanks, and when undertaking maintenance activities in the off-stream reservoir. If it is not technically feasible for the Proponent to maintain a distance of 100 metres, the Proponent shall provide a rationale to relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid effects on species at risk. Additional mitigation measures shall include the use of secondary containment. The Proponent shall submit these measures to the Agency prior to implementing them.	4.1.2.2; 4.7.1.3
Atmospheric Environment	**6.1**	See specific condition regarding vehicles and emission standards	4.9.1
	6.2	The Proponent shall develop, prior to construction, and implement, during construction, a no-idling policy for all vehicles within the project development area. The Proponent shall require that all persons abide by this policy, unless not technically feasible or not feasible for health or safety reasons. The Proponent shall submit the policy to the Agency prior to construction.	4.9.1
	6.3	The Proponent shall develop, prior to construction and in consultation with relevant authorities, and implement during all phases of the Designated Project, measures to maintain baseline air quality and prevent exceedance of the Canadian Council of Ministers of the Environment' Canadian Ambient Air Quality Standards.	4.9.1
	6.4	The Proponent shall develop, prior to construction, and implement during all phases of the Designated Project, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of mitigation measures as it pertains to adverse changes to air quality attributed to the Designated Project. See 6.4.1 to 6.4.6 for conditions to include in the program.	4.9.1
	6.5	The Proponent shall provide Indigenous groups with the results of the follow-up program referred to in condition 6.4 in plain language at a minimum twice annually, at a time determined in consultation with Indigenous groups.	4.9.1
Human Health	**7.1**	The Proponent shall not exceed the noise limits set out in the United States Environmental Protection Agency Office of Noise Abatement and Control document titled Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety for short-term noise exposure during construction.	4.9.2
	7.2	For any blasting activities required for the Designated Project, the Proponent shall take into account Environment and Climate Change Canada's Environment Code of Practice for Metal Mines for the control of noise and vibration from blasting and thresholds and mitigation measures for blasting noise identified in Health Canada's Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise.	4.9.2
	7.3	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, a protocol for receiving complaints related to exposure to noise attributable to the Designated Project. The Proponent shall provide the protocol to the Agency prior to construction and shall implement it during construction. As part of the implementation of the protocol, the Proponent shall respond to any noise complaint attributed to any component of the Designated Project within 48 hours of the complaint being received and shall implement any corrective action, if required to reduce exposure to noise, in a timely manner.	This condition was complied with, and the protocol provided to the Agency prior to construction.
	7.4	The Proponent shall develop a communication plan in consultation with Indigenous groups. The Proponent shall develop the communication plan prior to construction and shall implement and keep it up to date during all phases of the Designated Project. See 7.4.1 - 7.4.3 for conditions to include in the plan.	This condition was complied with, and the plan provided to the Agency prior to construction.
	7.5	The Proponent shall implement, during all phases of the Project, measures to mitigate fugitive dust emissions attributable to the Designated Project. As part of the measures, the Proponent shall: 7.5.1 establish speed limits on Designated Project roads during all phases of the Designated Project and require that all persons abide by these speed limits; and 7.5.2 apply dust suppressant on the Designated Project permanent access roads and parking areas during all phases of the Designated Project. The Proponent shall select, in consultation with relevant authorities, dust suppressants with the least potential effects on human health and the environment.	4.9.1
	7.6	The Proponent shall decommission and plug off water wells located within the project development area that are not used to monitor groundwater quality pursuant to condition 7.9.1, prior to the start of operation.	This condition was complied with, and an update was provided in the 2021/2022 annual report

	Condition #	Summary of Condition	Annual Report Section
Human Health (cont'd)	**7.7**	The Proponent shall monitor, at a minimum twice prior to construction and weekly during flood operation, total mercury and methylmercury levels in the Elbow River upstream of the diversion system, in the off-stream reservoir, and in the low-level outlet downstream of the off-stream reservoir outlet gate, unless not feasible for safety reasons.	4.8.1
	7.8	The Proponent shall develop, in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to contamination of country food. See 7.8.1 to 7.8.4 for conditions to be included in the program.	4.8.1, results sent to IAAC directly
	7.9	The Proponent shall develop prior to operation, and implement, in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to drinking water quality. See 7.9.1 to 7.9.3 for conditions that need to be included in the plan.	4.8.2; Appendix B.2
	7.10	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of all measures to mitigate fugitive dust emissions attributable to the Designated Project.	4.9.1
	7.11	The Proponent shall provide Indigenous groups with the results of the follow-up program referred to in condition 7.10 in plain language at a minimum twice annually, at a time determined in consultation with Indigenous groups.	4.9.1
Current use of lands and resources for traditional purposes	**8.1**	The Proponent shall undertake, in consultation with Indigenous groups and relevant authorities, progressive reclamation of areas disturbed by the Designated Project, including bank and riparian areas. In doing so, the Proponent shall: 8.1.1 identify agronomic plant species and plant species native to the regional assessment area to use for revegetation, including plant species suitable as habitat for migratory birds and native seed mix suitable for wetlands; 8.1.2 revegetate the portions of the diversion channel excavated through soil and the earthen dam embankment free of rip rap; 8.1.3 reclaim non-native plant areas to equivalent baseline land functions after construction and during post flood operation; and 8.1.4 reclaim the surface drainage patterns of the area after construction.	3.1, 4.7.1.2; The seed mixes are identified in the Vegetation and Wetland Mitigation, Monitoring and Revegetation Plan. The Plan was sent to Indigenous groups prior to the start of construction for their review and feedback.
	8.2	The Proponent shall manage noxious weeds and invasive alien species as necessary to promote successful revegetation that includes traditional plant establishment and growth. In doing so, the Proponent shall not use herbicide within 30 metres of wetlands and waterbodies in the project development area.	4.7.1.1
	8.3	The Proponent shall conduct pre-construction surveys to determine the presence of grizzly bear (Ursus arctos) western population active dens in the project development area. The Proponent shall establish, in consultation with Indigenous groups and relevant authorities, no-work buffer zones around grizzly bear western population active dens identified during the pre- construction surveys or found by the Proponent or brought to the attention of the Proponent by an Indigenous group during any phase of the Designated Project. The Proponent shall maintain the buffer zones from their establishment and until the active den is no longer occupied.	4.7.2.1; This condition was complied with, and reported in the 2021/2022 annual report
	8.4	The Proponent shall follow the timing restrictions on industrial activities identified in the Alberta's Recommended Land Use Guidelines: Key Wildlife and Biodiversity Zones when undertaking construction and maintenance activities in the Key Wildlife and Biodiversity Zone identified along the Elbow River. 8.4.1 If it is not economically or technically feasible for the Proponent to follow the timing restrictions on industrial activities identified in the Alberta's *Recommended Land Use Guidelines: Key Wildlife and Biodiversity Zones*, develop and implement additional mitigation measures, in consultation with Environment and Climate change Canada and other relevant authorities. The Proponent shall submit these measures to the Agency prior to implementing them.	Appendix B.1
	8.5	The Proponent shall install and maintain, during construction and operation, one underpass under Highway 22 where it crosses the diversion channel and wildlife friendly fences to provide passage for grizzly bear western population (*Ursus arctos*) and ungulates. The Proponent shall install the wildlife friendly fences as identified in Figure IR 15-1 submitted in the Response to Information Requests Round 1 Package 2 (Canadian Impact Assessment Registry Reference Number 80123, Document Number 1260), taking into account Alberta Conservation Association *Landholder's Guide to Wildlife Friendly Fencing*, to prevent access by livestock and allow safe passage for wildlife. The Proponent shall maintain the fences during all phases of the Designated Project.	This condition is acknowledged. Work is still in progress to complete the underpass and install the wildlife friendly fencing as per the condition.
	8.6	The Proponent shall maintain navigation on the Elbow River during all phases of the Designated Project. The Proponent shall establish and maintain a portage route around the diversion system gate and the service spillway locations to maintain navigation on the Elbow River during construction of these project components and install safety signage to signal the presence of the diversion system gate and location of the portage route until such time that the portage route is no longer required to maintain navigation on the Elbow River.	4.1
	8.7	The Proponent shall provide the Agency and Indigenous groups with the final project design within seven days of its finalization and shall consult with Indigenous groups at least 60 days in advance of construction activities to understand locations and timing needed to allow Indigenous groups to catalogue, harvest and transplant traditional and medicinal plants present within the project development area, in a culturally appropriate way.	This condition was completed and reported on in the 2021/2022 annual report

	Condition #	Summary of Condition	Annual Report Section
Current use of lands and resources for traditional purposes (cont'd)	**8.8**	The Proponent shall start developing, prior to construction and complete at the latest 1 year prior to start of operation, in consultation with Indigenous groups, a Land Use Plan to support Indigenous groups' use of the project development area, and implement the plan during all phases of the Designated Project. The Proponent shall submit the final plan to the First Nation Land Use Advisory Committee referred to in condition 8.11, First Nations and the Agency within seven days of its finalization. See sub-section 8.8.1 to 8.8.4 for conditions to be captured in the plan.	4.11
	8.9	The Proponent shall establish, in consultation with First Nations, a staging area for traditional use activities in close proximity to the land use areas identified in condition 8.8. The Proponent shall allow and provide sufficient space within the staging area for the construction of semi-permanent structures. The Proponent shall provide maps to the Agency and First Nations of the staging area prior to construction.	This condition was completed, and the maps were sent directly to First Nations and IAAC prior to the start of construction.
	8.10	The Proponent shall provide unimpeded access for First Nations to the staging area identified in condition 8.9, except during the flood operation, when access to the staging area may be prohibited for safety reasons and if not possible for maintenance purposes. The Proponent shall communicate to First Nations the closure of the staging area when required for safety reasons and during flood season	This condition is acknowledged; First Nations will have unimpeded access to the staging area unless access to the staging area is impeded by flood operations.
	8.11	The Proponent shall establish, prior to construction and in consultation with First Nations, and maintain, throughout construction and operation, a First Nation Land Use Advisory Committee (the committee) to support the development and implementation of the plan identified in condition 8.8. When establishing the committee, the Proponent shall consult with each First Nation with respect to whether they wish to participate as members of the committee and shall prioritize the selection of representatives from First Nations who wish to participate as members in the committee. As part of the establishment of the committee, the Proponent shall co-develop Terms of Reference for the committee with First Nations and update the Terms of Reference every 10 years. The Proponent shall provide the completed Terms of Reference to the Agency prior to construction and any update within 30 days of the Terms of Reference being updated. See sub-sections 8.11.1 - 8.1.11-7 for Terms of Reference conditions.	4.11
	8.12	The Proponent shall include any Indigenous groups for which Aboriginal or Treaty Rights under section 35 of *The Constitution Act, 1982* are recognized by the Government of Alberta after the issuance of this Decision Statement in the Land Use Plan, the staging area and the First Nations Land Use Advisory Committee referred to in conditions 8.9, 8.10 and 8.11.	4.11
	8.13	The Proponent shall develop, prior to operation, and in consultation with Indigenous groups, a follow-up program to verify the accuracy of the environmental assessment as it pertains to natural re-vegetation of the drained reservoir during post-flood operation. See sub-sections 8.13.1 and 8.13.2 for items to include in the follow up program.	The follow-up program is contained in the Vegetation and Wetland Mitigation, Monitoring and Revegetation Plan and was provided to the Agency prior to construction.
	8.14	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of mitigation measures as it pertains to the adverse environmental effects of the Designated Project on the current use of lands and resources for traditional purposes. See sub-sections 8.14.1 - 8.14.5 for monitoring conditions.	4.11
Physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance	**9.1**	The Proponent shall retain, prior to construction, the services of Indigenous monitors to observe, record, and report to the Proponent and Indigenous groups on the implementation, throughout construction, of requirements set out in this Decision Statement including the archeological and heritage management plan referred to in condition 9.3. Prior to retaining the services of Indigenous monitors, the Proponent shall consult with each Indigenous group with respect to whether they wish to participate as Indigenous monitor. When retaining the services of Indigenous monitors from each Indigenous group who wishes to participate, the Proponent shall determine, in consultation with these Indigenous groups, the scope, purpose and objectives of the participation of each Indigenous monitor and shall provide that information to the Agency	4.5.1
	9.2	The Proponent shall develop and implement, prior to construction and in consultation with Indigenous groups and Alberta Ministry of Culture, Multiculturalism and Status of Women, a historic resource impact assessment of the project development area. The Proponent shall apply the archaeological and heritage management plan pursuant to condition 9.3 to structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources identified as part of the historic resource impact assessment.	3, 3.1
	9.3	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, Alberta Ministry of Culture, Multiculturalism and Status of Women, and implement, during construction and operation, an archaeological and heritage management plan for any structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources within the project development area, including, but not limited to sites and things subject to the *Alberta Historical Act*. See sub-sections 9.3.1 - 9.3.4 for conditions to include in the plan.	4.10.1

	Condition #	Summary of Condition	Annual Report Section
Physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance (cont'd)	**9.4**	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, cultural awareness training for all employees associated with the Designated Project. The Proponent shall implement the training prior to the start of construction and during all phases of the Designated Project.	4.10.2
	9.5	The Proponent shall, prior to construction and in consultation with Indigenous groups, provide access to Indigenous groups to the project development area for the purpose of conducting ceremonies, to the extent that such access is safe.	This condition is acknowledged; access was and will be granted when access to the Project Development Area is safe.
	9.6	The Proponent shall provide the Agency and Indigenous groups with a map of the final construction site within seven days of its finalization	This condition was complied with, and a map of construction was provided to Agency and Indigenous groups prior to construction.
	9.7	The Proponent shall have a qualified individual conduct paleontological monitoring during construction when: 9.7.1 excavating bedrock for the diversion system; 9.7.2 excavating 4 metres of bedrock or greater, including for the emergency spillway; 9.7.3 excavating bedrock for new road alignments including on Highway 22; and 9.7.4 pipeline operators are using open cut methods for relocation of pipelines and utilities under the diversion channel.	4.10.3
	9.8	The Proponent shall strip and stockpile topsoil during construction and shall prevent mixing of topsoil with other soil horizons. The Proponent shall replace the topsoil during progressive reclamation pursuant to condition 8.1.	4.1.1.1; 4.7.1.2
	9.9	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and Alberta Ministry of Culture, Multiculturalism and Status of Women, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of all mitigation measures for effects to any structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources. The Proponent shall implement the follow-up program during all phases of the Designated Project and submit the results of the follow-up program to Alberta Ministry of Culture, Multiculturalism and Status of Women.	3.1; 4.10
Independent Environmental Monitor	**10.1**	The Proponent shall retain, prior to construction, the services of a third-party independent environmental monitor, who is a qualified individual as it pertains to environmental monitoring in Alberta, to independently observe and record on the implementation of the conditions set out in this Decision Statement during construction and to report findings to the Proponent and the Agency.	4.5.2
	10.2	The Proponent shall require the independent environmental monitor to report to the Proponent, in writing, about the implementation of any condition set out in this Decision Statement during construction. The Proponent shall also require the independent environmental monitor to recommend to the Proponent, in writing, which action(s) in their view should be taken by the Proponent with respect to the implementation of conditions set out in this Decision Statement during construction	4.5.2
	10.3	The Proponent shall require the independent environmental monitor to provide to the Agency, at a frequency to be determined in consultation with the Agency, the information reported to the Proponent pursuant to condition 10.2 at the same time that the Proponent receives that information.	4.5.2
	10.4	The Proponent shall require the independent environmental monitor to retain the information reported to the Proponent pursuant to condition 10.2 for five years following submission to the Agency pursuant to condition 10.3.	The independent environmental monitor's reports referenced in condition 10.2 are and will be maintained for five years following submission to the Agency.
Accidents and Malfunctions	**11.1**	The Proponent shall take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects and to mitigate any adverse environmental effect from accidents and malfunctions that do occur. See sub-sections 11.1.1 to 11.1.5 for measures.	4.4
	11.2	The Proponent shall consult, prior to construction, Indigenous groups on the measures to be implemented to prevent accidents and malfunctions.	4.4
	11.3	The Proponent shall develop an accident and malfunction response plan in relation to, and for the construction of the Designated Project and an accident and malfunction response plan in relation to, and for the operation of the Designated Project. The Proponent shall develop the accident and malfunction response plan in relation to, and for construction of the Designated Project prior to construction and the accident and malfunction response plan in relation to, and for the operation of the Designated Project prior to the first flood operation. See 11.3.1 to 11.3.6 for conditions that need to captured in the plan.	4.4
	11.4	The Proponent shall maintain the accident and malfunction response plan referred to in condition 11.3 up-to-date during all phases of the Designated Project. The Proponent shall submit any updated accident and malfunction response plan to the Agency and to the parties being consulted during the development of the plan within 30 days of the plan being updated	4.4

	Condition #	Summary of Condition	Annual Report Section
Accidents and Malfunctions (cont'd)	**11.5**	In the event of an accident or malfunction with the potential to cause adverse environmental effects, the Proponent shall immediately implement the measures appropriate to the accident or malfunction referred to in condition 11.3.2. See sub-sections 11.5.1 - 11.5.4 for measures.	4.4
	11.6	The Proponent shall develop, in consultation with Indigenous groups and potentially affected parties, a communication plan for accidents and malfunctions occurring in relation to the Designated Project, including accidents and malfunctions occurring within the project development area which may affect area(s) outside of the project development area. The Proponent shall develop the communication plan prior to construction and shall implement and keep it up-to-date during all phases of the Designated Project. See sub-section 11.6.1 to 11.6.3 for plan specifics.	This condition was completed, and the communication plan was sent directly to First Nations and IAAC prior to the start of construction.
Schedules	**12.1**	The Proponent shall submit to the Agency a schedule for all conditions set out in this Decision Statement no later than 60 days prior to the start of construction. This schedule shall detail all activities planned to fulfill each condition set out in this Decision Statement and the commencement and estimated completion month(s) and year(s) for each of these activities.	4.6
	12.2	The Proponent shall submit to the Agency a schedule outlining all activities required to carry out all phases of the Designated Project no later than 60 days prior to the start of construction. The schedule shall indicate the commencement and estimated completion month(s) and year(s) and duration of each of these activities.	4.6
	12.3	The Proponent shall submit to the Agency in writing an update to schedules referred to in conditions 12.1 and 12.2 every year no later than October 31.	As per condition 12.3, an update to the schedules referred to in conditions 12.1 and 12.2 will be provided to the Agency every year no later than October 31.
	12.4	The Proponent shall provide Indigenous groups with the schedules referred to in conditions 12.1 and 12.2, and any update to the initial schedule made pursuant to condition 12.3 at the same time the Proponent provides these documents to the Agency.	As per condition 12.4, the schedules identified in conditions 12.1 and 12.2 will also be provided to the Indigenous groups at the same time they are sent provided to the Agency.
Records	**13.1**	The Proponent shall maintain all records relevant to the implementation of the conditions set out in this Decision Statement. The Proponent shall provide the aforementioned records to the Agency upon demand within a timeframe specified by the Agency.	This condition is acknowledged. All records relevant to condition 13.1 will be provided to the Agency upon request.
	13.2	The Proponent shall retain all records referred to in condition 13.1 at a facility in Canada and shall provide the address of the facility to the Agency. The Proponent shall notify the Agency at least 30 days prior to any change to the physical location of the facility where the records are retained, and shall provide to the Agency the address of the new location.	This condition is acknowledged. All records referred to in condition 13.1 will be retained as per condition 13.2.

APPENDIX B
TECHNICAL MEMOS

B.1
Summary of 2022/2023 Remote Camera Monitoring Program

Springbank Off-Stream Reservoir Project Remote Camera Monitoring Program - 2022/2023

October 2023

Prepared for:
Alberta Transportation

Prepared by:
Stantec Consulting Ltd.

Project Number:
110773396

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Acronyms / Abbreviations

%	percent
<	less than
>	greater than
BA	before-after
Hwy	highway
KWBZ	Key Wildlife and Biodiversity Zone
LAA	local assessment area
m	metre
WMMP	Wildlife Mitigation and Monitoring Plan

1 Remote Camera Monitoring Program

1.1 Objectives

As stated in the Wildlife Mitigation and Monitoring Plan (WMMP), the objectives of the remote camera monitoring program are to evaluate potential Project effects on wildlife habitat use and movement as well as to evaluate the effectiveness of mitigation measures. Overall, the remote camera monitoring program is designed to monitor large and medium-sized mammals including species of cultural importance (e.g., deer [*Odocoileus* spp.], elk [*Cervus canadensis*], grizzly bear [*Ursus arctos*], coyote [*Canis latrans*], red fox [*Vulpes vulpes*]).

The remote camera monitoring program has been designed to answer two key questions:

1. Is there a measurable change in the relative abundance (photographic rate) of large and medium-sized mammals in the local assessment area (LAA) during construction and dry operations compared to baseline/pre-construction?
2. What is the wildlife crossing success or crossing rate for permanent Project structures including the Highway (Hwy) 22 underpass, Hwy 22 culvert, diversion channel, floodplain berm, wildlife-friendly fencing, off-stream dam, and low-level outlet? (i.e., do mitigation measures facilitate wildlife movement in the LAA?)

The results presented in this annual report were collected during the 2022-2023 construction period and include data collected during all four seasons: spring (April 1 to May 31); summer (June 1 to August 31); fall (September 1 to November 30); and winter (December 1 to March 31). The remainder of the 2023 data (spring, summer, fall) will be presented in the Year 3 Annual Report scheduled to be submitted in late 2024.

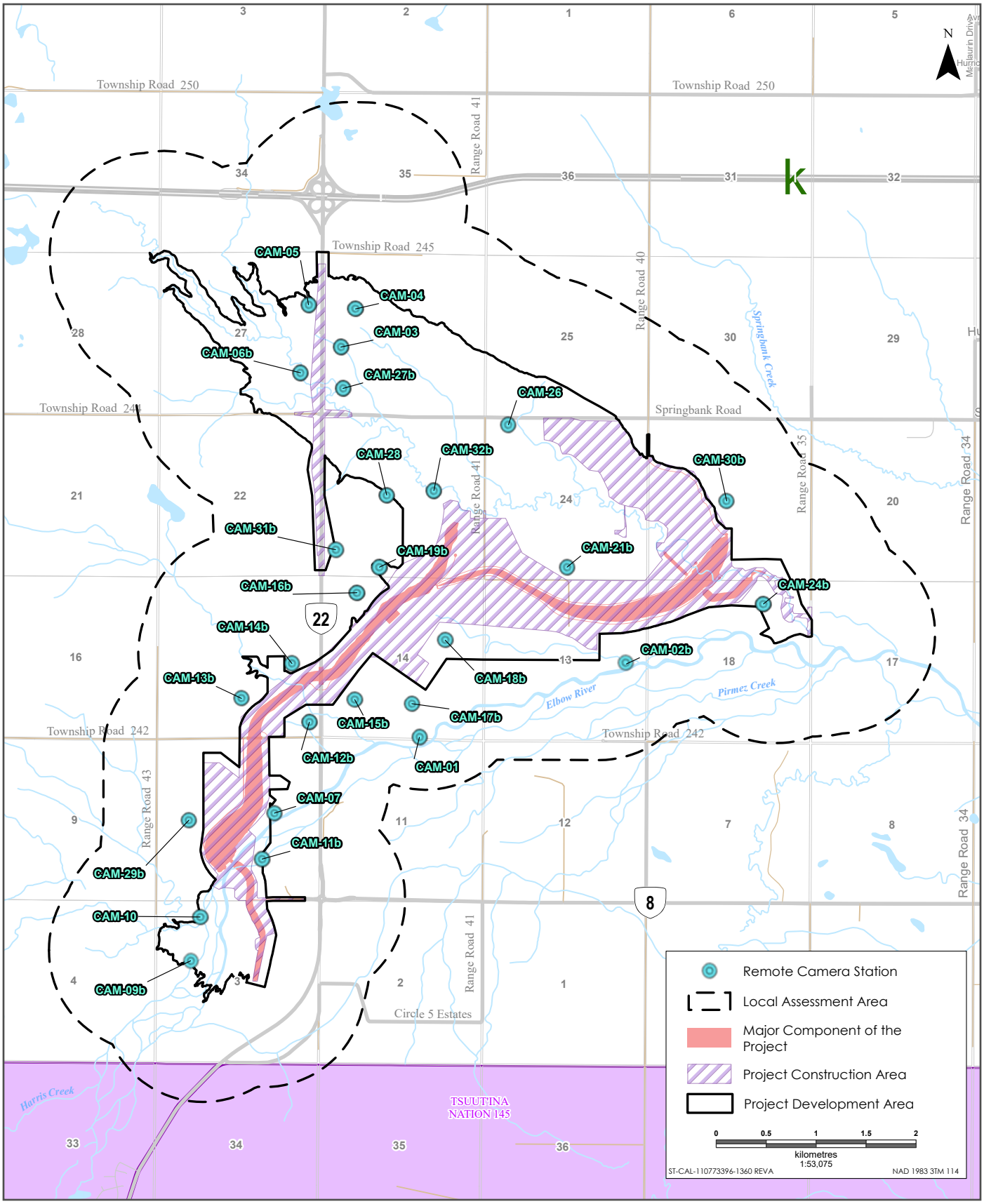
Mitigation measures proposed to reduce potential Project effects on wildlife movement due to Project permanent structures including the installation of wildlife-friendly fencing (key question 2) have yet to be implemented and are not included in this annual report.

2 Methods

2.1 Site Selection

The remote cameras (Reconyx Hyperfire 2™) deployed during the 2021 pre-construction monitoring period were placed within the Project Construction Area (i.e., permanent Project structure footprint and temporary workspaces) and subsequently moved to monitor wildlife use during construction outside of the Project Construction Area. Cameras were redeployed in similar habitat types outside the Project Construction Area where land access permitted. The locations and habitat types of 31 remote cameras initially deployed during the pre-construction period are described in Year 1 Annual Report. During construction four remote cameras were not deployed: one due to elk damage, one due to suspected elk damage and/or vandalism and two remote cameras (CAM-20 and CAM-25) were not relocated outside the Project Construction Area because there was no other suitable alternative location within similar habitat types. Except for some minor adjustments to two cameras, the locations of 27 remote camera monitoring stations during the 2022-2023 construction period (Year 2 Annual Report) remained the same as those reported in the Year 1 Annual Report (Figure 1).

Cameras were deployed to maximize the probability of animal detection (habitat use, movement) in the PDA and LAA by installing them on wildlife and/or human trails, where possible. The cameras were installed on trees or fence posts in steel security enclosures, using swivels, lag bolts and cable locks, and were approximately 1.0 -1.5 metres (m) above ground with an unobstructed view of targeted field of view (i.e., trail). Remote cameras were set to high sensitivity to take five pictures per trigger with no delay between triggers. The location of each camera was recorded as well as surrounding vegetation, aspect, height, and presence of wildlife sign, including trails, tracks, and scat. Maintenance visits to clear vegetation around cameras, collect data and assess functionality (e.g., battery, memory cards, locks, trigger function) were completed approximately every three to four months.



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.
8/24/2023

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Remote Camera Survey Locations
2022-2023 Construction

Figure 1

2.2 Data Analysis

All images were reviewed and classified using MapView™ Professional software to identify wildlife species detected. Individuals detected by remote cameras were identified to species, wildlife age and sex class was also determined when possible. False triggers (events without an animal present) (e.g., wind moving a tree branch) and construction equipment and/or vehicles were removed prior to data analysis.

Wildlife observations were recorded by identifying independent events, which were defined as any image or series of images of each species (individual animal or group of animals) occurring greater than two minutes after the last image of the same species. Other domestic livestock (i.e., cows, horses) as well as humans (e.g., hiker, hunter, dog walkers, construction personnel) were recorded as events but not analyzed further.

Some of the remote cameras malfunctioned due to battery failure or animals knocking the camera over and displacing the camera orientation, which reduced the number of operational days at certain monitoring stations. However, within each seasonal period, images were retained for analysis if there was a minimum of 30 monitoring days at each station based on Kays et al. (2020) who reported detection rates stabilized between three to five weeks for most species and around 30 days for common wildlife species. Otherwise, the data were omitted.

Naïve occupancy, defined as the proportion of sites with at least one species detection (Mackenzie et al. 2002, 2006) was calculated. In addition, a relative abundance index (i.e., photographic rate) was calculated by summing the count for each species over all independent events and dividing by the number of days the camera was active and calculated as the number of detections per 100 camera-days (Palmer et al. 2018, Burton et al. 2021). Photographic rates (detections/100 camera-days) were calculated for all focal wildlife species detected within each season to account for potential seasonal differences in detection rates (Kays et al. 2020). Specifically, this annual report includes an analysis of photographic rates for all four seasons including spring (April 1 to May 31), summer, (June 1 to August 31), fall (September 1 to November 30) and winter (December 1 to March 31).

A comparison of photographic rates between 2021 pre-construction and 2022-2023 construction periods was limited to fall and winter because there were no spring and summer pre-construction remote camera data collected during 2021 for comparison. The non-parametric Wilcoxon signed rank test was used to determine if there were significant differences ($P< 0.05$) between relative abundance estimates (photographic rates) calculated for pre-construction and construction using all remote cameras, which were considered dependent samples. The Wilcoxon test was limited to photographic rates that showed apparent strong differences between pre-construction and construction periods (Jenks et al. 2011). Statistical tests were completed using R version 4.1.3 (R Core Team 2022).

Only medium to large terrestrial mammals were included in the relative abundance analysis. All other wildlife observations observed by remote cameras were recorded as incidentals (e.g., birds, raptors, skunk) and not included in the analysis of relative abundance.

3 Results

3.1 Survey Effort

Twenty-seven remote cameras were deployed in the LAA during the 2022-2023 construction period (April 1, 2022 to March 31, 2023). Construction activities that had potential to result in sensory disturbance (e.g., noise, artificial light) and wildlife displacement occurred at all major Project components during the 2022-2023 monitoring period. Specifically, earthworks (e.g., topsoil stripping and excavation) were completed from April to mid-November, civil works (e.g., Hwy 22 Embankment Raise) and structural works (e.g., diversion structure, low-level outlet) were completed primarily during the winter months whereas the temporary diversion of Elbow River occurred during the 2023 summer and late fall. Section 4.1 of the Year 2 Annual Report provides a detailed description of construction activities.

As stated previously, some of the remote cameras malfunctioned (e.g., battery failure) during the 2022-2023 monitoring period, which resulted in the following seasonal survey effort: twenty-six cameras were operational during spring, 23 during summer, 26 during fall and 25 during the 2022-2023 winter season (Table 1).

Table 1 Summary of Seasonal Sampling Effort and Number of Independent Events Detected during 2022 Construction

Season	Number of Cameras Operational[1]	Total Camera-Days[2]	Number of Independent Events[3]
Spring (April 1 to May 31)	26	1,561	2,271
Summer (June 1 to August 31)	23	2,007	2,911
Fall (September 1 to November 30)	26	2,557	1,831
Winter (December 1 to March 31)	25	3,330	1,660
Total		**9,455**	**8,673**

Notes:

1 Number of remote cameras operational for a minimum of 30 days in each season.

2 Number of remote cameras operational multiplied by the number of days deployed.

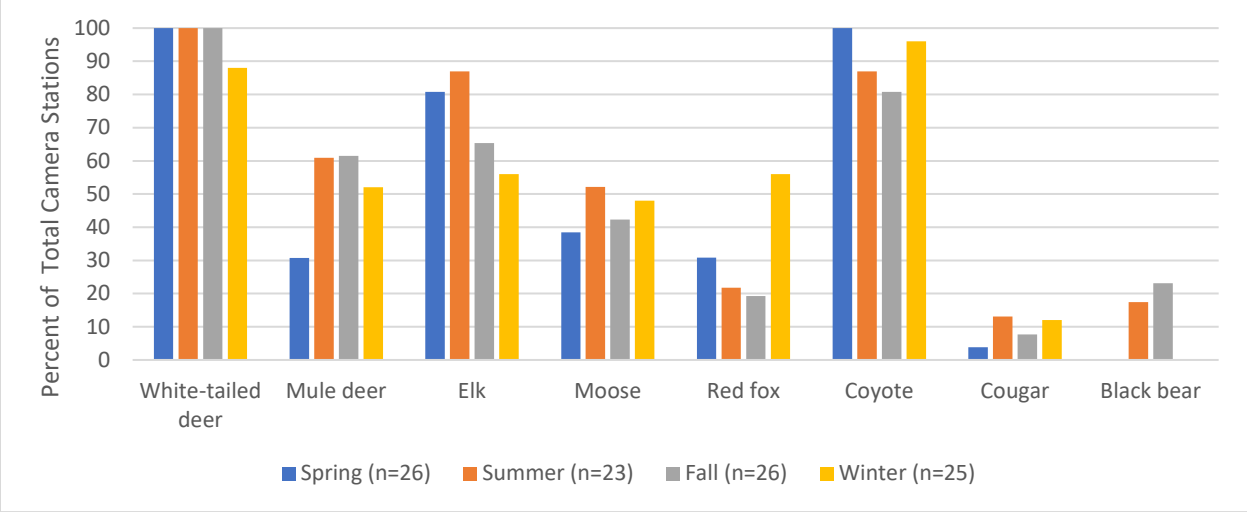
3 Number of independent events (detections) defined as any image or series of images of each species (individual animal or group of animals) occurring greater than two minutes after the last image of the same species.

Remote cameras detected 8,673 independent events over 9,455 camera-days across all four seasons during the 2022-2023 construction period (April 1, 2022 to March 31, 2023) (Table 1). Of those, 80.1% of total detections were comprised of three species, including white-tailed deer (*Odocoileus virginiana*) (46.5%), elk (23.4%), and coyote (10.2%). Other focal wildlife species detected included mule deer (*Odocoileus hemionus*) (4.3%), red fox (1.7%), moose (*Alces alces*) (1.5%) as well as black bear (*Ursus americanus*) and cougar (*Puma concolor*) both comprising less than 1% of independent events. The remainder of independent events included other wildlife (e.g., birds, small mammals) (6.6%), humans including vehicles and construction equipment (3.7%), cows (1.1%), and horses (0.3%).

3.2 Naïve Occupancy

White-tailed deer was detected at all (100%) remote camera stations deployed during spring, summer and fall and 22 of 25 cameras during winter (88%) (Figure 2). Elk was detected at over 80% of the camera stations during spring and summer but were detected at fewer camera stations during fall (65%) and winter (56%) (Figure 2). The naïve occupancy estimate for coyote was also relatively high during spring (100%) and winter (96%) as well as during summer and fall (>80%). Cougar and black bear were detected at relatively fewer remote camera stations across all seasons compared to other species (Figure 2).

Figure 2 **Naïve Occupancy Estimates for Focal Wildlife Species Detected during the Remote Camera Monitoring Program – 2022-2023 Construction Period**



Note:
n = number of remote cameras operational during each season).

3.3 Relative Abundance and Distribution

Nine mammal species were detected during the 2022-2023 construction period including one bobcat (*Lynx rufus*) during spring (Table 2). Grizzly bear was not detected at remote camera stations; however, black bear was detected during summer and fall in upland areas and along Elbow River. Overall, elk had the highest relative abundance index across all seasons followed by white-tailed deer and coyote (Table 2). Nine species of small mammals were also detected including white-tailed jackrabbit (*Lepus townsendii)*, snowshoe hare (*Lepus americanus*), cottontail (*Sylvilagus* spp.), striped skunk (*Mephitis mephitis*) raccoon (*Procyon lotor*), red squirrel (*Tamiasciurus hudsonicus*), northern flying squirrel (*Glaucomys sabrinus*), as well as two semi-aquatic furbearers (beaver [*Castor canadensis*], American mink [*Neovison vison*]). Twenty-one bird species were also detected including four species of waterfowl, (mostly Canada goose [Branta canadensis] and mallard [*Anas platyrhynchos*]), two species of waterbird (spotted sandpiper[*Actitis macularius*] and great blue heron[*Ardea herodias*]), six songbirds, two woodpeckers (downy woodpecker [*Picoides pubescens*], hairy woodpecker [*Picoides villosus*]) as well as American crow (*Corvus brachyrhynchos*), black-billed magpie (*Pica hudsonia*), European starling (*Sturnus vulgaris*), mourning dove (*Zenaida aurita*), great-horned owl (*Bubo virginianus*), northern harrier (*Circus cyaneus*) and red-tailed hawk (*Buteo jamaicensis)*.

Although elk and white-tailed deer were detected at similar photographic rates during spring and summer, there were fewer detections/100 camera-days for both species during fall and winter. Coyote was detected more frequently during spring and winter compared to summer and fall, whereas mule deer and red fox photographic rates were relatively higher during winter compared to other seasons (Table 2).

During spring, photographic rates of white-tailed deer and elk was highest at CAM-30b located near the east end of the offstream dam; however, both species were also detected at high rates at CAM-17b, CAM-18b, CAM-19b and CAM-24b, north of the Elbow River and east of Hwy 22 (Figure 3; Appendix B, Figure B1). One bobcat was detected at CAM-28, which is located east of Hwy 22, approximately 600 m from the construction footprint in mixed forest/agricultural land (Appendix A, Photo A.1).

During summer, photographic rates of focal wildlife species increased at most remote camera stations compared to spring, except for CAM 30b, where elk and white-tailed were detected less frequently (Figure 3). Elk herds were detected at relatively high photographic rates at CAM-04 located approximately 300 m east of Hwy 22 near the Embankment Raise as well as CAM-15b, 17b, 18b and 19b located east of Hwy 22 near the temporary bridge (Appendix B, Figure B2). Female elk and their calves were detected at 15 of 23 (65.2%) remote cameras during June and July including at stations east (CAM-04; Appendix A, Photo A.2) and west (CAM-06b; Appendix A, Photo A.3) of Hwy 22 near the Embankment Raise. Cougar was detected at three camera stations, including two deployed along the Elbow River (CAM-10; Appendix A, Photo A.4 and CAM-11b) and CAM-19b located in tame pasture/shrubland north of the Elbow River and east of Hwy 22. Black bear was detected along the Elbow River at CAM-9b, and CAM-10 as well as at CAM-05 located west of Hwy 22 near the Embankment Raise (Appendix A, Photo A.5).

Table 2 Relative Abundance of Wildlife Species by Season during 2022-2023 Construction

Season	Photographic Rate (Detections/100 Camera-Days)									
	Black Bear	**Bobcat**	**Cougar**	**Coyote**	**Red Fox**	**Moose**	**Elk**	**Mule Deer**	**White-tailed Deer**	**Unidentified Deer**
Spring (n=26)	0.0	0.1	0.1	17.2	1.2	1.3	149.6	3.9	126.0	0.2
Summer (n=23)	0.5	0.0	0.3	5.5	0.7	2.0	166.5	3.3	100.8	1.4
Fall (n=26)	0.5	0.0	0.1	6.8	1.4	2.5	74.1	7.2	54.8	1.2
Winter (n=25)	N/A	0.0	0.3	13.2	2.6	0.9	105.9	14.1	37.0	0.6

Notes:

n= number of remote camera stations

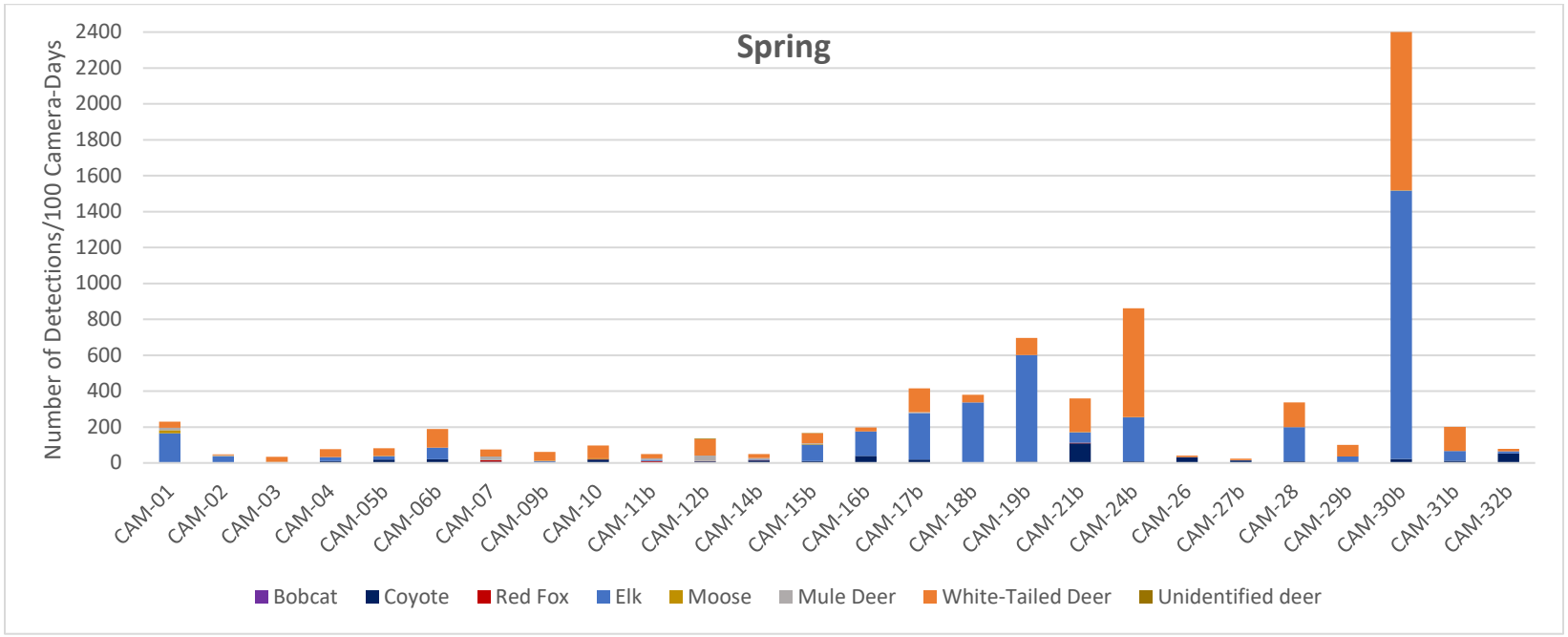
N/A - not applicable.

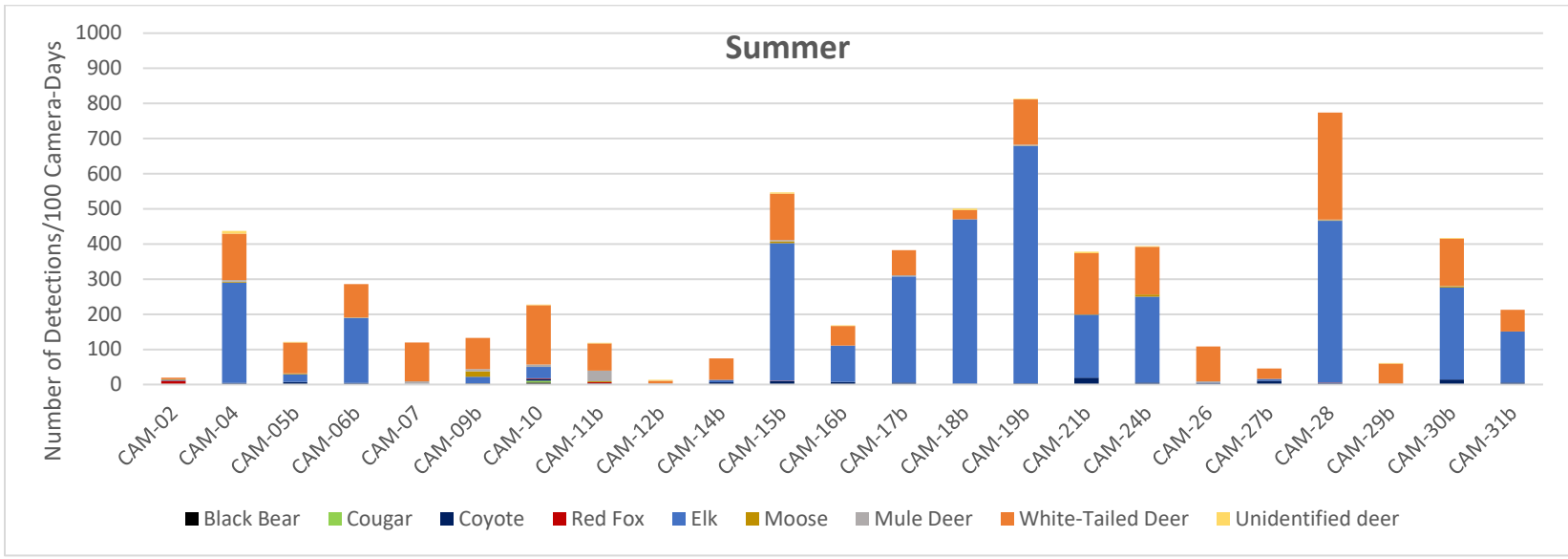
During fall, photographic rates at most remote camera stations decreased compared to summer, except for CAM-04, which detected the highest number of elk relative to other seasons (Figure 3; Appendix B, Figure B3). Elk herds were detected resting, feeding as well as travelling north and south at CAM-04, which contained shrubland/grassland habitat. Remote cameras deployed along Elbow River in mixed forest (CAM-01, CAM-02, CAM-07, CAM-09b, CAM-10, CAM-11b) as well as some upland cameras (e.g., CAM-26, CAM-29b) had relatively lower levels of activity compared to other remote camera stations deployed in shrubland/grassland and tame pasture (CAM-24b, CAM 28, CAM-30b) (Figure 3, Appendix B, Figure B3). White-tailed deer was the most frequently detected species along Elbow River during fall; however, moose (*Alces alces*), mule deer (*Odocoileus hemionus*), cougar (CAM-02 and CAM-10 [Appendix A, Photo A.6]) and black bear (CAM-01, CAM-9b, CAM-10) were also detected (Figure 3). No elk were observed along the Elbow River during fall (Figure 3).

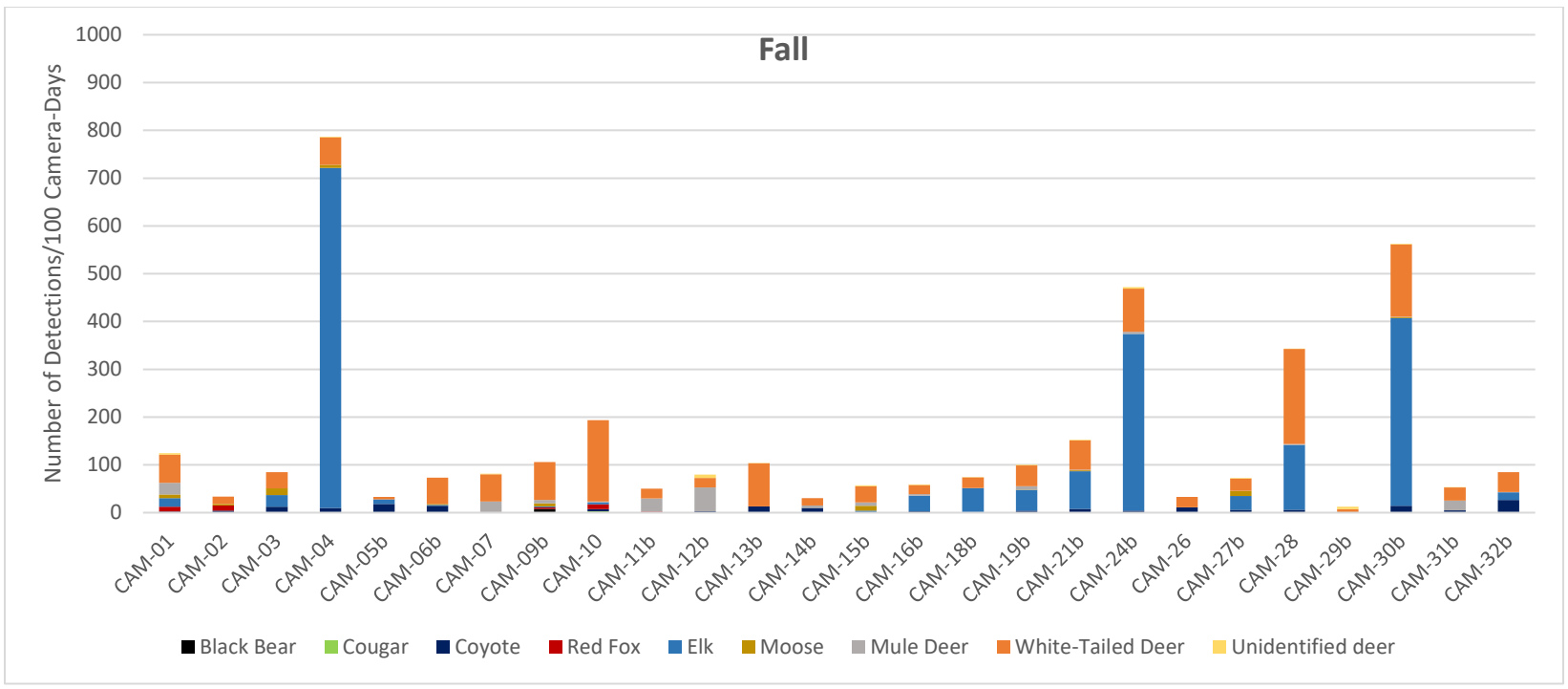
During winter, photographic rates were relatively low compared to other seasons, except for CAM-30b, where elk photographic rates were the highest compared to other species and seasons (Figure 3; Appendix B, Figure B4). White-tailed deer photographic rates were the lowest during winter compared to other seasons. Mule deer were detected most frequently at CAM-12b near Township Road 242 (Figure 3). Cougar was detected at three remote camera stations including CAM-01, CAM-02 and CAM-10 (Appendix A, Photo A.7).

Overall, photographic rates were highest at CAM-30b where elk and white-tailed deer were frequently detected, particularly during spring and winter (Figure 3; Appendix B, Figure B1, Figure B4) when they were detected travelling south and north presumably between preferred foraging areas (Appendix A, Photo A.8). Elk herds were also observed resting and feeding in large numbers at CAM-30b during winter (Appendix A, Photo A.9). CAM-24b, deployed south of unnamed creek in tame pasture (agricultural land) also recorded a relatively high number of white-tailed deer and elk (Figure 3). Mean group size of elk was 4.3, 3.4 and 5.7 during spring, summer and fall respectively. During winter, average groups size increased to 15.3; however, there was considerable variation among cameras (Table 3).

Figure 3 **Relative Abundance (Number of Detections/100 Camera-Days) of Wildlife Species by Season at each Remote Camera Station during 2022-2023 Construction**







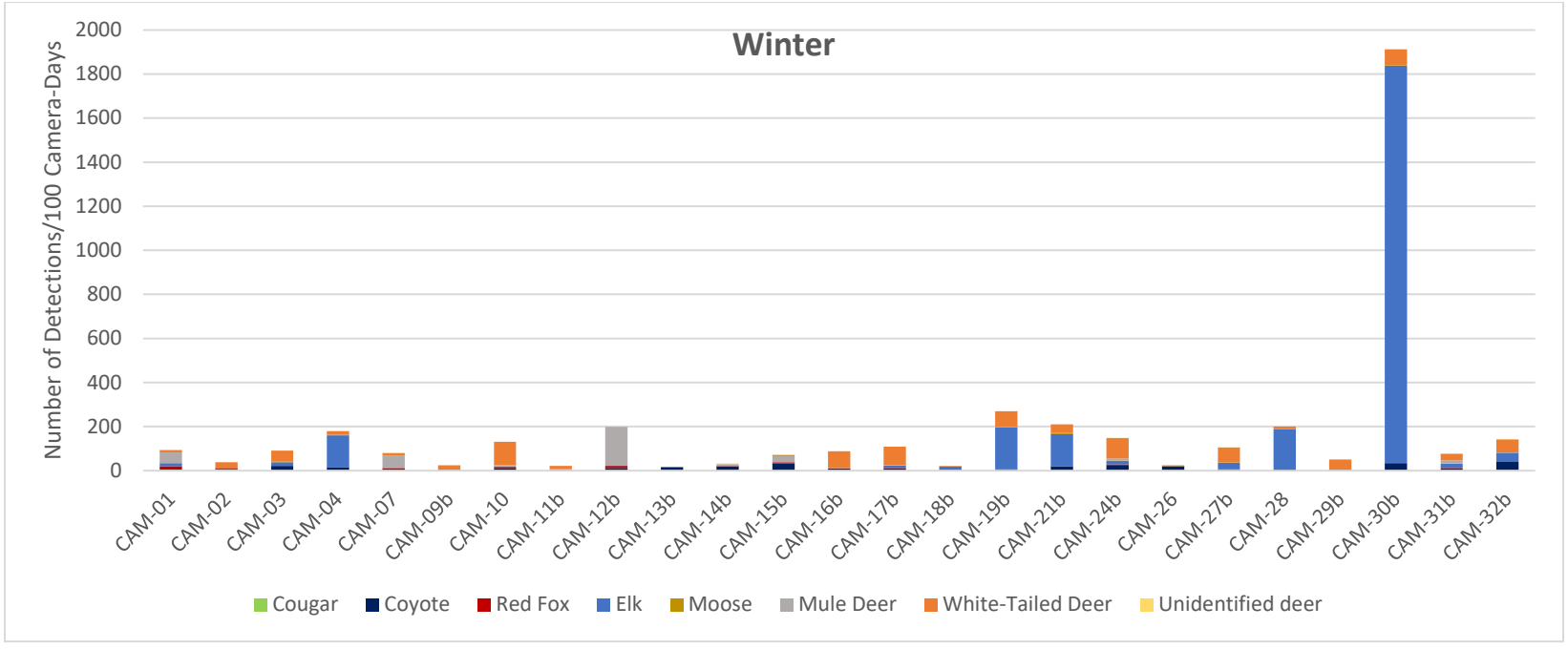


Table 3 Summary of Elk Group Size by Season – 2022-2023 Construction

	Number of Groups Detected (Independent Events)	Number of Individuals Detected	Mean Group Size (±1SD)	Range (min-max)
Spring	485	2,336	4.8 (10.4)	1-100
Summer	983	3,342	3.4 (7.4)	1-117
Fall	334	1,896	5.7 (11.1)	1-80
Winter	231	3,525	15.3 (24.8)	1-105

3.4 Pre-construction and Construction

A comparison of photographic rates between the 2021 pre-construction and 2022-2023 construction periods indicated that the number of detections/100 cameras-days for elk, white-tailed deer and coyote was relatively lower during fall 2022 construction compared to fall 2021 pre-construction (Figure 4). The photographic rates for white-tailed deer showed the largest decline (45%) during construction compared to pre-construction. In contrast, mule deer were detected relatively more frequently during fall construction compared to pre-construction.

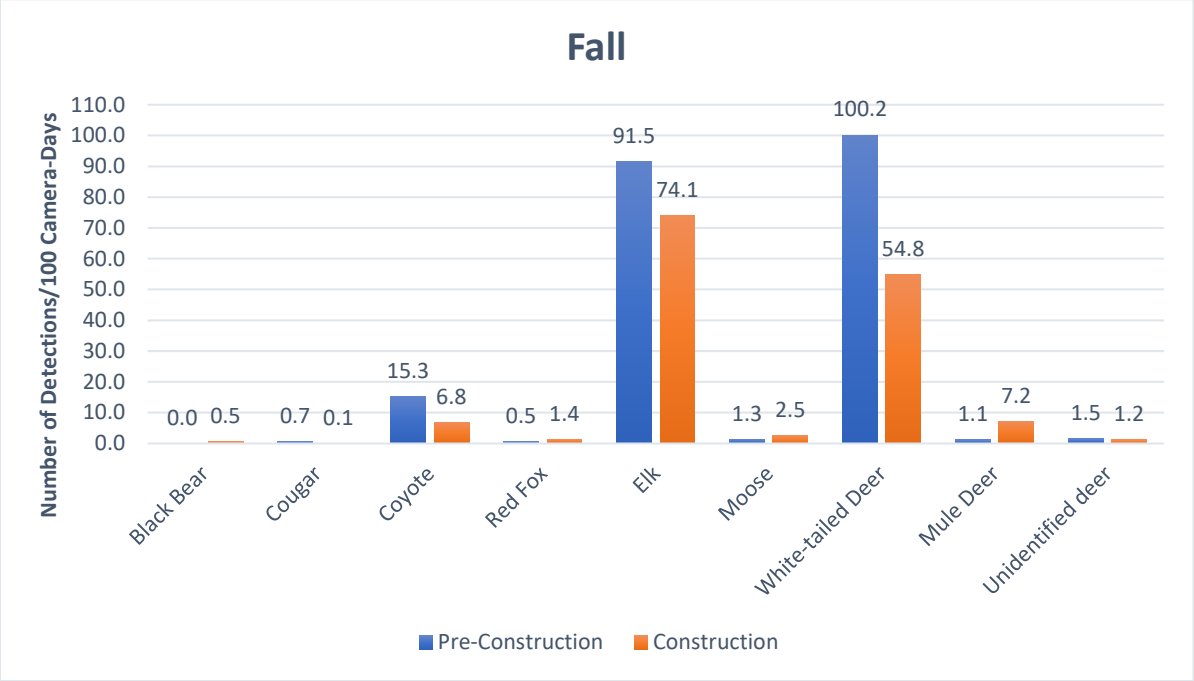
During fall 2022 construction, an inspection of photographic rates at each camera station indicated lower photographic rates of white-tailed deer at survey stations that were closer to construction activities including CAM-7, CAM-9b as well as CAM-19b and CAM-24b compared to 2021 pre-construction (Figure 5). However, there was an increase in photographic rates of white-tailed deer at survey stations farther from construction activities including CAM-28 and CAM-30b compared to pre-construction (Figure 5). Although there were apparent changes in relative abundance at remote camera stations, there was no statistically significant difference in photographic rates between pre-construction and construction (P = 0.442).

During winter, photographic rates for white-tailed deer and coyote were slightly lower during construction compared to pre-construction; however, elk photographic rates more than doubled during construction compared to pre-construction (Figure 4). Although elk photographic rates increased during construction they were not significantly different from pre-construction (P =0.816). Similar to fall, photographic rates of mule deer and red fox were relatively higher during construction compared to pre-construction.

During winter, ungulates were detected at eight remote camera stations deployed within the Key Wildlife and Biodiversity Zone (KWBZ) along Elbow River. However, photographic rates varied by species, camera station and project phase. White-tailed deer and mule deer were detected most frequently followed by elk and moose (Figure 6). Photographic rates for mule deer were higher during construction compared to pre-construction (e.g., CAM-01, CAM-07) whereas white-tailed deer photographic rates decreased at two stations (CAM-09b, CAM-18b), increased at CAM-17b and remained similar at other stations (Figure 6). Overall, elk relative abundance was higher in upland areas compared to the KWBZ stations along the Elbow River during construction (see Figure 3).

Although cougar were detected relatively infrequently, cougar photographic rates were higher during fall pre-construction compared to construction but similar during winter pre-construction and construction periods (Figure 4).

Figure 4 **Relative Abundance of Wildlife Species during 2021 Pre-Construction and 2022-2023 Construction Periods.**



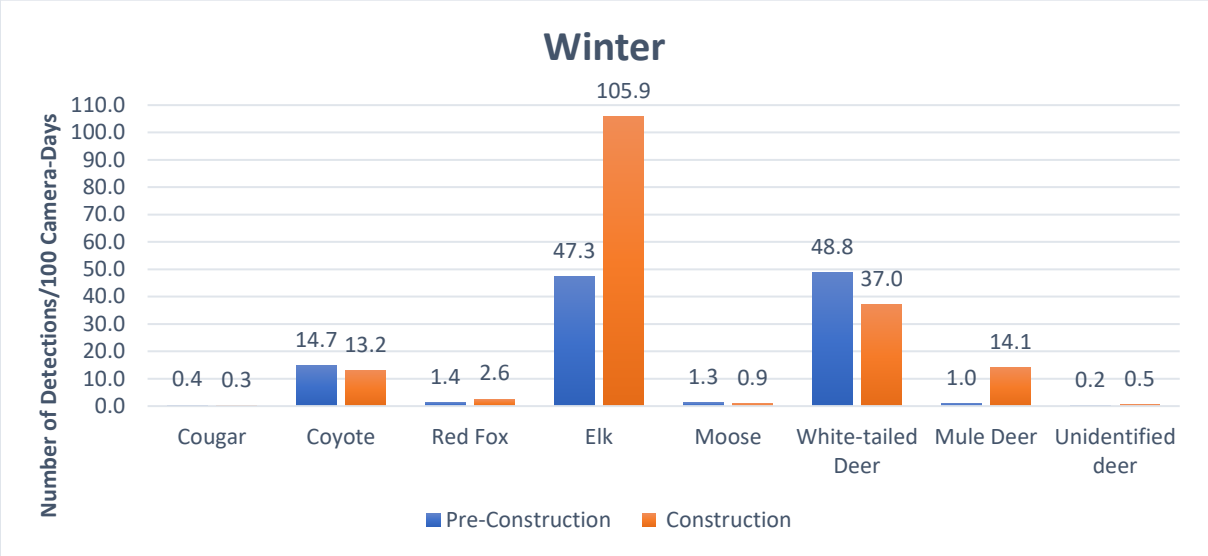


Figure 5 **Relative Abundance of White-tailed Deer at each Remote Camera Station during Fall 2021 Pre-Construction (PC) and Fall 2022 Construction (C) Periods.**

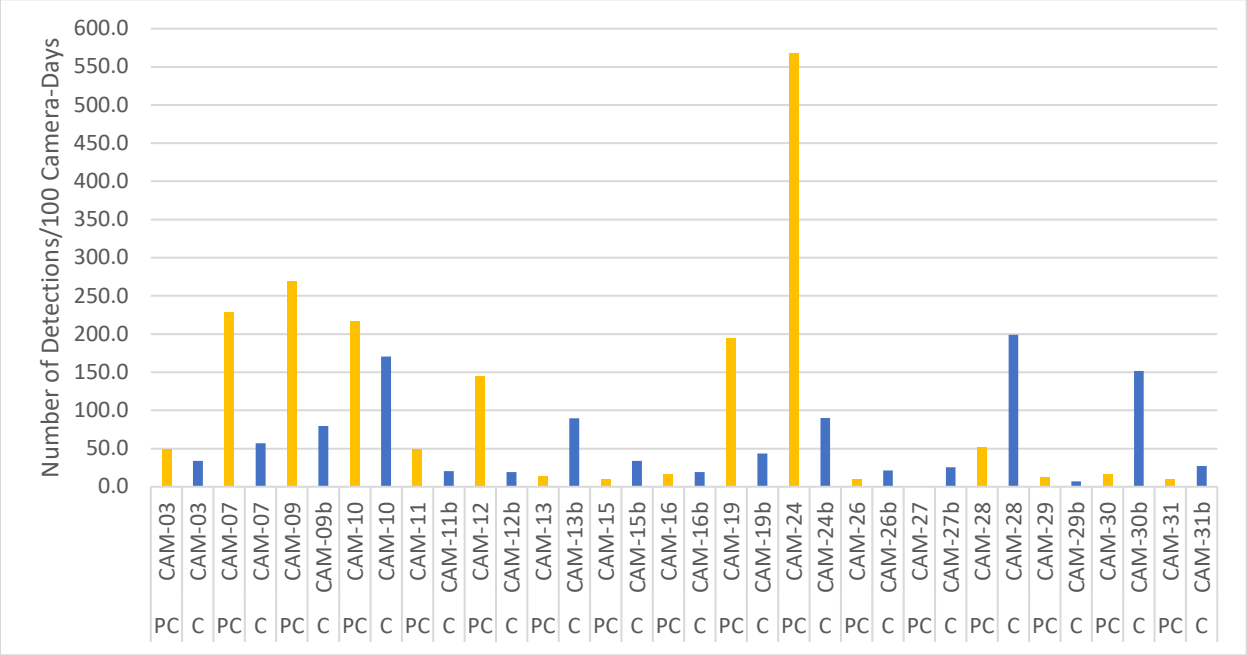
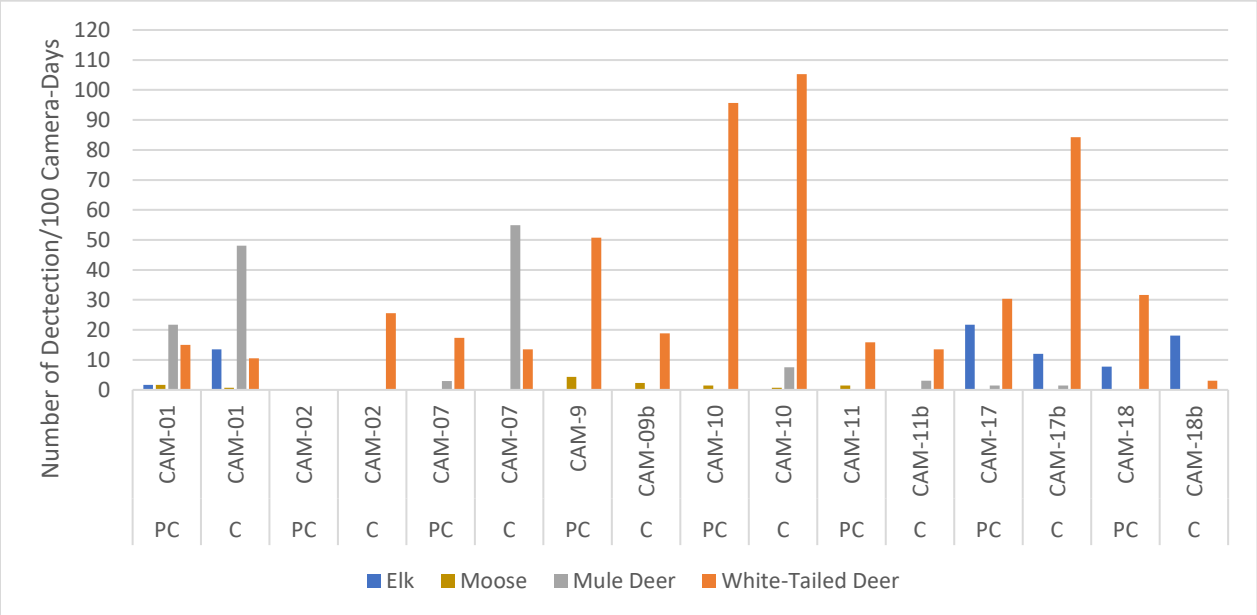


Figure 6 **Relative Abundance of Ungulates at Remote Camera Stations along Elbow River during Winter 2021-2022 Pre-Construction (PC) and Winter 2022-2023 Construction (C) Periods.**



4 Discussion

Overall, the relatively high naïve occupancy estimates for white-tailed deer, elk and coyote indicated these three common species remained relatively well distributed throughout the LAA during the 2022-2023 construction period. However, photographic rates of white-tailed deer and elk varied by season, survey station and project phase. At some survey stations, photographic rates were relatively lower during construction compared to pre-construction, while at other stations photographic rates were higher during construction. A relative reduction in photographic rates at remote camera stations deployed near construction activities that occurred at the diversion inlet structure (e.g., CAM-07) and low-level outlet (CAM-24b) during fall suggests white-tailed deer may have temporarily reduced habitat use in these areas due to sensory disturbance from ongoing construction. Because photographic rates increased at survey stations located away from construction activities (e.g., CAM-28 and CAM 30b), also suggests white-tailed deer may have shifted their distribution in response to construction activities during fall. However, a variety of other confounding factors (e.g., weather, food availability, predators) might have also contributed to the lower photographic rates during fall construction. Whether these seasonal changes in white-tailed deer distribution and abundance represent temporary shifts in the LAA will be investigated during future construction monitoring.

Despite some apparent differences in white-tailed deer and elk photographic rates between pre-construction and construction, the rates were not significantly different, which might be related to the fact that large differences were limited to a few survey stations while other remote camera stations detected less of a difference.

The relatively large increase in relative abundance indices for elk during fall and winter reflects larger group sizes (e.g., 50-100) that typically occur during these seasonal periods (Hebblewhite and Pletscher 2002, Flowers 2019). Incidental observations by environmental monitors and construction personnel during construction also indicated that large herds of elk (e.g., 50-300) continue to use the LAA, particularly east of Hwy 22 in areas south of Springbank Road and North of Springbank Road (see Section 4.7.2 of Year 2 Annual Report).

Overall, the number of focal wildlife species detected (species richness) during the 2021 pre-construction period (7) was similar to the 2022-2023 construction period (9) where seven wildlife species including cougar, coyote, red fox, elk, moose, white-tailed deer and mule deer continued to use the LAA. Black bear and bobcat, which were not detected during 2021 pre-construction were detected during 2022 construction (summer/fall and spring respectively). However, similar to white-tailed deer and elk, photographic rates for other focal wildlife species also varied by season and project phase (e.g., cougar, mule deer).

4.1 Data Limitations

As predicted in the EIA, direct and indirect habitat loss have potential to result in displacement and/or sensory disturbance of wildlife during construction. However, the before-after (BA) study design does not account for temporal changes due to other confounding factors (see above), which hampers interpretation of potential changes in wildlife use (Morrison et al. 2010). Although the distribution and total number of remote cameras deployed to monitor wildlife use in the LAA during 2022-2023 construction is considered adequate to detect any potential changes in wildlife occupancy and relative abundance (Shannon et al. 2014), camera malfunctions resulted in a loss of data at specific monitoring stations during certain seasons (e.g., CAM-13b, CAM-05, CAM-06), which reduced survey effort and availability of data related to wildlife use on the west side of Hwy 22.

Although the distribution of remote camera monitoring stations identifies where elk have been detected in the LAA, the spacing of the cameras does not allow identification of specific movement paths between or among survey stations. Therefore, it is difficult to determine daily/seasonal movement patterns and whether any of the existing construction activities are creating potential physical or sensory barriers to movement. However, because elk were detected at a relatively high proportion of total remote camera stations in the LAA (>80% in spring and summer and >50% in fall and winter), suggests elk were able to access seasonal habitats in and adjacent to the LAA as evidenced by detections both north and south of the diversion channel, low-level outlet and off-stream dam construction activities.

Photographic rates of species should be interpreted with caution because they do not account for probability of detection (Burton et al. 2015, Caravaggi et al. 2020). However, the relatively open habitat conditions (agricultural land, grassland, open shrub) and camera placement along trails provided relatively consistent conditions across the majority of camera stations, which would reduce potential bias in detectability. Nonetheless, it is recognized there are species-specific differences in home range sizes, behaviour and movement patterns that can affect relative abundance indices (Burton et al. 2015). Overall, photographic rates were considered adequate to determine species occurrence at multiple cameras sites during the same monitoring period and study area (Muhly et al. 2011).

4.2 Future Monitoring

Overall, the remote camera data collected in during 2022-2023 provided additional construction data that demonstrated spatial variation in wildlife species occurrence and relative abundance in the LAA. The remote camera monitoring program will continue to use the existing camera stations to provide monitoring results during 2023-2024 construction. However, additional cameras will be considered to monitor wildlife response to wildlife-friendly fencing as fencing installation progresses. Future construction monitoring and 2024 reporting will include additional seasonal data, where annual variation in trends may become apparent relative to baseline conditions and/or other monitoring years. As monitoring continues and sample sizes increase, more robust statistical analysis will be completed to quantitatively compare potential changes in photographic rates during pre-construction, construction, and eventually dry operations. Specifically, a modelling approach will be considered to account for seasonal and annual variation in photographic rates and/or occupancy using a generalized linear model (Sollmann 2018). Image recognition and classification software (e.g., MegaDetector [Microsoft Inc], Timelapse [Greenberg 2021) are also being explored to increase data processing efficiency.

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Appendices

Appendix A Photos

Photo A.1 Bobcat detected at CAM-28 east of Hwy 22 (mixed forest/shrubland) during spring (April) 2022

Photo A.2 **Elk cow and calf detected at CAM-04 east of Hwy 22 near the Embankment Raise during summer (June) 2022.**

Photo A.3 Cow elk and calves detected at CAM-06b west of Hwy 22 near the Embankment Raise during summer (June) 2022

Photo A.4 Cougar detected at CAM-10 along Elbow River during summer (June) 2022

Photo A.5 Black bear detected at CAM-5 west of Hwy 22 near Embankment Raise during summer (August) 2022

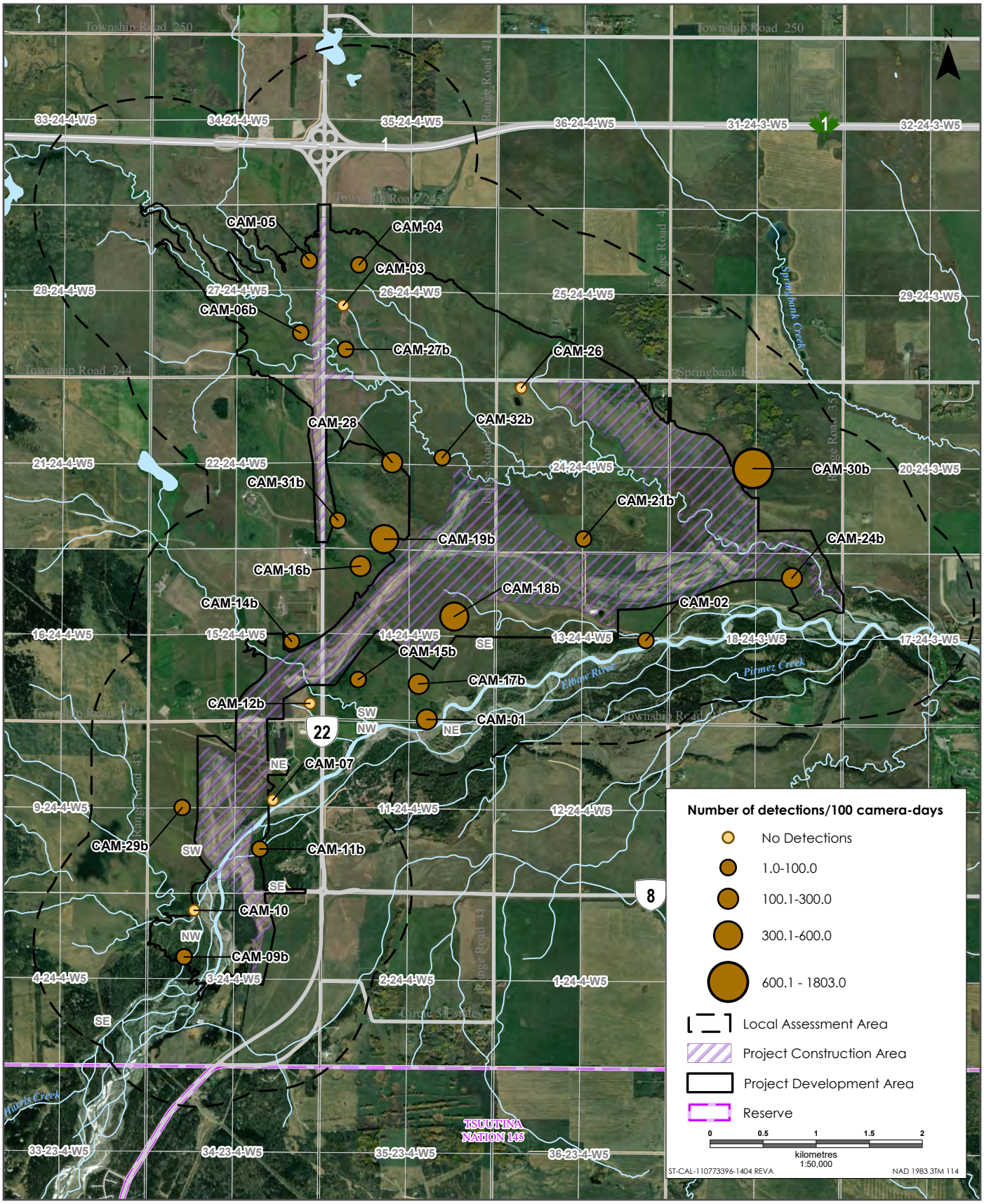
Photo A.6 Cougar detected at CAM-10 along Elbow River during fall (September) 2022

Photo A.7 Cougar detected at CAM-02 along Elbow River during winter (February) 2023

Photo A.8 Elk herd observed foraging/travelling at CAM-30b during spring (April) 2022.

Photo A.9 Elk herd foraging/resting at CAM-30b during winter (January) 2023

Appendix B Elk Relative Abundance (Photographic Rates) by Remote Camera Station in the LAA



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta

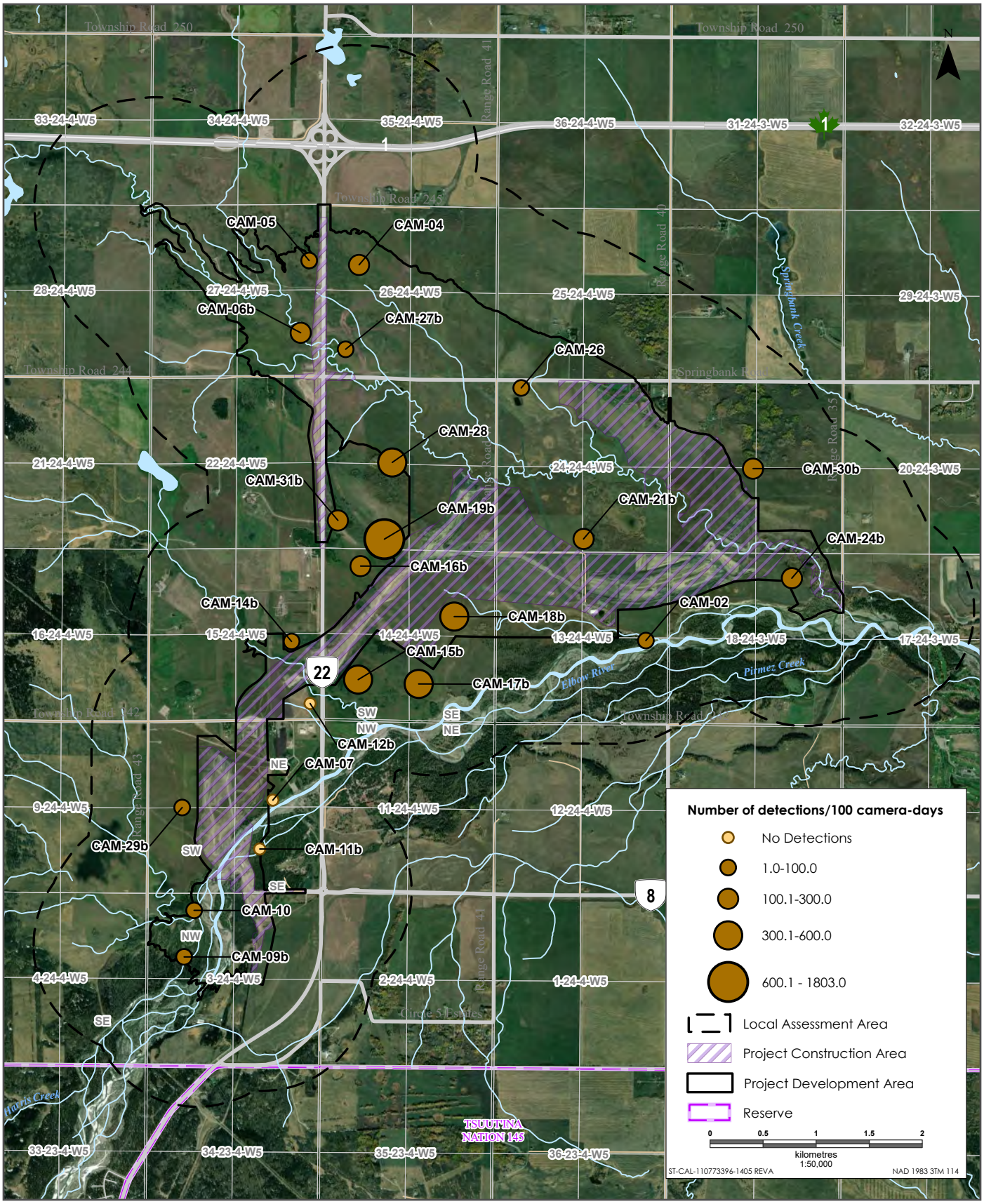
Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.
9/13/2023

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Number of Elk Detections/100 Camera-Days at each Remote Camera Station - Spring 2022 Construction

Appendix B1



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta

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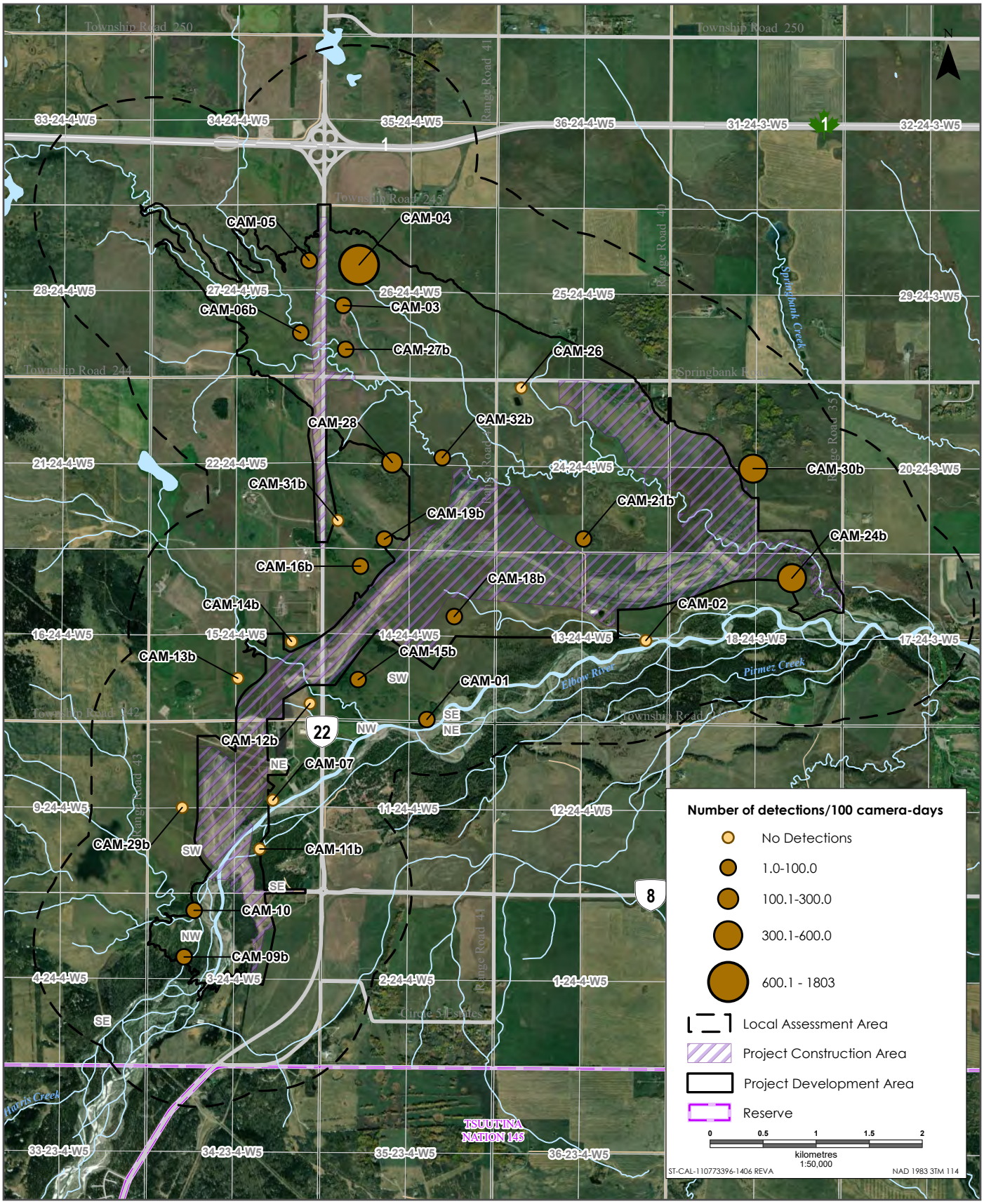
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Number of Elk Detections/100 Camera-Days at each Remote Camera Station - Summer 2022 Construction

Appendix B2



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.
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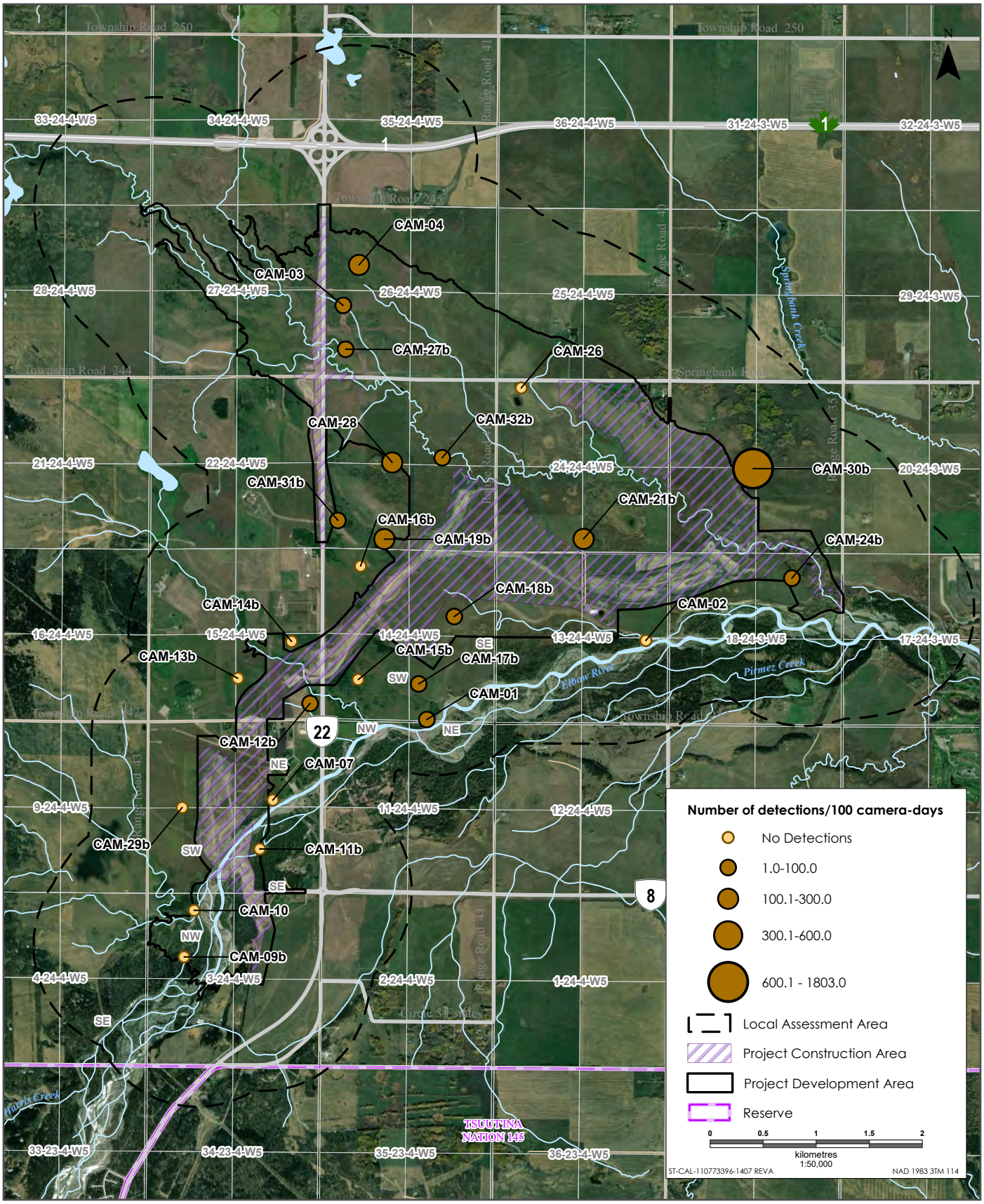
ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Number of Elk Detections/100 Camera-Days at each Remote Camera Station - Fall 2022 Construction

Appendix B3



Sources: Base Data - Government of Canada. Thematic Data - Government of Alberta

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the issuing agency.
9/13/2023

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ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT

Number of Elk Detections/100 Camera-Days at each Remote Camera Station - Winter 2022-2023 Construction

Appendix B4

B.2
Groundwater

Springbank Off-stream Reservoir Project
2023 Groundwater Monitoring Report

October 2023

Prepared for:
Transportation and Economic Corridors

Prepared by:
Stantec Consulting Ltd.

Project Number:
110773396

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Acronyms / Abbreviations

%	percent
<	less than
>	greater than
°C	degrees Celsius
3D CSM	three-dimensional conceptual site model
AD	Absolute difference
AEP	Alberta Environment and Parks
Alberta Tier 1 Guidelines	Alberta Tier 1 Soil and Groundwater Remediation Guidelines
AWWID	Alberta Water Well Information Database
BGP	base of groundwater protection
BTEX	benzene, toluene, ethylbenzene, xylenes
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
cfu	colony forming unit
CGDWQ	Guidelines for Canadian Drinking Water Quality
Cv	coefficient of variation
DEM	digital elevation model
DO	dissolved oxygen
DOC	dissolved organic carbon
E. Coli	Escherichia coli
EC	electrical conductivity
EIA	environmental impact assessment
GCDWQ	Guidelines for Canadian Drinking Water Quality

GWMP	Groundwater Monitoring Plan
HPC	heterotrophic plate counts
IAAC	Impact Assessment Agency of Canada
LAA	local assessment area
LTC	level, temperature and conductivity
m	metre
m ASL	metres above sea level
m BGL	metres below ground level
m/s	metres per second
m/year	metres per year
m^3/day	cubic metres per day
mg/L	milligrams per litre
mL	millilitre
mpn	most probable number
NRCB	Natural Resources Conservation Board
ORP	oxidation-reduction potential
PDA	Project development area
PS1	Parameter Suite 1
PS2	Parameter Suite 2
PS3	Parameter Suite 3
Q2	second quarter
QA/QC	quality assurance/quality control
RAA	regional assessment area
RPD	relative percent difference
SR1; the Project	Springbank Off-stream Reservoir Project

Stantec	Stantec Consulting Ltd.
TDR	Technical Data Report
TDS	total dissolved solids
TSS	total suspended solids
UCL	upper confidence limit
US EPA	United States Environmental Protection Agency

1 Introduction

This document describes the activities completed and results of the Groundwater Monitoring Program for the Springbank Off-stream Reservoir Project (SR1; the Project) in 2022 and 2023. This scope of the Groundwater Monitoring Program is based on the Stantec Consulting Ltd. Groundwater Monitoring Plan (GWMP) for the Project (Stantec 2021) and covers the monitoring period between July 1, 2022 and June 30, 2023.

The GWMP provides a summary of the project, the hydrogeological framework, the potential interactions between groundwater and the Project and mitigation measures identified to provide context for the plan. A summary of the hydrogeological setting is provided in Appendix A of this report for reference. The GWMP was developed using a tiered approach that considers the potential project interactions that could lead to effects on groundwater resources, which vary depending upon the specific location within the Project area and the project lifecycle phase. The timing and level of comprehensiveness involved in the GWMP varies accordingly. Monitoring results are compared to relevant water quality guidelines and trigger values established in the GWMP. Once sufficient data are gathered, data will also be compared to quantitative control limits and temporal trend analyses will be completed to identify potential project effects.

Should the GWMP results exceed groundwater quantity or quality triggers, a conceptual groundwater response plan is also included in the GWMP that describes the actions that would be taken.

2 Background

The Project consists of the construction and operation of an off-stream reservoir to divert and retain a portion of Elbow River flows during a flood. The diverted water will be released back to Elbow River in a controlled manner after the flows in Elbow River decrease sufficiently to accommodate the release of water from the reservoir. The off-stream reservoir will not hold a permanent pool of water. The hydrogeological setting of the Project is presented in Appendix A to provide context for the GWMP.

2.1 Project Components

The primary Project components include:

- a diversion structure on the main channel and floodplain of Elbow River
- a diversion channel to transport diverted floodwater from the Elbow River to the off-stream reservoir
- a dam to temporarily retain the diverted floodwater in the reservoir
- a low-level outlet in the dam to return retained water through the existing unnamed creek and back to the Elbow River when the operator determines conditions are appropriate

2.2 Construction and Groundwater Effects Mitigation

A number of construction activities with potential to affect either groundwater quality or quantity occurred during the current reporting period including:

- excavation of a borrow pit in NE22-24-04-W5M, approximately 200 m hydraulically upgradient of MW16-26-18 (potential to decrease groundwater level)
- raising the grade of Highway 22 immediately adjacent to MW16-26-18 and MW16-27-12 (potential effects on groundwater level and quality)
- dewatering from the construction of the diversion channel (potential to decrease groundwater level)
- diversion of surface water and groundwater from dugouts and water wells for soil conditioning and dust control (potential to decrease groundwater level)
- dam construction (potential to increase pore pressures/groundwater level)

The primary Project components are being constructed and operated under four lifecycle phases. The groundwater monitoring program results presented in this report covers two of these lifecycle phases: a portion of the pre-construction baseline period, and the early stages of construction.

Construction dewatering of groundwater, where/when required, is being done locally and according to the terms and conditions of licences issued by AEP (where applicable and if required) and best management practices. Best management practices will include, but are not limited to, the following:

- Water is discharged in a manner to avoid erosion using turbidity barriers, containment berms and settling ponds. Construction dewatering is done in accordance with the terms and conditions of *Water Act* approval and the federal *Fisheries Act* and *Canadian Navigable Waters Act*.
- Total suspended solids (TSS) levels are controlled using silt fences and turbidity barriers. TSS levels are monitored by carrying out frequent water quality testing.
- Construction dewatering is limited through construction planning.
- Existing water wells within the construction footprint have been decommissioned and plugged off to prevent groundwater contamination and additional wells within the reservoir footprint will be decommissioned prior to operation.
- Regional-scale effects on groundwater quantity can be mitigated by allowing seepage in the diversion channel (when it is dry) to infiltrate back into the subsurface, or flow back into Elbow River through surface water drainage pathways.

Effects on groundwater quantity as a result of construction dewatering will not be entirely mitigated at a local scale because dewatering deliberately seeks to temporarily lower the groundwater table in the Project development area (PDA) to facilitate construction. The amount of time required for construction dewatering is minimized through construction planning. Groundwater that is collected during dewatering is returned to the local watershed to mitigate regional-scale effects on groundwater quantity.

Groundwater that seeps into the diversion channel (when dry) remains within the watershed, although potentially travelling through a more tortuous route back to its discharge area. Regional-scale effects on groundwater quantity can be mitigated by allowing seepage in the diversion channel to infiltrate back into the subsurface, or flow back into Elbow River through surface water drainage pathways.

The secondary effects on groundwater quality related to changes in groundwater flow patterns will not be entirely mitigated because dewatering activities deliberately seek to lower the water table (and in turn affect groundwater flowpaths, potentially resulting in changes in groundwater quality). The amount of time required for construction dewatering is minimized through construction planning which in turn will limit the duration of the residual effects. Other mitigation measures are in place as follows:

- at locations where flows from construction operations are discharged into waterbodies, water quality is tested at discharge locations and TSS monitored
- construction dewatering may be reduced through construction planning

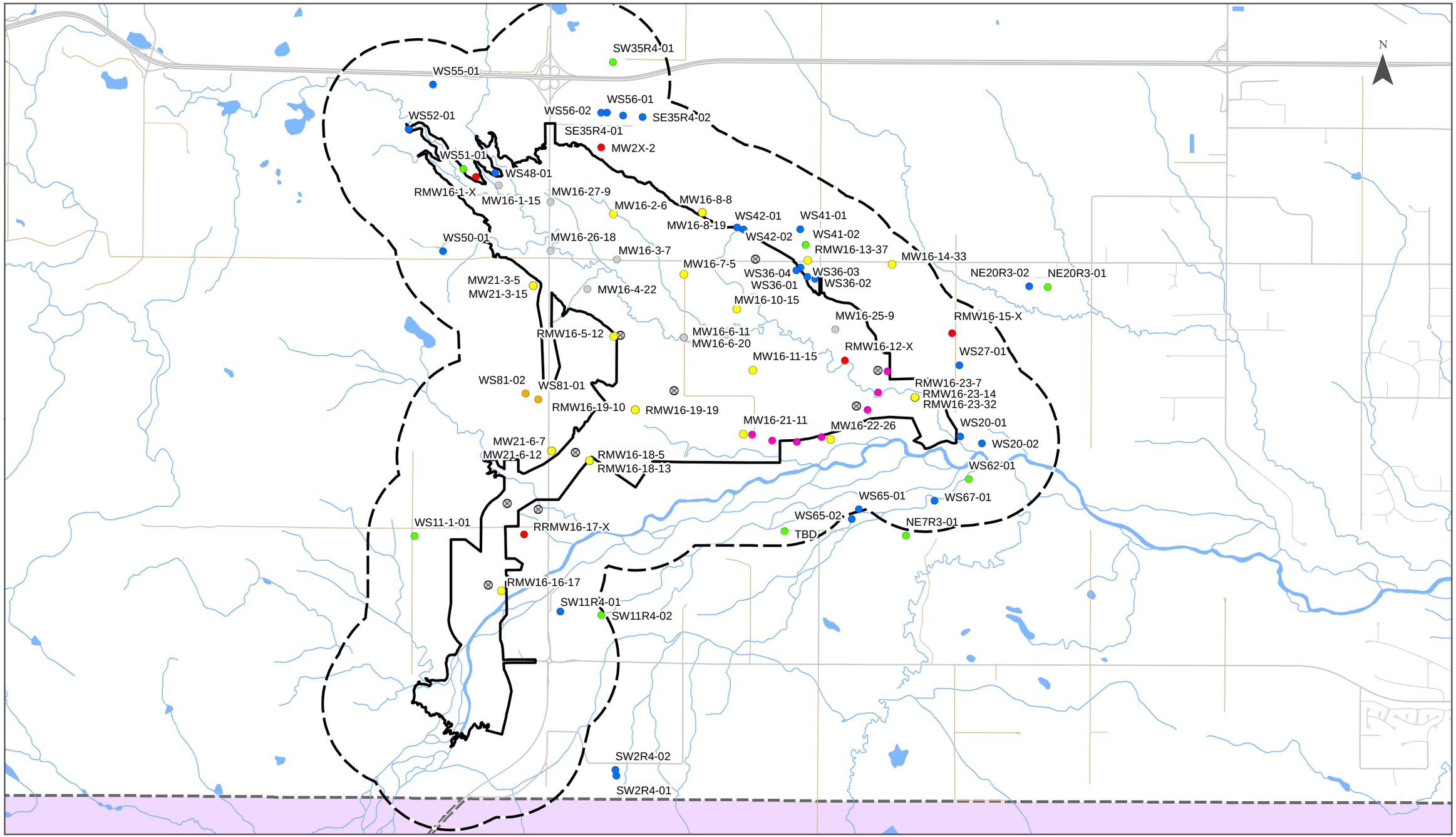
2.3 Groundwater Monitoring Well Network

2.3.1 Tiered Groundwater Monitoring Locations

Figure 2.1 presents the layout of the current groundwater monitoring network. The density and distribution of groundwater monitoring wells is based on the need to detect potential changes to groundwater levels and quality that could arise from interactions between the Project and groundwater resources. The siting of monitoring wells considered the expected extent of effects on groundwater for construction as well as dry and flood operations.

Simulation results from the numerical groundwater modeling completed as part of the environmental impact assessment (EIA) were reviewed to understand the potential areas over which effects on groundwater could be expected. Under dry operations, the simulated extent of potential effects will be limited to areas near the diversion channel, due to drawdown caused by incision of the channel through the water table. Under flood operations, effects on groundwater are expected to be limited to areas near the diversion channel and off-stream reservoir. In the case of both dry and flood operations, potential effects on groundwater are predicted to be limited to within the EIA local assessment area (LAA), with the potential exception of the area west of the diversion channel. Thus, monitoring wells sited within the LAA and west of the diversion channel will be able to detect change related to potential Project effects, should they occur.

Groundwater monitoring well locations were also selected to allow for characterization of “background” water quality in areas anticipated to be unaffected by Project interactions depending on the stage of project. For example, Tier 2 and Tier 3 wells that are far removed from construction activities will continue to provide background data during the construction phase and operation phase up until the first operational flood event. Monitoring well locations were also selected based on the location of existing users of groundwater, such that some locations are able to provide “early warning” for changes in groundwater prior to those effects reaching existing groundwater users.



Sources: Base Data- Government of Alberta, Government of Canada. Thematic Data - Stantec Ltd.

Project Development Area	Tier 2a
Local Assessment Area	Tier 3
Tsuut'ina Nation Reserve	One-Time Domestic Well
Tier 1 - pending installation	EIA Project Well
Tier 2	Decommissioned or Destroyed
Tier 2 - pending installation	

NAD 1983 3TM 114

0 1 2
kilometres

Stantec

ALBERTA TRANSPORTATION SPRINGBANK OFF-STREAM RESERVOIR PROJECT - 2023 GROUNDWATER MONITORING REPORT

Groundwater Monitoring Network
Figure 2.1

Three monitoring tiers have been established, based loosely around the associated geographic coverage:

- Tier 1 monitoring wells or piezometers will be shallow and located within or immediately adjacent to Project infrastructure (dam, diversion intake and channel). Piezometers or vibrating wire piezometers (for pore pressure monitoring) will be used for geotechnical monitoring within the Project components; however, this data will also be used to support the monitoring of potential effects to groundwater. Shallow monitoring wells will also be installed in this area in consultation with the dam engineering team prior to operations.
- Tier 2 monitoring wells are shallow and within or very near the wetted perimeter of the off-stream reservoir and diversion channel. They are installed in both the unconsolidated and shallow bedrock deposits. The Tier 2 wells also include nested pairs completed at different depths to monitor different stratigraphic units and potential changes in vertical hydraulic gradients. Nested monitoring well locations are indicated in Figure 2.1 (multiple well names at a given location). Note that Tier 2 wells installed in bedrock are only situated outside of the wetted perimeter to prevent potential vertical pathways for floodwater to enter bedrock aquifers.

  A subset of Tier 2a wells are also included specifically to monitor drawdown near the diversion channel during construction and dry operations to address Natural Resources Conservation Board (NRCB) approval condition 11.5 a[1].
- Tier 3 monitoring wells are situated beyond the area of predicted project effects at locations of some of the closest potential receptors to the Project. These monitoring wells are, or will be, installed within unconsolidated or bedrock units depending upon local groundwater use and potential aquifers of interest. The main purpose of these monitoring wells is to provide early detection of potential effects on groundwater that are propagating outward from the LAA. These monitoring wells will also be potentially used as background monitoring wells to discriminate between changes to groundwater levels arising from a flood or precipitation event, versus those which can be attributed to operation of the Project.

Tier 1 locations will be finalized toward the end of the construction phase once the Project infrastructure is built. Tier 2 monitoring well locations have been finalized (pending land access in some cases) and the network is nearing completion. The current network includes 23 of 28 proposed Tier 2 wells in their final locations. The remaining four wells include:

- MW16-15-34 and RMW16-17-10 require replacement which was planned for August 2023 at locations labeled RMW16-15-X and RRMW16-17-X on Figure 2.1
- one well (labelled MW2X-2 on Figure 2.1) is pending land access

[1]"monitor water levels in domestic water wells west of the diversion channel to the boundary of the local assessment area that may be impacted by dewatering during the Project construction. During flood and dryland operation, monitoring of the wells should be continued by the Operator for a minimum of five years or until it can be demonstrated that permanent lowering of the water level does not significantly impact yields from the water wells,"

- MW16-12-3 had to be decommissioned to accommodate dam construction and will be replaced following construction at location RMW16-12-X
- MW16-1-15 continues to be monitored but requires replacement outside of the wetted perimeter prior to the operation phase of the Project

Domestic water well owners within the modelled drawdown area west of the diversion channel were invited to be included in the Tier 2a monitoring well network, however, only one landowner (with two wells) chose to participate. A total of eight Tier 3 monitoring well locations have been established with land access pending for the remaining one (approximate location labeled TBD on Figure 2.1). At the time of this report, additional private landowners have not accepted invitations to participate and Rocky View County has indicated that they will not allow groundwater monitoring wells in the county road allowances. As such, it is uncertain if the remaining Tier 3 well can be installed at a location meeting the original intent.

In addition to the monitoring network, the locations of monitoring wells used in the EIA (herein referred to as “EIA Project Wells”) that will not be part of the long-term network are also presented. These monitoring wells have been or will be decommissioned prior to operation, due to their location relative to the construction footprint or their completion relative to future operational flooding of the reservoir. The remaining EIA Project Wells continued to be monitored and sampled in 2022 and 2023 to gather additional baseline data. The data from these wells, along with previously collected data from the decommissioned monitoring wells, will also be included in the baseline dataset.

Landowners within the LAA and north of the Elbow River were also invited to participate in one-time baseline testing of their domestic water wells based on a commitment made during the NRCB EIA Hearing. These locations are labeled “One-Time Domestic Wells” in Figure 2.1.

In Figure 2.1, the Tier 1 monitoring wells will be within the dam structure. These wells would be expected to fall within an area where Project effects are expected (during dry and flood operations). Additional Tier 1 monitoring wells may be included near the diversion inlet and along the diversion channel. The locations will be finalized based on geotechnical and dam safety requirements.

In Figure 2.1, the Tier 2 monitoring wells are shown across much of the LAA, including some wells within the wetted area of the reservoir (i.e., the area of the reservoir that would be inundated during a design flood). These wells would be expected to fall within or very near to areas where Project effects are expected (during dry and flood operations). Previous wells installed to support the EIA that were completed in bedrock within the wetted perimeter will be decommissioned prior to operations. The remaining Tier 2 wells within the wetted perimeter are shallow and completed in the unconsolidated deposits and will remain in place during flood operations to monitor effects.

Tier 2a wells shown in Figure 2.1 fall within the potential construction and dry operations drawdown area near the diversion channel. Monitoring of the Tier 2a wells is voluntary and based on landowner participation.

In Figure 2.1, the Tier 3 monitoring wells are shown both north and south of Elbow River. These wells are situated in areas outside of the expected areas where Project effects could occur (however they could still detect effects from a flood or precipitation). Tier 3 wells near Elbow River (NE7-R3-01 and WS62-01) are screened within the alluvial deposits and thus are directly connected to Elbow River, and they would be expected to experience changes in levels or quality during and after a flood in response to changes in river stage. Changes in these wells would be associated with natural effects of a flood and could be used to help differentiate flood-related effects from those attributable to the Project. Other wells south of the Project are situated in upland areas outside the alluvial deposits, and they would not be in direct communication with Elbow River.

The plan for the Tier 3 network was to use as many existing domestic wells as possible, however, because they require appropriate construction and are dependent on long-term access agreements, there are a few gaps remaining in the network and there is a need to find or install additional wells. Tier 3 wells will provide the ability to detect changes that could potentially propagate outward from the LAA in the direction of domestic and agricultural well users.

Existing domestic water wells for inclusion as Tier 3 monitoring wells were evaluated to verify that they were in appropriate locations, are screened at appropriate depths, are in good condition, and have good surface seal integrity. Ideally these wells would not be in use or near other wells in use such that water levels are not influenced by pumping, however, that is not the case for the current set of wells, but data logging pressure transducers have been installed in the Tier 3 wells to monitor water level variation due to pumping as well as potential interference from the Project.

2.3.2 Monitoring Well Development

Monitoring wells installed specifically for the project to be included in the GWMP have been developed following completion. Development is conducted to remove drilling fluids (if used) and fine-grained materials from around the filter pack to improve the hydraulic efficiency of the filter pack and improve hydraulic communication between the filter pack and geologic formation. The objective of the well development is to provide more representative groundwater samples and improved hydraulic conductivity estimates.

2.4 Groundwater Monitoring Program

2.4.1 Analytical Parameter Suites

Analytical parameter suites were developed for the GWMP to enable characterization of potential changes in groundwater quality through both general measures of groundwater quality (e.g., electrical conductivity [EC]), and through measures of groundwater quality specific to a given chemical compound (e.g., nitrate).

Interactions between the Project and groundwater can include changes to groundwater quantity or flow patterns that can in turn affect groundwater quality. There is also potential for groundwater contamination related to construction activities or the quality of the water in the reservoir during flood operations. The parameter suites were chosen to include a broad range of analytes as well as general indicators of water quality such as pH, electrical conductivity and dissolved organic carbon. Other parameters such as hydrocarbons are aimed at accidental releases during construction or in presence in floodwater. Similarly bacteriological parameters are intended to address potential impacts from human or animal waste in the floodwater.

The parameter suite applied during the monitoring program varies depending upon the Project phase and monitoring tier. Three parameter suites have been defined for the GWMP:

- Parameter Suite 1 (PS1) includes temperature and electrical conductivity (measured insitu).
- Parameter Suite 2 (PS2) includes general potability parameters, major ions, bacteriological parameters, dissolved organic carbon (DOC).
- Parameter Suite 3 (PS3) includes those listed in PS2 as well as dissolved metals, nutrients, benzene, toluene, ethylbenzene, xylenes (BTEX), and F1 to F2 fraction hydrocarbons.

Parameter Suite PS3 is being used for the baseline period and into the construction period to gather detailed water quality data. The parameter suites to be measured on an ongoing, scheduled basis will be reduced to PS2 and PS1 as described in Section 2.4.2. Escalation to a higher parameter suite would still occur during a flood event or if the results from the lower, scheduled parameter suite suggest that further analysis is required. For example, should electrical conductivity (as part of PS1) exhibit an unexpectedly elevated reading, then analysis of PS2 could then be implemented to provide further information regarding which specific chemical parameter is contributing to the elevated electrical conductivity.

2.4.2 Frequency of Monitoring

The frequency of monitoring for measurement of groundwater levels and collection of groundwater samples for water quality analysis is dependent on:

- the phase of the Project under consideration. Project Phases requiring higher levels of monitoring comprehensiveness (e.g., baseline and flood operations) will have a higher frequency of monitoring events.
- the tier of monitoring well under examination. In general, monitoring wells within the Tier 1 category will have a higher frequency of monitoring relative to the Tier 3 monitoring wells.
- the parameter suite that is under examination. General or bulk parameters (PS1) will have a higher frequency of monitoring than PS2 or PS3.

The planned frequency of monitoring for groundwater levels and quality has been defined at three levels:

- near-continuous measurement (C) of levels and quality through data logging probes that automatically collect and record at high frequency intervals.
- intermittent (I) measurement of routine, scheduled monitoring at set frequency (e.g., semi-annually)
- event (E) based measurement in response to a flood or other operational event (e.g., maintenance) where groundwater could be affected. Monitoring frequency during operational flood events will be assessed based on accessibility, safety and other constraints.

2.4.3 Overview of Groundwater Monitoring Program

Figure 2.2 illustrates the implementation of Monitoring Tiers, Parameter Suites, and Monitoring Frequency into an overall program that provides varying levels of monitoring comprehensiveness over the Project Phases.

In general, the level of monitoring comprehensiveness varies as follows (highest to lowest):

- Flood and post-flood operations requires of the most comprehensive monitoring because this is when the most Project interactions are applicable and when effects on groundwater are most likely to be observable.
- Baseline monitoring requires a highly comprehensive monitoring that starts prior to construction of the Project. The comprehensive baseline monitoring is being extended for some monitoring locations to assess the natural variability of groundwater quantity and quality. For example, baseline monitoring at monitoring wells not situated near construction areas could extend at least until construction is completed or even further until flood operations occur, if necessary
- Construction monitoring requires medium comprehensive monitoring. This monitoring is more focused on Project interactions that could potentially arise in a localized area due to construction activities (e.g., monitoring around a particular location undergoing construction dewatering).
- Dry operations monitoring has less comprehensive monitoring and occurs during dry operations between floods. This lower level of monitoring reflects the fewer Project interactions that are applicable when the Project is not in operation and flood water is not being retained within the off-stream reservoir.

As the monitoring program progresses through construction, dry operation, and flood operation it will be adapted as necessary to address observed effects on groundwater levels and groundwater quality. Adaptations may include augmentation of the monitoring network and/or changes to the monitoring frequency or analytical parameters in these areas.

Figure 2.2 Overview Summary of Groundwater Monitoring Program

		Baseline (Highly Comprehensive)			
	Well Count	**Levels**	**PS1**	**PS2**	**PS3**
Tier 1					
Tier 2	28	C	C	I	I
Tier 2a	2	C	C	I	I
Tier 3	9	C	C	I	I

		Construction (Medium Comprehensiveness)			
	Well Count	**Levels**	**PS1**	**PS2**	**PS3**
Tier 1	TBD	C			
Tier 2	28	C	C	I	I
Tier 2a	2	C	C		
Tier 3	9	C	C		

		Dry Operations (Least Comprehensive)			
	Well Count	**Levels**	**PS1**	**PS2**	**PS3**
Tier 1	TBD	C	C	I	
Tier 2	28	C	C	I	
Tier 2a	2	C	C		
Tier 3	9	C	C		

		Flood/Event Operations (Most Comprehensive)			
	Well Count	**Levels**	**PS1**	**PS2**	**PS3**
Tier 1	TBD	C	C	E	E
Tier 2	28	C	C	E	E
Tier 2a	2	C	C	E	
Tier 3	9	C	C	E	

Levels	C - Continuous
	I - Intermittent
	E - Event Based
Parameter Suite	PS1 - Temperature and EC
	PS2 - potability, major ions, bacteriological, DOC
	PS3 - dissolved metals, nutrients, BTEX, F1-F2 hydrocarbons

2.4.4 Groundwater Monitoring and Sampling Protocols

Data logging pressure transducers and multi parameter sondes are installed in Tier 2 and Tier 3 monitoring wells. This equipment measures and records near continuous (i.e. hourly) water level (pressure), temperature, and electrical conductivity (LTC loggers). Data logging pressure transducers (no electrical conductivity) were also installed at the Tier 2a monitoring wells. Near continuous pressure measurement will also be measured in Tier 1 wells using either pressure transducers or vibrating wire piezometers.

The following field procedures are used during monitoring to measure groundwater levels and to collect the groundwater samples:

- The depth to water at each monitoring well is measured and recorded.
- Each Tier 2 monitoring well is purged using its own dedicated inertial pump system or bailer until three well volumes are removed or until they are dry. Tier 3 domestic wells are purged using existing well pumps for a minimum of 15 minutes and until stabilization of field parameters (dissolved oxygen [DO], oxidation-reduction potential [ORP], pH, EC) is achieved.
- Water samples are collected into laboratory supplied containers within a day of purging (unless additional time is required for water level recovery) following laboratory instructions for filtering, preservation/treatment, and temperature moderation. Samples are labeled at the time of collection with the site number, the date of collection, and the analysis required.
- Field measurements of combustible headspace vapours, DO, ORP, pH, EC and temperature are collected at the time of sample collection.
- Quality assurance/quality control (QA/QC) samples are collected at a rate of approximately 10% of the total samples. Duplicate samples for quality control are obtained by rinsing a clean container with formation water, discarding the rinse water and then collecting the required sample volume. The sample is split into two aliquots and placed into two different bottles with one bottle identified under a different sample name and the second bottle under the regular sample number. The laboratory is not informed of the nature of the sample. Demineralized water blanks are also collected during the sampling periods to determine bottle cleanliness and the effects of sample transport, handling, and collection techniques. QA/QC water samples are given realistic sample numbers and submitted as groundwater samples.

The samples are delivered to a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory using standard chain of custody protocols. Chain of custody documents are included along with the laboratory reports in Appendix D.

3 2022-2023 Groundwater Monitoring Programs

The potential interactions that could lead to effects on groundwater resources vary depending upon the specific location and Project phase. The potential interactions for the baseline and construction phases included in this reporting period are described below.

During baseline data collection there was comprehensive baseline monitoring ongoing prior to Project disturbances. The baseline period will continue through construction and up until operation in areas in and around the reservoir where no construction activities will take place. The intent of baseline monitoring is to understand a wide range of hydrochemical parameters and their potential natural variability in location and time. The baseline monitoring program seeks to understand local seasonal variation in water levels and hydrochemistry and is intended to establish a point of comparison that can be used to assess changes that could be attributable to the Project in the future.

During construction, medium comprehensive monitoring is continuing to gather baseline data in some areas as noted above, as well as to monitor potential effects of construction activities that could lead to disturbances to the groundwater system such as construction dewatering or deep excavation along the diversion channel.

The following sections describe the groundwater monitoring network development and the monitoring that was completed during the 2022-2023 reporting period. The scopes of work for drilling and well installation and for groundwater monitoring were dependent on land access constraints related to private property access permissions, construction and weather.

3.1 November 2022 Well Installation and Monitoring

The following monitoring well installation activities were completed in November 2022 to continue to relocate monitoring wells outside of the construction footprint and to continue to establish the permanent monitoring network:

- Installation of Tier 3 monitoring well WS11-1 on AT property in NW10-24-04-W5
- Installation of Tier 2 monitoring wells RRMW16-17-X and RMW16-15-X were planned for November 2022 drilling, however the locations could not be accessed with the drilling rig due to deep snow at the time. Installation of these two wells is now planned for August 2023.

The new well location is presented in Figure 2.1 and the borehole log including lithological descriptions and monitoring well completion details are included in Appendix B.

The groundwater monitoring well networks were monitored and sampled between November 14 and 23, 2022. The monitoring event included:

- 24 - Tier 2/Tier 2a wells
- 6 - EIA Project Wells
- 6 - Tier 3 wells

The monitoring wells included in the November 2022 monitoring event are summarized in Table 1. The EIA Project Wells continue to be monitored and sampled for baseline purpose as discussed in Section 2.3.1. Access restrictions, damaged or destroyed wells or inability to locate wells prevented monitoring and sampling of the remaining wells as noted in the table. Monitoring and laboratory analysis was completed as described in the sampling protocols in Section 2.4.4.

Data loggers were downloaded and calibrated in November 2022. Data logger pressure, temperature and electrical conductivity data are presented in Appendix C.

3.2 May 2023 Well Decommissioning and Monitoring

The following monitoring well decommissioning activities were completed in May 2023 to accommodate construction while also establishing the permanent monitoring network:

- Decommissioning of Tier 2 well MW16-12-3 to accommodate construction of the dam, this shallow well completed in unconsolidated deposits will be replaced following construction

The groundwater monitoring well networks were monitored and sampled between May 15-24, 2023. The monitoring event included:

- 24 - Tier 2/Tier 2a wells
- 7 - EIA Project Wells
- 8 - Tier 3 wells
- 8 - One-time domestic wells

The monitoring wells included in the May 2023 monitoring event are summarized in Table 1. Access restrictions, damaged or destroyed wells or inability to locate wells prevented monitoring and sampling of the remaining wells as noted in the table. Monitoring and laboratory analysis was completed as described in the sampling protocols in Section 2.4.4.

Data loggers were downloaded and calibrated in May 2023. Data logger pressure, temperature and electrical conductivity data are presented in Appendix C.

4 Results

4.1 Groundwater Levels

Data logger data are presented in Appendix C. Loggers had been installed in a number of wells in 2016 with quasi-continuous hourly measurements of pressure (head above logger) and temperature recorded from 2016 to 2023. The data from these monitoring wells (MW16-1-15, MW16-6-11, MW16-6-20, MW16-8-19 and MW16-18-10) show the natural water level fluctuation over the medium term (i.e., seasonal variation over 8 years). Groundwater levels varied between approximately 1.3 m and 3.2 m prior to the current monitoring period (i.e. 2016-2022) and showed similar ranges in variation between wells installed in shallow unconsolidated deposits and those installed deeper in bedrock. The lowest groundwater levels are generally observed between February and April and the highest levels are generally observed between May and July.

Construction of the channel and dam and dewatering of areas near the Tier 2 monitoring network began in 2022 and continued through the current reporting period. Construction activities had the potential to affect the water levels in wells near the dam and diversion channel. Changes in water levels at these wells included:

- Water levels in MW16-6-11 decreased approximately 0.75 cm following the May 2021 groundwater monitoring event and continued to decrease throughout 2022 and 2023. The average water level was 1.15 m lower between 2021 and 2023 compared to 2016 to 2021. Water levels have remained stable in the deeper nested monitoring well at this location (MW16-6-20). These nested EIA Project Wells are located approximately 150 m from the construction area for the diversion channel outlet. The decrease in water level may be a result of construction dewatering and/or construction of the water storage dugout in SE23-24-4-W5. Considering the deeper monitoring well is not affected, the decrease is not considered to be a result of groundwater extraction from the nearby well (GIC Well ID 1023594) which is completed at approximately 37 m BGL.
- Nested Tier 2 monitoring wells RMW16-18-5 and RMW16-18-13 are located approximately 100 m hydraulically downgradient of the diversion channel construction and approximately 120 m from a newly constructed dugout for the Project. As of the May 2023 monitoring event, water levels appear to continue to exhibit seasonal fluctuations and have not been affected by the project.
- Nested Tier 2 monitoring wells RMW16-19-10 and RMW16-19-19 are located approximately 100 m hydraulically downgradient of the diversion channel construction near the outlet end. Water levels in both the shallow and deeper monitoring wells have decreased approximately 1 m between July 2022 and May 2023. It is not clear whether the decreases are a continuation of previously observed decreasing trends (i.e. prior to July 2022) or if they may be a result of construction activities.

- Nested Tier 2 monitoring wells MW21-6-7 and MW21-6-12 are located approximately 100 m hydraulically upgradient of the diversion channel construction. As of the May 2023 monitoring event, water levels appear to exhibit seasonal fluctuations and have not been affected by the project.
- Tier 2 monitoring well RMW16-16-17 is located approximately 50 m hydraulically downgradient of the current diversion channel construction footprint. Water levels have remained consistent over the current monitoring period and have not been affected by the project.
- Tier 2b monitoring wells WS81-01 and WS81-02 are located approximately 625 m and 775 m, respectively from the current diversion channel construction footprint. The water levels at WS81-01 were variable due to pumping but the maximum levels (i.e. non-pumping) decreased in January 2023 and further in February before rebounding in March. The decrease in maximum levels was approximately 3 m. Given the relatively short historical monitoring period (May 2022 to May 2023), it is unclear if the decrease is due to seasonal variation, changes in pumping rate, or Project effects. The water levels at WS81-02 are also variable due to pumping, however the maximum (i.e. non-pumping) levels remained consistent over the current monitoring period. Given the similar completion depths and distance between the two wells (167 m), it is unlikely that Project effects would be observed at one well and not the other.

Groundwater levels near the dam:

- Tier 2 monitoring well MW16-12-3 was installed near the creek and remained dry prior to decommissioning in 2023. The well had been dry since 2017.
- Tier 2 monitoring well MW16-21-11 is installed hydraulically downgradient near the west end of the dam. The well has been dry or had limited water over the historical monitoring record but could not be located during the November 2022 or May 2023 monitoring events and may have been damaged due to construction in the area. The well had been installed with the top of casing below the cultivation depth of the field making it difficult to locate and the well may require replacement if it cannot be found during the next monitoring event.
- Tier 2 monitoring well MW16-22-26 is located approximately 80 m hydraulically downgradient of the current dam construction footprint. Water levels increased by approximately 0.75 m between October 2022 and January 2023. While the increase is within the potential range of natural variation, the timing of the increase is not consistent with observations across the rest of the monitoring network where water levels are generally stable or decrease over that period. As such, the increase may be the result of increased pore pressure related to construction of the dam.

Groundwater temperatures fluctuate in a regular pattern maintaining temperatures between approximately 3 and 7 °C throughout the year. A lag in temperature change is observed with the lowest temperatures observed in the summertime and the highest temperatures observed in the winter.

Electrical conductivity measured by the data loggers in 2022 and 2023 was relatively stable with some seasonal fluctuation. Shallow monitors such as MW16-7-5 had increased variability in EC values likely due to seasonal changes in meteoric recharge considering water level fluctuation is also greater in these monitoring wells. In RMW16-16-17, EC values increased by approximately 400 uS/m immediately following each of the May 2022 and November 2022 monitoring events. Conversely, the EC values decreased by approximately 400 uS/m after the May 2022 monitoring event at RMW16-19-10.

4.1.1 Groundwater Level Triggers

Triggers for groundwater levels will be established based upon the expected variability defined during the baseline monitoring program for each individual monitoring well. As mentioned in previous sections, the baseline period is not strictly limited to pre-construction but is continuing through the construction period for some monitoring wells as discussed in Section 2.2. For example, some monitoring wells that are distal to the construction footprint will continue to gather baseline data up until the first flood event to account for longer term natural variability.

It is expected that some monitoring well locations will naturally have a higher variability than others. Monitoring wells that are installed near Elbow River and within the alluvial deposits will exhibit a seasonal trend similar to surface water, with additional precipitation event-based “spikes”. Monitoring wells that are installed in low permeability unconsolidated deposits or deeper into bedrock would exhibit a more muted seasonal variability since they are not directly influenced by the surface water flow regime.

Construction of the channel and dewatering of areas near the Tier 2 monitoring network began in 2022 and continued through the current reporting period. Construction activities had the potential to affect the water levels in wells discussed in Section 4.1. Water level measurements at wells located away from the current construction footprint are still considered part of the baseline with respect to groundwater levels.

Groundwater level triggers include:

- potential development of flowing artesian conditions during flooding or reservoir retention
- a decrease in water level in a well(s) resulting from construction dewatering or permanent drawdown near the diversion channel to the point where the pre-existing well(s) are no longer useable

Neither of the trigger conditions were observed at any of the project or domestic monitoring wells in 2022 or 2023.

4.2 Groundwater Quality

4.2.1 Tier 2 and EIA Project Wells

Analytical data for the fall 2022 and spring 2023 monitoring events for the Tier 2 and EIA Project wells are presented in Table 2 and laboratory analytical reports are included in Appendix D for reference. Historical data are also presented in Table D.1 in Appendix D for reference.

The full analytical suite of parameters (PS3) described in Section 2.4.1 was analyzed for each monitoring well. Table 2 includes the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Alberta Tier 1 Guidelines) (AEP 2019) for fine grained soils in an agricultural land use setting and the Guidelines for Canadian Drinking Water Quality (GCDWQ) (Health Canada 2022). Guidelines are provided only for comparison purposes and discussion.

A total of 14 Tier 2 and EIA project monitoring wells completed in the unconsolidated deposits were sampled in November 2022 and May 2023. The TDS concentrations in the unconsolidated deposits were similar to the historical results and ranged from 590 to 6,400 mg/L with an average concentration of 1,975 mg/L. The TDS concentrations naturally exceed both referenced guidelines and are considered slightly to moderately saline. At three locations (MW16-2-6, MW16-10-15, RMW16-16-17) the TDS concentrations exceeded the definition of “non-saline water” (TDS <4,000 mg/L) under the Alberta’s Water (Ministerial) Regulation. Elevated TDS had been observed historically at these locations and the latest results were consistent with historical results.

A total of 14 Tier 2 and EIA project monitoring wells completed in bedrock were sampled in November 2022 and May 2023. The TDS concentrations in the bedrock deposits were similar to the previous (2016) results and ranged from 450 to 4,300 mg/L with an average concentration of 1,547 mg/L. The bedrock TDS concentrations remain lower than in the surficial deposits but still exceed referenced guidelines in the monitoring wells sampled and are considered slightly saline. The dominant cations contributing to the TDS is sodium (calcium and magnesium to a lesser extent) and the dominant anions are sulphate and bicarbonate. Chloride concentrations are generally low, however exceedances of the 100 mg/L Alberta Tier 1 Guideline have been noted at MW16-8-19 with concentrations within the range of historical results.

Nutrient concentrations including ammonia, nitrate, nitrite, phosphate and total Kjeldahl nitrogen are analyzed because they are contaminants of potential concern in agricultural settings. Nitrate and nitrite concentrations were low and below guidelines in all samples in November 2022 and May 2023. Ammonia nitrogen concentration exceed the Alberta Tier 1 Guideline in most samples with concentrations of up to 2.0 mg/L (RMW16-13-37 in May 2023). Ammonia concentrations were similar in wells completed in unconsolidated and bedrock deposits and the 2022 and 2023 concentrations were similar to historical results. Phosphate concentrations were low and/or below the laboratory detection limit in most samples.

Dissolved metals concentrations were generally within the range of expected concentrations for monitoring wells completed in glacial deposits and shallow bedrock in southern Alberta. Iron concentrations exceeded the 0.3 mg/L guideline at four locations with a maximum concentration 36 mg/L at RMW16-5-12 in May 2023, however, this result appears anomalous compared to historical results. Manganese concentrations exceeded the referenced guidelines (0.05 mg/L) at all locations except

MW16-8-19, MW21-3-15, and RMW16-13-37 with values ranging from <0.004 to 2.9 mg/L. Selenium concentrations exceeded the 0.001 mg/L Alberta Tier 1 Guideline in three monitoring wells but were generally lower than historical results. Uranium concentrations exceeded the 0.01 mg/L guidelines at seven monitoring wells. Results were consistent with historical conditions and all but one of the monitoring wells with uranium exceedances was completed in unconsolidated deposits, which is not unexpected given the prevalence of uranium in the glacial material. Sporadic Alberta Tier 1 Guideline exceedances of aluminum, cadmium, copper, and strontium along with single exceedances of mercury (RMW16-13-37 in May 2023), lead (RMW16-5-12 in May 2023) and silver (MW16-2-6 in November 2022) were also noted in the 2022 and 2023 analytical data.

Mercury is a contaminant of potential concern for dam reservoir areas due to the potential for methylmercury to form during the decomposition of organic matter. Dissolved mercury was below the laboratory detection limit in most samples but exceeded the 0.000005 mg/L Alberta Tier 1 guideline during a single sampling event at RMW16-13-37 with a concentration of 0.00046 mg/L in May 2023. The lab noted that there was sediment in the sample bottles, so it is likely that the elevated concentration was due to sorbed mercury on particles that made it through filtration. Historical exceedances have also been noted at RMW16-17-10, MW16-22-26, MW16-23-14, and MW21-6-7 but all were below guidelines in November 2022 and May 2023. Total mercury was also analysed in all samples with concentrations ranging from <0.0000019 to 0.00322 mg/L.

Hydrocarbon concentrations were below their respective laboratory detection limits at all monitoring wells in November 2022 and May 2023 except for MW16-2-6. The F2 (C10-C16) hydrocarbon fraction concentration at MW16-2-6 exceeded the Alberta Tier 1 Guideline in May 2021 with a concentration of 5.9 mg/L but decreased and was below the guideline during the 2022 and 2023 monitoring events with a concentration of 0.11 mg/L in May 2023.

Bacteriological parameters including Escherichia coli (E. Coli), fecal coliform, total coliforms, and heterotrophic plate counts (HPC) were enumerated for all samples. Sediment in the samples affected the detection limits for the bacteriological parameters as has also been the case for historical monitoring events. While the detection limits were not low enough to determine if the water is safe for human consumption in most samples, it does provide general information on the bacteriological levels and potential for pre-existing impacts in the shallow groundwater.

HPC’s were included in the analytical suite to provide information on the level of bacteriological activity. HPC concentrations varied significantly from 8 cfu/100 mL at RMW16-6-20 to greater than 60,000 cfu/100 mL at RMW16-18-5. No spatial or depth correlation was evident in the HPC data. E. coli counts were below the detection limits (up to 100 mpn/100 ml). Total coliform bacteria ranged from <1 to 3,700 mpn/100 mL. Fecal coliform bacteria also exceeded guidelines at two locations with concentrations of up to 63 mpn/100 mL at RMW16-13-37.

4.2.2 Tier 2A, Tier 3 and One-Time Domestic Wells

The Tier 2a, Tier 3 and One-Time Domestic Wells are grouped together for the purposes of discussion considering they are domestic and or stock watering wells as opposed to monitoring wells installed specifically for the project. Analytical data for the November 2022 and May 2023 monitoring events are presented Table 3 and laboratory analytical reports are included in Appendix D for reference.

TDS concentrations were lower in the Tier 2a, Tier 3 and domestic wells, averaging 684 mg/L in wells known to be completed in bedrock (some completion details are unknown) and 333 mg/L in wells completed in shallow alluvial deposits. The bedrock wells had similar major ion chemistry to the Tier 2 and EIA Project Wells in the previous section. The dominant cations contributing to the TDS in the bedrock wells are sodium (calcium and magnesium to a lesser extent) and the dominant anions are sulphate and bicarbonate. In contrast, the groundwater in the alluvial deposits is calcium and magnesium bicarbonate type water.

Nutrient concentrations including ammonia, nitrate, nitrite, phosphate and total Kjeldahl nitrogen were generally low. Nitrate concentrations exceeded the Alberta Tier 1 Guidelines in four samples over the November 2022 and May 2023 monitoring events but remained below CGDWQ in all samples.

Chloride exceeded the Alberta Tier 1 Guideline in two One-Time Domestic Well samples and exceeded the GCDWQ in one. A single sulphate exceedance of both guidelines was also noted in a One-Time Domestic Well sample.

Dissolved metals concentrations were generally lower than in the project monitoring wells in Section 4.2.1, however, there were still exceedances of Alberta Tier 1 Guidelines for aluminum, copper, manganese, selenium, and sodium in some samples. The only exceedances of the CGDWQ were for aluminum (1 location), manganese (7 locations) and sodium (3 locations). Total and dissolved mercury concentrations were below laboratory detection limits in all samples.

Hydrocarbon concentrations were below their respective guideline concentrations at all Tier 2a, Tier 3 and One-Time Domestic Wells.

Bacteriological parameters including E. Coli, fecal coliform, total coliforms and HPC were enumerated for all samples. HPC concentrations varied widely from <1 cfu/100 ml at WS62-01 in November 2022 to 1,300 cfu/100 mL at WS41-02 in November 2022. Total coliform bacteria ranged from <1 to >2400 mpn/100 mL at WS11-1 in May 2023. E. coli and fecal coliforms were reported to be below laboratory detection limits in all samples.

4.2.3 Groundwater Quality Triggers

No Project related effects were identified based on the review of the November 2022 and May 2023 groundwater monitoring program data.

After a sufficient baseline dataset has been established at a monitoring well (approximately eight monitoring events where possible), trigger values will be determined for parameters that are naturally present at detectible concentrations (e.g., chlorides) to identify changes in groundwater quality that fall outside of the baseline conditions for a given well. As of May 2023, monitoring wells have been sampled six times or less.

Triggers will be developed for each individual monitoring well and will be based on a calculated upper confidence limit (UCL). The baseline historical groundwater monitoring data for each well will be screened and outliers removed prior to the calculation of each UCL. Results that are more than two standard deviations above or below the mean of the historical data will be considered outliers. The UCL will be calculated as follows:

$$UCL = x + Z*s$$

Where:

x = sample mean
Z = multiplier (a value of 4.5 is considered appropriate for groundwater monitoring [Gibbons 1999])
s = sample standard deviation

United States Environmental Protection Agency (US EPA 1989) indicated that the overall confidence levels for the control limits calculated using Z=4.5 is 95% based on a minimum of eight historical monitoring events.

Where the standard deviation is very large or very small, the coefficient of variation (Cv) will be calculated for the UCL as follows:

Where $Cv < 0.05$ $UCL = 1.225*x$

Where $Cv > 0.5$ $UCL = 3.25*x$

UCL values for parameters that are not naturally present in groundwater (e.g., BTEX, F1-F3 hydrocarbons) will be considered to be equal to the lesser of five times the laboratory reportable detection limit or the referenced guideline for that parameter.

UCL trigger values will not be determined for monitoring wells where impacts are currently above the relevant guidelines. Instead, triggers at monitoring wells in the affected areas will be based on increasing temporal trends in groundwater quality over four monitoring events. However, sampling frequency in relation to seasonal variation may also need to be taken into consideration.

Once the baseline data set has been established, non-parametric trend analysis will be conducted for each groundwater monitoring well to assess changes in groundwater quality that may be due to Project operations. Trend analysis will be conducted for select analytes that are most indicative of potential changes in groundwater quality related to Project operations. The results of the trend analysis will be included in the annual groundwater monitoring reports for the Project.

The current maximum number of baseline events at any of the monitors is six, therefore UCL values have not yet been established and there are too few data points for non-parametric trend analysis. Development of UCL values and trend analysis will be completed after eight monitoring events (anticipated to occur in Q2 2024).

4.2.4 QA/QC Analytical Results

Four field duplicate sample sets and one field blank were prepared during the November 2022 monitoring event and four field duplicate sample sets two trip blanks and two field blanks were prepared during the May 2023 monitoring event. The QA/QC samples were prepared to evaluate the precision or reproducibility of the analytical data between samples. The relative percent difference (RPD) between the sample and duplicate results was calculated for each sample or, when the parameter result was within five times the detection limit, the Absolute difference (AD) between the sample and duplicate was calculated. An RPD of 40% or less, or an AD of less than two times the detection limit, is considered acceptable for duplicate groundwater samples (CCME 2016).

The duplicate QA/QC analytical results are presented in Table D.2 in Appendix D. A comparison of the duplicate sample results indicated that 99% (358 of 360 results) of the duplicate sample results meet the criteria referenced above. Overall, the reproducibility of the data is good and the analytical results are considered valid.

Laboratory QA/QC procedures and analysis are included with the analytical results in Appendix D. The quality assurance reports include analysis of matrix spikes, QC standards, blanks and calibration checks.

5 Conclusions and Recommendations

Groundwater monitoring network development and groundwater monitoring activities continued to be completed during the July 2022 to June 2023 reporting period. An additional Tier 3 monitoring well (WS11-1) was installed in NW10-24-04-W5 to further develop the monitoring network. Installation of Tier 2 monitoring wells RRMW16-17-X and RMW16-15-X were planned for November 2022 drilling, however the locations could not be accessed with the drilling rig due to deep snow. Installation of these two wells is now planned for August 2023.

Groundwater monitoring and sampling was completed in November 2022 and May 2023. The monitoring and sampling included the Tier 2 monitoring wells, Tier 2a monitoring wells, Tier 3 domestic wells, one-time domestic wells (NRCB EIA hearing commitment) and the legacy EIA Project wells.

The monitoring programs included measurement of groundwater levels, field parameters (DO, ORP, pH, EC) and downloading and calibration of data logging pressure transducers. The transducers are deployed to measure and record near continuous water level (pressure), temperature, and electrical conductivity at the Tier 2, Tier 2a and Tier 3 monitoring wells. Groundwater samples were collected and submitted to the laboratory for routine potability parameters, major ions, bacteriological parameters, DOC, dissolved metals, nutrients, BTEX, and F1 to F2 fraction hydrocarbons.

Construction of the diversion channel and dewatering of areas near the Tier 2 monitoring network began in 2022 and continued through the current reporting period. Construction activities had the potential to affect the water levels in wells near the dam and diversion channel. Changes in water levels at monitoring wells near these areas included:

- Water levels in MW16-6-11 decreased by approximately 1.15 m between 2021 and 2023. Since the decrease began prior to construction it is at least in part due to natural variation but dewatering and/or construction of the water storage dugout in SE23-24-4-W5 could also be contributing factors.
- Nested Tier 2 monitoring wells RMW16-19-10 and RMW16-19-19 are located approximately 100 m hydraulically downgradient of the diversion channel construction near the outlet end. Water levels in both the shallow and deeper monitoring wells have decreased approximately 1 m between July 2022 and May 2023 which may be the continuation of previously observed decreasing trends (i.e., prior to July 2022) and/or a result of construction activities.
- Tier 2a monitoring wells WS81-01 is located approximately 625 m from the current diversion channel construction footprint. The water levels at WS81-01 were variable due to pumping but the maximum levels (i.e., non-pumping) decreased in January 2023 and further in February before rebounding in March. It is unclear if the decrease is due to seasonal variation, changes in pumping rate, or project effects, but the adjacent well WS81-02 did not show a similar decrease.
- Tier 2 monitoring well MW16-22-26 is located approximately 80 m hydraulically downgradient of the current dam construction footprint. Water levels increased by approximately 0.75 m between October 2022 and January 2023 which may be the result of increased pore pressure related to construction of the dam.

Changes in water levels that are potentially related to Project effects are limited to localized areas near the construction activities as anticipated in the EIA.

Groundwater quality during the November 2022 and May 2023 monitoring events was consistent with historical results and, while there are numerous exceedances of the Alberta Tier 1 Guidelines (AEP 2019) and the Guidelines for Canadian Drinking Water Quality (Health Canada 2022), no exceedances were attributed to Project effects. Therefore, Project effects on groundwater quality have not been identified at this point in the construction phase.

The following recommendations are made for the next monitoring period:

- continue semi-annual groundwater monitoring for potential construction related effects and as additional baseline data gathering away from construction areas
- install Tier 2 monitoring wells RRMW16-17-X and RMW16-15-X in August 2023
- establish the final Tier 3 monitoring location shown as “TBD” on Figure 2.1, if possible based on private landowner agreement
- the next groundwater monitoring report should cover the period between July 1, 2023 and June 30, 2024

6 References

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Tables

Table 1 Groundwater Monitoring Summary

Monitoring Well	Monitoring Tier	Unit	2022-2023 Monitoring	
			Nov-22	May-23
MW16-1-15	Tier 2	Bedrock	X	X
MW16-2-6	Tier 2	Unconsolidated	X	X
RMW16-5-12	Tier 2 (replacement)	Bedrock	X	X
MW16-7-5	Tier 2	Unconsolidated	X	X
MW16-8-8	Tier 2	Unconsolidated	X	X
MW16-8-19	Tier 2	Bedrock	X	X
MW16-10-15	Tier 2	Unconsolidated	X	X
MW16-11-15	Tier 2	Unconsolidated	X	X
MW16-12-3	Tier 2	Unconsolidated	DRY	Decommissioned
RMW16-13-37	Tier 2	Bedrock	X	X
MW16-14-33	Tier 2	Bedrock	NA	
MW16-15-34	Tier 2	Bedrock	Decommissioned	
RMW16-16-17	Tier 2 (replacement)	Bedrock	X	X
RMW16-17-10	Tier 2 (replacement)	Unconsolidated	Decommissioned	
RMW16-18-5	Tier 2 (replacement)	Unconsolidated	X	X
RMW16-18-13	Tier 2 (replacement)	Bedrock	X	X
RMW16-19-10	Tier 2 (replacement)	Unconsolidated	X	X
RMW16-19-19	Tier 2 (replacement)	Bedrock	X	X
MW16-21-11	Tier 2	Bedrock	CNL	CNL
MW16-22-26	Tier 2	Unconsolidated	X	X
RMW16-23-7	Tier 2 (replacement)	Unconsolidated	X	X
RMW16-23-14	Tier 2 (replacement)	Bedrock	X	X
RMW16-23-32	Tier 2 (replacement)	Bedrock	X	X
MW21-3-5	Tier 2	Unconsolidated	DRY	DRY
MW21-3-15	Tier 2	Bedrock	X	X
MW21-6-7	Tier 2	Unconsolidated	X	X
MW21-6-12	Tier 2	Bedrock	X	X
WS81-01	Tier 2a	Bedrock	NA	X
WS81-02	Tier 2a	Bedrock	NA	X
NE20-R3-01	Tier 3	Bedrock	X	X
SW35-R4-01	Tier 3	Bedrock	X	X
NE7-R3-01	Tier 3	Unconsolidated (alluvial)	X	X
SW11-R4-02	Tier 3	Bedrock	NA	X
WS11-01	Tier 3	Bedrock	X	X
WS41-02	Tier 3	Bedrock	X	X
WS51-01	Tier 3	Bedrock	NA	X
WS62-01	Tier 3	Unconsolidated (alluvial)	X	X
MW16-3-7	EIA Project Well	Unconsolidated	CNL	X
MW16-4-22	EIA Project Well	Bedrock	X	X
MW16-6-11	EIA Project Well	Unconsolidated	X	X
MW16-6-20	EIA Project Well	Bedrock	X	X
MW16-24-30	EIA Project Well	Bedrock	Decommissioned	
MW16-25-9	EIA Project Well	Unconsolidated	X	X
MW16-26-18	EIA Project Well	Bedrock	X	X
MW16-27-9	EIA Project Well	Unconsolidated	X	X
WS20-01	One Time	Bedrock		X
WS20-02	One Time	Unknown		X
WS27-01	One Time	Unknown		X
WS36-01	One Time	Unknown		X

Table 1 Groundwater Monitoring Summary

Monitoring Well	Monitoring Tier	Unit	2022-2023 Monitoring	
			Nov-22	May-23
WS36-02	One Time	Unknown		X
WS36-03	One Time	Unknown		X
WS36-04	One Time	Unknown		X
WS50-01	One Time	Unknown		X

decomissioned monitoring wells

X - monitored and sampled (where sufficient volume)
CNL - could not locate
NA - no access
NR - not required (one-time sampling completed)
ISV - insufficient volume for sample collection

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-1-15				MW16-2-6	
Sample Date				21-Nov-22	21-Nov-22		23-May-23	15-Nov-22	15-May-23
Sample ID				MW16-1-15	22-13		MW16-1-15	MW16-2-6	MW16-2-6
Sampling Company				STANTEC	STANTEC		STANTEC	STANTEC	STANTEC
Laboratory				BV	BV		BV	BV	BV
Laboratory Work Order				C291884	C291884		C336439	C290290	C334367
Laboratory Sample ID				BHL363	BHL367		BQW247	BHB173	BQM166
Location Description				Tier 2	Tier 2		Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	RPD	Bedrock	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ		Field Duplicate	(%)			
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	10.6	-	-	7.8	3.7	3.6
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,008[A]**	-	-	**1,976[A]**	**5,807[A]**	**5,689[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-19.8	-	-	212.7	-33.2	156.9
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	**6.88[B]**	-	-	7.46	7.20	**6.94[B]**
Temperature, Field	deg C	n/v	≤15[B]	6.3	-	-	8.9	4.4	14.4
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	28	28	nc	-	99	95
Cation Sum	meq/L	n/v	n/v	26	26	nc	-	100	94
Hardness (as CaCO3)	mg/L	n/v	n/v	940	970	3%	1,100	3,000	3,000
Ion Balance	%	n/v	n/v	4.5	3.2	nc	4.8	2.6	0.38
Nitrate	mg/L	13_{f}[A]	45[C]	0.065	<0.044	nc	<0.044	<2.2	<1.1
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.015	<0.010	nc	<0.010	<0.50 MI	<0.25 Z8
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	nc	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,700[AB]**	**1,700[AB]**	0%	**1,800[AB]**	**6,400[AB]**	**6,000[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	nc	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	nc	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	0.11
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.7	2.7	0%	2.2	4.4	3.3
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**2,100[A]**	**2,100[A]**	0%	**2,200[A]**	**6,400[A]**	**6,600[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.75	7.78	nc	7.98	7.48	7.66
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	320	330	3%	320	650	610
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	400	400	0%	390	800	740
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,000[AB]**	**1,000[AB]**	0%	**1,000[AB]**	**4,100[AB]**	**4,000[AB]**
Chloride	mg/L	100[A]	≤250[B]	10	10	0%	10	1.5	1.4
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	nc	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	0.0031	nc	<0.0030	0.0051	0.0049
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.056[A]**	0.029	nc	**0.058[A]**	**0.13[A]**	**0.17[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.015	<0.010	nc	<0.010	<0.50	<0.25
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	nc	<0.0030	<0.0030	<0.0030 P2
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	<1.0	<1.0	nc	0.55	<0.50	1.36
Nitrogen	mg/L	n/v	n/v	<1.0 DB	<1.0 DB	nc	0.55 DB	0.50 DB	1.4 DB
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	<0.0030	<0.0030	nc	-	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	nc	-	0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00038	0.00032	nc	-	0.00038	0.00048
Barium	mg/L	2.0[A]	2.0[C]	0.011	0.011	nc	-	0.015	<0.010
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	-	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.061	0.059	nc	-	0.11	0.11
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.00018	0.00018	0%	-	0.00015	0.000075
Calcium	mg/L	n/v	n/v	220	230	4%	260	410	410
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	nc	-	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.0010	0.00097	nc	-	0.0025	0.0025
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	0.0015	nc	-	**0.010[A]**	<0.0010
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	nc	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	nc	-	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	<0.020	0.022	nc	-	0.12	0.11
Magnesium	mg/L	n/v	n/v	95	97	2%	120	480	480
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.77[AB]**	**0.81[AB]**	5%	**0.95[AB]**	**1.3[AB]**	**1.3[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0020	0.0020	0%	-	0.00083	0.0010
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0012	0.0012	nc	-	0.0059	0.0061
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	nc	-	<0.10	<0.10
Potassium	mg/L	n/v	n/v	3.6	3.7	3%	4.1	8.4	8.0
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	0.00027	nc	-	0.00079	<0.00020
Silicon	mg/L	n/v	n/v	3.9	4.1	5%	-	5.3	5.2
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	nc	-	**0.0034[A]**	<0.00010
Sodium	mg/L	200[A]	≤200[B]	160	160	0%	170	**1,000[AB]**	**780[AB]**
Strontium	mg/L	n/v	7.0[C]	1.6	1.6	0%	-	6.2	6.3
Sulfur	mg/L	n/v	n/v	280	280	0%	-	2,000	1,300
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	nc	-	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	nc	-	0.0026	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	-	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0045	0.0045	0%	-	**0.029[AC]**	**0.031[AC]**
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	-	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	nc	-	<0.0030	<0.0030
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000393[A]**	**0.000338[A]**	15%	**0.000141[A]**	**0.000028[A]**	**0.000051[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<2.0 Z8***	***<5.0 MI***	***<5.0 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<5.0 Z8***	***<5.0 MI***	***<5.0 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	380	230	**49%**	660	>6000	1,600 Z8
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<2.0 Z8***	***<5.0 MI***	**5.0 Z8[D]**

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-7-5		MW16-8-8	
Sample Date				16-Nov-22	17-May-23	23-Nov-22	19-May-23
Sample ID				MW16-7-5	MW16-7-5	MW16-8-8	MW16-8-8
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV
Laboratory Work Order				C290717	C335152	C292418	C335907
Laboratory Sample ID				BHD546	BQP594	BHO195	BQT299
Location Description				Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ				
Field Parameters							
Dissolved Oxygen, Field	mg/L	n/v	n/v	5.3	11.2	5.9	8.0
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**3,116[A]**	**2,715[A]**	**1,099[A]**	**1,250[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-43.5	121.4	-41.2	196.9
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.07	7.53	7.31	7.53
Temperature, Field	deg C	n/v	≤15[B]	11.3	6.2	4.6	14.0
Calculated Parameters							
Anion Sum	meq/L	n/v	n/v	44	39	14	13
Cation Sum	meq/L	n/v	n/v	40	39	14	14
Hardness (as CaCO3)	mg/L	n/v	n/v	1,200	1,200	640	660
Ion Balance	%	n/v	n/v	5.1	0.49	1.6	3.6
Nitrate	mg/L	13_{f}[A]	45[C]	<0.22	0.094	2.8	2.0
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.050 MI	0.021	0.63	0.46
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**2,700[AB]**	**2,400[AB]**	**740[AB]**	**740[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-
BTEX and Petroleum Hydrocarbons							
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics							
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	4.8	5.2	2.2	5.1
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**3,300[A]**	**3,000[A]**	**1,100[A]**	**1,100[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.53	7.58	7.80	7.72
Anions							
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	450	470	420	410
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	540	570	510	500
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_{j}[B]	**1,700[AB]**	**1,400[AB]**	220	210
Chloride	mg/L	100[A]	≤250[B]	8.8	5.9	28	27
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-
Nutrients							
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0075	0.0072	<0.0030	<0.0030
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	0.019	**0.055[A]**	**0.10[A]**	<0.015
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.050	0.021	0.63	0.46
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0073	0.0031 P2	0.0050	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.02	2.70	<0.40	3.36
Nitrogen	mg/L	n/v	n/v	1.0 DB	2.7	0.65 DB	3.8
Metals - Dissolved							
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	<0.0030	<0.0030	<0.0030	0.0045
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	0.0011
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00041	0.00031	0.00036	0.00029
Barium	mg/L	2.0[A]	2.0[C]	0.020	0.018	0.048	0.062
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.099	0.094	0.060	0.042
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.000083	0.000077	<0.000020	0.000023
Calcium	mg/L	n/v	n/v	190	190	140	140
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0011	0.0056	0.0014	0.0011
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.070	0.073	<0.020	0.039
Magnesium	mg/L	n/v	n/v	170	170	71	75
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	**0.12[AB]**	**0.030[AB]**	**0.044[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0013	0.0014	0.00086	0.0010
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0035	0.0027	0.0011	0.0013
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	5.1	4.9	6.0	6.3
Selenium	mg/L	0.0020[A]	0.05[C]	0.00055	0.00025	**0.0040[A]**	0.0020
Silicon	mg/L	n/v	n/v	4.2	4.6	4.3	4.6
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**370[AB]**	**350[AB]**	26	26
Strontium	mg/L	n/v	7.0[C]	2.1	1.9	1.2	1.2
Sulfur	mg/L	n/v	n/v	480	460	66	66
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	0.0018	0.012
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	**0.016[A]**	**0.015[A]**	**0.013[A]**	**0.013[A]**
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	0.0036	<0.0030	<0.0030	<0.0030
Metals - Total							
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.00021[A]**	**0.000196[A]**	**0.000105[A]**	**0.000857[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-
Microbiological Parameters							
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<100***	***<10 Z8***	***<1.0***	***<10 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<100 MI***	**10 Z8[D]**	***<1.0***	***<10 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	130 SC1	1,900 Z8	45	13,000 Z8
Total Coliforms	mpn/100mL	n/v	0[D]	**1,300 MI[D]**	**140 Z8[D]**	***<1.0***	**3,700 Z8[D]**

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-8-19				MW16-10-15		MW16-11-15
Sample Date				23-Nov-22	23-Nov-22		19-May-23	17-Nov-22	17-May-23	17-Nov-22
Sample ID				MW16-8-19	22-15		MW16-8-19	RMW16-10-15	MW16-10-15	RMW16-11-15
Sampling Company				STANTEC	STANTEC		STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV		BV	BV	BV	BV
Laboratory Work Order				C292418	C292418		C335907	C291130	C335152	C291130
Laboratory Sample ID				BHO194	BHO197		BQT300	BHF765	BQP597	BHF766
Location Description				Tier 2	Tier 2		Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	RPD	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ		Field Duplicate	(%)				
Field Parameters										
Dissolved Oxygen, Field	mg/L	n/v	n/v	6.9	-	-	7.6	7.1	5.6	9.6
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,284[A]**	-	-	**1,227[A]**	**4,183[A]**	**4,101[A]**	**3,087[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-53.6	-	-	200.2	-143.0	136.4	-18.5
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.67	-	-	7.29	**6.78[B]**	7.26	7.44
Temperature, Field	deg C	n/v	≤15[B]	4.1	-	-	11.9	1.8	8.5	1.7
Calculated Parameters										
Anion Sum	meq/L	n/v	n/v	14	14	nc	15	66	63	42
Cation Sum	meq/L	n/v	n/v	14	15	nc	16	64	65	42
Hardness (as CaCO3)	mg/L	n/v	n/v	600	630	5%	690	2,400	2,500	1,300
Ion Balance	%	n/v	n/v	2.7	4.9	nc	5.8	1.3	1.6	0.26
Nitrate	mg/L	13_{f}[A]	45[C]	3.2	3.2	0%	3.2	2.2	<1.1	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.72	0.73	1%	0.72	0.50	<0.25 Z8	<0.010
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	nc	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**720[AB]**	**730[AB]**	1%	**780[AB]**	**4,100[AB]**	**4,000[AB]**	**2,700[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons										
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	nc	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	nc	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics										
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	1.4	1.8	nc	3.5	2.5	2.3	2.8
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,300[A]**	**1,300[A]**	0%	**1,300[A]**	**4,300[A]**	**4,400[A]**	**3,100[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.69	7.68	nc	7.79	7.57	7.25	7.75
Anions										
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	430	440	2%	470	470	510	410
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	530	530	0%	570	580	620	500
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_{j}[B]	93	91	2%	84	**2,700[AB]**	**2,500[AB]**	**1,600[AB]**
Chloride	mg/L	100[A]	≤250[B]	**110[A]**	**110[A]**	0%	**120[A]**	3.0	2.3	<1.0
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-
Nutrients										
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	nc	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	nc	<0.0030	0.0031	0.0048	0.0033
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	<0.015	0.020	nc	<0.015	**0.44[A]**	**0.45[A]**	-
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.72	0.73	1%	0.72	0.50	<0.25	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	nc	<0.0030	0.0036	0.010	<0.015 DB
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	<0.20	<0.20	nc	<0.020	1.5	1.08	<1.0
Nitrogen	mg/L	n/v	n/v	0.60 DB	0.61 DB	nc	0.57 NN	2.0 DB	1.1 DB	<1.0 DB
Metals - Dissolved										
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	<0.0030	<0.0030	nc	0.0037	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	nc	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	nc	<0.00020	0.00037	0.00030	0.00042
Barium	mg/L	2.0[A]	2.0[C]	0.063	0.063	0%	0.067	0.015	0.013	0.014
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.051	0.044	nc	0.047	0.23	0.22	0.12
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.000034	<0.000020	nc	0.000031	**0.0009[A]**	0.00021	0.00017
Calcium	mg/L	n/v	n/v	140	150	7%	160	480	490	320
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	0.0017	nc	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	nc	<0.00030	0.0044	0.0041	0.0014
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0015	0.0012	nc	0.0020	<0.0010	0.0027	0.0011
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	nc	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	<0.020	0.023	nc	0.028	0.040	0.058	0.047
Magnesium	mg/L	n/v	n/v	60	64	6%	72	290	310	130
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	<0.0040	nc	<0.0040	**2.9[AB]**	**2.8[AB]**	**1.1[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.00058	0.00063	nc	0.00067	0.00084	0.00055	0.00062
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	<0.00050	0.0011	nc	<0.00050	0.0084	0.0076	0.0023
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	5.9	6.1	3%	6.7	10	10	5.9
Selenium	mg/L	0.0020[A]	0.05[C]	**0.0086[A]**	**0.0090[A]**	5%	**0.0075[A]**	0.00095	<0.00020	0.00025
Silicon	mg/L	n/v	n/v	3.7	3.9	5%	4.2	5.1	5.2	4.3
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	52	54	4%	56	**370[AB]**	**340[AB]**	**350[AB]**
Strontium	mg/L	n/v	7.0[C]	1.5	1.5	0%	1.5	**7.2[C]**	**7.2[C]**	3.2
Sulfur	mg/L	n/v	n/v	27	28	4%	28	790	900	470
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	0.0013	0.0011	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0053	0.0051	4%	0.0056	0.010	**0.011[A]**	0.0056
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	nc	<0.0030	0.0076	<0.0030	<0.0030
Metals - Total										
Mercury	mg/L	0.0000050[A]	0.001[C]	0.0000036	<0.0000019	nc	0.0000036	**0.00048[A]**	**0.000196[A]**	**0.000163[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-	-
Microbiological Parameters										
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<100 MI***	***<10 Z8***	***<100 MI***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<100 MI***	***<10 Z8***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	35	50	**35%**	230	1,500	820	390 SC1
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<100 MI***	***<10 Z8***	***<100 MI***

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-22-26		MW21-3-15		MW21-6-7	
Sample Date				22-Nov-22	18-May-23	16-Nov-22	16-May-23	15-Nov-22	17-May-23
Sample ID				MW16-22-26	MW16-22-26	MW21-3-15	MW21-3-15	MW21-6-7	MW21-6-7
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV
Laboratory Work Order				C292215	C335681	C290717	C334712	C290290	C335152
Laboratory Sample ID				BHN145	BQS280	BHD545	BQN669	BHB169	BQP598
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Unconsolidated	Unconsolidated	Bedrock	Bedrock	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ						
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	3.9	9.2	8.0	12.0	4.0	7.7
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,934[A]**	**1,833[A]**	**1,272[A]**	**1,115[A]**	**1,367[A]**	**1,301[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-50.3	107.8	-35.8	190.4	-49.6	150.9
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.76	7.59	**8.60[A]**	7.90	7.19	7.40
Temperature, Field	deg C	n/v	≤15[B]	3.1	7.4	0.7	9.3	5.8	7.6
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	24	25	15	14	16	16
Cation Sum	meq/L	n/v	n/v	24	27	13	15	17	16
Hardness (as CaCO3)	mg/L	n/v	n/v	670	770	23	16	320	320
Ion Balance	%	n/v	n/v	0.92	3.2	6.8	4.7	1.8	1.6
Nitrate	mg/L	13_f[A]	45[C]	0.55	0.35	0.050	0.045	0.17	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.14	0.11	0.011	0.010	0.039	<0.010
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	0.062	0.11	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,600[AB]**	**1,700[AB]**	**820[AB]**	**820[AB]**	**940[AB]**	**910[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.6	1.6	2.7	2.0	3.8	4.1
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**2,000[A]**	**2,000[A]**	**1,200[A]**	**1,200[A]**	**1,400[A]**	**1,400[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.86	7.52	8.43	8.45	7.67	7.48
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	5.5	9.5	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	180	190	610	540	550	550
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	220	230	740	630	670	670
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	6.6	11	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_j[B]	**990[AB]**	**1,000[AB]**	150	150	230	220
Chloride	mg/L	100[A]	≤250[B]	2.9	2.6	<1.0	1.9	27	25
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	0.019	0.034	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.051	0.011	0.029	0.016	0.0042	<0.0030
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**1.0[A]**	**0.62[A]**	**0.51[A]**	**0.33[A]**	0.024	**0.045[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.12	0.080	0.011	0.010	0.039	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	0.061	0.056	0.044	0.018	0.032	3.0 DB
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.51	0.665	<1.0	0.66	1.15	2.02
Nitrogen	mg/L	n/v	n/v	1.7	0.78	<1.0 DB	0.67 DB	1.2 DB	2.0
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	<0.0030	<0.0030	0.022	0.0076	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	0.0014	0.0011	0.00081	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00040	0.00049	0.0014	0.0013	0.00023	0.00028
Barium	mg/L	2.0[A]	2.0[C]	0.016	0.018	0.060	0.020	0.021	0.021
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.13	0.14	0.19	0.22	0.19	0.19
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	0.000033
Calcium	mg/L	n/v	n/v	170	190	6.8	5.4	86	84
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.00034	0.00032	<0.00030	<0.00030	0.00058	0.00055
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	0.0019	0.0025	**0.0074[A]**	<0.0010	0.0014
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	**3.5[AB]**	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.055	0.050	0.027	0.029	0.034	0.032
Magnesium	mg/L	n/v	n/v	60	70	1.5	0.53	26	27
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.43[AB]**	**0.47[AB]**	0.015	<0.0040	**0.18[AB]**	**0.20[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0023	0.0023	0.0044	0.0016	0.0011	0.0017 NH
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.001	0.00088	<0.00050	0.00059	0.0018	0.0023
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	6.8	7.8	1.5	0.63	4.3	4.1
Selenium	mg/L	0.0020[A]	0.05[C]	0.00036	<0.00020	0.00068	0.00056	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	3.8	4.4	9.6	4.2	4.3	4.6
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**230[AB]**	**250[AB]**	**290[AB]**	**340[AB]**	**240[AB]**	**220[AB]**
Strontium	mg/L	n/v	7.0[C]	3.0	3.2	0.076	0.059	0.89	0.90
Sulfur	mg/L	n/v	n/v	310	330	44	54	66	75
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	0.0064	0.0046	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.0045	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0019	0.0019	0.0012	0.00049	0.0073	0.0077
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	0.0013	0.0025	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	0.0032	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	**0.00176[AC]**	**0.0000333[A]**	**0.000731[A]**	**0.00093[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<100***	***<10 Z8***	***<100 MI***	***<10 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<100 MI***	***<10 Z8***	***<100 MI***	***<10 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	780	5,500	>6000	540 Z8	1,600	170
Total Coliforms	mpn/100mL	n/v	0[D]	**180[D]**	**140[D]**	**980[D]**	***<10 Z8***	***<100 MI***	***<10 Z8***

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW21-6-12				RMW16-5-12		RMW1
Sample Date				15-Nov-22	15-Nov-22		17-May-23	21-Nov-22	19-May-23	18-Nov-22
Sample ID				MW21-6-12	22-11		MW21-6-12	RMW16-5-12	RMW16-5-12	RMW16-13-37
Sampling Company				STANTEC	STANTEC		STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV		BV	BV	BV	BV
Laboratory Work Order				C290290	C290290		C335152	C291884	C335907	C291479
Laboratory Sample ID				BHB170	BHB175		BQP599	BHL366	BQT302	BHH857
Location Description				Tier 2	Tier 2		Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	RPD	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ		Field Duplicate	(%)				
Field Parameters										
Dissolved Oxygen, Field	mg/L	n/v	n/v	5.9	-	-	6.9	4.4	3.8	5.0
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,479[A]**	-	-	**1,409[A]**	769	798	**1,772[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-50.6	-	-	81.3	-30.9	119.8	-21.4
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.36	-	-	7.23	7.28	7.45	**8.53[A]**
Temperature, Field	deg C	n/v	≤15[B]	5.9	-	-	10.2	4.8	**19.5[B]**	3.8
Calculated Parameters										
Anion Sum	meq/L	n/v	n/v	17	17	nc	17	9.0	9.6	21
Cation Sum	meq/L	n/v	n/v	18	18	nc	17	8.6	19	21
Hardness (as CaCO3)	mg/L	n/v	n/v	350	350	0%	340	280	720	42
Ion Balance	%	n/v	n/v	2.5	2.5	nc	0.84	2.5	33	0.83
Nitrate	mg/L	13_f[A]	45[C]	<0.044	<0.044	nc	<0.044	0.26	0.14	0.17
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.010	<0.010	nc	<0.010	0.059	0.032	0.038
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	nc	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,000[AB]**	**1,000[AB]**	0%	**960[AB]**	450	**660[AB]**	**1,200[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons										
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	nc	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	nc	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics										
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.5	4.4	**55%**	3.3	1.7	3.0	16
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,600[A]**	**1,600[A]**	0%	**1,500[A]**	770	770	**1,800[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.68	7.67	nc	7.54	7.94	7.90	7.96
Anions										
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	530	530	0%	540	400	430	740
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	640	640	0%	660	490	530	900
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_j[B]	230	230	0%	220	43	43	260
Chloride	mg/L	100[A]	≤250[B]	74	74	0%	66	1.8	<1.0	30
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-
Nutrients										
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	nc	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	0.0032	nc	<0.0030	0.0043	<0.0030	0.0047
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.18[A]**	**0.18[A]**	0%	**0.16[A]**	**0.17[A]**	**0.31[A]**	**1.0[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.010	nc	<0.010	0.059	0.032	0.038
Phosphorus, Dissolved	mg/L	n/v	n/v	0.12 DB	0.14	15%	<0.0030	<0.0030	<0.0030	0.0070
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.690	0.471	**38%**	0.315	<2.0	0.75	<2.0
Nitrogen	mg/L	n/v	n/v	0.69	0.47	**38%**	0.31	<2.0 DB	0.78 DB	<2.0 DB
Metals - Dissolved										
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	<0.0030	<0.0030	nc	0.0063	<0.0030	**2.8[AB]**	0.012
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	nc	<0.00060	<0.00060	<0.00060	0.0043
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00083	0.00079	nc	0.00090	0.00028	0.0020	0.0013
Barium	mg/L	2.0[A]	2.0[C]	0.014	0.014	nc	0.013	0.070	0.33	0.30
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.20	0.20	0%	0.21	0.079	0.097	0.14
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	<0.000020	0.000024	nc	0.000029	<0.000020	**0.00075[A]**	0.000061
Calcium	mg/L	n/v	n/v	91	91	0%	87	62	180	12
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	nc	<0.0010	<0.0010	0.0047	<0.0010
Cobalt	mg/L	n/v	n/v	0.00054	0.00059	nc	0.00063	0.00038	0.0048	0.00045
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0010	<0.0010	nc	0.0017	<0.0010	0.0046	0.0021
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	nc	<0.060	<0.060	**36[AB]**	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	nc	<0.00020	<0.00020	**0.0070[C]**	0.00026
Lithium	mg/L	n/v	n/v	0.048	0.045	nc	0.050	<0.020	0.032	0.050
Magnesium	mg/L	n/v	n/v	29	29	0%	29	30	64	2.8
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.099[AB]**	**0.099[AB]**	0%	**0.097[AB]**	**0.15[AB]**	**1.2[AB]**	0.016
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0011	0.0011	0%	0.0017	0.0015	0.00081	0.089
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0021	0.0022	nc	0.0029	0.0011	0.0081	0.0088
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	1.7	<0.10
Potassium	mg/L	n/v	n/v	4.7	4.9	4%	4.3	6.6	7.2	3.6
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	nc	<0.00020	0.0010	0.0016	0.0010
Silicon	mg/L	n/v	n/v	3.9	4.0	3%	4.3	2.8	17	3.0
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**260[AB]**	**260[AB]**	0%	**230[AB]**	65	68	**450[AB]**
Strontium	mg/L	n/v	7.0[C]	1.6	1.6	0%	1.5	1.3	1.5	0.28
Sulfur	mg/L	n/v	n/v	65	75	14%	75	11	13	68
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	0.0080
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	0.0073	0.0013
Uranium	mg/L	0.010[A]	0.02[C]	0.0053	0.0053	0%	0.0062	0.0014	0.0021	**0.022[AC]**
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	0.0083	0.0030
Zinc	mg/L	0.030[A]	≤5.0[B]	0.0039	0.0070	nc	<0.0030	<0.0030	0.029	<0.0030
Metals - Total										
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.00002[A]**	**0.000024[A]**	nc	**0.0000217[A]**	**0.000477[A]**	**0.000091[A]**	**0.000233[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-	-
Microbiological Parameters										
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<10 Z8***	***<100 MI***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<10 Z8***	***<100 MI***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	970	1,200	21%	130	480	33,000 Z8	1,000
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<10 Z8***	**310 MI[D]**

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				6-13-37	RMW16-16-17		RMW16-18-5		RMW16-18-13	
Sample Date				16-May-23	18-Nov-22	16-May-23	17-Nov-22	18-May-23	17-Nov-22	18-May-23
Sample ID				RMW16-13-37	RMW16-16-17	RMW16-16-17	RMW16-18-05	RMW16-18-5	RMW16-18-13	RMW16-18-13
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C334712	C291479	C334712	C291130	C335681	C291130	C335681
Laboratory Sample ID				BQN668	BHH855	BQN670	BHF768	BQS288	BHF767	BQS289
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ							
Field Parameters										
Dissolved Oxygen, Field	mg/L	n/v	n/v	2.0	13.4	5.1	3.4	4.3	2.3	4.7
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,214[A]**	**2,651[A]**	**4,612[A]**	**1,131[A]**	**1,013[A]**	**1,136[A]**	**1,014[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-100.9	-16.8	21.2	-10.4	191.6	2.3	167.1
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.08	7.32	7.27	7.22	7.50	7.39	7.58
Temperature, Field	deg C	n/v	≤15[B]	9.6	2.2	12.3	1.9	9.6	1.4	14.5
Calculated Parameters										
Anion Sum	meq/L	n/v	n/v	33	67	66	12	12	11	12
Cation Sum	meq/L	n/v	n/v	15	66	67	13	14	12	14
Hardness (as CaCO3)	mg/L	n/v	n/v	20	1,300	1,300	260	300	140	200
Ion Balance	%	n/v	n/v	37	0.78	0.85	1.6	8.1	2.9	8.8
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.22	<0.22	3.9	4.2	<0.44	3.0
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.010	<0.050 MI	<0.050 Z8	0.89 MI	0.95 Z8	<0.10 MI	0.68
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	0.040	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,400[AB]**	**4,300[AB]**	**4,200[AB]**	**670[AB]**	**690[AB]**	**640[AB]**	**680[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons										
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00060 EC	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.37	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics										
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	10	3.2	5.5	2.5	2.2	2.0	1.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,800[A]**	**5,100[A]**	**5,000[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.41	7.61	7.90	8.06	7.95	8.19	8.07
Anions										
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	1,600	730	740	410	410	370	380
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	1,900	890	900	500	500	450	470
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	90	**2,500[AB]**	**2,400[AB]**	68	59	82	68
Chloride	mg/L	100[A]	≤250[B]	9.0	5.2	5.2	93	96	79	87
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-
Nutrients										
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.013	0.0039	<0.0030	0.0046	<0.0030	0.0048	<0.0030
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**2.0[A]**	**1.6[A]**	**1.7[A]**	0.030	0.020	<0.015	<0.015
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.050	<0.050	0.88	0.95	<0.10	0.68
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.030 DB P2	0.0032	0.13	0.011	<0.0030	<0.0030	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	22.0	2.09	2.71	<1.0	0.24	0.62	<0.020
Nitrogen	mg/L	n/v	n/v	22	2.1 DB	2.7	<1.0 DB	1.2 DB	0.62	0.70
Metals - Dissolved										
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	**0.064[A]**	0.015	0.0055	<0.0030	0.0048	<0.0030	0.0040
Antimony	mg/L	0.0060[A]	0.006[C]	0.0059	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.0024	0.0048	0.0030	<0.00020	<0.00020	<0.00020	<0.00020
Barium	mg/L	2.0[A]	2.0[C]	0.16	<0.010	<0.050	0.075	0.077	0.034	0.045
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.15	0.19	0.22	0.12	0.11	0.14	0.14
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.000025	0.00004	<0.000020	0.000028	0.000022	<0.000020	<0.000020
Calcium	mg/L	n/v	n/v	6.1	280	280	54	59	30	42
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	0.0034	0.0017	0.00033	0.00035	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	**0.013[A]**	<0.0010	0.0043	<0.0010	0.0029	<0.0010	0.0023
Iron	mg/L	0.30[A]	≤0.3[B]	0.29	<0.060	**5.6[AB]**	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.044	0.22	0.25	<0.020	<0.020	0.020	<0.020
Magnesium	mg/L	n/v	n/v	1.2	140	150	30	38	15	23
Manganese	mg/L	0.020[A]	≤0.02[B]	0.015	**0.41[AB]**	**0.56[AB]**	**0.12[AB]**	**0.13[AB]**	**0.098[AB]**	**0.13[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.00046[A]**	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.12	0.0015	0.00087	0.0034	0.0027	0.0037	0.0037
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0015	0.014	0.0048	0.0009	0.00087	<0.00050	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	3.9	8.3	9.6	2.0	2.3	0.95	1.3
Selenium	mg/L	0.0020[A]	0.05[C]	0.00058	0.00048	0.00099	0.00065	0.00053	0.00053	0.00044
Silicon	mg/L	n/v	n/v	3.8	4.2	16	3.3	3.6	2.7	3.4
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**340[AB]**	**930[AB]**	**910[AB]**	170	190	**210[AB]**	**220[AB]**
Strontium	mg/L	n/v	7.0[C]	0.12	**7.2[C]**	**7.2[C]**	0.43	0.47	0.22	0.29
Sulfur	mg/L	n/v	n/v	31	770	750	19	21	24	27
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	**0.018[A]**	0.00036	0.00031	0.0075	0.0078	0.0044	0.0054
Vanadium	mg/L	n/v	n/v	0.0075	<0.0010	0.0020	0.0011	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total										
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.00322[AC]**	**0.000234[A]**	**0.000232[A]**	**0.000255[A]**	**0.00021[A]**	0.0000041	***<0.000019***
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-	-
Microbiological Parameters										
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<20 Z8***	***<100 MI***	***<10 Z8***	***<100 MI***	***<10 Z8***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	**63 Z8[D]**	***<100 MI***	***<10 Z8***	***<1.0***	***<10 Z8***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	26,000 Z8	520	220 Z8	>6000	>60000 Z8	2,300	1,400
Total Coliforms	mpn/100mL	n/v	0[D]	**80 Z8[D]**	***<100 MI***	***<10 Z8***	***<100 MI***	***<10 Z8***	**1.0[D]**	***<1.0***

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-19-10		RMW16-19-19			
Sample Date				17-Nov-22	18-May-23	17-Nov-22	17-Nov-22		18-May-23
Sample ID				RMW16-19-10	RMW16-19-10	RMW16-19-19	22-12		RMW16-19-19
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC		STANTEC
Laboratory				BV	BV	BV	BV		BV
Laboratory Work Order				C291130	C335681	C291130	C291130		C335681
Laboratory Sample ID				BHF769	BQS287	BHF764	BHF770		BQS286
Location Description				Tier 2	Tier 2	Tier 2	Tier 2		Tier 2
Lithology				Unconsolidated	Unconsolidated	Bedrock	Bedrock		Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ				Field Duplicate	RPD (%)	
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	4.0	6.4	3.8	-	-	7.2
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**3,014[A]**	**2,468[A]**	**2,607[A]**	-	-	**2,646[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-28.0	98.3	-29.1	-	-	-31.7
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	**6.95[B]**	7.41	7.15	-	-	7.40
Temperature, Field	deg C	n/v	≤15[B]	4.9	9.7	3.0	-	-	13.7
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	40	36	32	32	nc	33
Cation Sum	meq/L	n/v	n/v	40	39	31	32	nc	34
Hardness (as CaCO3)	mg/L	n/v	n/v	1,100	1,100	470	470	0%	540
Ion Balance	%	n/v	n/v	0.18	4.0	1.3	0.36	nc	1.4
Nitrate	mg/L	13_f[A]	45[C]	<0.044	<0.044	<0.044	0.093	nc	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.010	<0.010	<0.010	0.021	nc	<0.010
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	nc	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**2,600[AB]**	**2,300[AB]**	**2,000[AB]**	**2,000[AB]**	0%	**2,100[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	nc	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	nc	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	nc	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	nc	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	nc	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	nc	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	nc	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	nc	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	nc	<0.10
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	5.7	3.9	3.9	4.1	5%	3.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**3,100[A]**	**2,800[A]**	**2,700[A]**	**2,700[A]**	0%	**2,700[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.76	7.64	8.01	7.91	nc	7.79
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	nc	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	460	510	590	600	2%	590
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	560	620	720	730	1%	720
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	nc	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	nc	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,500[AB]**	**1,200[AB]**	**980[AB]**	**970[AB]**	1%	**1,000[AB]**
Chloride	mg/L	100[A]	≤250[B]	2.9	1.7	1.2	1.4	nc	<1.0
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	nc	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0042	<0.0030	0.0032	0.0043	nc	<0.0030
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.074[A]**	**0.38[A]**	**1.0[A]**	**1.1[A]**	10%	**1.0[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.010	<0.010	0.021	nc	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030	<0.0030	nc	0.0042
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	<1.0	0.91	1.39	1.30	7%	1.13
Nitrogen	mg/L	n/v	n/v	<1.0 DB	0.91 DB	1.4 DB	1.3 DB	7%	1.1
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	0.0033	<0.0030	<0.0030	<0.0030	nc	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	nc	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00028	0.00025	0.00026	<0.00020	nc	<0.00020
Barium	mg/L	2.0[A]	2.0[C]	0.013	0.013	<0.010	<0.010	nc	<0.010
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	nc	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.12	0.13	0.15	0.14	7%	0.15
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.000026	0.00012	<0.000020	<0.000020	nc	<0.000020
Calcium	mg/L	n/v	n/v	280	260	110	110	0%	130
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	nc	<0.0010
Cobalt	mg/L	n/v	n/v	0.00061	0.00067	<0.00030	<0.00030	nc	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0013	0.0021	<0.0010	<0.0010	nc	0.0025
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	nc	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	nc	<0.00020
Lithium	mg/L	n/v	n/v	0.021	0.021	0.054	0.053	nc	0.053
Magnesium	mg/L	n/v	n/v	100	96	46	46	0%	55
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.59[AB]**	**0.79[AB]**	**0.29[AB]**	**0.30[AB]**	3%	**0.32[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	nc	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.00077	0.00065	0.0014	0.0014	0%	0.0011
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0023	0.002	<0.00050	<0.00050	nc	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	nc	<0.10
Potassium	mg/L	n/v	n/v	6.1	7.0	5.2	5.2	0%	5.9
Selenium	mg/L	0.0020[A]	0.05[C]	**0.0024[A]**	0.0010	<0.00020	<0.00020	nc	<0.00020
Silicon	mg/L	n/v	n/v	3.7	4.2	3.3	3.3	0%	3.7
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	nc	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**410[AB]**	**410[AB]**	**500[AB]**	**510[AB]**	2%	**530[AB]**
Strontium	mg/L	n/v	7.0[C]	1.9	1.9	1.8	1.8	0%	2.0
Sulfur	mg/L	n/v	n/v	440	400	290	290	0%	310
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	nc	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	nc	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	nc	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	**0.012[A]**	0.0099	0.00087	0.00087	0%	0.00086
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	nc	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	<0.0030	nc	<0.0030
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000708[A]**	**0.001[A]**	**0.0000093[A]**	**0.0000131[A]**	nc	**0.0000077[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<100 MI***	***<10 Z8***	***<1.0***	***<1.0***	nc	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<10 Z8***	***<1.0***	***<1.0***	nc	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	290	19,000 Z8	550	1,500 SC1	**93%**	1,300
Total Coliforms	mpn/100mL	n/v	0[D]	***<100 MI***	***<10 Z8***	***<1.0***	***<1.0***	nc	***<1.0***

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-23-7		RMW16-23-14			
Sample Date				18-Nov-22	18-May-23	18-Nov-22	18-May-23	18-May-23	
Sample ID				RMW16-23-7	RMW16-23-7	RMW16-23-14	RMW16-23-14	WS2023-3	
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	
Laboratory				BV	BV	BV	BV	BV	
Laboratory Work Order				C291479	C335681	C291479	C335681	C335681	
Laboratory Sample ID				BHH856	BQS283	BHH853	BQS284	BQS292	
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	
Sample Type	Units	2022 AEPA Tier 1	GCDWQ					Field Duplicate	RPD (%)
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	4.2	4.2	3.5	3.6	-	-
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,015[A]**	700	**1,161[A]**	**1,064[A]**	-	-
Oxidation Reduction Potential, field	mV	n/v	n/v	-22.6	114.0	-20.2	93.2	-	-
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.18	7.49	7.29	7.55	-	-
Temperature, Field	deg C	n/v	≤15[B]	6.8	12.7	4.8	13.7	-	-
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	11	11	13	13	13	nc
Cation Sum	meq/L	n/v	n/v	11	13	13	17	16	nc
Hardness (as CaCO3)	mg/L	n/v	n/v	440	540	310	380	360	5%
Ion Balance	%	n/v	n/v	1.7	8.0	0.83	13	7.1	nc
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.044	<0.044	<0.044	<0.044	nc
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.010	<0.010	<0.010	<0.010	<0.010	nc
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	nc
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**590[AB]**	**630[AB]**	**740[AB]**	**810[AB]**	**810[AB]**	0%
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	nc
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	nc
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	nc
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	nc
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	nc
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	1.5	2.1	1.9	1.4	1.3	nc
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	980	980	**1,200[A]**	**1,200[A]**	**1,200[A]**	0%
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.74	7.77	7.85	8.00	7.84	nc
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	nc
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	340	340	370	370	410	10%
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	420	410	460	450	500	11%
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	nc
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	nc
Sulfate	mg/L	$429_{n5,e}$[A]	$≤500_{j}$[B]	140	140	240	240	240	0%
Chloride	mg/L	100[A]	≤250[B]	47	50	15	13	13	0%
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	nc
Orthophosphate (as P)	mg/L	n/v	n/v	0.0048	<0.0030	0.0048	<0.0030	<0.0030	nc
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.055[A]**	**0.20[A]**	**0.45[A]**	**0.56[A]**	**0.56[A]**	0%
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.010	<0.010	<0.010	<0.010	nc
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	0.014	<0.0030	<0.0030	<0.0030	nc
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	<0.20	1.62	0.751	0.571	0.583	2%
Nitrogen	mg/L	n/v	n/v	<0.20 DB	1.6 DB	0.75	0.57	0.58	2%
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	<0.0030	0.0040	<0.0030	<0.0030	0.0040	nc
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	nc
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00032	0.00022	<0.00020	<0.00020	<0.00020	nc
Barium	mg/L	2.0[A]	2.0[C]	0.10	0.099	0.021	0.020	0.019	nc
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc
Boron	mg/L	1.0[A]	5[C]	<0.020	0.028	0.054	0.080	0.079	nc
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.000043	0.000045	0.000042	0.00003	<0.000020	nc
Calcium	mg/L	n/v	n/v	110	130	76	90	84	7%
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc
Cobalt	mg/L	n/v	n/v	0.00069	0.00066	<0.00030	<0.00030	<0.00030	nc
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	0.0020	<0.0010	0.0019	0.0022	nc
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	nc
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	nc
Lithium	mg/L	n/v	n/v	<0.020	<0.020	0.033	0.042	0.040	nc
Magnesium	mg/L	n/v	n/v	41	54	30	37	35	6%
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.26[AB]**	**0.35[AB]**	**0.21[AB]**	**0.20[AB]**	**0.19[AB]**	5%
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	nc
Molybdenum	mg/L	n/v	n/v	0.0015	0.0010	0.0014	0.0012	0.0012	0%
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0025	0.0017	<0.00050	<0.00050	<0.00050	nc
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	nc
Potassium	mg/L	n/v	n/v	5.2	5.6	4.3	5.5	5.0	10%
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	0.00026	<0.00020	<0.00020	<0.00020	nc
Silicon	mg/L	n/v	n/v	3.4	4.2	3.6	4.8	4.7	2%
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	nc
Sodium	mg/L	200[A]	≤200[B]	44	50	150	**200[B]**	190	5%
Strontium	mg/L	n/v	7.0[C]	0.72	0.75	0.83	0.93	0.87	7%
Sulfur	mg/L	n/v	n/v	38	48	62	76	82	8%
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	nc
Tin	mg/L	n/v	n/v	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	nc
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc
Uranium	mg/L	0.010[A]	0.02[C]	0.0031	0.0023	0.00050	0.00033	0.00032	nc
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	nc
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000206[A]**	**0.000186[A]**	<0.0000019	<0.0000019	0.0000027	nc
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<100 MI***	***<10 Z8***	***<1.0***	***<1.0***	***<1.0***	nc
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<100 MI***	***<10 Z8***	***<1.0***	***<1.0***	***<1.0***	nc
Heterotrophic Plate Count	cfu/mL	n/v	n/v	640	32,000 Z8	1,200	780	740	5%
Total Coliforms	mpn/100mL	n/v	0[D]	***<100 MI***	***<10 Z8***	**9.7[D]**	**1.0[D]**	**1.0[D]**	nc

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-23-32		MW16-3-7			MW16-4-22		
Sample Date				18-Nov-22	18-May-23	15-May-23	21-Nov-22	19-May-23	19-May-23		
Sample ID				RMW16-23-32	RMW16-23-32	MW16-3-7	MW16-4-22	MW16-4-22	WS2023-4		
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC		
Laboratory				BV	BV	BV	BV	BV	BV		
Laboratory Work Order				C291479	C335681	C334367	C291884	C335907	C335907		
Laboratory Sample ID				BHH854	BQS285	BQM165	BHL365	BQT301	BQT303		
Location Description				Tier 2	Tier 2	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well		
Lithology				Bedrock	Bedrock	Unconsolidated	Bedrock	Bedrock	Bedrock		
Sample Type	Units	2022 AEPA Tier 1	GCDWQ						Field Duplicate	RPD (%)	
Field Parameters											
Dissolved Oxygen, Field	mg/L	n/v	n/v	6.1	4.9	10.5	10.4	2.0	-	-	
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,166[A]**	**1,071[A]**	**2,481[A]**	**4,085[A]**	**3,934[A]**	-	-	
Oxidation Reduction Potential, field	mV	n/v	n/v	-23.8	78.2	215.8	-22.8	-75.0	-	-	
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.79	7.68	7.34	**6.99[B]**	7.04	-	-	
Temperature, Field	deg C	n/v	≤15[B]	5.8	9.0	13.9	4.2	**17.9[B]**	-	-	
Calculated Parameters											
Anion Sum	meq/L	n/v	n/v	13	13	33	61	56	58	nc	
Cation Sum	meq/L	n/v	n/v	14	16	32	55	62	63	nc	
Hardness (as CaCO3)	mg/L	n/v	n/v	67	81	910	1,800	2,100	2,200	5%	
Ion Balance	%	n/v	n/v	2.7	10	1.0	4.8	5.3	4.7	nc	
Nitrate	mg/L	13_f[A]	45[C]	0.056	<0.044	1.0	<0.044	<0.22	<0.22	nc	
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.013	<0.010	0.23	<0.010	<0.050 Z8	<0.050 Z8	nc	
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	nc	
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**750[AB]**	**780[AB]**	**2,000[AB]**	**3,800[AB]**	**3,700[AB]**	**3,800[AB]**	3%	
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-	-	
BTEX and Petroleum Hydrocarbons											
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc	
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc	
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc	
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	nc	
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	nc	
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	nc	
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	nc	
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	nc	
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.30 VV	nc	
Miscellaneous Inorganics											
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	1.1	1.3	2.8	6.1	8.6	7.1	19%	
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,200[A]**	**1,200[A]**	**2,700[A]**	**4,100[A]**	**4,300[A]**	**4,300[A]**	0%	
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.27	8.26	7.86	7.48	7.71	7.53	nc	
Anions											
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	nc	
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	530	530	440	470	470	470	0%	
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	640	650	540	580	580	570	2%	
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	nc	
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	nc	
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	120	100	**1,000[AB]**	**2,500[AB]**	**2,200[AB]**	**2,300[AB]**	4%	
Chloride	mg/L	100[A]	≤250[B]	<1.0	<1.0	79	<1.0	<1.0	<1.0	nc	
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-	
Nutrients											
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	nc	
Orthophosphate (as P)	mg/L	n/v	n/v	0.0094	0.0070	0.0077	<0.0030	<0.0030	<0.0030	nc	
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.75[A]**	**0.72[A]**	0.030	**1.0[A]**	**1.0[A]**	**1.0[A]**	0%	
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.013	<0.010	0.23	<0.010	<0.050	<0.050	nc	
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0051	0.0044 P2	0.0060 P2	<0.0030	<0.0030	<0.0030	nc	
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.927	0.759	1.05	<2.0	1.43	1.01	**34%**	
Nitrogen	mg/L	n/v	n/v	0.94	0.76	1.3 DB	<2.0 DB	1.4	1.0 DB	**33%**	
Metals - Dissolved											
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	<0.0030	<0.0030	<0.0030	<0.0030	0.0030	<0.0030	nc	
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	nc	
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00046	0.00054	0.00038	0.00099	0.0016	0.0016	0%	
Barium	mg/L	2.0[A]	2.0[C]	0.020	0.022	0.022	<0.010	<0.010	<0.010	nc	
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc	
Boron	mg/L	1.0[A]	5[C]	0.080	0.090	0.096	0.097	0.12	0.18	nc	
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	<0.000020	<0.000020	0.000074	0.000054	<0.000020	<0.000020	nc	
Calcium	mg/L	n/v	n/v	18	21	160	420	480	490	2%	
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc	
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	0.00064	0.00044	0.00035	0.00035	nc	
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	0.0019	0.0010	<0.0010	0.0016	0.0016	nc	
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	0.18	**1.4[AB]**	**1.3[AB]**	7%	
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	nc	
Lithium	mg/L	n/v	n/v	0.051	0.050	0.055	0.073	0.098	0.10	nc	
Magnesium	mg/L	n/v	n/v	5.6	6.8	130	190	230	230	0%	
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.028[AB]**	**0.031[AB]**	**0.24[AB]**	**0.74[AB]**	**0.84[AB]**	**0.85[AB]**	1%	
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	nc	
Molybdenum	mg/L	n/v	n/v	0.0021	0.0020	0.00089	0.0012	0.00075	0.00088	nc	
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	<0.00050	<0.00050	0.0025	0.0013	0.00091	<0.00050	nc	
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	nc	
Potassium	mg/L	n/v	n/v	2.6	3.2	4.4	8.7	9.7	9.9	2%	
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00050	nc	
Silicon	mg/L	n/v	n/v	3.2	3.9	4.4	4.2	5.0	5.0	0%	
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	nc	
Sodium	mg/L	200[A]	≤200[B]	**280[AB]**	**320[AB]**	**320[AB]**	**420[AB]**	**450[AB]**	**450[AB]**	0%	
Strontium	mg/L	n/v	7.0[C]	0.33	0.36	1.8	6.6	6.7	6.5	3%	
Sulfur	mg/L	n/v	n/v	36	38	340	750	790	800	1%	
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	nc	
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc	
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	nc	
Uranium	mg/L	0.010[A]	0.02[C]	0.00020	0.00018	**0.014[A]**	0.0022	0.0023	0.0023	0%	
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	0.0010	<0.0010	<0.0010	<0.0010	nc	
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	0.0049	<0.0030	<0.0030	nc	
Metals - Total											
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	**0.000059[A]**	**0.000111[A]**	**0.0000118[A]**	**0.0000107[A]**	10%	
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-	-	
Microbiological Parameters											
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<5.0 Z8***	***<1.0***	***<1.0***	***<1.0***	nc	
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<5.0 Z8***	***<1.0***	***<1.0***	***<1.0***	nc	
Heterotrophic Plate Count	cfu/mL	n/v	n/v	760	87	1,200 Z8	65	1,500	1,200	22%	
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<5.0 Z8***	***<1.0***	***<1.0***	***<1.0***	nc	

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-6-11		MW16-6-20		MW16-25-9	
Sample Date				22-Nov-22	17-May-23	21-Nov-22	17-May-23	22-Nov-22	18-May-23
Sample ID				MW16-6-11	MW16-6-11	MW16-6-20	MW16-6-20	MW16-25-9	MW16-25-9
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV
Laboratory Work Order				C292215	C335152	C291884	C335152	C292215	C335681
Laboratory Sample ID				BHN144	BQP595	BHL364	BQP596	BHN146	BQS282
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Unconsolidated	Unconsolidated	Bedrock	Bedrock	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ						
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	10.9	6.7	4.6	6.5	6.2	2.8
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**2,088[A]**	**2,961[A]**	**2,195[A]**	**2,042[A]**	625	**1,072[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-45.6	118.1	-23.8	73.7	-4.8	189.2
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.40	7.41	8.31	7.62	7.66	7.35
Temperature, Field	deg C	n/v	≤15[B]	4.4	6.2	4.3	8.5	3.7	13.1
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	44	42	24	24	14	14
Cation Sum	meq/L	n/v	n/v	45	42	23	23	15	17
Hardness (as CaCO3)	mg/L	n/v	n/v	1,400	1,400	190	200	610	730
Ion Balance	%	n/v	n/v	1.4	0.34	2.4	2.8	1.0	11
Nitrate	mg/L	13_{f}[A]	45[C]	0.13	<0.44	0.063	0.060	0.081	0.12
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.029	<0.10 Z8	0.014	0.013	0.018	0.027
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**2,900[AB]**	**2,700[AB]**	**1,600[AB]**	**1,600[AB]**	**750[AB]**	**780[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-	-	-
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.8	3.4	2.6	1.8	4.0	4.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**3,200[A]**	**3,300[A]**	**2,200[A]**	**2,200[A]**	**1,200[A]**	**1,200[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.76	7.42	8.11	7.97	7.81	7.49
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	360	370	290	290	550	550
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	440	460	360	360	680	670
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,800[AB]**	**1,700[AB]**	**880[AB]**	**870[AB]**	160	150
Chloride	mg/L	100[A]	≤250[B]	1.3	1.7	<1.0	2.3	<1.0	1.1
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0039	0.0048	0.0037	0.0036	0.0064	0.010
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.32[A]**	**0.33[A]**	**1.2[A]**	**1.1[A]**	<0.015	**0.14[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.029	<0.10	0.014	0.013	0.018	0.027
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0051	<0.0030 P2	<0.0030	<0.0030 P2	0.0059	0.0092 P2
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.73	1.52	<2.0	2.34	<0.40	0.44
Nitrogen	mg/L	n/v	n/v	0.76 DB	1.5 DB	<2.0 DB	2.4	<0.40 DB	0.46 DB
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	<0.0030	**2.5[AB]**	<0.0030	0.0031	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00037	0.0011	<0.00020	0.00039	0.00057	0.00045
Barium	mg/L	2.0[A]	2.0[C]	0.012	0.012	0.018	0.020	0.049	0.058
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.14	0.14	0.092	0.12	0.058	0.068
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.00015	0.00022	<0.000020	<0.000020	0.000044	0.000044
Calcium	mg/L	n/v	n/v	330	310	50	54	120	140
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	0.0023	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.0019	0.0028	0.00033	0.00040	0.00083	0.00054
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	0.0035	<0.0010	0.0011	<0.0010	0.0024
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	0.0010	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.052	0.056	0.060	0.080	0.051	0.046
Magnesium	mg/L	n/v	n/v	140	140	15	17	75	92
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.95[AB]**	**0.96[AB]**	**0.11[AB]**	**0.14[AB]**	**0.17[AB]**	**0.17[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.00087	0.00088	0.0022	0.0026	0.0014	0.0010
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0043	0.0062	0.00062	0.00061	0.0031	0.0029
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	7.0	6.6	4.0	4.2	5.2	6.3
Selenium	mg/L	0.0020[A]	0.05[C]	0.00062	0.00023	<0.00020	<0.00020	0.00027	0.00035
Silicon	mg/L	n/v	n/v	4.2	4.5	2.8	3.3	5.1	6.2
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**380[AB]**	**330[AB]**	**440[AB]**	**420[AB]**	58	62
Strontium	mg/L	n/v	7.0[C]	3.1	2.7	1.1	1.0	1.2	1.3
Sulfur	mg/L	n/v	n/v	550	580	230	280	51	46
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	0.068	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0069	0.0069	<0.00010	0.00011	**0.024[AC]**	**0.021[AC]**
Vanadium	mg/L	n/v	n/v	<0.0010	0.0022	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	0.0083	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000087[A]**	**0.00046[A]**	**0.000141[A]**	**0.000049[A]**	**0.0000113[A]**	**0.000042[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<10 Z8***	***<1.0***	***<10 Z8***	***<1.0***	***<10 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<10 Z8***	***<1.0***	***<10 Z8***	***<1.0***	***<10 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	71	3,100 Z8	8.0	10 Z9	190 SC1	19,000 Z8
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<10 Z8***	***<1.0***	***<10 Z8***	***<1.0***	***<10 Z8***

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-26-18		MW16-27-9	
Sample Date				15-Nov-22	15-May-23	15-Nov-22	15-May-23
Sample ID				MW16-26-18	MW16-26-18	MW16-27-9	MW16-27-9
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV
Laboratory Work Order				C290290	C334367	C290290	C334367
Laboratory Sample ID				BHB171	BQM164	BHB172	BQM163
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Bedrock	Bedrock	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ				
Field Parameters							
Dissolved Oxygen, Field	mg/L	n/v	n/v	9.6	4.8	14.7	6.9
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,211[A]**	**1,249[A]**	**1,437[A]**	**1,490[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-34.3	37.9	4.7	83.2
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.51	7.89	7.63	7.19
Temperature, Field	deg C	n/v	≤15[B]	4.6	12.5	4.3	9.6
Calculated Parameters							
Anion Sum	meq/L	n/v	n/v	13	15	18	19
Cation Sum	meq/L	n/v	n/v	14	15	20	19
Hardness (as CaCO3)	mg/L	n/v	n/v	120	140	700	670
Ion Balance	%	n/v	n/v	3.4	0.98	3.7	0.48
Nitrate	mg/L	13_f[A]	45[C]	0.070	<0.044	<0.044	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.016	<0.010	<0.010	<0.010
Nitrite	mg/L	$1.97_{n4.e.\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**850[AB]**	**920[AB]**	**1,100[AB]**	**1,100[AB]**
Sodium Adsorption Ratio (SAR)	none	5.0[A]	n/v	-	-	-	-
BTEX and Petroleum Hydrocarbons							
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics							
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	1.3	2.2	2.2	1.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,300[A]**	**1,500[A]**	**1,600[A]**	**1,600[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.14	8.28	7.54	7.51
Anions							
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	270	290	490	520
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	320	350	600	640
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	$\leq 500_j$[B]	370	360	420	390
Chloride	mg/L	100[A]	≤250[B]	9.3	64	<1.0	1.2
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-
Nutrients							
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0066	0.011	0.0031	0.0034
Ammonia (as N) - Total	mg/L	5.025_{n2}[A]	n/v	**0.72[A]**	**0.63[A]**	**0.36[A]**	**0.29[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.016	<0.010	<0.010	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	0.0057 P2	<0.0030	<0.0030 P2
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.73	1.09	0.59	0.86
Nitrogen	mg/L	n/v	n/v	0.74 DB	1.1 DB	0.59 DB	0.86 DB
Metals - Dissolved							
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	<0.0030	0.0053	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00022	0.00035	0.00032	0.00026
Barium	mg/L	2.0[A]	2.0[C]	0.014	0.032	0.010	0.017
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.12	0.13	0.11	0.14
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	<0.000020	<0.000020	0.00017	0.00005
Calcium	mg/L	n/v	n/v	34	38	170	160
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	0.0012	0.0011
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	<0.0010	<0.0010	<0.0010
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.038	0.023	0.036	0.031
Magnesium	mg/L	n/v	n/v	9.0	11	66	64
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.065[AB]**	**0.065[AB]**	**0.29[AB]**	**0.30[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0047	0.0052	0.00052	0.00051
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	<0.00050	<0.00050	0.00099	0.00077
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	2.1	3.0	4.7	4.6
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	3.9	4.6	5.1	5.8
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**270[AB]**	**270[AB]**	130	120
Strontium	mg/L	n/v	7.0[C]	0.54	0.62	1.3	1.4
Sulfur	mg/L	n/v	n/v	110	130	120	140
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	<0.00010	<0.00010	0.0049	0.0053
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total							
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000037[A]**	**0.0000231[A]**	**0.000175[A]**	**0.000233[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-
Microbiological Parameters							
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<5.0 MI***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	1,200	1,300	130 SVH	38
Total Coliforms	mpn/100mL	n/v	0[D]	**150[D]**	**1,400[D]**	***<1.0***	**20[D]**

See notes on the last page

Table 2 Groundwater Analytical Results - Tier 2 and EIA Project Wells

Notes:

2022 AEPA Tier 1	Alberta Environment and Protected Areas (AEPA). 2022. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch 189 pp.
A	Table 2. Alberta Tier 1 Groundwater Remediation Guidelines - Agricultural - Fine
GCDWQ	Health Canada (September 2022). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
B	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
C	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
D	Guidelines for Canadian Drinking Water Quality - Microbiological Parameters
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
a	This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants; it does not apply to naturally occurring aluminum found in groundwater. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
f	Guidelines only provided for Nitrate (as N). Nitrate guideline (as NO3) is calculated by multiplying the Nitrate (as N) guideline by 4.43.
j	High levels (above 500 mg/L) can cause physiological effects such as diarrhea or dehydration.
n1,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.1 for further guidance on aquatic life pathway, standard varies with pH, long term guideline shown (see Table 1.1 for short term guideline). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n2	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.2 for further guidance on aquatic life pathway, standard varies with pH and temperature (see Table 1.2 for guideline and is for total ammonia (NH3 as N).
n3,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.3 for further guidance on aquatic life pathway, standard varies with hardness, long term is shown (see Table 1.3 for short term). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e, g	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines. Guidelines only provided for Nitrite (as N). Nitrite guideline (as NO2) is calculated by multiplying the Nitrite (as N) guideline by 3.29.
n5,e	Guideline for protection of aquatic life is below detection limit, groundwater monitoring is required. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.7 for further guidance on aquatic life pathway, standard varies with hardness. Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
A*	Ammonia greater than TKN. Results are within acceptable limits of precision.
AT	Detection limit raised due to interference.
CD	Detection limits raised due to dilution to bring analyte within the calibrated range.
DB	Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
DSM	Detection limits raised due to sample matrix
DVM	Detection limit raised based on sample volume used and sample matrix
DXE	Dissolved greater than total. Unable to re-analyze due to insufficient sample.
EC	Detection limit raised due to interferent.
MA	Matrix Spike outside acceptance limits due to matrix interference. Reanalysis yields similar results.
MI	Detection limits raised due to matrix interference.
MSE	Matrix spike exceeds acceptance limits due to probable matrix interference.
NF	Duplicate exceeds acceptance criteria due to sample non homogeneity.
NH	Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
NN	Nitrogen < Nitrate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
NNA	Nitrogen < Ammonia: Both values fall within the method uncertainty for duplicates and are likely equivalent.
OG	Orthophosphate greater than phosphate. Results within acceptable limits of precision.
P2	Phosphorus < Orthophosphate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
SC1	Spreader colony present. Quantitative colony reporting is not possible due to bacterial density.
SVH	Sample analyzed over hold time. Sample analysis is recommended within 24 hours of sampling.
VV	Detection limit raised based on sample volume used for analysis.
Z8	Detection limit raised due to matrix interference.
Z9	Detection limit raised due to matrix interference. One big Spreader colony obscured other colonies.
RPD	Relative Percent Difference.
61%	RPD exceeds data quality objective of 30%.
nc	RPD is not calculated if one or more values is non detect or if one or more values is less than five times the reportable detection limit.

Table 3 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS81-01			WS81-02	NE7-R3-01	
Sample Date				17-May-23	17-May-23		17-May-23	16-Nov-22	16-May-23
Sample ID				WS81-1	WS2023-1		WS81-2	NE7R3-1	NE7R3-1
Sampling Company				STANTEC	STANTEC		STANTEC	STANTEC	STANTEC
Laboratory				BV	BV		BV	BV	BV
Laboratory Work Order				C335152	C335152		C335152	C290717	C334712
Laboratory Sample ID				BQP602	BQP603		BQP601	BHD548	BQN672
Location Description				Tier 2a	Tier 2a		Tier 2b	Tier 3	Tier 3
Lithology				Bedrock	Bedrock		Bedrock	Unconsolidated (alluvial)	Unconsolidated (alluvial)
Sample Type	Units	2022 AEPA Tier 1	GCDWQ		Field Duplicate	RPD (%)			
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	6.3	-	-	4.7	10.2	16.9
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,128[A]**	-	-	**1,357[A]**	527	462
Oxidation Reduction Potential, field	mV	n/v	n/v	221.3	-	-	16.4	-53.4	215.0
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.43	-	-	7.46	**6.80[B]**	7.58
Temperature, Field	deg C	n/v	≤15[B]	7.9	-	-	6.2	7.5	4.0
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	14	14	nc	16	5.6	5.5
Cation Sum	meq/L	n/v	n/v	14	14	nc	16	5.3	6.0
Hardness (as CaCO3)	mg/L	n/v	n/v	440	440	0%	260	250	280
Ion Balance	%	n/v	n/v	0.043	0.91	nc	0.23	2.8	4.9
Nitrate	mg/L	13_f[A]	45[C]	**25[A]**	**24[A]**	4%	1.5	2.0	3.5
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	5.6	5.4	4%	0.43	0.45	0.79
Nitrite	mg/L	$1.97_{n4.e,\alpha}$[A]	3[C]	<0.033	<0.033	nc	0.27	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**770[AB]**	**780[AB]**	1%	**930[AB]**	290	300
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	nc	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	nc	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.2	2.4	nc	3.7	1.2	2.0
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,200[A]**	**1,200[A]**	0%	**1,500[A]**	530	500
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.57	7.56	nc	7.58	7.56	7.67
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	440	450	2%	550	200	190
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	540	540	0%	670	240	230
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	180	190	5%	240	65	64
Chloride	mg/L	100[A]	≤250[B]	38	38	0%	18	8.4	8.8
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	nc	0.083	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	nc	<0.0030	<0.0030	<0.0030
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	<0.015	<0.015	nc	0.027	<0.015	<0.015
Nitrate (as N)	mg/L	3.0[A]	10[C]	**5.6[A]**	**5.4[A]**	4%	0.35	0.45	0.79
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	nc	0.093	<0.0030	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	<0.20	<0.20	nc	0.062	0.040	<0.020
Nitrogen	mg/L	n/v	n/v	5.1 NN	5.5	8%	0.49	0.49	0.78 NN
See notes on the last page									
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	<0.0030	0.021	nc	<0.0030	**0.73[AB]**	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	nc	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00027	0.00026	nc	0.00026	0.00046	0.00040
Barium	mg/L	2.0[A]	2.0[C]	0.023	0.023	nc	0.045	0.12	0.11
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.14	0.14	0%	0.15	<0.020	<0.020
Cadmium	mg/L	$0.00037_{n3.e}$[A]	0.007[C]	<0.000020	<0.000020	nc	<0.000020	0.000048	<0.000020
Calcium	mg/L	n/v	n/v	88	87	1%	54	69	77
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	nc	<0.00030	0.00038	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	**0.014[A]**	**0.014[A]**	0%	0.0021	0.0022	0.0026
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	nc	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3.e}$[A]	0.005[C]	0.00054	0.00052	nc	<0.00020	0.00097	<0.00020
Lithium	mg/L	n/v	n/v	0.034	0.033	nc	0.035	<0.020	<0.020
Magnesium	mg/L	n/v	n/v	53	53	0%	29	18	21
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	<0.0040	nc	0.016	<0.0040	<0.0040
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0059	0.0058	2%	0.0016	0.00069	0.00074
Nickel	mg/L	$0.150_{n3.e}$[A]	n/v	0.0014	0.0012	nc	0.00055	<0.00050	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	2.0	2.0	0%	1.6	3.9	3.7
Selenium	mg/L	0.0020[A]	0.05[C]	**0.0026[A]**	**0.0029[A]**	11%	0.00098	0.00074	0.00063
Silicon	mg/L	n/v	n/v	3.3	3.3	0%	3.2	2.6	2.7
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	120	120	0%	**260[AB]**	7.0	7.9
Strontium	mg/L	n/v	7.0[C]	1.1	1.1	0%	0.91	0.34	0.36
Sulfur	mg/L	n/v	n/v	61	61	0%	81	17	23
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	0.015	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0039	0.0042	7%	0.0061	0.00085	0.00072
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	0.0020	0.0020
Zinc	mg/L	0.030[A]	≤5.0[B]	0.023	0.025	8%	0.0031	0.012	0.011
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	<0.0000019
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	<1.0	6.0	nc	<1.0	12	3.0
Total Coliforms	mpn/100mL	n/v	0[D]	**30[D]**	**18[D]**	**50%**	***<1.0***	**9.8[D]**	***<1.0***
See notes on the last page									

Table 3 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				NE20-R3-01		SW11-R4-02	SW35-R4-01		WS11-1	
Sample Date				14-Nov-22	17-May-23	19-May-23	15-Nov-22	16-May-23	25-Nov-22	17-May-23
Sample ID				NE2OR3-2	NE20R3-2	SW11R4-2	SW35R4-1	SW35R4-1	WS11-1	WS11-1
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C289871	C335152	C335907	C290290	C334712	C293015	C335152
Laboratory Sample ID				BGY829	BQP600	BQT306	BHB174	BQN671	BHR664	BQP593
Location Description				Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ							
Field Parameters										
Dissolved Oxygen, Field	mg/L	n/v	n/v	8.6	9.5	3.0	3.0	5.8	16.2	6.7
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,424[A]**	**1,135[A]**	442	**1,302[A]**	**1,305[A]**	898	747
Oxidation Reduction Potential, field	mV	n/v	n/v	-14.8	213.4	179.7	-44.2	162.7	-31.5	149.7
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.48	7.34	7.73	7.64	7.59	8.42	7.55
Temperature, Field	deg C	n/v	≤15[B]	12.7	**15.4[B]**	7.6	8.7	7.4	5	12.6
Calculated Parameters										
Anion Sum	meq/L	n/v	n/v	17	17	5.1	15	16	10	9.5
Cation Sum	meq/L	n/v	n/v	16	17	5.5	17	17	11	9.3
Hardness (as CaCO3)	mg/L	n/v	n/v	490	580	62	82	73	240	240
Ion Balance	%	n/v	n/v	3.0	2.0	4.2	3.4	2.2	1.7	1.1
Nitrate	mg/L	13_f[A]	45[C]	3.4	2.3	<0.044	5.4	4.1	0.059	0.068
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.77 MI	0.51	<0.010	1.2	0.92 Z8	0.013	0.015
Nitrite	mg/L	$1.97_{n4.e,\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**930[AB]**	**940[AB]**	300	**900[AB]**	**930[AB]**	**540[AB]**	480
BTEX and Petroleum Hydrocarbons										
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00041
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics										
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.1	2.4	2.2	0.89	1.8	2.9	1.8
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,500[A]**	**1,500[A]**	480	**1,400[A]**	**1,400[A]**	920	830
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.83	7.62	8.15	8.09	8.17	8.19	7.88
Anions										
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	440	450	190	580	610	450	450
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	530	550	230	710	750	550	550
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_j[B]	290	270	57	170	170	25	13
Chloride	mg/L	100[A]	≤250[B]	76	69	4.9	4.3	4.8	29	6.3
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-
Nutrients										
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0065	<0.0030	0.0033	0.0087	0.0089	<0.0030	<0.0030
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	0.23	0.41	0.17	0.064	0.23	0.29	0.25
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.77	0.51	<0.010	1.2	0.92	0.013	0.015
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030 P2	0.0091	0.0070 P2	0.0061	0.011
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.13	0.302	0.183	0.099	0.371	0.57	0.332
Nitrogen	mg/L	n/v	n/v	1.9	0.81	0.18	1.3	1.3	0.59 DB	0.35
See notes on the last page										
Metals - Dissolved										
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0037	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	0.0033	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	<0.00020	0.00055	0.00072	0.0021	0.00089
Barium	mg/L	2.0[A]	2.0[C]	0.018	0.018	0.081	0.026	0.024	0.17	0.21
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.063	0.059	0.055	0.073	0.086	**1.2[A]**	0.54
Cadmium	mg/L	$0.00037_{n3.e}$[A]	0.007[C]	0.000046	0.000086	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
Calcium	mg/L	n/v	n/v	94	130	17	21	19	54	50
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00053	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0039	0.0057	0.0015	0.0017	0.0026	<0.0010	<0.0010
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3.e}$[A]	0.005[C]	<0.00020	0.00021	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.032	0.040	0.036	0.072	0.077	0.026	<0.020
Magnesium	mg/L	n/v	n/v	63	65	5.0	7.0	6.0	26	27
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	**0.051[AB]**	**0.051[AB]**	0.0060	0.0097	**0.28[AB]**	**0.32[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	0.0000039	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.00093	0.00087	0.0013	0.0058	0.0052	0.0068	0.0030
Nickel	mg/L	$0.150_{n3.e}$[A]	n/v	0.0021	0.0029	<0.00050	<0.00050	<0.00050	0.0013	0.00078
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	6.6	6.4	0.92	2.7	2.8	6.4	5.1
Selenium	mg/L	0.0020[A]	0.05[C]	0.00028	<0.00020	<0.00020	0.0011	0.00091	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	3.5	3.9	4.0	2.8	3.2	5.0	5.8
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	140	120	98	**340[AB]**	**350[AB]**	130	100
Strontium	mg/L	n/v	7.0[C]	1.7	1.6	0.34	0.32	0.31	2.8	2.6
Sulfur	mg/L	n/v	n/v	86	98	19	51	59	7.9	4.5
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0036	0.0035	<0.00010	0.00058	0.00048	0.00045	0.00012
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	0.0018	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	0.017	0.018	0.028	0.0056	0.017	0.0049	0.0035
Metals - Total										
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	**0.00094[A]**	0.0000026
Microbiological Parameters										
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<10 MI***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<10 MI***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	160	83	28	100	1.0	110	320
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0 PH***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	**10 MI[D]**	**>2400[D]**
See notes on the last page										

Table 3 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS41-02		WS51-01	WS62-01		WS20-1
Sample Date				14-Nov-22	15-May-23	23-May-23	16-Nov-22	16-May-23	24-May-23
Sample ID				WS41-2	WS41-2	WS51-1	WS62-1	WS62-1	WS20-1
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV
Laboratory Work Order				C289871	C334367	C336439	C290717	C334712	C336854
Laboratory Sample ID				BGY828	BQM167	BQW245	BHD547	BQN673	BQZ215
Location Description				Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	One Time
Lithology				Bedrock	Bedrock	Bedrock	Unconsolidated (alluvial)	Unconsolidated (alluvial)	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ						
Field Parameters									
Dissolved Oxygen, Field	mg/L	n/v	n/v	3.8	5.4	2.9	5.3	12.6	5.7
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,082[A]**	**1,080[A]**	724	605	572	385
Oxidation Reduction Potential, field	mV	n/v	n/v	13.8	130.0	-81.3	-44.0	213.6	52.3
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.28	7.46	7.61	7.01	7.45	7.58
Temperature, Field	deg C	n/v	≤15[B]	6.5	6.9	8.5	8.1	4.0	5.6
Calculated Parameters									
Anion Sum	meq/L	n/v	n/v	12	14	-	7.0	7.1	4.7
Cation Sum	meq/L	n/v	n/v	14	14	-	6.2	7.3	4.3
Hardness (as CaCO3)	mg/L	n/v	n/v	410	170	190	290	350	120
Ion Balance	%	n/v	n/v	5.1	2.2	2.8	6.2	2.0	4.8
Nitrate	mg/L	13_{f}[A]	45[C]	**20[A]**	4.4	<0.044	0.14	0.46	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	4.5	0.99	<0.010	0.032	0.10	<0.010
Nitrite	mg/L	$1.97_{n4.e,\alpha}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**670[AB]**	**750[AB]**	**520[AB]**	360	380	250
BTEX and Petroleum Hydrocarbons									
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics									
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	1.9	1.7	0.66	1.5	1.9	<0.50
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,100[A]**	**1,200[A]**	800	620	630	420
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.62	8.04	8.21	7.51	7.83	7.94
Anions									
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	450	580	310	250	240	160
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	550	710	380	300	290	190
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_{j}[B]	60	86	130	87	98	70
Chloride	mg/L	100[A]	≤250[B]	60	23	<1.0	8.1	6.8	2.7
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-
Nutrients									
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0035	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	0.018	0.25	0.24	<0.015	<0.015	<0.015
Nitrate (as N)	mg/L	3.0[A]	10[C]	**4.5[A]**	0.99	<0.010	0.032	0.10	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	2.23	0.409	0.270	0.061	<0.020	<2.0
Nitrogen	mg/L	n/v	n/v	6.7	1.4	0.27	0.093	0.11	<2.0 DB
See notes on the last page									
Metals - Dissolved									
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	<0.0030	<0.0030	-	<0.0030	<0.0030	0.0045
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	-	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	0.00045	-	<0.00020	<0.00020	<0.00020
Barium	mg/L	2.0[A]	2.0[C]	0.080	0.045	-	0.062	0.066	0.035
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.053	0.055	-	<0.020	<0.020	<0.020
Cadmium	mg/L	$0.00037_{n3.e}$[A]	0.007[C]	0.00003	<0.000020	-	<0.000020	<0.000020	<0.000020
Calcium	mg/L	n/v	n/v	90	41	59	81	96	29
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	-	<0.00030	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0067	0.0031	-	**0.023[A]**	**0.018[A]**	0.0025
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3.e}$[A]	0.005[C]	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	<0.020	0.036	-	<0.020	<0.020	<0.020
Magnesium	mg/L	n/v	n/v	44	18	11	21	26	12
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	0.0077	**0.16[AB]**	<0.0040	0.0070	**0.11[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0044	0.0089	-	0.00048	0.00054	0.0025
Nickel	mg/L	$0.150_{n3.e}$[A]	n/v	0.00078	<0.00050	-	<0.00050	<0.00050	0.00057
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	-	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	6.2	4.0	1.1	1.8	2.0	1.3
Selenium	mg/L	0.0020[A]	0.05[C]	**0.0063[A]**	0.0020	-	0.00062	0.0012	0.00022
Silicon	mg/L	n/v	n/v	3.3	2.7	-	2.5	2.9	1.1
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	120	**230[AB]**	130	8.1	8.6	42
Strontium	mg/L	n/v	7.0[C]	1.3	0.63	-	0.42	0.46	0.26
Sulfur	mg/L	n/v	n/v	21	29	-	23	33	18
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	0.0023
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0037	0.0031	-	0.00080	0.0011	<0.00010
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	0.0020	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	0.026	0.011	-	0.012	0.016	<0.0030
Metals - Total									
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Microbiological Parameters									
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<2.0 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<2.0 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	1,300	<1.0	1.0	<1.0	25	120
Total Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<2.0 Z8***
See notes on the last page									

Table 3 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location					WS20-2		WS27-01	WS36-01	WS36-02	WS36-03	WS36-04	WS50-01
Sample Date				24-May-23	24-May-23		24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	23-May-23
Sample ID				WS20-2	WS2023-5		WS27-1	WS36-1	WS36-2	WS36-3	WS36-4	WS50-1
Sampling Company				STANTEC	STANTEC		STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV		BV	BV	BV	BV	BV	BV
Laboratory Work Order				C336854	C336854		C336854	C336854	C336854	C336854	C336854	C336439
Laboratory Sample ID				BQZ216	BQZ217		BQZ214	BQZ210	BQZ211	BQZ212	BQZ213	BQW246
Location Description				One Time	One Time		One Time	One Time	One Time	One Time	One Time	One Time
Lithology				Unknown	Unknown		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Sample Type	Units	2022 AEPA Tier 1	GCDWQ		Field Duplicate	RPD (%)						
Field Parameters												
Dissolved Oxygen, Field	mg/L	n/v	n/v	8.5	-	-	3.4	7.5	2.5	4.8	2.2	4.1
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	325	-	-	979	904	**1,884[A]**	**1,431[A]**	**1,304[A]**	**2,138[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	250.9	-	-	139.3	135.1	123.1	40.9	100.1	16.4
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.70	-	-	7.57	7.55	7.41	7.45	7.36	7.74
Temperature, Field	deg C	n/v	≤15[B]	13.7	-	-	7.1	7.6	8.0	8.8	12.2	7.1
Calculated Parameters												
Anion Sum	meq/L	n/v	n/v	3.9	3.9	nc	11	12	21	18	16	-
Cation Sum	meq/L	n/v	n/v	3.8	3.7	nc	13	13	23	19	17	-
Hardness (as CaCO3)	mg/L	n/v	n/v	190	180	5%	270	530	760	520	510	140
Ion Balance	%	n/v	n/v	1.8	3.2	nc	5.4	5.2	4.6	3.5	4.1	0.66
Nitrate	mg/L	13_f[A]	45[C]	0.59	0.59	0%	3.9	3.2	**16[A]**	**15[A]**	3.3	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.13	0.13	0%	0.87	0.72	3.5	3.4	0.75	<0.010
Nitrite	mg/L	$1.97_{n4.e,\alpha}$[A]	3[C]	<0.033	<0.033	nc	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	210	200	5%	**650[AB]**	**620[AB]**	**1,100[AB]**	**1,000[AB]**	**870[AB]**	**1,600[AB]**
BTEX and Petroleum Hydrocarbons												
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	nc	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	nc	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	nc	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics												
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	0.73	1.1	nc	1.2	0.88	1.4	1.3	1.3	1.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	350	350	0%	1,000	1,000	**2,000[A]**	**1,500[A]**	**1,400[A]**	**2,400[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.02	7.89	nc	8.38	8.29	7.80	8.23	8.01	8.50
Anions												
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	6.5	<1.0	<1.0	<1.0	<1.0	17
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	140	130	7%	420	440	510	540	500	630
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	160	160	0%	490	530	630	650	610	730
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	7.8	<1.0	<1.0	<1.0	<1.0	21
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_j[B]	59	58	2%	100	77	94	180	140	**650[AB]**
Chloride	mg/L	100[A]	≤250[B]	<1.0	1.6	nc	35	50	**290[AB]**	**110[A]**	96	4.3
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-	-	-
Nutrients												
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	nc	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	nc	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0036
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	<0.015	<0.015	nc	0.19	<0.015	<0.015	0.38	0.23	0.57
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.13	0.13	0%	0.87	0.72	**3.5[A]**	**3.4[A]**	0.75	<0.010
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	nc	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030 P2
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.027	<0.020	nc	0.231	<0.020	<0.10	0.28	0.207	0.727
Nitrogen	mg/L	n/v	n/v	0.16	0.15	6%	1.1	0.58 NN	3.4 NN	3.7	0.96	0.73
See notes on the last page												
Metals - Dissolved												
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_a[B]	0.0038	0.0055	nc	<0.0030	0.0032	0.0035	0.025	0.012	-
Antimony	mg/L	0.0060[A]	0.006[C]	0.00094	<0.00060	nc	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	-
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Barium	mg/L	2.0[A]	2.0[C]	0.055	0.055	0%	0.051	0.031	0.051	0.032	0.036	-
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Boron	mg/L	1.0[A]	5[C]	<0.020	<0.020	nc	0.047	0.055	0.078	0.086	0.085	-
Cadmium	mg/L	$0.00037_{n3.e}$[A]	0.007[C]	<0.000020	<0.000020	nc	<0.000020	<0.000020	0.00003	<0.000020	<0.000020	-
Calcium	mg/L	n/v	n/v	50	48	4%	58	110	170	120	110	33
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	nc	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	-
Copper	mg/L	0.0070[A]	≤1.0[B]	**0.019[A]**	**0.019[A]**	0%	0.0012	<0.0010	**0.017[A]**	<0.0010	0.0010	-
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	nc	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3.e}$[A]	0.005[C]	<0.00020	<0.00020	nc	<0.00020	<0.00020	0.00024	<0.00020	<0.00020	-
Lithium	mg/L	n/v	n/v	<0.020	<0.020	nc	0.053	0.020	0.027	0.053	0.056	-
Magnesium	mg/L	n/v	n/v	15	14	7%	29	62	79	53	59	13
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	<0.0040	nc	0.016	<0.0040	<0.0040	**0.023[AB]**	**0.044[AB]**	**0.10[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	0.0000021	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.00062	0.00053	nc	0.0036	0.00046	0.0010	0.0031	0.00072	-
Nickel	mg/L	$0.150_{n3.e}$[A]	n/v	<0.00050	<0.00050	nc	<0.00050	<0.00050	0.0014	0.0011	<0.00050	-
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	nc	<0.10	<0.10	<0.10	<0.10	<0.10	-
Potassium	mg/L	n/v	n/v	0.56	0.54	nc	4.1	6.3	7.7	7.0	7.0	2.0
Selenium	mg/L	0.0020[A]	0.05[C]	0.00073	0.00072	nc	**0.0024[A]**	**0.016[A]**	0.0015	**0.0044[A]**	0.00082	-
Silicon	mg/L	n/v	n/v	2.4	2.3	nc	2.7	4.1	3.2	3.4	3.6	-
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	nc	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-
Sodium	mg/L	200[A]	≤200[B]	1.9	1.9	nc	170	52	170	190	150	**550[AB]**
Strontium	mg/L	n/v	7.0[C]	0.40	0.40	0%	0.74	1.3	1.8	1.2	1.6	-
Sulfur	mg/L	n/v	n/v	22	21	5%	26	28	27	50	41	-
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	nc	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Uranium	mg/L	0.010[A]	0.02[C]	0.00042	0.00040	nc	0.0021	0.0042	0.0059	0.0059	0.0040	-
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	nc	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-
Zinc	mg/L	0.030[A]	≤5.0[B]	0.021	0.022	5%	0.0033	<0.0030	0.012	0.0062	<0.0030	-
Metals - Total												
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	nc	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Microbiological Parameters												
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	nc	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	<1.0	6.0	nc	400	<1.0	6.0	64	2.0	4.0
Total Coliforms	mpn/100mL	n/v	0[D]	**1.0[D]**	**3.1[D]**	nc	***<1.0***	***<1.0***	**2.0[D]**	***<1.0***	***<1.0***	***<1.0***
See notes on the last page												

Table 3 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Notes:

2022 AEP Tier 1	Alberta Environment and Protected Areas (AEPA). 2022. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch 189 pp.
A	Table 2. Alberta Tier 1 Groundwater Remediation Guidelines - Agricultural - Fine
GCDWQ	Health Canada (September 2022). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
B	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
C	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
D	Guidelines for Canadian Drinking Water Quality - Microbiological Parameters
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
a	This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants; it does not apply to naturally occurring aluminum found in groundwater. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
f	Guidelines only provided for Nitrate (as N). Nitrate guideline (as NO3) is calculated by multiplying the Nitrate (as N) guideline by 4.43.
i	High levels (above 500 mg/L) can cause physiological effects such as diarrhea or dehydration.
n1,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.1 for further guidance on aquatic life pathway, standard varies with pH, long term guideline shown (see Table 1.1 for short term guideline). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n2	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.2 for further guidance on aquatic life pathway, standard varies with pH and temperature (see Table 1.2 for guideline and is for total ammonia (NH3 as N).
n3,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.3 for further guidance on aquatic life pathway, standard varies with hardness, long term is shown (see Table 1.3 for short term). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e, g	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines. Guidelines only provided for Nitrite (as N). Nitrite guideline (as NO2) is calculated by multiplying the Nitrite (as N) guideline by 3.29.
n5,e	Guideline for protection of aquatic life is below detection limit, groundwater monitoring is required. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.7 for further guidance on aquatic life pathway, standard varies with hardness. Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
AT	Detection limit raised due to interference.
CD	Detection limits raised due to dilution to bring analyte within the calibrated range.
DB	Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
DSM	Detection limits raised due to sample matrix
HX	Holding time had been exceeded upon sample receipt.
MD	Dissolved greater than total. Results are within limits of uncertainty.
MI	Detection limits raised due to matrix interference.
NH	Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
NN	Nitrogen < Nitrate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
P2	Phosphorus < Orthophosphate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
PH	Sample received past hold time.
VV	Detection limit raised based on sample volume used for analysis.
Z8	Detection limit raised due to matrix interference.
RPD	Relative Percent Difference.
61%	RPD exceeds data quality objective of 30%.
nc	RPD is not calculated if one or more values is non detect or if one or more values is less than five times the reportable detection limit.

Appendices

Appendix A Hydrogeological Setting

The hydrogeologic setting of the regional assessment area (RAA) is summarized below in order to provide context for the GWMP.

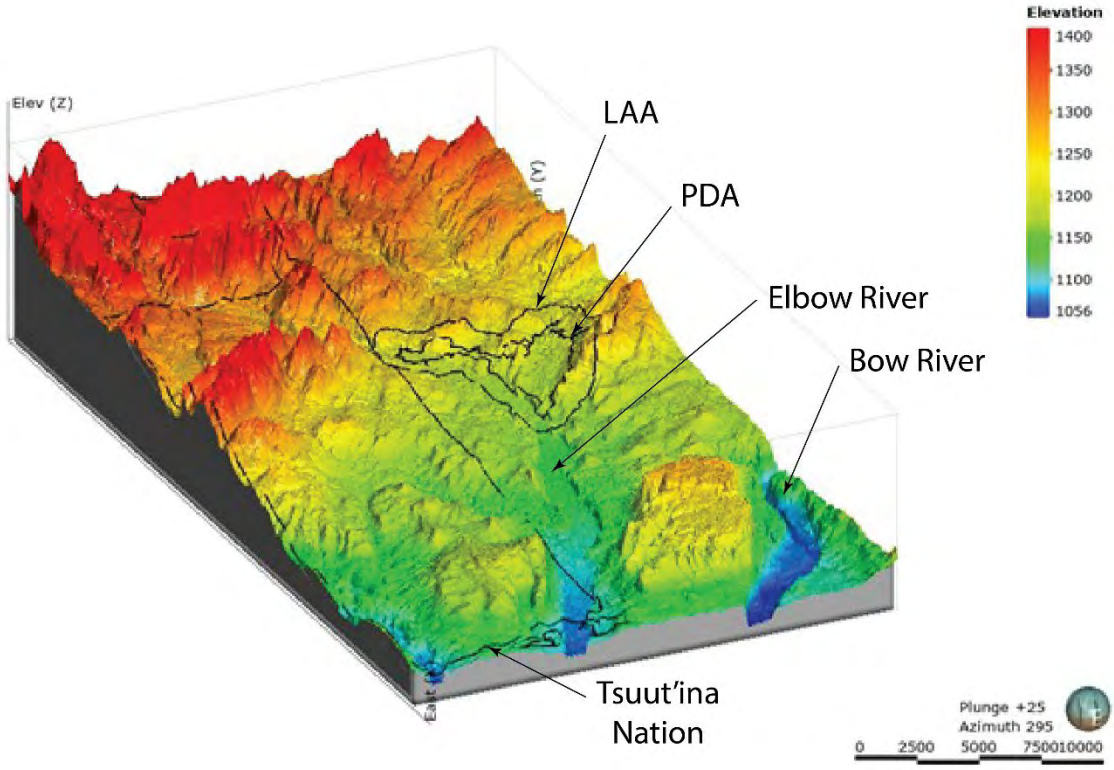
A.1 Regional Topography and Drainage

The ground surface topography of the RAA is depicted by the digital elevation model (DEM) in Figure A.1. Outlines of the Hydrogeology PDA/LAA used in the EIA and Tsuut'ina Nation Reserve are also shown as overlays for reference. Areas of higher elevation are denoted by red, and they grade down to areas of low elevation, denoted by blue as shown on the colour scale. The topographic elevation ranges from approximately 1,365 m ASL on the bedrock ridges in the southwest corner of the RAA to approximately 1,125 m ASL along Elbow River at the eastern boundary.

The topography on the north side of the RAA consists of a series of ridges and valleys that are oriented northwest to southeast. The topography of most of the RAA is generally controlled by the bedrock structure, particularly in the southwest, and to a lesser extent, the patterns of glacial sediment deposition modifying the topography in lower areas. Prominent ridges through the assessment area are a result of formations that are more resistive to weathering; the valleys in between the ridges are more easily weathered or recessive.

Near the modern river channels, fluvial erosion and deposition is the primary topographic control agent. Near Elbow River and Jumpingpound Creek, the terrain is incised with one or more fluvial terraces within the river valleys. Hummocky regions have low to moderate relief, with gentle slopes that vary between 2% and 15%. Areas with low relief are underlain by till or glaciolacustrine sediments, while areas of moderate relief are underlain by till and glaciofluvial sediments. Outcrops of bedrock occur along ridges in the lower areas of the RAA and are moderately weathered and fractured, but they are covered by a thick sequence of unconsolidated sediment.

Figure A.1 Topography of the Regional Assessment Area



A.2 Regional Hydrogeologic Setting

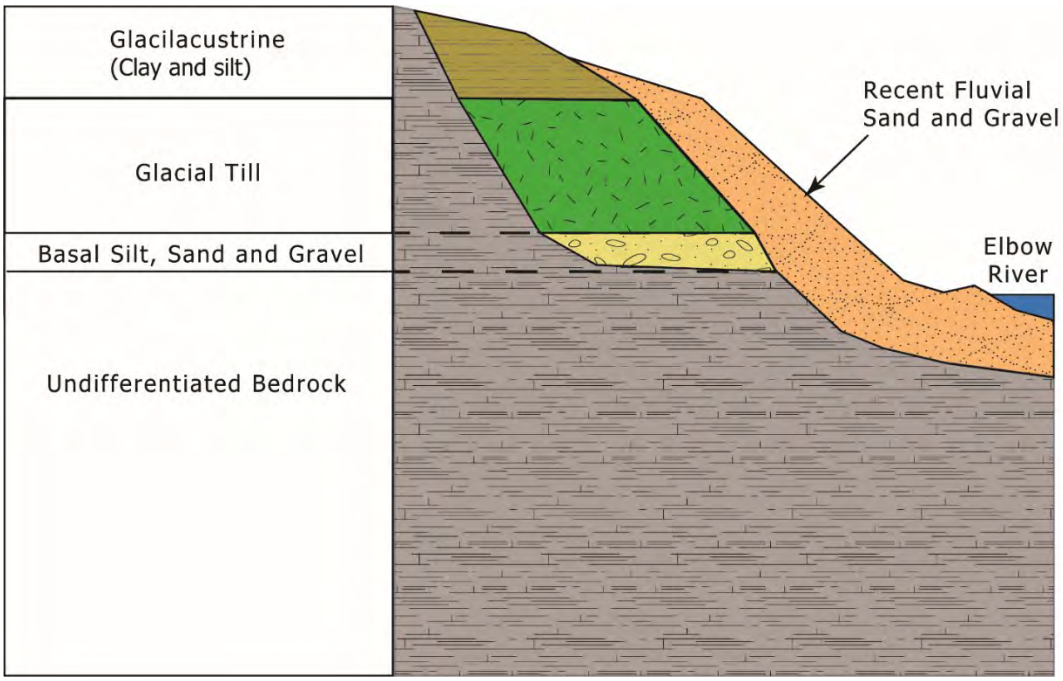
A.2.1 Conceptual Hydrostratigraphic Framework

The conceptual hydrostratigraphic framework for the LAA and RAA is based on the three-dimensional conceptual site model (3D CSM) developed for the baseline groundwater assessment. Figure A.2 presents an oblique view of the 3D CSM looking from the east with the RAA boundary shown overlain on the model and air photograph for reference.

A regional stratigraphic column that shows the generalized stratigraphy beneath the RAA is depicted in Figure A.3. Brief descriptions of each stratigraphic unit, and a discussion of the additional salient features of the area are presented in the following subsections.

Figure A.2 Oblique Angle Overview of 3D CSM

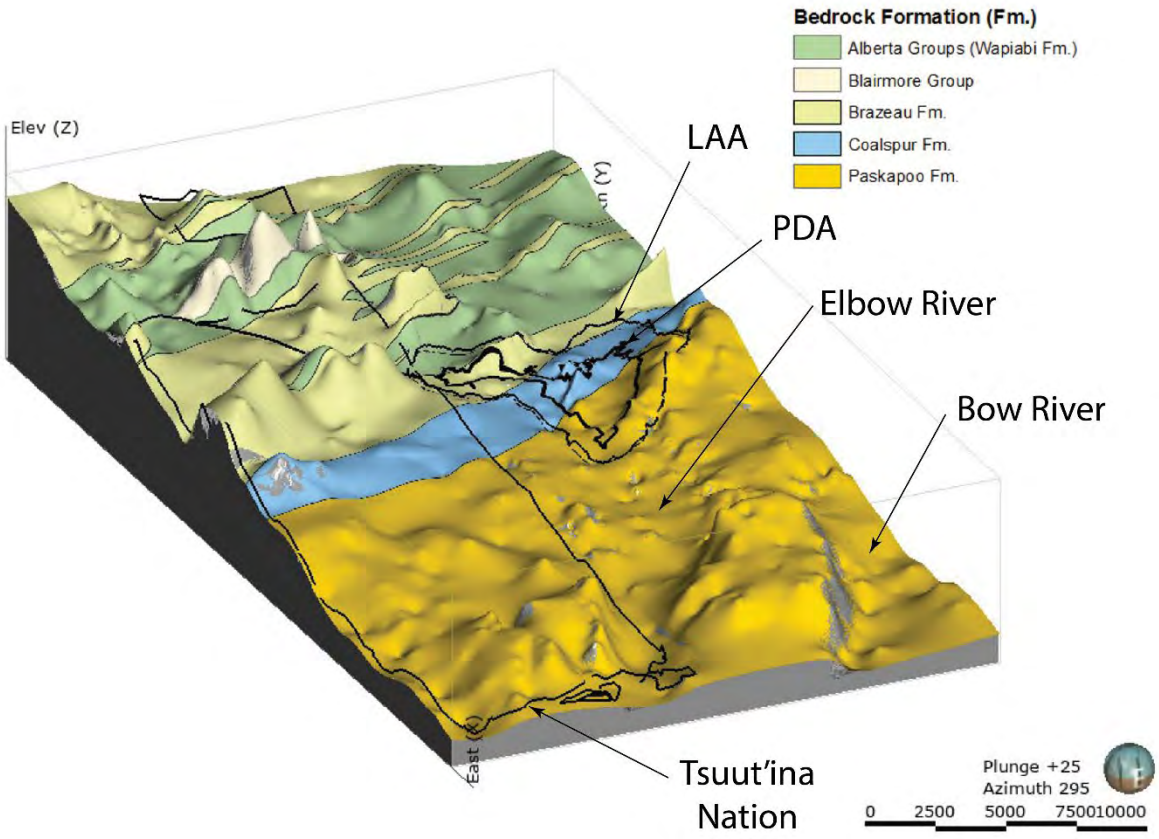
Figure A.3 Conceptual Regional Stratigraphic Column



A.2.2 Bedrock

The bedrock surface within the RAA was shaped by tectonism and associated formation of the Rocky Mountains to the west, glacial erosion/deposition, and erosional incision of modern-day river channels. The RAA is in the disturbed belt which forms a transitional zone (foothills) between the Rocky Mountains to the west and prairie to the east. Bedrock topography is depicted in Figure A.4.

Figure A.4 Bedrock Topography and Subcrop Formations



The bedrock units encountered beneath the quaternary deposits are presented below from oldest to youngest. This generally coincides with how they appear from west to east across the RAA except for the Blairmore Group:

- The lower Cretaceous Blairmore Group dominantly composed of fluvial sediments. The two fluvial formations belonging to the upper Blairmore Group include the Beaver Mines and Mill Creek formations (Langenberg et al. 2000). This unit subcrops over a small topographically elevated area in the southwest of the RAA.
- The upper Cretaceous-aged Wapiabi Formation of the Alberta Group is generally composed of shale and mudstone with minor siltstone, except for the Chungo and Marshybank Members, which are sandstone dominated (Pana and Elgr 2013).
- The upper Cretaceous-aged Brazeau Formation is composed primarily of sandstone and laminated siltstone, along with olive green mudstone and granule to pebble conglomerate in the lower part. The upper part is composed of greenish-grey to dark grey mudstone, siltstone and greenish-grey sandstone. Thin coal and coaly shale beds and thin bentonite layers also occur in the upper part (Prior et al. 2013).
- The Upper Cretaceous-to-Tertiary aged Coalspur Formation formed as a marginal marine fluvial infill of the foreland basin. The Coalspur Formation is composed of thinly bedded to massive sandstone, siltstone, light grey to olive green mudstone, shale, coaly shale, coal seams and minor volcanic tuff in the lower portions (Pana and Elgr 2013).
- The Tertiary-aged Paskapoo Formation is made up of thick tabular sandstone, siltstone and mudstone (Glass 1990). The sandstones are fine to coarse grained and are cliff forming. The Paskapoo Formation also contains a substantial amount of shale, carbonaceous shale, siltstone, rare coals seams and shell beds (Pana and Elgr 2013). In the central Rocky Mountains and foothills, the Paskapoo Formation is dominated by recessively weathering, grey to greenish-grey mudstone and siltstone with subordinate pale grey, thick- to thin-bedded, sandstone; minor conglomerate; mollusc coquina; and coal (Prior et al. 2013). The Paskapoo Formation is the primary bedrock aquifer in the Elbow River watershed. Due to the stratigraphy of the layers of sandstone and shale within this formation, multiple aquifers occur at various depths in the rock (Waterline 2011).

The approximate subcrop boundaries of the bedrock units are presented in Figure A.4 and are based on regional mapping by Pana and Elgr (2013), except for the contact between the Coalspur and Brazeau Formations. This contact was reinterpreted by Jerzykiewicz (1997) based on observation and description of the entrance conglomerate in outcrop along Highway 22. The entrance conglomerate marks the boundary between these two formations, and its presence was confirmed in the field Project-specific data gathering.

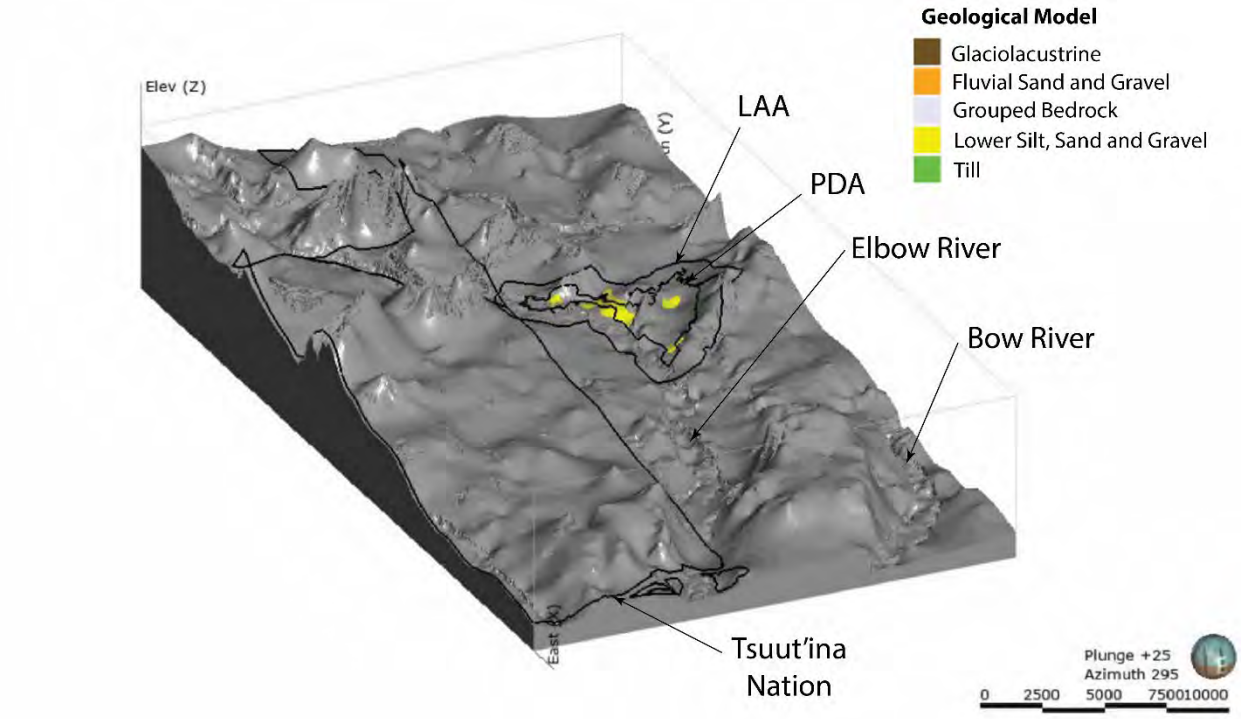
The bedrock descriptions from boreholes drilled to support the Project consist of varying thicknesses of alternating siltstone, sandstone mudstone and claystone. Generalized descriptions of each of these lithological units are as follows:

- Grey to brown, fine to medium-grained sandstone ranges from completely unlithified to well cemented and dry. Significant fracturing was noted in many intervals, with oxidation common along fracture planes. The upper sandstone beds beneath the unconsolidated deposits are highly weathered. Thicknesses of individual sandstone beds range from thin, centimetre-scale beds to a maximum of 15.3 m and an average thickness of 2.5 m.
- Grey to brown and, in some intervals, greenish-grey siltstone occurs and is extremely weak and friable to well cemented. It is highly fractured in some intervals, with oxidation along fracture planes. The average thickness of the interbedded siltstone beds is 2.5 m.
- Medium grey to brown claystone, generally blocky and not fissile-like shale, dry except where fractures are saturated occurs. Fracturing varies from completely unfractured to, more often, highly fractured with oxidation and alteration of clay along fractures. Claystone is interbedded with the other lithologies described above, with an average thickness of 1.9 m for each of the interbedded layers.

A.2.3 Basal Silt, Sand and Gravel

In some portions of the LAA, a coarser grained unit occurs above the bedrock at the base of the till. This unit is most prominent near the Elbow River valley and consists of a mixture of brown sand, silt and gravel with variable fines. The unit ranges in thickness from 0.9 to 4.2 m with an average of 2.4 m in the boreholes where it was encountered. The distribution of the basal silt, sand and gravel deposits is shown in yellow in Figure A.5. While this unit may be more widespread within the RAA than the distribution shown, the data density in the LAA was sufficient based on Project-specific data to allow correlation and mapping of this unit.

Figure A.5 Distribution of Basal Silt, Sand and Gravel



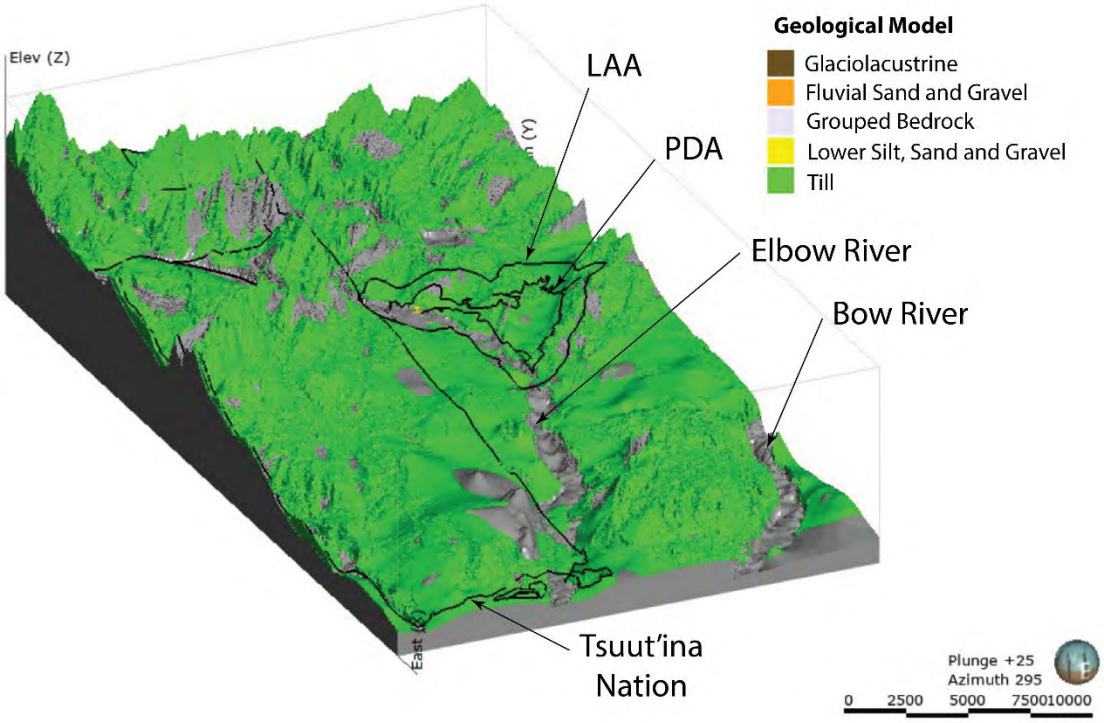
A.2.4 Till

The unconsolidated deposits present beneath the majority of the RAA consist of Pleistocene Age glaciolacustrine clay and till (Fenton et al. 2013; Moran 1986). In the RAA, the till material was deposited by glacial ice as basal or lateral moraines. Based on the field observations and laboratory grain size analyses completed as part of the geotechnical drilling program, the till in the LAA is composed of a heterogeneous mixture of approximately equal parts clay and silt, a lower proportion of sand, and minor gravel. Silt and sand lenses are also present within the heterogeneous matrix. The till is described as generally stiff to very stiff or hard, medium to high plastic clay with silt and more minor sand. Where present, the till ranges in thickness from 0.2 m to greater than 50 m with an average thickness of 10 m across the RAA.

Two main till sub-units are summarized as follows:

- Brown-grey subglacial till is dark brown to grey sandy, silty, clay with variable gravel. The till is hard with low to medium plasticity. The brown-grey subglacial till was encountered throughout the dam and diversion footprint. Cobble-sized clasts within the matrix were rounded to sub-rounded sandstones and carbonates.
- Upper brown till occurs above the subglacial till and is a massive, matrix-supported, olive brown to brown, medium plastic clay, clay and silt with sand content increasing with depth. This unit was encountered in boreholes in the dam footprint and eastern portion of the diversion channel.

Figure A.6 Distribution of Till



A.2.5 Glaciolacustrine Deposits

Glaciolacustrine clay overlies the till in the low-lying areas of the LAA. The silty clay was deposited in Glacial Lake Calgary, a proglacial lake formed by ice damming during the last deglaciation. The glaciolacustrine deposits have been named the Calgary Formation (Moran 1986).

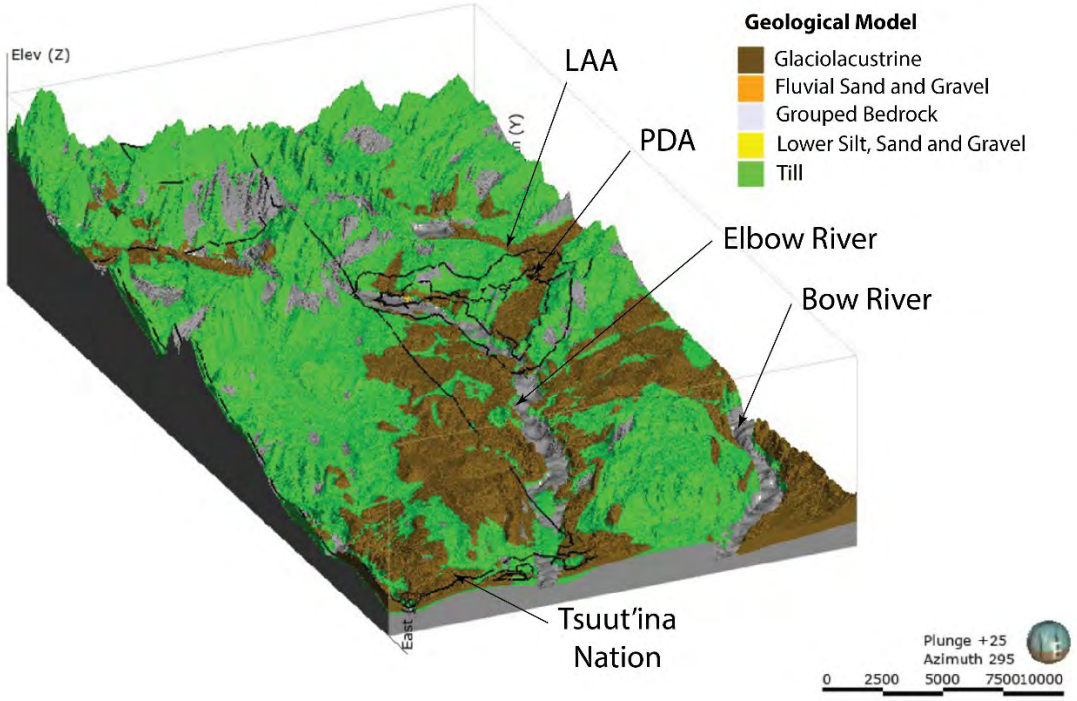
The distribution of this unit is presented in blue in Figure A.7. Outlines of the Tsuut'ina Nation Reserve and the Hydrogeology PDA/LAA are also shown as overlays for reference. Within the LAA, the glaciolacustrine clay averaged 5.3 m thick in the boreholes where it was encountered.

Based on the field observations and laboratory grain size analyses, the glaciolacustrine clay in the LAA is composed of 50-70% clay, 30-40% silt and a minor proportion of sand. Typical of a lacustrine deposit, the clay was found to be laminated with silt and fine sand. This layering has resulted in the following:

- relatively high hydraulic conductivities for silty clays (measured at 1.4×10^{-7} m/s and model calibrated at 5.1×10^{-6} m/s) and anisotropy ratios (horizontal hydraulic conductivity: vertical hydraulic conductivity) compared to the underlying till
- groundwater preferentially flows through the silt

The laminations and rhythmic bedding of the glaciolacustrine deposits can be observed along the banks of Elbow River in the RAA.

Figure A.7 Distribution of Glaciolacustrine Deposits



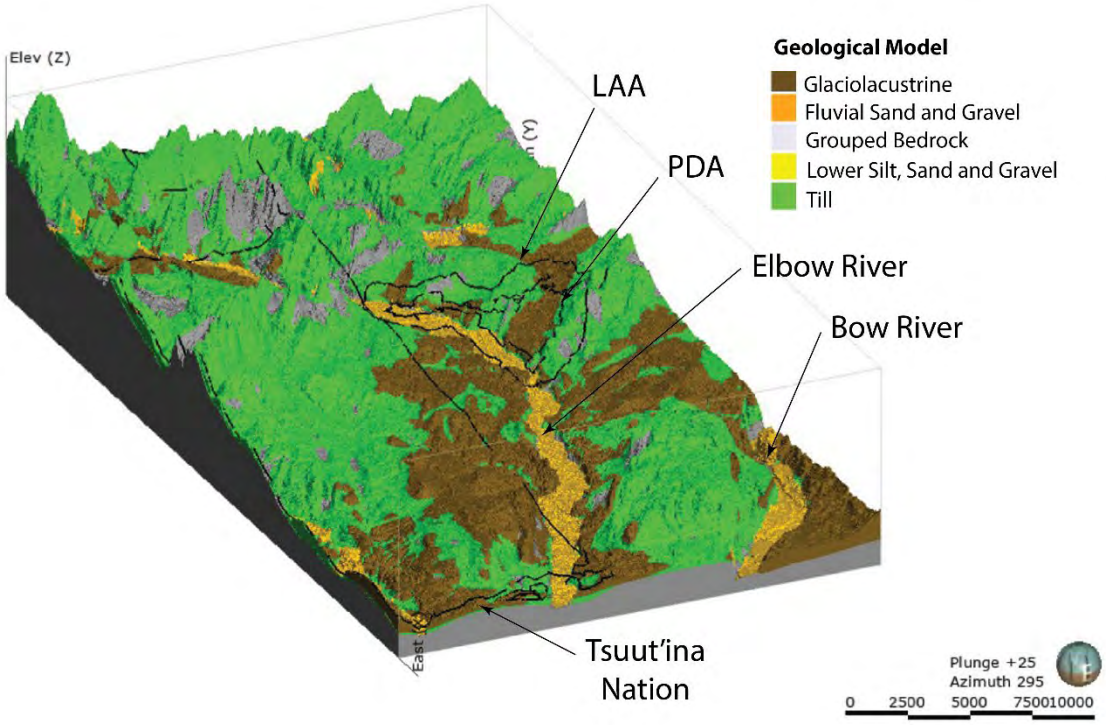
A.2.6 Recent Fluvial Deposits

Post-glacial fluvial channel sediments are in the Elbow River valley that extends across the RAA and in the Jumpingpound Creek channel in the western portion of the RAA. These sediments developed as the high-energy rivers, eroded and exported material from upstream areas and deposited coarse alluvium (sand and gravel) in the river channel. Localized areas of overbank deposits consisting of fluvial silt are also present (Moran 1986). The deposition of alluvium over Quaternary deposits or bedrock in the valleys resulted in the formation of alluvial aquifers, which are an important source of groundwater for the river and residents.

The alluvial aquifers provide temporary storage for water from Elbow River and Jumpingpound Creek during floods; the water is naturally released back into the rivers from bank storage after a flood recedes. Groundwater from the alluvial aquifer of Elbow River is essential in maintaining baseflow. Yields for the Elbow River alluvial aquifer range from 175 m^3/day to 2,500 m^3/day (Waterline 2011).

Recent fluvial deposits are depicted in orange in Figure A.8. Outlines of the Tsuut'ina Nation Reserve and the Hydrogeology PDA/LAA are also shown as overlays for reference. The fluvial deposits in this area are brown and grey silty gravel with more minor sand, cobbles and boulders.

Figure A.8 Distribution of Recent Fluvial Deposits



A.3 Groundwater Flow

A.3.1 Groundwater Flow in the Unconsolidated Glacial Deposits

Groundwater levels within the surficial deposits generally follow the topography and range from 0 m BGL, where the water table intersects ground surface at springs and along stream and river banks, to approximately 8.0 m BGL. The corresponding groundwater elevations range from approximately 1,380 m ASL in the topographically elevated areas in the of the RAA southwest to 1,080 m ASL along the eastern boundary of the RAA.

There is high potential for perched water table development within the RAA because of the following landscape and geological controls:

- permeability contrast created by an unconsolidated sediment veneer over the bedrock
- steep land surface gradients and erosional unconformities that truncate hydrostratigraphic units within the RAA
- mapped contact springs that indicate perched conditions in topographically elevated areas.

Groundwater flow direction is interpreted to be toward Elbow River across the majority of the RAA, except for areas 1) northwest where shallow groundwater flows west toward Jumpingpound Creek, 2) areas along the north side of the RAA across the flow divide, and 3) in the Bow River watershed where groundwater flows north. Horizontal gradients beneath the LAA range from 0.003 in the central portion of the reservoir to 0.1 in the southern portion of the LAA that is adjacent to the Elbow River near the diversion structure.

As noted above, the unconsolidated sediment above bedrock is also thought to host-perched water tables in which groundwater flow is typically dictated by local-scale topography where the permeability contrast exists to support development of perched groundwater.

The average linear groundwater velocity in the unconsolidated glaciolacustrine deposits and till is estimated to range from less than 0.01 m/year to approximately 2.3 m/year. However, it should be noted that flow velocities through sand lenses within, or at the base of, the till could be higher.

A.3.2 Groundwater Flow in the Upper Bedrock Aquifers

The potentiometric surface elevation in the upper bedrock ranges from approximately 1,400 m ASL in the southwest to 1,080 m ASL at the base of the Elbow River valley along the eastern boundary of the RAA. The potentiometric surface elevation in the mountainous southwest area of the RAA is predicted above land surface between topographically elevated areas. This suggests the presence of locally perched bedrock aquifers in this area that are poorly hydraulically connected to the underlying regional bedrock aquifer.

Groundwater flow direction in the bedrock is dominantly controlled by the bedrock surface-topography. On the north side of Elbow River, the bedrock generally slopes towards the river, while being influenced by variation in the bedrock surface topography. There are some topographic low areas in the bedrock on the north side of the river that focus groundwater flow in the bedrock beneath the PDA and LAA before trending towards Elbow River. The bedrock topography is significantly more complex on the south side of Elbow River and the flow patterns in the bedrock demonstrate radial flow away from elevated bedrock features. Correspondingly, the surface water drainage features to Elbow River on the south side appear to act as groundwater discharge features that focus flow between topographically-elevated bedrock features.

Horizontal gradients in the upper-bedrock aquifers beneath the LAA range from 0.005 in the central portion of the proposed reservoir to 0.02 in the southern portion of the LAA adjacent to Elbow River near the diversion structure.

The average linear groundwater velocity in the shallow bedrock is estimated to range from less than 0.01 cm/year in the unfractured portions of the claystone bedrock to approximately 30 m/year in the more permeable sandstone in the areas of higher hydraulic gradient near the Elbow River.

A.4 Existing Groundwater and Surface Water Use

Groundwater use in the RAA is primarily from shallow bedrock aquifers with some wells also completed in the recent fluvial deposits along Elbow River. Regional mapping by HCL (2002) indicate yields from the bedrock aquifers in the disturbed belt range from 10 m^3/day to 75 m^3/day. Yields from wells completed in the recent fluvial deposits along Elbow River are expected to range from 175 m^3/day to 2,500 m^3/day (Waterline 2011).

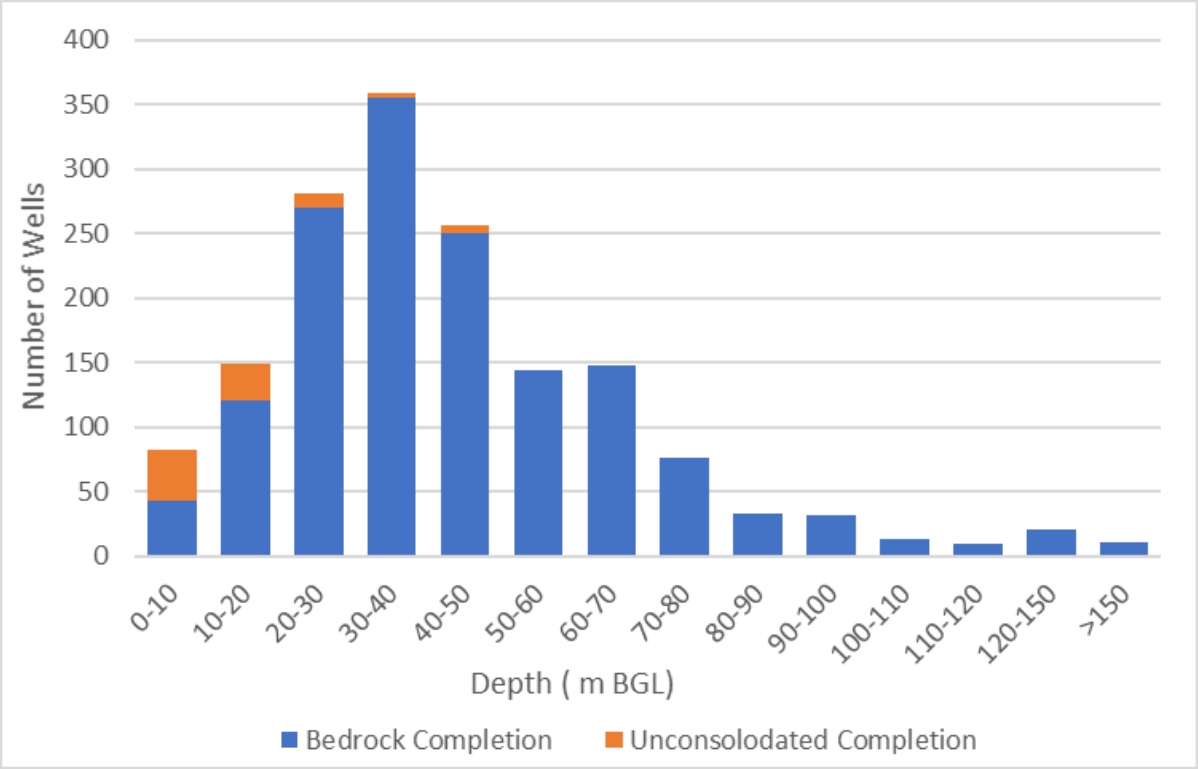
The base of groundwater protection (BGP) is an estimate of the elevation of the base of the geological formation in which the groundwater is deemed useable with a total dissolved solids (TDS) concentration of less than 4,000 mg/L. West of the RAA, the BGP is defined as the base of the Paskapoo Formation; however, because the RAA lies within the disturbed belt of the Rocky Mountains, the AGS has set an arbitrary BGP of 600 m BGL.

Water well drillers records for groundwater wells completed in the RAA were queried from the Alberta Water Well Information Database (AWWID). A total of 2,140 unique well records were identified within the RAA. A number of well record types were removed from the raw data such as abandoned test holes, dry holes, piezometers, and seismic test holes, which are not reflective of groundwater use. A total of 1,708 water well drilling records remained after removing irrelevant data. The proposed use of the wells associated with the AWWID drilling records within the expanded were as follows:

- 1,458 for domestic use
- 71 for stock use
- 75 for domestic and stock use
- 15 for commercial purposes
- 16 for industrial purposes
- 5 for irrigation purposes
- 9 for municipal use
- 59 for unknown use

Water well depths ranged from 1.5 m to 246 m BGL. Figure A.9 presents a histogram of the total depth recorded on the drilling records. The number of wells completed in bedrock and unconsolidated units are also summarized in the figure. A total of 83 well records were for wells installed in unconsolidated deposits with completion depths ranging from 0 to 50 m BGL. It is worth noting that many of the wells will not currently be in use considering the average age of the records is 33 years and some are as old as 80 years. Additional detail and mapping regarding groundwater use are presented in the Hydrogeology Technical Data Report (TDR) Update (Stantec 2019).

Figure A.9 Histogram of Water Well Depth in the RAA



A.5 Implications for the Groundwater Monitoring Plan

The following factors were considered during development of the GWMP based on the hydrostratigraphic framework and summary of groundwater use presented above:

- The hydrogeologic setting in the RAA is complex and consists of a series of unconsolidated deposits overlying bedrock. The GWMP describes monitoring of both unconsolidated and bedrock hydrostratigraphic units.
- The distribution of the unconsolidated units is highly variable across the RAA, but generally consist of low permeability (10^{-10} to 10^{-6} m/s) deposits in areas outside of river valleys. Higher permeability deposits are generally confined to the Elbow River valley and within some of the smaller tributary valleys. The GWMP considers the variable distribution of the unconsolidated deposits and describes monitoring in both permeable units (potential aquifers) and low permeability units (aquitards).

- Bedrock in the RAA is also variable and heterolithic, generally consisting of interbedded sequences of fine-and-coarse grained deposits varying from mudstones to sandstones. When the position of monitoring wells is better constrained, the completion interval for the monitoring well will need to carefully consider the lithology encountered during drilling/installation to reflect the uppermost interval most likely to be used domestic/agricultural use.
- Groundwater use for domestic and agricultural purposes in the RAA is sourced from both unconsolidated and bedrock units. However, use from the bedrock units dominates, particularly for wells with depths greater than 10 m. As such, the draft GWMP considers monitoring of the deeper bedrock units, particularly in areas distant from Project infrastructure, such that unexpected change in groundwater levels can be detected in hydrostratigraphic units currently being used for domestic and agricultural purposes.

Appendix B Borehole Logs

Monitoring Well: MW16-1-15 (GW1)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	19-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-33327.478
Contractor:	All Service Drilling Inc.	**Northing:**	5659967.274

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
0	0		SAND AND GRAVEL Fine to coarse grained	0.00
			SILT Medium brown, with clay, moist, high plastic	0.30
5			CLAY Medium brown, trace silt, moist, high plastic, few intermittent <150 mm thick silt lenses	1.52
10	2			
	4			
15			SILTY CLAY (TILL) Medium brown, with very fine to medium grained sand, some gravel, moist	4.88
20	6			
25	8			
			CLAY (TILL) Dark brown to dark grey, with gravel, some silt, low plastic	8.53
30	10			
35			SILTSTONE Grey to greenish grey, few fractures	10.06
40	12			
			SANDSTONE Medium grey, fine grained, moderate fracturing, minor oxidation and clay mineralization along fractures - @ 13.11 m: sand becomes interbedded with alternating grey and brown fine grained layers	12.19
45	14			
50				
	16			
55			End of Borehole	16.76

Diagram	Description
	0.805 m Stick-up
	Sand 0 to 1.83 m BGS
	Groundwater 3.70 m BGS May 19, 2016
	254 mm diameter borehole from 0 to 10.06 m
	Bentonite
	Solid pipe 51 mm diameter Schedule 40 PVC
	102 mm diameter borehole from 10.06 to 16.76 m
	Sand Sil 9 (4/10)
	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot

Screen Interval: 12.19 - 15.24 m BGS
Sand Pack Interval: 11.58 - 16.76 m BGS
Well Seal Interval: 1.83 - 11.58 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-1-15

Stantec

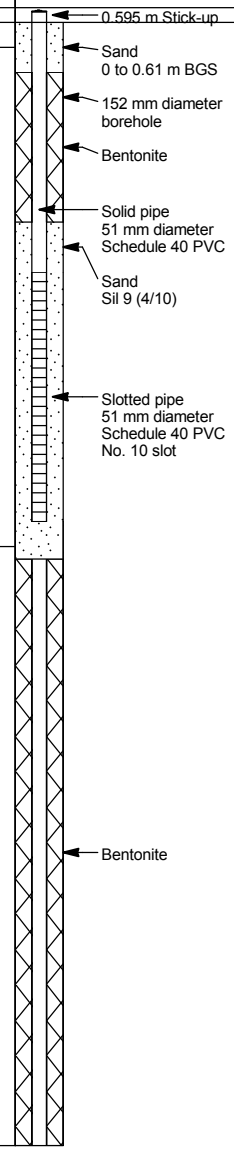
Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-2-6 (GW2)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	26-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31947.274
Contractor:	All Service Drilling Inc.	**Northing:**	5659623.886

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			SOIL Black to dark brown, moist	0.00
			CLAY Brown to beige, some silt, moist, high plastic	0.30
5	2		- @ 2.13 m: becomes mottled beige and grey, silt content increases to 15-30%	
10	4		- @ 3.66 m: trace gravel and coal present	
20	6			
			SILT (TILL) Light brown, some fine grained sand stringers, with gravel and clay, moist, low plastic	6.40
25	8			
30	10			
35			- @ 10.67 m: grades to gravelly silt	
40	12			
45	14		End of Borehole	13.72



Screen Interval: 3.05 - 6.10 m BGS
Sand Pack Interval: 2.44 - 6.55 m BGS
Well Seal Interval: 6.55 - 13.72 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-2-6

Stantec

Drawn By/Checked By: M. Kuhl / D. King

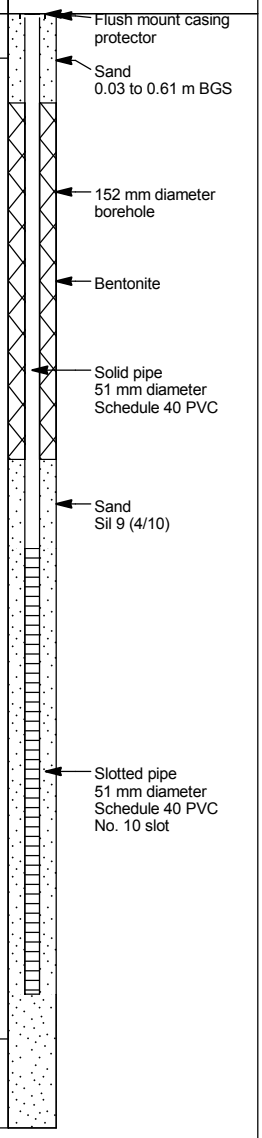
STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

Monitoring Well: MW16-3-7 (GW3)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	29-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31904.435
Contractor:	All Service Drilling Inc.	**Northing:**	5659073.461

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			SAND AND GRAVEL (FILL)	0.00
			CLAY AND SILT Medium brown, moist, medium plastic	0.30
5	2		- @ 1.83 m: silt content decreases to 30-40%, high plastic	
10	4			
15			- from 5.18 to 6.10 m: layer of silt with clay, wet	
20	6			
			SILTY CLAY (TILL) Medium brown, some very fine grained sand, with gravel, dry to moist, low to medium plastic	7.01
25	8		End of Borehole	7.62



Screen Interval: 3.66 - 6.71 m BGS
Sand Pack Interval: 3.05 - 7.62 m BGS
Well Seal Interval: 0.61 - 3.05 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-3-7

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-4-22 (GW4)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	20-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-32259.324
Contractor:	All Service Drilling Inc.	**Northing:**	5658717.399

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)	Diagram / Description
0	0		Ground Surface		0.662 m Stick-up
			TOPSOIL	0.00	
			CLAY Light to medium brown, with silt, moist, high plastic	0.30	Sand 0 to 1.22 m BGS
5	2				Bentonite
					Groundwater 2.38 m BGS May 20, 2016
10	4				Cuttings and sand 1.83 to 4.88 m BGS
15					
20	6				254 mm diameter borehole from 0 to 12.80 m
			SILTY CLAY (TILL) Medium brown, some very fine to fine sand, with gravel, moist, high plastic	6.71	
25	8		- @ 8.23 m: trace coal present		
30	10		- @ 9.45 m: sand component increases to 15-30% very fine to fine sand		Solid pipe 51 mm diameter Schedule 40 PVC
35			SILT AND CLAY (TILL) With very fine to fine sand, with gravel, dry to slighly moist, friable	10.97	Bentonite

Screen Interval: 18.59 - 21.64 m BGS
Sand Pack Interval: 18.29 - 21.95 m BGS
Well Seal Interval: 21.95 - 22.86 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-4-22

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-4-22 (GW4)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	20-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-32259.324
Contractor:	All Service Drilling Inc.	**Northing:**	5658717.399

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			SILT AND CLAY (TILL) With very fine to fine sand, with gravel, dry to slighly moist, friable	
40	12			
			SANDSTONE Medium grey, very fine to fine grained, few fractures, some oxidation on fracture surfaces, no structure, massive	12.80
45	14			
			- @ 14.94 m: sandstone becomes slightly banded with alternating light grey and dark grey layers, no oxidation present	
50				
	16			
55				
			- @ 17.98 m: medium grained layers interbedded with finer grained layers become present	
60	18			
			- @ 20.12 m: sand begins to coarsen to medium grained sandstone, some clay along fractures	
65	20			
70				
			SILTSTONE Dark grey, highly fractured and altered - @ 21.95 m: clay mineralization along fractures	21.64
	22		SANDSTONE Medium grey, very fine grained	22.25
			CLAYSTONE Dark grey to black, few fractures	22.56
75			End of Borehole	22.86

INSTALLATION DETAILS	Description
Diagram	
	102 mm diameter borehole from 12.80 to 22.86 m
	Sand Sil 9 (4/10)
	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
	Bentonite

Screen Interval: 18.59 - 21.64 m BGS
Sand Pack Interval: 18.29 - 21.95 m BGS
Well Seal Interval: 21.95 - 22.86 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-4-22

Stantec

Drawn By/Checked By: M. Kuhl / D. King

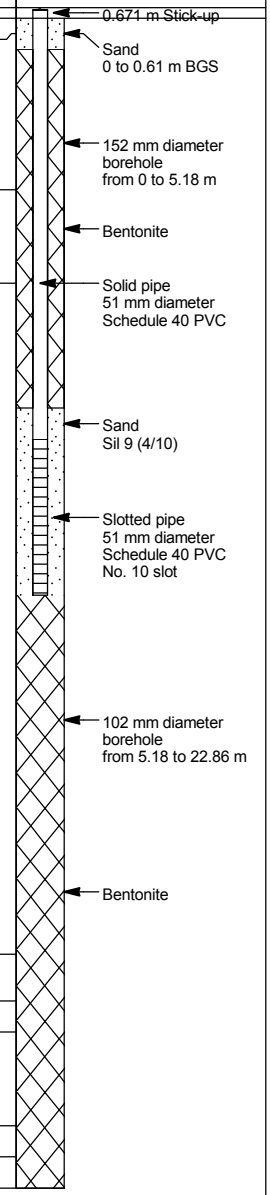
Monitoring Well: MW16-5-11 (GW5)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	09-Jun-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31863.152
Contractor:	All Service Drilling Inc.	**Northing:**	5658164.716

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
			SILTY CLAY (TILL) Medium brown, some very fine grained sand, with gravel, moist, low plastic	0.30
5	2			
10				
	4		CLAY Mottled brown and grey, some gravel, some silt, moist, high plastic	3.35
15				
			SANDSTONE brown, very fine to fine grained, few fractures with minor oxidation, massive - @ 5.49 : oxidized clay infill in 50 mm fracture	5.18
20	6			
			- @ 7.01 m: becomes silty, finer grained, with dark and light brown cross-bedding	
25	8			
			- @ 8.23 m: 50 mm coal seam, sandstone becomes massive again, few irregular coal stringers	
30			- @ 8.84 m: coarsens to a fine grained sandstone, very few fractures, weakly bedded	
	10			
35				
40	12			
45	14			
50			- @ 15.24 m: exhibits black and brown fine planar laminated beds, becomes very fine grained	
	16		- @ 16.15 m: beds become irregular and highly deformed, exhibits minor displacement along fractures, microfolds in some bedding	
55				
60	18		CLAYSTONE Dark grey, highly fractured, altered to clay along fractures, brittle - from 18.90 to 19.20 m: few 13 to 38 mm thick coal seams	18.29
			SANDSTONE Grey, fine grained, becomes finer towards bottom of unit, weakly bedded	19.20
65	20		CLAYSTONE Dark grey, highly fractured, altered to clay along fractures, brittle	19.81
70				
	22		SANDSTONE Green to greyish green, very fine grained, some shell fragments	21.64
75			CLAYSTONE Dark grey, highly fractured, altered to clay along fractures, brittle	22.25
	24		End of Borehole	22.86

INSTALLATION DETAILS



Screen Interval: 8.23 - 11.28 m BGS
Sand Pack Interval: 7.62 - 11.28 m BGS
Well Seal Interval: 0.61 - 7.62 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-5-11

Stantec

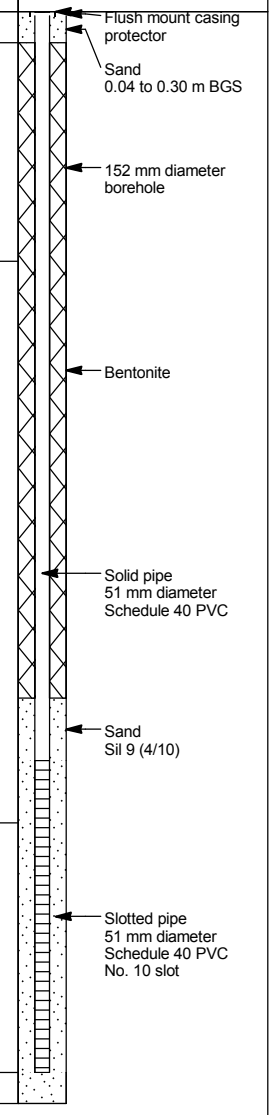
Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-6-11 (GW6S)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	26-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31100.486
Contractor:	All Service Drilling Inc.	**Northing:**	5658135.293

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			SILT Light brown, some clay, moist to wet	0.30
5	2		- @ 1.22 m: clay content begins to increase	
			SILTY CLAY Light brown to light grey, medium to high plastic, mottled	2.44
10	4			
15			- @ 4.88 m: clay content decreases to 15-30%, high plastic	
20	6			
25				
	8		SILTY CLAY (TILL) Medium brown, with very fine grained sand, some gravel, moist, medium plastic	7.92
30			- @ 9.14 m: silt content increases to > 40%	
	10			
35			CLAYSTONE Light to medium grey, dry, medium to high plastic when wetted	10.36
			End of Borehole	10.67
	12			



Screen Interval: 7.32 - 10.36 m BGS
Sand Pack Interval: 6.71 - 10.67 m BGS
Well Seal Interval: 0.30 - 6.71 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-6-11

Stantec

Drawn By/Checked By: M. Kuhl / D. King

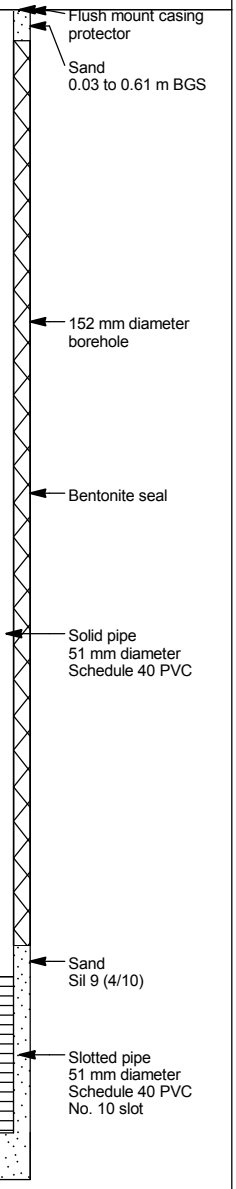
Monitoring Well: MW16-6-20 (GW6D)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	26-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31100.423
Contractor:	All Service Drilling Inc.	**Northing:**	5658133.938

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			SILT Light brown, some clay, moist to wet - @ 1.22 m: clay content begins to increase	0.30
5	2			
			SILTY CLAY Light brown to light grey, medium to high plastic, mottled	2.44
10	4			
15			- @ 4.88 m: clay content decreases to 15-30%, high plastic	
20	6			
25	8		SILTY CLAY (TILL) Medium brown, with very fine grained sand, some gravel, moist, medium plastic	7.92
30	10		- @ 9.14 m: silt content increases to > 40%	
35			CLAYSTONE - fom 10.36 to 18.90 m: light to medium grey, dry, medium to high plastic when wetted, some small intervals of soft clay fracture gouge throughout	10.36
40	12			
45	14			
50				
	16			
55				
60	18		- from 18.90 to 20.42 m: black to dark grey, dry	
65	20			
			SILTSTONE Light grey, weathered to silt	20.42
70			CLAYSTONE Dark grey, dry	21.34
	22			
75			End of Borehole	22.86
	24			

INSTALLATION DETAILS



Screen Interval: 18.90 - 21.95 m BGS
Sand Pack Interval: 18.29 - 22.86 m BGS
Well Seal Interval: 0.61 - 18.29 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-6-20

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-7-5 (GW7)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	28-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31098.792
Contractor:	All Service Drilling Inc.	**Northing:**	5658895.242

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			SILTY CLAY Light to medium brown, moist, medium plastic	0.30
5	2			
10	4			
15			- from 4.57 to 5.18 m: trace fine grained sand, some gravel	
20	6			
			SILTY CLAY (TILL) With very fine to fine grained sand (oxidized), with gravel, dry to moist, low plastic	6.71
25	8			
30			End of Borehole	9.14
	10			

Diagram / Description

- Flush mount casing protector
- Sand 0.05 to 0.61 m BGS
- 152 mm diameter borehole
- Bentonite
- Solid pipe 51 mm diameter Schedule 40 PVC
- Sand Sil 9 (4/10)
- Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
- Bentonite

Screen Interval: 2.13 - 5.18 m BGS
Sand Pack Interval: 1.83 - 5.19 m BGS
Well Seal Interval: 0.61 - 1.83 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-7-5

Stantec

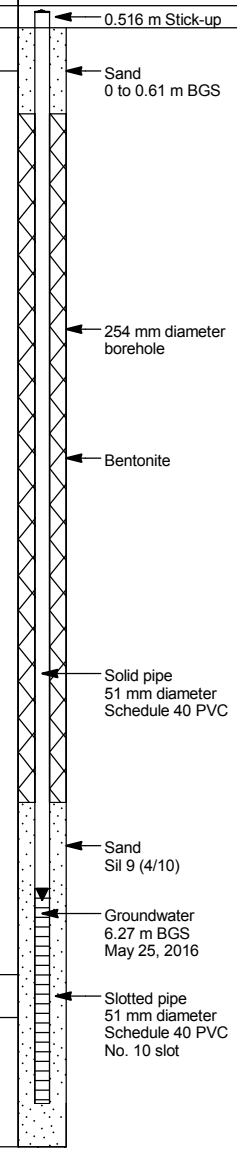
Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-8-8 (GW8S)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	25-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-30875.717
Contractor:	All Service Drilling Inc.	**Northing:**	5659641.119

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
0	0		SOIL Black, dry	0.00
			SILT (TILL) Brown to light brown, some gravel, with clay, dry, low plastic, friable	0.30
5	2			
			- @ 2.44 m: some very fine grained sand seams become present	
10	4		- @ 3.35 m: becomes moist	
15	6		- @ 5.79 m: red to orange, trace oxidized silt stringers	
20			SILT AND SAND Brown, very fine grained, saturated	6.71
			SILTY CLAY (TILL) Light to medium brown, with gravel, dry, low plastic	7.01
25	8		End of Borehole	7.92



Screen Interval: 6.10 - 7.62 m BGS
Sand Pack Interval: 5.49 - 7.92 m BGS
Well Seal Interval: 0.61 - 5.49 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-8-8

Stantec

Drawn By/Checked By: M. Kuhl / D. King

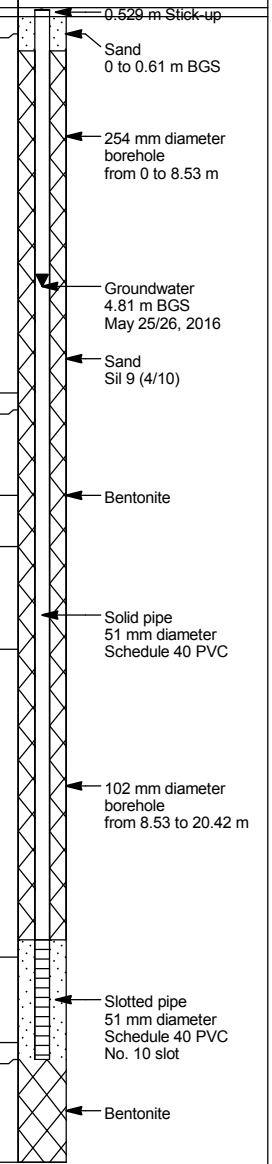
Monitoring Well: MW16-8-19 (GW8D)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	25-May-2016 / 26-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-30877.454
Contractor:	All Service Drilling Inc.	**Northing:**	5659641.18

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			SOIL Black, dry	0.00 0.30
			SILT (TILL) Brown to light brown, some gravel, with clay, dry, low plastic, friable	
5	2			
			- @ 2.44 m: some very fine grained sand seams become present	
10	4		- @ 3.35 m: becomes moist	
15				
20	6		- @ 5.79 m: red to orange, trace oxidized silt stringers	
			SILT AND SAND Brown, very fine grained, saturated	6.71 7.01
25	8		SILTY CLAY (TILL) Light to medium brown, with gravel, dry, low plastic	
30			SILTSTONE Light brown to beige, dry, friable	8.53
	10		CLAYSTONE Light to medium grey, few fructures	9.45
35			- @ 10.36 m: becomes highly weathered, with abundant fractures, orangish brown clay mineralization along fracture surfaces	
			SILTSTONE Grey to dark grey, finely interbedded light and dark layers, unfractured	11.28
40	12			
45	14		- @ 14.02 m: thin very fine to fine grained sand layers become present	
50	16			
55			SANDSTONE Medium brown, fine grained, few fractures, minor oxidation and mineralization along fractures	16.76
	18			
60			CLAY Black, high plastic	18.29 18.59
			SILTSTONE Grey to greenish grey, dry, friable, clay alteration along fracture surfaces	
65	20			
			End of Borehole	20.42
70				

INSTALLATION DETAILS



Screen Interval: 16.46 - 18.59 m BGS
Sand Pack Interval: 16.46 - 18.59 m BGS
Well Seal Interval: 0.61 - 16.46 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-8-19

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-9-6 (GW9)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	02-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-30236.405
Contractor:	All Service Drilling Inc.	**Northing:**	5659076.781

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			CLAY Light to medium brown, with silt, moist, high plastic, mottled	0.30
	1			
5				
	2			
			- below 3.66 m: some seams of very fine grained sand (oxidized)	
10	3			
	4			
			- from 4.57 to 5.18 m: silt content increases to > 40%	
15				
	5			
			SILTY CLAY (TILL) with very fine to fine grained sand, with gravel	5.18
	6			
20			End of Borehole	6.10

Diagram / Description

- Flush mount casing protector
- Sand 0.04 to 0.61 m BGS
- 152 mm diameter borehole
- Bentonite
- Solid pipe 51 mm diameter Schedule 40 PVC
- Sand Sil 9 (4/10)
- Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot

Screen Interval: 4.27 - 5.79 m BGS
Sand Pack Interval: 3.96 - 6.10 m BGS
Well Seal Interval: 0.61 - 3.96 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-9-6

Stantec

Drawn By/Checked By: M. Kuhl / D. King

STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

Monitoring Well: MW16-10-15 (GW10)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	10-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-30461.405
Contractor:	All Service Drilling Inc.	**Northing:**	5658478.167

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
			SILTY CLAY Light to medium brown, moist, medium to high plastic, mottled	0.30
5	2			
10	4		- below 3.66 m: some very fine grained sand, some gravel	
15				
			CLAYEY SILT Light grey to medium brown, moist, high plastic, mottled	5.49
20	6			
25	8			
30				
	10		CLAY (TILL) Medium brown, some very fine grained sand, some gravel, with silt, dry to moist, medium plastic	9.45
35			- @ 10.97 m: gravel content increases to 15-30%	
40	12			
			CLAYEY SILT (TILL) Medium to dark grey, with very fine grained sand, some gravel, dry, low plastic	12.80
45	14			
50			SILTSTONE Light to medium grey, dry	14.94
	16			
55				
60	18		End of Borehole	18.29

INSTALLATION DETAILS

Diagram	Description
	0.848 m Stick-up
	Sand 0 to 0.30 m BGS
	152 mm diameter borehole
	Bentonite
	Solid pipe 51 mm diameter Schedule 40 PVC
	Sand Sil 9 (4/10)
	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
	Bentonite

Screen Interval: 12.19 - 15.24 m BGS
Sand Pack Interval: 11.89 - 18.14 m BGS
Well Seal Interval: 18.14 - 18.29 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-10-15

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-11-15 (GW11)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	30-Jun-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-30269.84
Contractor:	All Service Drilling Inc.	**Northing:**	5657742.889

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
			CLAY Light to medium brown, with silt, moist, high plastic, mottled	0.30
5	2		- @ 2.13 m: silt content increases to 30-40%, mottled brown and grey	
10	4		- @ 2.74 m: silt content decreases back to 15-30%	
15				
20	6		- @ 5.79 m: clay content begins to decrease towards bottom of interval	
			SILT Medium brown, some clay, moist	6.40
25	8			
			SILT (TILL) Medium brown, with fine to medium grained sand, with gravel, some clay, moist	8.53
30	10			
35				
40	12		SILT Medium brown, some very fine grained sand, moist to wet	12.19
45	14			
			CLAY (TILL) Medium to dark grey, some very fine grained sand, some gravel, with silt, low plastic	14.63
50			End of Borehole	15.24
	16			

Diagram / Description:
- 0.588 m Stick-up
- Sand, 0 to 0.30 m BGS
- 152 mm diameter borehole
- Bentonite
- Solid pipe, 51 mm diameter, Schedule 40 PVC
- Sand, Sil 9 (4/10)
- Slotted pipe, 51 mm diameter, Schedule 40 PVC, No. 10 slot

Screen Interval: 11.58 - 14.63 m BGS
Sand Pack Interval: 10.97 - 15.24 m BGS
Well Seal Interval: 0.30 - 10.97 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-11-15

Stantec

Drawn By/Checked By: M. Kuhl / D. King

STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

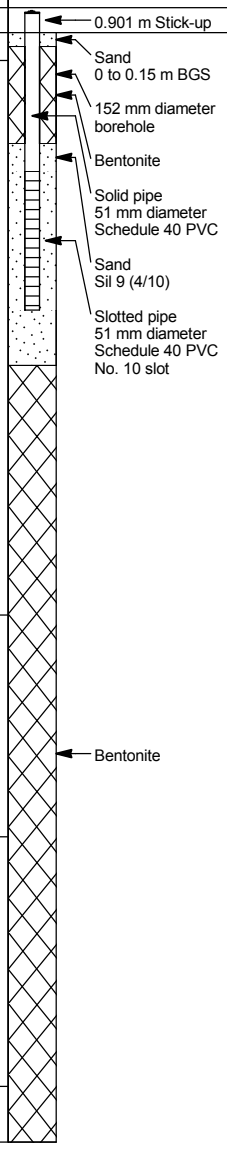
Monitoring Well: MW16-12-3 (GW12)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	19-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-29160.284
Contractor:	All Service Drilling Inc.	**Northing:**	5657858.348

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
			CLAYEY SILT (TILL) Medium brown, moist, high plastic	0.30
5	2		- @ 1.83 m: sand content increases to 30-40%, fine to medium grained sand, some gravel	
10	4		- @ 2.74 m: sand content decreases to 15-30%	
15				
20	6		SANDY SILT (TILL) Medium brown, some gravel, with clay, dry to moist, crumbly	6.40
25	8			
30	10		SANDY CLAY (TILL) Medium to dark grey, some silt, dry to moist	8.84
35				
40	12		CLAYSTONE Light grey to brown, dry	11.58
			End of Borehole	12.19

INSTALLATION DETAILS



Screen Interval: 1.52 - 3.05 m BGS
Sand Pack Interval: 1.22 - 3.66 m BGS
Well Seal Interval: 0.15 - 1.22 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-12-3

Stantec

Drawn By/Checked By: M. Kuhl / D. King

STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

Monitoring Well: MW16-13-37 (GW13)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Air rotary auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	08-Aug-2016 / 09-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	n/a
Contractor:	All Service Drilling Inc.	**Northing:**	n/a

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			GRAVEL (FILL)	0.00
			CLAYEY SILT (TILL) Mottled light and medium brown, some very fine grained sand (slightly oxidized), dry to moist, medium plastic	0.30
5	2		- @ 2.13 m: some gravel	
10	4		- @ 3.66 m: sand content increases to 15-30%	
15				
20	6			
25	8		SANDSTONE Very fine to fine grained, dry	7.62
30			- from 9.14 to 9.75 m: saturated	
35	10		CLAYSTONE Medium brown, dry	9.75
			- below 10.36 m: few moist zones weathered to clay	
40	12		SILTSTONE Light grey, dry, friable	11.28
45	14		- @ 12.80 m: saturated	
50				
55	16			
60	18		CLAYSTONE Medium grey to brown, some zones weathered to clay, other zones dry, friable	17.37
65	20		- below 20.12 m: dry	
70				
75	22			
80	24			
85	26		SILTSTONE Light to medium grey, in some zones fractured and weathered to silt	24.99
90	28			
95				
100	30		CLAYSTONE Light to medium grey, dry, some fractured and weathered zones	29.26
105	32		below 31.70 m: completely dry	
110	34			
115			SILTSTONE Light grey, saturated	34.75
120	36		CLAYSTONE Light to medium grey	35.97
125	38		End of Borehole	36.58

INSTALLATION DETAILS

Diagram	Description
	Flush mount casing protector
	Sand 0 to 0.30 m BGS
	108 mm diameter borehole
	Bentonite grout
	Solid pipe 51 mm diameter Schedule 40 PVC
	Sand Sil 9 (4/10)
	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot

Screen Interval: 33.53 - 36.58 m BGS
Sand Pack Interval: 32.92 - 36.58 m BGS
Well Seal Interval: 0.30 - 32.92 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114

Stantec

Drawn By/Checked By: M. Kuhl / D. King

STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

Monitoring Well: MW16-14-33 (GW14)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Air rotary auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	09-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-28592.189
Contractor:	All Service Drilling Inc.	**Northing:**	5659018.428

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			GRAVEL	0.00
5	2		CLAYEY SILT (TILL) Brown, some very fine grained sand, moist, medium plastic	0.30
10				
	4		SANDSTONE Light to medium brown, very fine grained sand, dry	3.66
15				4.27
20	6		CLAYSTONE Medium grey, dry	
25	8			
30			SANDSTONE Light to medium brown, very fine to fine grained	8.53
35	10			
40	12			
45	14		SILTSTONE Light grey, dry	13.11
50				
55	16			
60	18			
65	20		CLAYSTONE Medium grey to brown, dry	19.51
70				
75	22			
80	24		SILTSTONE Medium brown, saturated	24.38
85	26			
90				
95	28			
100	30		CLAYSTONE Light to medium grey	29.57
105	32		SILTSTONE Light to medium grey, saturated	31.09
110	34		CLAYSTONE Light to medium grey	33.22
115	36		End of Borehole	33.53

INSTALLATION DETAILS

Diagram

Description

- Flush mount casing protector
- Sand 0.02 to 0.61 m BGS
- 108 mm diameter borehole
- Bentonite grout
- Solid pipe 51 mm diameter Schedule 40 PVC
- Sand Sil 9 (4/10)
- Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot

Screen Interval: 29.88 - 32.93 m BGS
Sand Pack Interval: 29.87 - 32.93 m BGS
Well Seal Interval: 0.61 - 29.87 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-14-33

Stantec

Drawn By/Checked By: M. Kuhl / D. King

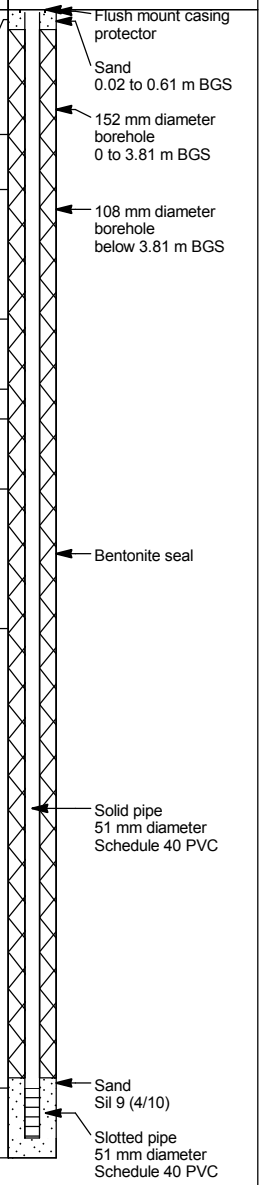
Monitoring Well: MW16-15-34 (GW15)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem/ air rotary auger (Truck mounted)
Client:	Alberta Transportation	**Date started/completed:**	27-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-27818.819
Contractor:	All Service Drilling Inc.	**Northing:**	5658214.931

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
5	2		SILTY CLAY (TILL) Beige to light brown, moist, medium plastic - @ 1.83 m: some very fine grained sand stringers, some gravel	0.30
10	4		SILTSTONE Light beige, dry	3.81
15	6		SANDSTONE Light brown, very fine grained, dry	5.49
20	8			
25	10		SILTSTONE Light beige, dry, few thin sandstone layers throughout	9.45
30	12		CLAYSTONE Medium grey, dry	11.58
35	14		SANDSTONE Light brown, very fine to fine grained, dry	12.50
40	16		SILTSTONE Light grey to light brown, dry - from 15.85 to 17.07 m: few seams of fine grained sand (oxidized)	14.63
45	18			
50	20		CLAYSTONE Medium to dark grey, dry	18.90
55	22			
60	24			
65	26		- below 26.82 m: some siltstone layers	
70	28			
75	30			
80	32		- @ 31.09 m: light grey	
85	34		SILTSTONE Light to medium greenish grey - 32.92 m: saturated	32.92
90	36		End of Borehole	35.05

INSTALLATION DETAILS



Screen Interval: 32.92 - 34.44 m BGS
Sand Pack Interval: 32.61 - 35.05 m BGS
Well Seal Interval: 0.61 - 32.61 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-15-34

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-16-11 (DC-9)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	15-Apr-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-33453.625
Contractor:	All Service Drilling Inc.	**Northing:**	5655154.279

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			SOIL Some clay, organics	0.00
			SILT Brown to beige, minor very fine sand, some clay	0.30
			CLAY Mottled beige to grey, minor silt, moist	1.52
			CLAY (TILL) Some fine to very fine grained sand, some gravel, some silt, dry, friable	5.18
			SANDSTONE Very fine grained, dry, weathered, crumbles under minor force	10.36
			End of Borehole	10.97

Diagram

Description

- 0.914 m Stick-up
- Sand
0 to 0.30 m BGS
- 254 mm diameter
borehole
from 0 to 10.36 m
- Bentonite
- Solid pipe
51 mm diameter
Schedule 40 PVC
- Sand
Sil 9 (4/10)
- Slotted pipe
51 mm diameter
Schedule 40 PVC
No. 10 slot
- 102 mm diameter
borehole
from 10.36 to 10.97 m

Screen Interval: 7.62 - 10.67 m BGS
Sand Pack Interval: 7.01 - 10.97 m BGS
Well Seal Interval: 0.30 - 7.01 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-16-11

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-17-5 (DC-15)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	11-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-33226.452
Contractor:	All Service Drilling Inc.	**Northing:**	5656140.553

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			CLAY Mottled brown - from 0.2 to 2.5 m: minor silt, damp to moist, low to medium plastic	0.20
5	2			
			- from 2.5 to 5.1 m: minor sand, some silt, moist, medium plastic	
10	4			
15				
			SILTY CLAY (TILL) Minor sand, trace gravel, damp, some oxidation	5.10
20	6			
25	8			
			SILT Brown, minor fine grained sand, trace gravel, some clay, moist	8.20
30	10			
35				
	12		End of Borehole	11.15

Diagram / Description:
- Flush mount casing protector
- Sand 0.09 to 0.50 m BGS
- 152 mm diameter borehole
- Bentonite
- Solid pipe 51 mm diameter Schedule 40 PVC
- Sand Sil 9 (4/10)
- Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
- Bentonite

Screen Interval: 3.70 - 5.20 m BGS
Sand Pack Interval: 3.50 - 5.49 m BGS
Well Seal Interval: 5.49 - 11.15 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-17-5

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-18-6 (DC-21S)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	11-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-32406.586
Contractor:	All Service Drilling Inc.	**Northing:**	5656749.506

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)	Diagram	Description
			Ground Surface			0.816 m Stick-up
0	0		SILTY CLAY (TILL) Brown, minor sand, moist, low plastic	0.00		Sand 0 to 0.30 m BGS
	1					152 mm diameter borehole
5						Bentonite
	2					
10	3					Solid pipe 51 mm diameter Schedule 40 PVC
			SANDY CLAY	3.50		Sand Sil 9 (4/10)
	4					
15			- from 4.8 to 4.9 m: rafted bedrock			Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
	5		SAND AND SILT Light brown, medium grained, some gravel, moist	5.10		
	6					Bentonite
20			End of Borehole	6.10		

Screen Interval: 3.97 - 5.49 m BGS
Sand Pack Interval: 3.50 - 5.64 m BGS
Well Seal Interval: 5.64 - 6.10 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-18-6

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-18-10 (DC-21D)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	11-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-32406.714
Contractor:	All Service Drilling Inc.	**Northing:**	5656750.577

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)	Diagram / Description
			Ground Surface		0.774 m Stick-up
0	0		SILTY CLAY (TILL) Brown, minor sand, moist, low plastic	0.00	Sand 0 to 0.30 m BGS
5	2				254 mm diameter borehole from 0 to 6.40 m
10					Solid pipe 51 mm diameter Schedule 40 PVC
	4		- beginning @ 3.5 m: becomes sandy clay		
15			- from 4.8 to 4.9 m: rafted bedrock		Bentonite
			SAND AND SILT Light brown, medium grained, some gravel, moist	5.10	
20	6		SILTSTONE Grey to greenish, some fractures, oxidation along fractures	6.40	
25					102 mm diameter borehole from 6.40 to 12.50 m
	8		SANDSTONE Grey to greenish, very fine grained, few fractures, oxidation on fratures surfaces	7.90	
			CLAYSTONE - from 8.5 to 8.63 m: brown, minor silt, moist, weathered to soft clay - from 8.63 to 12.5 m: grey, oxidized fractures	8.50	Sand Sil 9 (4/10)
30			- @ 9.24 m: fracture intensity increases		
	10		- from 9.65 to 10.9 m: highly fractured, oxidation and some clay along fractures		Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
35			- from 10.36 to 10.63 m: altered to clay		
	12				
40			- @ 12.10 m: becomes hard/cemented		
			End of Borehole	12.50	
45					

Screen Interval: 9.08 - 10.60 m BGS
Sand Pack Interval: 8.78 - 12.50 m BGS
Well Seal Interval: 0.30 - 8.78 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-18-10

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-19-8 (DC-25S)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger
Client:	Alberta Transportation	**Date started/completed:**	09-Jun-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31684.576
Contractor:	All Service Drilling Inc.	**Northing:**	5657262.245

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)	Diagram / Description
0	0		Ground Surface		0.925 m Stick-up
			TOPSOIL	0.00	Sand 0 to 0.30 m BGS
			SILTY CLAY (TILL) Light to medium brown, some very fine grained sand, some gravel, few lenses of oxidized silt, moist, low plastic	0.61	
5	2				152 mm diameter borehole
10	4				Bentonite
					Solid pipe 51 mm diameter Schedule 40 PVC
15					
20	6				Sand Sil 9 (4/10)
			SANDY SILT Medium brown, very fine grained, wet	6.40	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
25	8		End of Borehole	7.62	

Screen Interval: 6.10 - 7.62 m BGS
Sand Pack Interval: 5.79 - 7.62 m BGS
Well Seal Interval: 0.30 - 5.79 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-19-8

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-19-19 (DC-25D)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	08-Jun-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31684.489
Contractor:	All Service Drilling Inc.	**Northing:**	5657263.177

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
			SILTY CLAY (TILL) Light to medium brown, some very fine grained sand, some gravel, few lenses of oxidized silt, moist, low plastic	0.61
10	2			
			- @ 3.66 m: gravel content increases to 15-30%	
20	6			
			SANDY SILT Medium brown, very fine grained, wet	6.40
30	10			
			SANDSTONE Light to medium brown, very fine to fine grained, few fractures, reddish orange oxidation	10.36
40	12		- @ 12.50 m: becomes grey, few thin black stringers and minor cross-bedding	
			CLAYSTONE Medium to dark grey, highly fractured, few 150 to 300 mm thick intervals of clay alteration in zones of intense fracturing	13.11
50	16		- @ 15.54 m: 300 mm thick interval of green to greyish siltstone, minor bioturbation, few shell fragments	
55			- @ 16.76 m: 150 mm thick seam of anthracite present	
			SANDSTONE Green to greyish, very fine to fine grained, planar bedding, few fractures, no oxidation	17.07
60	18			
			CLAYSTONE Medium grey to dark grey, highly fractured, clay alteration along fractures, friable	18.59
70	22		- @ 21.64 m: becomes hard and cohesive, few fractures	
75				
			End of Borehole	23.16
80	24			

INSTALLATION DETAILS

Diagram	Description
	0.913 m Stick-up
	Sand 0 to 0.61 m BGS
	254 mm diameter borehole from 0 to 10.36 m BGS
	Groundwater 6.57 m BGS June 08, 2016
	Bentonite seal
	102 mm diameter borehole from 10.36 to 23.16 m
	Solid pipe 51 mm diameter Schedule 40 PVC
	Sand Sil 9 (4/10)
	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
	Bentonite

Screen Interval: 17.07 - 18.59 m BGS
Sand Pack Interval: 16.76 - 18.67 m BGS
Well Seal Interval: 0.61 - 16.76 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-19-19

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-20-21 (D2)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger
Client:	Alberta Transportation	**Date started/completed:**	10-Jun-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-31218.384
Contractor:	All Service Drilling Inc.	**Northing:**	5657498.57

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
			SILTY CLAY Light brown, moist, medium plastic	0.30
5	2			
			SILTY CLAY (TILL) Mottled brown and grey, with very fine sand lenses (tend to be orangish brown and oxidized), with gravel, moist	2.44
10	4			
15				
20	6			
25			SILT Medium brown, with clay, moist, crumbly	7.32
30	8			
	10		- @ 9.45 m: beige, begins to contain some very fine sand lenses (150 mm thick) and some gravel, dry	
35				
40	12		- @ 11.58 m: silt becomes dark brown to grey	
45	14		SILTSTONE Medium to dark grey, highly fractured, edges of large fractures have been weathered to silt, smaller fractures exhibit oxidation	13.41
50				
	16			
55				
60	18			
65	20		SANDSTONE Grey to dark grey, very fine to fine grained, with weak cross-bedding, few fractures	19.51
70			End of Borehole	21.34
	22			
75				

INSTALLATION DETAILS

Diagram

Description

- 0.746 m Stick-up
- Sand
0 to 1.22 m BGS
- Groundwater
1.93 m BGS
June 10, 2016
- Bentonite
- 152 mm diameter borehole
from 0 to 13.41 m
- Solid pipe
51 mm diameter
Schedule 40 PVC
- 102 mm diameter borehole
from 13.41 to 21.34 m
- Sand
- Slotted pipe
51 mm diameter
Schedule 40 PVC
No. 10 slot

Screen Interval: 19.81 - 21.34 m BGS
Sand Pack Interval: 4.27 - 21.34 m BGS
Well Seal Interval: 1.22 - 4.27 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-20-20

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-21-11 (D9)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	01-May-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-30383.805
Contractor:	All Service Drilling Inc.	**Northing:**	5656987.083

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)	Diagram	Description
			Ground Surface			
			OVERBURDEN	0.00		Flush mount casing protector
						Sand 0.09 to 0.80 m BGS
5	2					254 mm diameter borehole from 0 to 2.60 m
			SANDSTONE Coarse grained, weathered, few fractures	2.60		
10			MUDSTONE AND CLAYSTONE Interbedded, massive - mudstone: brown, friable, has been weathered to clay along fractured - claystone: grey to light grey, with minor fractures, oxidation on fractures	3.00		
15	4					Bentonite
			SANDSTONE Grey to brown, fine grained, well defined cross-bedding	5.40		
20	6		SILTSTONE Grey to brown, highly fractured and weathered, portions are highly friable and weathered to clay	6.20		Solid pipe 51 mm diameter Schedule 40 PVC
25	8					102 mm diameter borehole from 2.60 to 14.10 m
						Sand
30			SANDSTONE Grey to brown, medium grained, planar laminated, competent core	9.40		Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
35	10		SILTSTONE Highly fractured with weathering to silt along fractures	10.50		
40	12		SANDSTONE Fine grained, finely cross-bedded, few fractures with oxidation along fracture surfaces	12.10		Bentonite
			SILTSTONE Grey, highly fractured and weathered	12.60		
			SANDSTONE Fine grained, finely cross-bedded, few fractures	13.10		
45	14		SILTSTONE Highly fractured and friable	13.60		
			End of Borehole	14.10		

Screen Interval: 9.00 - 10.50 m BGS
Sand Pack Interval: 8.60 - 10.80 m BGS
Well Seal Interval: 10.80 - 14.10 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-21-11

Stantec

Drawn By/Checked By: M. Kuhl / D. King

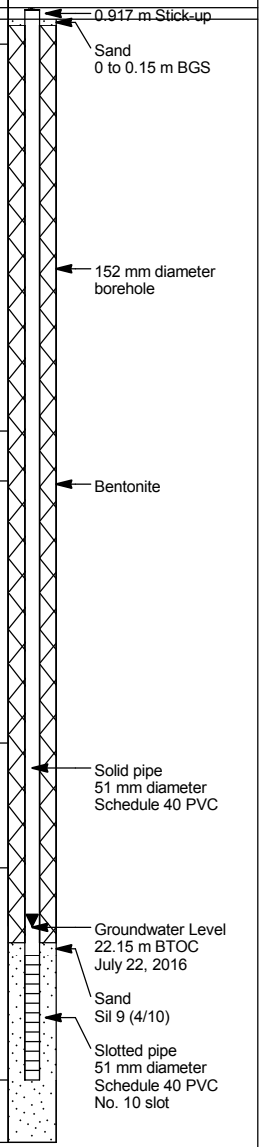
Monitoring Well: MW16-22-26 (D27)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	21-Jul-2016 / 22-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-29330.853
Contractor:	All Service Drilling Inc.	**Northing:**	5656907.343

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
5	2		CLAY - from 0.61 to 2.44 m: beige to light brown, with silt, moist, high plastic	0.61
10	4		- from 2.44 to 10.06 m: medium brown, trace fine grained sand, trace gravel, some silt, medium plastic	
15				
20	6			
25	8			
30	10			
35			SILTY CLAY Medium brown, some very fine grained sand, trace gravel, medium plastic, minor oxidation within sand stringers - @ 11.28 m: sand content increases to 15-30%, gravel content increases to 5-15%	10.06
40	12		SANDY SILT Medium brown, with gravel, dry to moist, friable	11.28
45	14			
50				
	16		- below 15.85 m: dry	
55				
60	18		SANDY SILT (TILL) Medium to dark grey, some gravel, with clay, dry, medium plastic	17.68
65	20			
70			SILTY CLAY (TILL) Dark grey, with gravel, dry to moist, medium plastic	20.73
75	22			
80	24			
85	26		SILTSTONE Light to medium grey	25.91
90	28		End of Borehole	27.43
95				
	30			

INSTALLATION DETAILS



Screen Interval: 22.86 - 25.91 m BGS
Sand Pack Interval: 22.56 - 27.43 m BGS
Well Seal Interval: 0.15 - 22.56 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-22-26

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-23-14 (D36S)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	24-Jul-2016 / 25-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-29019.682
Contractor:	All Service Drilling Inc.	**Northing:**	5657309.567

SUBSURFACE PROFILE					INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)	Diagram	Description
0	0		Ground Surface			0.855 m Stick-up
			TOPSOIL	0.00		
			CLAY Light to medium brown, trace very fine grained sand, some silt, moist, medium plastic	0.30		Sand 0 to 0.61 m BGS
5	2					
10						152 mm diameter borehole
	4					
15						
			SILTY CLAY (TILL) Medium brown, with very fine grained sand, some gravel, moist	4.88		
20	6					Bentonite
25	8					
30						Solid pipe 51 mm diameter Schedule 40 PVC
	10					
35						
	12					
40			SILT Light brown, trace very fine grained sand, moist	12.19		Sand Sil 9 (4/10)
			- @ 13.41 m: becomes wet			Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
45	14		CLAY Low plastic - from 13.72 to 14.02 m: some silt	13.72		
			End of Borehole	14.00		

Screen Interval: 12.48 - 14.00 m BGS
Sand Pack Interval: 12.17 - 14.00 m BGS
Well Seal Interval: 0.61 - 12.17 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-23-14

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-23-36 (D36D)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger (Track mounted)/ Coring
Client:	Alberta Transportation	**Date started/completed:**	24-Jul-2016 / 25-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-29019.349
Contractor:	All Service Drilling Inc.	**Northing:**	5657308.346

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
5	2		CLAY Light to medium brown, trace very fine grained sand, some silt, moist, medium plastic	0.30
10	4			
15				
20	6		SILTY CLAY (TILL) Medium brown, with very fine grained sand, some gravel, moist	4.88
25	8			
30	10			
35				
40	12		SILT Light brown, trace very fine grained sand, moist	12.19
45	14		- @ 13.41 m: becomes wet	13.72
50			CLAY Low plastic	15.24
55	16		- from 13.72 to 14.02 m: some silt - from 14.02 to 15.20 m: light grey, dry to damp, mottled	
60	18		SANDSTONE Medium brown, highly fractured	17.00
65	20		CLAYSTONE Grey, highly fractured, clay fracture gouge present	
70				
75	22			
80	24		SANDSTONE Medium brown to grey	23.15
85	26		SILTSTONE Grey, some oxidation on fractured surfaces	24.65
90				
95	28		- from 28.05 to 28.45 m: highly fractured - below 28.45 m: some bedding present	
100	30			
105	32		SANDSTONE Grey, fine grained	30.90
110			MUDSTONE Grey to dark grey, fractured	31.85
115	34			
120	36			
125	38			
130			SILTSTONE Grey, fractured	39.15
135	40		- from 41.05 to 41.65 m: some bedding	
140	42		MUDSTONE Grey, fractured	42.55
145	44			
150				
155	46		End of Borehole	45.72
	48			

INSTALLATION DETAILS

Diagram	Description
	0.764 m Stick-up
	Sand 0 to 0.61 m BGS
	152 mm diameter borehole
	Bentonite
	Solid pipe 51 mm diameter Schedule 40 PVC
	Sand Sil 9 (4/10)
	Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot
	Bentonite

Screen Interval: 35.70 - 37.20 m BGS
Sand Pack Interval: 35.00 - 37.80 m BGS
Well Seal Interval: 0.61 - 35.00 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-23-36

Stantec

Drawn By/Checked By: M. Kuhl / D. King

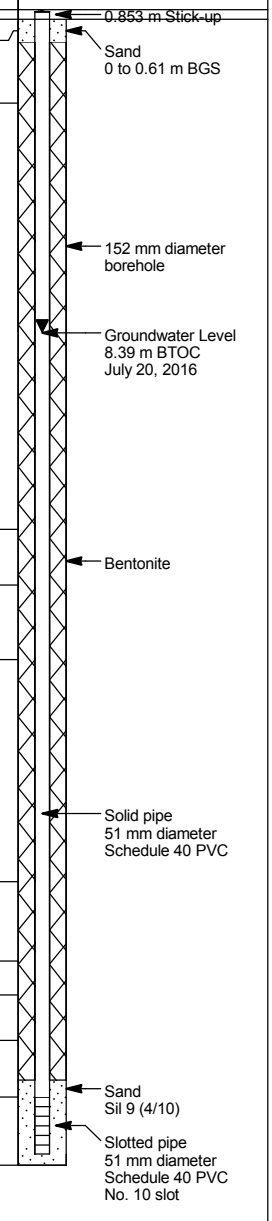
Monitoring Well: MW16-24-30 (D51)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Hollow-stem auger / Coring
Client:	Alberta Transportation	**Date started/completed:**	19-Jul-2016 / 20-Jul-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-28761.753
Contractor:	All Service Drilling Inc.	**Northing:**	5657740.483

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
0	0		Ground Surface	
			TOPSOIL	0.00
5	2		SILT With sand, trace gravel, dry to damp	0.30
10	4		CLAY Medium brown, trace sand and gravel, low plastic, minor oxidation, mottled	2.25
40	12		- @ 11.9 m: becomes sandy	
45	14		SAND Some gravel, some clay, dry, oxidized	13.70
50	16		SILTSTONE Light to medium grey, areas with high fracture intensity, some oxidation along larger fractures	15.20
60	18		SANDSTONE Brown to grey, planar bedded	17.20
75	22			
80	24		SILTSTONE Light to medium grey, areas with high fracture intensity, some oxidation along larger fractures - below 24.08 m: fine planar laminations - below 24.69 m: grainsize begins to decrease towards bottom of interval	23.16
85	26		CLAYSTONE Dark to medium grey, some fracturing, minor weathering along fractures	25.30
			SILTSTONE Light to medium grey, highly fractured, faint laminations and cross-bedding - below 27.13 m: some lenses of very fine grained sandstone	26.21
90	28		CLAYSTONE Medium grey, highly fractured and weathered to clay throughout interval	27.43
95	30		SANDSTONE Medium grey, very fine to fine grained, competent, few fractures	28.96
100	32		End of Borehole	30.78

INSTALLATION DETAILS



Screen Interval: 28.96 - 30.48 m BGS
Sand Pack Interval: 28.50 - 30.78 m BGS
Well Seal Interval: 0.61 - 28.50 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-24-30

Stantec

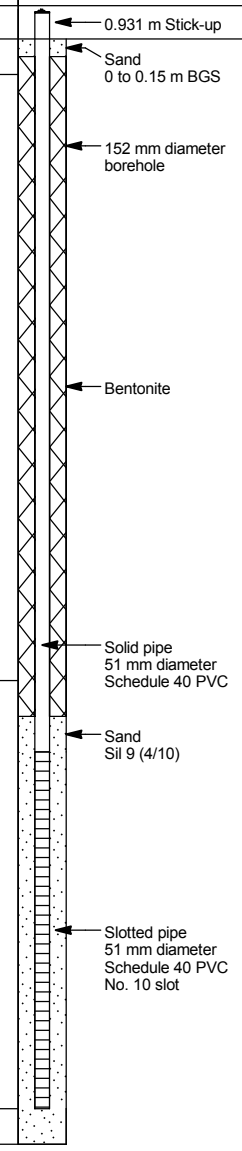
Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-25-9 (BS3)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	19-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-29274.736
Contractor:	All Service Drilling Inc.	**Northing:**	5658230.981

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
0	0		TOPSOIL	0.00
			SILTY CLAY Light to medium brown, moist, medium plastic, some mottling	0.30
5	2			
			- @ 2.74 m: silt content decreases to 15-30%	
10	4			
15			- @ 4.88 m: silt content increases to > 40% - below 5.18 m: trace gravel	
			SILT AND CLAY (TILL) Medium brown, some very fine grained sand, some gravel, moist, medium plastic	5.49
20	6			
25	8			
30			CLAYSTONE Light grey to brown, dry	9.14
	10		End of Borehole	9.45



Screen Interval: 6.10 - 9.14 m BGS
Sand Pack Interval: 5.79 - 9.45 m BGS
Well Seal Interval: 0.15 - 5.79 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-25-9

Stantec

Drawn By/Checked By: M. Kuhl / D. King

Monitoring Well: MW16-26-18 (H6)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	29-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-32702.727
Contractor:	All Service Drilling Inc.	**Northing:**	5659178.128

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			CLAY Light to medium brown, with silt, moist, high plastic, mottled	0.30
5	2		SILTY CLAY (TILL) Medium brown, with very fine grained sand, some gravel, moist, medium plastic	1.83
10	4			
15				
20	6			
			SAND AND SILT Medium brown, very fine grained, moist - @ 7.32 m: saturated	6.71
25	8			
			CLAY (TILL) Dark grey, with very fine grained sand, with gravel, with silt, dry to moist, low to medium plastic	8.23
30	10			
35				
40	12			
45	14			
50			CLAYSTONE Grey, dry, crumbly	15.24
55	16			
			- from 17.37 to 17.98 m: fractured, saturated interval	
60	18			
			End of Borehole	18.29

INSTALLATION DETAILS

Diagram

Description

- Flush mount casing protector
- Sand 0.05 to 0.30 m BGS
- 152 mm diameter borehole
- Bentonite
- Solid pipe 51 mm diameter Schedule 40 PVC
- Sand Sil 9 (4/10)
- Slotted pipe 51 mm diameter Schedule 40 PVC No. 10 slot

Screen Interval: 15.85 - 18.29 m BGS
Sand Pack Interval: 15.54 - 18.29 m BGS
Well Seal Interval: 0.30 - 15.54 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-26-18

Stantec

Drawn By/Checked By: M. Kuhl / D. King

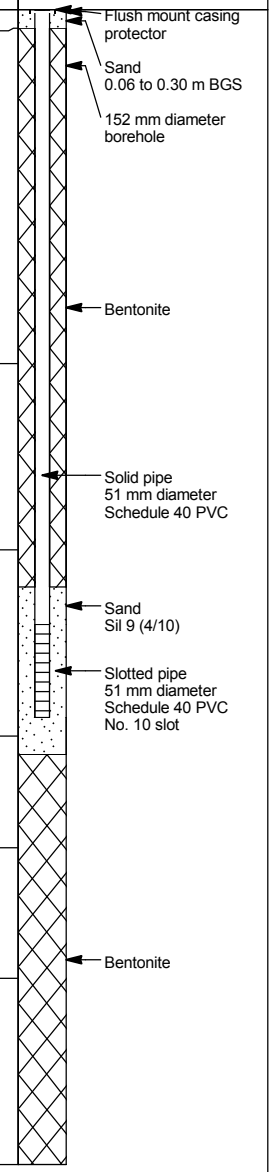
STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

Monitoring Well: MW16-27-12 (H9)

Project:	Springbank Off-Stream Reservoir Project (SR1)	**Drilling method:**	Solid-stem auger (Track mounted)
Client:	Alberta Transportation	**Date started/completed:**	29-Aug-2016
Location:	Rocky View County, Alberta	**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	D. Nisbet	**Easting:**	-32702.328
Contractor:	All Service Drilling Inc.	**Northing:**	5659766.161

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Lithologic Description	Depth (m BGS)
			Ground Surface	
			TOPSOIL	0.00
			SILTY CLAY Light to medium brown, moist, high plastic, mottled	0.30
5	2			
10	4		- @ 2.74 m: silt content increases to > 40%	
15				
20	6		CLAY (TILL) Some gravel, with silt, moist, high plastic	5.79
25	8			
30			SAND AND SILT Medium brown, very fine grained, moist	8.84
	10			
35			- @ 10.36 m: saturated	
40	12		SILT (TILL) Medium brown, with very fine grained sand, with gravel, with clay, dry to moist, medium plastic	11.89
45	14		CLAY (TILL) Dark grey, with sand, with gravel, with silt, dry to moist, medium plastic	13.72
50				
	16		CLAYSTONE Light grey, dry, some zones are highly fractured and saturated, crumbly	15.85
55				
60	18			
65	20		End of Borehole	18.90



Screen Interval: 10.06 - 11.58 m BGS
Sand Pack Interval: 9.45 - 12.19 m BGS
Well Seal Interval: 0.30 - 9.45 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

mm - millimetres
Coordinate System - NAD 1983 3TM 114
Completed as Well MW16-27-9

Stantec

Drawn By/Checked By: M. Kuhl / D. King

STANTEC BOREHOLE AND WELL V2 110773396_NEW.GPJ STANTEC - DATA TEMPLATE.GDT 17/1/16 MKUHL

Monitoring Well: MW21-3-15

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	26-Aug-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677300
Contractor:	All Service Drilling	**Northing:**	5660000

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
			Ground Surface			Aboveground casing 0.69 m
0	0.0		TOPSOIL some organics, brown to black, dry	0.00		50 mm solid PVC pipe packed in 10-20 filter sand
2	0.5		SILT AND SAND very fine sand, some clay, light brown to brown, low plasticity, dry	0.40		
5	1.5		CLAYEY SILT some sand, trace gravel, trace oxidaiton staining and white mineral precipitates, low plasticity	1.40		
13	4.0		SILTY SAND very fine sand, brown, moist	4.10		
16	5.0		- at 4.9 m BGS, auger refusal, switch to coring MUDSTONE highly fractured and oxidized surfaces, greyish brown	4.90		
20	6.0		- at 6.0 m BGS, some clay and silt along fractures			50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 11.8 m BGS
23	7.0		- at 6.95 m BGS, thin clay layer			

Screen Interval: 12.40 - 15.40 m BGS
Sand Pack Interval: 11.80 - 15.40 m BGS
Well Seal Interval: 0.30 - 11.80 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: MW21-3-15

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	26-Aug-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677300
Contractor:	All Service Drilling	**Northing:**	5660000

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
26	8.0		MUDSTONE highly fractured and oxidized surfaces, greyish brown			
27			SILTSTONE highly oxidized, grayish green to grey - at 8.3 to 8.8 m BGS, extensive weathering and fractures, clays and silts in fractures	8.10		Water level 8.319 m BTOC 4-May-22
28	8.5					
29						
30	9.0		SANDSTONE very fine grained, greyish green to grey	8.90		
31	9.5					
32						
33	10.0		SILTSONE greenish grey to grey - at 9.8 to 10.1 m BGS, very weathered to poorly consolidated silts and some clays in fractures	9.80		
34						
35	10.5					
36	11.0		SANDSTONE very fine grained, grey to very light grey	10.90		
37						
38	11.5		SILTSTONE grey to dark grey, poorly consolidated	11.30		
39						
40	12.0		- at 12.1 to 12.3 m BGS, few fractures throughout			50 mm solid PVC pipe packed in 10-20 filter sand 11.8 to 12.4 m BGS
41	12.5		SANDSTONE fine grained, grey to very light grey, few fractures	12.40		
42						
43	13.0		- at 12.8 to 13.1 m BGS, thin layer of siltstone			
44						
45	13.5					
46	14.0		SILTSTONE grey to dark grey, thin coal layer to 14.1 m BGS - at 14.1 to 14.4 m BGS, poorly consolidated	13.90		50 mm slotted PVC pipe packed in 10-20 filter sand 12.4 to 15.4 m BGS
47						
48	14.5					
49	15.0					
50						
51	15.5		End of Borehole	15.40		
52						
53	16.0					

Screen Interval: 12.40 - 15.40 m BGS
Sand Pack Interval: 11.80 - 15.40 m BGS
Well Seal Interval: 0.30 - 11.80 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: MW21-3-5

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	27-Aug-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677301
Contractor:	All Service Drilling	**Northing:**	5660000

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
-2	-0.5					Aboveground casing 0.74 m
0	0.0		Ground Surface			
			TOPSOIL some organics, brown to black, dry	0.00		50 mm solid PVC pipe packed in 10-20 filter sand
1	0.5		SILT AND SAND very fine sand, some clay, light brown to brown, low plasticity, dry	0.40		
4	1.0					
5	1.5		CLAYEY SILT some sand, trace gravel, trace oxidaiton staining and white mineral precipitates, low plasticity	1.40		50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 3.4 m BGS
10	3.0					
11	3.5					50 mm solid PVC pipe packed in 10-20 filter sand 3.4 to 3.7 m BGS
13	4.0		SILTY SAND very fine sand, brown, moist	4.10		
14	4.5					50 mm slotted PVC pipe packed in 10-20 filter sand 3.7 to 5.3 m BGS
16	5.0		- at 4.9 m BGS, auger refusal, switch to coring MUDSTONE highly fractured and oxidized surfaces, greyish brown	4.90		
17			End of Borehole	5.30		
18	5.5					
20	6.0					
21	6.5					
23	7.0					

Screen Interval: 3.70 - 5.30 m BGS
Sand Pack Interval: 3.40 - 5.30 m BGS
Well Seal Interval: 0.30 - 3.40 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

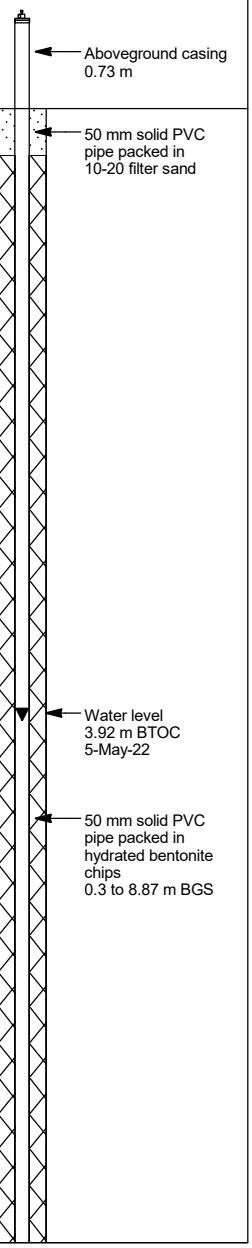
STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: MW21-6-12

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	27-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677606
Contractor:	All Service Drilling	**Northing:**	5658026

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
			Ground Surface	
0	0.0		TOPSOIL organics, black, dry	0.00
1	0.5		SILT AND SAND some gravel, light brown, dry	0.40
3	1.0		SILTY CLAY TILL some sand, and gravel, trace oxidaiton staining, light brown to brown, mediun plasticity, dry	0.80
10	3.0		SANDY CLAY trace siltstone and sandstone, low plasticity, moist	3.10
17	5.0		SILTY SAND trace clay and gravel, light brown, damp, moist at bottom	5.10
21	6.5		SILTSTONE highly fractured, oxidated surfaces, weathered, friable - at 6.7 to 7.0 m BGS, colour changes to greenish grey	6.20



Screen Interval: 9.10 - 12.10 m BGS
Sand Pack Interval: 8.80 - 12.30 m BGS
Well Seal Interval: 0.30 - 8.80 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

Monitoring Well: MW21-6-12

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	27-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677606
Contractor:	All Service Drilling	**Northing:**	5658026

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
24	7.5		SILTSTONE highly fractured, oxidated surfaces, weathered, friable			
25						
26	8.0					
27			SANDSTONE very fine grained, grey to very light grey, oxidation of fractured surfaces	8.10 8.20		
28	8.5		MUDSTONE grey to very light grey, weathering, oxidaiton along fractures - at 8.6 to 8.9 m BGS, poorly consolidated			
29						
30	9.0		- at 8.9 to 9.7 m BGS consolidated			50 mm solid PVC pipe packed in 10-20 filter sand 8.8 to 9.1 m BGS
31	9.5					
32			- 9.7 to 10.1 m BGS, well cemented			
33	10.0		- 10.1 to 10.5 m BGS, weathered and poorly consolidated clays and silts			
34						
35	10.5					50 mm slotted PVC pipe packed in 10-20 filter sand 9.1 to 12.1 m BGS
36	11.0					
37			- at 11.1 m BGS, well cemented SANDSTONE grey to very light grey, fossils	11.20		
38	11.5					
39			MUDSTONE brown to grey, slight weathering at upper contact	11.90		
40	12.0					10-20 filter sand
41	12.5		End of Borehole	12.30		
42						
43	13.0					
44						
45	13.5					
46	14.0					
47						
48	14.5					
49	15.0					

Screen Interval: 9.10 - 12.10 m BGS
Sand Pack Interval: 8.80 - 12.30 m BGS
Well Seal Interval: 0.30 - 8.80 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

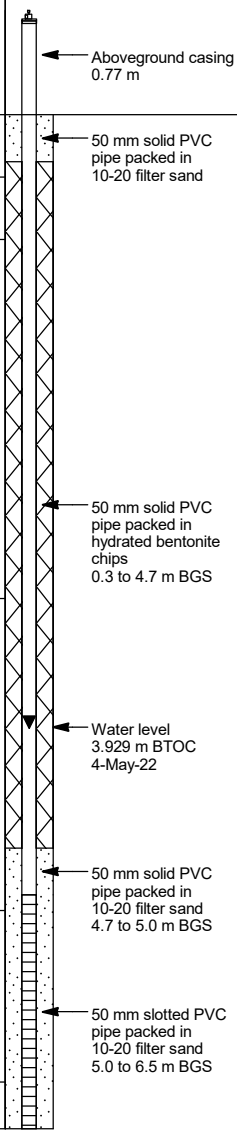
Monitoring Well: MW21-6-7

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	27-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677606
Contractor:	All Service Drilling	**Northing:**	5658026

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
			Ground Surface	
0	0.0		TOPSOIL organics, black, dry	0.00
1	0.5		SILT AND SAND some gravel, light brown, dry	0.40
3	1.0		SILTY CLAY TILL some sand, and gravel, trace oxidaiton staining, light brown to brown, medium plasticity, dry	0.80
10	3.0		SANDY CLAY trace siltstone and sandstone, low plasticity, moist	3.10
17	5.0		SILTY SAND trace clay and gravel, light brown, damp, moist at bottom	5.10
21	6.5		SILTSTONE highly fractured, oxidated surfaces, weathered, friable	6.20
			End of Borehole	6.50

INSTALLATION DETAILS



Screen Interval: 5.00 - 6.50 m BGS
Sand Pack Interval: 4.70 - 6.50 m BGS
Well Seal Interval: 0.30 - 4.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-13-37

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	24-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	680595
Contractor:	All Service Drilling	**Northing:**	5660430

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
			Ground Surface		
			GRAVEL FILL	0.00	Flushmount well protector
2	1		SILTY CLAY TILL some sand, trace gravel and coal, oxidaiton staining, and white mineral precipitate, medium plasticity, brown, moist	0.30	50 mm solid PVC pipe packed in 10-20 filter sand
4					
6	2				
8					
10	3		- at 3.2 m BGS, increasing sand		
12			SANDY SILTY CLAY some gravel, brown, moist	3.50	
14	4				
16	5		- at 4.6 m BGS, some cobbles		
18					
20	6				
22	7				
24			- at 7.4 m BGS, sandstone chips		
26	8		SANDSTONE weathered	7.50	
28			- at 8.6 m BGS, auger refusal, switch to air rotary		
30	9		- at 9.0 m BGS, very fine grained, greyish brown to grey		
32	10				
34			MUDSTONE brown to dark brown, dry	10.40	
36	11				
38			SILTSTONE some weathering and oxidized fractures, grey to dark grey	11.50	
40	12				
42					

Screen Interval: 33.50 - 36.50 m BGS
Sand Pack Interval: 33.00 - 36.50 m BGS
Well Seal Interval: 0.30 - 33.00 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-13-37

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	24-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	680595
Contractor:	All Service Drilling	**Northing:**	5660430

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
44			SILTSTONE some weathering and oxidized fractures, grey to dark grey		
46	14				
48			very fine to fine grained, friable, grey to light grey, dry	14.70	
50	15		- at 15.5 m BGS, interbedded sitlstone, grey to dark grey		
52	16				
54					50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 33.0 m BGS
56	17		MUDSTONE dark grey to dark brown, friable	17.00	
58					
60	18				
62	19				
64					
66	20				
68					
70	21				
72	22				
74					
76	23				
78					
80	24				Water level 24.275 m BTOC 4-May-22
82	25				
84			SILTSTONE grey to dark grey	25.20	

Screen Interval: 33.50 - 36.50 m BGS
Sand Pack Interval: 33.00 - 36.50 m BGS
Well Seal Interval: 0.30 - 33.00 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

Monitoring Well: RMW16-13-37

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	24-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	680595
Contractor:	All Service Drilling	**Northing:**	5660430

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
86			SILTSTONE grey to dark grey		
88	27				
90					
92	28				
94			MUDSTONE light grey to grey, dry	28.50	
96	29				
98			SILTSTONE dark grey, interbeded with very fine grained sandstone	29.60	
100	30		at 30.1 m BGS, SANDSTONE		
102			MUDSTONE grey to light grey	30.70	
104	31				
106	32		- at 32.0 m BGS, grey to dark grey with black speckled sandstone, saturated		
108					
110	33		- at 33.0 m BGS, brown to grey		50 mm solid PVC pipe packed in 10-20 filter sand 33 to 33.5 m BGS
112	34				
114			SILTSTONE grey to dark grey, oxidized fractures	34.50	50 mm slotted PVC pipe packed in 10-20 filter sand 7.5 to 10.5 m BGS
116	35				
118					
120	36		MUDSTONE grey to greenish grey	36.00	
122			End of Borehole	36.50	
124	37				
126	38				

Screen Interval: 33.50 - 36.50 m BGS
Sand Pack Interval: 33.00 - 36.50 m BGS
Well Seal Interval: 0.30 - 33.00 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-16-17

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	25-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677090
Contractor:	All Service Drilling	**Northing:**	565364

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
-2	-0.5				Aboveground casing 0.73 m
0	0.0		Ground Surface		
0	0.0		TOPSOIL organics, black, dry	0.00	50 mm solid PVC pipe packed in 10-20 filter sand
1	0.5		SILTY CLAY trace sand, white mineral precipitates, occasional lenses of silt and very fine sand, light brown, grey mottling, high plasticity	0.30	
5	1.5				
6	2.0		SILTY CLAY TILL some sand, trace gravel, white mineral precipitates, high plasticity, light brown with grey mottling, dry to moist	1.70	
10	3.0				
11	3.5		- at 3.3 m BGS, slight increase in silt and sand, medium plasticity		
17	5.0				Water level 5.34 m BTOC 5-May-22
18	5.5				
19	6.0				
20	6.0		- at 6.0 m BGS, colour changes to brown		
20	6.2		- at 6.2 m BGS, ioncreasing gravel, occasional cobble		
21	6.5				50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 12.9 m BGS
23	7.0				
25	7.5				
26	8.0				

Screen Interval: 13.50 - 16.50 m BGS
Sand Pack Interval: 12.90 - 16.50 m BGS
Well Seal Interval: 0.30 - 12.90 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-16-17

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	25-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677090
Contractor:	All Service Drilling	**Northing:**	565364

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
28	8.5		SILTY CLAY TILL some sand, trace gravel, white mineral precipitates, high plasticity, light brown with grey mottling, dry to moist		
29	9.0				
30					
31	9.5				
32					
33	10.0		- at 10.0 m BGS, some moisture		
34					
35	10.5				
36					
37	11.0				
38	11.5				
39			SANDSTONE very fine grained, weathered, friable, light brown to grey, weathered	11.80	
40	12.0				
41	12.5				
42					
43	13.0				50 mm solid PVC pipe packed in 10-20 filter sand 12.9 to 13.5 m BGS
44					
45	13.5				
46	14.0				
47					
48	14.5				
49	15.0		- at 15.0 m BGS, bery poor recovery		50 mm slotted PVC pipe packed in 10-20 filter sand 13.5 to 16.5 m BGS
50					
51	15.5				
52	16.0		- at 15.8 m BGS, saturated, auger refusal		
53					
54	16.5		End of Borehole	16.50	
55					
56	17.0				

Screen Interval: 13.50 - 16.50 m BGS
Sand Pack Interval: 12.90 - 16.50 m BGS
Well Seal Interval: 0.30 - 12.90 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-17-10

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	25-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677476
Contractor:	All Service Drilling	**Northing:**	5657319

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
-2	-0.5				Aboveground casing 0.70 m
0	0.0		Ground Surface TOPSOIL organics, black, dry	0.00	50 mm solid PVC pipe packed in 10-20 filter sand
1	0.5		SILT AND CLAY trace fine sand, light brown, low to medium plasticity, dry	0.30	
5	1.5		CLAY trace silt, trace pockets of sand, olive with gray mottling, dry to moist	1.50	
7	2.0		SILTY CLAY TILL some sand, trace oxidation staining and white mineral precipitates, oilive with grey mottling, dry to moist	2.10	
13	4.0		SILT AND CLAY some sand, trace gravel, occasional cobble, brown to dark brown, medium plasticity, moist	3.90	50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 7.8 m BGS
23	7.0				Water level 7.299 m BTOC 10-May-22
25	7.5				

Screen Interval: 8.10 - 9.60 m BGS
Sand Pack Interval: 7.80 - 9.80 m BGS
Well Seal Interval: 0.30 - 7.80 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-17-10

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	25-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	677476
Contractor:	All Service Drilling	**Northing:**	5657319

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
26	8.0		SILT AND CLAY some sand, trace gravel, occasional cobble, brown to dark brown, medium plasticity, moist		50 mm solid PVC pipe packed in 10-20 filter sand 7.8 to 8.1 m BGS
28	8.5				
29	9.0		SILT AND SAND fine grained sand, some clay and gravel, white mineral precipitates, green to brown, medium plasticity, moist to damp	8.60	50 mm slotted PVC pipe packed in 10-20 filter sand 8.1 to 9.6 m BGS
31	9.5		SANDSTONE fine to very fine grained, weathered, very light grey, weathered	9.30	10-20 filter sand
33	10.0				Hydrated bentonite chips
34	10.5		End of Borehole	10.50	
36	11.0				
38	11.5				
39	12.0				
41	12.5				
42	13.0				
44	13.5				
45	14.0				
47	14.5				
48	15.0				
50	15.5				
52	16.0				
53					

Screen Interval: 8.10 - 9.60 m BGS
Sand Pack Interval: 7.80 - 9.80 m BGS
Well Seal Interval: 0.30 - 7.80 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

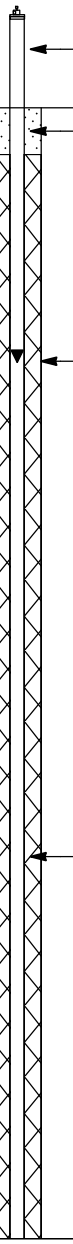
Monitoring Well: RMW16-18-13

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	26-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	678068
Contractor:	All Service Drilling	**Northing:**	5657928

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
0	0.0		Ground Surface	
			TOPSOIL organics, black, dry	0.00
			SILTY CLAY TILL some sand, trace gravel, trace oxidation statining (light orange), brown, medium plasticity	0.20
			SANDY CLAY some gravel and cobbles, brown, dry	2.30
			SILT AND SAND some gravel, trace clay, brown, moist	3.20
			SILTSTONE very poor recovery, grey, weathered	4.70
			SANDSTONE grey to greenish grey,	5.30
				7.10

Diagram



Description

Screen Interval: 9.60 - 12.60 m BGS
Sand Pack Interval: 9.30 - 12.60 m BGS
Well Seal Interval: 0.30 - 9.30 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-18-13

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	26-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	678068
Contractor:	All Service Drilling	**Northing:**	5657928

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
24	7.5		MUDSTONE dark brown to dark grey - at 7.3 to 7.5 m BGS, oxidation and slight weathering		
25					
26	8.0		- at 7.85 m BGS, fracture		
27			- at 8.1 to 8.8 m BGS light grey clay, alogr multiple fractures		
28	8.5				
29			- at 8.8 m BGS, highly fractured and oxidized		
30	9.0				
31	9.5		SANDSTONE fine grained, slight oxidation, greenish grey to grey	9.20	50 mm solid PVC pipe packed in 10-20 filter sand 9.3 to 9.6 m BGS
32					
33	10.0		SILTSTONE greenish grey to grey, highly fractured with some silts and clays along fractured zones	9.90	
34	10.5				
35			- at 10.6 m BGS, no silts and clays		
36	11.0				
37			SANDSTONE greenish grey to grey	11.10	50 mm slotted PVC pipe packed in 10-20 filter sand 9.6 to 12.6 m BGS
38	11.5		SILTSTONE greenish grey to grey, well consolidated, highly fractured	11.50	
39	12.0				
40					
41	12.5		End of Borehole	12.60	
42	13.0				
43					
44	13.5				
45					
46	14.0				
47					
48	14.5				
49	15.0				

Screen Interval: 9.60 - 12.60 m BGS
Sand Pack Interval: 9.30 - 12.60 m BGS
Well Seal Interval: 0.30 - 9.30 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

Monitoring Well: RMW16-18-5

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	23-Aug-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT	**Easting:**	678066
Contractor:	All Service Drilling	**Northing:**	5657928

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
			Ground Surface	
0	0.0		TOPSOIL organics, black, dry	0.00
1	0.5		SILTY CLAY TILL some sand, trace gravel, trace oxidation statining (light orange), brown, medium plasticity	0.20
8	2.5		SANDY CLAY some gravel and cobbles, brown, dry	2.30
11	3.5		SILT AND SAND some gravel, trace clay, brown, moist	3.20
16	5.0		SILTSTONE very poor recovery, grey, weathered	4.70
20	6.0		End of Borehole	6.00

Diagram / Description

- Aboveground casing 0.73 m
- 50 mm solid PVC pipe packed in 10-20 filter sand
- Water level 1.71 m BTOC 5-May-22
- 50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 3.2 m BGS
- 50 mm solid PVC pipe packed in 10-20 filter sand 3.2 to 3.5 m BGS
- 50 mm slotted PVC pipe packed in 10-20 filter sand 13.5 to 16.5 m BGS
- Slough

Screen Interval: 3.50 - 5.00 m BGS
Sand Pack Interval: 3.20 - 5.00 m BGS
Well Seal Interval: 0.30 - 3.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-19-10

Project:	SR1/Springank	**Method:**	Soid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	29-Nov-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/AK	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
-2	-0.5					Aboveground casing 0.76 m
0	0.0		Ground Surface			
			TOPSOIL sandy, brown, dry	0.00		50 mm solid PVC pipe packed in 10-20 filter sand
1	0.5		SILTY CLAY AND SAND brown, low plasticity, dry	0.50		
2						
3	1.0					
4						
5	1.5					
6						
7	2.0					
8	2.5		- at 2.5 m BGS, trace gravel, grey to brown, medium plasticity, moist			
9						
10	3.0					
11						
12	3.5					50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 7.2 m BGS
13	4.0					
14						
15	4.5					
16						
17	5.0					
18	5.5					
19						
20	6.0					
21						
22	6.5					
23	7.0		SILTY CLAY some sand	6.90		Water level 7.035 m BTOC 6-May-22
24						50 mm solid PVC pipe packed in
25	7.5					

Screen Interval: 7.50 - 10.50 m BGS
Sand Pack Interval: 7.20 - 10.50 m BGS
Well Seal Interval: 0.30 - 7.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-19-10

Project:	SR1/Springank	**Method:**	Soid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	29-Nov-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/AK	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
26	8.0		SILTY CLAY some sand		10-20 filter sand 7.2 to 7.5 m BGS
27					
28	8.5				
29					50 mm slotted PVC pipe packed in 10-20 filter sand 7.5 to 10.5 m BGS
30	9.0				
31					
32	9.5				
33	10.0		SANDSTONE finegrained, brown, wet	10.00	
34					
35	10.5		End of Borehole	10.50	
36	11.0				
37					
38	11.5				
39					
40	12.0				
41	12.5				
42					
43	13.0				
44					
45	13.5				
46	14.0				
47					
48	14.5				
49					
50	15.0				
51	15.5				
52					
53	16.0				

Screen Interval: 7.50 - 10.50 m BGS
Sand Pack Interval: 7.20 - 10.50 m BGS
Well Seal Interval: 0.30 - 7.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-19-19

Project:	SR1/Springank	**Method:**	Soid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	29-Nov-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/AK	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
			Ground Surface	
0	0		TOPSOIL sandy, brown, dry	0.00
2	1		SILTY CLAY AND SAND brown, low plasticity, dry	0.50
8	2		- at 2.5 m BGS, trace gravel, grey to brown, medium plasticity, moist	
22	7		SILTY CLAY some sand	6.90

INSTALLATION DETAILS

Diagram	Description
	Aboveground casing 0.76 m
	50 mm solid PVC pipe packed in 10-20 filter sand
	Water level 5.824 m BTOC 6-May-22
	50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 13.1 m BGS

Screen Interval: 17.50 - 19.50 m BGS
Sand Pack Interval: 13.10 - 19.50 m BGS
Well Seal Interval: 0.30 - 13.10 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-19-19

Project:	SR1/Springank	**Method:**	Soid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	29-Nov-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/AK	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
	10					
34			SANDSTONE finegrained, brown, wet	10.00		
36	11					
38						
40	12					
42						
	13		SILTSTONE some sand and clay, grey, low plasticity, dry	13.00		
44						
46	14					
48						
	15					
50						50 mm solid PVC pipe packed in 10-20 filter sand 13.1 to 17.5 m BGS
52	16					
54						
56	17					
58			SANDSTONE fine grained, grey, moist	17.70		
	18					
60						
						50 mm slotted PVC pipe pre-packed packed in filter sand 17.5 to 19.5 m BGS
62	19		SILTSTONE some sand and clay, grey, low plasticity, moist	18.70		
64						
			End of Borehole	19.50		
66	20					

Screen Interval: 17.50 - 19.50 m BGS
Sand Pack Interval: 13.10 - 19.50 m BGS
Well Seal Interval: 0.30 - 13.10 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-23-13

Project:	SR1/Springank	**Method:**	Air Rotary
Client:	Alberta Transportaiton	**Date started/completed:**	12-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
			Ground Surface		
1			TOPSOIL darkbrown to black, moist	0.00	Flushmount casing 0.76 m
2	0.5		SILTY SAND trace gravel, light brown to grey, dry to moist	0.30	50 mm solid PVC pipe packed in 10-20 filter sand
3	1.0		SANDY CLAY TILL trace gravel, trace mineral precipitate, oxidation staining, low plasticity, light brown to brown,	0.90	
4					
5	1.5		- at 1.4 m BGS, cobble sized gravel - at 1.5 m BGS, increased gravel to approximately 30 percent		
6	2.0				
7					
8	2.5				
9					
10	3.0		SAND AND GRAVEL brown, dry	3.00	
11	3.5				
12					
13	4.0				Water level 4.09 m BTOC 13-May-22
14					
15	4.5		- at 4.5 m BGS, becomes moist		
16					
17	5.0				
18	5.5				
19					50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 11.1 m BGS
20	6.0				
21			SANDSTONE fine grained, brown, poor recovery	6.20	
22	6.5				
23					
24	7.0		- at 7.2 m BGS, colour changes to grey, moist		
25	7.5		- at 7.7 m BGS, colour changes to brown		
26					
27	8.0				
28	8.5		- at 8.4 m BGS, Colour changes to grey, weathered		
29					
30	9.0		MUDSTONE grey, moist	9.00	
31	9.5				
32					

Screen Interval: 11.40 - 12.90 m BGS
Sand Pack Interval: 11.10 - 12.90 m BGS
Well Seal Interval: 0.30 - 11.10 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JD/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-23-13

Project:	SR1/Springank	**Method:**	Air Rotary
Client:	Alberta Transportaiton	**Date started/completed:**	12-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
33						
34			SANDSTONE fine grained, trace silt, moist	10.30		
	10.5		MUDSTONE saturated, grey	10.50		
35						
36	11.0					
37						50 mm solid PVC pipe packed in 10-20 filter sand 11.1 to 11.4 m BGS
	11.5		SANDSTONE saturated, grey to brown	11.40		
38						
39	12.0					
40						50 mm slotted PVC pipe packed in 10-20 filter sand 11.4 to 12.9 m BGS
41	12.5		- at 12.4 to 12.5 m BGS, mudstone lens			
42						
	13.0		MUDSTONE saturated, grey to brown	12.90		Slough
43			SANDSTONE saturated, grey to brown	13.20		
44	13.5		End of Borehole	13.50		
45						
46	14.0					
47						
48	14.5					
49						
50	15.0					
51						
52	15.5					
53						
54	16.0					
55						
56	16.5					
57						
58	17.0					
59						
60	17.5					
61						
62	18.0					
63						
64	18.5					
65						
	19.0					
	19.5					

Screen Interval: 11.40 - 12.90 m BGS
Sand Pack Interval: 11.10 - 12.90 m BGS
Well Seal Interval: 0.30 - 11.10 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JD/DK

Monitoring Well: RMW16-23-32

Project:	SR1/Springank	**Method:**	Air Rotary
Client:	Alberta Transportaiton	**Date started/completed:**	13-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	681934
Contractor:	All Service Drilling	**Northing:**	5658853

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
			Ground Surface		
			TOPSOIL darkbrown to black, moist	0.00	Flushmount casing
2			SILTY SAND trace gravel, light brown to grey, dry to moist	0.30	50 mm solid PVC pipe packed in 10-20 filter sand
4	1		SANDY CLAY TILL trace gravel, trace mineral precipitate, oxidation staining, low plasticity, light brown to brown, - at 1.4 m BGS, cobble sized gravel - at 1.5 m BGS, increased gravel to approximately 30 percent	0.90	
6	2				
8					
10	3		SAND AND GRAVEL brown, dry	3.00	Water level 3.27 m BTOC 13-May-22
12					
14	4		- at 4.5 m BGS, becomes moist		
16	5				
18					
20	6		SANDSTONE fine grained, brown, poor recovery	6.20	
22					
24	7		- at 7.2 m BGS, colour changes to grey, moist - at 7.7 m BGS, colour changes to brown		
26	8				
28			- at 8.4 m BGS, Colour changes to grey, weathered		
30	9		MUDSTONE grey, moist	9.00	
32					
34	10		SANDSTONE	10.30	

Screen Interval: 29.50 - 31.00 m BGS
Sand Pack Interval: 29.20 - 31.00 m BGS
Well Seal Interval: 0.30 - 29.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

Monitoring Well: RMW16-23-32

Project:	SR1/Springank	**Method:**	Air Rotary
Client:	Alberta Transportaiton	**Date started/completed:**	13-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	681934
Contractor:	All Service Drilling	**Northing:**	5658853

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
			fine grained, trace silt, moist	10.50	
36	11		MUDSTONE saturated, grey		
38			SANDSTONE saturated, grey to brown	11.40	
40	12		- at 12.4 to 12.5 m BGS, mudstone lens		
42	13		MUDSTONE saturated, grey to brown	12.90	
44			SANDSTONE saturated, grey to brown	13.20	
46	14				
48			SANDSTONE AND MUDSTONE intebedded dark grey mudstone and fine grained grey to blackish grey sandstones	14.30	50 mm solid PVC pipe packed in hydrated bentonite chips 0.3 to 29.2 m BGS
50	15				
52	16				
54					
56	17				
58					
60	18		MUDSTONE grey to dark grey	18.00	
62	19				
64					
66	20		- at 19.8 m BGS, becomes sturated, grey		
			SILTSTONE grey to dark grey, saturated	20.40	
68			SANDSTONE saturated, dark grey	20.70	

Screen Interval: 29.50 - 31.00 m BGS
Sand Pack Interval: 29.20 - 31.00 m BGS
Well Seal Interval: 0.30 - 29.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-23-32

Project:	SR1/Springank	**Method:**	Air Rotary
Client:	Alberta Transportaiton	**Date started/completed:**	13-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	681934
Contractor:	All Service Drilling	**Northing:**	5658853

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
70			SANDSTONE saturated, dark grey	
72	22		MUDSTONE saturated, grey to light grey	21.80
74				
76	23			
78				
80	24			
82	25		SANDSTONE saturated, grey	24.60
84			SILTSTONE saturated, black	25.30
	26		MUDSTONE saturated, grey	25.90
86			SILTSTONE saturated, dark grey	26.10
88	27		MUDSTONE saturated, grey - at 27.6 m BGS, becomes weathered	26.50
90				
92	28		SILTSTONE saturated, brown to grey	28.00
94				
96	29			
98	30		SANDSTONE saturated, grey to greyish brown	29.50
100				
102	31		MUDSTONE saturated, dark grey	31.00

Diagram / Description

- 50 mm solid PVC pipe packed in 10-20 filter sand 29.2 to 29.5 m BGS
- 50 mm slotted PVC pipe packed in 10-20 filter sand 29.5 to 31.0 m BGS

Screen Interval: 29.50 - 31.00 m BGS
Sand Pack Interval: 29.20 - 31.00 m BGS
Well Seal Interval: 0.30 - 29.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: RMW16-23-32

Project:	SR1/Springank	**Method:**	Air Rotary
Client:	Alberta Transportaiton	**Date started/completed:**	13-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	681934
Contractor:	All Service Drilling	**Northing:**	5658853

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
104	32		SILTSTONE SHALE saturated, dark grey	31.70	Slough
			End of Borehole	32.00	
106					
108	33				
110					
112	34				
114					
116	35				
118					
120	36				
122					
124	37				
126					
128	38				
130					
132	39				
134					
136	40				
	41				

Screen Interval: 29.50 - 31.00 m BGS
Sand Pack Interval: 29.20 - 31.00 m BGS
Well Seal Interval: 0.30 - 29.20 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing
Locaiton coordinates are approximate

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

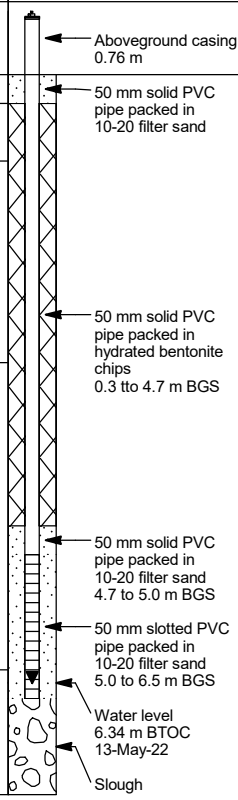
Monitoring Well: RMW16-23-7

Project:	SR1/Springank	**Method:**	Solid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	11-May-2022
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/IM	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
			Ground Surface	
0	0		TOPSOIL darkbrown to black, moist	0.00
2			SILTY SAND trace gravel, light brown to grey, dry to moist	0.30
4	1		SANDY CLAY TILL trace gravel, trace mineral precipitate, oxidation staining, low plasticity, light brown to brown, - at 1.4 m BGS, cobble sized gravel - at 1.5 m BGS, increased gravel to approximately 30 percent	0.90
6	2			
8				
10	3		SAND AND GRAVEL brown, dry	3.00
12	4			
14				
16	5		- at 4.5 m BGS, becomes moist	
18				
20	6		SANDSTONE fine grained, brown, poor recovery	6.20
22	7			
24			End of Borehole	7.50
26	8			
28				
30	9			
32	10			
34				
36	11			
38				
	12			

INSTALLATION DETAILS



Screen Interval: 5.00 - 6.50 m BGS
Sand Pack Interval: 4.70 - 6.50 m BGS
Well Seal Interval: 0.30 - 4.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

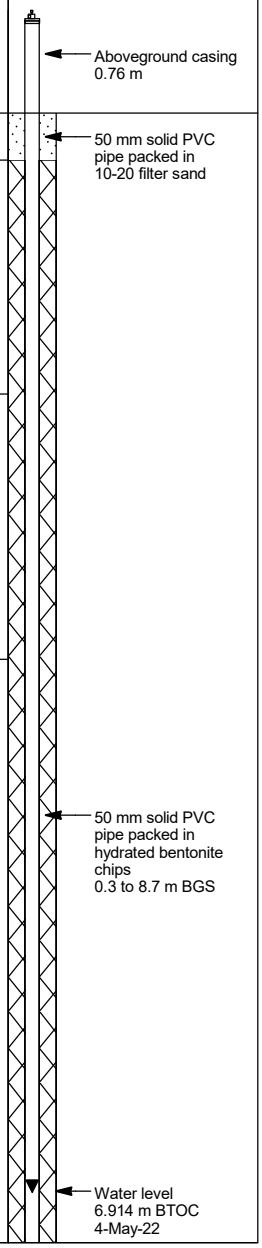
STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Wells: RMW16-5-12

Project:	SR1/Springank	**Method:**	Soid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	30-Nov-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/AK	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
-2	-0.5			
0	0.0		Ground Surface TOPSOIL	0.00
1			SANDY CLAY fine grained sand, some oxidation and organics, greyish brown, dry	0.30
2	0.5			
3	1.0			
4				
5	1.5			
6			SILTY SAND some gravel, trace clay, low plasticity, reddish brown, moist	1.80
7	2.0			
8	2.5			
9				
10	3.0			
11	3.5		SANDSTONE fine to very fine sand, brown, dry	3.50
12				
13	4.0			
14				
15	4.5			
16	5.0			
17				
18	5.5			
19				
20	6.0			
21	6.5			
22				
23	7.0			



Screen Interval: 9.00 - 12.00 m BGS
Sand Pack Interval: 8.70 - 12.00 m BGS
Well Seal Interval: 0.30 - 8.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Wells: RMW16-5-12

Project:	SR1/Springank	**Method:**	Soid Stem Auger
Client:	Alberta Transportaiton	**Date started/completed:**	30-Nov-2021
Location:	Rockyview County	**Ground surface elevation:**	n/a
Number:	10773396.5210.215	**Top of casing elevation:**	n/a
Field investigator:	WT/AK	**Easting:**	n/a
Contractor:	All Service Drilling	**Northing:**	n/a

SUBSURFACE PROFILE | INSTALLATION DETAILS

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram	Description
24	7.5		SANDSTONE fine to very fine sand, brown, dry			
26	8.0		SILTSTONE traces of coal, grey, wet	8.00		
28	8.5					
29	9.0		SANDSTONE very fine sand, silt seams, grey, dry	9.00		50 mm solid PVC pipe packed in 10-20 filter sand 8.7 to 9.0 m BGS
31	9.5					
33	10.0					
34	10.5					50 mm slotted PVC pipe packed in 10-20 filter sand 9.0 to 12.0 m BGS
36	11.0					
38	11.5					
39	12.0		End of Borehole	12.00		
41	12.5					
43	13.0					
44	13.5					
46	14.0					
48	14.5					
49	15.0					

Screen Interval: 9.00 - 12.00 m BGS
Sand Pack Interval: 8.70 - 12.00 m BGS
Well Seal Interval: 0.30 - 8.70 m BGS

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
n/a - not available

m BTOC - metres below top of casing

Stantec

Drawn By/Checked By: JL/DK

STANTEC BOREHOLE AND WELL V2 SPRINGBANK_LOGS_20220808.GPJ STANTEC - DATA TEMPLATE.GDT 8/11/22 JLAUTERMILCH

Monitoring Well: WS11-01

Project:	Springbank Offstream Reservoir Project (SR1)	**Method:**	Solid Stem Auger
Client:	Alberta Transportation	**Date started/completed:**	24-Nov-2022
Location:		**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	W.T.	**Easting:**	2272.481
Contractor:	All Service Drilling	**Northing:**	2252.153

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)
-2	-0.5			
-1				
0	0.0		Ground Surface	
			TOPSOIL dark brown to black, moist	0.00
1				
2	0.5		SILTY SAND trace sand, brown, dry	0.40
			SILT AND CLAY trace sand, brown, dry	0.70
3	1.0			
4			-at 1.1 m BGS white mineral precipitates	
5	1.5		SILTY CLAY some sand, trace gravel and cobbles, trace mineral precipitates and oxidation staining throughout, brown to olive, moist	1.50
6	2.0			
7				
8	2.5			
9				
10	3.0			
11			SANDY SILT trace clay decreasing with depth, dark brown	3.20
12	3.5			
13				
14	4.0			
15	4.5		-saturated at 4.4 m BGS SILTY CLAY trace sand and gravel, dark brown, moist to saturated	4.50
16				
17	5.0		SANDSTONE very fine grained, light brown	5.00
18	5.5			
19				
20	6.0		-very fine sand to silt (siltstone), greyish brown at 6.0 m BGS	

INSTALLATION DETAILS

Diagram	Description
	Above Ground Casing 0.725 m AGS
	51 mm solid PVC pipe packed in bentonite 0.0 to 10.2 m BGS

Screen Interval: 10.50 - 12.00 m BGS
Sand Pack Interval: 10.20 - 12.00 m BGS
Well Seal Interval: 0.00 - 10.20 m BGS

Notes:
m BGS - metres below ground surface
n/a - not available

Soil strength (consistency) and plasticity terms are for descriptive purposes only and must not be used for design or construction purposes.

Drawn By/Checked By: D.K.

Monitoring Well: WS11-01

Project:	Springbank Offstream Reservoir Project (SR1)	**Method:**	Solid Stem Auger
Client:	Alberta Transportation	**Date started/completed:**	24-Nov-2022
Location:		**Ground surface elevation:**	n/a
Number:	110773396	**Top of casing elevation:**	n/a
Field investigator:	W.T.	**Easting:**	2272.481
Contractor:	All Service Drilling	**Northing:**	2252.153

SUBSURFACE PROFILE				INSTALLATION DETAILS	
Depth (ft)	Depth (m)	Graphic Log	Stratigraphic Description	Depth (m BGS)	Diagram / Description
21	6.5		SANDSTONE very fine grained, light brown		
22					
23	7.0				
24					
	7.5				
25			SILTSTONE greyish brown, dry	7.50	
26	8.0				
27					
28	8.5				
29					
	9.0		SANDSTONE coal seam, moist to saturated	9.00	
30					
31	9.5		-very fine grained, dark brow, moist at 9.6 m BGS		
32					
33	10.0				
34					51 mm solid PVC pipe packed in 10-20 filter sand 10.2 to 10.5 m BGS
35	10.5		-fine to medium grained, grey, well consolidated at 10.5 m BGS		
36					
37	11.0				51 mm slotted PVC screen packed in 10-20 filter sand 10.5 to 12.0 m BGS
38					
39	11.5				
	12.0		-aguer refusal at 12.0 m BGS End of Borehole	12.00	
40					
41	12.5				
42					
43	13.0				

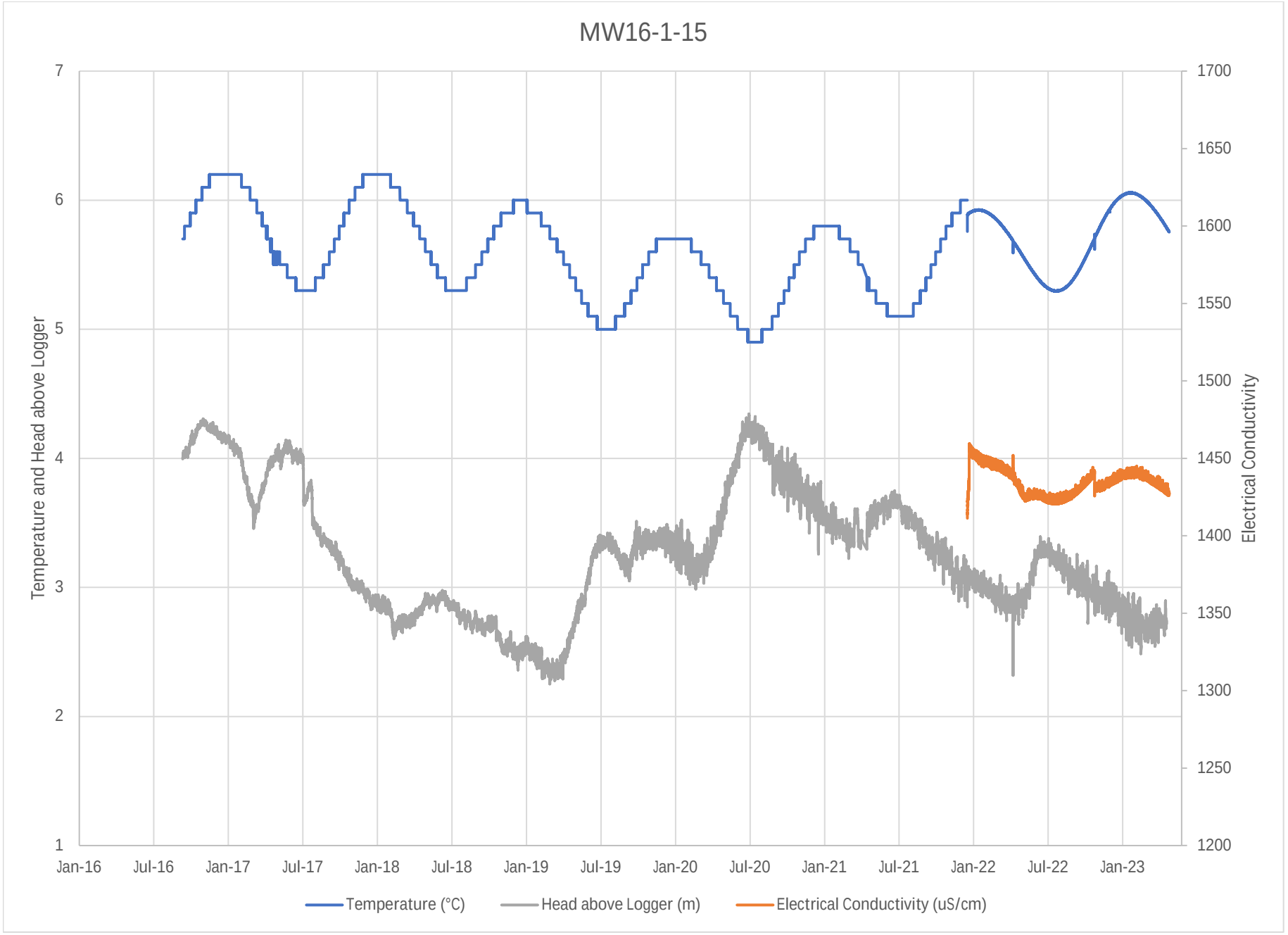
Screen Interval: 10.50 - 12.00 m BGS
Sand Pack Interval: 10.20 - 12.00 m BGS
Well Seal Interval: 0.00 - 10.20 m BGS

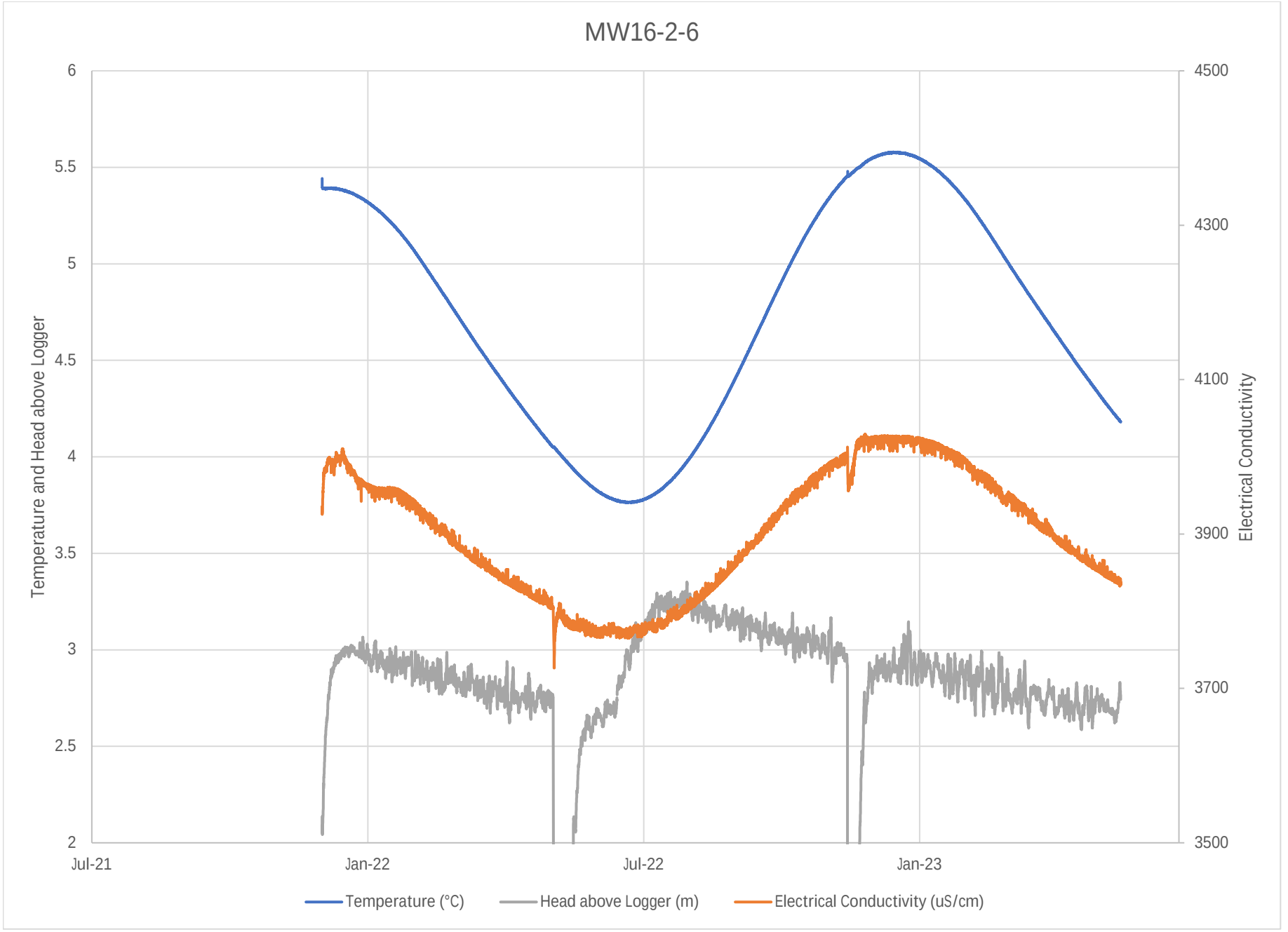
Notes:
m BGS - metres below ground surface
n/a - not available

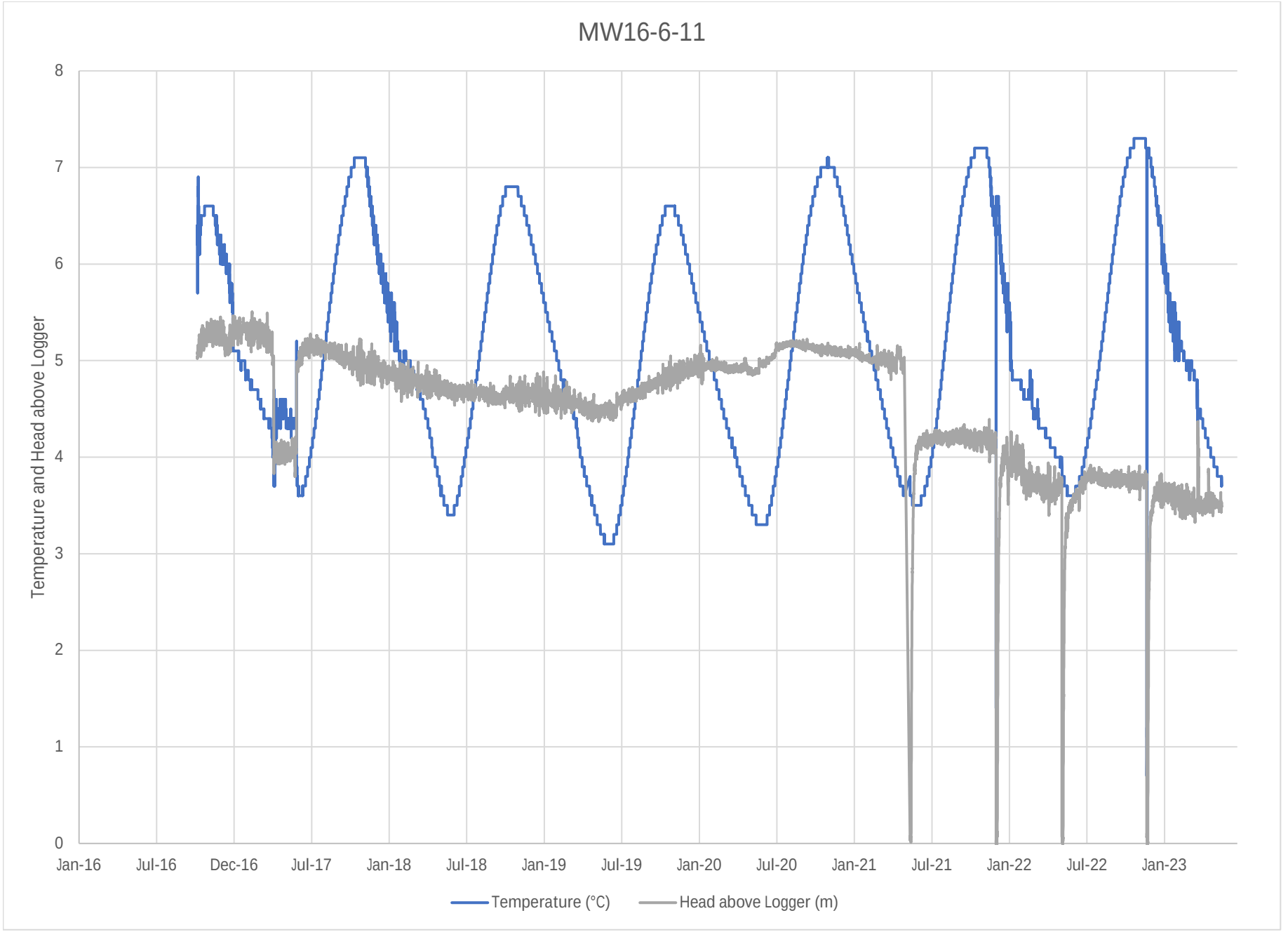
Soil strength (consistency) and plasticity terms are for descriptive purposes only and must not be used for design or construction purposes.

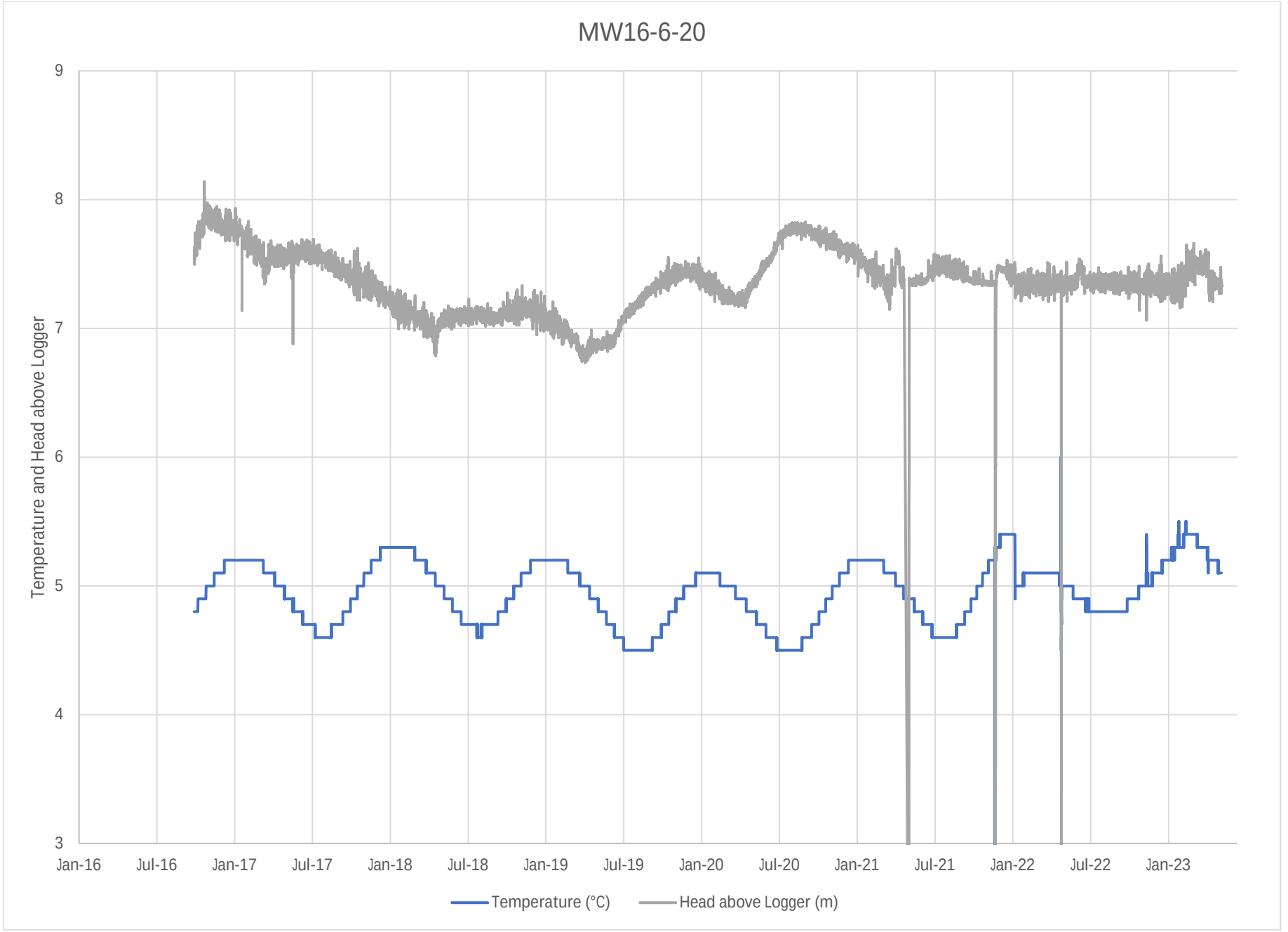
Drawn By/Checked By: D.K.

Appendix C Data Logging Pressure Transducer Data

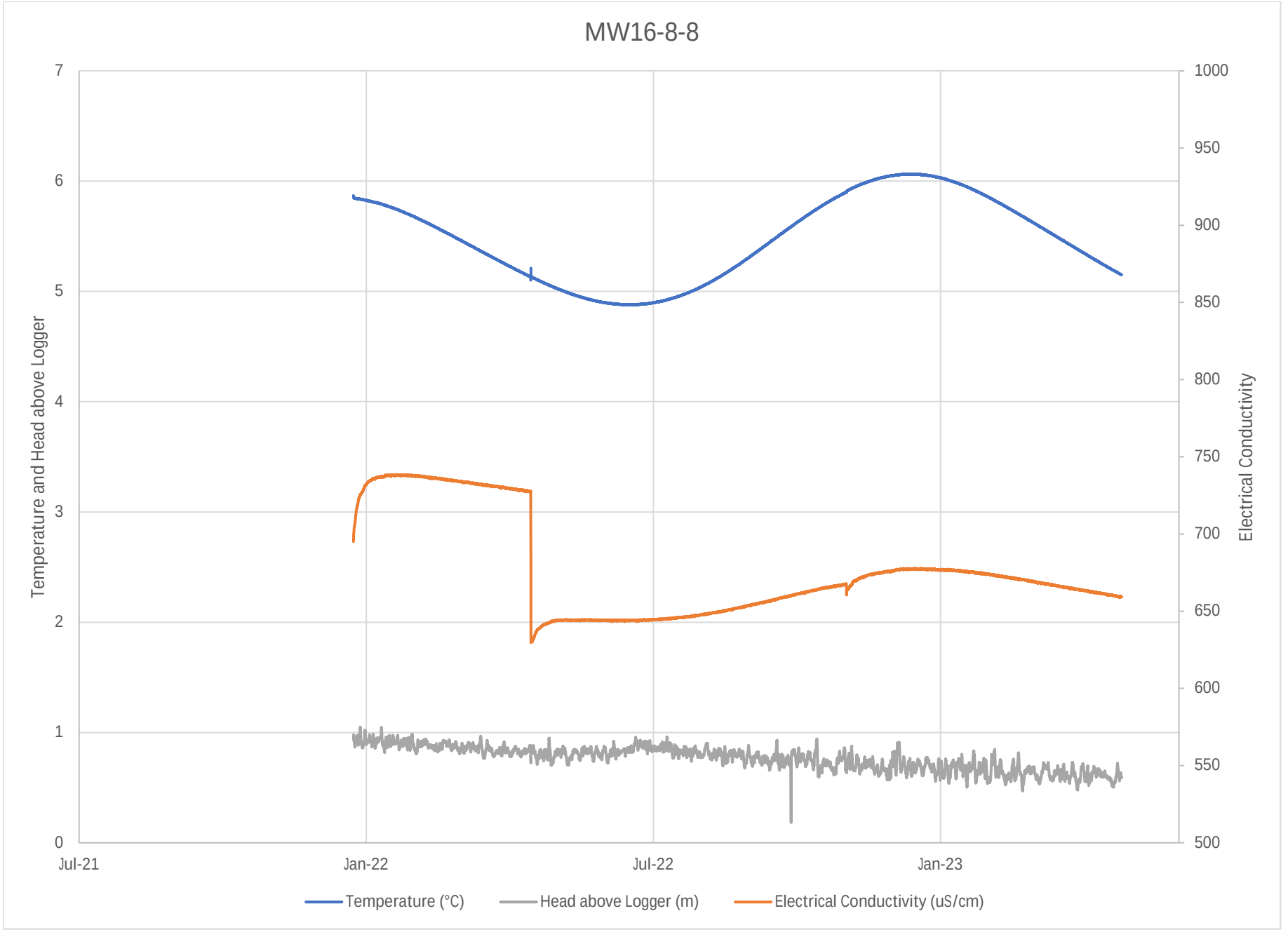

MW16-1-15
Temperature and Head above Logger
Electrical Conductivity
7
6
5
4
3
2
1
1700
1650
1600
1550
1500
1450
1400
1350
1300
1250
1200
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

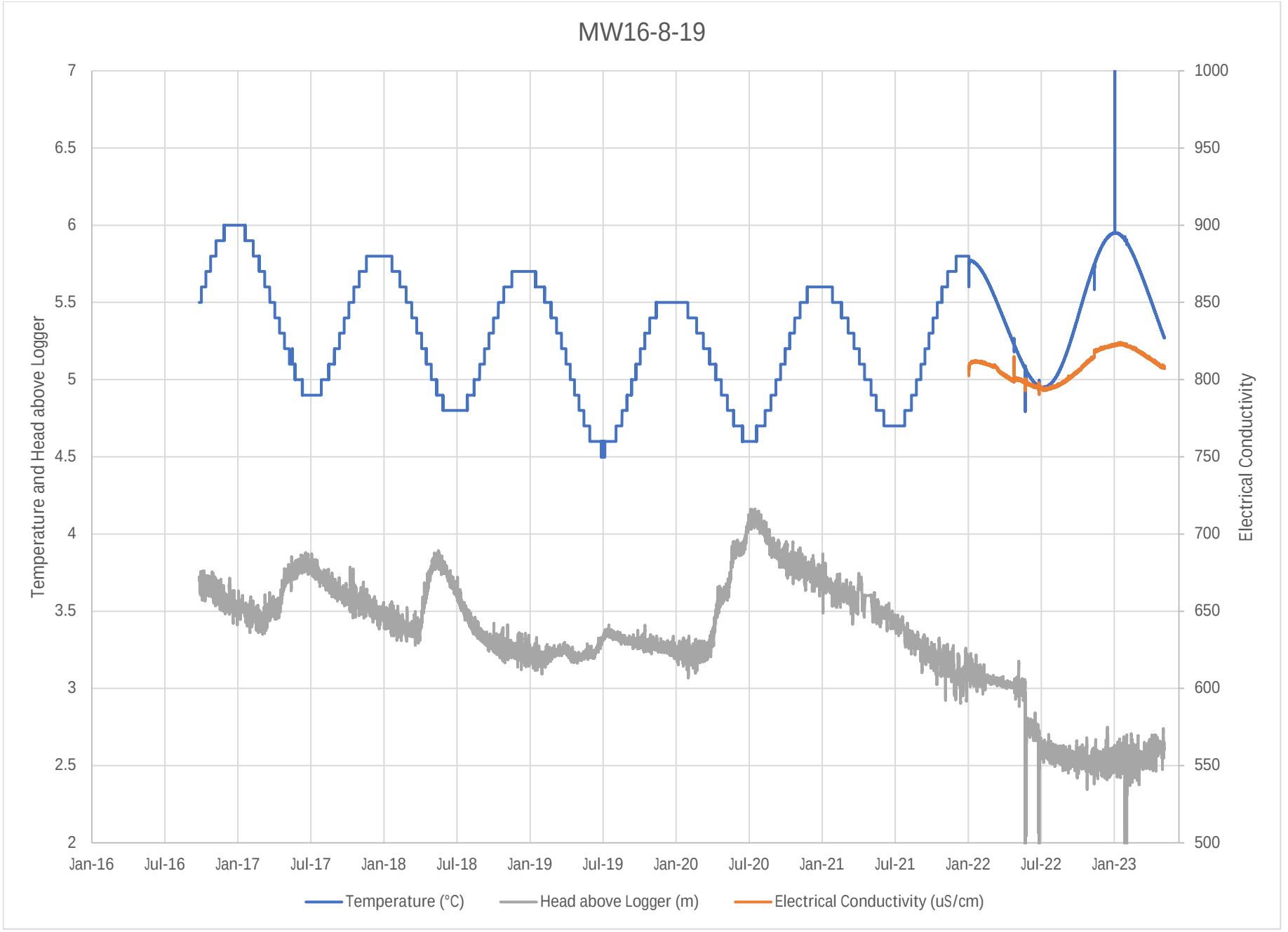

MW16-2-6
Temperature and Head above Logger
Electrical Conductivity
6
5.5
5
4.5
4
3.5
3
2.5
2
4500
4300
4100
3900
3700
3500
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

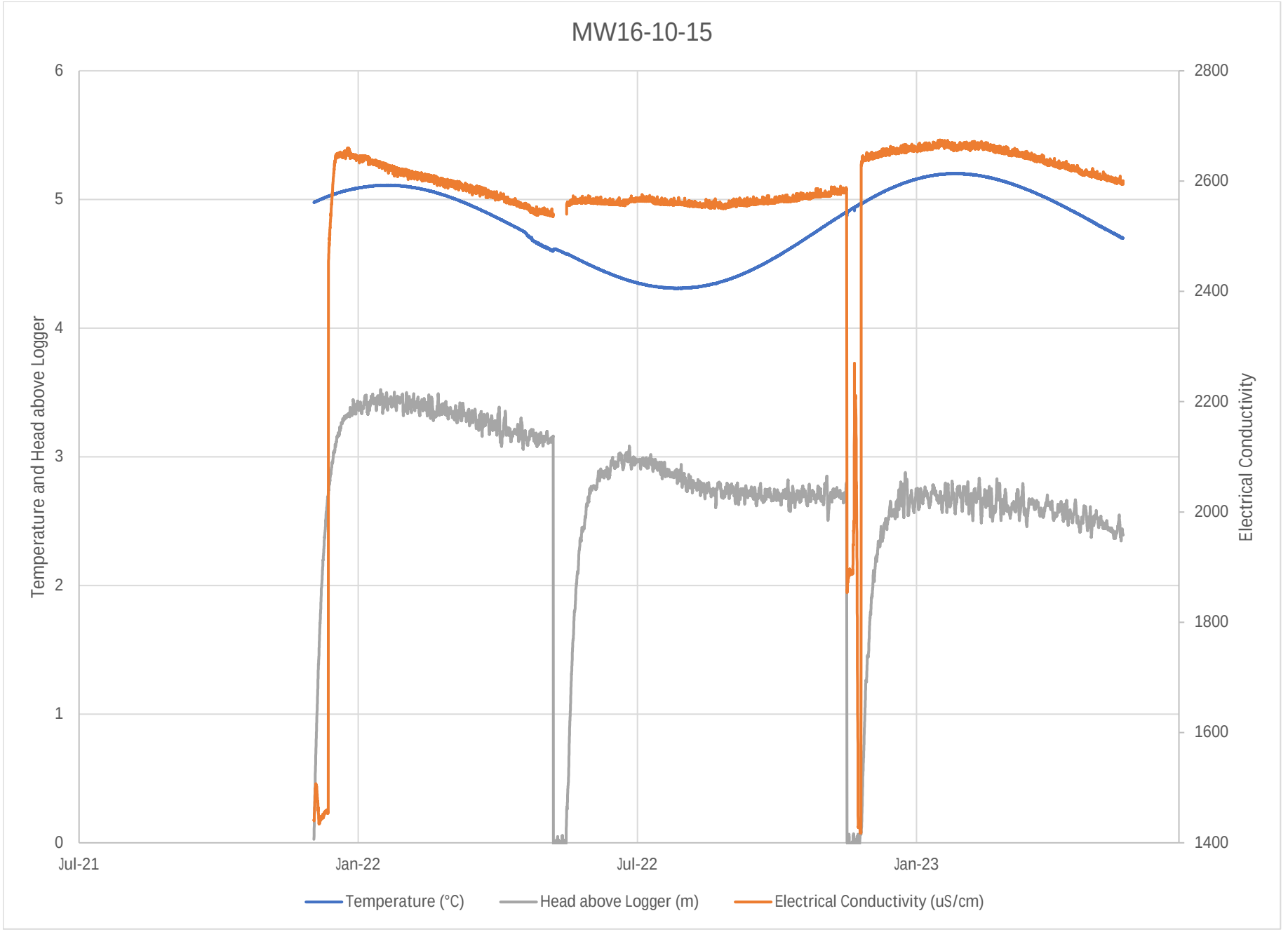

MW16-6-11
Temperature and Head above Logger
8
7
6
5
4
3
2
1
0
Jan-16
Jul-16
Dec-16
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)

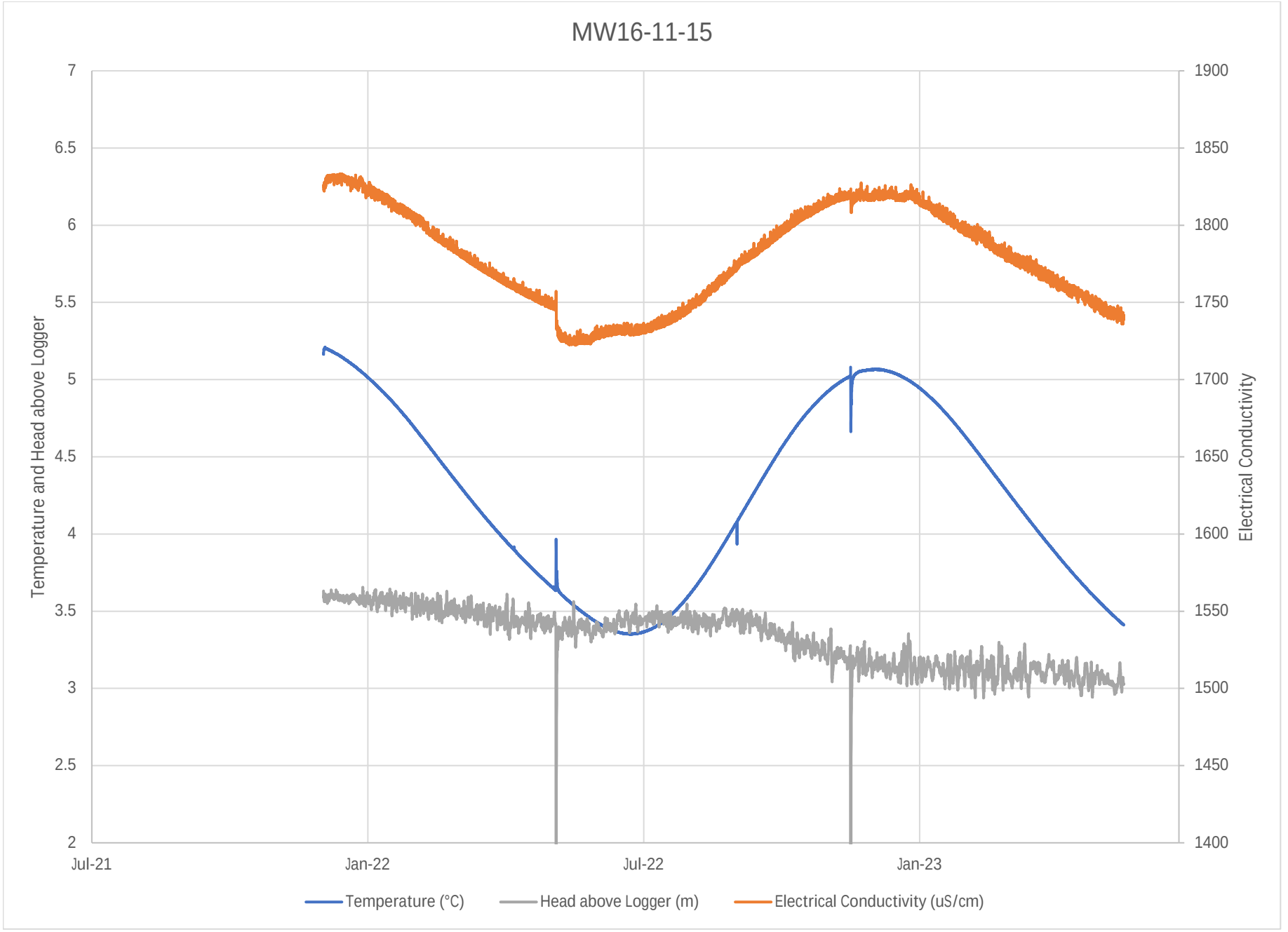

MW16-6-20
Temperature and Head above Logger
9
8
7
6
5
4
3
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)

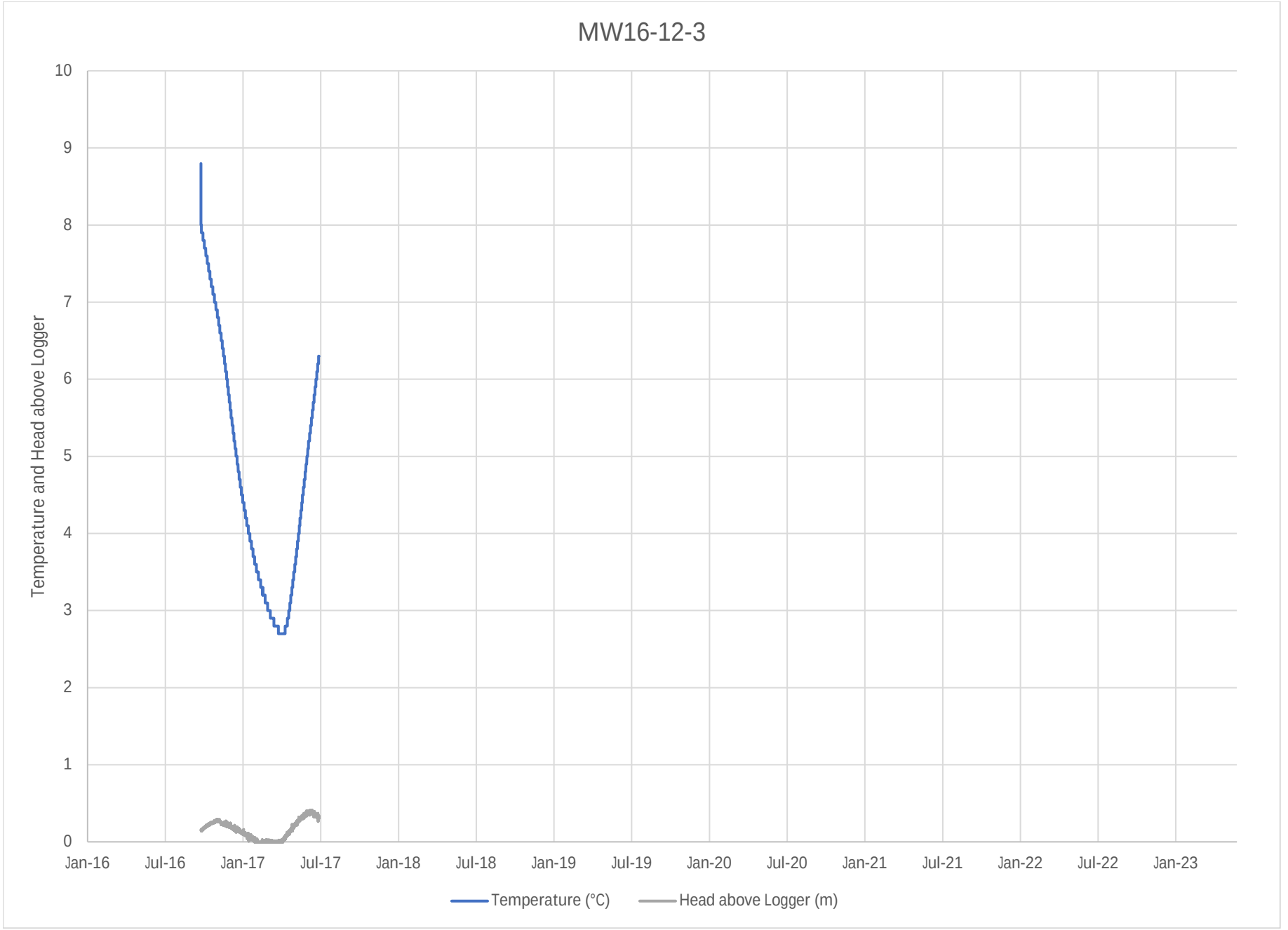

MW16-7-5
Temperature and Head above Logger
Electrical Conductivity
0
1
2
3
4
5
6
7
1900
1950
2000
2050
2100
2150
2200
2250
2300
2350
2400
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

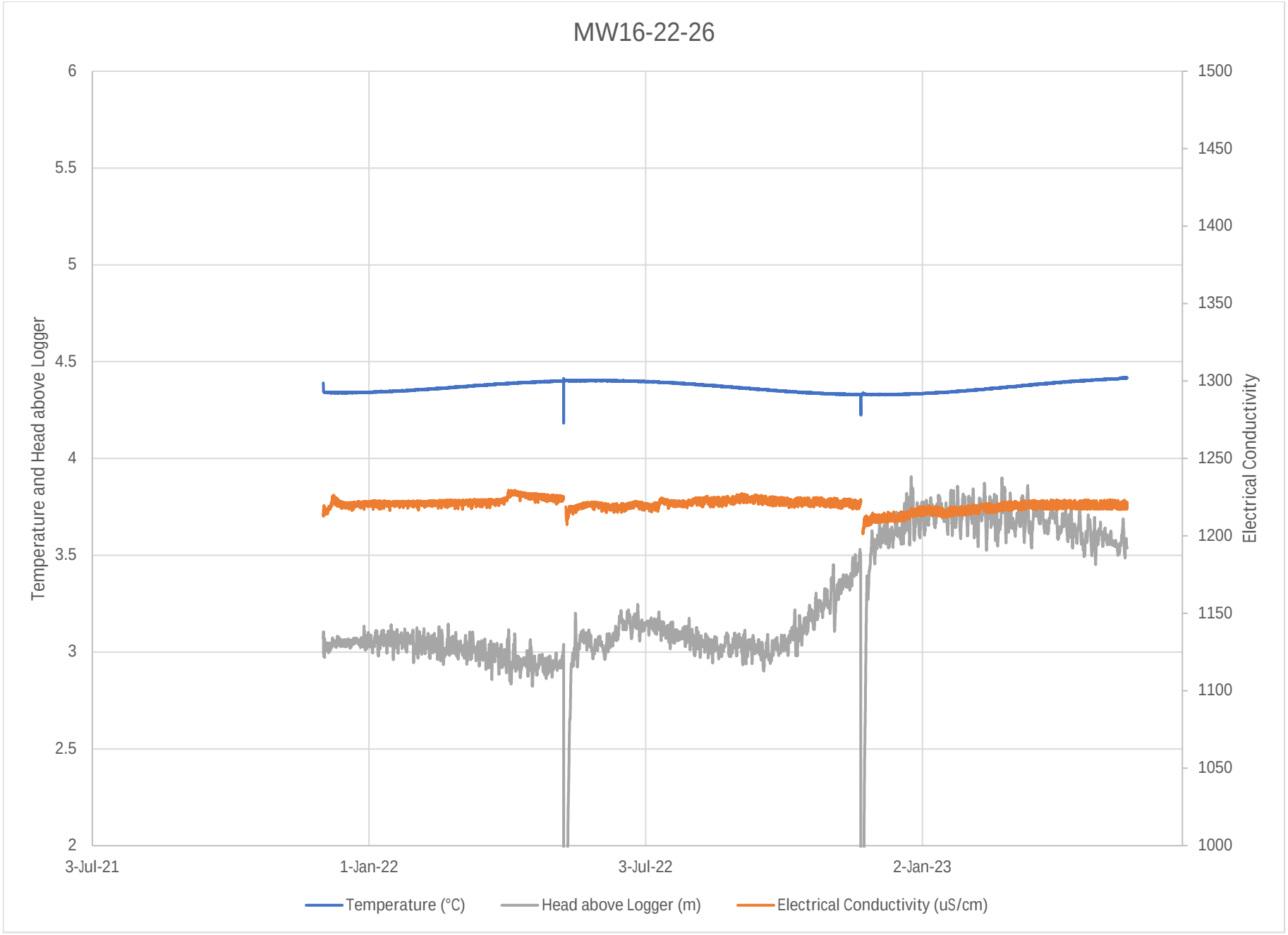

MW16-8-8
Temperature and Head above Logger
Electrical Conductivity
0
1
2
3
4
5
6
7
500
550
600
650
700
750
800
850
900
950
1000
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

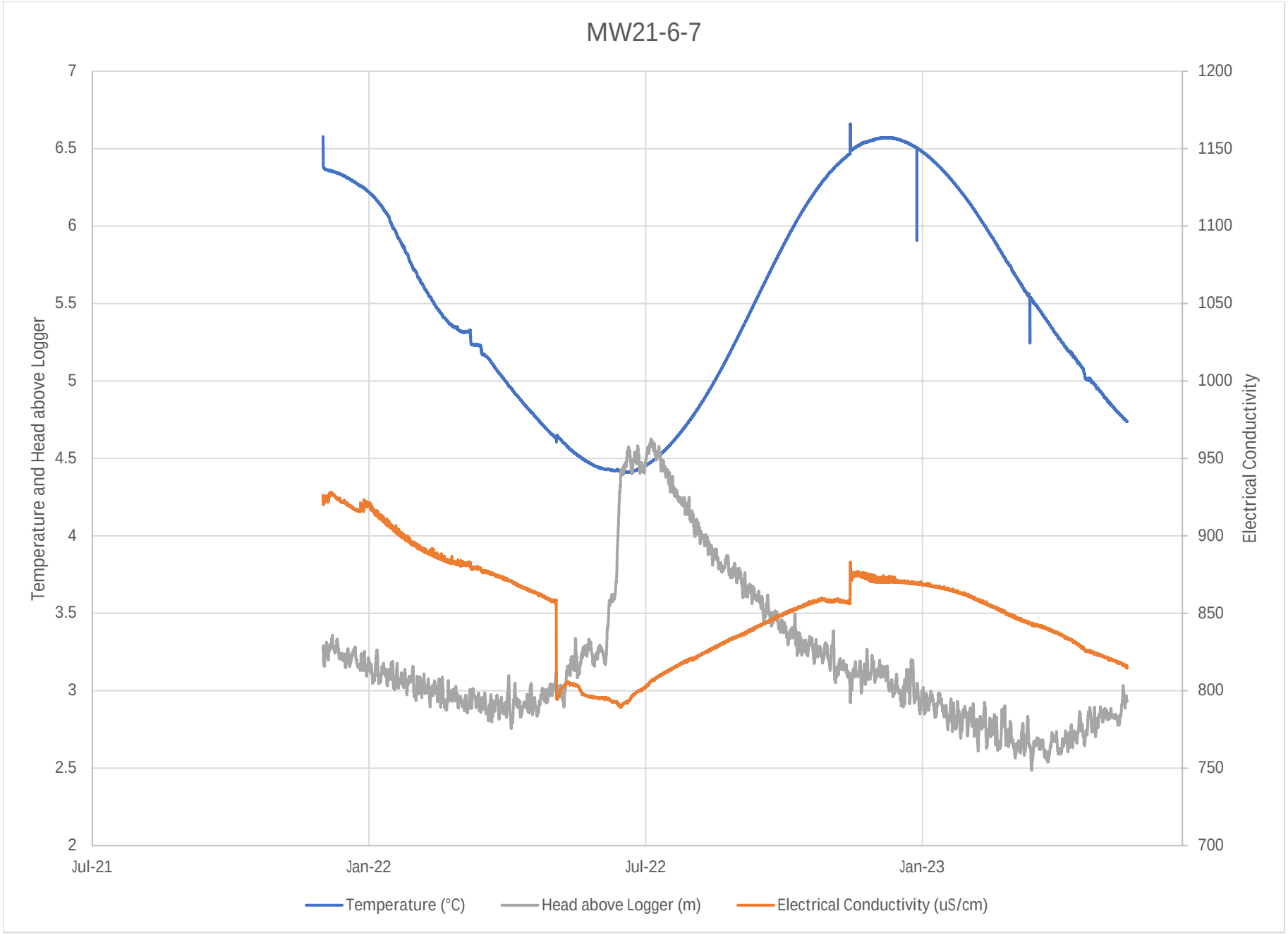

MW16-8-19
Temperature and Head above Logger
Electrical Conductivity
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1000
950
900
850
800
750
700
650
600
550
500
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

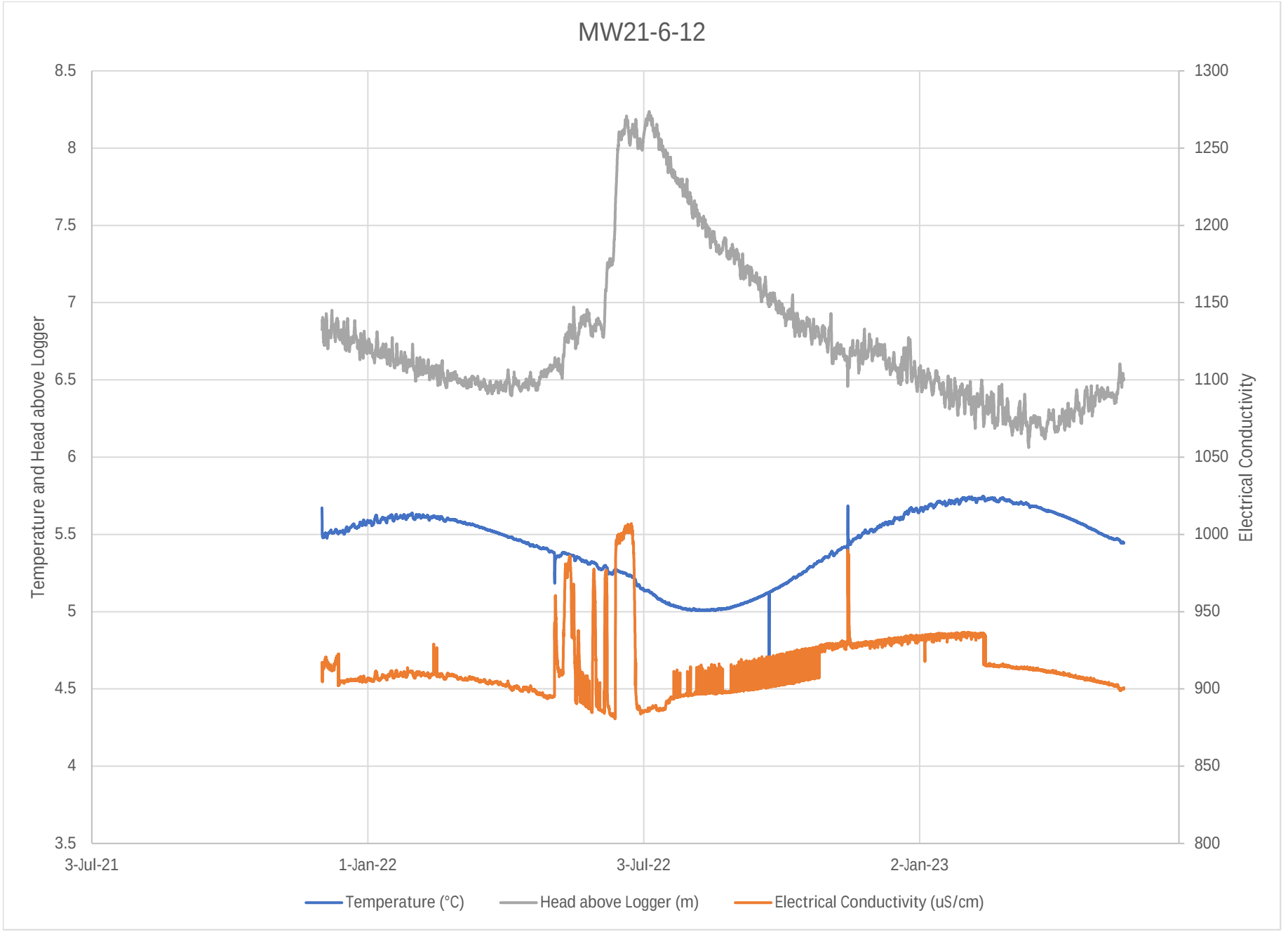

MW16-10-15
Temperature and Head above Logger
Electrical Conductivity
6
5
4
3
2
1
0
2800
2600
2400
2200
2000
1800
1600
1400
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

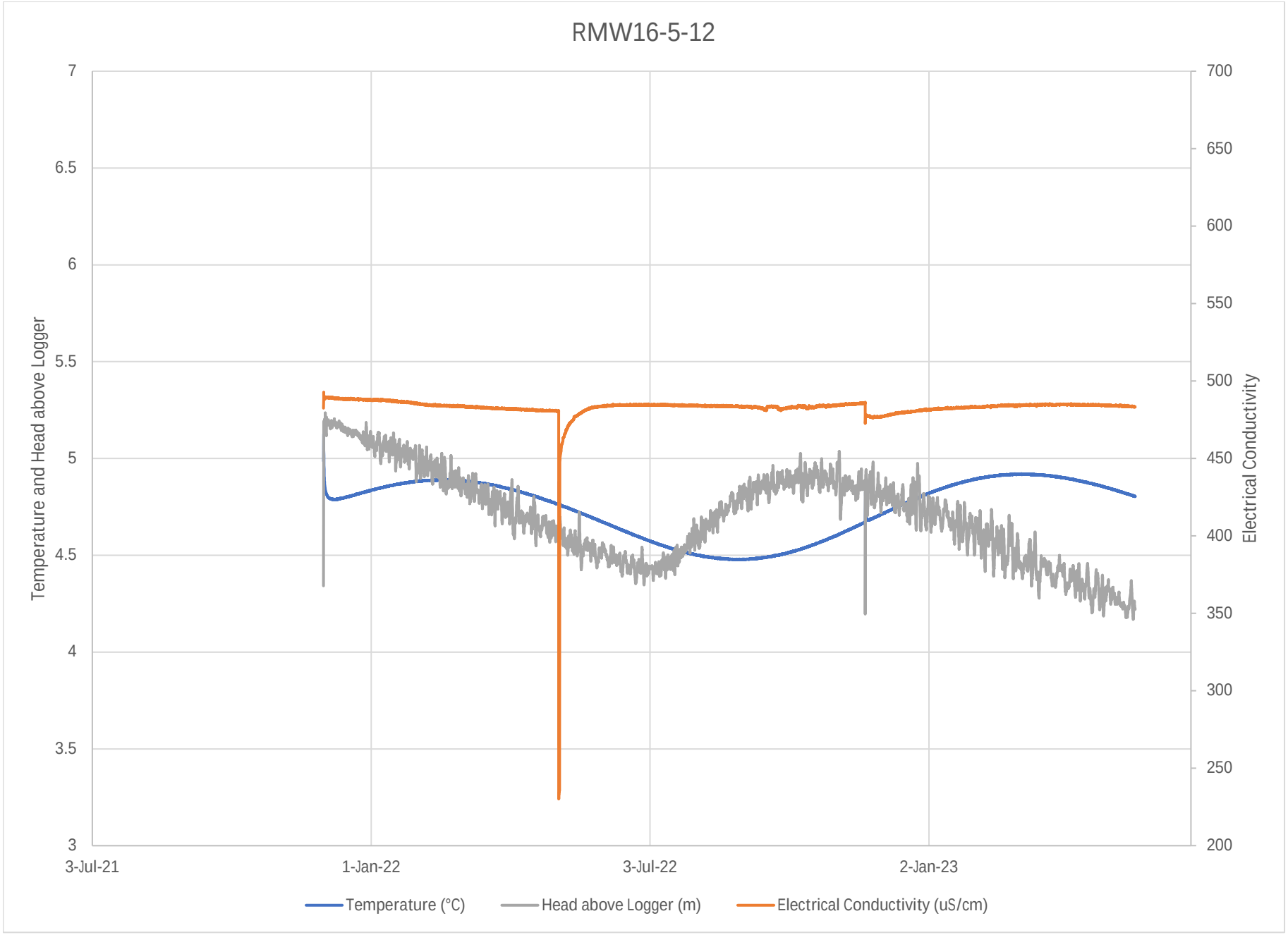

MW16-11-15
Temperature and Head above Logger
Electrical Conductivity
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1900
1850
1800
1750
1700
1650
1600
1550
1500
1450
1400
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

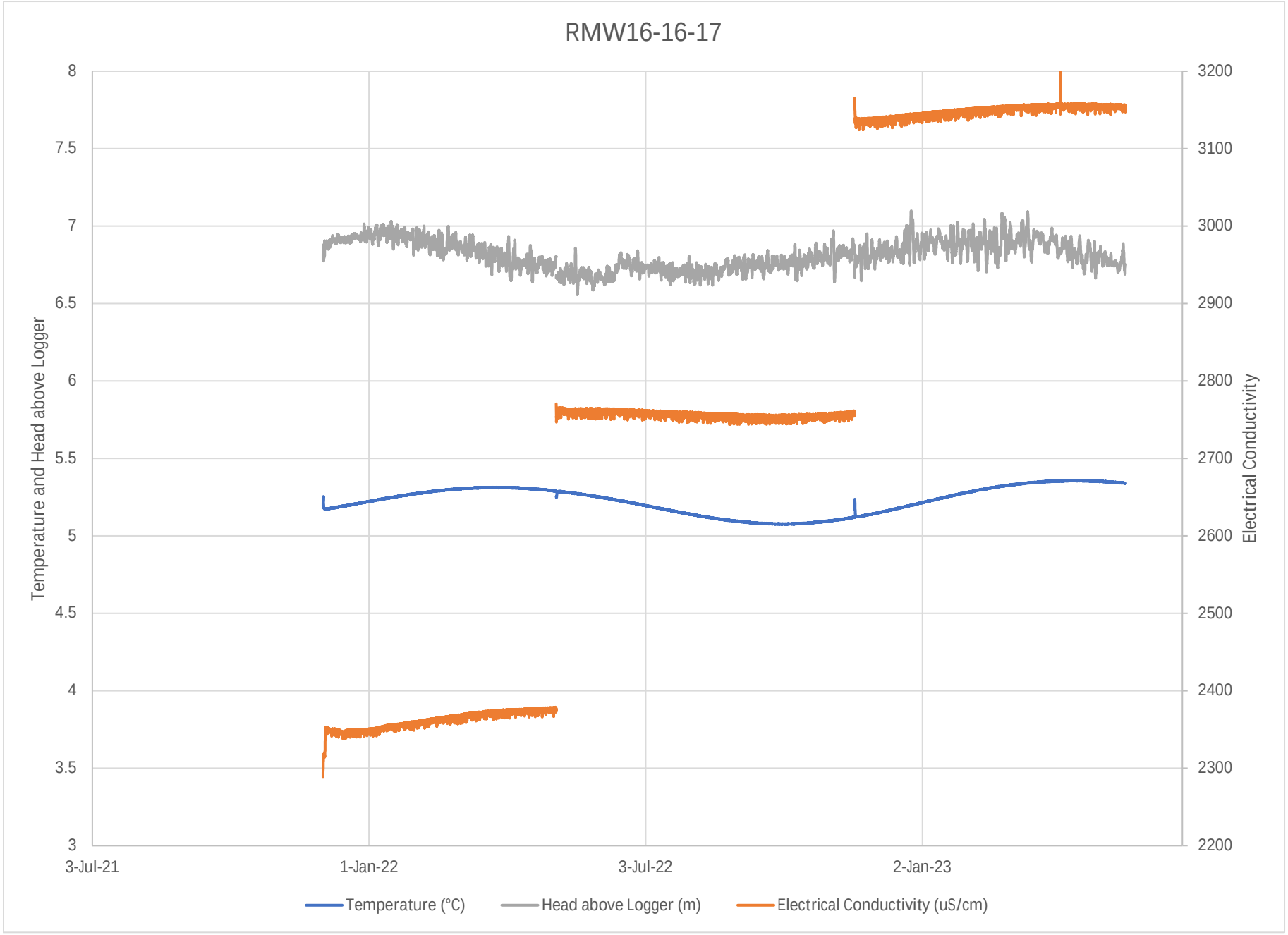

MW16-12-3
Temperature and Head above Logger
10
9
8
7
6
5
4
3
2
1
0
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)

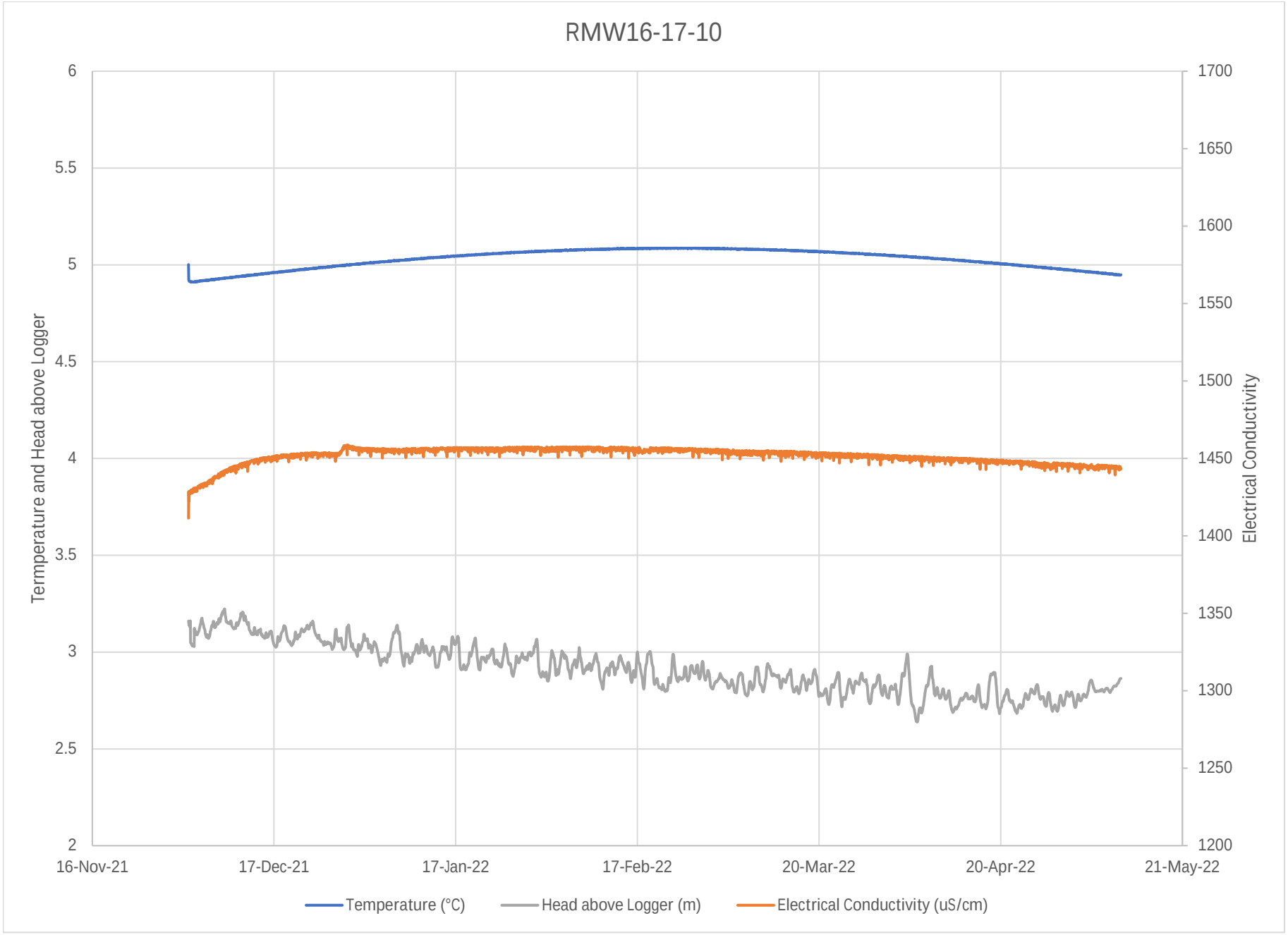

MW16-22-26
Temperature and Head above Logger
Electrical Conductivity
6
5.5
5
4.5
4
3.5
3
2.5
2
1500
1450
1400
1350
1300
1250
1200
1150
1100
1050
1000
3-Jul-21
1-Jan-22
3-Jul-22
2-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

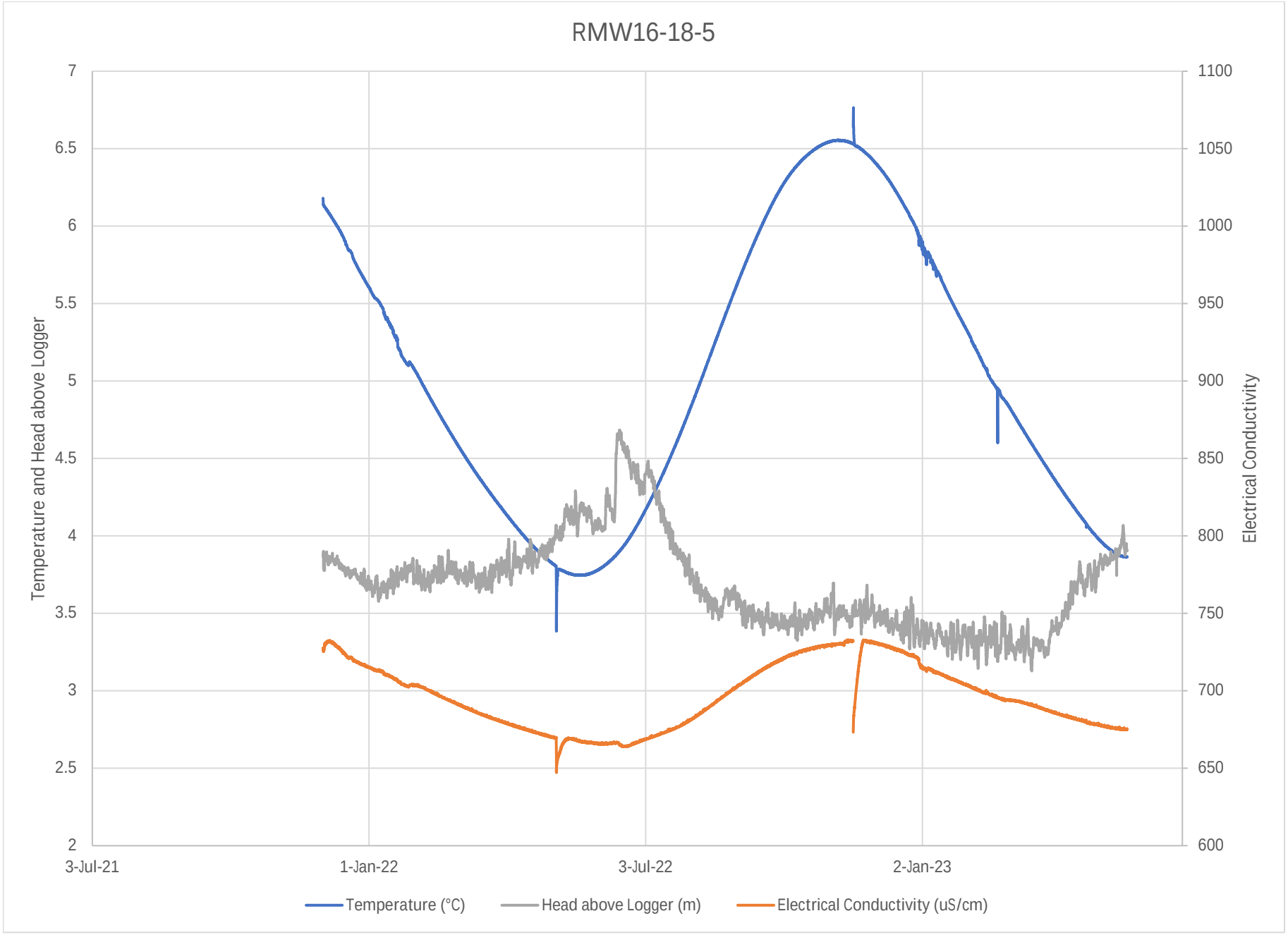

MW21-6-7
Temperature and Head above Logger
Electrical Conductivity
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1200
1150
1100
1050
1000
950
900
850
800
750
700
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

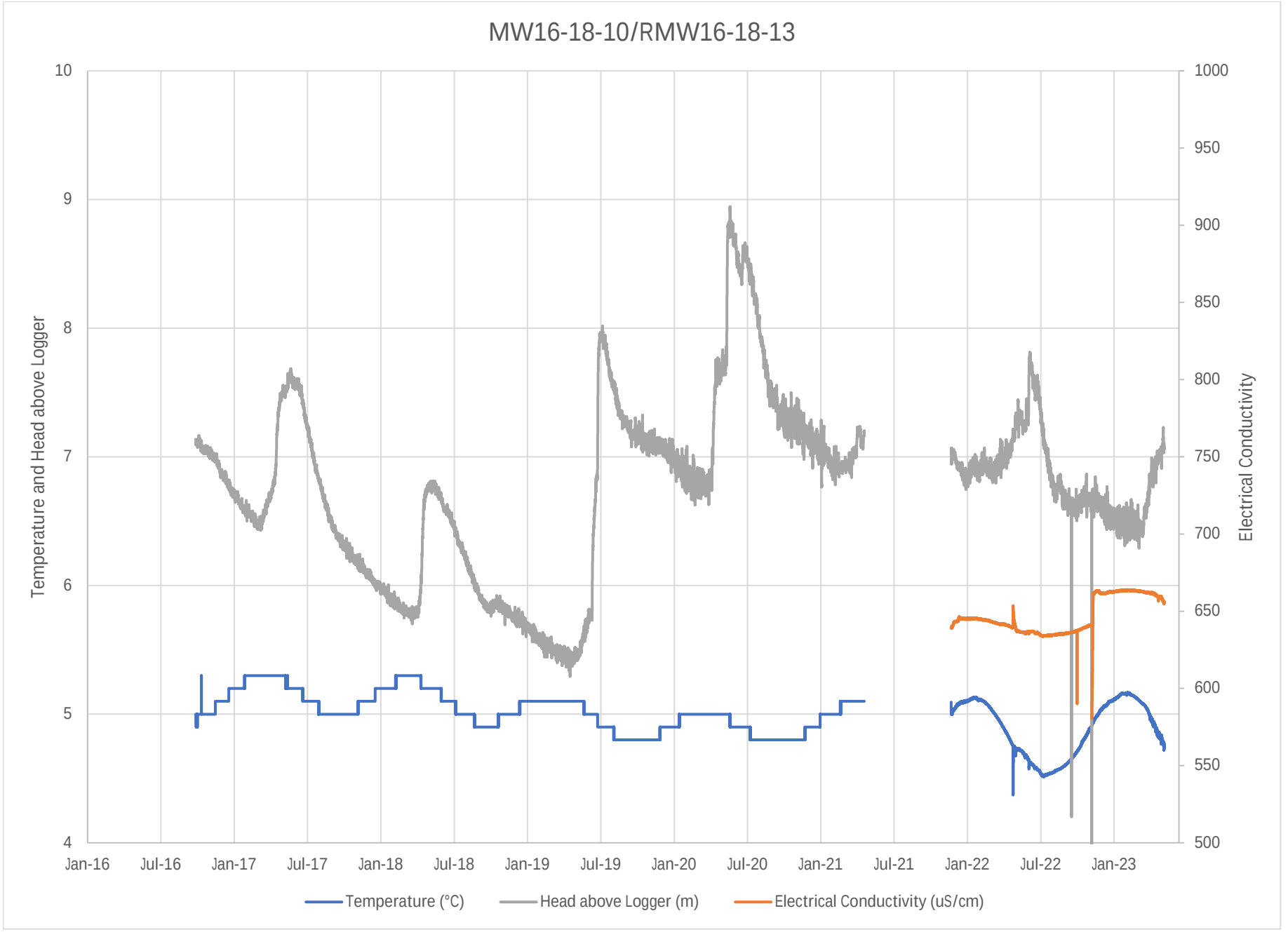

MW21-6-12
Temperature and Head above Logger
Electrical Conductivity
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
1300
1250
1200
1150
1100
1050
1000
950
900
850
800
3-Jul-21
1-Jan-22
3-Jul-22
2-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

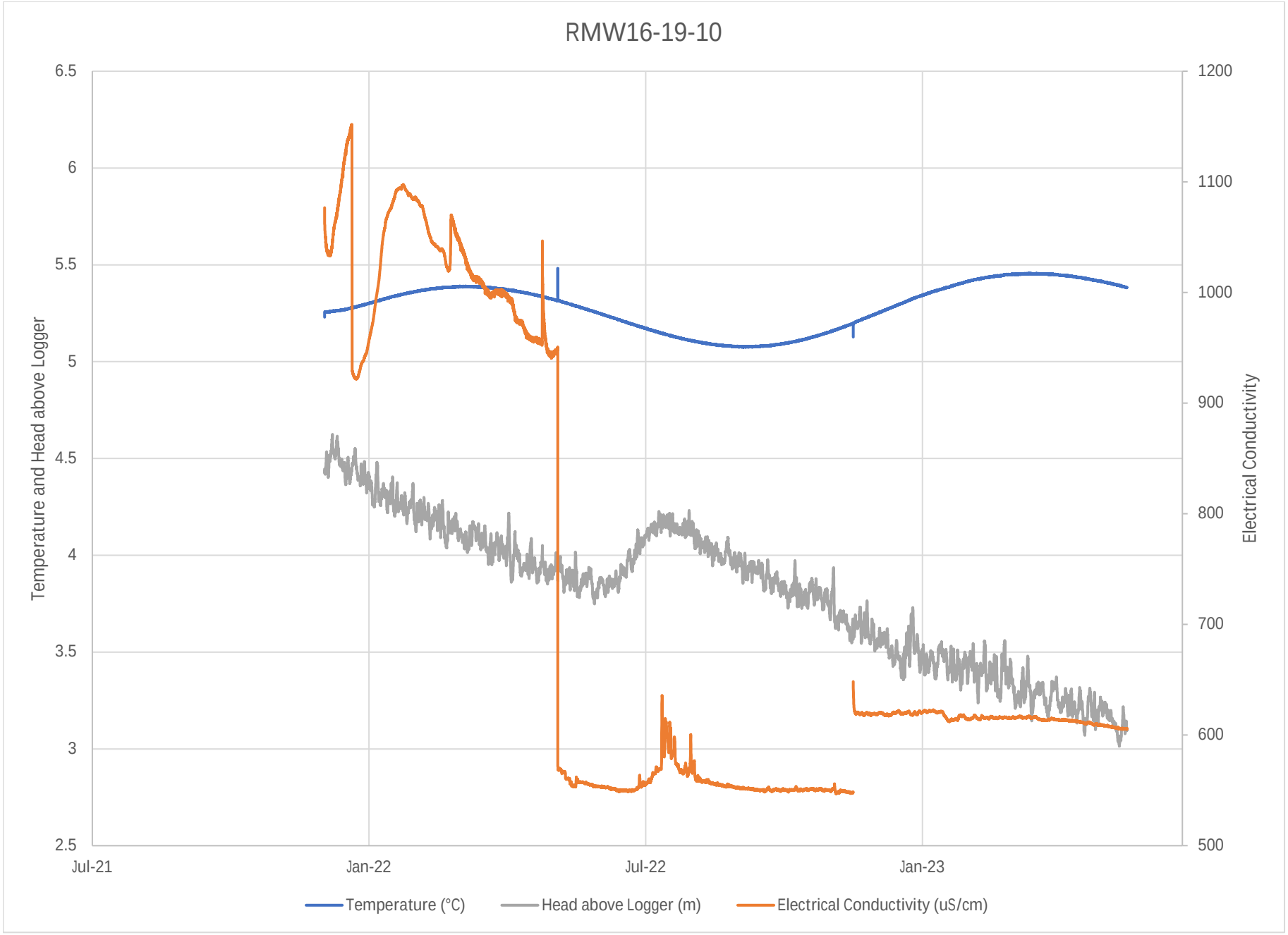

RMW16-5-12
Temperature and Head above Logger
Electrical Conductivity
7
6.5
6
5.5
5
4.5
4
3.5
3
700
650
600
550
500
450
400
350
300
250
200
3-Jul-21
1-Jan-22
3-Jul-22
2-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

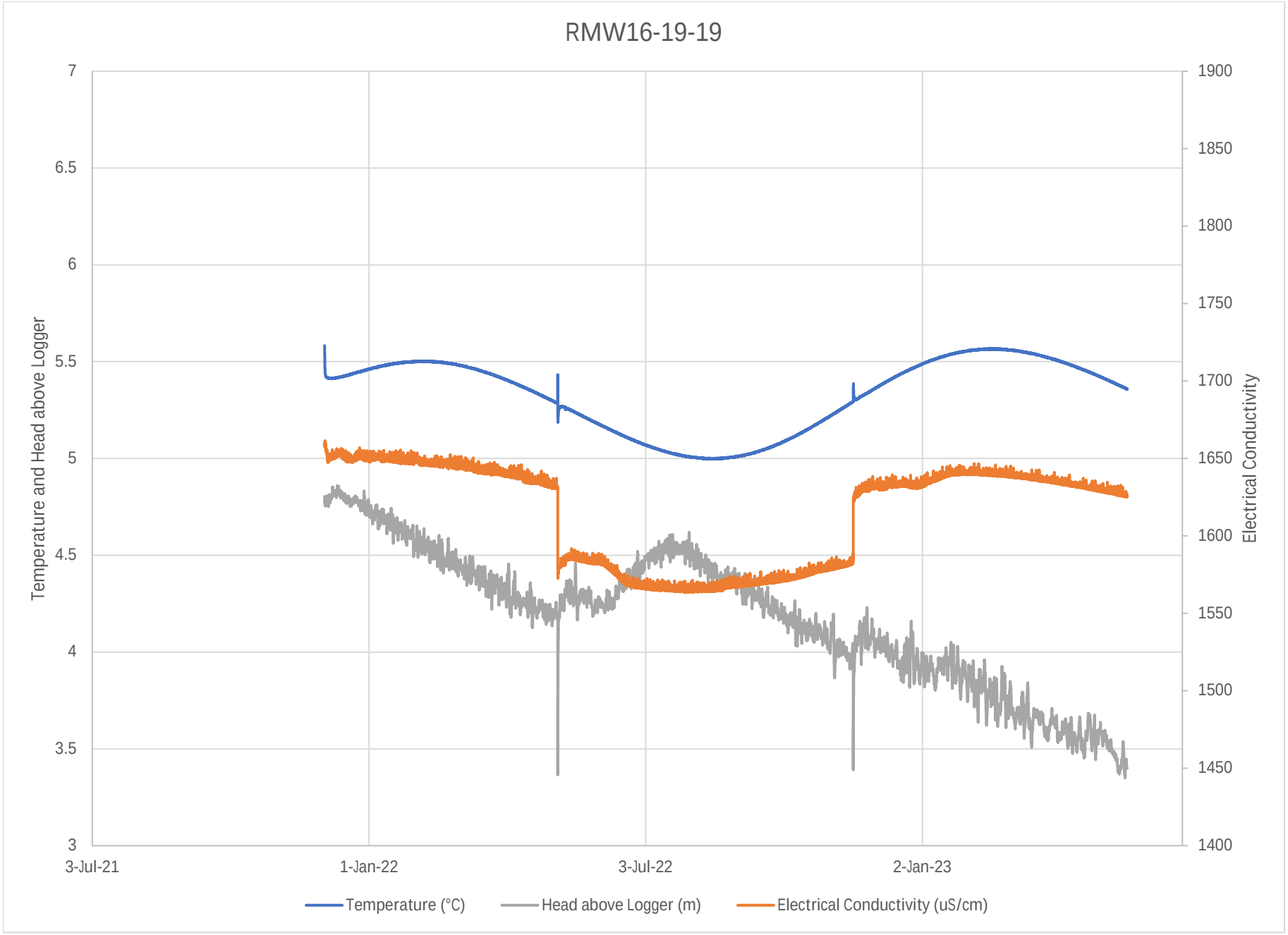

RMW16-16-17
Temperature and Head above Logger
Electrical Conductivity
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
3-Jul-21
1-Jan-22
3-Jul-22
2-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

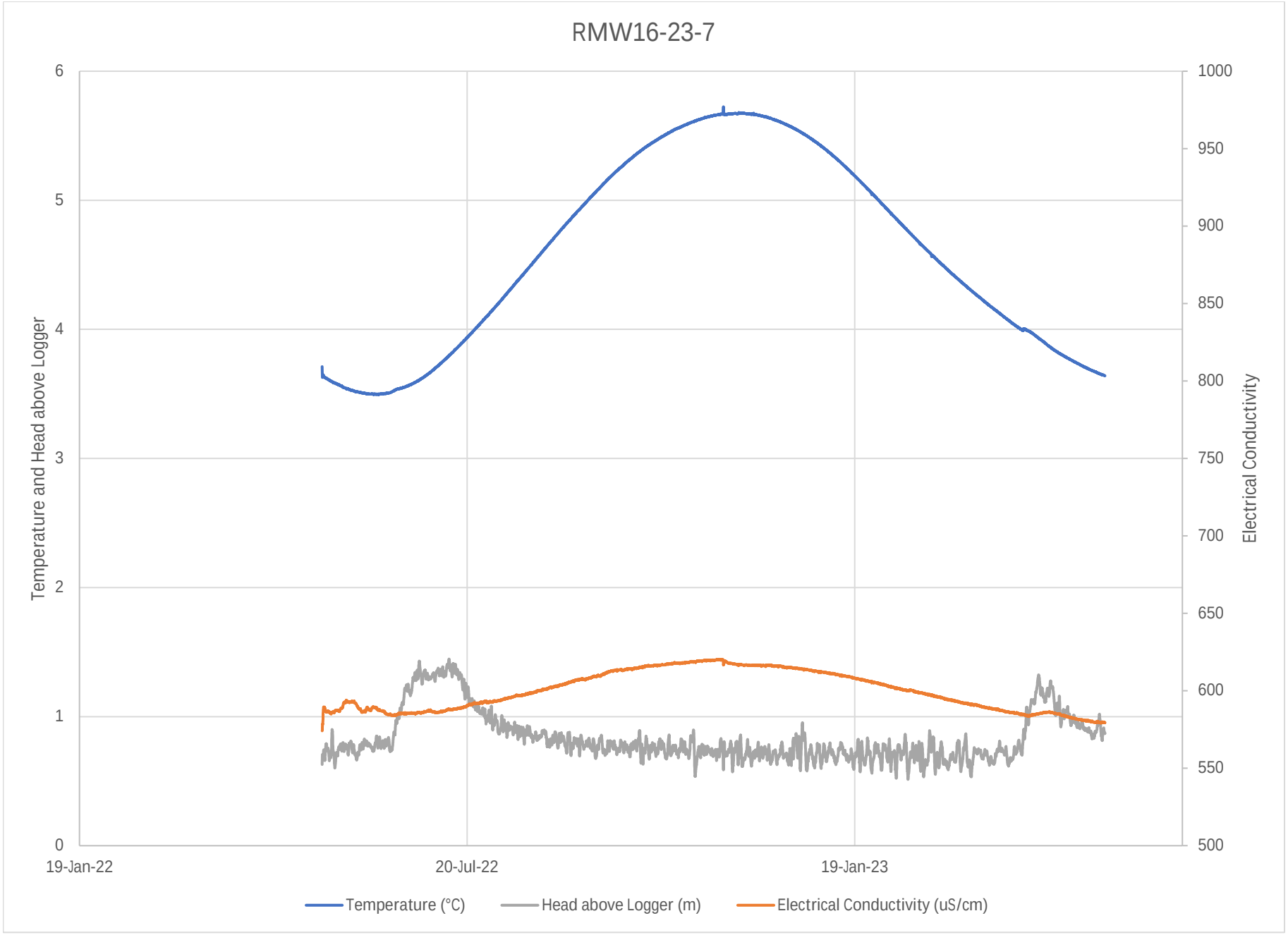

RMW16-17-10
Termperature and Head above Logger
Electrical Conductivity
6
5.5
5
4.5
4
3.5
3
2.5
2
1700
1650
1600
1550
1500
1450
1400
1350
1300
1250
1200
16-Nov-21
17-Dec-21
17-Jan-22
17-Feb-22
20-Mar-22
20-Apr-22
21-May-22
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

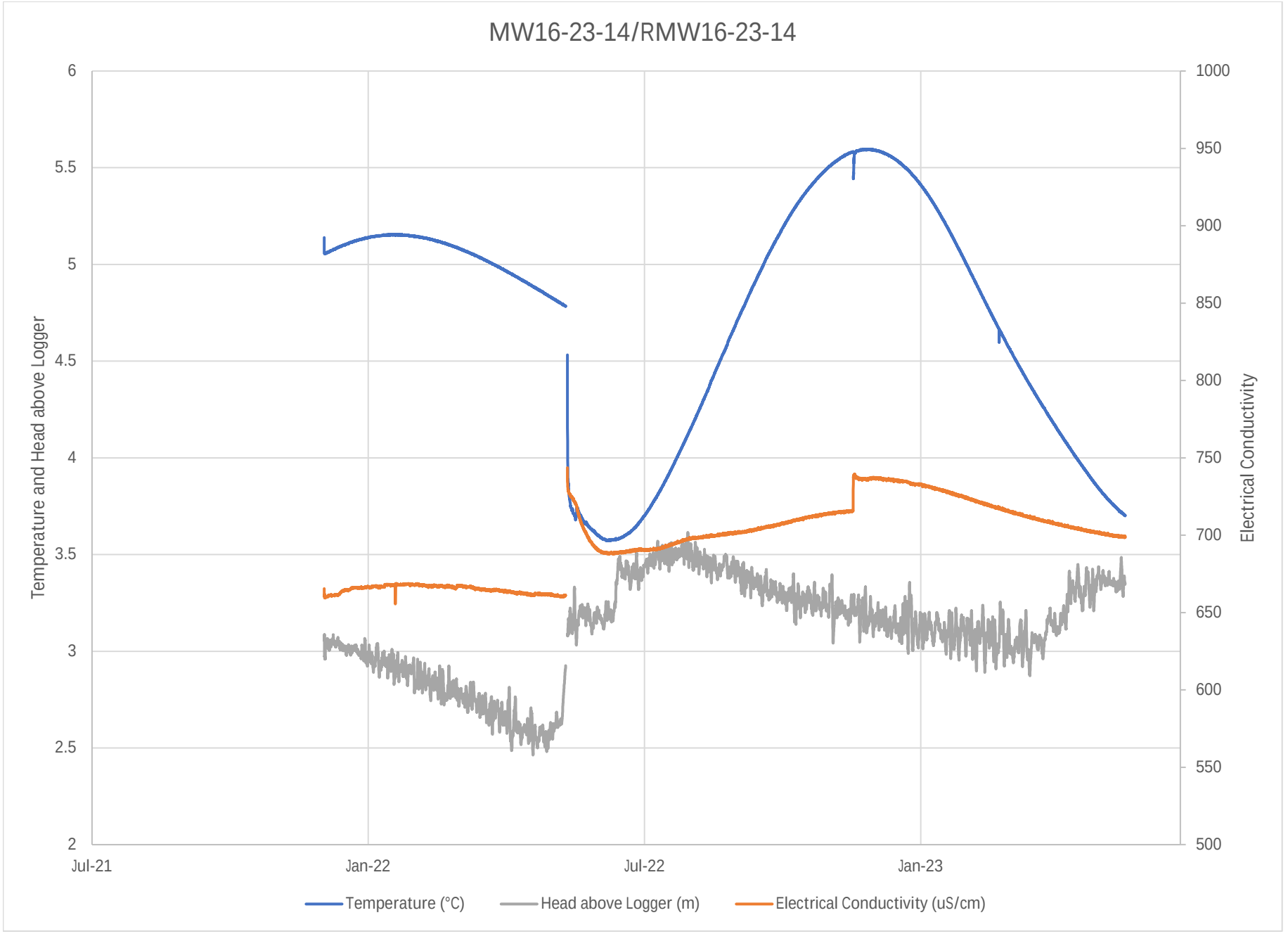

RMW16-18-5
Temperature and Head above Logger
Electrical Conductivity
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1100
1050
1000
950
900
850
800
750
700
650
600
3-Jul-21
1-Jan-22
3-Jul-22
2-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

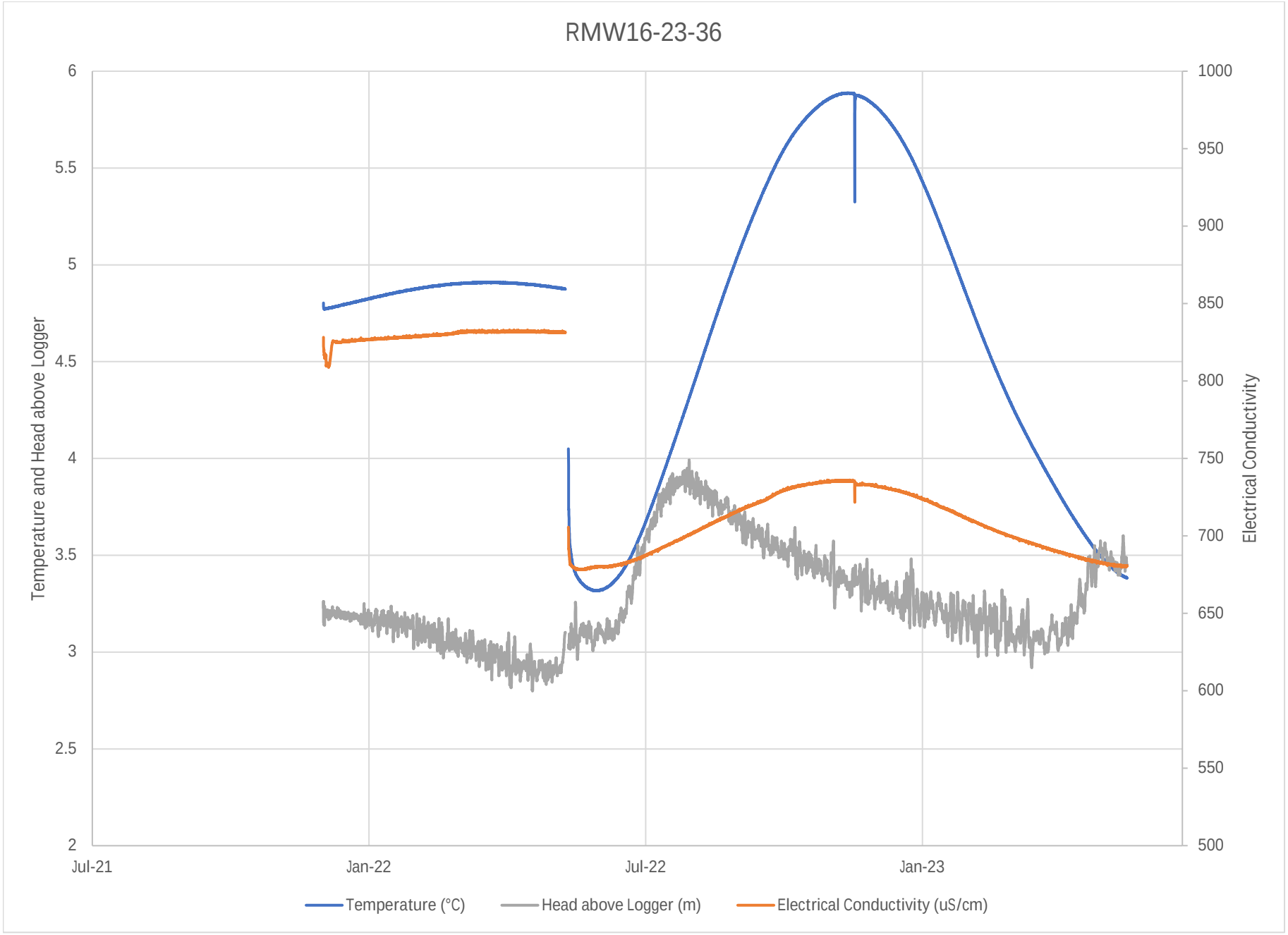

MW16-18-10/RMW16-18-13
Temperature and Head above Logger
Electrical Conductivity
10
9
8
7
6
5
4
1000
950
900
850
800
750
700
650
600
550
500
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

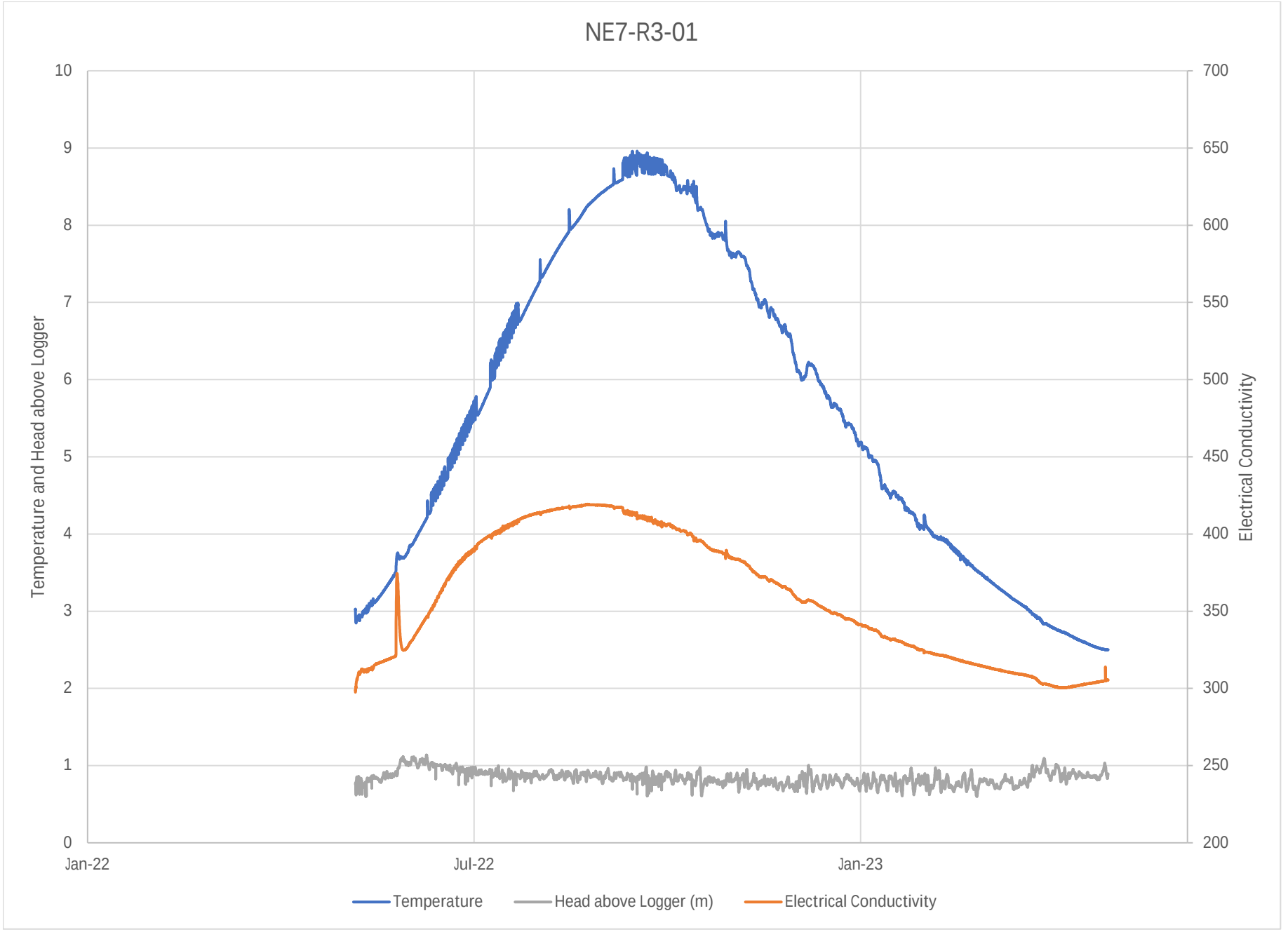

RMW16-19-10
Temperature and Head above Logger
Electrical Conductivity
6.5
6
5.5
5
4.5
4
3.5
3
2.5
1200
1100
1000
900
800
700
600
500
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

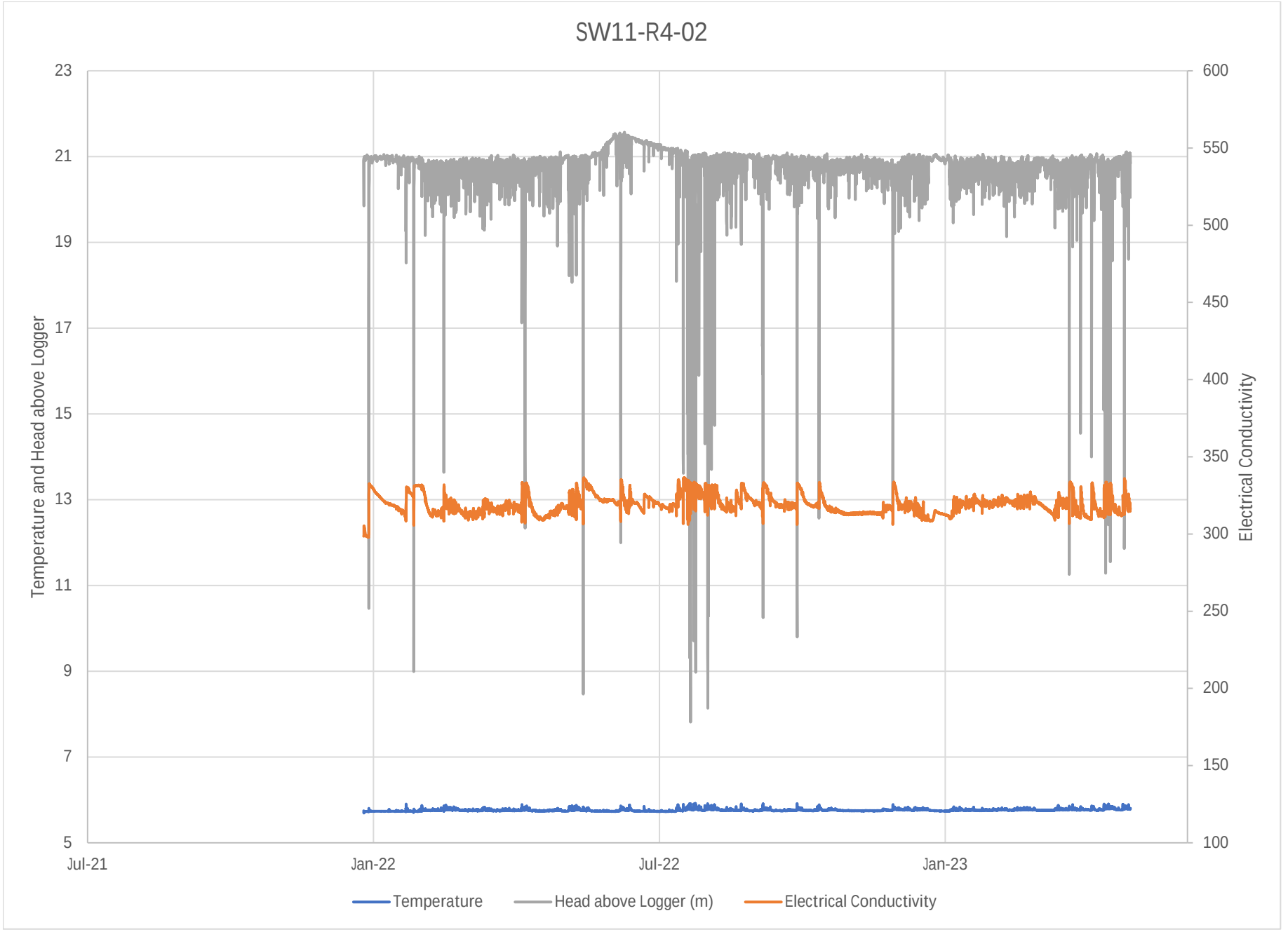

RMW16-19-19
Temperature and Head above Logger
Electrical Conductivity
7
6.5
6
5.5
5
4.5
4
3.5
3
1900
1850
1800
1750
1700
1650
1600
1550
1500
1450
1400
3-Jul-21
1-Jan-22
3-Jul-22
2-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

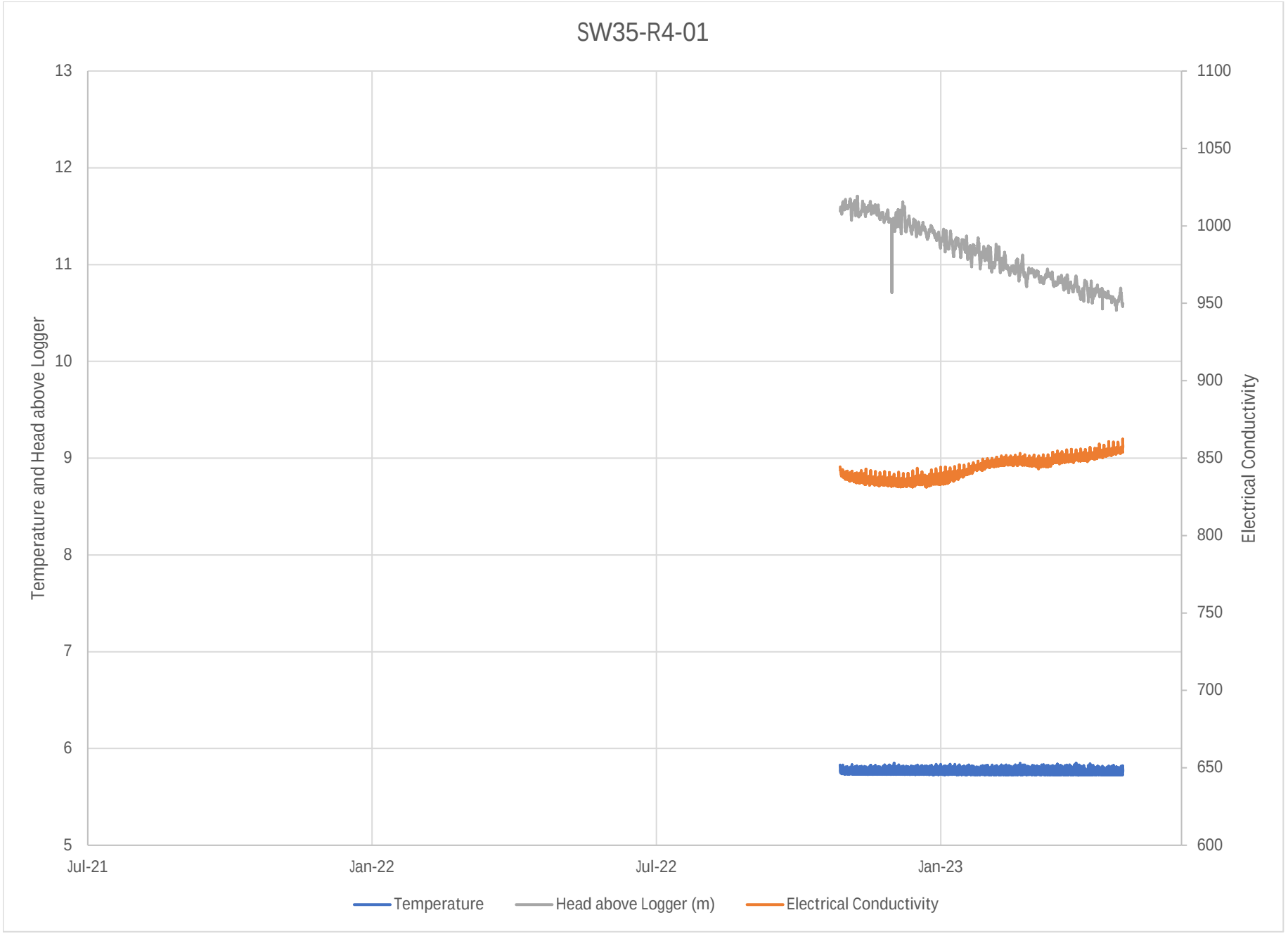

RMW16-23-7
Temperature and Head above Logger
Electrical Conductivity
6
5
4
3
2
1
0
1000
950
900
850
800
750
700
650
600
550
500
19-Jan-22
20-Jul-22
19-Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

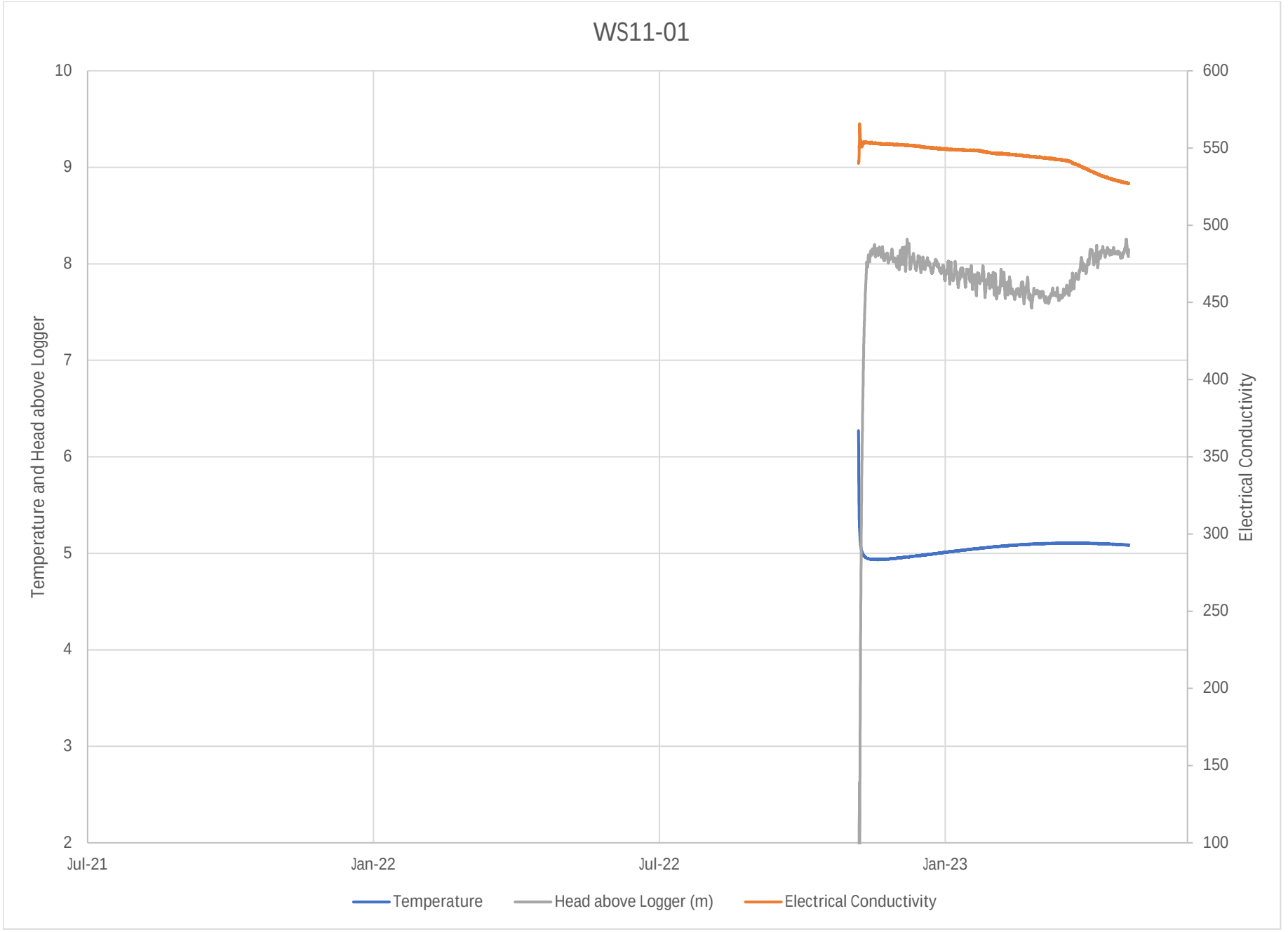

MW16-23-14/RMW16-23-14
Temperature and Head above Logger
Electrical Conductivity
6
5.5
5
4.5
4
3.5
3
2.5
2
1000
950
900
850
800
750
700
650
600
550
500
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

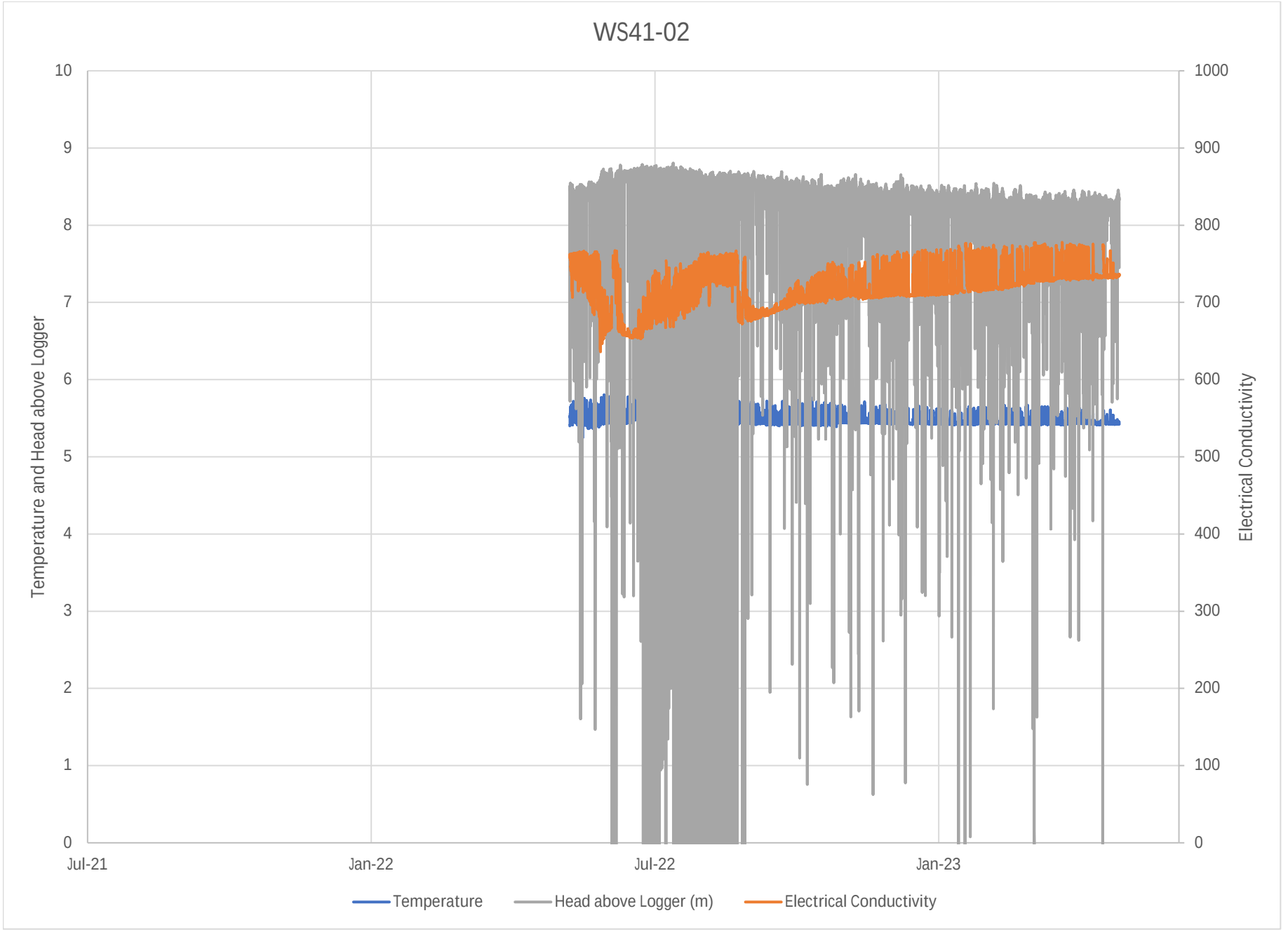

RMW16-23-36
Temperature and Head above Logger
Electrical Conductivity
6
5.5
5
4.5
4
3.5
3
2.5
2
1000
950
900
850
800
750
700
650
600
550
500
Jul-21
Jan-22
Jul-22
Jan-23
Temperature (°C)
Head above Logger (m)
Electrical Conductivity (uS/cm)

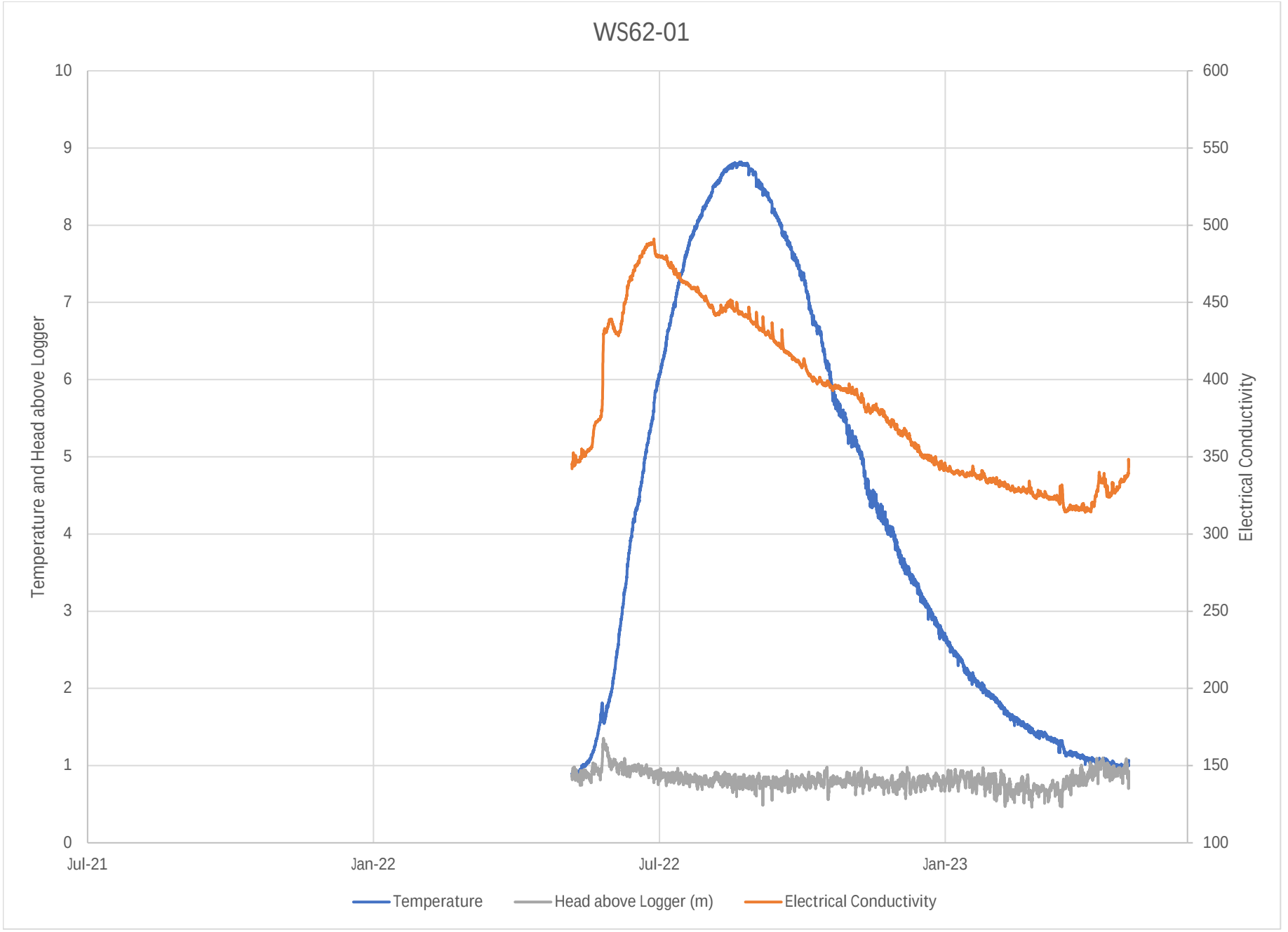

NE7-R3-01
Temperature and Head above Logger
Electrical Conductivity
10
9
8
7
6
5
4
3
2
1
0
700
650
600
550
500
450
400
350
300
250
200
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity

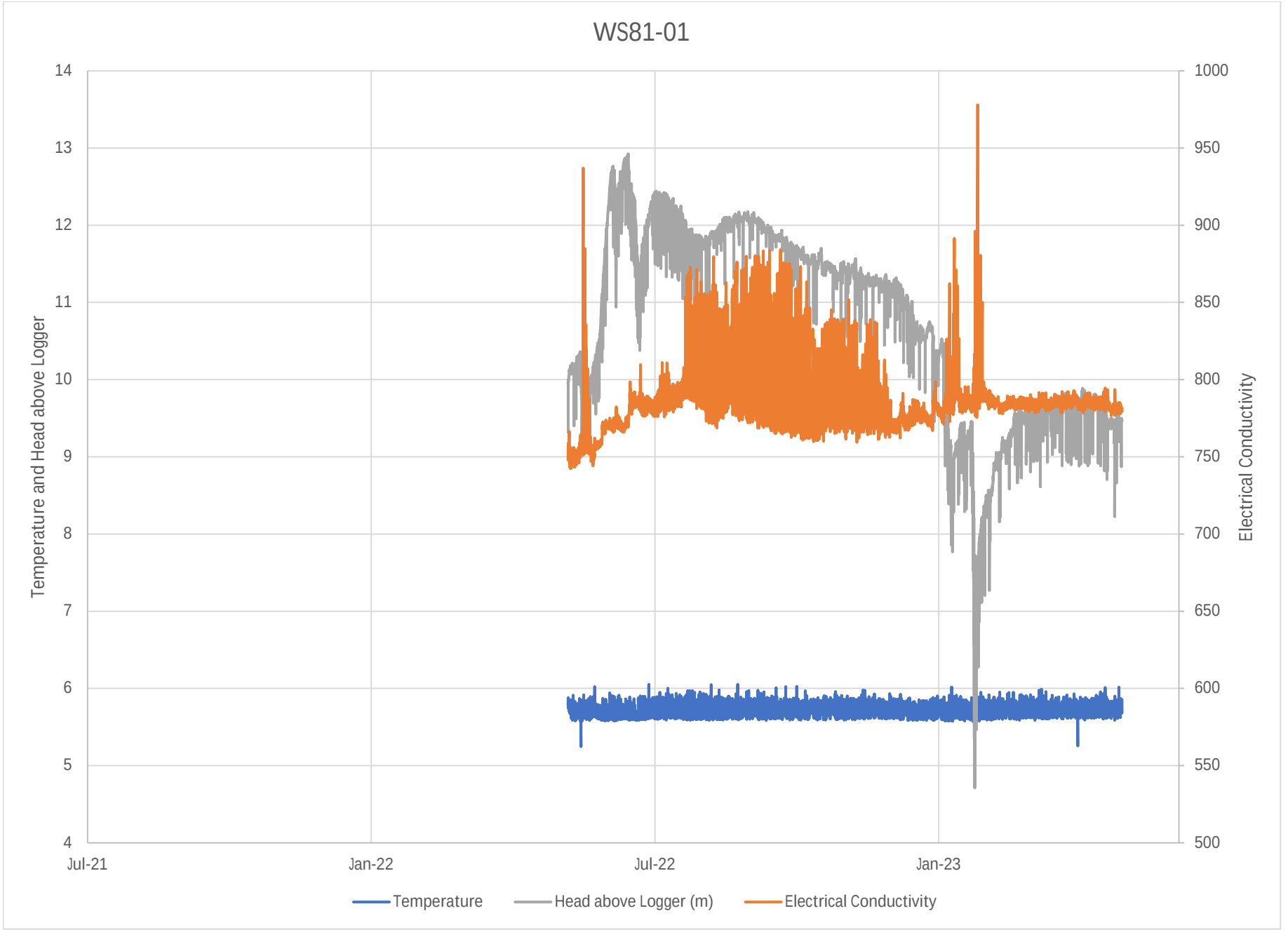

SW11-R4-02
Temperature and Head above Logger
Electrical Conductivity
23
21
19
17
15
13
11
9
7
5
600
550
500
450
400
350
300
250
200
150
100
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity

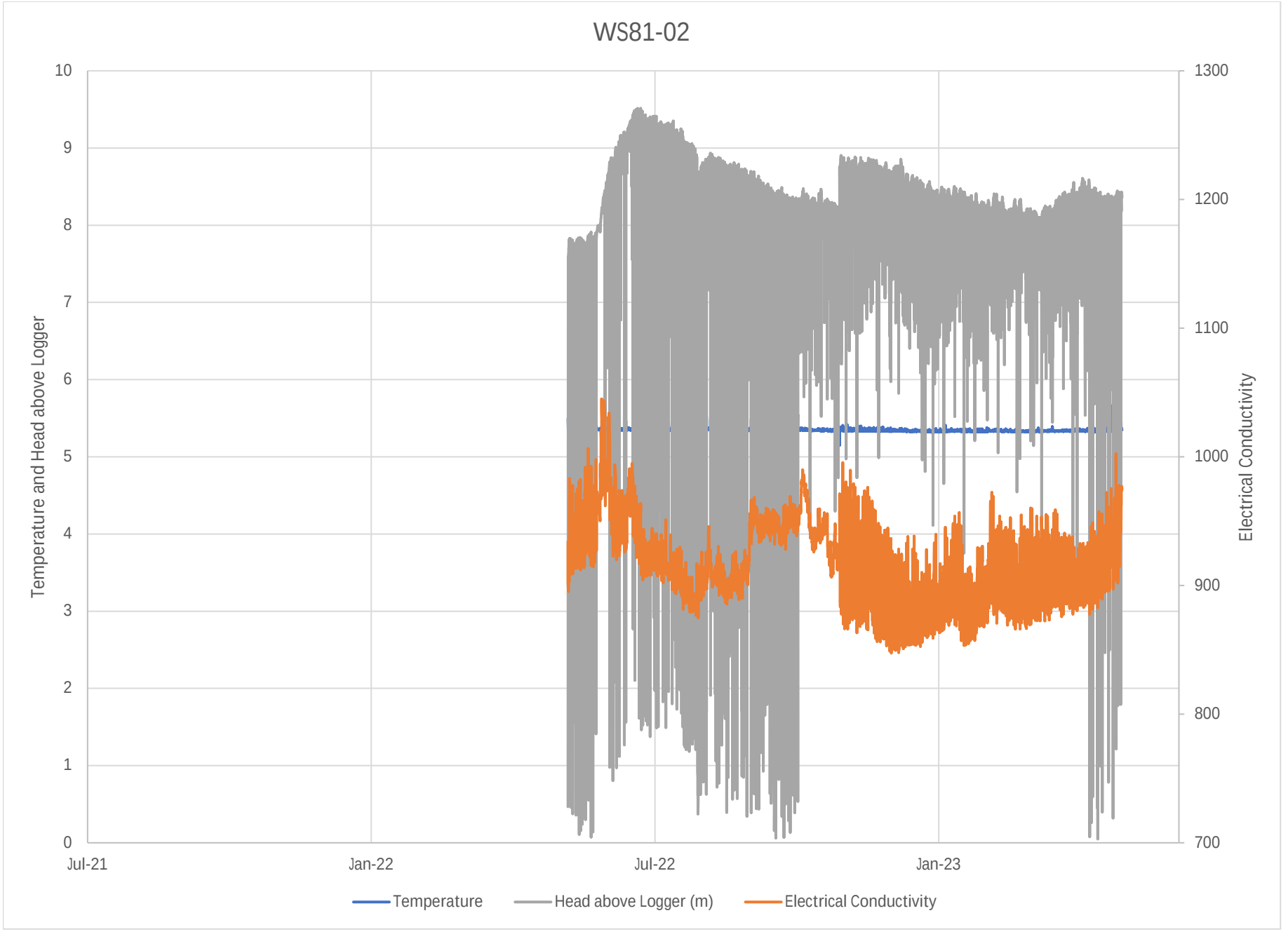

SW35-R4-01
Temperature and Head above Logger
Electrical Conductivity
13
12
11
10
9
8
7
6
5
1100
1050
1000
950
900
850
800
750
700
650
600
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity


WS11-01
Temperature and Head above Logger
Electrical Conductivity
10
9
8
7
6
5
4
3
2
600
550
500
450
400
350
300
250
200
150
100
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity


WS41-02
Temperature and Head above Logger
Electrical Conductivity
10
9
8
7
6
5
4
3
2
1
0
1000
900
800
700
600
500
400
300
200
100
0
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity


WS62-01
Temperature and Head above Logger
Electrical Conductivity
10
9
8
7
6
5
4
3
2
1
0
600
550
500
450
400
350
300
250
200
150
100
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity


WS81-01
Temperature and Head above Logger
Electrical Conductivity
14
13
12
11
10
9
8
7
6
5
4
1000
950
900
850
800
750
700
650
600
550
500
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity


WS81-02
Temperature and Head above Logger
Electrical Conductivity
10
9
8
7
6
5
4
3
2
1
0
1300
1200
1100
1000
900
800
700
Jul-21
Jan-22
Jul-22
Jan-23
Temperature
Head above Logger (m)
Electrical Conductivity

Appendix D Laboratory Analytical Data and Historical Data Tables

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-1-15						MW16-2-6						MW16-5-11	
Sample Date				3-Oct-16	12-May-21	13-Jan-22	5-May-22	21-Nov-22	23-May-23	30-Sep-16	12-May-21	24-Nov-21	4-May-22	15-Nov-22	15-May-23	4-Oct-16	14-May-21
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ														
Field Parameters																	
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	1.43	2.83	3.18	10.6	7.8	-	3.79	3.92	2.33	3.7	3.6	-	12.81
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,978[A]**	**2,187[A]**	**2,134[A]**	**2,192[A]**	**1,008[A]**	**1,976[A]**	**5,210[A]**	**6,179[A]**	**6,105[A]**	**6,392[A]**	**5,807[A]**	**5,689[A]**	710	707.5
Oxidation Reduction Potential, field	mV	n/v	n/v	-	60.2	44.7	68.2	-19.8	212.7	-	92.4	95.3	-21.3	-33.2	156.9	-	73.6
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.2	7.23	7.64	7.16	**6.88[B]**	7.46	7.1	**6.86[B]**	**6.93[B]**	**6.38[AB]**	7.20	**6.94[B]**	7.1	7.40
Temperature, Field	deg C	n/v	≤15[B]	7.7	8.8	5.6	7.7	6.3	8.9	8.6	7.4	5.09	9	4.4	14.4	6.7	7.4
Calculated Parameters																	
Anion Sum	meq/L	n/v	n/v	25	27	29	29	28	-	83	97	-	94	99	95	8.8	8.3
Cation Sum	meq/L	n/v	n/v	28	26	27	29	26	-	83	96	-	96	100	94	8.7	8.1
Hardness (as CaCO3)	mg/L	n/v	n/v	1,000	990	1,000	1,100	940	1,100	2,600	3,100	3,390	3,100	3,000	3,000	340	320
Ion Balance	%	n/v	n/v	1.1	2.4	2.2	0.84	4.5	4.8	1.0	0.61	114	1.3	2.6	0.38	0.99	1.2
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.22	<0.22	<0.22	0.065	<0.044	<0.22	<0.22	<0.5	<0.44	<2.2	<1.1	3.3	2.7
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.020	<0.050 MI	<0.050 AT	<0.050 AT	0.015	<0.010	0.024	<0.050 MI	<0.02	<0.10 DB	<0.50 MI	<0.25 Z8	0.76	0.62
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	0.078	<0.033	<0.10	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,600[AB]**	**1,700[AB]**	**1,800[AB]**	**1,800[AB]**	**1,700[AB]**	**1,800[AB]**	**5,300[AB]**	**6,100[AB]**	**6,140[AB]**	**6,000[AB]**	**6,400[AB]**	**6,000[AB]**	440	410
BTEX and Petroleum Hydrocarbons																	
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.00044	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	0.00055	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	0.0013	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.47	**5.9[A]**	<0.1	0.28	<0.10	0.11	<0.10	<0.10
Miscellaneous Inorganics																	
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.6	2.4	2.1	2.4	2.7	2.2	6.2	4.2	4.774	4.1	4.4	3.3	2.8	3.6
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**2,100[A]**	**2,200[A]**	**2,200[A]**	**2,200[A]**	**2,100[A]**	**2,200[A]**	**5,900[A]**	**6,400[A]**	**6,550[A]**	**6,500[A]**	**6,400[A]**	**6,600[A]**	780	720
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.88	7.63	7.56	7.74	7.75	7.98	7.95	7.31	7.82	7.41	7.48	7.66	7.96	7.96
Anions																	
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	300	320	320	300	320	320	520	650	615	650	650	610	380	370
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	360	390	400	370	400	390	630	790	751	800	800	740	470	450
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**910 CD[AB]**	**990 CD[AB]**	**1,000[AB]**	**1,100[AB]**	**1,000[AB]**	**1,000[AB]**	**3,500 CD[AB]**	**4,000 CD[AB]**	**3,880[AB]**	**3,900[AB]**	**4,100[AB]**	**4,000[AB]**	43	36
Chloride	mg/L	100[A]	≤250[B]	3.8	9.3	11	11	10	10	6.0	2.9	1.2	1.8	1.5	1.4	4.8	3.3
Nutrients																	
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.024	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	0.0041	<0.0030	<0.0030	<0.0030	0.0041	0.0059	<0.15	<0.0030	0.0051	0.0049	<0.0030	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	***<0.050***	**0.045[A]**	**0.036[A]**	**0.036[A]**	**0.056[A]**	**0.058[A]**	**0.27[A]**	**0.20[A]**	**0.15[A]**	**0.16[A]**	**0.13[A]**	**0.17[A]**	**0.062[A]**	**0.14[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.050	<0.050	<0.050	0.015	<0.010	<0.050 MI	<0.050	<0.02	<0.10	<0.50	<0.25	0.76	0.62
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	<0.0030	<0.0030	0.52 DB	<0.0030	<0.0030	<0.0030	0.0094	0.0060	-	0.0032	<0.0030	<0.0030 P2	0.0034	0.0059
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.5 DB	0.26	0.258	0.86	<1.0	0.55	5.1 DB	7.2	2.3	<2.0	<0.50	1.36	7.5 DB	2.4
Nitrogen	mg/L	n/v	n/v	-	0.26 DB	0.26	0.86 DB	<1.0 DB	0.55 DB	-	7.2 DB	-	<2.0 DB	0.50 DB	1.4 DB	-	3.0 DB

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-1-15						MW16-2-6						MW16-5-11	
Sample Date				3-Oct-16	12-May-21	13-Jan-22	5-May-22	21-Nov-22	23-May-23	30-Sep-16	12-May-21	24-Nov-21	4-May-22	15-Nov-22	15-May-23	4-Oct-16	14-May-21
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ														
Metals - Dissolved																	
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	-	0.016	0.0069	0.021	0.0036	<0.0030	<0.0030	0.011	0.018
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	-	0.00073	<0.00060	<0.001	<0.00060	0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	0.00036	0.00051	0.00038	-	0.0044	0.00035	<0.001	0.0010	0.00038	0.00048	0.0010	0.00047
Barium	mg/L	2.0[A]	2.0[C]	0.018	<0.010	0.012	0.012	0.011	-	0.018	<0.010	<0.05	<0.010	0.015	<0.010	0.068	0.071
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.078	0.078	0.077	0.080	0.061	-	0.11	0.10	0.11	0.11	0.11	0.11	0.036	0.043
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	<0.000020	<0.000020	0.00032	0.000066	0.00018	-	0.000092	0.000039	0.000124	0.00027	0.00015	0.000075	<0.000020	0.000022
Calcium	mg/L	n/v	n/v	230	220	230	250	220	260	390	400	451	410	410	410	76	69
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.0012	0.00087	0.00098	0.00099	0.0010	-	0.0060	0.0021	0.0027	0.0029	0.0025	0.0025	0.0010	0.00040
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.00020	0.00020	0.00097	<0.0010	<0.0010	-	0.00084	0.00090	0.0034	0.0015	**0.010[A]**	<0.0010	<0.00020	0.0013
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	0.069	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.1	<0.060	<0.060	<0.060	0.061	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.022	<0.020	<0.020	<0.020	<0.020	-	0.11	0.099	-	0.11	0.12	0.11	<0.020	0.022
Magnesium	mg/L	n/v	n/v	110	100	100	110	95	120	400	520 CD	549	490	480	480	38	37
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.88[AB]**	**0.82[AB]**	**0.83[AB]**	**0.82[AB]**	**0.77[AB]**	**0.95[AB]**	**1.5[AB]**	**1.3[AB]**	**1.31[AB]**	**1.3[AB]**	**1.3[AB]**	**1.3[AB]**	**0.15[AB]**	**0.11[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	0.0000029	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0028	0.0017	0.0019	0.0019	0.0020	-	0.0071	0.00091	<0.001	0.00092	0.00083	0.0010	0.012	0.0056
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.001	0.00083	0.0013	0.00099	0.0012	-	0.016	0.0059	0.007	0.0071	0.0059	0.0061	0.002	0.001
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	4.8	3.6	3.8	4.2	3.6	4.1	9.4	7.5	8.8	8.3	8.4	8.0	3.7	3.7
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	0.0013	<0.00020	<0.0005	0.00024	0.00079	<0.00020	**0.0031[A]**	**0.0025[A]**
Silicon	mg/L	n/v	n/v	4.7	4.3	4.4	4.5	3.9	-	5.9	4.8	-	5.2	5.3	5.2	4.2	4.5
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00005	<0.00010	**0.0034[A]**	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	160	140	160	170	160	170	**690 CD[AB]**	**750 CD[AB]**	**882[AB]**	**800[AB]**	**1,000[AB]**	**780[AB]**	39	35
Strontium	mg/L	n/v	7.0[C]	1.6	1.4	1.6	1.6	1.6	-	4.6	5.8 CD	-	6.0	6.2	6.3	0.82	0.93
Sulfur	mg/L	n/v	n/v	340	330	310	310	280	-	1,200 CD	1,400 CD	-	1,300	2,000	1,300	13	11
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	-	<0.0010	0.0026	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0054	0.0043	0.0042	0.0048	0.0045	-	**0.040[AC]**	**0.029[AC]**	**0.031[AC]**	**0.029[AC]**	**0.029[AC]**	**0.031[AC]**	0.0053	0.0067
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	-	0.0016	<0.0010	-	0.0013	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	-	0.016	0.0031	<0.005	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total																	
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.0020 DB***	**0.0000473[A]**	**0.000038[A]**	**0.000055[A]**	**0.000393[A]**	**0.000141[A]**	***<0.0060 DB***	**0.000277 DB[A]**	**0.000032[A]**	**0.00071[A]**	**0.000028[A]**	**0.000051[A]**	***<0.020 DB***	**0.000383 DB[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-	-	-	2.61	-	-	-	-	-
Microbiological Parameters																	
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<10 DB***	***<10 MI***	***<10 VV***	***<10***	***<1.0***	***<2.0 Z8***	***<100 DB***	***<100 MI***	***<1***	***<2.0 AT***	***<5.0 MI***	***<5.0 Z8***	***<100 DB***	***<100 MI***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<10 DB***	***<10 MI***	***<10***	***<10***	***<1.0***	***<5.0 Z8***	***<100 DB***	***<100 MI***	**2[D]**	***<10 AT***	***<5.0 MI***	***<5.0 Z8***	***<100 DB***	***<100 MI***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	4,900 DB	5,500	10,000 VV	2,700	380	660	49,000 DB	6,100 MI	8,700	6,200 DVM	>6000	1,600 Z8	44,000 DB	18,000 MI
Total Coliforms	mpn/100mL	n/v	0[D]	**230 DB[D]**	***<10 MI***	**680 VV[D]**	**260[D]**	***<1.0***	***<2.0 Z8***	***<100 DB***	***<100 MI***	**7[D]**	***<2.0 AT***	***<5.0 MI***	**5.0 Z8[D]**	***<100 DB***	***<100 MI***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-5-12				MW16-7-5						MW16-8-8					
Sample Date				1-Dec-21	4-May-22	21-Nov-22	19-May-23	27-Sep-16	13-May-21	1-Dec-21	5-May-22	16-Nov-22	17-May-23	4-Oct-16	13-May-21	13-Jan-22	6-May-22	23-Nov-22	19-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																
Field Parameters																			
Dissolved Oxygen, Field	mg/L	n/v	n/v	8.3	5.12	4.4	3.8	-	13.59	8.14	2.9	5.3	11.2	-	14.49	3.65	4.15	5.9	8.0
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	776	818	769	798	**3,660[A]**	**3,246[A]**	**3,318[A]**	**3,271[A]**	**3,116[A]**	**2,715[A]**	**1,003[A]**	**1,081[A]**	**1,410[A]**	**1,157[A]**	**1,099[A]**	**1,250[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-17.3	-45.2	-30.9	119.8	-	63.0	95.7	5.8	-43.5	121.4	-	88.7	73.6	68.1	-41.2	196.9
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.73	**6.96[B]**	7.28	7.45	7.5	7.26	7.28	7.09	7.07	7.53	7.1	7.38	7.59	7.43	7.31	7.53
Temperature, Field	deg C	n/v	≤15[B]	5.1	8.9	4.8	**19.5[B]**	7.6	6.5	5.94	7.4	11.3	6.2	7.7	7.1	6	9.5	4.6	14.0
Calculated Parameters																			
Anion Sum	meq/L	n/v	n/v	-	9.2	9.0	9.6	55	36	-	38	44	39	12	12	13	14	14	13
Cation Sum	meq/L	n/v	n/v	-	9.6	8.6	19	49	44	-	43	40	39	12	13	14	16	14	14
Hardness (as CaCO3)	mg/L	n/v	n/v	329	310	280	720	1,600	1,400	1,440	1,300	1,200	1,200	550	590	620	710	640	660
Ion Balance	%	n/v	n/v	120	2.2	2.5	33	0.90	9.8	120	6.8	5.1	0.49	1.0	3.3	1.7	5.8	1.6	3.6
Nitrate	mg/L	13_{f}[A]	45[C]	0.8	<0.044	0.26	0.14	<0.044	0.062	2.2	0.088	<0.22	0.094	6.9	3.6	3.6	3.3	2.8	2.0
Nitrate + Nitrite (as N)	mg/L	100^{A}	n/v	0.18	<0.010	0.059	0.032	<0.020	0.014	0.50	0.020	<0.050 MI	0.021	1.6	0.81 MI	0.81	0.74	0.63	0.46
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.05	<0.033	<0.033	<0.033	<0.033	<0.033	<0.10	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	426	480	450	**660[AB]**	**3,400[AB]**	**2,400[AB]**	**2,560[AB]**	**2,500[AB]**	**2,700[AB]**	**2,400[AB]**	**640[AB]**	**660[AB]**	**720[AB]**	**770[AB]**	**740[AB]**	**740[AB]**
BTEX and Petroleum Hydrocarbons																			
Benzene	mg/L	0.0050[A]	0.005[C]	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																			
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	3	2.5	1.7	3.0	9.2	3.6	4	3.8	4.8	5.2	2.8	1.6	1.8	2.8	2.2	5.1
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	729	780	770	770	**3,900[A]**	**3,400[A]**	**3,470[A]**	**3,200[A]**	**3,300[A]**	**3,000[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.26	8.04	7.94	7.90	7.57	7.91	8.19	7.82	7.53	7.58	7.90	7.81	7.50	7.78	7.80	7.72
Anions																			
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	334	410	400	430	380	440	415	400	450	470	370	370	400	430	420	410
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	408	500	490	530	470	540	507	490	540	570	450	460	490	520	510	500
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	$≤500_{I}$[B]	46.1	48	43	43	**2,200 CD[AB]**	**1,300 CD[AB]**	**1,450[AB]**	**1,400[AB]**	**1,700[AB]**	**1,400[AB]**	140	180 CD	210	210	220	210
Chloride	mg/L	100[A]	≤250[B]	3.3	2.7	1.8	<1.0	14	8.8	6.9	5.8	8.8	5.9	60	27	28	28	28	27
Nutrients																			
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.15	<0.0030	0.0043	<0.0030	0.012 OG	0.011	<0.15	0.011	0.0075	0.0072	<0.0030	0.0049	0.0043	<0.0030	<0.0030	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.28[A]**	**0.29[A]**	**0.17[A]**	**0.31[A]**	**0.16[A]**	**0.11[A]**	**0.06[A]**	0.029	0.019	**0.055[A]**	**0.055[A]**	<0.015	<0.015	<0.015	**0.10[A]**	<0.015
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.18	<0.010	0.059	0.032	<0.010	0.014	0.50	0.020	<0.050	0.021	1.6	0.81	0.81	0.74	0.63	0.46
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	-	0.058	<0.0030	<0.0030	0.0065	0.012	-	0.010	0.0073	0.0031 P2	0.0045	0.0053	1.4 DB	<0.0030	0.0050	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	8.00	4.7	<2.0	0.75	0.62	<1.0	0.89	1.80	1.02	2.70	0.95	0.182	0.131	14.2	<0.40	3.36
Nitrogen	mg/L	n/v	n/v	-	4.7 DB	<2.0 DB	0.78 DB	-	<1.0 DB	-	1.8 DB	1.0 DB	2.7	-	0.99	0.94	15 DB	0.65 DB	3.8

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-5-12				MW16-7-5						MW16-8-8					
Sample Date				1-Dec-21	4-May-22	21-Nov-22	19-May-23	27-Sep-16	13-May-21	1-Dec-21	5-May-22	16-Nov-22	17-May-23	4-Oct-16	13-May-21	13-Jan-22	6-May-22	23-Nov-22	19-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																
Metals - Dissolved																			
Aluminum	mg/L	0.05$_{rn1,e}$[A]	0.1$_{a}$[B]	**0.061**[A]	0.0058	<0.0030	**2.8**[AB]	0.0048	<0.0030	0.039	<0.0030	<0.0030	<0.0030	<0.0030	0.0096	0.0049	0.0033	<0.0030	0.0045
Antimony	mg/L	0.0060[A]	0.006[C]	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	0.0011
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.001	0.00056	0.00028	0.0020	0.0010	0.00046	<0.001	0.00063	0.00041	0.00031	<0.00020	0.00025	<0.00020	0.00030	0.00036	0.00029
Barium	mg/L	2.0[A]	2.0[C]	0.07	0.069	0.070	0.33	0.032	0.013	<0.05	0.019	0.020	0.018	0.039	0.044	0.045	0.046	0.048	0.062
Beryllium	mg/L	n/v	n/v	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.09	0.12	0.079	0.097	0.12	0.10	0.11	0.10	0.099	0.094	0.043	0.052	0.042	0.047	0.060	0.042
Cadmium	mg/L	0.00037$_{rn3,e}$[A]	0.007[C]	0.000030	<0.00002	<0.000020	**0.00075**[A]	0.00013	0.000021	0.000028	<0.00002	0.000083	0.000077	0.000040	<0.000020	<0.00002	<0.00002	<0.000020	0.000023
Calcium	mg/L	n/v	n/v	74.9	68	62	180	250	210	234	200	190	190	120	130	130	150	140	140
Chromium	mg/L	0.050[A]	0.05[C]	<0.0005	<0.0010	<0.0010	0.0047	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.0009	0.00042	0.00038	0.0048	0.0051	0.00077	0.0018	0.00085	<0.00030	<0.00030	0.00057	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0008	<0.0010	<0.0010	0.0046	0.00097	0.00023	<0.0008	<0.0010	0.0011	0.0056	0.00032	0.0020	0.00053	<0.0010	0.0014	0.0011
Iron	mg/L	0.30[A]	≤0.3[B]	<0.1	<0.060	<0.060	**36**[AB]	<0.060	<0.060	<0.1	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	0.0070$_{rn3,e}$[A]	0.005[C]	0.0004	<0.00020	<0.00020	**0.0070**[C]	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	-	<0.020	<0.020	0.032	0.077	0.070	-	0.060	0.070	0.073	<0.020	0.020	<0.020	<0.020	<0.020	0.039
Magnesium	mg/L	n/v	n/v	34.5	34	30	64	230	210	209	190	170	170	60	67	70	82	71	75
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.122**[AB]	**0.14**[AB]	**0.15**[AB]	**1.2**[AB]	**0.81**[AB]	**0.30**[AB]	**0.389**[AB]	**0.22**[AB]	<0.0040	**0.12**[AB]	**0.12**[AB]	0.013	**0.025**[AB]	0.019	**0.030**[AB]	**0.044**[AB]
Mercury	mg/L	0.0000050[A]	0.001[C]	-	<0.0000019	<0.0000019	<0.0000019	0.0000020	<0.0000019	-	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.006	0.0039	0.0015	0.00081	0.0026	0.0011	0.002	0.0014	0.0013	0.0014	0.0011	0.00073	0.00078	0.0010	0.00086	0.0010
Nickel	mg/L	0.337$_{rn3,e}$[A]	n/v	0.003	0.0015	0.0011	0.0081	0.011	0.0035	0.006	0.0027	0.0035	0.0027	0.0025	0.0011	0.0011	0.00082	0.0011	0.0013
Phosphorus	mg/L	n/v	n/v	<0.08	<0.10	<0.10	1.7	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	8.1	8.2	6.6	7.2	5.9	4.5	5.0	5.5	5.1	4.9	5.8	5.7	6.1	6.8	6.0	6.3
Selenium	mg/L	0.0020[A]	0.05[C]	<0.0005	0.00029	0.0010	0.0016	0.00046	0.00021	<0.0005	0.00094	0.00055	0.00025	**0.011**[A]	**0.0044**[A]	**0.0038**[A]	**0.0035**[A]	**0.0040**[A]	0.0020
Silicon	mg/L	n/v	n/v	-	4.1	2.8	17	5.6	5.0	-	4.6	4.2	4.6	4.2	4.9	4.4	4.6	4.3	4.6
Silver	mg/L	0.00010[A]	n/v	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	58.0	73	65	68	**400**[AB]	**370**[AB]	**405**[AB]	**400**[AB]	**370**[AB]	**350**[AB]	25	24	25	28	26	26
Strontium	mg/L	n/v	7.0[C]	-	1.2	1.3	1.5	2.4	2.3	-	2.1	2.1	1.9	0.90	1.1	1.2	1.3	1.2	1.2
Sulfur	mg/L	n/v	n/v	-	18	11	13	700 CD	610 CD	-	530	480	460	45	73	62	68	66	66
Thallium	mg/L	n/v	n/v	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	-	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0021	0.0018	0.012
Titanium	mg/L	n/v	n/v	0.002	0.0016	<0.0010	0.0073	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.002	0.0022	0.0014	0.0021	**0.020**[A]	**0.014**[A]	**0.018**[A]	**0.016**[A]	**0.016**[A]	**0.015**[A]	**0.011**[A]	**0.011**[A]	**0.012**[A]	**0.013**[A]	**0.013**[A]	**0.013**[A]
Vanadium	mg/L	n/v	n/v	-	0.0011	<0.0010	0.0083	<0.0010	<0.0010	-	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.005	<0.0030	<0.0030	0.029	<0.0030	<0.0030	<0.005	<0.0030	0.0036	<0.0030	<0.0030	0.0036	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total																			
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000055**[A]	**0.000096**[A]	**0.000477**[A]	**0.000091**[A]	***<0.0020 DB***	**0.0000292**[A]	**0.000013**[A]	**0.000114**[A]	**0.00021**[A]	**0.000196**[A]	***<0.02 DB***	**0.0000091**[A]	**0.000146**[A]	**0.00278**[AC]	**0.000105**[A]	**0.000857**[A]
Phosphorus	mg/L	n/v	n/v	11.6	-	-	-	-	-	1.11	-	-	-	-	-	-	-	-	-
Microbiological Parameters																			
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	**411**[D]	**10 AT**[D]	***<1.0***	***<10 Z8***	***<10***	***<10 SVH MI***	**14**[D]	***<100***	***<100***	***<10 Z8***	***<100 DB***	***<1.0***	***<10 VV***	***<100 DVM***	***<1.0***	***<10 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	**579**[D]	**10 AT**[D]	***<1.0***	***<10 Z8***	***<10 DB***	**20 SVH MI**[D]	**35**[D]	***<100***	***<100 MI***	**10 Z8**[D]	***<100 DB***	***<1.0***	***<10 VV***	***<100 DVM***	***<1.0***	***<10 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	4,600	>6000 DVM	480	33,000 Z8	920	210	1,760	2,400	130 SC1	1,900 Z8	34,000 DB	1,100	16,000 VV	470 AT	45	13,000 Z8
Total Coliforms	mpn/100mL	n/v	0[D]	**2,424**[D]	**10 AT**[D]	***<1.0***	***<10 Z8***	**1,700**[D]	***<10 SVH MI***	**365**[D]	***<100***	**1,300 MI**[D]	**140 Z8**[D]	***<100 DB***	**>2400**[D]	**200 VV**[D]	**530 DVM**[D]	***<1.0***	**3,700 Z8**[D]

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-8-19						MW16-10-15					
Sample Date				4-Oct-16	13-May-21	13-Jan-22	6-May-22	23-Nov-22	19-May-23	4-Oct-16	13-May-21	24-Nov-21	9-May-22	17-Nov-22	17-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ												
Field Parameters															
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	2.75	4.81	3.3	6.9	7.6	-	20.18	3.1	5.02	7.1	5.6
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,130[A]**	**1,246[A]**	**1,282[A]**	**1,292[A]**	**1,284[A]**	**1,227[A]**	**2,890[A]**	**3,992[A]**	**3,930[A]**	**4,422[A]**	**4,183[A]**	**4,101[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	88.4	84.1	84.5	-53.6	200.2	-	-54.3	60.5	-0.25	-143.0	136.4
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.4	7.09	7.4	**6.97[B]**	7.67	7.29	7.2	**6.80[B]**	**6.49[AB]**	**6.86[B]**	**6.78[B]**	7.26
Temperature, Field	deg C	n/v	≤15[B]	6.8	6.9	4.8	7.5	4.1	11.9	9	9.5	5.03	9	1.8	8.5
Calculated Parameters															
Anion Sum	meq/L	n/v	n/v	15	14	14	13	14	15	45	61	-	64	66	63
Cation Sum	meq/L	n/v	n/v	14	15	16	16	14	16	42	62	-	63	64	65
Hardness (as CaCO3)	mg/L	n/v	n/v	580	640	670	680	600	690	1,400	2,300	2,510	2,500	2,400	2,500
Ion Balance	%	n/v	n/v	0.93	3.1	5.7	9.3	2.7	5.8	0.94	0.93	113	0.85	1.3	1.6
Nitrate	mg/L	13_{f}[A]	45[C]	3.1	3.8	4.1	3.9	3.2	3.2	0.12	<0.22	<0.5	<0.22	2.2	<1.1
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.70	0.87 MI	0.92	0.88	0.72	0.72	0.027	<0.050 MI	<0.02	<0.050 AT	0.50	<0.25 Z8
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.10	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**750[AB]**	**750[AB]**	**760[AB]**	**740[AB]**	**720[AB]**	**780[AB]**	**2,800[AB]**	**3,900[AB]**	**3,960[AB]**	**4,000[AB]**	**4,100[AB]**	**4,000[AB]**
BTEX and Petroleum Hydrocarbons															
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
Miscellaneous Inorganics															
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	1.3	0.63	0.95	1.8	1.4	3.5	4.2	2.3	4.391	2.6	2.5	2.3
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,300[A]**	**1,300[A]**	**1,300[A]**	**1,200[A]**	**1,300[A]**	**1,300[A]**	**3,000[A]**	**4,300[A]**	**4,390[A]**	**4,300[A]**	**4,300[A]**	**4,400[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.74	7.69	7.43	7.65	7.69	7.79	7.65	7.52	7.87	7.29	7.57	7.25
Anions															
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	460	440	450	420	430	470	380	480	472	490	470	510
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	560	530	540	510	530	570	470	580	575	600	580	620
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<5	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	110	82	85	84	93	84	**1,800 CD[AB]**	**2,500 CD[AB]**	**2,450[AB]**	**2,600[AB]**	**2,700[AB]**	**2,500[AB]**
Chloride	mg/L	100[A]	≤250[B]	**110[A]**	**130[A]**	**120[A]**	**120 AT[A]**	**110[A]**	**120[A]**	7.1	3.7	2.3	2.6	3.0	2.3
Nutrients															
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.15	<0.0030	0.0031	0.0048
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	***<0.050***	0.018	<0.015	<0.015	<0.015	<0.015	**0.59[A]**	**0.43[A]**	**0.46[A]**	**0.46[A]**	**0.44[A]**	**0.45[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.70	0.87	0.92	0.88	0.72	0.72	0.027	<0.050	<0.02	<0.050	0.50	<0.25
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	<0.0030	<0.0030	0.11 DB	<0.0030	<0.0030	<0.0030	0.0035	0.017	-	0.021	0.0036	0.010
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.3	0.177	0.105	0.075	<0.20	<0.020	5.4 CD	1.88	11.1	1.5	1.5	1.08
Nitrogen	mg/L	n/v	n/v	-	1.0	1.0	0.95	0.60 DB	0.57 NN	-	1.9 DB	-	1.5 DB	2.0 DB	1.1 DB

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-8-19						MW16-10-15					
Sample Date				4-Oct-16	13-May-21	13-Jan-22	6-May-22	23-Nov-22	19-May-23	4-Oct-16	13-May-21	24-Nov-21	9-May-22	17-Nov-22	17-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ												
Metals - Dissolved															
Aluminum	mg/L	0.05$_{rn1,e}$[A]	0.1$_{a}$[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0037	0.0042	<0.0030	**0.069**[A]	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	0.00079	<0.00060	<0.001	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0012	0.00053	<0.001	0.00034	0.00037	0.00030
Barium	mg/L	2.0[A]	2.0[C]	0.054	0.062	0.063	0.063	0.067	0.067	0.022	0.015	<0.05	0.012	0.015	0.013
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.043	0.053	0.047	0.052	0.051	0.047	0.12	0.22	0.21	0.21	0.23	0.22
Cadmium	mg/L	0.00037$_{rn3,e}$[A]	0.007[C]	0.000029	0.000020	0.000023	0.000028	0.000034	0.000031	0.0001	<0.000020	0.000262	0.000067	**0.0009**[A]	0.00021
Calcium	mg/L	n/v	n/v	130	150	150	150	140	160	320	470	514	460	480	490
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0008	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.0043	0.0041	0.0050	0.0044	0.0044	0.0041
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.00020	0.00022	0.00051	<0.0010	0.0015	0.0020	<0.00020	<0.00020	**0.0127**[A]	<0.0010	<0.0010	0.0027
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	**0.35**[AB]	<0.1	<0.060	<0.060	<0.060
Lead	mg/L	0.0070$_{rn3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0005	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	<0.020	0.021	0.028	<0.020	<0.020	0.028	0.055	0.050	-	0.025	0.040	0.058
Magnesium	mg/L	n/v	n/v	60	67	70	72	60	72	140	280	299	310	290	310
Manganese	mg/L	0.020[A]	≤0.02[B]	0.0062	0.0058	<0.0040	<0.0040	<0.0040	<0.0040	**1.0**[AB]	**3.0**[AB]	**2.80**[AB]	**2.8**[AB]	**2.9**[AB]	**2.8**[AB]
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.000002	<0.0000019	0.0000022	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.00085	0.0011	0.00068	0.00060	0.00058	0.00067	0.0034	0.00047	<0.001	0.00066	0.00084	0.00055
Nickel	mg/L	0.337$_{rn3,e}$[A]	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.013	0.007	0.013	0.008	0.0084	0.0076
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	5.7	6.1	6.5	6.8	5.9	6.7	11	10	11.2	10	10	10
Selenium	mg/L	0.0020[A]	0.05[C]	**0.0080**[A]	**0.0061**[A]	**0.0086**[A]	**0.0077**[A]	**0.0086**[A]	**0.0075**[A]	0.00038	0.00052	<0.0005	<0.00020	0.00095	<0.00020
Silicon	mg/L	n/v	n/v	3.7	4.6	4.1	4.1	3.7	4.2	4.5	6.0	-	5.4	5.1	5.2
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	47	51	56	56	52	56	**330**[AB]	**350**[AB]	**401**[AB]	**320**[AB]	**370**[AB]	**340**[AB]
Strontium	mg/L	n/v	7.0[C]	1.3	1.4	1.5	1.5	1.5	1.5	3.4	6.6 CD	-	**7.1**[C]	**7.2**[C]	**7.2**[C]
Sulfur	mg/L	n/v	n/v	29	31	27	27	27	28	650 CD	920 CD	-	890	790	900
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	0.0011	0.0013	0.0011
Titanium	mg/L	n/v	n/v	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.003	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0053	0.0044	0.0049	0.0050	0.0053	0.0056	**0.012**[A]	0.0080	**0.011**[A]	0.010	0.010	**0.011**[A]
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	**0.035**[A]	<0.0030	0.0076	<0.0030
Metals - Total															
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.000100 DB***	**0.0000262**[A]	**0.0000104**[A]	**0.0000058**[A]	0.0000036	0.0000036	***<0.02 DB***	**0.000195 DB**[A]	**0.000092**[A]	**0.000169**[A]	**0.00048**[A]	**0.000196**[A]
Phosphorus	mg/L	n/v	n/v	-	-	-	-	-	-	-	-	9.25	-	-	-
Microbiological Parameters															
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<10 MI***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<100 DB***	***<10 MI***	**6**[D]	***<10 AT***	***<100 MI***	***<10 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<10 MI***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	**100 DB**[D]	***<10 MI***	**23**[D]	***<50 AT***	***<100 MI***	***<10 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	620	210	140	73	35	230	>6000 DB	5,400 MI	91,500	1,200 AT	1,500	820
Total Coliforms	mpn/100mL	n/v	0[D]	**27**[D]	***<10 MI***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	**9,100 DB**[D]	**310 MI**[D]	**154**[D]	***<10 AT***	***<100 MI***	***<10 Z8***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-11-15						MW16-12-3	RMW16-13-37				MW16-14-33	MW16-15-34	MW16-16-11	
Sample Date				30-Sep-16	13-May-21	22-Nov-21	6-May-22	17-Nov-22	18-May-23	6-Oct-16	24-Nov-21	9-May-22	18-Nov-22	16-May-23	27-Sep-16	26-Sep-16	3-Oct-16	13-May-21
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Field Parameters																		
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	1.52	4.7	2.77	9.6	7.9	-	6.07	5.11	5.0	2.0	-	-	-	14.91
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**2,750[A]**	**3,012[A]**	**2,842[A]**	**2,921[A]**	**3,087[A]**	**2,677[A]**	**2,370[A]**	**3,344[A]**	**3,027[A]**	**1,772[A]**	**1,214[A]**	**1,906[A]**	984	**4,840[A]**	**5,210[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	48.7	47.5	-8.3	-18.5	86.2	-	-44.4	-101.7	-21.4	-100.9	-	-	-	84.2
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.1	7.01	7.08	**6.94[B]**	7.44	7.43	7	8.01	7.67	**8.53[A]**	8.08	7.5	7.4	7.2	**6.76[B]**
Temperature, Field	deg C	n/v	≤15[B]	9.4	8.0	4.35	8.5	1.7	9.1	6.7	3.96	6.2	3.8	9.6	8	8	12.1	12.2
Calculated Parameters																		
Anion Sum	meq/L	n/v	n/v	39	41	-	36	42	39	33	-	35	21	33	45	11	78	81
Cation Sum	meq/L	n/v	n/v	38	42	-	38	42	41	31	-	34	21	15	160	10	75	80
Hardness (as CaCO3)	mg/L	n/v	n/v	1,200	1,400	1,240	1,200	1,300	1,300	1,300	155	110	42	20	6,700	52	2,400	2,700
Ion Balance	%	n/v	n/v	0.98	0.17	108	1.8	0.26	3.2	0.94	110	0.63	0.83	37	3.4	0.95	0.95	0.41
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.22	<0.5	<0.044	<0.044	<0.22	1.5	0.7	<0.044	0.17	<0.044	0.072	<0.044	0.14	<0.22
Nitrate + Nitrite (as N)	mg/L	$100_{n4,e,n}$[A]	n/v	<0.020	<0.050 MI	<0.02	<0.010	<0.010	<0.050 Z8	0.34	0.16	<0.010	0.038	<0.010	<0.020	<0.020	0.031	<0.050 MI
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.033	<0.10	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**2,400[AB]**	**2,600[AB]**	**2,390[AB]**	**2,300[AB]**	**2,700[AB]**	**2,500[AB]**	**1,900[AB]**	**2,470[AB]**	**2,200[AB]**	**1,200[AB]**	**1,400[AB]**	**4,700[AB]**	**610[AB]**	**4,900[AB]**	**5,100[AB]**
BTEX and Petroleum Hydrocarbons																		
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	-	<0.0005	0.00051	<0.00040	<0.00060 EC	<0.00040	<0.00040	**0.0056[AC]**	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	-	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.024	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	-	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	**0.0034[AB]**	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	-	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	0.013	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	-	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	0.0056	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	-	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00080	0.019	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	-	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	-	<0.1	<0.10	<0.10	<0.37	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																		
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	3.1	2.4	6	3.0	2.8	9.6	-	58.28	41	16	10	3.9	1.7	4.6	3.4
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**3,100[A]**	**3,100[A]**	**3,000[A]**	**2,900[A]**	**3,100[A]**	**3,100[A]**	**2,600[A]**	**3,650[A]**	**3,100[A]**	**1,800[A]**	**1,800[A]**	**2,000[A]**	1,000	**5,400[A]**	**5,500[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.99	7.69	8.07	7.86	7.75	7.63	7.97	8.33	8.02	7.96	8.41	7.80	8.31	7.57	7.48
Anions																		
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<100	81	<0.50	<0.50	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	410	410	400	370	410	400	410	450	640	740	1,600	1,500	350	630	720
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	500	500	497	450	500	490	510	540	780	900	1,900	1,600	430	770	870
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<100	97	<0.50	<0.50	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<100	<5.0	<0.50	<0.50	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,500 CD[AB]**	**1,600 CD[AB]**	**1,380[AB]**	**1,400[AB]**	**1,600[AB]**	**1,500[AB]**	**900 CD[AB]**	**1,130[AB]**	**950[AB]**	260	90	**730 CD[AB]**	170	**3,100 CD[AB]**	**3,200 CD[AB]**
Chloride	mg/L	100[A]	≤250[B]	1.7	1.5	<1.0	<1.0	<1.0	<1.0	**230 CD[A]**	**156[A]**	84	30	9.0	25	3.4	7.9	5.9
Nutrients																		
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	<0.15	<0.0030	0.0033	<0.0030	-	<0.15	0.0078	0.0047	0.013	0.0039	0.0038	0.0045	0.0037
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.49[A]**	**0.39[A]**	**0.53[A]**	**0.46[A]**	-	**0.69[A]**	-	**1.77[A]**	**1.5[A]**	**1.0[A]**	**2.0[A]**	**1.5[A]**	**0.99 A*[A]**	**0.60[A]**	**0.33[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.050	<0.02	<0.010	<0.010	<0.050	0.34	0.16	<0.010	0.038	<0.010	0.016	<0.010	0.031	<0.050
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	0.0033	<0.0030	-	<0.0030	<0.015 DB	<0.0030	-	-	0.0048	0.0070	<0.030 DB P2	0.0073	0.0057	0.011	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	3.7 DB	1.67	39.8	4.0	<1.0	0.48	-	17.0	3.2	<2.0	22.0	38 CD	0.90 A*	14 DB	1.25
Nitrogen	mg/L	n/v	n/v	-	1.7 DB	-	4.0 DB	<1.0 DB	0.48 DB NNA	-	-	3.2 DB	<2.0 DB	22	-	-	-	1.2 DB

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-11-15						MW16-12-3	RMW16-13-37				MW16-14-33	MW16-15-34	MW16-16-11	
Sample Date				30-Sep-16	13-May-21	22-Nov-21	6-May-22	17-Nov-22	18-May-23	6-Oct-16	24-Nov-21	9-May-22	18-Nov-22	16-May-23	27-Sep-16	26-Sep-16	3-Oct-16	13-May-21
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Metals - Dissolved																		
Aluminum	mg/L	0.05$_{n1,e}$[A]	0.1$_{a}$[B]	<0.0030	0.0057	<0.004	<0.0030	<0.0030	<0.0030	0.0070	**0.279**[AB]	0.013	0.012	**0.064**[A]	0.016 NF MA	0.0040	0.0056	0.0050
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	0.00075	0.0043	0.0059	0.0021	0.0013	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.0012	0.0011	0.002	0.00060	0.00042	0.00063	0.00092	0.003	0.0049	0.0013	0.0024	0.0017	0.0010	0.00085	0.00056
Barium	mg/L	2.0[A]	2.0[C]	0.016	0.012	<0.05	0.012	0.014	0.013	0.12	0.09	0.049	0.30	0.16	**3.8**[AC]	0.013	0.026	0.013
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.10	0.12	0.09	0.12	0.12	0.11	0.051	0.16	0.18	0.14	0.15	***<2.0***	0.040	0.20	0.29
Cadmium	mg/L	0.00037$_{n3,e}$[A]	0.007[C]	0.000043	0.000052	0.000288	0.000078	0.00017	0.000098	0.000036	0.000098	<0.00002	0.000061	0.000025	0.000024	<0.000020	0.00014 NF	0.000098
Calcium	mg/L	n/v	n/v	290	330	297	280	320	310	270	47.6	32	12	6.1	2,300	14	440	460
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	0.0006	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.0016	0.0014	0.0018	0.0013	0.0014	0.0015	<0.00030	<0.0009	0.00031	0.00045	<0.00030	0.00065	<0.00030	0.0037	0.0036
Copper	mg/L	0.0070[A]	≤1.0[B]	0.00029	0.00072	<0.0008	<0.0010	0.0011	0.0020	0.0018	**0.0233**[A]	<0.0010	0.0021	**0.013**[A]	<0.00020	<0.00020	**0.0097**[A]	0.00022
Iron	mg/L	0.30[A]	≤0.3[B]	**0.37**[AB]	**0.52**[AB]	<0.1	<0.060	<0.060	<0.060	<0.060	0.1	0.22	<0.060	0.29	**68**[AB]	<0.060	<0.060	**0.51**[AB]
Lead	mg/L	0.0070$_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	<0.00020	0.0006	<0.00020	0.00026	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.050	0.055	-	0.044	0.047	0.049	0.030	-	0.085	0.050	0.044	<2.0	0.074	0.15	0.15
Magnesium	mg/L	n/v	n/v	110	140	122	120	130	130	160	8.8	6.7	2.8	1.2	190	4.2	320	370
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.77**[AB]	**1.2**[AB]	**0.721**[AB]	**0.84**[AB]	**1.1**[AB]	**1.0**[AB]	**0.025**[AB]	**0.187**[AB]	**0.16**[AB]	0.016	0.015	**14**[AB]	**0.028**[AB]	**2.3**[AB]	**3.4**[AB]
Mercury	mg/L	0.0000050[A]	0.001[C]	0.0000036	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000025	<0.0000019	<0.0000019	**0.00046**[A]	<0.0000020	<0.0000020	<0.0000020	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0015	0.00057	0.001	0.0011	0.00062	0.00050	0.0021	0.046	0.064	0.089	0.12	0.028	0.018	0.0011	0.00041
Nickel	mg/L	0.337$_{n3,e}$[A]	n/v	0.0027	0.0025	<0.003	0.0022	0.0023	0.0023	0.0041	0.003	0.0022	0.0088	0.0015	0.0036	<0.00050	0.0066	0.007
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	0.08	<0.10	<0.10	<0.10	49	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	6.0	5.9	6.9	6.3	5.9	6.5	6.4	5.6	5.1	3.6	3.9	53	2.4	15	13
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	0.0010	0.0010	0.00025	0.00044	0.0016	**0.0042**[A]	0.00096	0.0010	0.00058	0.0011	0.00065	0.00038	0.00030
Silicon	mg/L	n/v	n/v	4.8	5.3	-	4.2	4.3	4.7	6.1	-	5.0	3.0	3.8	25	2.6	6.3	7.1
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**320**[AB]	**320**[AB]	**343**[AB]	**320**[AB]	**350**[AB]	**340**[AB]	110	**860**[AB]	**740**[AB]	**450**[AB]	**340**[AB]	**410**[AB]	**210**[AB]	**600 CD**[AB]	**590 CD**[AB]
Strontium	mg/L	n/v	7.0[C]	2.6	3.0	-	2.9	3.2	3.0	1.1	-	0.59	0.28	0.12	**9.7**[C]	0.25	4.9	6.0 CD
Sulfur	mg/L	n/v	n/v	480	590 CD	-	470	470	610	270	-	320	68	31	220	51	1,000 CD	1,200 CD
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	0.0080	0.0023	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.003	<0.0010	<0.0010	<0.0010	<0.0010	0.007	0.0019	0.0013	0.0015	0.0020	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0071	0.0054	0.006	0.0061	0.0056	0.0051	0.010	**0.029**[AC]	**0.030**[AC]	**0.022**[AC]	**0.018**[A]	**0.012**[A]	0.00024	**0.033**[AC]	**0.019**[A]
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	0.0011	-	0.0011	0.0030	0.0075	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	0.0053	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	<0.0030	0.018	<0.0030	<0.0030	<0.0030	0.0036	<0.0030	<0.0030	<0.0030
Metals - Total																		
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.0060 DB***	**0.000215 DB**[A]	**0.000052**[A]	**0.0009**[A]	**0.000163**[A]	**0.00062**[A]	**0.00030 DB**[A]	***<0.0000125***	**0.000522**[A]	**0.000233**[A]	**0.00322**[AC]	***<0.02 DB***	***<0.00010 DB***	***<0.0060 DB***	**0.0000788**[A]
Phosphorus	mg/L	n/v	n/v	-	-	24.4	-	-	-	-	8.47	-	-	-	-	-	-	-
Microbiological Parameters																		
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<100 DB***	***<10 MI***	**11**[D]	***<100 DVM***	***<100 MI***	***<10 Z8***	-	**3**[D]	***<10 AT***	***<100 MI***	***<20 Z8***	***<20***	***<1.0***	***<100 DB***	***<10 SVH MI***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<100 DB***	***<10 MI***	**11**[D]	***<100 DVM***	***<1.0***	***<10 Z8***	-	**5**[D]	**10 AT**[D]	***<100 MI***	**63 Z8**[D]	***<20 DB***	***<1.0***	***<100 DB***	***<10 SVH MI***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	23,000 DB	370	5,800	1,900 AT	390 SC1	36,000 Z8	-	111,000	150,000 AT	1,000	26,000 Z8	>6000	39	50,000 DB	350
Total Coliforms	mpn/100mL	n/v	0[D]	**100 DB**[D]	***<10 MI***	**205**[D]	***<100 DVM***	***<100 MI***	***<10 Z8***	-	**178**[D]	**85 AT**[D]	**310 MI**[D]	**80 Z8**[D]	**2,300**[D]	***<1.0***	**200 DB**[D]	***<10 SVH MI***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-16-17				MW16-17-5	RMW16-17-10		MW16-18-6		RMW16-18-5				MW16-18-10	
Sample Date				2-Dec-21	5-May-22	18-Nov-22	16-May-23	6-Oct-16	22-Nov-21	10-May-22	4-Oct-16	13-May-21	22-Nov-21	5-May-22	17-Nov-22	18-May-23	4-Oct-16	13-May-21
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Field Parameters																		
Dissolved Oxygen, Field	mg/L	n/v	n/v	6.62	3.98	13.4	5.1	-	7.13	3.61	-	23.79	41.26	3.71	3.4	4.3	-	5.11
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**5,160[A]**	**5,086[A]**	**2,651[A]**	**4,612[A]**	**6,290[A]**	**2,077[A]**	**2,143[A]**	**1,029[A]**	**1,060[A]**	**1,073[A]**	**1,143[A]**	**1,131[A]**	**1,013[A]**	**1,049[A]**	**1,211[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	5	-23.4	-16.8	21.2	-	19.3	51.2	-	62.5	62.1	67	-10.4	191.6	-	69.4
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.13	**6.9[B]**	7.32	7.27	7	7.2	7.11	7.1	7.43	7.94	7.42	7.22	7.50	7	7.53
Temperature, Field	deg C	n/v	≤15[B]	4.07	7.5	2.2	12.3	6.7	6.55	7.4	6.3	6.4	6.32	8.2	1.9	9.6	6.3	6.5
Calculated Parameters																		
Anion Sum	meq/L	n/v	n/v	-	59	67	66	110	-	26	13	12	-	12	12	12	13	13
Cation Sum	meq/L	n/v	n/v	-	66	66	67	100	-	27	12	13	-	13	13	14	12	13
Hardness (as CaCO3)	mg/L	n/v	n/v	1,520	1,400	1,300	1,300	3,500	826	850	480	490	265	260	260	300	160	200
Ion Balance	%	n/v	n/v	109	5.6	0.78	0.85	0.93	108	0.36	0.98	2.0	109	3.3	1.6	8.1	0.93	0.068
Nitrate	mg/L	13_{f}[A]	45[C]	<0.5	<0.22	<0.22	<0.22	5.0	<0.5	<0.22	5.3	4.1	4.3	4.1	3.9	4.2	0.51	1.6
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.02	<0.050 AT	<0.050 MI	<0.050 Z8	1.3	<0.02	<0.050 AT	1.2	0.93 MI	0.97	0.95	0.89 MI	0.95 Z8	0.13	0.35
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.10	<0.033	<0.033	<0.033	0.55	<0.05	<0.033	0.10	<0.033	<0.05	0.040	0.040	<0.033	0.054	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**4,460[AB]**	**3,900[AB]**	**4,300[AB]**	**4,200[AB]**	**6,900[AB]**	**1,530[AB]**	**1,600[AB]**	**650[AB]**	**620[AB]**	**665[AB]**	**650[AB]**	**670[AB]**	**690[AB]**	**680[AB]**	**740[AB]**
BTEX and Petroleum Hydrocarbons																		
Benzene	mg/L	0.0050[A]	0.005[C]	<0.0005	<0.00040	<0.00040	<0.00040	-	<0.0005	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.0003	<0.00040	<0.00040	<0.00040	-	<0.0003	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	0.0013	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.0005	<0.00040	<0.00040	<0.00040	-	<0.0005	<0.00040	0.00062	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	0.00068	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	-	<0.00080	<0.00080	<0.00080	-	-	<0.00080	0.0020	<0.00080	-	<0.00080	<0.00080	<0.00080	0.0029	<0.00080
Xylene, o-	mg/L	n/v	n/v	-	<0.00040	<0.00040	<0.00040	-	-	<0.00040	0.0010	<0.00040	-	<0.00040	<0.00040	<0.00040	0.0012	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.0005	<0.00089	<0.00089	<0.00089	-	<0.0005	<0.00089	0.0030	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	0.0041	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.1	<0.10	<0.10	<0.10	-	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.1	<0.10	<0.10	<0.10	-	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.1	<0.10	<0.10	<0.10	-	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																		
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	4	2.6	3.2	5.5	-	6	3.3	4.9	3.8	6	2.2 DSM	2.5	2.2	2.6	1.6
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**5,510[A]**	**5,200[A]**	**5,100[A]**	**5,000[A]**	**6,900[A]**	**2,080[A]**	**2,100[A]**	**1,100[A]**	**1,100[A]**	**1,130[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**	**1,200[A]**	**1,200[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.14	7.89	7.61	7.90	7.81	8.02	7.80	8.01	7.93	8.25	7.95	8.06	7.95	8.10	7.96
Anions																		
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	683	640	730	740	520	453	450	420	450	408	380	410	410	410	420
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	833	780	890	900	640	566	550	510	550	511	470	500	500	500	510
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_{l}[B]	**2,560[AB]**	**2,200[AB]**	**2,500[AB]**	**2,400[AB]**	**4,800 CD[AB]**	**744[AB]**	**830[AB]**	100	82	62.2	70	68	59	110	94
Chloride	mg/L	100[A]	≤250[B]	4.1	5.3	5.2	5.2	8.7	<1.0	<1.0	72	45	80.2	92	93	96	78	**110[A]**
Nutrients																		
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.01	<0.010	<0.010	<0.010	0.17	<0.01	<0.010	0.031	<0.010	<0.01	0.012	0.012	<0.010	0.017	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.15	0.0037	0.0039	<0.0030	-	<0.15	0.0043	<0.0030	0.0032	<0.15	0.0049	0.0046	<0.0030	<0.0030	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**1.91[A]**	**1.7[A]**	**1.6[A]**	**1.7[A]**	-	**0.05[A]**	**0.066[A]**	***<0.050***	<0.015	**0.05[A]**	0.017	0.030	0.020	***<0.050***	0.034
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.02	<0.050	<0.050	<0.050	1.1	<0.02	<0.050	1.2	0.93	0.97	0.93	0.88	0.95	0.12	0.35
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	-	<0.0030	0.0032	0.13	-	-	0.0034	0.0038	0.0031	-	0.0069	0.011	<0.0030	<0.0030	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	19.06	4.8	2.09	2.71	-	4.5	<2.0	1.3	0.72	1.7	0.63	<1.0	0.24	18 CD	0.89
Nitrogen	mg/L	n/v	n/v	-	4.8 DB	2.1 DB	2.7	-	-	<2.0 DB	-	1.7 DB	-	1.6 DB	<1.0 DB	1.2 DB	-	1.2 DB

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-16-17				MW16-17-5	RMW16-17-10		MW16-18-6		RMW16-18-5				MW16-18-10	
Sample Date				2-Dec-21	5-May-22	18-Nov-22	16-May-23	6-Oct-16	22-Nov-21	10-May-22	4-Oct-16	13-May-21	22-Nov-21	5-May-22	17-Nov-22	18-May-23	4-Oct-16	13-May-21
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Metals - Dissolved																		
Aluminum	mg/L	$0.05_{n1,e}$ [A]	0.1_{a} [B]	0.005	<0.0030	0.015	0.0055	0.0039	0.011	<0.0030	<0.0030	0.0053	0.017	0.015	<0.0030	0.0048	<0.0030	0.0032
Antimony	mg/L	0.0060 [A]	0.006 [C]	0.002	0.00096	<0.00060	<0.00060	0.00062	<0.001	0.0014	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050 [A]	0.010 [C]	**0.014 [AC]**	**0.012 [AC]**	0.0048	0.0030	0.00053	0.001	0.00042	0.00022	0.00026	0.001	0.00029	<0.00020	<0.00020	0.00039	<0.00020
Barium	mg/L	2.0 [A]	2.0 [C]	<0.05	0.012	<0.010	<0.050	0.041	<0.05	0.022	0.075	0.080	<0.05	0.065	0.075	0.077	0.030	0.028
Beryllium	mg/L	n/v	n/v	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0 [A]	5 [C]	0.23	0.22	0.19	0.22	0.12	0.12	0.13	0.088	0.092	0.11	0.11	0.12	0.11	0.14	0.16
Cadmium	mg/L	$0.00037_{n3,e}$ [A]	0.007 [C]	0.000064	0.000087	0.00004	<0.000020	0.00028	0.000086	<0.00002	<0.000020	<0.000020	0.000047	<0.00002	0.000028	0.000022	<0.000020	<0.000020
Calcium	mg/L	n/v	n/v	346	300	280	280	410	189	190	86	85	54.7	52	54	59	38	47
Chromium	mg/L	0.050 [A]	0.05 [C]	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.0096	0.0054	0.0034	0.0017	0.00083	0.0022	0.0014	<0.00030	<0.00030	<0.0009	0.00031	0.00033	0.00035	0.00034	<0.00030
Copper	mg/L	0.0070 [A]	≤1.0 [B]	<0.0008	<0.0010	<0.0010	0.0043	0.0017	<0.0008	<0.0010	0.00067	0.00080	0.0011	<0.0010	<0.0010	0.0029	<0.00020	0.00041
Iron	mg/L	0.30 [A]	≤0.3 [B]	<0.1	<0.060	<0.060	**5.6 [AB]**	<0.060	<0.1	<0.060	<0.060	<0.060	<0.1	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$ [A]	0.005 [C]	<0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	-	0.24	0.22	0.25	0.15	-	0.022	0.026	0.027	-	<0.020	<0.020	<0.020	0.031	0.039
Magnesium	mg/L	n/v	n/v	159	150	140	150	600 CD	86.0	92	63	67	31.1	32	30	38	16	21
Manganese	mg/L	0.020 [A]	≤0.02 [B]	**0.902 [AB]**	**0.69 [AB]**	**0.41 [AB]**	**0.56 [AB]**	**0.39 [AB]**	**0.648 [AB]**	**0.72 [AB]**	**0.058 [AB]**	0.0047	**0.099 [AB]**	**0.099 [AB]**	**0.12 [AB]**	**0.13 [AB]**	**0.20 [AB]**	**0.21 [AB]**
Mercury	mg/L	0.0000050 [A]	0.001 [C]	-	<0.0000019	<0.0000019	<0.0000019	<0.0000020	**0.0000052 [A]**	<0.0000019	<0.0000020	<0.0000019	0.0000039	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.025	0.0085	0.0015	0.00087	0.0015	0.001	0.0010	0.0019	0.0015	0.004	0.0032	0.0034	0.0027	0.0037	0.0018
Nickel	mg/L	$0.337_{r3,e}$ [A]	n/v	0.06	0.029	0.014	0.0048	0.0054	0.006	0.0018	0.00099	0.0006	<0.003	0.0013	0.0009	0.00087	<0.00050	0.0025
Phosphorus	mg/L	n/v	n/v	<0.08	<0.10	<0.10	<0.50	0.11	<0.08	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	14.0	12	8.3	9.6	11	5.4	5.6	2.4	2.2	2.6	2.2	2.0	2.3	1.3	1.3
Selenium	mg/L	0.0020 [A]	0.05 [C]	<0.0005	0.0011	0.00048	0.00099	**0.034 [A]**	<0.0005	<0.00020	0.0012	**0.0023 [A]**	<0.0005	0.00060	0.00065	0.00053	0.00066	0.0013
Silicon	mg/L	n/v	n/v	-	5.0	4.2	16	5.2	-	4.5	4.1	4.3	-	3.8	3.3	3.6	3.4	4.0
Silver	mg/L	0.00010 [A]	n/v	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200 [A]	≤200 [B]	**972 [AB]**	**880 [AB]**	**930 [AB]**	**910 [AB]**	**750 CD [AB]**	**232 [AB]**	**220 [AB]**	66	62	179	170	170	190	**200 [B]**	**210 [AB]**
Strontium	mg/L	n/v	7.0 [C]	-	7.0	**7.2 [C]**	**7.2 [C]**	4.7	-	2.7	0.75	0.80	-	0.41	0.43	0.47	0.27	0.36
Sulfur	mg/L	n/v	n/v	-	830	770	750	1,500 CD	-	250	29	31	-	22	19	21	33	36
Thallium	mg/L	n/v	n/v	0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	-	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	0.002	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010 [A]	0.02 [C]	0.005	0.0014	0.00036	0.00031	**0.031 [AC]**	0.007	0.0067	**0.011 [A]**	0.0076	0.008	0.0080	0.0075	0.0078	0.0064	0.0049
Vanadium	mg/L	n/v	n/v	-	0.0010	<0.0010	0.0020	<0.0010	-	<0.0010	<0.0010	<0.0010	-	0.0016	0.0011	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030 [A]	≤5.0 [B]	<0.005	<0.0030	<0.0030	<0.0030	0.0062	<0.005	<0.0030	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total																		
Mercury	mg/L	0.0000050 [A]	0.001 [C]	**0.000035 [A]**	**0.000491 [A]**	**0.000234 [A]**	**0.000232 [A]**	***<0.00020 DB***	***<0.0000125***	**0.000239 [A]**	***<0.0060 DB***	**0.0000383 [A]**	**0.000069 [A]**	**0.000225 [A]**	**0.000255 [A]**	**0.00021 [A]**	***<0.0060 DB***	***<0.00019 DB***
Phosphorus	mg/L	n/v	n/v	10.4	-	-	-	-	2.62	-	-	-	2.87	-	-	-	-	-
Microbiological Parameters																		
Escherichia coli (E.Coli)	mpn/100mL	n/v	0 [D]	**1 [D]**	***<10***	***<100 MI***	***<10 Z8***	-	**3 [D]**	***<10 AT***	***<10 DB***	***<10 MI***	***<1***	***<100***	***<100 MI***	***<10 Z8***	***<100 DB***	***<10 MI***
Fecal Coliforms	mpn/100mL	n/v	0 [D]	**2 [D]**	***<100***	***<100 MI***	***<10 Z8***	-	**8 [D]**	**10 AT [D]**	***<10 DB***	***<10 MI***	***<1***	***<100***	***<1.0***	***<10 Z8***	***<100 DB***	***<10 MI***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	18,300	740	520	220 Z8	-	95,000	900 AT	4,400 DB	140	89,500	79,000	>6000	>60000 Z8	17,000 DB	450
Total Coliforms	mpn/100mL	n/v	0 [D]	**550 [D]**	**210 [D]**	***<100 MI***	***<10 Z8***	-	**1,990 [D]**	**160 AT [D]**	**140 DB [D]**	***<10 MI***	**85 [D]**	***<100***	***<100 MI***	***<10 Z8***	**310 DB [D]**	***<10 MI***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-18-13				MW16-19-8	RMW16-19-10				MW16-19-19	RMW16-19				MW16-21-11
Sample Date				22-Nov-21	5-May-22	17-Nov-22	18-May-23	27-Sep-16	1-Dec-21	6-May-22	17-Nov-22	18-May-23	27-Sep-16	1-Dec-21	6-May-22	17-Nov-22	18-May-23	29-Sep-16
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Field Parameters																		
Dissolved Oxygen, Field	mg/L	n/v	n/v	3.19	2.56	2.3	4.7	-	5.19	5.09	4.0	6.4	-	2.75	2.04	3.8	7.2	-
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,011[A]**	**1,098[A]**	**1,136[A]**	**1,014[A]**	**2,400[A]**	**3,024[A]**	**3,057[A]**	**3,014[A]**	**2,468[A]**	**2,850[A]**	**2,642[A]**	**2,642[A]**	**2,607[A]**	**2,646[A]**	848
Oxidation Reduction Potential, field	mV	n/v	n/v	52.3	66.9	2.3	167.1	-	123.8	52.2	-28.0	98.3	-	-4.7	-103	-29.1	-31.7	-
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.64	7.45	7.39	7.58	7.6	7.07	7.09	**6.95[B]**	7.41	7.2	7.23	7.05	7.15	7.40	7.2
Temperature, Field	deg C	n/v	≤15[B]	5.04	7.5	1.4	14.5	8	4.28	10.6	4.9	9.7	8.2	3.89	6.8	3.0	13.7	8.5
Calculated Parameters																		
Anion Sum	meq/L	n/v	n/v	-	12	11	12	32	-	38	40	36	36	-	32	32	33	9.2
Cation Sum	meq/L	n/v	n/v	-	13	12	14	31	-	42	40	39	34	-	33	31	34	9.9
Hardness (as CaCO3)	mg/L	n/v	n/v	132	180	140	200	980	1,180	1,200	1,100	1,100	600	485	480	470	540	440
Ion Balance	%	n/v	n/v	103	5.3	2.9	8.8	0.96	117	4.4	0.18	4.0	0.95	108	1.3	1.3	1.4	1.1
Nitrate	mg/L	13_{f}[A]	45[C]	1.5	2.8	<0.44	3.0	1.8	<0.5	<0.22	<0.044	<0.044	<0.044	<0.5	<0.044	<0.044	<0.044	**21[A]**
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.34	0.63	<0.10 MI	0.68	0.42	<0.02	<0.050 AT	<0.010	<0.010	<0.020	<0.02	<0.010	<0.010	<0.010	4.8
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.05	<0.033	<0.033	<0.033	<0.033	<0.10	<0.033	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**640[AB]**	**660[AB]**	**640[AB]**	**680[AB]**	**2,000[AB]**	**2,330[AB]**	**2,500[AB]**	**2,600[AB]**	**2,300[AB]**	**2,200[AB]**	**1,850[AB]**	**2,000[AB]**	**2,000[AB]**	**2,100[AB]**	480
BTEX and Petroleum Hydrocarbons																		
Benzene	mg/L	0.0050[A]	0.005[C]	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	0.00059
Xylene, m & p-	mg/L	n/v	n/v	-	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	0.00090
Xylene, o-	mg/L	n/v	n/v	-	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	0.0010
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.0005	<0.00089	<0.00089	<0.00089	0.0019
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																		
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	4	1.8	2.0	1.7	6.3	6	5.7	5.7	3.9	3.9	4	3.6	3.9	3.7	4.8
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,080[A]**	**1,100[A]**	**1,100[A]**	**1,100[A]**	**2,500[A]**	**3,110[A]**	**3,100[A]**	**3,100[A]**	**2,800[A]**	**3,000[A]**	**2,760[A]**	**2,600[A]**	**2,700[A]**	**2,700[A]**	800
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.40	8.20	8.19	8.07	7.56	8.12	7.57	7.76	7.64	7.54	8.24	8.01	8.01	7.79	7.96
Anions																		
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	6	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<1.0	<0.50
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	386	390	370	380	420	402	480	460	510	520	519	620	590	590	390
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	468	470	450	470	520	490	590	560	620	640	634	750	720	720	470
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	7	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<1.0	<0.50
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<1.0	<0.50	<5	<1.0	<1.0	<1.0	<0.50
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	82.4	80	82	68	**1,100 CD[AB]**	**1,280[AB]**	**1,400[AB]**	**1,500[AB]**	**1,200[AB]**	**1,200 CD[AB]**	**883[AB]**	**940[AB]**	**980[AB]**	**1,000[AB]**	50
Chloride	mg/L	100[A]	≤250[B]	64.3	76	79	87	1.9	2.5	2.1	2.9	1.7	1.7	<1.0	1.2	1.2	<1.0	4.6
Nutrients																		
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.01	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.15	<0.0030	0.0048	<0.0030	<0.0030	<0.15	0.0035	0.0042	<0.0030	<0.0030	<0.15	<0.0030	0.0032	<0.0030	0.0041 OG
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.04[A]**	<0.015	<0.015	<0.015	**0.070[A]**	**0.08[A]**	**0.043[A]**	**0.074[A]**	**0.38[A]**	**1.1[A]**	**1.14[A]**	**1.0[A]**	**1.0[A]**	**1.0[A]**	***<0.050***
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.34	0.63	<0.10	0.68	0.42	<0.02	<0.050	<0.010	<0.010	<0.010	<0.02	<0.010	<0.010	<0.010	**4.8[A]**
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	-	<0.0030	<0.0030	<0.0030	0.0037	-	<0.0030	<0.0030	<0.0030	<0.0030	-	<0.0030	<0.0030	0.0042	0.013
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.1	0.30	0.62	<0.020	0.70 DB	10.58	1.45	<1.0	0.91	1.5 DB	5.66	1.27	1.39	1.13	3.3 DB
Nitrogen	mg/L	n/v	n/v	-	0.93 DB	0.62	0.70	-	-	1.5 DB	<1.0 DB	0.91 DB	-	-	1.3	1.4 DB	1.1	-

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				RMW16-18-13				MW16-19-8	RMW16-19-10				MW16-19-19	RMW16-19				MW16-21-11
Sample Date				22-Nov-21	5-May-22	17-Nov-22	18-May-23	27-Sep-16	1-Dec-21	6-May-22	17-Nov-22	18-May-23	27-Sep-16	1-Dec-21	6-May-22	17-Nov-22	18-May-23	29-Sep-16
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Metals - Dissolved																		
Aluminum	mg/L	0.05$_{rn1,e}$[A]	0.1$_{a}$[B]	0.017	<0.0030	<0.0030	0.0040	0.0039	**0.072**[A]	<0.0030	0.0033	<0.0030	0.0033	**0.102**[AB]	<0.0030	<0.0030	<0.0030	0.0033
Antimony	mg/L	0.0060[A]	0.006[C]	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.001	0.00035	<0.00020	<0.00020	0.00030	0.002	0.00035	0.00028	0.00025	0.00033	<0.001	<0.00020	0.00026	<0.00020	0.00045
Barium	mg/L	2.0[A]	2.0[C]	<0.05	0.041	0.034	0.045	0.013	<0.05	0.015	0.013	0.013	<0.010	<0.05	<0.010	<0.010	<0.010	0.087
Beryllium	mg/L	n/v	n/v	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.13	0.14	0.14	0.14	0.092	0.12	0.13	0.12	0.13	0.13	0.15	0.15	0.15	0.15	0.061
Cadmium	mg/L	0.00037$_{rn3,e}$[A]	0.007[C]	0.000082	<0.00002	<0.000020	<0.000020	0.000057	0.000096	0.000051	0.000026	0.00012	<0.000020	0.000035	<0.00002	<0.000020	<0.000020	0.000073
Calcium	mg/L	n/v	n/v	29.5	38	30	42	230	309	290	280	260	140	119	110	110	130	86
Chromium	mg/L	0.050[A]	0.05[C]	0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.0009	<0.00030	<0.00030	<0.00030	<0.00030	0.0012	0.00068	0.00061	0.00067	<0.00030	<0.0009	<0.00030	<0.00030	<0.00030	0.00062
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0016	<0.0010	<0.0010	0.0023	0.00059	0.0011	<0.0010	0.0013	0.0021	<0.00020	<0.0008	<0.0010	<0.0010	0.0025	0.0013
Iron	mg/L	0.30[A]	≤0.3[B]	<0.1	<0.060	<0.060	<0.060	<0.060	<0.1	<0.060	<0.060	<0.060	**2.6**[AB]	<0.1	<0.060	<0.060	<0.060	0.078
Lead	mg/L	0.0070$_{rn3,e}$[A]	0.005[C]	0.0002	<0.00020	<0.00020	<0.00020	<0.00020	0.0006	<0.00020	<0.00020	<0.00020	<0.00020	0.0002	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	-	<0.020	0.020	<0.020	0.029	-	0.024	0.021	0.021	0.056	-	0.053	0.054	0.053	0.028
Magnesium	mg/L	n/v	n/v	14.1	21	15	23	99	100	110	100	96	62	45.6	49	46	55	54
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.078**[AB]	**0.12**[AB]	**0.098**[AB]	**0.13**[AB]	**0.071**[AB]	**0.537**[AB]	**0.61**[AB]	**0.59**[AB]	**0.79**[AB]	**0.37**[AB]	**0.248**[AB]	**0.28**[AB]	**0.29**[AB]	**0.32**[AB]	**0.17**[AB]
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000025	<0.0000019	<0.0000019	<0.0000019	<0.0000020	-	<0.0000019	<0.0000019	<0.0000019	<0.0000020	-	<0.0000019	<0.0000019	<0.0000019	<0.0000020
Molybdenum	mg/L	n/v	n/v	0.005	0.0036	0.0037	0.0037	0.00060	<0.001	0.00081	0.00077	0.00065	0.0012	0.002	0.0015	0.0014	0.0011	0.0010
Nickel	mg/L	0.337$_{rn3,e}$[A]	n/v	<0.003	<0.00050	<0.00050	<0.00050	<0.00050	0.004	0.0026	0.0023	0.002	<0.00050	<0.003	<0.00050	<0.00050	<0.00050	0.0016
Phosphorus	mg/L	n/v	n/v	<0.08	<0.10	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	1.3	1.4	0.95	1.3	5.9	6.5	6.8	6.1	7.0	5.9	5.3	5.7	5.2	5.9	7.6
Selenium	mg/L	0.0020[A]	0.05[C]	<0.0005	0.00053	0.00053	0.00044	**0.056**[AC]	<0.0005	**0.0030**[A]	**0.0024**[A]	0.0010	<0.00020	<0.0005	<0.00020	<0.00020	<0.00020	0.0019
Silicon	mg/L	n/v	n/v	-	3.0	2.7	3.4	3.6	-	3.9	3.7	4.2	3.4	-	3.6	3.3	3.7	4.7
Silver	mg/L	0.00010[A]	n/v	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**210**[AB]	**210**[AB]	**210**[AB]	**220**[AB]	**260**[AB]	**388**[AB]	**410**[AB]	**410**[AB]	**410**[AB]	**490**[AB]	**486**[AB]	**530**[AB]	**500**[AB]	**530**[AB]	21
Strontium	mg/L	n/v	7.0[C]	-	0.28	0.22	0.29	1.4	-	1.9	1.9	1.9	2.1	-	1.8	1.8	2.0	1.1
Sulfur	mg/L	n/v	n/v	-	24	24	27	370	-	450	440	400	370	-	320	290	310	19
Thallium	mg/L	n/v	n/v	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	-	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.005	0.0056	0.0044	0.0054	**0.013**[A]	**0.013**[A]	**0.012**[A]	**0.012**[A]	0.0099	0.00092	0.002	0.00088	0.00087	0.00086	0.0067
Vanadium	mg/L	n/v	n/v	-	0.0018	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.005	<0.0030	<0.0030	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total																		
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.000049**[A]	**0.0000083**[A]	0.0000041	***<0.000019***	***<0.0020 DB***	**0.000081**[A]	**0.00072**[A]	**0.000708**[A]	**0.001**[A]	***<0.00020 DB***	**0.000041**[A]	**0.0000099**[A]	**0.0000093**[A]	**0.0000077**[A]	***<0.02 DB***
Phosphorus	mg/L	n/v	n/v	0.53	-	-	-	-	14.2	-	-	-	-	8.71	-	-	-	-
Microbiological Parameters																		
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	**1**[D]	***<1.0***	***<1.0***	***<1.0***	**63**[D]	**13**[D]	***<100 DVM***	***<100 MI***	***<10 Z8***	***<10***	**1**[D]	***<1.0***	***<1.0***	***<1.0***	***<10 DB***
Fecal Coliforms	mpn/100mL	n/v	0[D]	**1**[D]	***<10***	***<1.0***	***<1.0***	***<10 DB***	**26**[D]	***<100 DVM***	***<1.0***	***<10 Z8***	***<10 DB***	**2**[D]	***<1.0***	***<1.0***	***<1.0***	***<10 DB***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	6,200	2,500	2,300	1,400	>6000	8,900	1,100 AT	290	19,000 Z8	1,700	1,350	140	550	1,300	3,200 DB
Total Coliforms	mpn/100mL	n/v	0[D]	**770**[D]	**12**[D]	**1.0**[D]	***<1.0***	**280**[D]	**194**[D]	**410 DVM**[D]	***<100 MI***	***<10 Z8***	**10**[D]	**86**[D]	**5.2**[D]	***<1.0***	***<1.0***	**20 DB**[D]

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-22-26						RMW16-23-7			MW16-23-14			RMW16-23-14		
Sample Date				28-Sep-16	14-May-21	23-Nov-21	10-May-22	22-Nov-22	18-May-23	13-May-22	18-Nov-22	18-May-23	29-Sep-16	14-May-21	23-Nov-21	13-May-22	18-Nov-22	18-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Field Parameters																		
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	4.71	4.89	5.34	3.9	9.2	5.87	4.2	4.2	-	9.22	4.31	4.73	3.5	3.6
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**2,080[A]**	**1,897[A]**	**1,922[A]**	**2,120[A]**	**1,934[A]**	**1,833[A]**	947	**1,015[A]**	700	**1,064[A]**	993	**1,016[A]**	**1,257[A]**	**1,161[A]**	**1,064[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	65.8	89.4	130.3	-50.3	107.8	-6.5	-22.6	114.0	-	0.1	31.9	81.2	-20.2	93.2
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.2	7.37	7.68	7.25	7.76	7.59	7.46	7.18	7.49	7.2	**6.96[B]**	**6.92[B]**	7.49	7.29	7.55
Temperature, Field	deg C	n/v	≤15[B]	7.9	14.0	3.56	4.8	3.1	7.4	6.4	6.8	12.7	9.4	10.4	2.17	6.9	4.8	13.7
Calculated Parameters																		
Anion Sum	meq/L	n/v	n/v	26	24	-	24	24	25	10	11	11	13	13	-	13	13	13
Cation Sum	meq/L	n/v	n/v	26	24	-	23	24	27	9.7	11	13	14	12	-	13	13	17
Hardness (as CaCO3)	mg/L	n/v	n/v	640	680	704	680	670	770	390	440	540	540	510	565	340	310	380
Ion Balance	%	n/v	n/v	1.0	0.53	116	4.1	0.92	3.2	2.0	1.7	8.0	1.0	1.7	111	1.1	0.83	13
Nitrate	mg/L	13_{f}[A]	45[C]	0.054	3.3	1.5	<0.044	0.55	0.35	0.37	<0.044	<0.044	<0.044	<0.044	<0.5	0.24	<0.044	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.020	0.73	0.34	0.022	0.14	0.11	0.098 AT	<0.010	<0.010	<0.020	<0.010	<0.02	0.054 AT	<0.010	<0.010
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.05	0.069	0.062	0.11	0.046	<0.033	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,700[AB]**	**1,600[AB]**	**1,480[AB]**	**1,500[AB]**	**1,600[AB]**	**1,700[AB]**	**560[AB]**	**590[AB]**	**630[AB]**	**680[AB]**	**620[AB]**	**639[AB]**	**750[AB]**	**740[AB]**	**810[AB]**
BTEX and Petroleum Hydrocarbons																		
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
Miscellaneous Inorganics																		
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	3.3	2.4	3	1.5	2.6	1.6	2.8	1.5	2.1	4.1	2.1	6	2.5	1.9	1.4
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**2,200[A]**	**2,000[A]**	**2,000[A]**	**2,000[A]**	**2,000[A]**	**2,000[A]**	900	980	980	**1,100[A]**	**1,100[A]**	**1,040[A]**	**1,200[A]**	**1,200[A]**	**1,200[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.04	7.80	8.13	7.94	7.86	7.52	7.98	7.74	7.77	7.94	7.52	7.90	7.97	7.85	8.00
Anions																		
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	180	180	184	180	180	190	250	340	340	600	580	561	390	370	370
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	220	220	232	220	220	230	300	420	410	730	710	702	480	460	450
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,100 CD[AB]**	**970 CD[AB]**	**845[AB]**	**1,000[AB]**	**990[AB]**	**1,000[AB]**	170	140	140	70	45	35.7	240	240	240
Chloride	mg/L	100[A]	≤250[B]	4.9	3.5	12.8	3.1	2.9	2.6	54	47	50	3.5	<1.0	5.5	16	15	13
Nutrients																		
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.010	<0.010	<0.01	0.021	0.019	0.034	0.014	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0076 OG	0.0068	<0.15	0.0092 DXE	0.051	0.011	<0.0030	0.0048	<0.0030	<0.0030	0.0033	0.17	<0.0030	0.0048	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.68[A]**	0.021	**0.14[A]**	**0.39[A]**	**1.0[A]**	**0.62[A]**	**0.13[A]**	**0.055[A]**	**0.20[A]**	**0.14[A]**	**0.089[A]**	**0.10[A]**	**0.24[A]**	**0.45[A]**	**0.56[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.012	0.73	0.34	<0.010	0.12	0.080	0.084	<0.010	<0.010	<0.010	<0.010	<0.02	0.054	<0.010	<0.010
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	<0.0030	0.0081	-	<0.0030	0.061	0.056	0.0066	<0.0030	0.014	<0.0030	0.0045	-	<0.0030	<0.0030	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.97	<0.020	0.3	0.788	1.51	0.665	1.52	<0.20	1.62	2.8 CD	0.149	1.0	0.37	0.751	0.571
Nitrogen	mg/L	n/v	n/v	-	0.62	-	0.81	1.7	0.78	1.6 DB	<0.20 DB	1.6 DB	-	0.15	-	0.42 DB	0.75	0.57

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-22-26						RMW16-23-7			MW16-23-14			RMW16-23-14		
Sample Date				28-Sep-16	14-May-21	23-Nov-21	10-May-22	22-Nov-22	18-May-23	13-May-22	18-Nov-22	18-May-23	29-Sep-16	14-May-21	23-Nov-21	13-May-22	18-Nov-22	18-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ															
Metals - Dissolved																		
Aluminum	mg/L	0.05$_{rn1,e}$[A]	0.1$_a$[B]	0.0036	0.0057	0.015	<0.0030	<0.0030	<0.0030	0.0060	<0.0030	0.0040	<0.0030	<0.0030	<0.004	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.001	0.0020	0.0014	0.0011	0.0028	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	0.00061	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00073	<0.00020	0.002	0.00048	0.00040	0.00049	0.00039	0.00032	0.00022	**0.0056[A]**	0.0013	0.002	0.00021	<0.00020	<0.00020
Barium	mg/L	2.0[A]	2.0[C]	0.034	0.020	<0.05	0.016	0.016	0.018	0.11	0.10	0.099	0.12	0.090	<0.05	0.030	0.021	0.020
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.098	0.14	0.14	0.12	0.13	0.14	0.027	<0.020	0.028	0.13	0.13	0.12	0.070	0.054	0.080
Cadmium	mg/L	0.00037$_{rn3,e}$[A]	0.007[C]	<0.000020	0.000042	0.000052	<0.00002	<0.000020	<0.000020	<0.00002	0.000043	0.000045	0.000033	<0.000020	0.000029	0.000030	0.000042	0.00003
Calcium	mg/L	n/v	n/v	170	170	184	160	170	190	99	110	130	130	130	146	79	76	90
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.00087	<0.00030	<0.0009	0.00050	0.00034	0.00032	0.00036	0.00069	0.00066	0.0020	0.00079	<0.0009	0.00047	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.00020	0.00026	<0.0008	<0.0010	<0.0010	0.0019	<0.0010	<0.0010	0.0020	<0.00020	0.0056	<0.0008	<0.0010	<0.0010	0.0019
Iron	mg/L	0.30[A]	≤0.3[B]	0.11	<0.060	<0.1	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	**0.50[AB]**	**0.91[AB]**	<0.1	<0.060	<0.060	<0.060
Lead	mg/L	0.0070$_{rn3,e}$[A]	0.005[C]	<0.00020	<0.00020	0.0003	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.064	0.064	-	0.032	0.055	0.050	<0.020	<0.020	<0.020	0.032	0.033	-	0.030	0.033	0.042
Magnesium	mg/L	n/v	n/v	54	58	59.3	66	60	70	34	41	54	53	45	48.6	35	30	37
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.51[AB]**	**0.27[AB]**	**0.400[AB]**	**0.46[AB]**	**0.43[AB]**	**0.47[AB]**	**0.074[AB]**	**0.26[AB]**	**0.35[AB]**	**0.75[AB]**	**0.37[AB]**	**0.368[AB]**	**0.42[AB]**	**0.21[AB]**	**0.20[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000020	<0.0000019	**0.0000056[A]**	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019	**0.0000081[A]**	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0039	0.0032	0.003	0.0028	0.0023	0.0023	0.0076	0.0015	0.0010	0.0053	0.00052	<0.001	0.0066	0.0014	0.0012
Nickel	mg/L	0.337$_{rn3,e}$[A]	n/v	0.0018	0.0014	<0.003	0.0008	0.001	0.00088	0.0016	0.0025	0.0017	0.0053	0.00088	<0.003	0.00085	<0.00050	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	7.1	6.7	6.8	6.6	6.8	7.8	7.6	5.2	5.6	6.5	4.5	5.0	4.9	4.3	5.5
Selenium	mg/L	0.0020[A]	0.05[C]	0.00023	0.00048	0.0010	<0.00020	0.00036	<0.00020	**0.0023[A]**	<0.00020	0.00026	<0.00020	<0.00020	0.0011	0.00039	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	4.8	4.4	-	4.0	3.8	4.4	3.4	3.4	4.2	6.5	5.9	-	4.2	3.6	4.8
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**310[AB]**	**230[AB]**	**252[AB]**	**200[B]**	**230[AB]**	**250[AB]**	40	44	50	59	40	53.2	140	150	**200[B]**
Strontium	mg/L	n/v	7.0[C]	2.4	3.1	-	2.9	3.0	3.2	0.44	0.72	0.75	1.1	1.3	-	0.55	0.83	0.93
Sulfur	mg/L	n/v	n/v	350	330	-	340	310	330	48	38	48	25	15	-	79	62	76
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	0.011	0.0064	0.0046	0.0014	<0.0010	0.0011	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0044	0.0026	0.003	0.0022	0.0019	0.0019	**0.011[A]**	0.0031	0.0023	0.0052	0.0026	0.003	0.0023	0.00050	0.00033
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	0.016	<0.005	0.015	<0.0030	0.0032	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030
Metals - Total																		
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.0060 DB***	<0.0000019	**0.0000056[A]**	<0.0000019	<0.0000019	<0.0000019	**0.000377[A]**	**0.000206[A]**	**0.000186[A]**	***<0.02 DB***	**0.0000234[A]**	**0.000013[A]**	**0.0000211[A]**	<0.0000019	<0.0000019
Phosphorus	mg/L	n/v	n/v	-	-	0.16	-	-	-	-	-	-	-	-	0.55	-	-	-
Microbiological Parameters																		
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<10 DB***	***<1.0***	***<1***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<100 MI***	***<10 Z8***	***<10 DB***	***<10 MI***	**1[D]**	***<1.0***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<10 DB***	***<1.0***	**1[D]**	**3.1[D]**	***<1.0***	***<1.0***	***<1.0***	***<100 MI***	***<10 Z8***	***<10 DB***	***<10 MI***	**1[D]**	***<1.0***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	>6000	510	3,800	1,200	780	5,500	2,000	640	32,000 Z8	20,000 DB	6,100 MI	2,660	35	1,200	780
Total Coliforms	mpn/100mL	n/v	0[D]	**2,000 DB[D]**	**1,200[D]**	**488[D]**	**460[D]**	**180[D]**	**140[D]**	**3.1[D]**	***<100 MI***	***<10 Z8***	**>2400 DB[D]**	***<10 MI***	**17[D]**	**8.6[D]**	**9.7[D]**	**1.0[D]**

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-23-36			RMW16-23-32			MW21-3-15			MW21-6-7		MW21-6-7	MW21-6-12			
Sample Date				29-Sep-16	14-May-21	23-Nov-21	13-May-22	18-Nov-22	18-May-23	4-May-22	16-Nov-22	16-May-23	22-Nov-21	5-May-22	15-Nov-22	17-May-23	22-Nov-21	5-May-22	15-Nov-22	17-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																	
Field Parameters																				
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	13.11	2.8	3.6	6.1	4.9	4.76	8.0	12.0	17.92	3.55	4.0	7.7	7.91	2.24	5.9	6.9
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,256[A]**	**1,298[A]**	**1,281[A]**	**1,169[A]**	**1,166[A]**	**1,071[A]**	**1,145[A]**	**1,272[A]**	**1,115[A]**	**1,306[A]**	**1,427[A]**	**1,367[A]**	**1,301[A]**	**1,425[A]**	**1,592[A]**	**1,479[A]**	**1,409[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	-72.6	-38.1	27.1	-23.8	78.2	88.2	-35.8	190.4	41.5	7.8	-49.6	150.9	69	-53.6	-50.6	81.3
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.3	7.64	7.71	7.71	7.79	7.68	7.56	**8.60[A]**	7.90	7.4	7	7.19	7.40	7.83	7.01	7.36	7.23
Temperature, Field	deg C	n/v	≤15[B]	8.3	7.8	3.88	5.5	5.8	9.0	8.4	0.7	9.3	7.36	9	5.8	7.6	5.99	12.1	5.9	10.2
Calculated Parameters																				
Anion Sum	meq/L	n/v	n/v	14	15	-	12	13	13	21	15	14	-	15	16	16	-	16	17	17
Cation Sum	meq/L	n/v	n/v	14	14	-	12	14	16	13	13	15	-	19	17	16	-	20	18	17
Hardness (as CaCO3)	mg/L	n/v	n/v	180	190	198	63	67	81	22	23	16	351	390	320	320	336	380	350	340
Ion Balance	%	n/v	n/v	0.99	1.8	112	1.3	2.7	10	22	6.8	4.7	110	12	1.8	1.6	106	10	2.5	0.84
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.044	<0.5	0.051	0.056	<0.044	0.062	0.050	0.045	<0.5	<0.044	0.17	<0.044	<1.0	<0.044	<0.044	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.020	<0.010	<0.02	0.012	0.013	<0.010	0.014	0.011	0.010	<0.02	<0.010	0.039	<0.010	<0.02	<0.010	<0.010	<0.010
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**850[AB]**	**900[AB]**	**858[AB]**	**660[AB]**	**750[AB]**	**780[AB]**	**990[AB]**	**820[AB]**	**820[AB]**	**957[AB]**	**950[AB]**	**940[AB]**	**910[AB]**	**968[AB]**	**980[AB]**	**1,000[AB]**	**960[AB]**
BTEX and Petroleum Hydrocarbons																				
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
Miscellaneous Inorganics																				
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.9	2.3	4	1.7	1.1	1.3	5.6	2.7	2.0	14	3.5	3.8	4.1	8	2.5	2.5	3.3
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,300[A]**	**1,400[A]**	**1,380[A]**	**1,200[A]**	**1,200[A]**	**1,200[A]**	**1,100[A]**	**1,200[A]**	**1,200[A]**	**1,480[A]**	**1,400[A]**	**1,400[A]**	**1,400[A]**	**1,510[A]**	**1,500[A]**	**1,600[A]**	**1,500[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.22	8.16	8.33	8.37	8.27	8.26	**8.59[A]**	8.43	8.45	8.13	7.83	7.67	7.48	8.07	7.91	7.68	7.54
Anions																				
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	4.5	<1.0	<1.0	13	5.5	9.5	<5	<1.0	<1.0	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	290	300	314	480	530	530	910	610	540	549	500	550	550	537	480	530	540
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	350	370	386	570	640	650	1,100	740	630	684	610	670	670	669	590	640	660
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	5.4	<1.0	<1.0	16	6.6	11	<5	<1.0	<1.0	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5	<1.0	<1.0	<1.0	<5	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	380 CD	410 CD	339	110	120	100	130	150	150	223	230	230	220	221	240	230	220
Chloride	mg/L	100[A]	≤250[B]	3.2	2.2	3.1	<1.0	<1.0	<1.0	3.7	<1.0	1.9	19.0	18	27	25	44.7	48	74	66
Nutrients																				
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0040 OG	0.0043	<0.15	0.0076	0.0094	0.0070	0.12	0.029	0.016	<0.15	<0.0030	0.0042	<0.0030	<0.15	<0.0030	<0.0030	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.83[A]**	**1.1[A]**	**1.11[A]**	**0.80[A]**	**0.75[A]**	**0.72[A]**	**0.90[A]**	**0.51[A]**	**0.33[A]**	**0.12[A]**	**0.036[A]**	0.024	**0.045[A]**	**0.23[A]**	**0.19[A]**	**0.18[A]**	**0.16[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.010	<0.02	0.012	0.013	<0.010	0.014	0.011	0.010	<0.02	<0.010	0.039	<0.010	<0.02	<0.010	<0.010	<0.010
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	0.013	0.016	-	0.0078	0.0051	0.0044 P2	0.13	0.044	0.018	-	0.010	0.032	3.0 DB	-	<0.0030	0.12 DB	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.3	1.86	4.3	0.989	0.927	0.759	14.4	<1.0	0.66	166	4.7	1.15	2.02	1.4	0.47	0.690	0.315
Nitrogen	mg/L	n/v	n/v	-	1.9 DB	-	1.0	0.94	0.76	14 DB	<1.0 DB	0.67 DB	-	4.7 DB	1.2 DB	2.0	-	0.47 DB	0.69	0.31

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-23-36			RMW16-23-32			MW21-3-15			MW21-6-7		MW21-6-7	MW21-6-12			
Sample Date				29-Sep-16	14-May-21	23-Nov-21	13-May-22	18-Nov-22	18-May-23	4-May-22	16-Nov-22	16-May-23	22-Nov-21	5-May-22	15-Nov-22	17-May-23	22-Nov-21	5-May-22	15-Nov-22	17-May-23
Location Description				Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2	Tier 2
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	**Units**	**2022 AEPA Tier 1**	**GCDWQ**																	
Metals - Dissolved																				
Aluminum	mg/L	0.05$_{rt1,e}$[A]	0.1$_{a}$[B]	0.0074	<0.0030	0.004	0.0033	<0.0030	<0.0030	**3.9**[AB]	0.022	0.0076	0.009	<0.0030	<0.0030	<0.0030	0.005	<0.0030	<0.0030	0.0063
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	0.0016	0.00081	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00035	0.00029	0.002	0.00056	0.00046	0.00054	**0.0065**[A]	0.0014	0.0013	0.001	0.00023	0.00023	0.00028	0.001	0.00072	0.00083	0.00090
Barium	mg/L	2.0[A]	2.0[C]	0.030	0.053	<0.05	0.019	0.020	0.022	0.041	0.060	0.020	<0.05	0.025	0.021	0.021	<0.05	0.015	0.014	0.013
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.086	0.095	0.09	0.087	0.080	0.090	0.19	0.19	0.22	0.19	0.20	0.19	0.19	0.21	0.23	0.20	0.21
Cadmium	mg/L	0.00037$_{rt3,e}$[A]	0.007[C]	<0.000020	<0.000020	0.000017	<0.00002	<0.000020	<0.000020	0.000029	<0.000020	<0.000020	0.000037	0.000023	<0.000020	0.000033	0.000077	<0.00002	<0.000020	0.000029
Calcium	mg/L	n/v	n/v	50	51	54.4	17	18	21	6.6	6.8	5.4	91.2	100	86	84	88.7	98	91	87
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	0.0036	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.0009	<0.00030	<0.00030	<0.00030	0.0010	<0.00030	<0.00030	<0.0009	0.00037	0.00058	0.00055	<0.0009	0.00058	0.00054	0.00063
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.00020	0.00025	<0.0008	<0.0010	<0.0010	0.0019	**0.0080**[A]	0.0025	**0.0074**[A]	<0.0008	<0.0010	<0.0010	0.0014	0.0012	<0.0010	0.0010	0.0017
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	**0.77**[AB]	<0.1	<0.060	<0.060	<0.060	**0.95**[AB]	**3.5**[AB]	<0.060	<0.1	<0.060	<0.060	<0.060	<0.1	<0.060	<0.060	<0.060
Lead	mg/L	0.0070$_{rt3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	0.0016	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.066	0.075	-	0.037	0.051	0.050	<0.020	0.027	0.029	-	0.032	0.034	0.032	-	0.045	0.048	0.050
Magnesium	mg/L	n/v	n/v	14	15	15.2	5.1	5.6	6.8	1.4	1.5	0.53	30.0	34	26	27	27.7	33	29	29
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.083**[AB]	**0.10**[AB]	**0.073**[AB]	**0.027**[AB]	**0.028**[AB]	**0.031**[AB]	**0.034**[AB]	0.015	<0.0040	0.009	**0.17**[AB]	**0.18**[AB]	**0.20**[AB]	**0.149**[AB]	**0.18**[AB]	**0.099**[AB]	**0.097**[AB]
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019	0.000002	<0.0000019	<0.0000019	**0.0000054**[A]	<0.0000019	<0.0000019	<0.0000019	***<0.0000125***	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0023	0.0023	0.005	0.0022	0.0021	0.0020	0.023	0.0044	0.0016	0.002	0.0016	0.0011	0.0017 NH	0.002	0.0012	0.0011	0.0017
Nickel	mg/L	0.337$_{rt3,e}$[A]	n/v	<0.00050	<0.00050	<0.003	<0.00050	<0.00050	<0.00050	0.0067	<0.00050	0.00059	<0.003	0.0019	0.0018	0.0023	0.005	0.0016	0.0021	0.0029
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	<0.14	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	4.2	4.0	4.3	2.5	2.6	3.2	1.2	1.5	0.63	6.2	5.2	4.3	4.1	4.3	5.1	4.7	4.3
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	0.0020	0.00029	<0.00020	<0.00020	**0.0022**[A]	0.00068	0.00056	<0.0005	0.00023	<0.00020	<0.00020	<0.0005	<0.00020	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	3.8	3.8	-	3.5	3.2	3.9	4.5	9.6	4.2	-	4.9	4.3	4.6	-	4.5	3.9	4.3
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**230**[AB]	**230**[AB]	**252**[AB]	**240**[AB]	**280**[AB]	**320**[AB]	**300**[AB]	**290**[AB]	**340**[AB]	**251**[AB]	**260**[AB]	**240**[AB]	**220**[AB]	**253**[AB]	**270**[AB]	**260**[AB]	**230**[AB]
Strontium	mg/L	n/v	7.0[C]	0.77	0.83	-	0.29	0.33	0.36	0.053	0.076	0.059	-	1.0	0.89	0.90	-	1.8	1.6	1.5
Sulfur	mg/L	n/v	n/v	120	140	-	38	36	38	46	44	54	-	72	66	75	-	73	65	75
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.15	0.0045	<0.0010	0.005	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.00010	<0.00010	<0.001	0.00024	0.00020	0.00018	0.0072	0.0012	0.00049	0.008	0.0070	0.0073	0.0077	0.004	0.0043	0.0053	0.0062
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	0.011	0.0013	0.0025	-	0.0014	<0.0010	<0.0010	-	0.0014	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	0.0065	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	<0.005	<0.0030	0.0039	<0.0030
Metals - Total																				
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.00020 DB***	**0.0000699**[A]	**0.000025**[A]	0.0000024	<0.0000019	<0.0000019	**0.00446**[AC]	**0.00176**[AC]	**0.0000333**[A]	**0.000060**[A]	**0.00169**[AC]	**0.000731**[A]	**0.00093**[A]	**0.000010**[A]	**0.0000122**[A]	**0.00002**[A]	**0.0000217**[A]
Phosphorus	mg/L	n/v	n/v	-	-	2.01	-	-	-	-	-	-	10.3	-	-	-	0.50	-	-	-
Microbiological Parameters																				
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	**11**[D]	***<20 MI***	***<1***	***<1.0***	***<1.0***	***<1.0***	***<100 AT***	***<100***	***<10 Z8***	**4**[D]	***<10***	***<100 MI***	***<10 Z8***	***<1***	**10**[D]	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	**5.1**[D]	***<20 MI***	***<1***	***<1.0***	***<1.0***	***<1.0***	***<100 AT***	***<100 MI***	***<10 Z8***	**9**[D]	***<100***	***<100 MI***	***<10 Z8***	***<1***	***<10***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	400	1,100 MI	2,450	110	760	87	100,000 DVM	>6000	540 Z8	73,000	1,200	1,600	170	5,650	210	970	130
Total Coliforms	mpn/100mL	n/v	0[D]	**520**[D]	***<20 MI***	**81**[D]	**20**[D]	***<1.0***	***<1.0***	***<100 AT***	**980**[D]	***<10 Z8***	**830**[D]	**30**[D]	***<100 MI***	***<10 Z8***	**548**[D]	**10**[D]	***<1.0***	***<1.0***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-3-7				MW16-3-7	MW16-4-16	MW16-4-22					
Sample Date				28-Sep-16	12-May-21	24-Nov-21	4-May-22	15-May-23	4-Oct-16	4-Oct-16	12-May-21	24-Nov-21	4-May-22	21-Nov-22	19-May-23
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated		Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ												
Field Parameters															
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	8.41	6.99	4.05	10.5	-	-	6.51	3.59	2.73	10.4	2.0
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**2,410[A]**	**1,307[A]**	**1,845[A]**	**2,566[A]**	**2,481[A]**	-	**3,550[A]**	**2,857[A]**	**4,143[A]**	**4,362[A]**	**4,085[A]**	**3,934[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	51.9	104.4	85.6	215.8	-	-	11.9	37.2	-28.7	-22.8	-75.0
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.3	7.30	7.1	**6.64[B]**	7.34	-	7.2	**6.75[B]**	**6.88[B]**	**6.33[AB]**	**6.99[B]**	7.04
Temperature, Field	deg C	n/v	≤15[B]	9.4	8.4	7.46	10.4	13.9	-	6.2	8.5	5.38	14.7	4.2	**17.9[B]**
Calculated Parameters															
Anion Sum	meq/L	n/v	n/v	32	29	-	33	33	55	54	61	-	60	61	56
Cation Sum	meq/L	n/v	n/v	33	28	-	35	32	51	50	57	-	59	55	62
Hardness (as CaCO3)	mg/L	n/v	n/v	950	770	823	1,000	910	1,700	1,700	1,900	1,660	2,000	1,800	2,100
Ion Balance	%	n/v	n/v	1.0	2.6	120	2.4	1.0	0.94	0.94	3.4	94	1.1	4.8	5.3
Nitrate	mg/L	13_{f}[A]	45[C]	1.3	1.1	0.8	<0.22	1.0	0.045	<0.044	<0.22	<0.5	<0.22	<0.044	<0.22
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.30	0.26	0.18	<0.050 DB	0.23	<0.020	<0.020	<0.050 MI	<0.02	<0.050 DB	<0.010	<0.050 Z8
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	0.051	<0.033	<0.05	<0.033	<0.033	<0.033	<0.033	<0.033	<0.10	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**2,000[AB]**	**1,800[AB]**	**1,550[AB]**	**2,000[AB]**	**2,000[AB]**	**3,400[AB]**	**3,400[AB]**	**3,800[AB]**	**3,600[AB]**	**3,800[AB]**	**3,800[AB]**	**3,700[AB]**
BTEX and Petroleum Hydrocarbons															
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00080	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
Miscellaneous Inorganics															
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	8.0	5.1	6.396	3.7	2.8	5.2	5.1	6.5	5.386	5.6	6.1	8.6
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**2,600[A]**	**2,400[A]**	**2,140[A]**	**2,500[A]**	**2,700[A]**	**4,000[A]**	**4,000[A]**	**4,200[A]**	**4,310[A]**	**4,300[A]**	**4,100[A]**	**4,300[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.16	7.48	8.07	7.81	7.86	7.45	7.52	7.37	7.79	7.64	7.48	7.71
Anions															
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<0.50	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	450	420	387	470	440	460	460	470	448	490	470	470
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	550	510	472	570	540	560	570	580	547	590	580	580
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<0.50	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<0.50	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,100 CD[AB]**	**910 CD[AB]**	**710[AB]**	**1,100[AB]**	**1,000[AB]**	**2,200 CD[AB]**	**2,100 CD[AB]**	**2,500 CD[AB]**	**2,320[AB]**	**2,400[AB]**	**2,500[AB]**	**2,200[AB]**
Chloride	mg/L	100[A]	≤250[B]	12	62	63.7	41	79	3.0	3.0	2.1	<1.0	1.1	<1.0	<1.0
Nutrients															
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	0.016	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0099 OG	0.013	<0.15	0.0046	0.0077	<0.0030	<0.0030	<0.0030	<0.15	<0.0030	<0.0030	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.20[A]**	**0.073[A]**	**0.05[A]**	**0.051[A]**	0.030	**1.0[A]**	**0.96[A]**	**0.97[A]**	**0.93[A]**	**1.0[A]**	**1.0[A]**	**1.0[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.29	0.26	0.18	<0.050	0.23	0.010	<0.010	<0.050	<0.02	<0.050	<0.010	<0.050
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	0.0067	0.021	-	0.0089	0.0060 P2	<0.0030	<0.0030 MA	0.017	-	0.0041	<0.0030	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.7 DB	1.11	2.0	0.72	1.05	1.1	1.1	1.46	2.8	1.57	<2.0	1.43
Nitrogen	mg/L	n/v	n/v	-	1.4 DB	-	0.72 DB	1.3 DB	-	-	1.5 DB	-	1.6 DB	<2.0 DB	1.4

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-3-7				MW16-3-7	MW16-4-16	MW16-4-22					
Sample Date				28-Sep-16	12-May-21	24-Nov-21	4-May-22	15-May-23	4-Oct-16	4-Oct-16	12-May-21	24-Nov-21	4-May-22	21-Nov-22	19-May-23
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated		Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ												
Metals - Dissolved															
Aluminum	mg/L	$0.05_{n1,e}$ [A]	0.1_{a} [B]	0.0064	<0.0030	0.045	0.0089	<0.0030	<0.0030	<0.0030	**0.14** [AB]	0.005	<0.0030	<0.0030	0.0030
Antimony	mg/L	0.0060 [A]	0.006 [C]	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050 [A]	0.010 [C]	0.00078	<0.00020	<0.001	0.00045	0.00038	0.0019	0.0017	0.0020	0.001	0.00075	0.00099	0.0016
Barium	mg/L	2.0 [A]	2.0 [C]	0.035	0.025	<0.05	0.025	0.022	<0.010	<0.010	<0.010	<0.05	<0.010	<0.010	<0.010
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0 [A]	5 [C]	0.10	0.088	0.08	0.10	0.096	0.11	0.11	0.12	0.12	0.13	0.097	0.12
Cadmium	mg/L	$0.00037_{n3,e}$ [A]	0.007 [C]	0.000036	0.000020	0.000058	0.000054	0.000074	<0.000020	<0.000020	<0.000020	<0.000016	0.000026	0.000054	<0.000020
Calcium	mg/L	n/v	n/v	170	140	130	160	160	380	380	440	340	450	420	480
Chromium	mg/L	0.050 [A]	0.05 [C]	<0.0010	<0.0010	0.0018	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.0023	0.00087	<0.0009	0.00063	0.00064	0.00031	0.00034	0.00055	0.0013	0.00033	0.00044	0.00035
Copper	mg/L	0.0070 [A]	≤1.0 [B]	0.00085	0.00029	0.0042	<0.0010	0.0010	<0.00020	<0.00020	0.00026	<0.0008	<0.0010	<0.0010	0.0016
Iron	mg/L	0.30 [A]	≤0.3 [B]	0.17	<0.060	<0.1	<0.060	<0.060	**2.2** [AB]	**2.2** [AB]	**3.1** [AB]	**1.7** [AB]	<0.060	0.18	**1.4** [AB]
Lead	mg/L	$0.0070_{n3,e}$ [A]	0.005 [C]	<0.00020	<0.00020	0.0012	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.057	0.041	-	0.055	0.055	0.074	0.070	0.082	-	0.078	0.073	0.098
Magnesium	mg/L	n/v	n/v	130	110	121	150	130	180	180	200	197	210	190	230
Manganese	mg/L	0.020 [A]	≤0.02 [B]	**0.39** [AB]	**0.26** [AB]	**0.201** [AB]	**0.23** [AB]	**0.24** [AB]	**0.60** [AB]	**0.60** [AB]	**0.90** [AB]	**0.803** [AB]	**0.78** [AB]	**0.74** [AB]	**0.84** [AB]
Mercury	mg/L	0.0000050 [A]	0.001 [C]	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000020	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0020	0.0011	0.002	0.0011	0.00089	0.0015	0.0016	0.00090	0.004	0.00095	0.0012	0.00075
Nickel	mg/L	$0.337_{n3,e}$ [A]	n/v	0.0065	0.0028	0.005	0.003	0.0025	<0.00050	<0.00050	0.0013	0.004	0.00083	0.0013	0.00091
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	6.1	4.1	4.7	4.8	4.4	8.5	8.2	8.5	8.9	9.4	8.7	9.7
Selenium	mg/L	0.0020 [A]	0.05 [C]	0.00026	<0.00020	<0.0005	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0011	<0.00020	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	5.1	4.2	-	4.9	4.4	4.4	4.3	5.4	-	4.8	4.2	5.0
Silver	mg/L	0.00010 [A]	n/v	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00005	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200 [A]	≤200 [B]	**320** [AB]	**280** [AB]	**289** [AB]	**330** [AB]	**320** [AB]	**390** [AB]	**370** [AB]	**400** [AB]	**466** [AB]	**430** [AB]	**420** [AB]	**450** [AB]
Strontium	mg/L	n/v	7.0 [C]	1.6	1.5	-	1.7	1.8	5.9 CD	6.0 CD	6.1 CD	-	6.7	6.6	6.7
Sulfur	mg/L	n/v	n/v	370	300	-	380	340	720 CD	730 CD	690 CD	-	850	750	790
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0001	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.002	0.0027	<0.0010	<0.0010	<0.0010	0.0029	0.002	0.0011	<0.0010	<0.0010
Uranium	mg/L	0.010 [A]	0.02 [C]	**0.014** [A]	**0.012** [A]	**0.012** [A]	**0.014** [A]	**0.014** [A]	0.0022	0.0023	0.0023	0.002	0.0022	0.0022	0.0023
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	0.0013	0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030 [A]	≤5.0 [B]	<0.0030	<0.0030	0.007	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.005	<0.0030	0.0049	<0.0030
Metals - Total															
Mercury	mg/L	0.0000050 [A]	0.001 [C]	***<0.0060 DB***	**0.00117 DB** [AC]	**0.000016** [A]	**0.000047** [A]	**0.000059** [A]	***<0.0060 DB***	***<0.0020 DB***	**0.000114 DB** [A]	<0.0000025	***<0.000019***	**0.000111** [A]	**0.0000118** [A]
Phosphorus	mg/L	n/v	n/v	-	-	1.19	-	-	-	-	-	1.01	-	-	-
Microbiological Parameters															
Escherichia coli (E.Coli)	mpn/100mL	n/v	0 [D]	***<10 DB***	***<100 MI***	**24** [D]	***<2.0 AT***	***<5.0 Z8***	***<2.0 DB***	***<2.0 DB***	***<100 MI***	***<1***	***<2.0 AT***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0 [D]	***<10 DB***	***<100 MI***	**40** [D]	***<10 AT***	***<5.0 Z8***	***<2.0 DB***	***<2.0 DB***	***<100 MI***	**3** [D]	***<10 AT***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	>6000	5,700 MI	10,900	2,600	1,200 Z8	630 DB	550 DB	4,100 MI	500	3,300	65	1,500
Total Coliforms	mpn/100mL	n/v	0 [D]	**450 DB** [D]	***<100 MI***	**238** [D]	***<2.0 AT***	***<5.0 Z8***	***<2.0 DB***	***<2.0 DB***	***<100 MI***	**7** [D]	***<2.0 AT***	***<1.0***	***<1.0***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-6-11						MW16-6-20						MW16-9-6	MW16-15-16
Sample Date				27-Sep-16	12-May-21	1-Dec-21	5-May-22	22-Nov-22	17-May-23	27-Sep-16	12-May-21	1-Dec-21	5-May-22	21-Nov-22	17-May-23	30-Sep-16	28-Sep-16
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	
Sample Type	Units	2022 AEPA Tier 1	GCDWQ														
Field Parameters																	
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	3.72	14.78	2.59	10.9	6.7	-	3.26	10.78	5.24	4.6	6.5	-	-
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**3,070[A]**	**3,269[A]**	**3,104[A]**	**3,157[A]**	**2,088[A]**	**2,961[A]**	**1,715[A]**	**2,104[A]**	**2,079[A]**	**2,255[A]**	**2,195[A]**	**2,042[A]**	**1,515[A]**	-
Oxidation Reduction Potential, field	mV	n/v	n/v	-	53.9	87.5	14.2	-45.6	118.1	-	-52.6	48.8	12.1	-23.8	73.7	-	-
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.3	**6.95[B]**	7.13	**6.97[B]**	7.40	7.41	7.5	7.75	8.01	7.67	8.31	7.62	7.2	-
Temperature, Field	deg C	n/v	≤15[B]	7.7	13.4	5.78	8	4.4	6.2	9.6	7.3	4.23	8.1	4.3	8.5	11	-
Calculated Parameters																	
Anion Sum	meq/L	n/v	n/v	43	46	-	43	44	42	21	28	-	49	24	24	21	12
Cation Sum	meq/L	n/v	n/v	41	43	-	45	45	42	21	22	-	26	23	23	22	14
Hardness (as CaCO3)	mg/L	n/v	n/v	1,300	1,400	1,530	1,400	1,400	1,400	340	250	234	210	190	200	930	160
Ion Balance	%	n/v	n/v	0.95	3.9	119	2.4	1.4	0.34	0.98	12	112	32	2.4	2.8	1.1	1.1
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.22	<0.5	<0.22	0.13	<0.44	0.086	<0.044	<0.5	<0.044	0.063	0.060	0.065	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.020	<0.050 MI	<0.02	<0.050 MSE AT	0.029	<0.10 Z8	<0.020	<0.010	<0.02	<0.010	0.014	0.013	<0.020	<0.020
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.10	<0.033	<0.033	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**2,700[AB]**	**2,900[AB]**	**2,730[AB]**	**2,800[AB]**	**2,900[AB]**	**2,700[AB]**	**1,400[AB]**	**1,700[AB]**	**1,500[AB]**	**2,400[AB]**	**1,600[AB]**	**1,600[AB]**	**1,200[AB]**	**720[AB]**
BTEX and Petroleum Hydrocarbons																	
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00080
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																	
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	4.3	3.3	3	2.8	2.8	3.4	4.1	3.0	4	3.0	2.6	1.8	4.7	1.4
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**3,300[A]**	**3,400[A]**	**3,320[A]**	**3,200[A]**	**3,200[A]**	**3,300[A]**	**2,000[A]**	**2,300[A]**	**2,290[A]**	**2,200[A]**	**2,200[A]**	**2,200[A]**	**1,700[A]**	**1,100[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.53	7.46	8.07	7.71	7.76	7.42	7.99	8.10	8.49	8.18	8.11	7.97	7.88	8.18
Anions																	
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	6	<1.0	<1.0	<1.0	<0.50	<0.50
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	330	370	276	400	360	370	260	460	243	1,500	290	290	510	460
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	410	460	336	480	440	460	320	560	281	1,900	360	360	630	560
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	7	<1.0	<1.0	<1.0	<0.50	<0.50
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<0.50
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	**1,800 CD[AB]**	**1,900 CD[AB]**	**1,660[AB]**	**1,700[AB]**	**1,800[AB]**	**1,700[AB]**	**770 CD[AB]**	**920 CD[AB]**	**814[AB]**	**890[AB]**	**880[AB]**	**870[AB]**	**490 CD[A]**	150
Chloride	mg/L	100[A]	≤250[B]	4.3	2.1	1.0	1.6	1.3	1.7	4.0	3.2	1.0	1.7	<1.0	2.3	1.6	2.4
Nutrients																	
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	0.0040	<0.15	0.0034	0.0039	0.0048	<0.0030	0.0031	<0.15	<0.0030	0.0037	0.0036	0.0036	<0.0030
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.37[A]**	**0.32[A]**	**0.38[A]**	**0.39[A]**	**0.32[A]**	**0.33[A]**	**0.49[A]**	**1.1[A]**	**2.04[A]**	**1.3[A]**	**1.2[A]**	**1.1[A]**	**0.16[A]**	**0.84 A*[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.050	<0.02	<0.050	0.029	<0.10	0.020	<0.010	<0.02	<0.010	0.014	0.013	0.015	<0.010
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	<0.0030	0.0032	-	0.0052	0.0051	<0.0030 P2	<0.0030	0.0087	-	0.019	<0.0030	<0.0030 P2	0.0059	0.0069
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	6.5 DB	0.92	17.92	12.5	0.73	1.52	1.3	1.25	16.64	4.3	<2.0	2.34	0.20	0.81
Nitrogen	mg/L	n/v	n/v	-	0.92 DB	-	12 DB	0.76 DB	1.5 DB	-	1.2	-	4.3 DB	<2.0 DB	2.4	-	-

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-6-11						MW16-6-20						MW16-9-6	MW16-15-16
Sample Date				27-Sep-16	12-May-21	1-Dec-21	5-May-22	22-Nov-22	17-May-23	27-Sep-16	12-May-21	1-Dec-21	5-May-22	21-Nov-22	17-May-23	30-Sep-16	28-Sep-16
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	
Sample Type	Units	2022 AEPA Tier 1	GCDWQ														
Metals - Dissolved																	
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	0.0041	<0.0030	**0.117**[AB]	<0.0030	<0.0030	**2.5**[AB]	0.0067	<0.0030	**0.397**[AB]	<0.0030	<0.0030	0.0031	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	0.00065	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00050	0.00039	0.002	0.00054	0.00037	0.0011	0.00043	0.00041	<0.001	0.00081	<0.00020	0.00039	0.00093	0.0022
Barium	mg/L	2.0[A]	2.0[C]	0.021	0.011	<0.05	0.017	0.012	0.012	0.031	0.014	<0.05	0.023	0.018	0.020	0.039	0.018
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.13	0.13	0.13	0.14	0.14	0.14	0.093	0.11	0.11	0.12	0.092	0.12	0.14	0.089
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	0.000058	0.000030	0.000096	0.000037	0.00015	0.00022	<0.000020	<0.000020	<0.000016	0.000069	<0.000020	<0.000020	0.000073	<0.000020
Calcium	mg/L	n/v	n/v	310	320	361	320	330	310	76	63	63.2	55	50	54	220	38
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	0.0023	<0.0010	<0.0010	0.0008	<0.0010	<0.0010	<0.0010	0.0043	<0.0010
Cobalt	mg/L	n/v	n/v	0.0041	0.0023	0.0018	0.0013	0.0019	0.0028	0.00056	0.00049	<0.0009	0.00069	0.00033	0.00040	0.0037	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.00020	0.00038	0.0009	<0.0010	<0.0010	0.0035	0.00056	**0.013**[A]	0.0011	<0.0010	<0.0010	0.0011	0.00064	<0.00020
Iron	mg/L	0.30[A]	≤0.3[B]	0.11	0.16	<0.1	<0.060	<0.060	<0.060	<0.060	0.25	0.2	<0.060	<0.060	<0.060	0.13	0.15
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.0002	<0.00020	<0.00020	0.0010	<0.00020	0.00045	0.0006	0.00027	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.049	0.044	-	0.047	0.052	0.056	0.044	0.048	-	0.070	0.060	0.080	0.030	0.053
Magnesium	mg/L	n/v	n/v	140	140	152	150	140	140	36	22	18.5	17	15	17	94	15
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.85**[AB]	**1.2**[AB]	**1.10**[AB]	**0.68**[AB]	**0.95**[AB]	**0.96**[AB]	**0.16**[AB]	**0.22**[AB]	**0.119**[AB]	**0.17**[AB]	**0.11**[AB]	**0.14**[AB]	**0.93**[AB]	**0.066**[AB]
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000020	<0.0000019	-	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019	-	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000020
Molybdenum	mg/L	n/v	n/v	0.0014	0.00065	0.001	0.0018	0.00087	0.00088	0.0060	0.0026	0.004	0.0043	0.0022	0.0026	0.00082	0.0015
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	0.0064	0.0046	0.004	0.0032	0.0043	0.0062	<0.00050	0.0013	<0.003	0.0013	0.00062	0.00061	0.0071	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	8.5	6.4	7.5	8.1	7.0	6.6	4.9	4.2	4.8	5.5	4.0	4.2	5.6	3.9
Selenium	mg/L	0.0020[A]	0.05[C]	0.00044	<0.00020	<0.0005	0.00069	0.00062	0.00023	<0.00020	<0.00020	<0.0005	0.00022	<0.00020	<0.00020	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	5.0	4.8	-	4.1	4.2	4.5	3.4	3.5	-	2.7	2.8	3.3	5.5	3.6
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**330**[AB]	**350**[AB]	**388**[AB]	**380**[AB]	**380**[AB]	**330**[AB]	**320**[AB]	**390**[AB]	**452**[AB]	**490**[AB]	**440**[AB]	**420**[AB]	71	**230**[AB]
Strontium	mg/L	n/v	7.0[C]	2.4	2.9	-	3.0	3.1	2.7	0.78	1.1	-	1.0	1.1	1.0	1.4	0.65
Sulfur	mg/L	n/v	n/v	580 CD	530 CD	-	570	550	580	250	300	-	280	230	280	180	50
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0001	0.00025	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.002	<0.0010	<0.0010	0.068	<0.0010	<0.0010	0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0085	0.0067	0.008	0.0067	0.0069	0.0069	0.0021	0.00071	<0.001	0.00092	<0.00010	0.00011	0.0086	0.00020
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	0.0022	<0.0010	<0.0010	-	0.0024	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	0.0083	<0.0030	0.0036	0.007	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Metals - Total																	
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.02 DB***	**0.000361 DB**[A]	**0.000080**[A]	**0.00376**[AC]	**0.000087**[A]	**0.00046**[A]	***<0.00020 DB***	**0.0000064**[A]	**0.000022**[A]	**0.000208**[A]	**0.000141**[A]	**0.000049**[A]	***<0.000020 DB***	<0.0000020
Phosphorus	mg/L	n/v	n/v	-	-	14.0	-	-	-	-	-	<0.08	-	-	-	-	-
Microbiological Parameters																	
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<100***	***<100 MI***	**1**[D]	***<100***	***<1.0***	***<10 Z8***	***<1.0***	***<1.0***	**2**[D]	***<100***	***<1.0***	***<10 Z8***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<100 DB***	***<100 MI***	**9**[D]	***<100***	***<1.0***	***<10 Z8***	***<1.0***	***<100 MI***	**5**[D]	***<100***	***<1.0***	***<10 Z8***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	56,000 DB	7,100 MI	12,100	22,000	71	3,100 Z8	>6000	4,000	13,800	26,000	8.0	10 Z9	1,100	120
Total Coliforms	mpn/100mL	n/v	0[D]	**9,300**[D]	***<100 MI***	**113**[D]	***<100***	***<1.0***	***<10 Z8***	**>2400**[D]	**4.1**[D]	**204**[D]	***<100***	***<1.0***	***<10 Z8***	**390**[D]	**1.0**[D]

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-20-21	MW16-24-30				MW16-25-9					
Sample Date				27-Sep-16	28-Sep-16	14-May-21	23-Nov-21	10-May-22	30-Sep-16	14-May-21	23-Nov-21	10-May-22	22-Nov-22	18-May-23
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ											
Field Parameters														
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	-	11.89	3.65	3.46	-	11.01	4.01	2.93	6.2	2.8
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,996[A]**	**1,114[A]**	**1,107[A]**	**1,074[A]**	**1,178[A]**	**1,039[A]**	**1,647[A]**	**1,279[A]**	**1,293[A]**	625	**1,072[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	-	-10.9	25.8	36.5	-	62.3	36.6	98.7	-4.8	189.2
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.2	7	7.83	7.47	7.46	7.1	7.11	7.17	7.11	7.66	7.35
Temperature, Field	deg C	n/v	≤15[B]	6.2	8.2	7.0	3.4	6.5	7.3	8.0	3.32	8.2	3.7	13.1
Calculated Parameters														
Anion Sum	meq/L	n/v	n/v	25	13	13	-	13	13	21	-	16	14	14
Cation Sum	meq/L	n/v	n/v	24	14	12	-	13	14	21	-	16	15	17
Hardness (as CaCO3)	mg/L	n/v	n/v	740	160	160	170	170	590	810	745	650	610	730
Ion Balance	%	n/v	n/v	0.97	1.1	2.8	113	1.8	1.1	0.40	115	0.77	1.0	11
Nitrate	mg/L	13[f][A]	45[C]	0.085	<0.044	<0.044	<0.5	<0.044	0.064	<0.044	<0.5	<0.044	0.081	0.12
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.020	<0.020	<0.010	<0.02	<0.010	<0.020	<0.010	<0.02	<0.010	0.018	0.027
Nitrite	mg/L	1.97[n4,e,n][A]	3[C]	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**1,500[AB]**	**730[AB]**	**690[AB]**	**691[AB]**	**720[AB]**	**680[AB]**	**1,200[AB]**	**903[AB]**	**830[AB]**	**750[AB]**	**780[AB]**
BTEX and Petroleum Hydrocarbons														
Benzene	mg/L	0.0050[A]	0.005[C]	0.0010	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	0.00050	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00080	<0.00089	<0.0005	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
Miscellaneous Inorganics														
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	3.8	1.2	2.8	4	1.1	5.6	4.8	7	4.1	4.0	4.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**2,100[A]**	**1,100[A]**	**1,100[A]**	**1,150[A]**	**1,100[A]**	**1,100[A]**	**1,700[A]**	**1,350[A]**	**1,200[A]**	**1,200[A]**	**1,200[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.59	8.19	8.05	8.34	8.18	8.11	7.74	8.07	7.73	7.81	7.49
Anions														
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<0.50	<1.0	<5	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	450	460	470	456	480	470	530	532	560	550	550
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	540	560	570	567	590	580	650	660	690	680	670
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<0.50	<1.0	<5	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<0.50	<1.0	<5	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Sulfate	mg/L	429[n5,e][A]	≤500[I][B]	**760 CD[AB]**	160	150	120	150	150	**500 CD[AB]**	253	210	160	150
Chloride	mg/L	100[A]	≤250[B]	3.3	<1.0	2.5	2.0	1.0	8.2	3.8	1.6	<1.0	<1.0	1.1
Nutrients														
Nitrite (as N)	mg/L	0.6[n4,e][A]	1[C]	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	0.0034	<0.15	<0.0030	0.0086	0.0079	<0.15	0.012	0.0064	0.010
Ammonia (as N)	mg/L	5.025[n2][A]	n/v	**0.57[A]**	**0.86[A]**	**0.81[A]**	**0.77[A]**	**0.83[A]**	**0.12[A]**	0.029	<0.02	<0.015	<0.015	**0.14[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.019	<0.010	<0.010	<0.02	<0.010	0.015	<0.010	<0.02	<0.010	0.018	0.027
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030	-	<0.0030	0.016	0.018	-	0.0064	0.0059	0.0092 P2
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	11 DB	0.88	1.10	0.9	1.03	0.54 DB	0.69	1.4	2.26	<0.40	0.44
Nitrogen	mg/L	n/v	n/v	-	-	1.1	-	1.0	-	0.69 DB	-	2.3 DB	<0.40 DB	0.46 DB

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-20-21	MW16-24-30				MW16-25-9					
Sample Date				27-Sep-16	28-Sep-16	14-May-21	23-Nov-21	10-May-22	30-Sep-16	14-May-21	23-Nov-21	10-May-22	22-Nov-22	18-May-23
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ											
Metals - Dissolved														
Aluminum	mg/L	$0.05_{n1,e}$[A]	0.1_{a}[B]	0.0040	<0.0030	0.0032	0.013	<0.0030	0.028	<0.0030	0.033	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.001	0.0014	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.00043	0.0023	0.0025	0.005	0.0025	0.00078	0.00041	0.001	0.00060	0.00057	0.00045
Barium	mg/L	2.0[A]	2.0[C]	0.018	0.019	0.037	<0.05	0.018	0.053	0.063	<0.05	0.050	0.049	0.058
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.076	0.089	0.093	0.09	0.088	0.099	0.070	0.06	0.071	0.058	0.068
Cadmium	mg/L	$0.00037_{n3,e}$[A]	0.007[C]	<0.000020	<0.000020	<0.000020	0.000021	<0.00002	0.000065	0.000077	0.000023	0.000046	0.000044	0.000044
Calcium	mg/L	n/v	n/v	160	38	38	41.2	41	140	160	148	120	120	140
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	0.0007	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.00085	<0.00030	<0.00030	<0.0009	<0.00030	0.0020	0.00067	<0.0009	0.00069	0.00083	0.00054
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.00020	<0.00020	<0.00020	0.0016	<0.0010	0.0011	0.0016	0.0026	<0.0010	<0.0010	0.0024
Iron	mg/L	0.30[A]	≤0.3[B]	**0.69[AB]**	0.14	0.10	<0.1	<0.060	0.16	<0.060	<0.1	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3,e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	0.0010	<0.00020	<0.00020	<0.00020	0.0007	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.053	0.054	0.056	-	0.075	0.034	0.071	-	0.043	0.051	0.046
Magnesium	mg/L	n/v	n/v	82	16	15	16.2	17	59	100	91.2	82	75	92
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.34[AB]**	**0.067[AB]**	**0.076[AB]**	**0.065[AB]**	**0.067[AB]**	**0.23[AB]**	**0.22[AB]**	**0.170[AB]**	**0.14[AB]**	**0.17[AB]**	**0.17[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000020	<0.0000020	<0.0000019	<0.0000025	<0.0000019	0.0000035	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0052	0.0014	0.0035	0.001	0.0013	0.0036	0.0017	0.001	0.0014	0.0014	0.0010
Nickel	mg/L	$0.337_{n3,e}$[A]	n/v	<0.00050	<0.00050	<0.00050	<0.003	<0.00050	0.0067	0.0036	0.004	0.0028	0.0031	0.0029
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	0.09	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	8.9	4.0	3.6	3.9	4.0	6.6	5.9	5.7	5.8	5.2	6.3
Selenium	mg/L	0.0020[A]	0.05[C]	0.00090	<0.00020	<0.00020	0.0008	<0.00020	0.0014	<0.00020	0.0007	0.00045	0.00027	0.00035
Silicon	mg/L	n/v	n/v	4.0	3.6	3.6	-	3.3	7.0	6.0	-	5.3	5.1	6.2
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**210[AB]**	**240[AB]**	**200[B]**	**229[AB]**	**220[AB]**	34	110	79.3	63	58	62
Strontium	mg/L	n/v	7.0[C]	2.0	0.66	0.63	-	0.66	0.74	1.7	-	1.3	1.2	1.3
Sulfur	mg/L	n/v	n/v	240	51	51	-	44	49	180	-	66	51	46
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	-	<0.0010	0.0012	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0032	0.00022	0.00029	<0.001	0.00021	**0.014[A]**	**0.035[AC]**	**0.028[AC]**	**0.025[AC]**	**0.024[AC]**	**0.021[AC]**
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	-	<0.0010	0.0011	<0.0010	-	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.0030	0.019	<0.0030	<0.0030	<0.0030	0.011	<0.0030	<0.0030	<0.0030
Metals - Total														
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.0060 DB***	<0.0000020	0.0000042	**0.0000052[A]**	<0.0000019	***<0.0020 DB***	**0.0000683[A]**	**0.000097[A]**	**0.000077[A]**	**0.0000113[A]**	**0.000042[A]**
Phosphorus	mg/L	n/v	n/v	-	-	-	<0.08	-	-	-	0.81	-	-	-
Microbiological Parameters														
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<100***	***<1.0***	***<1.0***	***<1***	***<1.0***	***<10 DB***	***<10 MI***	**9[D]**	***<10 AT***	***<1.0***	***<10 Z8***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<100 DB***	***<1.0***	***<1.0***	***<1***	***<1.0***	***<10 DB***	***<10 MI***	**26[D]**	***<10 AT***	***<1.0***	***<10 Z8***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	17,000 DB	48	750	925	100	7,900 DB	5,300 MI	21,100	2,700 AT	190 SC1	19,000 Z8
Total Coliforms	mpn/100mL	n/v	0[D]	**750[D]**	**2.0[D]**	***<1.0***	**43[D]**	**19[D]**	**>2400 DB[D]**	***<10 MI***	**70[D]**	**30 AT[D]**	***<1.0***	***<10 Z8***

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-26-18						MW16-27-9					
Sample Date				28-Sep-16	12-May-21	24-Nov-21	4-May-22	15-Nov-22	15-May-23	28-Sep-16	12-May-21	24-Nov-21	4-May-22	15-Nov-22	15-May-23
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ												
Field Parameters															
Dissolved Oxygen, Field	mg/L	n/v	n/v	-	7.76	3.68	3.08	9.6	4.8	-	1.77	38.5	5.31	14.7	6.9
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,207[A]**	**3,581[A]**	**1,238[A]**	**1,372[A]**	**1,211[A]**	**1,249[A]**	**1,902[A]**	**1,826[A]**	**1,479[A]**	**1,580[A]**	**1,437[A]**	**1,490[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	-	-32.5	80.1	-3.8	-34.3	37.9	-	83.7	86.9	11.6	4.7	83.2
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.4	7.70	7.23	7.29	7.51	7.89	7.3	7.03	**6.85[B]**	**6.52[B]**	7.63	7.19
Temperature, Field	deg C	n/v	≤15[B]	7.1	5.6	6.78	10.1	4.6	12.5	8.2	6.8	2.65	9.3	4.3	9.6
Calculated Parameters															
Anion Sum	meq/L	n/v	n/v	14	16	-	14	13	15	25	29	-	18	18	19
Cation Sum	meq/L	n/v	n/v	14	16	-	16	14	15	22	24	-	21	20	19
Hardness (as CaCO3)	mg/L	n/v	n/v	140	170	71	150	120	140	800	800	739	760	700	670
Ion Balance	%	n/v	n/v	1.0	0.57	100	6.0	3.4	0.98	0.90	9.9	113	7.6	3.7	0.48
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	<0.044	<0.5	<0.044	0.070	<0.044	<0.044	0.079	<0.5	<0.044	<0.044	<0.044
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.020	<0.010	<0.02	<0.010	0.016	<0.010	<0.020	0.018	<0.02	<0.010	<0.010	<0.010
Nitrite	mg/L	$1.97_{n4,e,n}$[A]	3[C]	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033	<0.033	<0.033	<0.05	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**870[AB]**	**990[AB]**	**780[AB]**	**910[AB]**	**850[AB]**	**920[AB]**	**1,400[AB]**	**1,600[AB]**	**1,100[AB]**	**1,100[AB]**	**1,100[AB]**	**1,100[AB]**
BTEX and Petroleum Hydrocarbons															
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0003	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.0005	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089	<0.00080	<0.00089	<0.0005	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	<0.10	<0.10
Miscellaneous Inorganics															
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.1	2.3	3.274	1.8	1.3	2.2	1.8	4.0	3.069	2.1	2.2	1.7
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,300[A]**	**1,500[A]**	**1,310[A]**	**1,300[A]**	**1,300[A]**	**1,500[A]**	**2,000[A]**	**2,600[A]**	**1,600[A]**	**1,500[A]**	**1,600[A]**	**1,600[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.29	8.21	8.32	8.26	8.14	8.28	7.77	7.71	7.92	7.63	7.54	7.51
Anions															
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	260	280	265	290	270	290	530	420	482	510	490	520
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	310	340	319	350	320	350	650	510	588	620	600	640
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.50	<1.0	<5	<1.0	<1.0	<1.0	<0.50	<1.0	<5	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500[B]	400 CD	380 CD	344	370	370	360	**690 CD[AB]**	**490 CD[A]**	420	380	420	390
Chloride	mg/L	100[A]	≤250[B]	2.0	84	1.2	19	9.3	64	2.1	**370 CD[AB]**	<1.0	<1.0	<1.0	1.2
Nutrients															
Nitrite (as N)	mg/L	$0.6_{n4,e}$[A]	1[C]	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	0.0065	<0.15	<0.0030	0.0066	0.011	<0.0030	0.034	<0.15	<0.0030	0.0031	0.0034
Ammonia (as N)	mg/L	5.025_{n2}[A]	n/v	**0.64[A]**	**0.76[A]**	**0.62[A]**	**0.79[A]**	**0.72[A]**	**0.63[A]**	**0.38[A]**	**0.35[A]**	**0.35[A]**	**0.33[A]**	**0.36[A]**	**0.29[A]**
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	<0.010	<0.02	<0.010	0.016	<0.010	<0.010	0.018	<0.02	<0.010	<0.010	<0.010
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	0.0062	0.013	-	0.0031	<0.0030	0.0057 P2	<0.0030	0.20	-	<0.0030	<0.0030	<0.0030 P2
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	4.5 DB	1.42	1.7	<2.0	0.73	1.09	1.1	2.29	4.6	<2.0	0.59	0.86
Nitrogen	mg/L	n/v	n/v	-	1.4 DB	-	<2.0 DB	0.74 DB	1.1 DB	-	2.3 DB	-	<2.0 DB	0.59 DB	0.86 DB

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Sample Location				MW16-26-18						MW16-27-9					
Sample Date				28-Sep-16	12-May-21	24-Nov-21	4-May-22	15-Nov-22	15-May-23	28-Sep-16	12-May-21	24-Nov-21	4-May-22	15-Nov-22	15-May-23
Location Description				EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well	EIA Project Well
Lithology				Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Bedrock	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated	Unconsolidated
Sample Type	Units	2022 AEPA Tier 1	GCDWQ												
Metals - Dissolved															
Aluminum	mg/L	0.05$_{rt1,e}$[A]	0.1$_{a}$[B]	0.0037	<0.0030	**0.109[AB]**	0.0049	<0.0030	0.0053	<0.0030	**0.94[AB]**	<0.004	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.001	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	<0.001	0.0010	0.00022	0.00035	0.00036	0.0011	<0.001	0.00033	0.00032	0.00026
Barium	mg/L	2.0[A]	2.0[C]	<0.010	0.053	<0.05	0.018	0.014	0.032	<0.010	0.023	<0.05	0.013	0.010	0.017
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.13	0.12	0.13	0.14	0.12	0.13	0.13	0.12	0.13	0.14	0.11	0.14
Cadmium	mg/L	0.00037$_{rt3,e}$[A]	0.007[C]	<0.000020	<0.000020	<0.000016	<0.00002	<0.000020	<0.000020	0.000026	0.000035	0.000017	0.000047	0.00017	0.00005
Calcium	mg/L	n/v	n/v	40	47	16.0	41	34	38	200	180	186	180	170	160
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0005	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	<0.0005	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.0009	<0.00030	<0.00030	<0.00030	0.0014	0.0020	<0.0009	0.0010	0.0012	0.0011
Copper	mg/L	0.0070[A]	≤1.0[B]	0.00021	0.00021	0.0015	<0.0010	<0.0010	<0.0010	<0.00020	0.0017	<0.0008	<0.0010	<0.0010	<0.0010
Iron	mg/L	0.30[A]	≤0.3[B]	0.15	0.14	<0.1	<0.060	<0.060	<0.060	**0.42[AB]**	<0.060	<0.1	<0.060	<0.060	<0.060
Lead	mg/L	0.0070$_{rt3,e}$[A]	0.005[C]	<0.00020	<0.00020	0.0011	<0.00020	<0.00020	<0.00020	<0.00020	0.00047	<0.0002	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.035	0.028	-	0.038	0.038	0.023	0.041	0.050	-	0.033	0.036	0.031
Magnesium	mg/L	n/v	n/v	11	13	7.5	12	9.0	11	75	85	66.7	73	66	64
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.083[AB]**	**0.10[AB]**	**0.066[AB]**	**0.071[AB]**	**0.065[AB]**	**0.065[AB]**	**0.41[AB]**	**0.65[AB]**	**0.362[AB]**	**0.32[AB]**	**0.29[AB]**	**0.30[AB]**
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019	<0.0000020	<0.0000019	<0.0000025	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0048	0.0045	0.005	0.0051	0.0047	0.0052	0.00058	0.0035	0.004	0.00053	0.00052	0.00051
Nickel	mg/L	0.337$_{rt3,e}$[A]	n/v	<0.00050	<0.00050	<0.003	0.0006	<0.00050	<0.00050	0.00062	0.0047	<0.003	0.00093	0.00099	0.00077
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.08	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	2.8	2.8	1.9	2.7	2.1	3.0	4.9	6.3	4.7	5.1	4.7	4.6
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	0.0012	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	**0.0025[A]**	<0.00020	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	4.5	4.1	-	4.4	3.9	4.6	5.7	7.1	-	5.7	5.1	5.8
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00005	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	**250[AB]**	**290[AB]**	**253[AB]**	**290[AB]**	**270[AB]**	**270[AB]**	140	170	135	130	130	120
Strontium	mg/L	n/v	7.0[C]	0.61	0.65	-	0.67	0.54	0.62	1.6	1.4	-	1.4	1.3	1.4
Sulfur	mg/L	n/v	n/v	130	110	-	140	110	130	180	210	-	150	120	140
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0001	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0001	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	0.004	<0.0010	<0.0010	<0.0010	<0.0010	0.097	0.002	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.00013	0.00029	<0.001	0.00016	<0.00010	<0.00010	0.0049	**0.017[A]**	0.006	0.0050	0.0049	0.0053
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	0.0026	-	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	<0.0030	<0.005	<0.0030	<0.0030	<0.0030	<0.0030	0.0042	<0.005	<0.0030	<0.0030	<0.0030
Metals - Total															
Mercury	mg/L	0.0000050[A]	0.001[C]	***<0.0060 DB***	**0.0000096[A]**	**0.000016[A]**	**0.000131[A]**	**0.000037[A]**	**0.0000231[A]**	***<0.02 DB***	**0.000306 DB[A]**	**0.000072[A]**	**0.000177[A]**	**0.000175[A]**	**0.000233[A]**
Phosphorus	mg/L	n/v	n/v	-	-	0.56	-	-	-	-	-	8.81	-	-	-
Microbiological Parameters															
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<10 DB***	***<10 MI***	***<1***	***<5.0 AT***	***<1.0***	***<1.0***	***<10 DB***	***<100 MI***	**6[D]**	***<2.0 AT***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<10 DB***	***<10 MI***	***<1***	***<10 AT***	***<1.0***	***<1.0***	***<10 DB***	***<100 MI***	**27[D]**	***<10 AT***	***<5.0 MI***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	>6000	4,500	850	510	1,200	1,300	980	1,300 MI	2,400	430	130 SVH	38
Total Coliforms	mpn/100mL	n/v	0[D]	**580 DB[D]**	**640 MI[D]**	**649[D]**	**26 AT[D]**	**150[D]**	**1,400[D]**	**850 DB[D]**	**410 MI[D]**	**173[D]**	**8.2 AT[D]**	***<1.0***	**20[D]**

See notes on the last page

Table D.1 Historical Groundwater Analytical Results - Tier 2 and EIA Project Wells

Notes:

2022 AEPA Tier 1 Alberta Environment and Protected Areas (AEPA). 2022. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch 189 pp.

A	Table 2. Alberta Tier 1 Groundwater Remediation Guidelines - Agricultural - Fine
GCDWQ	Health Canada (September 2022). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
B	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
C	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
D	Guidelines for Canadian Drinking Water Quality - Microbiological Parameters
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
a	This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants; it does not apply to naturally occurring aluminum found in groundwater. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
f	Guidelines only provided for Nitrate (as N). Nitrate guideline (as NO3) is calculated by multiplying the Nitrate (as N) guideline by 4.43.
i	High levels (above 500 mg/L) can cause physiological effects such as diarrhea or dehydration.
n1,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.1 for further guidance on aquatic life pathway, standard varies with pH, long term guideline shown (see Table 1.1 for short term guideline). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n2	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.2 for further guidance on aquatic life pathway, standard varies with pH and temperature (see Table 1.2 for guideline and is for total ammonia (NH3 as N).
n3,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.3 for further guidance on aquatic life pathway, standard varies with hardness, long term is shown (see Table 1.3 for short term). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e, g	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines. Guidelines only provided for Nitrite (as N). Nitrite guideline (as NO2) is calculated by multiplying the Nitrite (as N) guideline by 3.29.
n5,e	Guideline for protection of aquatic life is below detection limit, groundwater monitoring is required. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.7 for further guidance on aquatic life pathway, standard varies with hardness. Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
A*	Ammonia greater than TKN. Results are within acceptable limits of precision.
AT	Detection limit raised due to interference.
CD	Detection limits raised due to dilution to bring analyte within the calibrated range.
DB	Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
DSM	Detection limits raised due to sample matrix
DVM	Detection limit raised based on sample volume used and sample matrix
DXE	Dissolved greater than total. Unable to re-analyze due to insufficient sample.
EC	Detection limit raised due to interferent.
MA	Matrix Spike outside acceptance limits due to matrix interference. Reanalysis yields similar results.
MI	Detection limits raised due to matrix interference.
MSE	Matrix spike exceeds acceptance limits due to probable matrix interference.
NF	Duplicate exceeds acceptance criteria due to sample non homogeneity.
NH	Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
NN	Nitrogen < Nitrate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
NNA	Nitrogen < Ammonia: Both values fall within the method uncertainty for duplicates and are likely equivalent.
OG	Orthophosphate greater than phosphate. Results within acceptable limits of precision.
P2	Phosphorus < Orthophosphate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
SC1	Spreader colony present. Quantitative colony reporting is not possible due to bacterial density.
SVH	Sample analyzed over hold time. Sample analysis is recommended within 24 hours of sampling.
VV	Detection limit raised based on sample volume used for analysis.
Z8	Detection limit raised due to matrix interference.
Z9	Detection limit raised due to matrix interference. One big Spreader colony obscured other colonies.
RPD	Relative Percent Difference.
61%	RPD exceeds data quality objective of 30%.
nc	RPD is not calculated if one or more values is non detect or if one or more values is less than five times the reportable detection limit.

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS81-01			WS81-02			NE7-R3-01			NE20-R3-01			SW11-R4-02			SW35-R4-01	
Sample Date				11-Jan-22	25-May-22	17-May-23	11-Jan-22	25-May-22	17-May-23	25-May-22	16-Nov-22	16-May-23	11-Jan-22	14-Nov-22	17-May-23	12-Jan-22	27-May-22	19-May-23	15-Nov-22	16-May-23
Sample ID				WS81-01	WS81-01	WS81-1	WS81-02	WS81-02	WS81-2	NE7R3-1	NE7R3-1	NE7R3-1	NE20R3-01	NE20R3-2	NE20R3-2	SW11R4-02	SW11R4-2	SW11R4-2	SW35R4-1	SW35R4-1
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C201468	C235072	C335152	C201468	C235072	C335152	C235072	C290717	C334712	C201468	C289871	C335152	C201825	C235756	C335907	C290290	C334712
Laboratory Sample ID				AMW362	ATQ223	BQP602	AMW363	ATQ224	BQP601	ATQ226	BHD548	BQN672	AMW361	BGY829	BQP600	AMY182	ATT544	BQT306	BHB174	BQN671
Location Description				Tier 2b	Tier 2b	Tier 2b	Tier 2b	Tier 2b	Tier 2b	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3
Lithology					Bedrock			Bedrock			Unconsolidated (alluvial)			Bedrock			Bedrock			Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																	
Field Parameters																				
Dissolved Oxygen, Field	mg/L	n/v	n/v	2.18	7.93	6.3	1.96	1.73	4.7	11.48	10.2	16.9	9.25	8.6	9.5	1.12	1.88	3.0	3.0	5.8
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	**1,201[A]**	**1,209[A]**	**1,128[A]**	**1,350[A]**	**1,443[A]**	**1,357[A]**	496	527	462	**1,600[A]**	**1,424[A]**	**1,135[A]**	460	477	442	**1,302[A]**	**1,305[A]**
Oxidation Reduction Potential, field	mV	n/v	n/v	158.9	63.9	221.3	-53.7	-46	16.4	107.6	-53.4	215.0	147.47	-14.8	213.4	-1.33	3	179.7	-44.2	162.7
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.45	7.66	7.43	7.48	7.35	7.46	7.67	**6.80[B]**	7.58	7.78	7.48	7.34	8.38	7.84	7.73	7.64	7.59
Temperature, Field	deg C	n/v	≤15[B]	5.8	8	7.9	5.2	6.9	6.2	3.8	7.5	4.0	11.5	12.7	**15.4[B]**	5.7	8.6	7.6	8.7	7.4
Calculated Parameters																				
Anion Sum	meq/L	n/v	n/v	14	14	14	15	16	16	5.3	5.6	5.5	18	17	17	4.9	5.2	5.1	15	16
Cation Sum	meq/L	n/v	n/v	15	15	14	17	18	16	5.8	5.3	6.0	20	16	17	5.3	5.1	5.5	17	17
Hardness (as CaCO3)	mg/L	n/v	n/v	450	440	440	220	250	260	270	250	280	690	490	580	46	55	62	82	73
Ion Balance	%	n/v	n/v	5.7	3.5	0.043	5.9	5.4	0.23	4.7	2.8	4.9	4.9	3.0	2.0	3.8	0.52	4.2	3.4	2.2
Nitrate	mg/L	13_{f}[A]	45[C]	**15[A]**	**19[A]**	**25[A]**	0.92	0.73	1.5	1.7	2.0	3.5	3.2	3.4	2.3	<0.044	<0.044	<0.044	5.4	4.1
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	3.3	4.4	5.6	0.26	0.21	0.43	0.39	0.45	0.79	0.72	0.77 MI	0.51	<0.010	<0.010	<0.010	1.2	0.92 Z8
Nitrite	mg/L	$1.97_{n4.e.g}$[A]	3[C]	<0.033	<0.033	<0.033	0.16	0.14	0.27	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**790[AB]**	**790[AB]**	**770[AB]**	**890[AB]**	**940[AB]**	**930[AB]**	290	290	300	**1,100[AB]**	**930[AB]**	**940[AB]**	280	290	300	**900[AB]**	**930[AB]**
BTEX and Petroleum Hydrocarbons																				
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																				
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.0	1.9	2.2	2.8	3.3	3.7	<0.50	1.2	2.0	2.2	2.1	2.4	0.57	<0.50	2.2	0.89	1.8
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	**1,200[A]**	**1,200[A]**	**1,200[A]**	**1,300[A]**	**1,500[A]**	**1,500[A]**	500	530	500	**1,600[A]**	**1,500[A]**	**1,500[A]**	460	490	480	**1,400[A]**	**1,400[A]**
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.47	7.80	7.57	7.82	7.59	7.58	7.60	7.56	7.67	7.77	7.83	7.62	8.08	8.35	8.15	8.09	8.17
Anions																				
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	440	420	440	550	550	550	180	200	190	440	440	450	190	190	190	580	610
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	530	520	540	670	670	670	220	240	230	530	530	550	230	230	230	710	750
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_{i}[B]	190	190	180	190	220	240	67	65	64	320	290	270	51	60	57	170	170
Chloride	mg/L	100[A]	≤250[B]	26	42	38	9.0	14	18	6.0	8.4	8.8	**110[A]**	76	69	5.2	4.6	4.9	4.3	4.8
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																				
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	0.047	0.041	0.083	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	0.0036	0.0031	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0065	<0.0030	0.0040	0.0043	0.0033	0.0087	0.0089
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	<0.015	<0.015	<0.015	0.031	0.038	0.027	<0.015	<0.015	<0.015	0.14	0.23	0.41	0.16	0.19	0.17	0.064	0.23
Nitrate (as N)	mg/L	3.0[A]	10[C]	**3.3[A]**	**4.4[A]**	**5.6[A]**	0.21	0.16	0.35	0.39	0.45	0.79	0.72	0.77	0.51	<0.010	<0.010	<0.010	1.2	0.92
Phosphorus, Dissolved	mg/L	n/v	n/v	-	-	<0.0030	-	-	0.093	-	<0.0030	<0.0030	-	<0.0030	<0.0030	-	-	<0.0030 P2	0.0091	0.0070 P2
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	<0.0030	<0.0030	-	<0.0030	<0.0030	-	<0.0030	-	-	<0.0030	-	-	0.0057	<0.0030	-	-	-
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.56	0.23	<0.20	0.123	0.239	0.062	0.409	0.040	<0.020	0.356	1.13	0.302	0.157	0.188	0.183	0.099	0.371
Nitrogen	mg/L	n/v	n/v	4.9	4.6	5.1 NN	0.38	0.45	0.49	0.80	0.49	0.78 NN	1.1	1.9	0.81	0.16	0.19	0.18	1.3	1.3

See notes on the last page

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS81-01			WS81-02			NE7-R3-01			NE20-R3-01			SW11-R4-02			SW35-R4-01	
Sample Date				11-Jan-22	25-May-22	17-May-23	11-Jan-22	25-May-22	17-May-23	25-May-22	16-Nov-22	16-May-23	11-Jan-22	14-Nov-22	17-May-23	12-Jan-22	27-May-22	19-May-23	15-Nov-22	16-May-23
Sample ID				WS81-01	WS81-01	WS81-1	WS81-02	WS81-02	WS81-2	NE7R3-1	NE7R3-1	NE7R3-1	NE20R3-01	NE2OR3-2	NE20R3-2	SW11R4-02	SW11R4-2	SW11R4-2	SW35R4-1	SW35R4-1
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C201468	C235072	BQP602	C201468	C235072	C335152	C235072	C290717	C334712	C201468	C289871	C335152	C201825	C235756	C335907	C290290	C334712
Laboratory Sample ID				AMW362	ATQ223	Tier 2b	AMW363	ATQ224	BQP601	ATQ226	BHD548	BQN672	AMW361	BGY829	BQP600	AMY182	ATT544	BQT306	BHB174	BQN671
Location Description				Tier 2b	Tier 2b		Tier 2b	Tier 2b	Tier 2b	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3
Lithology					Bedrock			Bedrock		Unconsolidated (alluvial)				Bedrock			Bedrock		Bedrock	
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																	
Metals - Dissolved																				
Aluminum	mg/L	0.05$_{n1.e}$[A]	0.1$_{a}$[B]	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	**0.73**[AB]	<0.0030	<0.0030	<0.0030	<0.0030	0.0050	<0.0030	<0.0030	<0.0030	<0.0030
Antimony	mg/L	0.0060[A]	0.006[C]	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	<0.00020	<0.00020	0.00027	<0.00020	<0.00020	0.00026	<0.00020	0.00046	0.00040	<0.00020	<0.00020	<0.00020	0.00020	<0.00020	<0.00020	0.00055	0.00072
Barium	mg/L	2.0[A]	2.0[C]	0.023	0.023	0.023	0.041	0.045	0.045	0.11	0.12	0.11	0.022	0.018	0.018	0.069	0.088	0.081	0.026	0.024
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	0.16	0.16	0.14	0.15	0.16	0.15	<0.020	<0.020	<0.020	0.059	0.063	0.059	0.031	0.045	0.055	0.073	0.086
Cadmium	mg/L	0.00037$_{n3.e}$[A]	0.007[C]	<0.00002	<0.00002	<0.000020	<0.00002	<0.00002	<0.000020	<0.00002	0.000048	<0.000020	0.000039	0.000046	0.000086	<0.00002	<0.00002	<0.000020	<0.000020	<0.000020
Calcium	mg/L	n/v	n/v	95	91	88	47	53	54	74	69	77	150	94	130	12	15	17	21	19
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00038	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	0.0028 NH	0.0044	**0.014**[A]	0.00032	<0.0010	0.0021	**0.017**[A]	0.0022	0.0026	0.0041	0.0039	0.0057	0.00094	0.0013	0.0015	0.0017	0.0026
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060
Lead	mg/L	0.0070$_{n3.e}$[A]	0.005[C]	<0.00020	<0.00020	0.00054	<0.00020	<0.00020	<0.00020	0.0012	0.00097	<0.00020	<0.00020	<0.00020	0.00021	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	0.039	0.031	0.034	0.042	0.037	0.035	<0.020	<0.020	<0.020	0.044	0.032	0.040	0.024	<0.020	0.036	0.072	0.077
Magnesium	mg/L	n/v	n/v	52	51	53	25	27	29	20	18	21	78	63	65	4.0	4.5	5.0	7.0	6.0
Manganese	mg/L	0.020[A]	≤0.02[B]	<0.0040	<0.0040	<0.0040	0.013	**0.022**[AB]	0.016	<0.0040	<0.0040	<0.0040	0.0088	<0.0040	**0.051**[AB]	**0.039**[AB]	**0.048**[AB]	**0.051**[AB]	0.0060	0.0097
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0048	0.0052	0.0059	0.0017	0.0015	0.0016	0.00061	0.00069	0.00074	0.0011	0.00093	0.00087	0.0019	0.0016	0.0013	0.0058	0.0052
Nickel	mg/L	0.150$_{n3.e}$[A]	n/v	<0.00050	0.00052	0.0014	<0.00050	<0.00050	0.00055	<0.00050	<0.00050	<0.00050	0.0021	0.0021	0.0029	<0.00050	0.001	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	2.4	2.2	2.0	1.6	1.6	1.6	3.8	3.9	3.7	8.0	6.6	6.4	0.80	0.76	0.92	2.7	2.8
Selenium	mg/L	0.0020[A]	0.05[C]	**0.0032**[A]	**0.0038**[A]	**0.0026**[A]	0.0013	0.0013	0.00098	0.00061	0.00074	0.00063	0.00038	0.00028	<0.00020	<0.00020	<0.00020	<0.00020	0.0011	0.00091
Silicon	mg/L	n/v	n/v	3.3	3.4	3.3	3.1	3.3	3.2	2.8	2.6	2.7	3.8	3.5	3.9	3.5	3.9	4.0	2.8	3.2
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	140	140	120	**290**[AB]	**300**[AB]	**260**[AB]	6.8	7.0	7.9	140	140	120	100	92	98	**340**[AB]	**350**[AB]
Strontium	mg/L	n/v	7.0[C]	1.1	1.1	1.1	0.76	0.88	0.91	0.35	0.34	0.36	1.8	1.7	1.6	0.25	0.32	0.34	0.32	0.31
Sulfur	mg/L	n/v	n/v	57	65	61	61	78	81	25	17	23	97	86	98	16	20	19	51	59
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.0041	0.0038	0.0039	0.0052	0.0051	0.0061	0.00070	0.00085	0.00072	0.0055	0.0036	0.0035	<0.00010	<0.00010	<0.00010	0.00058	0.00048
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0020	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0018
Zinc	mg/L	0.030[A]	≤5.0[B]	<0.0030	0.0061	0.023	0.0042	0.0033	0.0031	0.018	0.012	0.011	0.018	0.017	0.018	0.0039	**0.052**[A]	0.028	0.0056	0.017
Metals - Total																				
Mercury	mg/L	0.0000050[A]	0.001[C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Microbiological Parameters																				
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	82	41	<1.0	3.0	22	<1.0	1.0	12	3.0	68	160	83	340	72	28	100	1.0
Total Coliforms	mpn/100mL	n/v	0[D]	**2.0**[D]	**28**[D]	**30**[D]	***<1.0***	**1.0**[D]	***<1.0***	***<1.0***	**9.8**[D]	***<1.0***	***<1.0***	***<1.0 PH***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***

See notes on the last page

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS11-1		WS41-02				WS51-01		WS62-01				SE35-R4-01	SE35-R4-02	SW2-R4-01	SW2-R4-02	SW11-R4-01
Sample Date				25-Nov-22	17-May-23	5-Apr-16	26-May-22	14-Nov-22	15-May-23	13-Jan-22	23-May-23	14-Jan-22	25-May-22	16-Nov-22	16-May-23	10-Jan-22	25-May-22	11-Jan-22	26-May-22	12-Jan-22
Sample ID				WS11-1	WS11-1	WS41-02	WS41-2	WS41-2	WS41-2	WS51-01	WS51-1	WS62-01	WS62-01	WS62-1	WS62-1	SE35R4-01	SE35R4-2	SW2R4-01	SW2R4-2	SW11R4-01
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	MAXX	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C293015	C335152	B624910	C235445	C289871	C334367	C202060	C336439	C202261	C235072	C290717	C334712	C201202	C235072	C201468	C235441	C201825
Laboratory Sample ID				BHR664	BQP593	OJ8684	ATR988	BGY828	BQM167	AMZ441	BQW245	ANA368	ATQ222	BHD547	BQN673	AMU845	ATQ221	AMW360	ATR966	AMY181
Location Description				Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	One Time	One Time	One Time	One Time	One Time
Lithology				Bedrock			Bedrock			Bedrock		Unconsolidated (alluvial)				Bedrock	Bedrock	Unknown	Unknown	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																	
Field Parameters																				
Dissolved Oxygen, Field	mg/L	n/v	n/v	16.2	6.7	-	4.37	3.8	5.4	1.75	2.9	6.76	5.81	5.3	12.6	5.05	2.32	3.65	6.77	1.97
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	898	747	-	**1,182[A]**	**1,082[A]**	**1,080[A]**	793	724	582	625	605	572	**1,307[A]**	**1,265[A]**	**1,923[A]**	**2,999[A]**	408
Oxidation Reduction Potential, field	mV	n/v	n/v	-31.5	149.7	-	91.7	13.8	130.0	-129.9	-81.3	108.2	88.4	-44.0	213.6	52.4	-43	125.1	142	-163.4
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.42	7.55	-	7.21	7.28	7.46	7.86	7.61	7.67	7.5	7.01	7.45	7.19	7.28	7.33	7.23	**8.71[A]**
Temperature, Field	deg C	n/v	≤15[B]	5	12.6	-	7.6	6.5	6.9	6.9	8.5	3.4	4.3	8.1	4.0	5.4	8.3	5.9	12.5	5.5
Calculated Parameters																				
Anion Sum	meq/L	n/v	n/v	10	9.5	12	13	12	14	8.8	-	6.5	6.9	7.0	7.1	15	14	27	39	4.6
Cation Sum	meq/L	n/v	n/v	11	9.3	11	14	14	14	9.6	-	7.0	7.3	6.2	7.3	16	15	26	38	4.9
Hardness (as CaCO3)	mg/L	n/v	n/v	240	240	56	250	410	170	190	190	330	340	290	350	590	610	810	860	58
Ion Balance	%	n/v	n/v	1.7	1.1	0.93	3.3	5.1	2.2	4.2	2.8	3.5	3.0	6.2	2.0	3.7	4.6	0.51	0.34	3.3
Nitrate	mg/L	13_{f}[A]	45[C]	0.059	0.068	2.8	8.4	**20[A]**	4.4	<0.044	<0.044	0.13	0.28	0.14	0.46	3.5	<0.044	**26[A]**	1.4	0.13
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	0.013	0.015	0.64	1.9	4.5	0.99	<0.010	<0.010	0.030	0.063	0.032	0.10	0.78	<0.010	5.8	0.32	0.030
Nitrite	mg/L	$1.97_{n4.e.g}$[A]	3[C]	<0.033	<0.033	<0.033	0.036	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	0.038	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	**540[AB]**	480	**640[AB]**	**730[AB]**	**670[AB]**	**750[AB]**	**510[AB]**	**520[AB]**	350	370	360	380	**820[AB]**	**720[AB]**	**1,600[AB]**	**2,500[AB]**	250
BTEX and Petroleum Hydrocarbons																				
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	0.00041	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	-	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	-	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																				
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	2.9	1.8	-	2.2	1.9	1.7	0.64	0.66	1.1	0.93	1.5	1.9	1.6	1.5	3.4	3.1	0.52
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	920	830	**1,100[A]**	**1,200[A]**	**1,100[A]**	**1,200[A]**	810	800	590	630	620	630	**1,300[A]**	**1,300[A]**	**2,200[A]**	**3,000[A]**	410
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	8.19	7.88	7.99	7.75	7.62	8.04	7.84	8.21	7.47	7.37	7.51	7.83	7.41	7.36	7.56	7.55	8.21
Anions																				
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	450	450	520	530	450	580	310	310	240	240	250	240	490	430	480	460	210
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	550	550	640	640	550	710	380	380	290	290	300	290	590	520	590	570	260
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	≤500_{i}[B]	25	13	65	80	60	86	120	130	76	91	87	98	160	74	**720[AB]**	**1,400[AB]**	14
Chloride	mg/L	100[A]	≤250[B]	29	6.3	3.3	34	60	23	<1.0	<1.0	5.8	6.6	8.1	6.8	63	**120[A]**	54	3.3	2.0
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	0.62	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																				
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	-	<0.0030	0.0035	<0.0030	0.0032	<0.0030	0.0077	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0032	<0.0030	0.012
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	0.29	0.25	-	0.2	0.018	0.25	0.26	0.24	<0.015	<0.015	<0.015	<0.015	0.058	0.26	0.21	0.38	0.14
Nitrate (as N)	mg/L	3.0[A]	10[C]	0.013	0.015	0.64	1.9	**4.5[A]**	0.99	<0.010	<0.010	0.030	0.063	0.032	0.10	0.78	<0.010	**5.8[A]**	0.32	0.030
Phosphorus, Dissolved	mg/L	n/v	n/v	0.0061	0.011	-	-	<0.0030	<0.0030	-	<0.0030	-	-	<0.0030	<0.0030	-	-	-	-	-
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	-	-	-	<0.0030	-	-	<0.0030	-	<0.0030	<0.0030	-	-	<0.0030	<0.0030	0.0031	<0.0030	0.0087
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	0.57	0.332	-	0.20	2.23	0.409	0.269	0.270	0.053	0.123	0.061	<0.020	0.076	0.382	0.71	0.929	0.260
Nitrogen	mg/L	n/v	n/v	0.59 DB	0.35	-	2.1	6.7	1.4	0.27	0.27	0.083	0.19	0.093	0.11	0.86	0.38	6.5	1.3	0.29

See notes on the last page

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS11-1		WS41-02				WS51-01		WS62-01				SE35-R4-01	SE35-R4-02	SW2-R4-01	SW2-R4-02	SW11-R4-01
Sample Date				25-Nov-22	17-May-23	5-Apr-16	26-May-22	14-Nov-22	15-May-23	13-Jan-22	23-May-23	14-Jan-22	25-May-22	16-Nov-22	16-May-23	10-Jan-22	25-May-22	11-Jan-22	26-May-22	12-Jan-22
Sample ID				WS11-1	WS11-1	WS41-02	WS41-2	WS41-2	WS41-2	WS51-01	WS51-1	WS62-01	WS62-01	WS62-1	WS62-1	SE35R4-01	SE35R4-2	SW2R4-01	SW2R4-2	SW11R4-01
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	MAXX	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C293015	C335152	B624910	C235445	C289871	C334367	C202060	C336439	C202261	C235072	C290717	C334712	C201202	C235072	C201468	C235441	C201825
Laboratory Sample ID				BHR664	BQP593	OJ8684	ATR988	BGY828	BQM167	AMZ441	BQW245	ANA368	ATQ222	BHD547	BQN673	AMU845	ATQ221	AMW360	ATR966	AMY181
Location Description				Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	Tier 3	One Time	One Time	One Time	One Time	One Time
Lithology				Bedrock			Bedrock			Bedrock		Unconsolidated (alluvial)				Bedrock	Bedrock	Unknown	Unknown	Bedrock
Sample Type	Units	2022 AEPA Tier 1	GCDWQ																	
Metals - Dissolved																				
Aluminum	mg/L	$0.05_{n1.e}$[A]	0.1_{a}[B]	0.0037	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	-	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0043
Antimony	mg/L	0.0060[A]	0.006[C]	0.0033	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	-	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050[A]	0.010[C]	0.0021	0.00089	<0.00020	<0.00020	<0.00020	0.00045	0.00054	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.0023
Barium	mg/L	2.0[A]	2.0[C]	0.17	0.21	0.022	0.055	0.080	0.045	0.015	-	0.063	0.066	0.062	0.066	0.025	0.030	0.034	<0.010	0.28
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0[A]	5[C]	**1.2[A]**	0.54	0.047	0.059	0.053	0.055	0.10	-	<0.020	<0.020	<0.020	<0.020	0.074	0.058	0.089	0.16	0.061
Cadmium	mg/L	$0.00037_{n3.e}$[A]	0.007[C]	<0.000020	<0.000020	<0.000020	0.000023	0.00003	<0.000020	<0.00002	-	<0.00002	<0.00002	<0.000020	<0.000020	0.000026	<0.00002	<0.00002	<0.00002	<0.00002
Calcium	mg/L	n/v	n/v	54	50	14	57	90	41	57	59	92	96	81	96	130	140	180	210	14
Chromium	mg/L	0.050[A]	0.05[C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	0.00053	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	-	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	0.0070[A]	≤1.0[B]	<0.0010	<0.0010	<0.00020	0.0018	0.0067	0.0031	<0.00020	-	**0.013[A]**	**0.017[A]**	**0.023[A]**	**0.018[A]**	0.0045	<0.0010	0.0034	**0.013[A]**	0.00045
Iron	mg/L	0.30[A]	≤0.3[B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	**0.47[AB]**	<0.060	<0.060	<0.060
Lead	mg/L	$0.0070_{n3.e}$[A]	0.005[C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00024	<0.00020
Lithium	mg/L	n/v	n/v	0.026	<0.020	0.052	0.035	<0.020	0.036	0.023	-	<0.020	<0.020	<0.020	<0.020	0.026	<0.020	0.071	0.11	<0.020
Magnesium	mg/L	n/v	n/v	26	27	4.8	27	44	18	11	11	24	25	21	26	66	65	88	83	5.4
Manganese	mg/L	0.020[A]	≤0.02[B]	**0.28[AB]**	**0.32[AB]**	0.017	0.013	<0.0040	0.0077	**0.13[AB]**	**0.16[AB]**	0.0063	0.0062	<0.0040	0.0070	0.0040	**0.071[AB]**	**0.062[AB]**	**0.15[AB]**	0.015
Mercury	mg/L	0.0000050[A]	0.001[C]	0.0000039	<0.0000019	<0.0000020	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0068	0.0030	0.0053	0.0076	0.0044	0.0089	0.0051	-	0.00041	0.00040	0.00048	0.00054	0.0012	0.00023	0.00066	0.00036	0.0012
Nickel	mg/L	$0.150_{n3.e}$[A]	n/v	0.0013	0.00078	<0.00050	0.0012	0.00078	<0.00050	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	0.00054	<0.00050	0.00062	0.0078	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	6.4	5.1	2.2	5.1	6.2	4.0	1.1	1.1	2.0	2.0	1.8	2.0	6.4	6.2	4.0	4.9	0.91
Selenium	mg/L	0.0020[A]	0.05[C]	<0.00020	<0.00020	0.00026	**0.0037[A]**	**0.0063[A]**	0.0020	<0.00020	-	0.00061	0.0011	0.00062	0.0012	**0.0039[A]**	**0.012[A]**	0.0014	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	5.0	5.8	2.5	3.0	3.3	2.7	5.0	-	2.7	2.9	2.5	2.9	3.8	4.0	4.4	5.3	4.0
Silver	mg/L	0.00010[A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200[A]	≤200[B]	130	100	**230[AB]**	**210[AB]**	120	**230[AB]**	130	130	8.8	8.6	8.1	8.6	97	59	**230[AB]**	**480[AB]**	85
Strontium	mg/L	n/v	7.0[C]	2.8	2.6	0.27	0.79	1.3	0.63	0.56	-	0.46	0.47	0.42	0.46	1.4	1.7	1.8	3.5	0.22
Sulfur	mg/L	n/v	n/v	7.9	4.5	20	28	21	29	39	-	25	33	23	33	53	29	200	490	6.0
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010[A]	0.02[C]	0.00045	0.00012	0.00032 MD	0.0031	0.0037	0.0031	0.00015	-	0.00067	0.0010	0.00080	0.0011	0.0050	0.0033	0.010	0.00019	<0.00010
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030[A]	≤5.0[B]	0.0049	0.0035	0.023	0.0072	0.026	0.011	<0.0030	-	0.0057	0.028	0.012	0.016	0.0096	<0.0030	0.024	**0.053[A]**	<0.0030
Metals - Total																				
Mercury	mg/L	0.0000050[A]	0.001[C]	**0.00094[A]**	0.0000026	<0.0000020	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Microbiological Parameters																				
Escherichia coli (E.Coli)	mpn/100mL	n/v	0[D]	***<10 MI***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<2.0 AT***	***<1.0***	***<1.0***	***<1.0***
Fecal Coliforms	mpn/100mL	n/v	0[D]	***<10 MI***	***<1.0***	-	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	110	320	-	240	1,300	<1.0	1.0	1.0	16	7.0	<1.0	25	370	300	33	>6000	470
Total Coliforms	mpn/100mL	n/v	0[D]	**10 MI[D]**	**>2400[D]**	**24[D]**	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	**1.0[D]**	***<1.0***	***<1.0***	***<1.0***	***<3,500 AT***	**1.0[D]**	***<1.0***	***<1.0***

See notes on the last page

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS20-1	WS20-2	WS27-01	WS36-01	WS36-02	WS36-03	WS36-04	WS42-01	WS42-02	WS48-01	WS50-01	WS56-01	WS56-02	WS65-01	WS65-02	WS67-01
Sample Date				24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	26-May-22	26-May-22	13-Jan-22	23-May-23	10-Jan-22	10-Jan-22	12-Jan-22	12-Jan-22	25-May-22
Sample ID				WS20-1	WS20-2	WS27-1	WS36-1	WS36-2	WS36-3	WS36-4	WS42-1	WS42-2	WS48-01	WS50-1	WS56-01	WS56-02	WS65-01	WS65-02	WS67-01
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C336854	C336854	C336854	C336854	C336854	C336854	C336854	C235450	C235450	C202060	C336439	C201202	C201202	C201825	C201825	C235072
Laboratory Sample ID				BQZ215	BQZ216	BQZ214	BQZ210	BQZ211	BQZ212	BQZ213	ATR997	ATR998	AMZ440	BQW246	AMU843	AMU844	AMY183	AMY184	ATQ225
Location Description				One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time
Lithology				Bedrock	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Bedrock	Bedrock	Bedrock	Unknown	Bedrock	Bedrock	Bedrock	Unknown	Unconsolidated (alluvial)
Sample Type	**Units**	**2022 AEPA Tier 1**	**GCDWQ**																
Field Parameters																			
Dissolved Oxygen, Field	mg/L	n/v	n/v	5.7	8.5	3.4	7.5	2.5	4.8	2.2	6.07	4.78	3.49	4.1	6.59	1.75	10.13	1.16	3.76
Electrical Conductivity, Field	µS/cm	1,000[A]	n/v	385	325	979	904	**1,884[A]**	**1,431[A]**	**1,304[A]**	**1,102[A]**	**1,070[A]**	**1,823[A]**	**2,138[A]**	**1,341[A]**	**2,009[A]**	448	549	520
Oxidation Reduction Potential, field	mV	n/v	n/v	52.3	250.9	139.3	135.1	123.1	40.9	100.1	101.3	112.3	-102.9	16.4	-35.8	122	63.2	-25.8	-94.4
pH, Field	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.58	7.70	7.57	7.55	7.41	7.45	7.36	**6.99[B]**	7.04	7.7	7.74	7.01	7.19	7.73	8.29	7.47
Temperature, Field	deg C	n/v	≤15[B]	5.6	13.7	7.1	7.6	8.0	8.8	12.2	6.3	7.7	4.4	7.1	6.3	7.8	5.5	4.4	8
Calculated Parameters																			
Anion Sum	meq/L	n/v	n/v	4.7	3.9	11	12	21	18	16	12	11	22	-	15	19	4.9	5.7	5.5
Cation Sum	meq/L	n/v	n/v	4.3	3.8	13	13	23	19	17	13	12	21	-	16	21	5.2	6.4	5.6
Hardness (as CaCO3)	mg/L	n/v	n/v	120	190	270	530	760	520	510	560	550	600	140	670	11	250	21	260
Ion Balance	%	n/v	n/v	4.8	1.8	5.4	5.2	4.6	3.5	4.1	4.2	4.2	3.0	0.66	3.6	3.2	3.0	5.5	1.2
Nitrate	mg/L	13_{f}[A]	45[C]	<0.044	0.59	3.9	3.2	**16[A]**	**15[A]**	3.3	1.5	4.4	<0.044	<0.044	0.054	0.77	0.96	0.097	0.28
Nitrate + Nitrite (as N)	mg/L	100[A]	n/v	<0.010	0.13	0.87	0.72	3.5	3.4	0.75	0.34	1.0	<0.010	<0.010	0.012	0.17	0.22	0.022	0.063
Nitrite	mg/L	$1.97_{n4.e.g}$[A]	3[C]	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Total Dissolved Solids	mg/L	500[A]	≤500[B]	250	210	**650[AB]**	**620[AB]**	**1,100[AB]**	**1,000[AB]**	**870[AB]**	**610[AB]**	**600[AB]**	**1,400[AB]**	**1,600[AB]**	**760[AB]**	**1,100[AB]**	270	340	280
BTEX and Petroleum Hydrocarbons																			
Benzene	mg/L	0.0050[A]	0.005[C]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Toluene	mg/L	0.024[A]	0.024[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Ethylbenzene	mg/L	0.0016[A]	0.0016[B]	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, m & p-	mg/L	n/v	n/v	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080	<0.00080
Xylene, o-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylenes, Total	mg/L	0.020[A]	0.02[B]	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	2.2[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	1.1[A]	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Miscellaneous Inorganics																			
Dissolved Organic Carbon (DOC)	mg/L	n/v	n/v	<0.50	0.73	1.2	0.88	1.4	1.3	1.3	2.1	1.8	1.2	1.7	1.2	11	0.86	1.3	3.3
Electrical Conductivity, Lab	µS/cm	1,000[A]	n/v	420	350	1,000	1,000	**2,000[A]**	**1,500[A]**	**1,400[A]**	**1,100[A]**	**1,100[A]**	**1,800[A]**	**2,400[A]**	**1,300[A]**	**2,000[A]**	450	550	500
pH, lab	S.U.	6.5-8.5[A]	7.0-10.5[B]	7.94	8.02	8.38	8.29	7.80	8.23	8.01	7.38	7.44	7.65	8.50	7.40	7.35	7.55	8.05	7.38
Anions																			
Alkalinity (P as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	6.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	17	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Total (as CaCO3)	mg/L	n/v	n/v	160	140	420	440	510	540	500	380	380	210	630	430	380	160	220	230
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	190	160	490	530	630	650	610	460	460	260	730	530	460	200	260	280
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	7.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	21	<1.0	<1.0	<1.0	<1.0	<1.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Sulfate	mg/L	$429_{n5,e}$[A]	$≤500_{i}$[B]	70	59	100	77	94	180	140	64	58	**870[AB]**	**650[AB]**	86	56	74	69	43
Chloride	mg/L	100[A]	≤250[B]	2.7	<1.0	35	50	**290[AB]**	**110[A]**	96	95	94	2.2	4.3	**140[A]**	**380[AB]**	2.8	<1.0	1.9
Fluoride	mg/L	1.0[A]	1.5[C]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																			
Nitrite (as N)	mg/L	$0.6_{n4.e}$[A]	1[C]	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Orthophosphate (as P)	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	0.0032	0.0036	<0.0030	<0.0030	0.0033	0.0038	<0.0030
Ammonia (as N) - Total	mg/L	3.141_{n2}[A]	n/v	<0.015	<0.015	0.19	<0.015	<0.015	0.38	0.23	<0.015	<0.015	0.58	0.57	0.34	<0.015	<0.015	0.58	1
Nitrate (as N)	mg/L	3.0[A]	10[C]	<0.010	0.13	0.87	0.72	**3.5[A]**	**3.4[A]**	0.75	0.34	1.0	<0.010	<0.010	0.012	0.17	0.22	0.022	0.063
Phosphorus, Dissolved	mg/L	n/v	n/v	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	-	-	-	<0.0030 P2	-	-	-	-	-
Phosphorus, Total (Dissolved)	mg/L	n/v	n/v	-	-	-	-	-	-	-	<0.0030	<0.0030	0.026	-	0.056	<0.0030	<0.0030	0.41 DB	<0.0030
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	<2.0	0.027	0.231	<0.020	<0.10	0.28	0.207	0.784	0.092	0.724	0.727	0.522	0.046	0.082	<2.0	2.78
Nitrogen	mg/L	n/v	n/v	<2.0 DB	0.16	1.1	0.58 NN	3.4 NN	3.7	0.96	1.1	1.1	0.72	0.73	0.53	0.22	0.30	<2.0 DB	2.8 DB

See notes on the last page

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Sample Location				WS20-1	WS20-2	WS27-01	WS36-01	WS36-02	WS36-03	WS36-04	WS42-01	WS42-02	WS48-01	WS50-01	WS56-01	WS56-02	WS65-01	WS65-02	WS67-01
Sample Date				24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	24-May-23	26-May-22	26-May-22	13-Jan-22	23-May-23	10-Jan-22	10-Jan-22	12-Jan-22	12-Jan-22	25-May-22
Sample ID				WS20-1	WS20-2	WS27-1	WS36-1	WS36-2	WS36-3	WS36-4	WS42-1	WS42-2	WS48-01	WS50-1	WS56-01	WS56-02	WS65-01	WS65-02	WS67-01
Sampling Company				STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory				BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order				C336854	C336854	C336854	C336854	C336854	C336854	C336854	C235450	C235450	C202060	C336439	C201202	C201202	C201825	C201825	C235072
Laboratory Sample ID				BQZ215	BQZ216	BQZ214	BQZ210	BQZ211	BQZ212	BQZ213	ATR997	ATR998	AMZ440	BQW246	AMU843	AMU844	AMY183	AMY184	ATQ225
Location Description				One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time	One Time
Lithology				Bedrock	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Bedrock	Bedrock	Bedrock	Unknown	Bedrock	Bedrock	Bedrock	Unknown	Unconsolidated (alluvial)
Sample Type	**Units**	**2022 AEPA Tier 1**	**GCDWQ**																
Metals - Dissolved																			
Aluminum	mg/L	$0.05_{n1.e}$ [A]	0.1_{a} [B]	0.0045	0.0038	<0.0030	0.0032	0.0035	0.025	0.012	<0.0030	<0.0030	<0.0030	-	<0.0030	<0.0030	0.0081	0.0066	<0.0030
Antimony	mg/L	0.0060 [A]	0.006 [C]	<0.00060	0.00094	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060	-	<0.00060	<0.00060	<0.00060	<0.00060	<0.00060
Arsenic	mg/L	0.0050 [A]	0.010 [C]	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	0.00048	0.00033
Barium	mg/L	2.0 [A]	2.0 [C]	0.035	0.055	0.051	0.031	0.051	0.032	0.036	0.049	0.050	<0.010	-	0.039	<0.010	0.082	0.025	0.17
Beryllium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Boron	mg/L	1.0 [A]	5 [C]	<0.020	<0.020	0.047	0.055	0.078	0.086	0.085	0.036	0.036	0.081	-	0.11	0.063	<0.020	0.075	<0.020
Cadmium	mg/L	$0.00037_{n3.e}$ [A]	0.007 [C]	<0.000020	<0.000020	<0.000020	<0.000020	0.00003	<0.000020	<0.000020	0.000030	<0.00002	<0.00002	-	0.000022	<0.00002	<0.00002	<0.00002	<0.00002
Calcium	mg/L	n/v	n/v	29	50	58	110	170	120	110	130	120	170	33	150	1.7	70	6.4	76
Chromium	mg/L	0.050 [A]	0.05 [C]	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt	mg/L	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	-	0.00038	<0.00030	<0.00030	<0.00030	<0.00030
Copper	mg/L	0.0070 [A]	≤1.0 [B]	0.0025	**0.019** [A]	0.0012	<0.0010	**0.017** [A]	<0.0010	0.0010	<0.0010	0.0011	0.0025	-	<0.00020	**0.011** [A]	0.0035	0.00052	<0.0010
Iron	mg/L	0.30 [A]	≤0.3 [B]	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	<0.060	**0.41** [AB]	<0.060	<0.060	0.11	0.072
Lead	mg/L	$0.0070_{n3.e}$ [A]	0.005 [C]	<0.00020	<0.00020	<0.00020	<0.00020	0.00024	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Lithium	mg/L	n/v	n/v	<0.020	<0.020	0.053	0.020	0.027	0.053	0.056	<0.020	<0.020	0.030	-	0.043	0.036	<0.020	0.032	<0.020
Magnesium	mg/L	n/v	n/v	12	15	29	62	79	53	59	60	60	43	13	74	1.5	18	1.3	18
Manganese	mg/L	0.020 [A]	≤0.02 [B]	**0.11** [AB]	<0.0040	0.016	<0.0040	<0.0040	**0.023** [AB]	**0.044** [AB]	<0.0040	<0.0040	**0.40** [AB]	**0.10** [AB]	**0.20** [AB]	<0.0040	<0.0040	0.0064	**0.42** [AB]
Mercury	mg/L	0.0000050 [A]	0.001 [C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	0.0000021	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019
Molybdenum	mg/L	n/v	n/v	0.0025	0.00062	0.0036	0.00046	0.0010	0.0031	0.00072	0.0011	0.00068	0.0022	-	0.00028	0.00067	0.00068	0.0074	0.00052
Nickel	mg/L	$0.150_{n3.e}$ [A]	n/v	0.00057	<0.00050	<0.00050	<0.00050	0.0014	0.0011	<0.00050	<0.00050	<0.00050	<0.00050	-	0.0007	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10	<0.10	<0.10	<0.10
Potassium	mg/L	n/v	n/v	1.3	0.56	4.1	6.3	7.7	7.0	7.0	5.4	5.5	5.5	2.0	7.4	1.3	0.88	1.7	3.3
Selenium	mg/L	0.0020 [A]	0.05 [C]	0.00022	0.00073	**0.0024** [A]	**0.016** [A]	0.0015	**0.0044** [A]	0.00082	**0.0073** [A]	**0.0071** [A]	<0.00020	-	0.0014	**0.0063** [A]	0.00078	<0.00020	<0.00020
Silicon	mg/L	n/v	n/v	1.1	2.4	2.7	4.1	3.2	3.4	3.6	4.3	4.3	4.8	-	3.2	3.9	2.1	2.6	3.7
Silver	mg/L	0.00010 [A]	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Sodium	mg/L	200 [A]	≤200 [B]	42	1.9	170	52	170	190	150	29	29	**210** [AB]	**550** [AB]	43	**470** [AB]	3.9	140	4.2
Strontium	mg/L	n/v	7.0 [C]	0.26	0.40	0.74	1.3	1.8	1.2	1.6	1.1	1.1	1.6	-	2.3	<0.020	0.40	0.080	0.31
Sulfur	mg/L	n/v	n/v	18	22	26	28	27	50	41	22	20	250	-	28	18	23	22	15
Thallium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Tin	mg/L	n/v	n/v	0.0023	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Titanium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Uranium	mg/L	0.010 [A]	0.02 [C]	<0.00010	0.00042	0.0021	0.0042	0.0059	0.0059	0.0040	0.0046	0.0042	<0.00010	-	0.0022	0.0057	0.00048	0.00018	<0.00010
Vanadium	mg/L	n/v	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	<0.0010	0.0013	<0.0010	<0.0010	<0.0010
Zinc	mg/L	0.030 [A]	≤5.0 [B]	<0.0030	0.021	0.0033	<0.0030	0.012	0.0062	<0.0030	<0.0030	<0.0030	**0.036** [A]	-	**0.058** [A]	<0.0030	0.011	<0.0030	**1.2** [A]
Metals - Total																			
Mercury	mg/L	0.0000050 [A]	0.001 [C]	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	<0.0000019	0.0000021	<0.0000019	<0.0000019	<0.0000019	<0.0000019	***<0.000019***	<0.0000019
Microbiological Parameters																			
Escherichia coli (E.Coli)	mpn/100mL	n/v	0 [D]	***<2.0 Z8***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<10 VV***	***<2.0 AT***
Fecal Coliforms	mpn/100mL	n/v	0 [D]	***<2.0 Z8***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<1.0***	***<10 VV HX***	***<2.0 AT***
Heterotrophic Plate Count	cfu/mL	n/v	n/v	120	<1.0	400	<1.0	6.0	64	2.0	15	2.0	600	4.0	2.0	<1.0	29	>6000 DSM	220
Total Coliforms	mpn/100mL	n/v	0 [D]	***<2.0 Z8***	**1.0** [D]	***<1.0***	***<1.0***	**2.0** [D]	***<1.0***	***<1.0***	***<1.0***	**1.0** [D]	***<1.0***	***<1.0***	***<1.0***	***<1.0***	**6.3** [D]	**240 VV** [D]	***<30 AT***

See notes on the last page

Table D.2 Groundwater Analytical Results - Tier 2a, Tier 3 and One-Time Domestic Monitoring Wells

Notes:

2022 AEP Tier 1	Alberta Environment and Protected Areas (AEPA). 2022. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Land Policy Branch 189 pp.
A	Table 2. Alberta Tier 1 Groundwater Remediation Guidelines - Agricultural - Fine
GCDWQ	Health Canada (September 2022). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
B	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
C	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
D	Guidelines for Canadian Drinking Water Quality - Microbiological Parameters
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
a	This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants; it does not apply to naturally occurring aluminum found in groundwater. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
f	Guidelines only provided for Nitrate (as N). Nitrate guideline (as NO3) is calculated by multiplying the Nitrate (as N) guideline by 4.43.
i	High levels (above 500 mg/L) can cause physiological effects such as diarrhea or dehydration.
n1,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.1 for further guidance on aquatic life pathway, standard varies with pH, long term guideline shown (see Table 1.1 for short term guideline). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n2	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.2 for further guidance on aquatic life pathway, standard varies with pH and temperature (see Table 1.2 for guideline and is for total ammonia (NH3 as N).
n3,e	See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.3 for further guidance on aquatic life pathway, standard varies with hardness, long term is shown (see Table 1.3 for short term). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
n4,e, g	Overall guideline value for ecological receptors only. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.4 for further guidance on aquatic life pathway, standard varies with chloride, maximum nitrite-N is shown (see Table 1.4 for 30-day average). Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines. Guidelines only provided for Nitrite (as N). Nitrite guideline (as NO2) is calculated by multiplying the Nitrite (as N) guideline by 3.29.
n5,e	Guideline for protection of aquatic life is below detection limit, groundwater monitoring is required. See Environmental Quality Guideline for Alberta Surface Waters (AEP, 2018), Tables 1 and 1.7 for further guidance on aquatic life pathway, standard varies with hardness. Must refer to Tables in Appendix B of the Tier 1 guidelines and select lowest of aquatic life guideline and all other guidelines.
AT	Detection limit raised due to interference.
CD	Detection limits raised due to dilution to bring analyte within the calibrated range.
DB	Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.
DSM	Detection limits raised due to sample matrix
HX	Holding time had been exceeded upon sample receipt.
MD	Dissolved greater than total. Results are within limits of uncertainty.
MI	Detection limits raised due to matrix interference.
NH	Duplicate exceeds acceptance criteria due to sample non homogeneity. Reanalysis yields similar results.
NN	Nitrogen < Nitrate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
P2	Phosphorus < Orthophosphate: Both values fall within the method uncertainty for duplicates and are likely equivalent.
PH	Sample received past hold time.
VV	Detection limit raised based on sample volume used for analysis.
Z8	Detection limit raised due to matrix interference.
RPD	Relative Percent Difference.
61%	RPD exceeds data quality objective of 30%.
nc	RPD is not calculated if one or more values is non detect or if one or more values is less than five times the reportable detection limit.

B.3
Air Quality Monthly Summaries

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.97	0.66	0.08		-0.7	—	—
Minimum (Non-Zero)	1.35	0.97	0.66	0.08			—	—
Average	11.40	17.24	31.34	0.34	118.7 (ESE)	12.5	—	—
Median	9.52	13.69	20.88	0.29		11.9	—	—
Maximum	51.70	211.10	339.73	1.26		24.2	—	—
Standard Deviation	7.51	16.93	34.51	0.21		5.0	—	—
Number Obs	711	715	715	712	712	712	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	98.8%	99.3%	99.3%	98.9%	98.9%	98.9%	0.0%	0.0%
Calm Hours				224				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	449	356	253	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	41	16	42	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	6	6	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	4	2	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	6.27	7.27	12.10
Minimum (Non-Zero)	6.27	7.27	12.10
Average	11.39	17.25	31.28
Median	10.99	15.46	27.41
Maximum	16.66	36.97	73.28
Standard Deviation	2.47	6.67	15.91
Number Obs	30	30	30
Expected Obs	30	30	30
% Complete	98.8%	99.3%	99.3%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	30	30	30	3	5	10
1/3 of 24-hour AAAQO	20	13	10	10	17	33
2/3 of 24-hour AAAQO	0	2	2	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	0.00	—	—		—	—	—
Minimum (Non-Zero)	—	0.28	—	—			—	—
Average	—	57.02	—	—	— (—)	—	—	—
Median	—	18.71	—	—		—	—	—
Maximum	—	1,053.32	—	—		—	—	—
Standard Deviation	—	123.51	—	—		—	—	—
Number Obs	0	675	0	0	0	0	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	0.0%	93.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours				0				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	0	446	0	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	152	0	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	82	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	59	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	—	11.19	—
Minimum (Non-Zero)	—	11.19	—
Average	—	54.72	—
Median	—	26.66	—
Maximum	—	257.65	—
Standard Deviation	—	53.21	—
Number Obs	0	27	0
Expected Obs	30	30	30
% Complete	0.0%	93.8%	0.0%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	27	0	3	5	10
1/3 of 24-hour AAAQO	0	21	0	10	17	33
2/3 of 24-hour AAAQO	0	12	0	19	33	67
Above 24-hour AAAQO	0	11	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.10		-2.0	—	—
Minimum (Non-Zero)	0.17	0.07	1.07	0.10			—	—
Average	11.56	14.91	24.87	0.70	287.5 (WNW)	12.6	—	—
Median	9.92	13.27	20.77	0.56		11.9	—	—
Maximum	51.87	71.07	147.51	2.82		24.5	—	—
Standard Deviation	7.01	8.55	17.13	0.45		5.0	—	—
Number Obs	717	716	717	718	718	718	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	99.6%	99.4%	99.6%	99.7%	99.7%	99.7%	0.0%	0.0%
Calm Hours				22				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	480	332	219	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	31	6	7	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	7.70	8.67	13.19
Minimum (Non-Zero)	7.70	8.67	13.19
Average	11.57	14.92	24.85
Median	11.20	14.52	21.80
Maximum	18.67	22.88	44.56
Standard Deviation	2.11	3.39	8.56
Number Obs	30	30	30
Expected Obs	30	30	30
% Complete	99.6%	99.4%	99.6%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	15	30	30	3	5	10
1/3 of 24-hour AAAQO	0	10	6	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	1.23	0.00	0.10		2.9	—	—
Minimum (Non-Zero)	1.23	1.60	0.10			—	—
Average	12.76	26.41	0.72	— (—)	13.0	—	—
Median	10.65	18.55	0.54		12.2	—	—
Maximum	50.98	229.72	3.35		24.6	—	—
Standard Deviation	7.84	27.41	0.56		4.8	—	—
Number Obs	652	646	653	653	653	0	0
Expected Obs	720	720	720	720	720	720	720
% Complete	90.6%	89.7%	90.7%	90.7%	90.7%	**0.0%**	**0.0%**
Calm Hours			57				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	459	175	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	52	26	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	5	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	6.97	13.07
Minimum (Non-Zero)	6.97	13.07
Average	12.79	26.19
Median	12.83	19.48
Maximum	22.88	75.98
Standard Deviation	3.47	15.43
Number Obs	27	27
Expected Obs	30	30
% Complete	90.6%	89.7%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	27	27	3	10	
1/3 of 24-hour AAAQO	23	5	10	33	
2/3 of 24-hour AAAQO	1	2	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for June 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		1.0	18.0	86.4
Minimum (Non-Zero)	1.11			18.0	86.4
Average	4.88	307.2 (NW)	12.5	68.5	87.8
Median	4.72		12.0	71.0	87.7
Maximum	16.94		24.1	99.0	89.2
Standard Deviation	2.53		4.71	21.90	0.626
Number Obs	649	649	706	715	706
Expected Obs	720	720	720	720	720
% Complete	90.1%	90.1%	98.1%	99.3%	98.1%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for June 2022

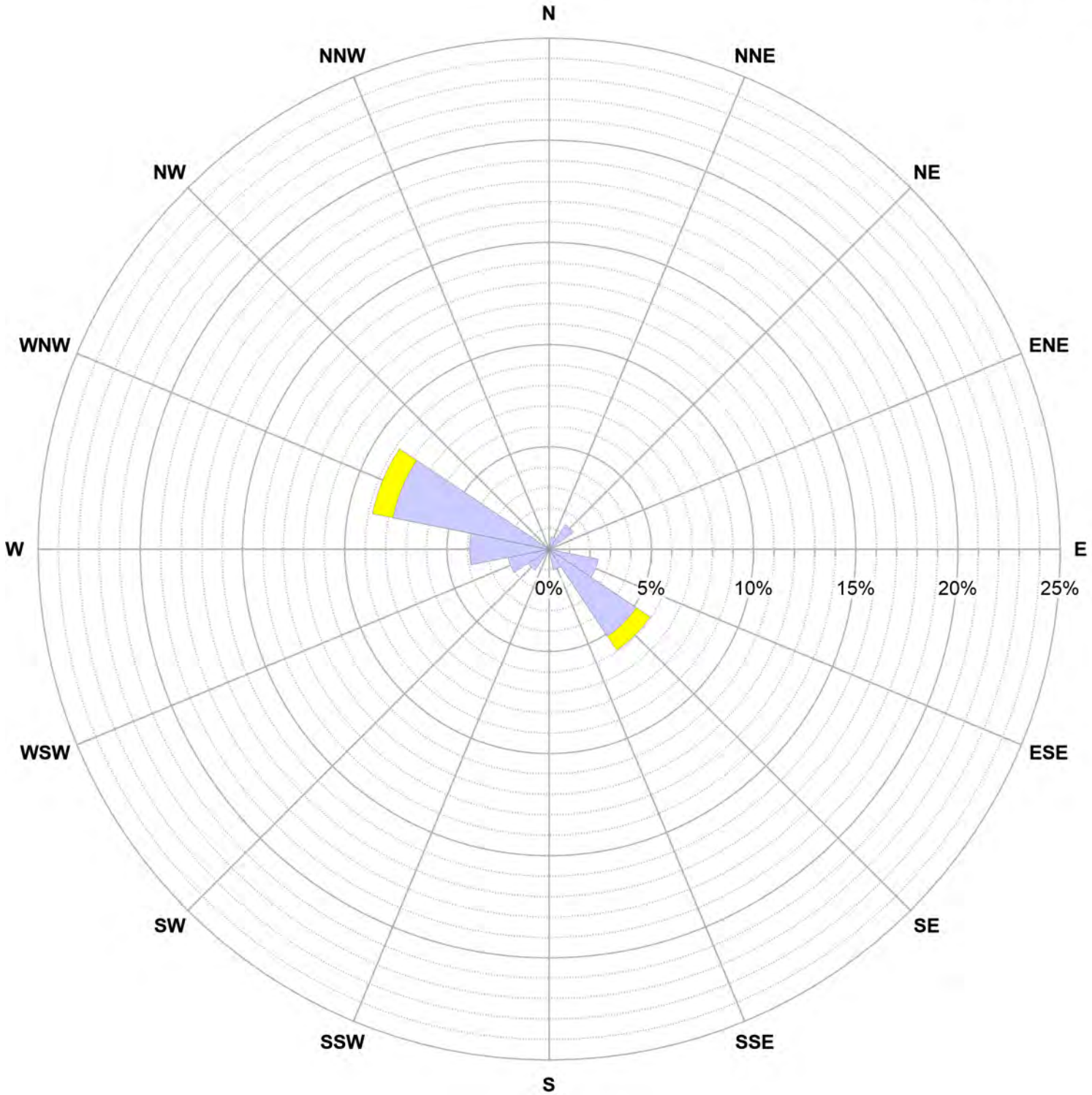
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	-1.55	-1.76	-1.55	—	—	0.00	—	0.00	1.23
Minimum (Non-Zero)	-1.55	-1.76	-1.55	—	—	1.35	—	0.17	1.23
Average	5.37	6.05	5.57	—	—	11.40	—	11.56	12.76
Median	4.80	5.21	5.03	—	—	9.52	—	9.92	10.65
Maximum	43.99	51.80	25.04	—	—	51.70	—	51.87	50.98
Standard Deviation	4.45	4.83	3.49	—	—	7.51	—	7.01	7.84
Number Obs	666	719	719	0	0	711	0	717	652
Expected Obs	720	720	720	720	720	720	720	720	720
% Complete	92.5%	99.9%	99.9%	**0.0%**	**0.0%**	98.8%	**0.0%**	99.6%	90.6%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

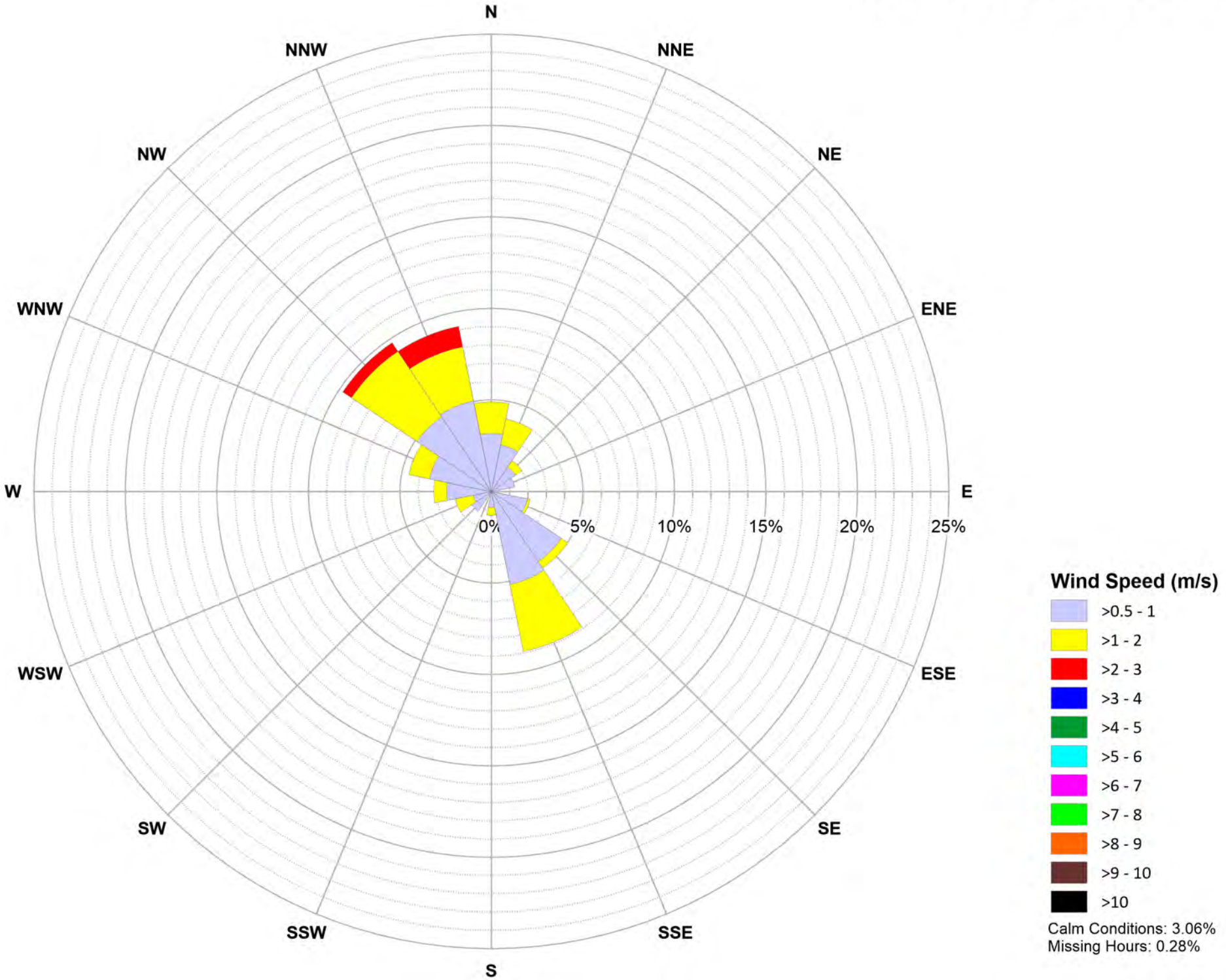
	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.31	1.26	0.92	—	—	6.27	—	7.70	6.97
Minimum (Non-Zero)	0.31	1.26	0.92	—	—	6.27	—	7.70	6.97
Average	5.27	6.05	5.57	—	—	11.39	—	11.57	12.79
Median	4.45	5.40	5.14	—	—	10.99	—	11.20	12.83
Maximum	11.97	11.25	10.51	—	—	16.66	—	18.67	22.88
Standard Deviation	2.73	2.85	2.47	—	—	2.47	—	2.11	3.47
Number Obs	27	30	30	0	0	30	0	30	27
Expected Obs	30	30	30	30	30	30	30	30	30
% Complete	90.0%	100.0%	100.0%	**0.0%**	**0.0%**	100.0%	**0.0%**	100.0%	90.0%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

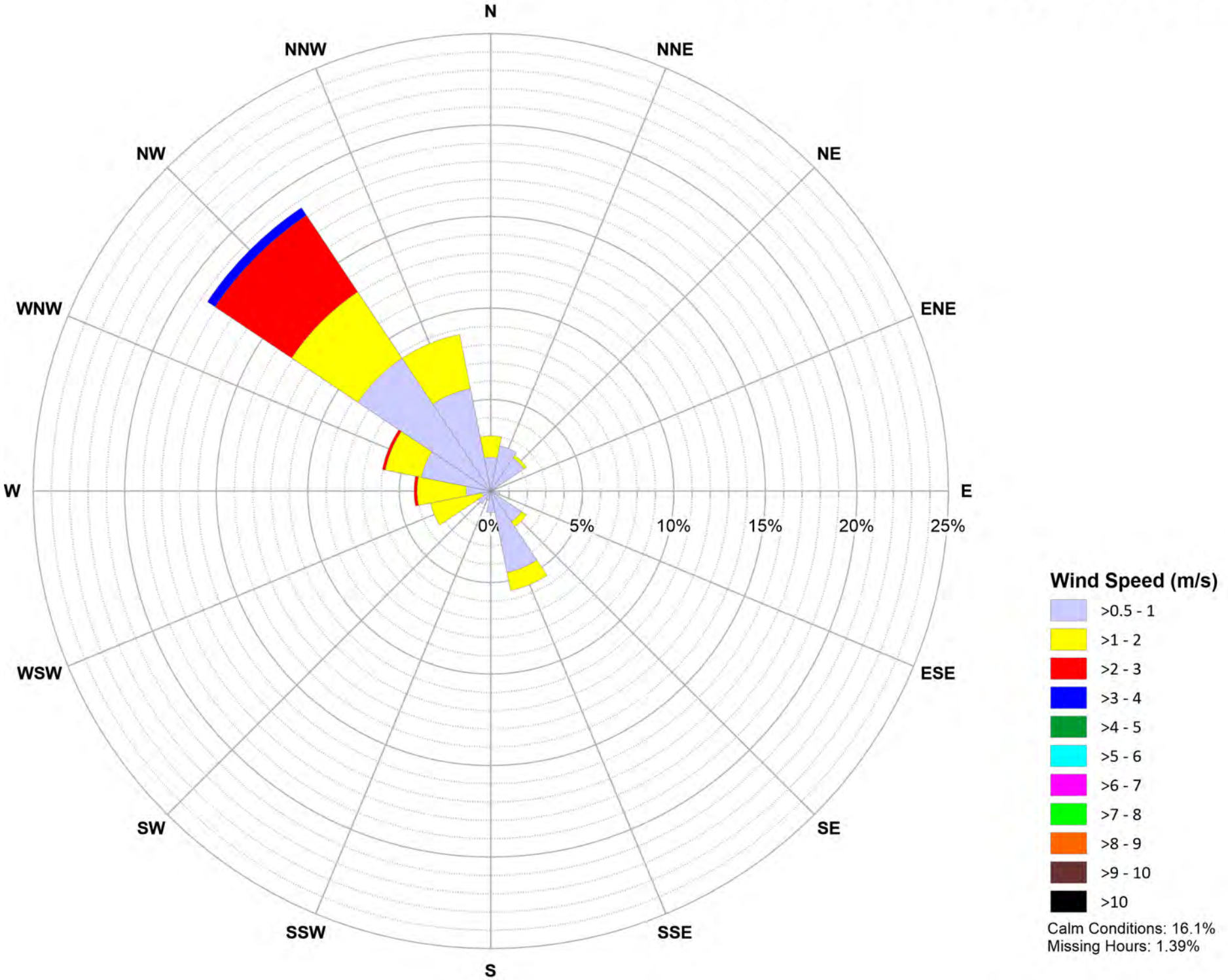
June 2022 Site 1 Wind Rose



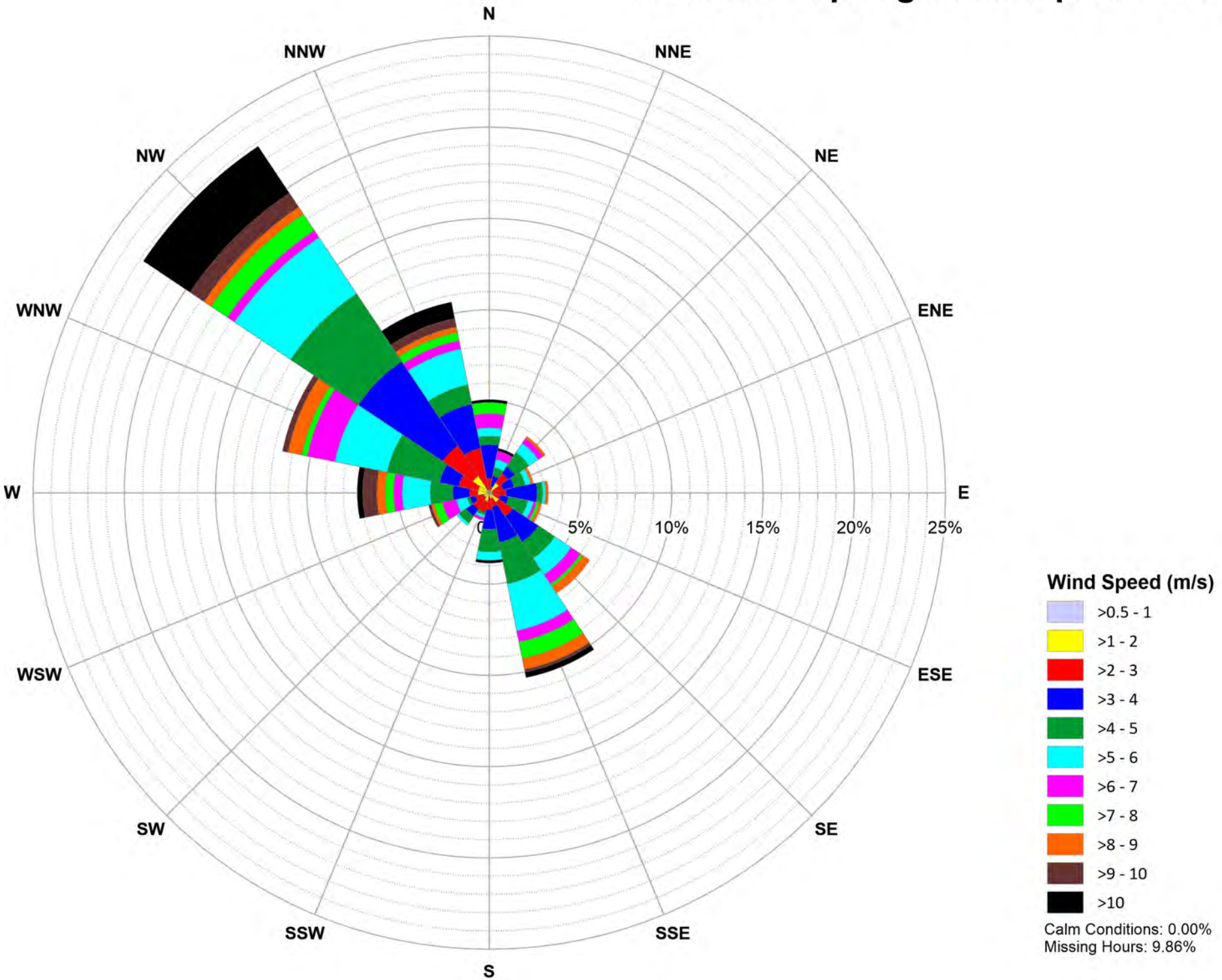
June 2022 Site 3 Wind Rose

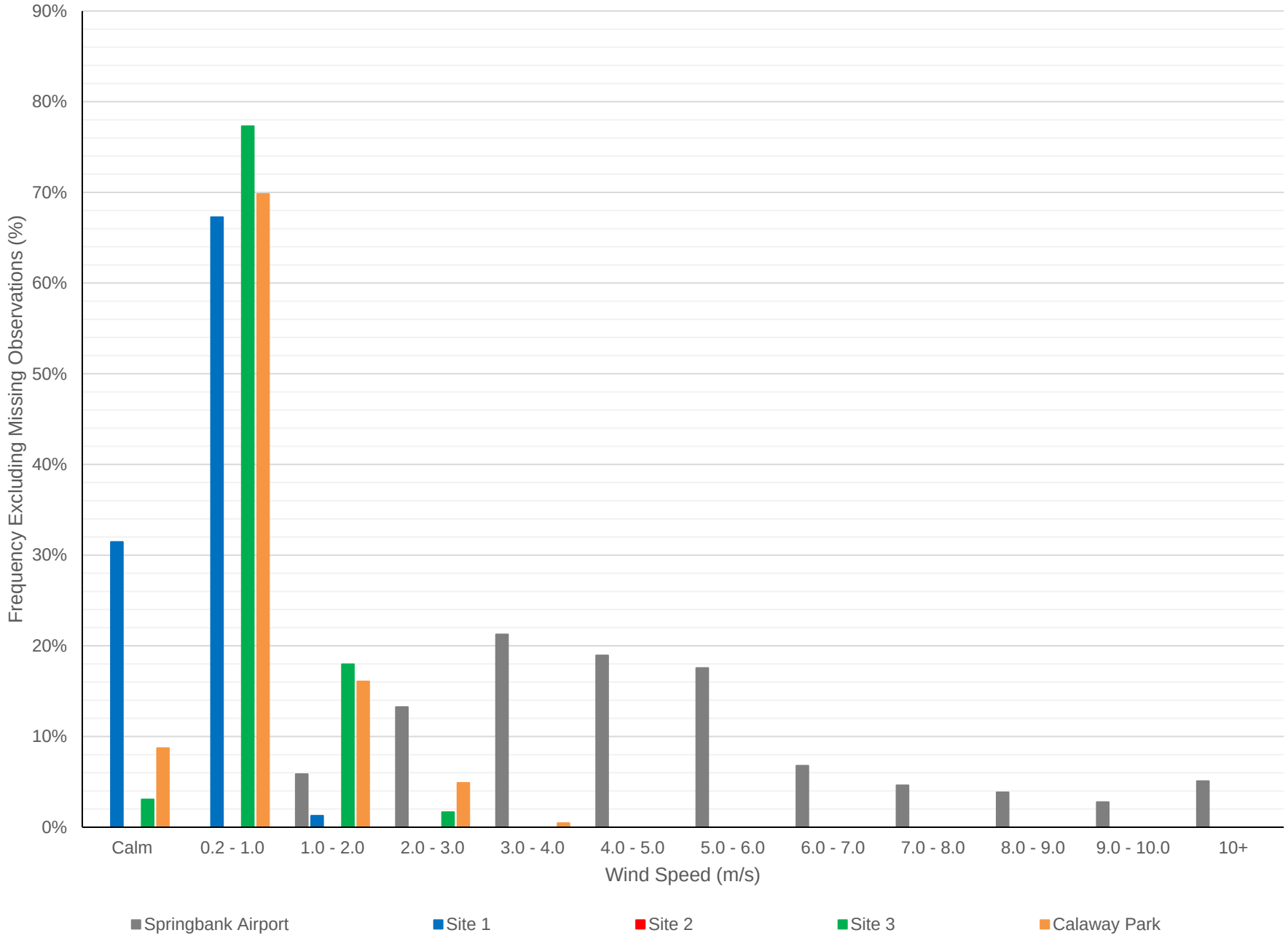


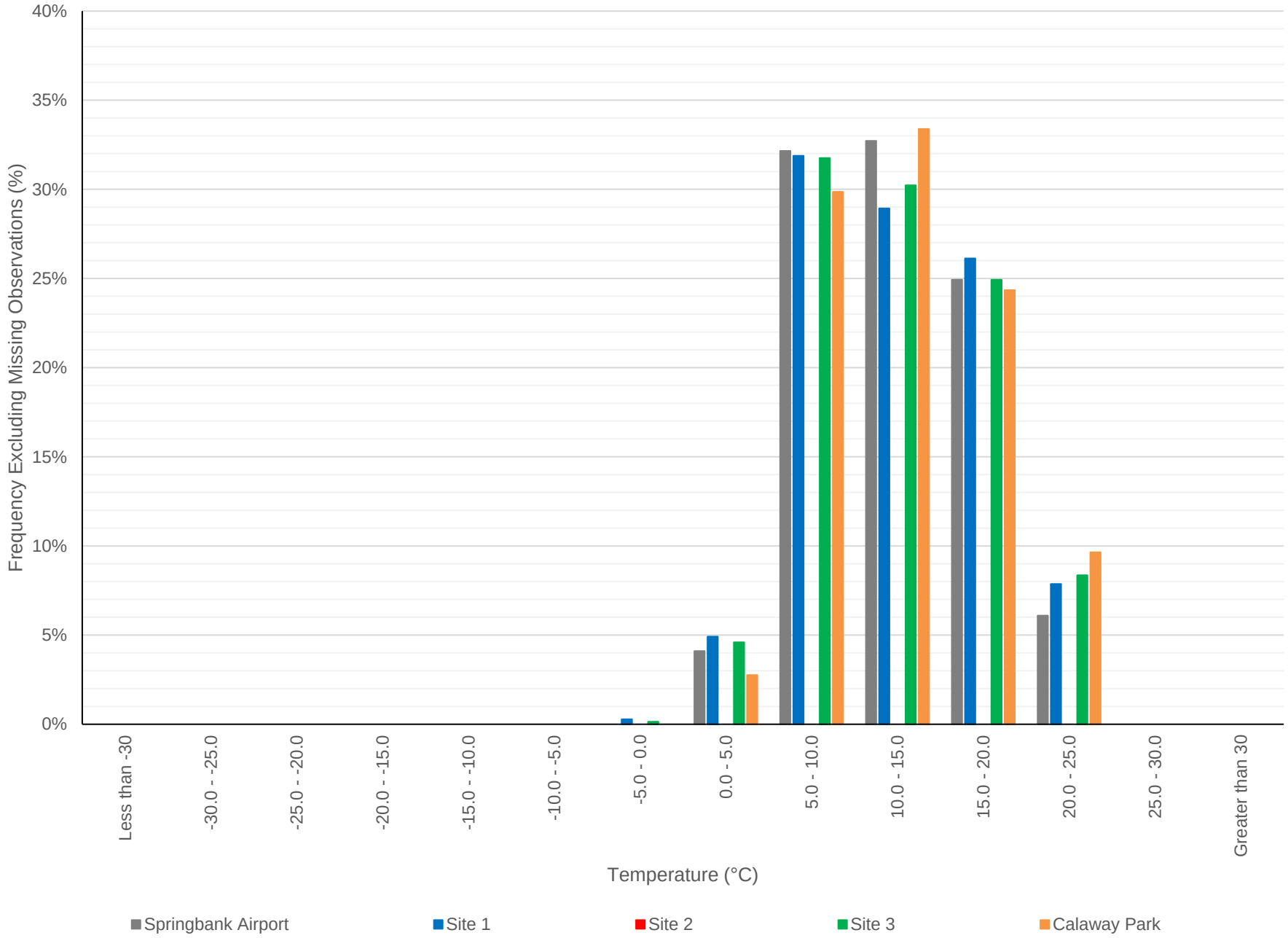
June 2022 Calaway Park Wind Rose

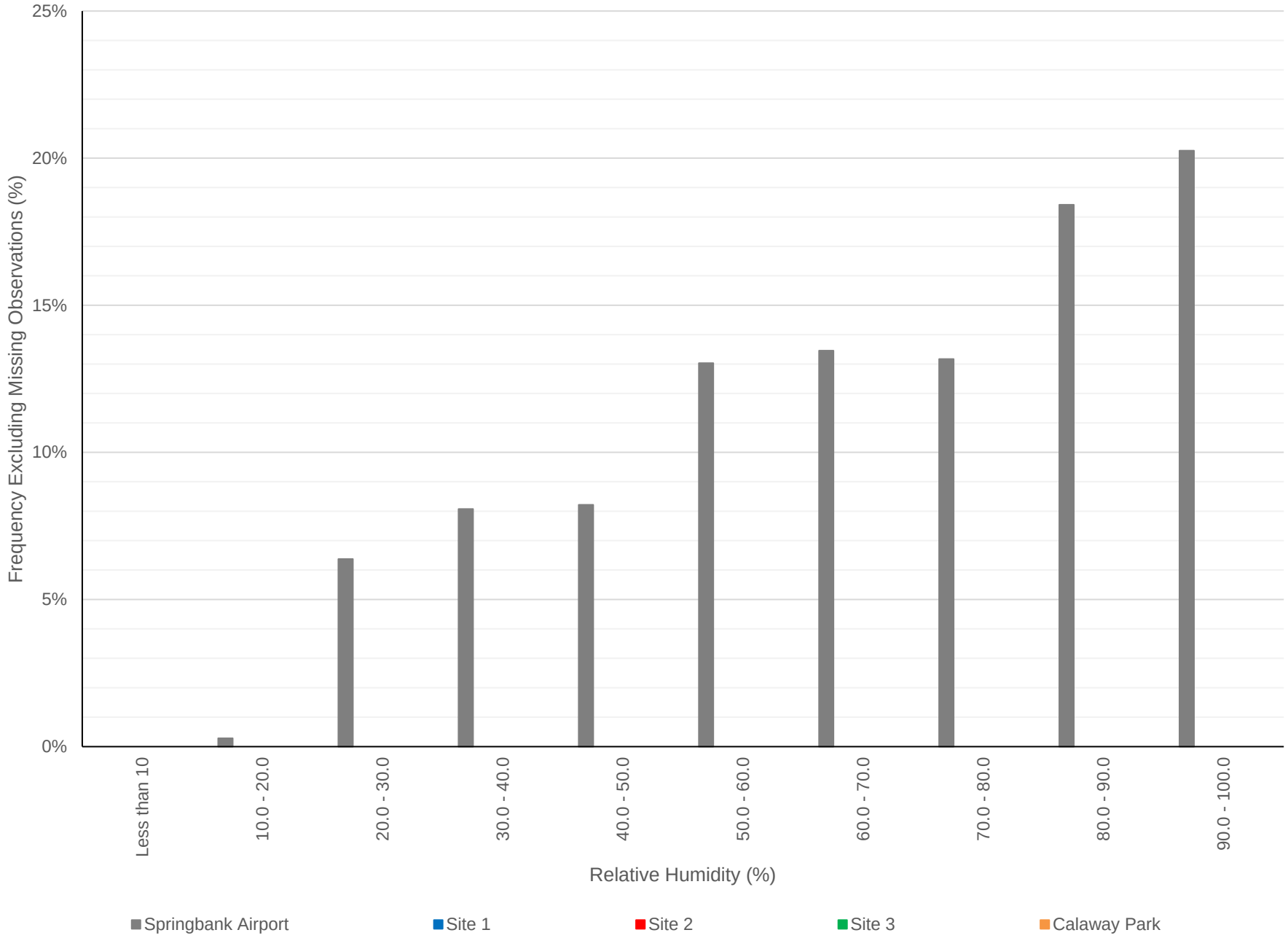


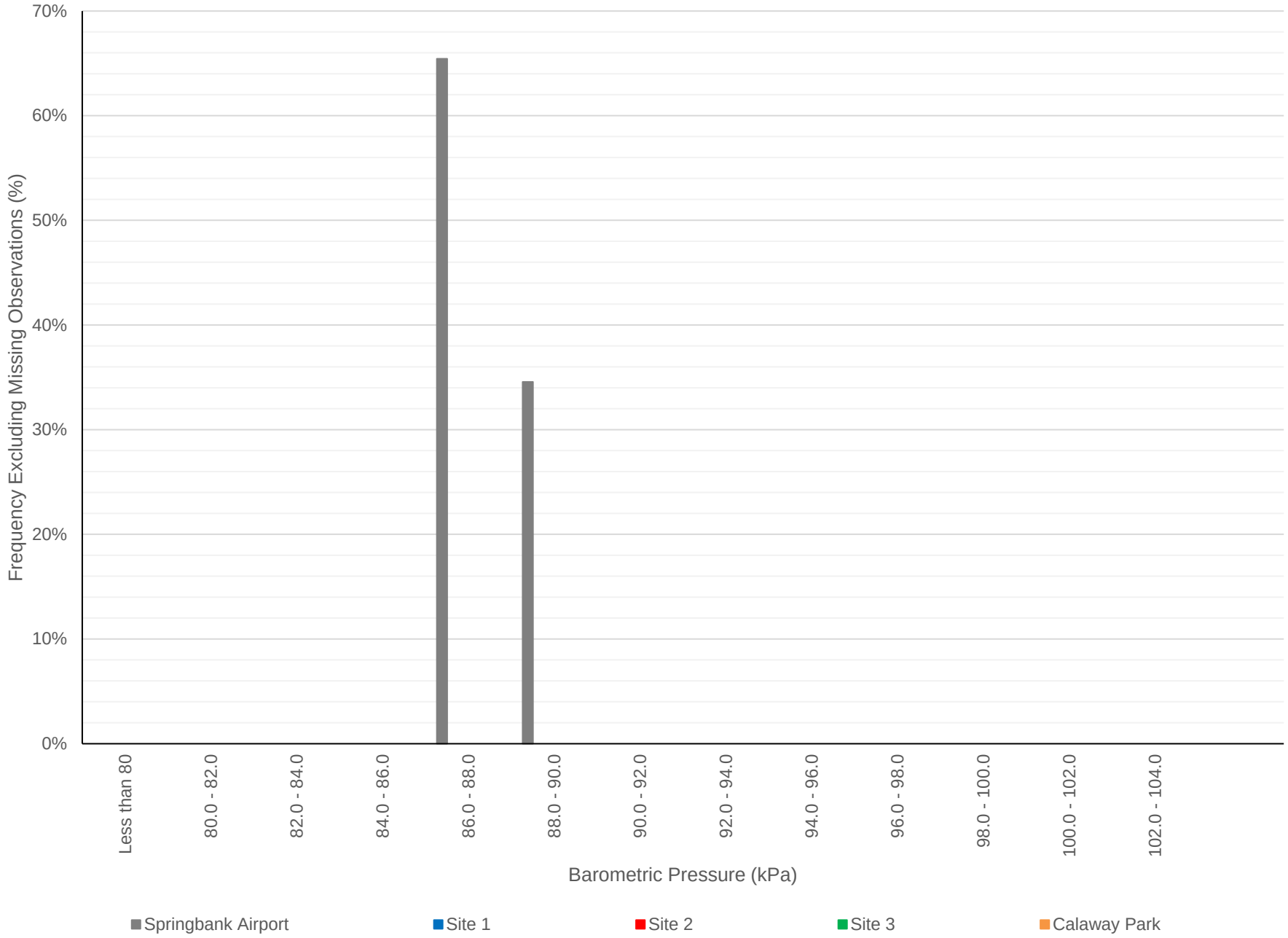
June 2022 Springbank Airport Wind Rose

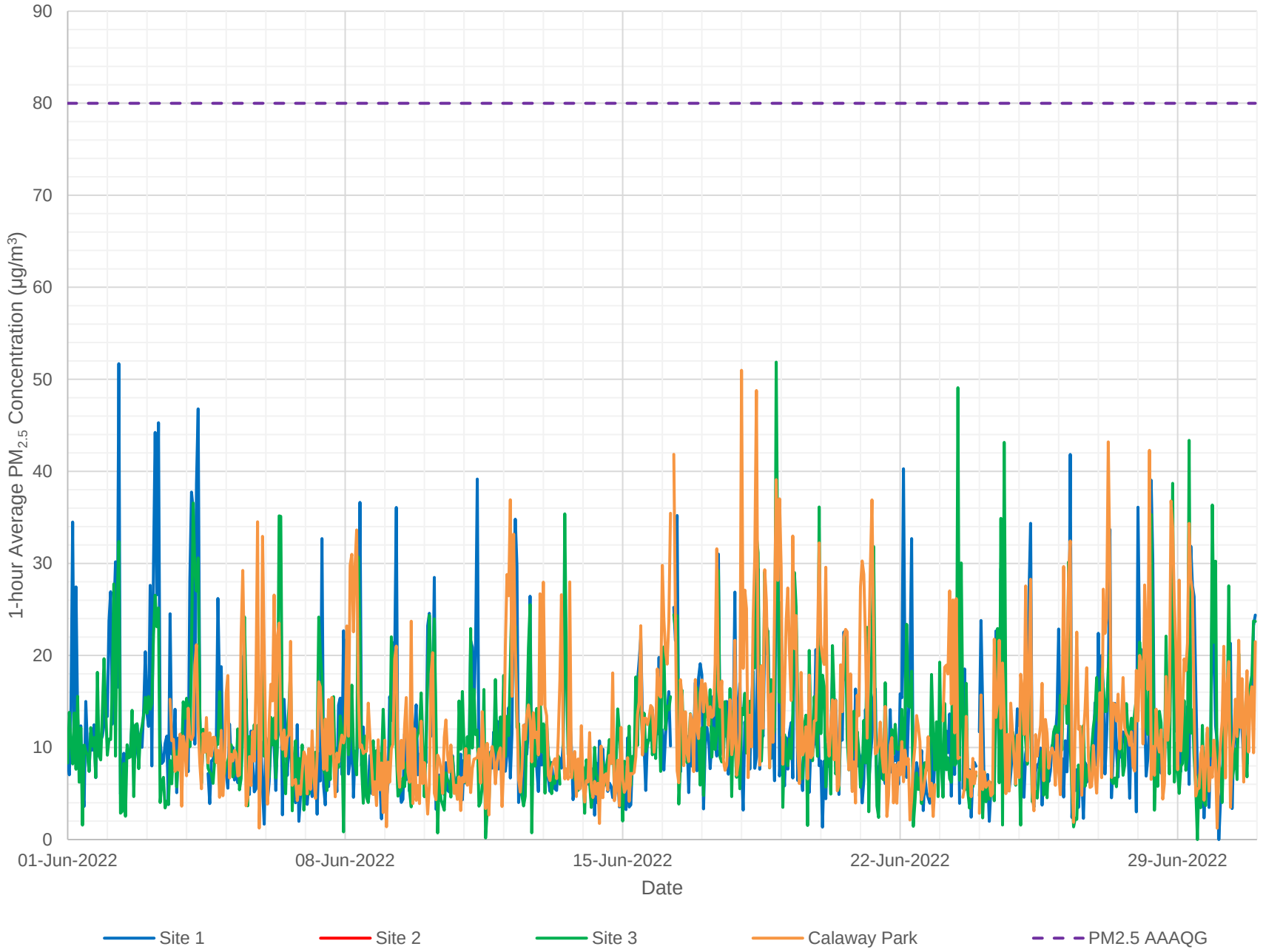


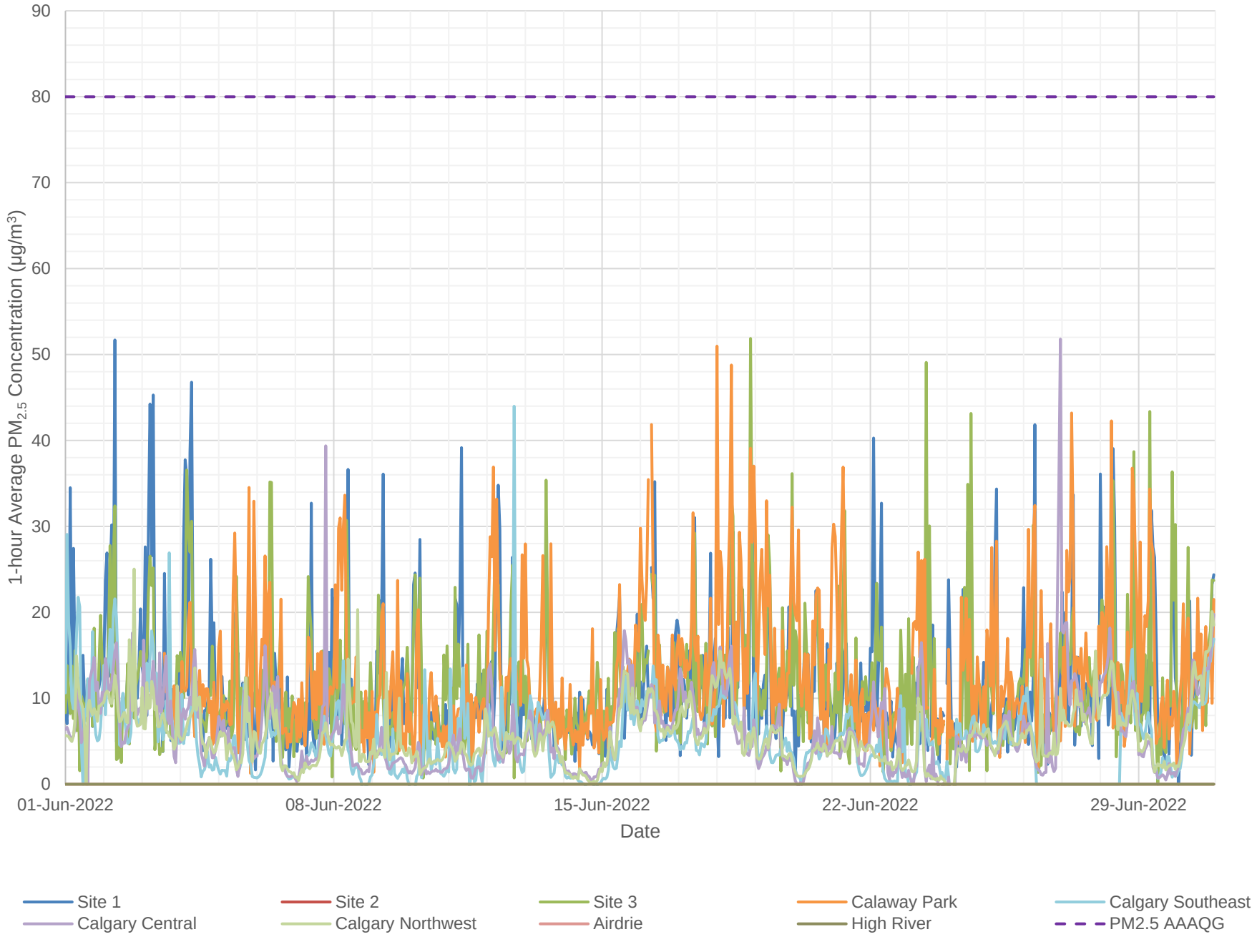

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

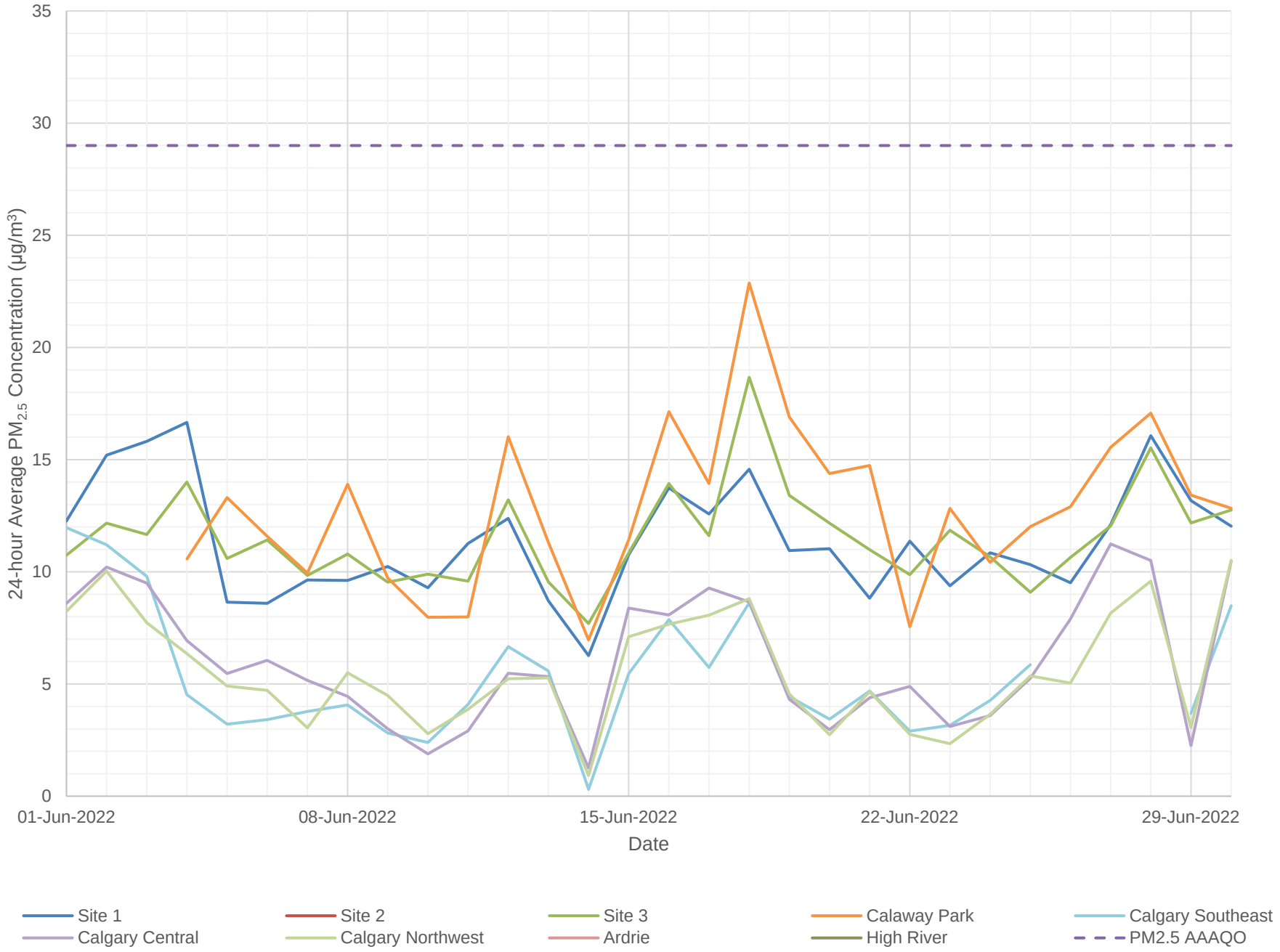

25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

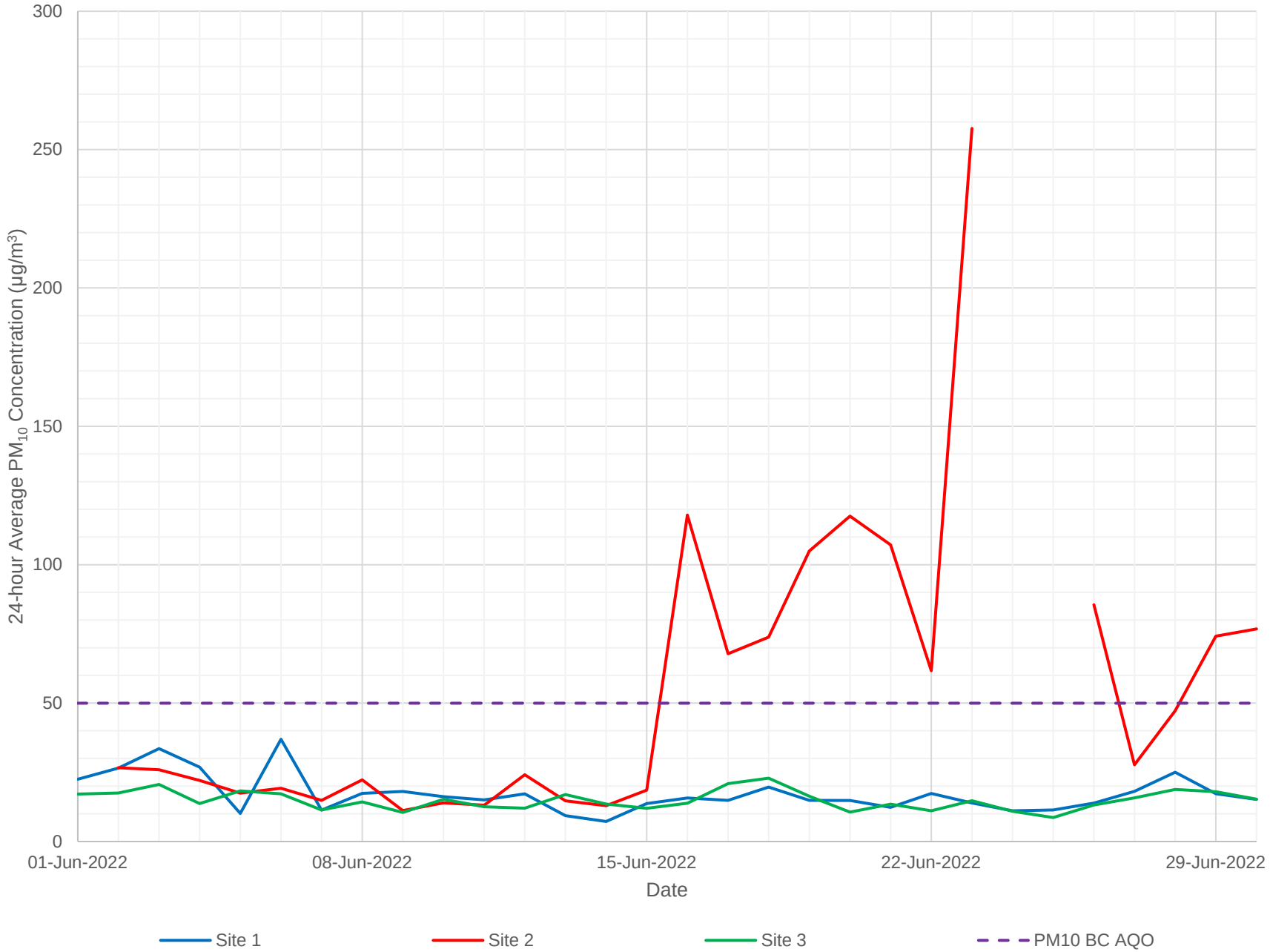

70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

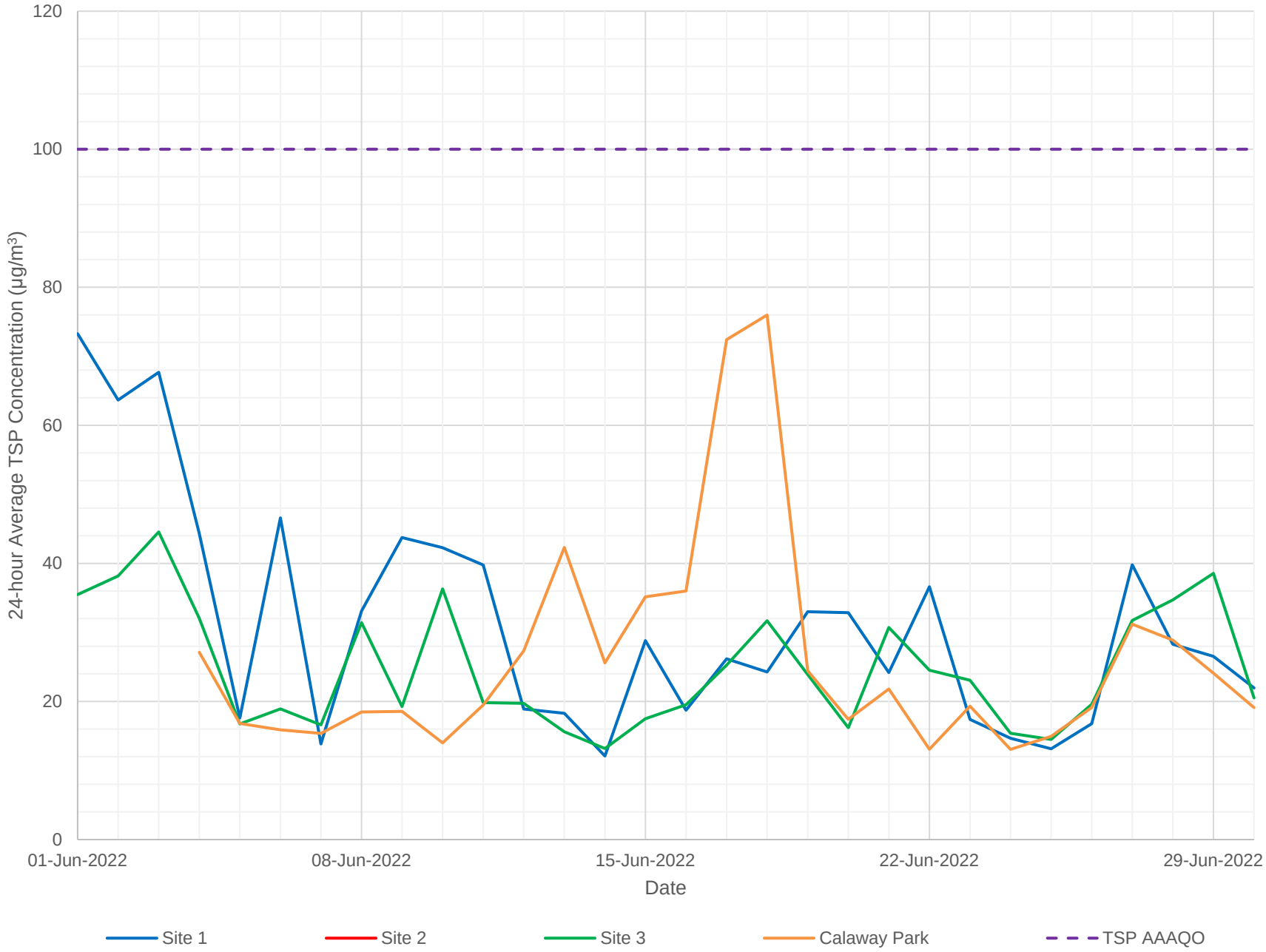

90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2022
08-Jun-2022
15-Jun-2022
22-Jun-2022
29-Jun-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Jun-2022
08-Jun-2022
15-Jun-2022
22-Jun-2022
29-Jun-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2022
08-Jun-2022
15-Jun-2022
22-Jun-2022
29-Jun-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2022
08-Jun-2022
15-Jun-2022
22-Jun-2022
29-Jun-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


300
250
200
150
100
50
0
24-hour Average PM10 Concentration (µg/m3)
01-Jun-2022
08-Jun-2022
15-Jun-2022
22-Jun-2022
29-Jun-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO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100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Jun-2022
08-Jun-2022
15-Jun-2022
22-Jun-2022
29-Jun-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for July 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.78	0.00	0.08		4.8	—	—
Minimum (Non-Zero)	0.28	0.78	1.50	0.08			—	—
Average	11.51	23.55	54.39	0.30	47.0 (NE)	17.0	—	—
Median	9.75	17.85	33.77	0.26		16.0	—	—
Maximum	46.83	177.47	655.87	0.93		32.5	—	—
Standard Deviation	7.10	18.33	66.24	0.19		6.3	—	—
Number Obs	725	740	741	726	726	726	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	97.4%	99.5%	99.6%	97.6%	97.6%	97.6%	0.0%	0.0%
Calm Hours				278				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	476	517	419	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	33	63	110	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	10	36	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	1	16	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	7.15	13.58	13.06
Minimum (Non-Zero)	7.15	13.58	13.06
Average	11.53	23.60	54.50
Median	11.74	23.11	49.21
Maximum	15.28	56.35	182.54
Standard Deviation	1.97	8.87	34.83
Number Obs	30	31	31
Expected Obs	31	31	31
% Complete	97.4%	99.5%	99.6%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	30	31	31	3	5	10
1/3 of 24-hour AAAQO	26	25	23	10	17	33
2/3 of 24-hour AAAQO	0	5	6	19	33	67
Above 24-hour AAAQO	0	1	4	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for July 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	0.00	—	—		—	—	—
Minimum (Non-Zero)	—	1.17	—	—			—	—
Average	—	46.82	—	—	— (—)	—	—	—
Median	—	14.63	—	—		—	—	—
Maximum	—	2,310.00	—	—		—	—	—
Standard Deviation	—	173.84	—	—		—	—	—
Number Obs	0	665	0	0	0	0	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	0.0%	89.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours				0				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	0	357	0	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	56	0	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	39	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	29	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	—	8.47	—
Minimum (Non-Zero)	—	8.47	—
Average	—	47.54	—
Median	—	16.28	—
Maximum	—	285.69	—
Standard Deviation	—	71.05	—
Number Obs	0	27	0
Expected Obs	31	31	31
% Complete	0.0%	89.4%	0.0%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	27	0	3	5	10
1/3 of 24-hour AAAQO	0	12	0	10	17	33
2/3 of 24-hour AAAQO	0	7	0	19	33	67
Above 24-hour AAAQO	0	6	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Summary of EBAM Station Particulate and Meteorological Monitoring for July 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.09		4.5	—	—
Minimum (Non-Zero)	0.20	0.03	0.43	0.09			—	—
Average	10.81	14.56	27.46	0.50	352.5 (N)	17.0	—	—
Median	9.36	12.38	23.82	0.42		16.1	—	—
Maximum	40.68	69.92	193.20	1.39		32.3	—	—
Standard Deviation	6.89	9.14	19.36	0.26		6.2	—	—
Number Obs	738	645	739	741	741	741	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	99.2%	86.7%	99.3%	99.6%	99.6%	99.6%	0.0%	0.0%
Calm Hours				62				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	452	285	281	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	28	7	11	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	1	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	7.40	9.15	14.52
Minimum (Non-Zero)	7.40	9.15	14.52
Average	10.80	14.64	27.45
Median	10.53	13.92	24.80
Maximum	14.80	22.86	69.89
Standard Deviation	2.01	3.79	9.63
Number Obs	31	26	31
Expected Obs	31	31	31
% Complete	99.2%	86.7%	99.3%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	8	26	31	3	5	10
1/3 of 24-hour AAAQO	0	9	4	10	17	33
2/3 of 24-hour AAAQO	0	0	1	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for July 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.09		4.9	—	—
Minimum (Non-Zero)	0.07	0.10	0.09			—	—
Average	11.76	27.87	0.44	342.8 (NNW)	17.2	—	—
Median	9.53	23.20	0.39		16.3	—	—
Maximum	53.17	239.79	2.06		31.8	—	—
Standard Deviation	8.64	21.09	0.28		6.1	—	—
Number Obs	740	547	742	742	742	0	0
Expected Obs	744	744	744	744	744	744	744
% Complete	99.5%	**73.5%**	99.7%	99.7%	99.7%	**0.0%**	**0.0%**
Calm Hours			147				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	435	211	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	56	7	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	1	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	6.04	15.25
Minimum (Non-Zero)	6.04	15.25
Average	11.77	28.23
Median	11.48	26.06
Maximum	18.66	60.39
Standard Deviation	3.44	9.99
Number Obs	31	21
Expected Obs	31	31
% Complete	99.5%	**73.5%**

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	31	21	3	10	
1/3 of 24-hour AAAQO	22	3	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for July 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		4.8	22.0	87.4
Minimum (Non-Zero)	1.11			22.0	87.4
Average	3.61	128.9 (SE)	16.7	70.5	88.0
Median	3.06		15.8	74.5	88.0
Maximum	11.94		31.1	100.0	88.5
Standard Deviation	1.80		5.82	21.88	0.256
Number Obs	584	584	735	740	735
Expected Obs	744	744	744	744	744
% Complete	78.5%	78.5%	98.8%	99.5%	98.8%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for July 2022

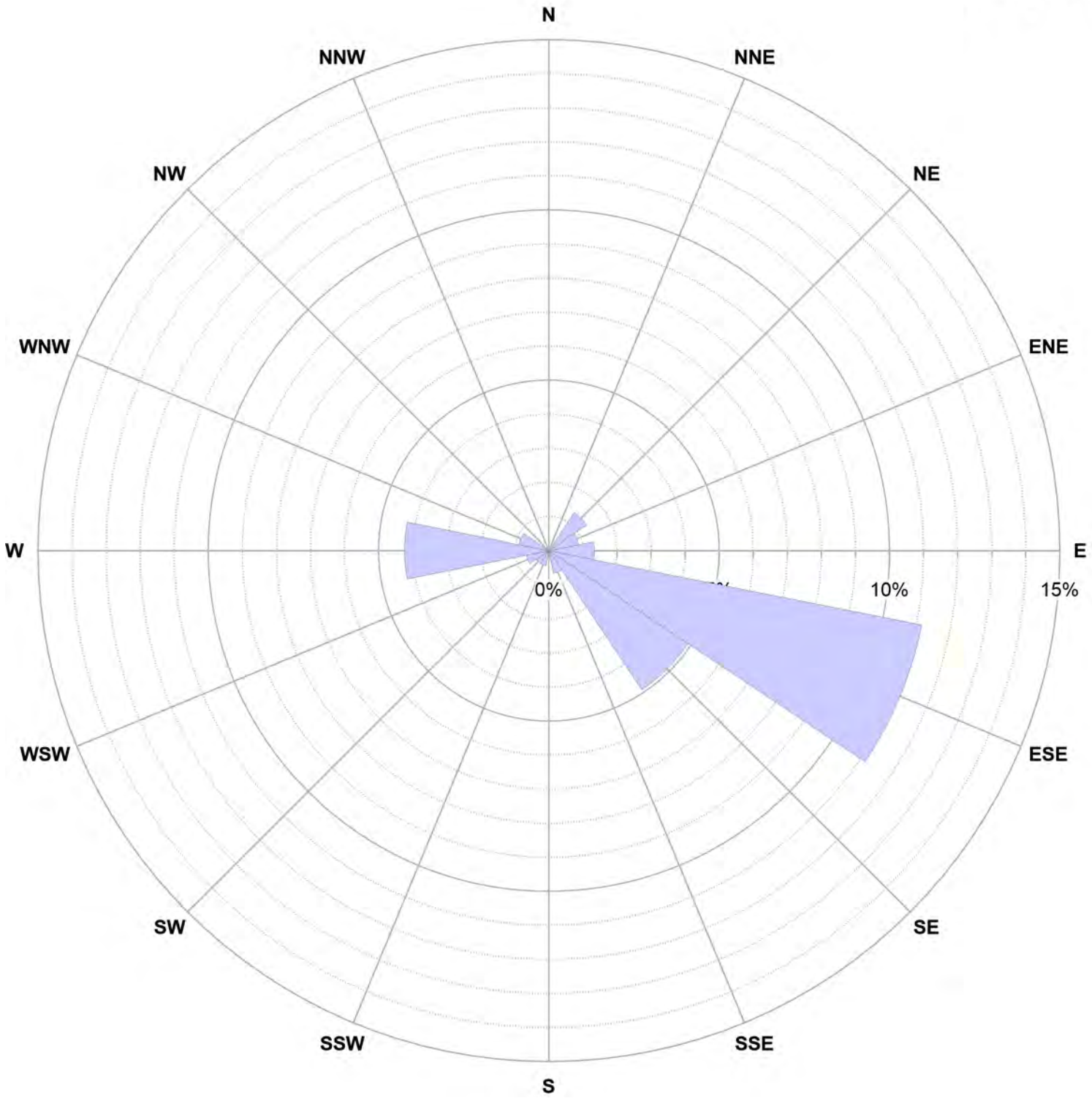
CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations						SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.27	0.31	0.55	—	—	0.00	—	0.00	0.00
Minimum (Non-Zero)	0.27	0.31	0.55	—	—	0.28	—	0.20	0.07
Average	8.42	6.97	6.95	—	—	11.51	—	10.81	11.76
Median	7.31	6.51	6.46	—	—	9.75	—	9.36	9.53
Maximum	42.29	36.32	27.74	—	—	46.83	—	40.68	53.17
Standard Deviation	5.34	4.07	3.59	—	—	7.10	—	6.89	8.64
Number Obs	740	742	742	0	0	725	0	738	740
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	99.5%	99.7%	99.7%	**0.0%**	**0.0%**	97.4%	**0.0%**	99.2%	99.5%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations						SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	1.59	1.99	1.88	—	—	7.15	—	7.40	6.04
Minimum (Non-Zero)	1.59	1.99	1.88	—	—	7.15	—	7.40	6.04
Average	8.41	6.97	6.94	—	—	11.53	—	10.80	11.77
Median	7.73	6.85	6.80	—	—	11.74	—	10.53	11.48
Maximum	20.99	12.97	11.22	—	—	15.28	—	14.80	18.66
Standard Deviation	3.92	2.58	2.42	—	—	1.97	—	2.01	3.44
Number Obs	31	31	31	0	0	30	0	31	31
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	100.0%	100.0%	100.0%	**0.0%**	**0.0%**	96.8%	**0.0%**	100.0%	100.0%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

July 2022 Site 1 Wind Rose

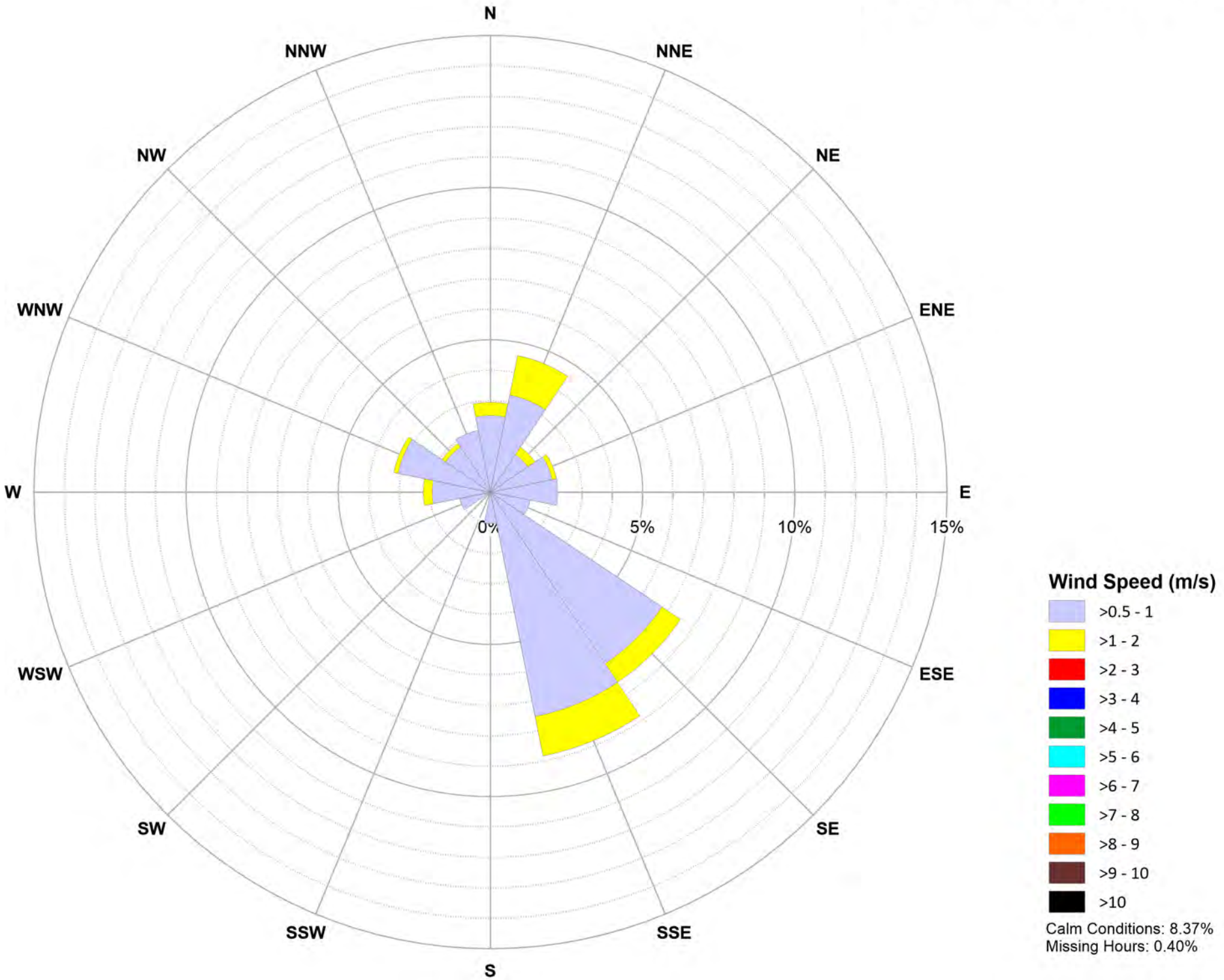


Wind Speed (m/s)

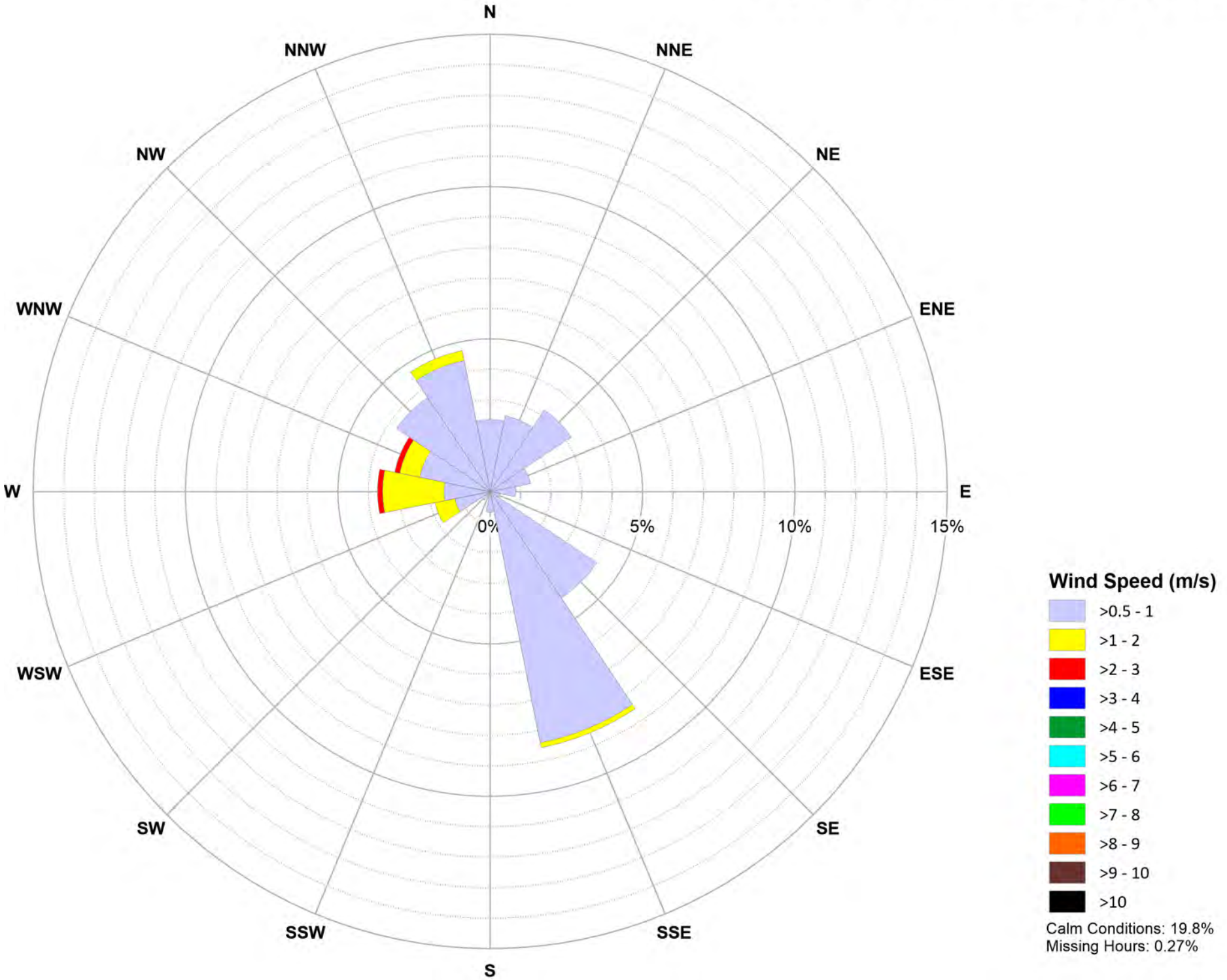
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 38.3%
Missing Hours: 2.42%

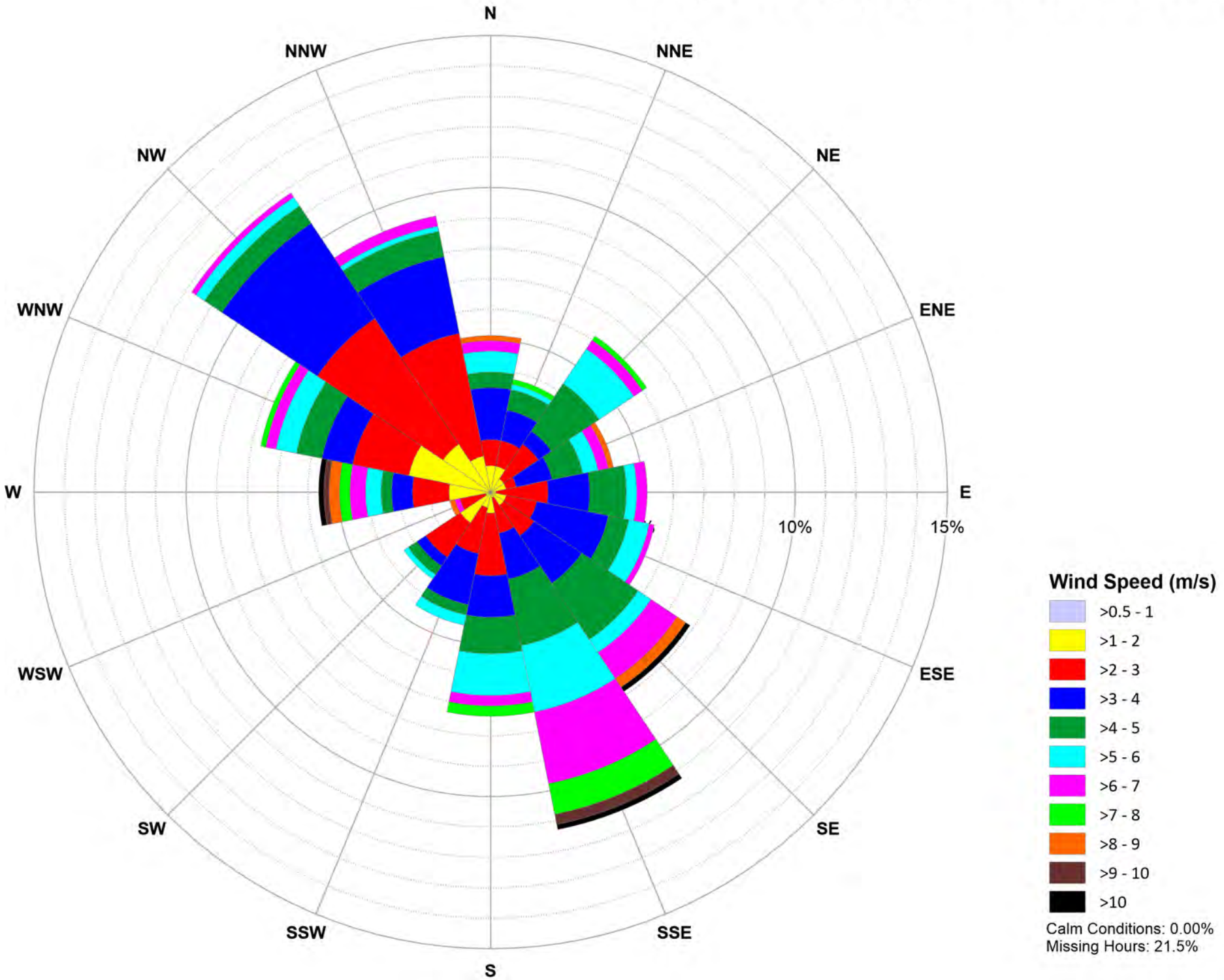
July 2022 Site 3 Wind Rose

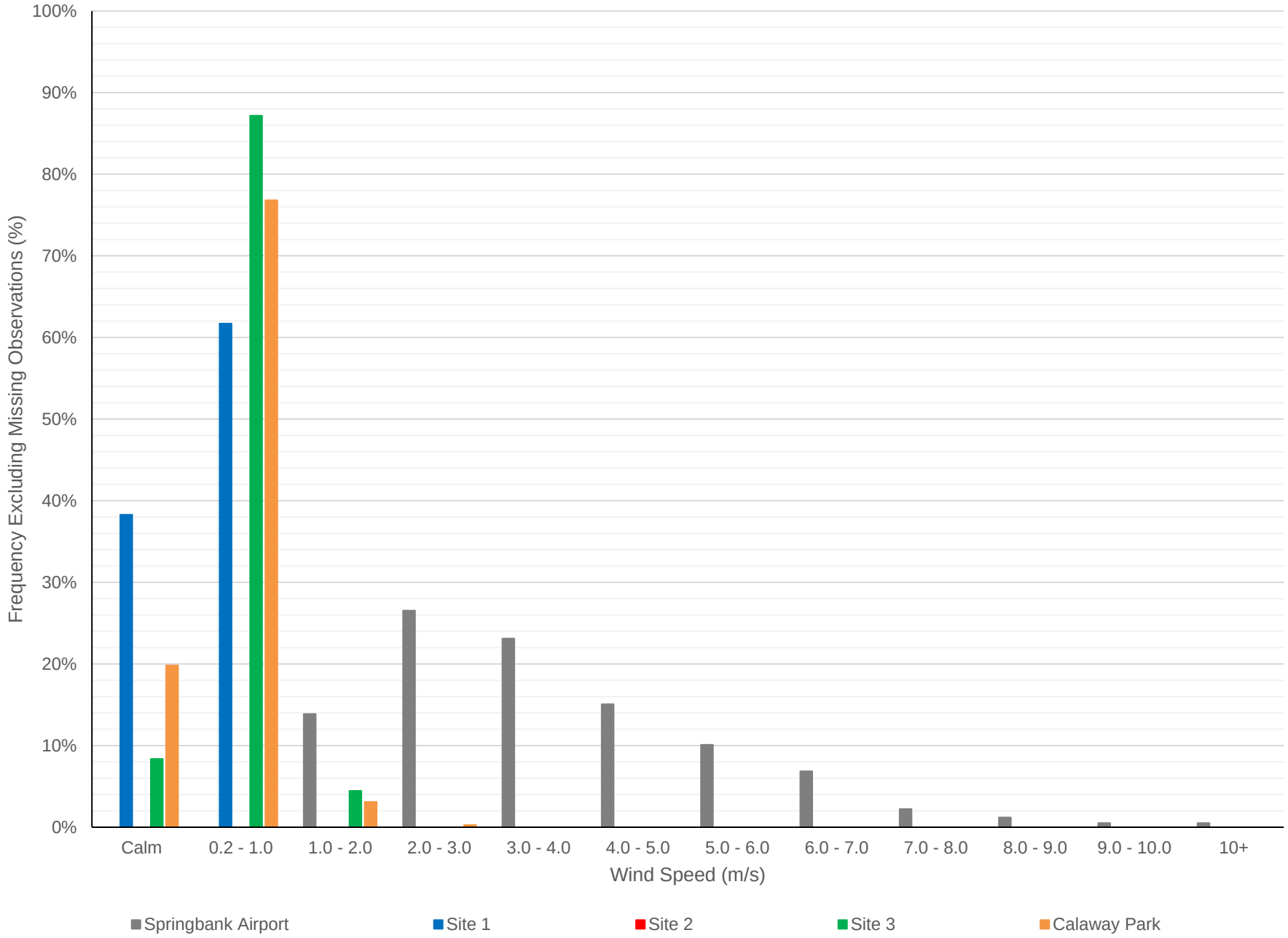


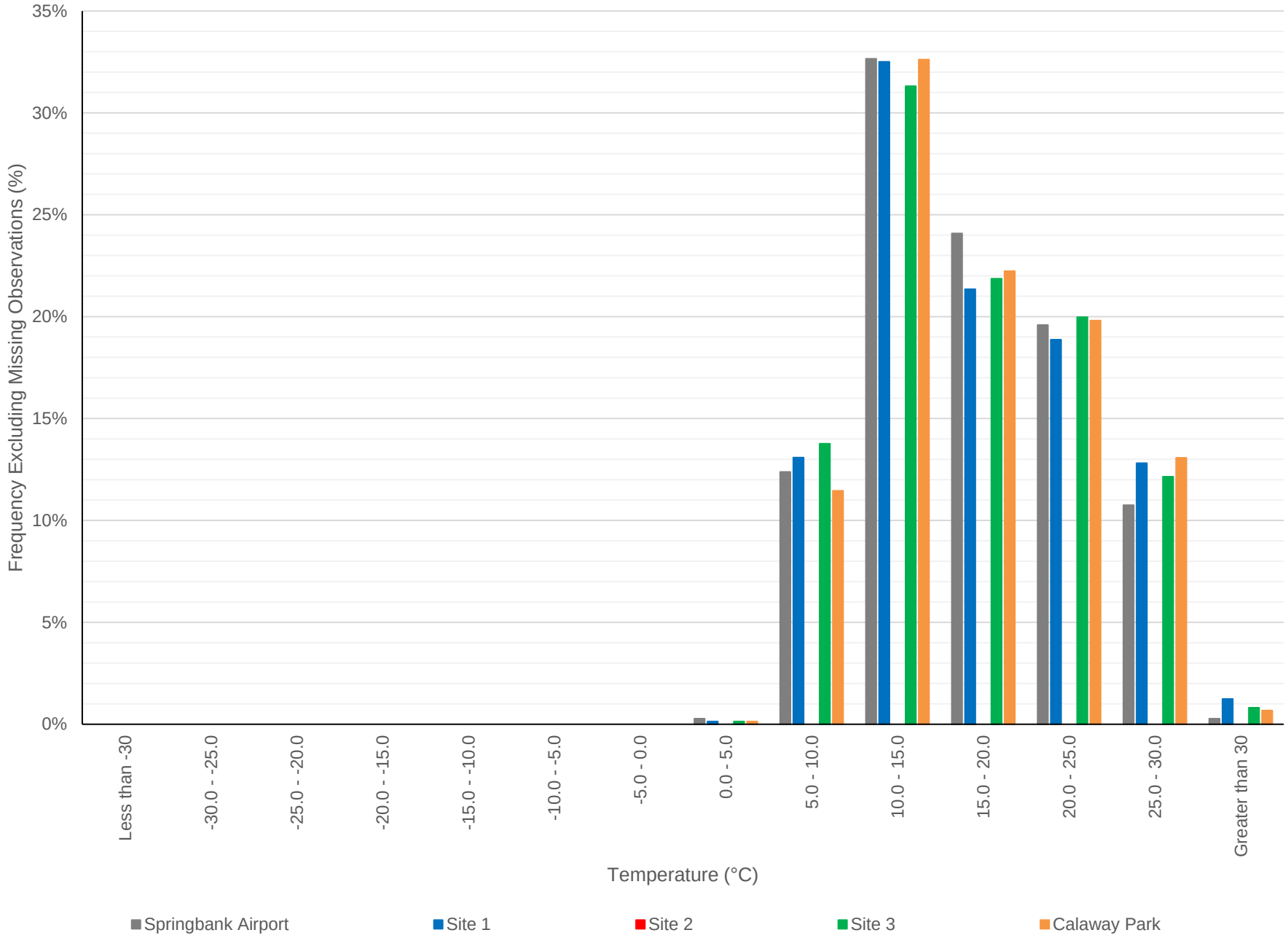
July 2022 Calaway Park Wind Rose

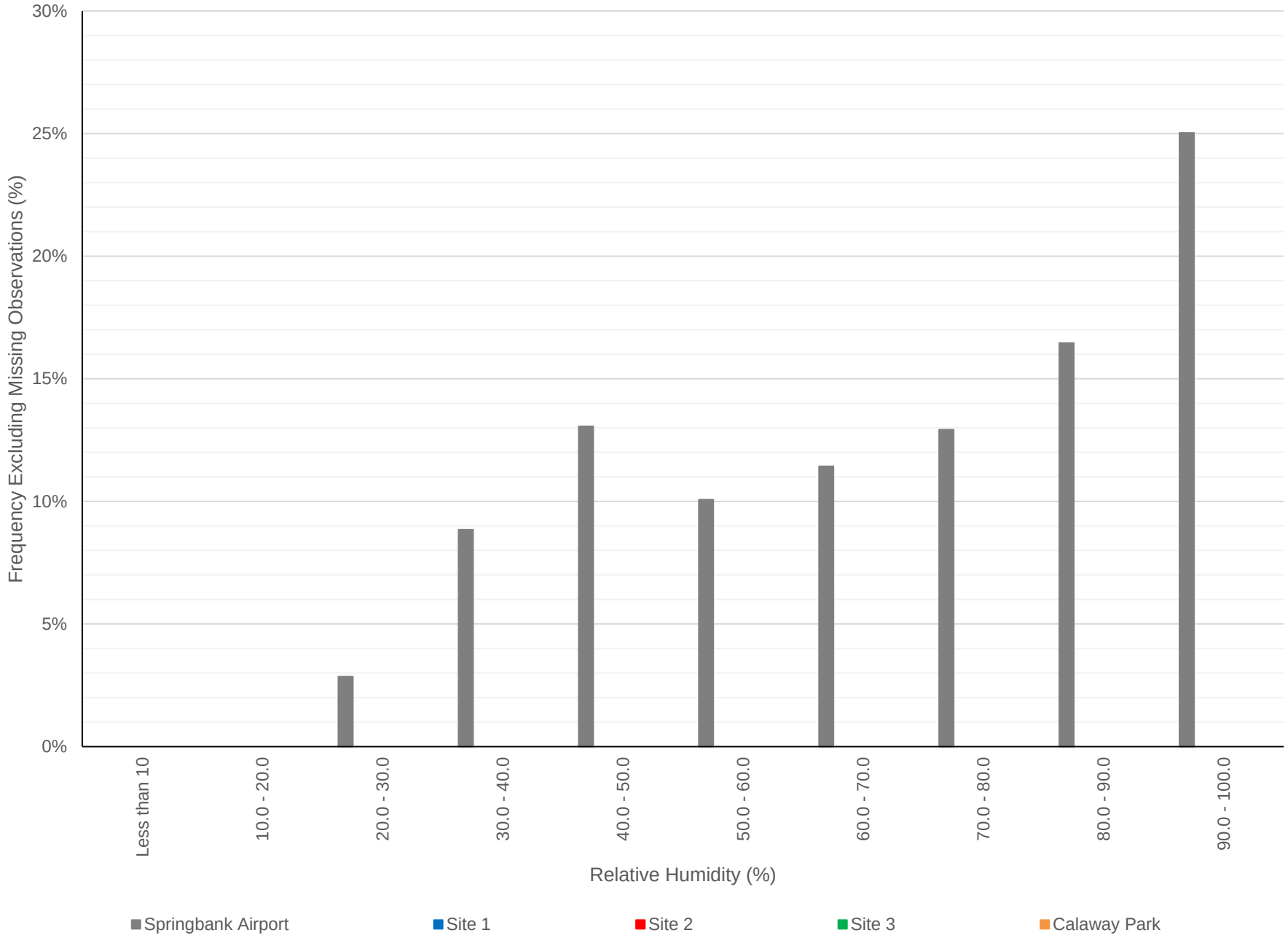


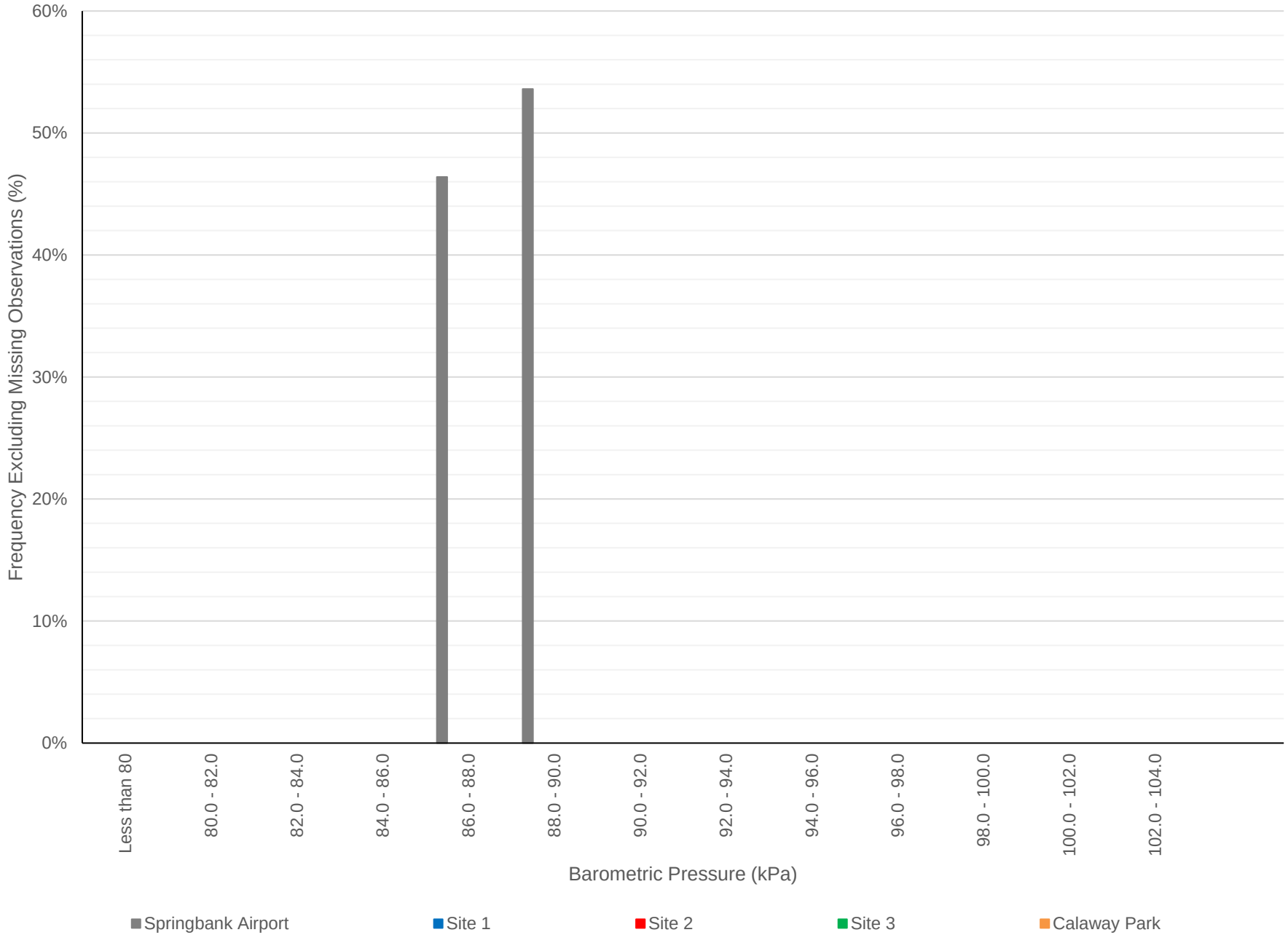
July 2022 Springbank Airport Wind Rose

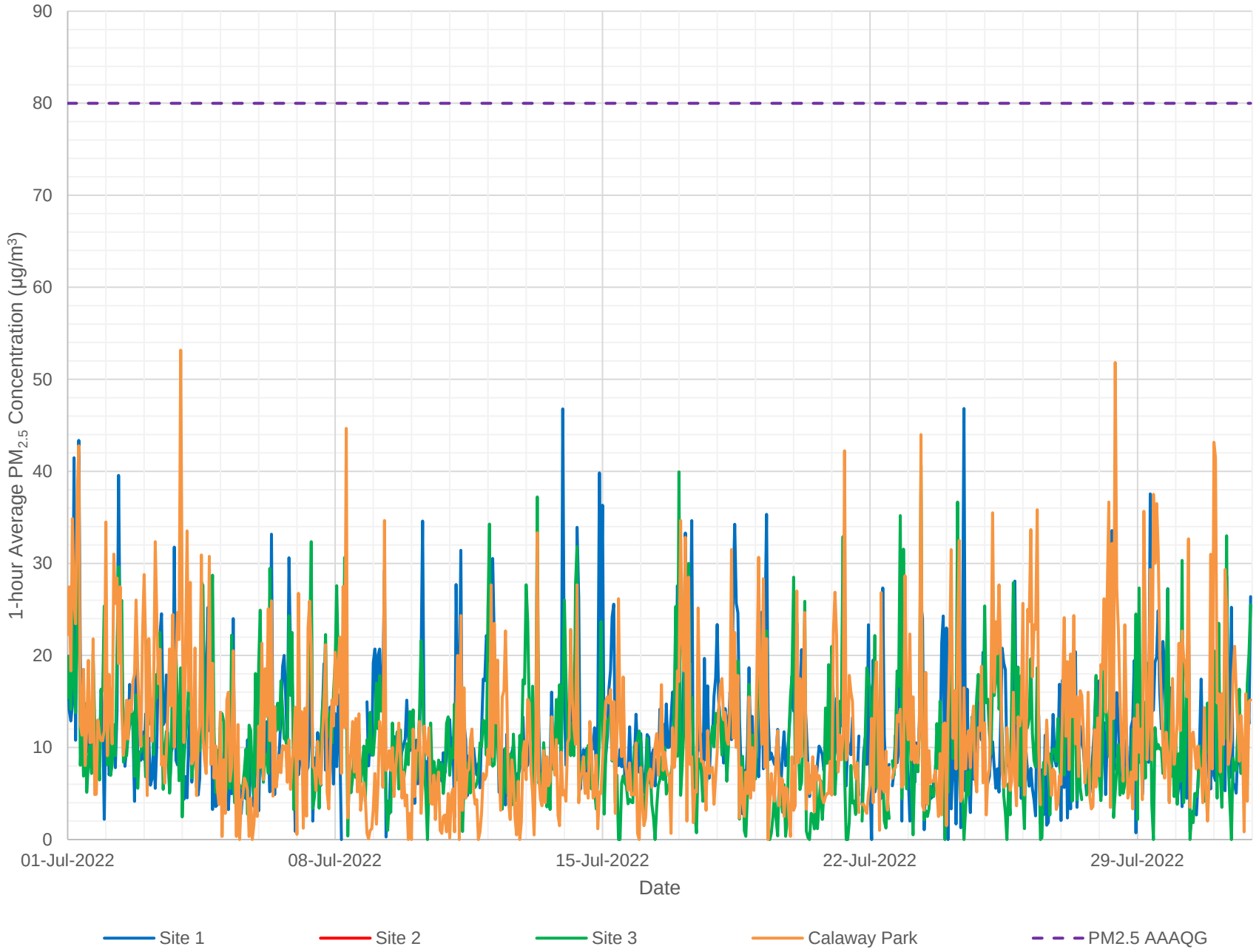


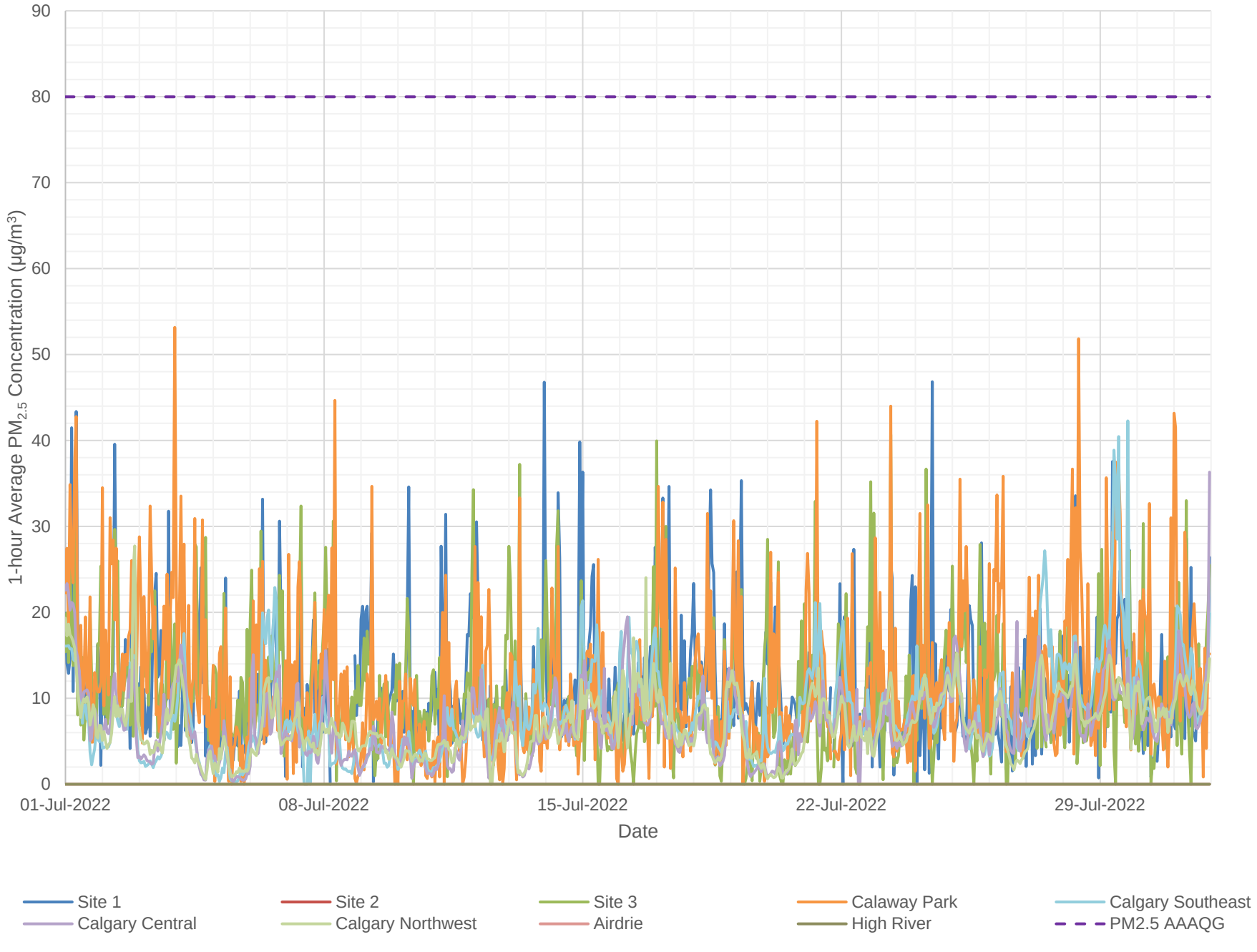

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Jul-2022
08-Jul-2022
15-Jul-2022
22-Jul-2022
29-Jul-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Jul-2022
08-Jul-2022
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Date
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Calgary Southeast
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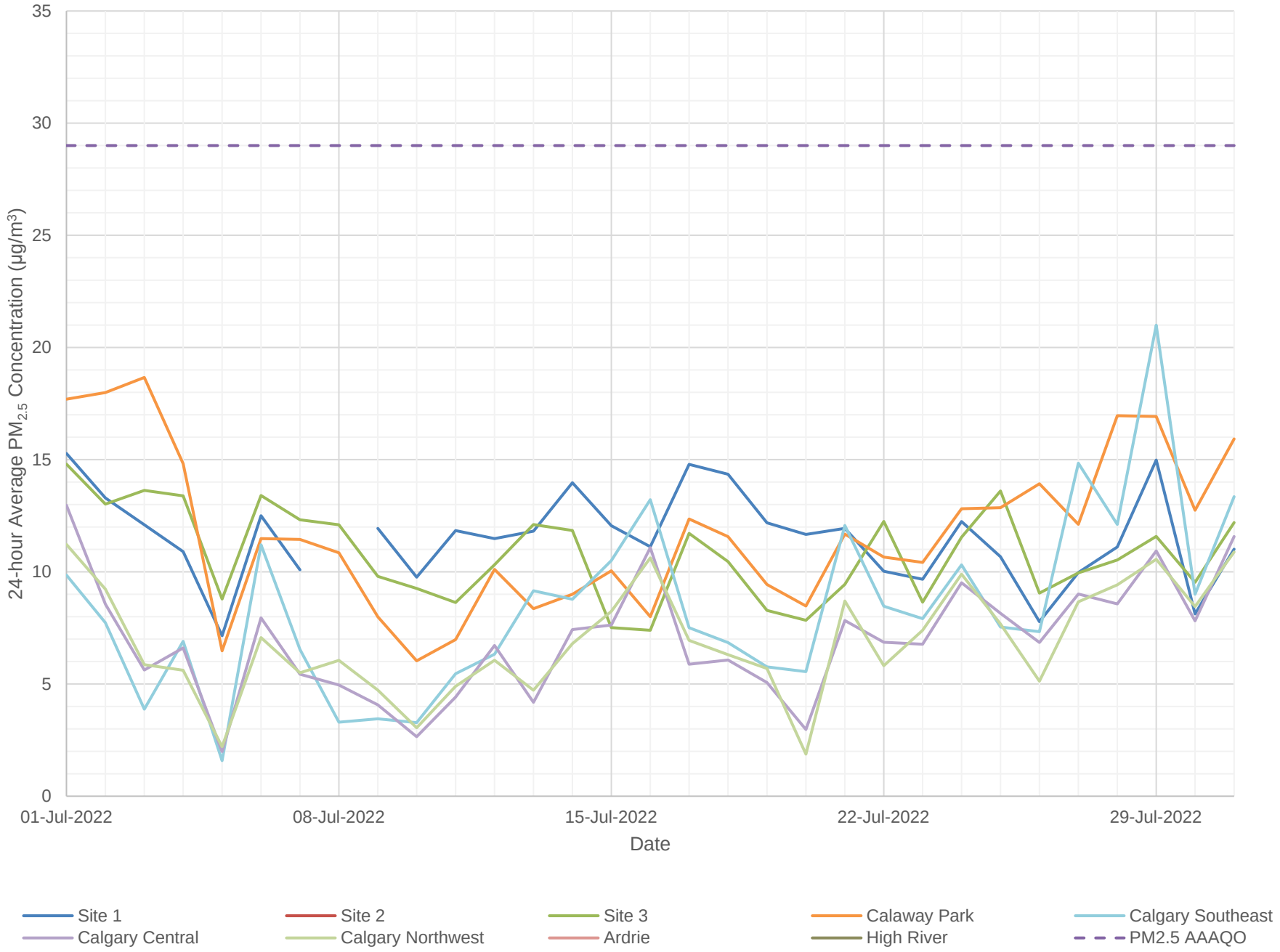
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jul-2022
08-Jul-2022
15-Jul-2022
22-Jul-2022
29-Jul-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jul-2022
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Site 1
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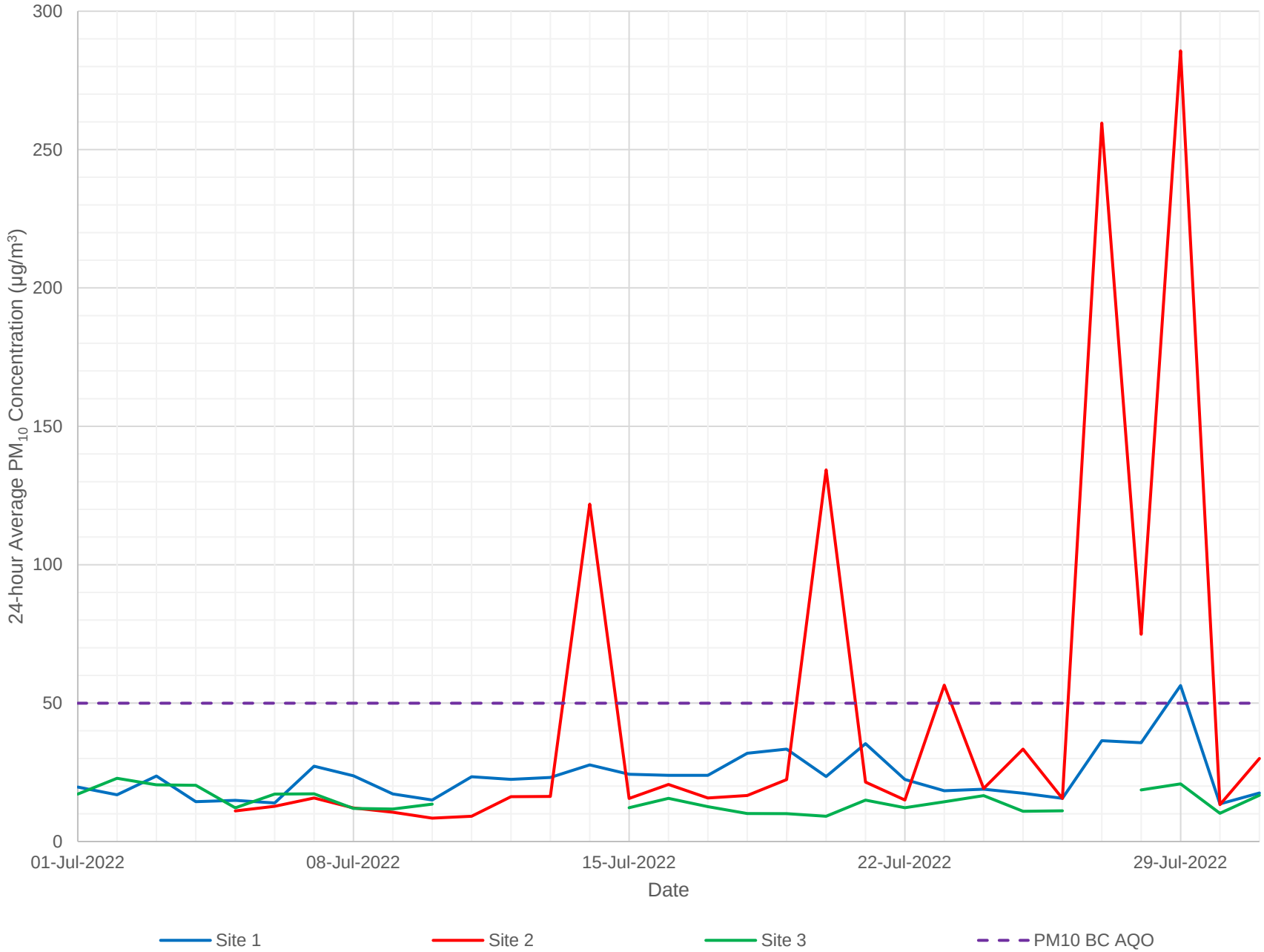
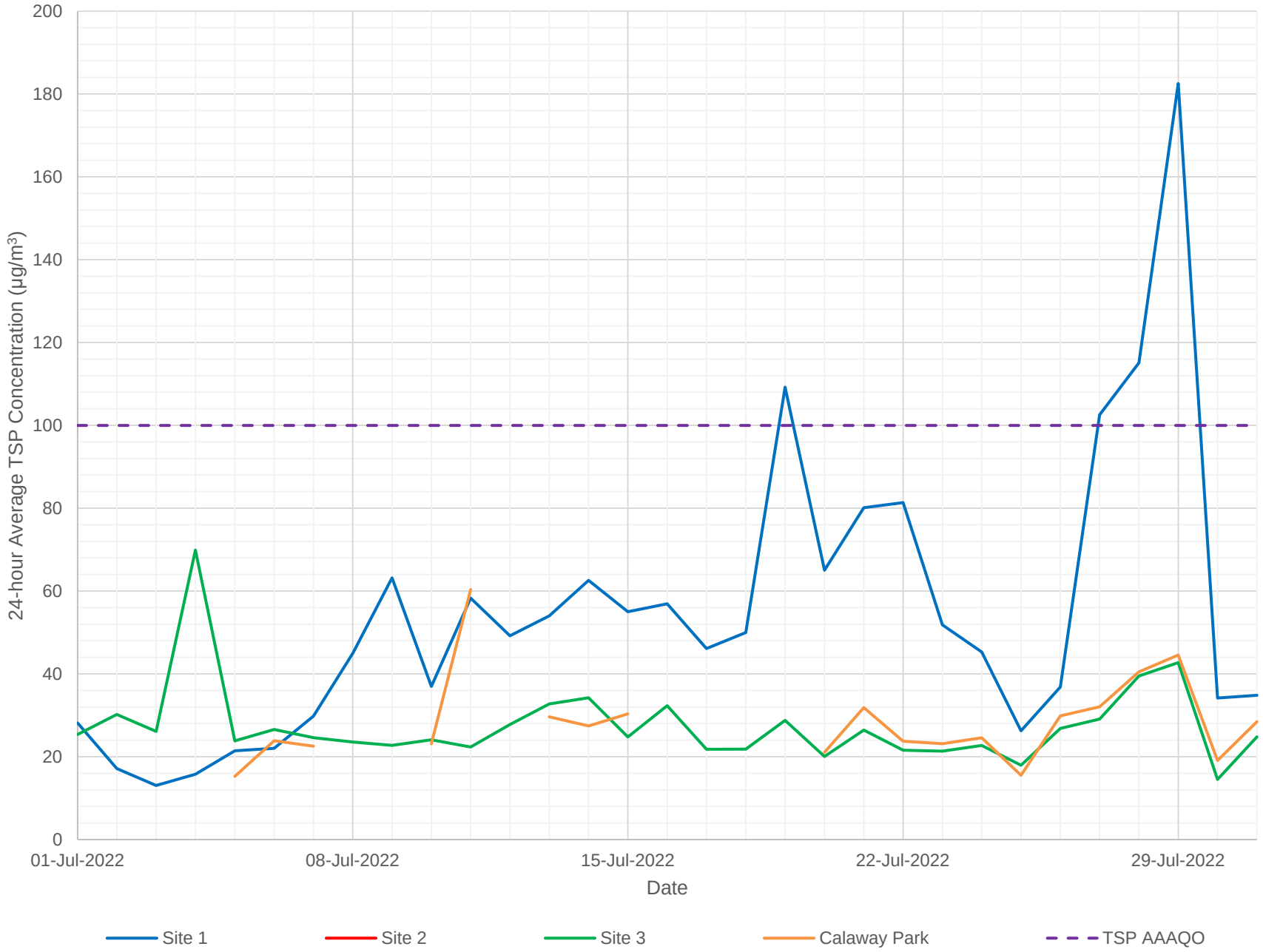
PM2.5 AAAQO


300
250
200
150
100
50
0
24-hour Average PM10 Concentration (µg/m3)
01-Jul-2022
08-Jul-2022
15-Jul-2022
22-Jul-2022
29-Jul-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO


200
180
160
140
120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Jul-2022
08-Jul-2022
15-Jul-2022
22-Jul-2022
29-Jul-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for August 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		2.1	—	—
Minimum (Non-Zero)	0.03	0.17	0.50	0.08			—	—
Average	12.33	48.13	110.80	0.30	135.0 (SE)	17.6	—	—
Median	9.17	23.75	45.83	0.24		16.5	—	—
Maximum	93.10	1,607.33	1,746.45	1.03		32.1	—	—
Standard Deviation	10.68	111.23	168.68	0.19		6.8	—	—
Number Obs	743	742	741	744	744	744	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	99.9%	99.7%	99.6%	100.0%	100.0%	100.0%	0.0%	0.0%
Calm Hours				287				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	433	553	503	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	77	179	247	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	5	78	139	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	1	41	72	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	4.98	8.08	12.26
Minimum (Non-Zero)	4.98	8.08	12.26
Average	12.33	48.11	110.79
Median	12.31	35.31	92.21
Maximum	21.66	154.21	401.88
Standard Deviation	4.17	35.65	87.62
Number Obs	31	31	31
Expected Obs	31	31	31
% Complete	99.9%	99.7%	99.6%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	31	31	31	3	5	10
1/3 of 24-hour AAAQO	23	27	26	10	17	33
2/3 of 24-hour AAAQO	2	17	20	19	33	67
Above 24-hour AAAQO	0	11	15	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for August 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	0.00	—	—		—	—	—
Minimum (Non-Zero)	—	0.80	—	—			—	—
Average	—	118.87	—	—	— (—)	—	—	—
Median	—	22.92	—	—		—	—	—
Maximum	—	5,728.33	—	—		—	—	—
Standard Deviation	—	447.15	—	—		—	—	—
Number Obs	0	550	0	0	0	0	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	0.0%	73.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours				0				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	0	438	0	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	114	0	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	67	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	54	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	—	12.86	—
Minimum (Non-Zero)	—	12.86	—
Average	—	122.67	—
Median	—	28.28	—
Maximum	—	797.38	—
Standard Deviation	—	205.45	—
Number Obs	0	21	0
Expected Obs	31	31	31
% Complete	0.0%	73.9%	0.0%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	21	0	3	5	10
1/3 of 24-hour AAAQO	0	18	0	10	17	33
2/3 of 24-hour AAAQO	0	9	0	19	33	67
Above 24-hour AAAQO	0	6	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Summary of EBAM Station Particulate and Meteorological Monitoring for August 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.09		1.1	—	—
Minimum (Non-Zero)	0.15	0.17	2.00	0.09			—	—
Average	13.21	17.07	28.38	0.51	89.5 (E)	17.3	—	—
Median	11.73	15.04	25.40	0.41		16.2	—	—
Maximum	52.98	114.00	439.53	1.82		31.9	—	—
Standard Deviation	7.56	11.21	20.98	0.29		6.9	—	—
Number Obs	742	540	741	743	743	743	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	99.7%	72.6%	99.6%	99.9%	99.9%	99.9%	0.0%	0.0%
Calm Hours				37				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	568	299	321	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	44	10	4	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	1	1	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	1	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	6.53	8.63	15.61
Minimum (Non-Zero)	6.53	8.63	15.61
Average	13.22	17.15	28.41
Median	14.05	17.88	28.85
Maximum	17.67	25.71	48.52
Standard Deviation	2.72	4.57	8.19
Number Obs	31	19	31
Expected Obs	31	31	31
% Complete	99.7%	72.6%	99.6%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	18	19	31	3	5	10
1/3 of 24-hour AAAQO	0	11	7	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for August 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.09		2.2	—	—
Minimum (Non-Zero)	0.30	0.56	0.09			—	—
Average	13.36	27.14	0.46	123.1 (ESE)	17.5	—	—
Median	10.33	23.19	0.40		16.3	—	—
Maximum	98.00	132.83	1.83		30.9	—	—
Standard Deviation	11.82	18.19	0.30		6.4	—	—
Number Obs	743	722	744	744	744	0	0
Expected Obs	744	744	744	744	744	744	744
% Complete	99.9%	97.0%	100.0%	100.0%	100.0%	0.0%	0.0%
Calm Hours			134				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	463	291	8	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	80	7	27	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	13	0	53	184
Above 1-hour Equivalent AAAQO or AAAQG	2	0	80	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	5.07	8.41
Minimum (Non-Zero)	5.07	8.41
Average	13.36	27.21
Median	12.09	26.27
Maximum	29.68	46.81
Standard Deviation	5.58	10.53
Number Obs	31	30
Expected Obs	31	31
% Complete	99.9%	97.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 24-hour AAAQO	31	28	3	10
1/3 of 24-hour AAAQO	23	10	10	33
2/3 of 24-hour AAAQO	5	0	19	67
Above 24-hour AAAQO	1	0	29	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for August 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		2.0	21.0	86.6
Minimum (Non-Zero)	1.11			21.0	86.6
Average	3.65	313.0 (NW)	17.5	65.0	88.0
Median	3.06		16.3	67.0	88.2
Maximum	12.50		30.7	100.0	88.9
Standard Deviation	1.88		6.33	23.30	0.470
Number Obs	646	646	721	721	721
Expected Obs	744	744	744	744	744
% Complete	86.8%	86.8%	96.9%	96.9%	96.9%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for August 2022

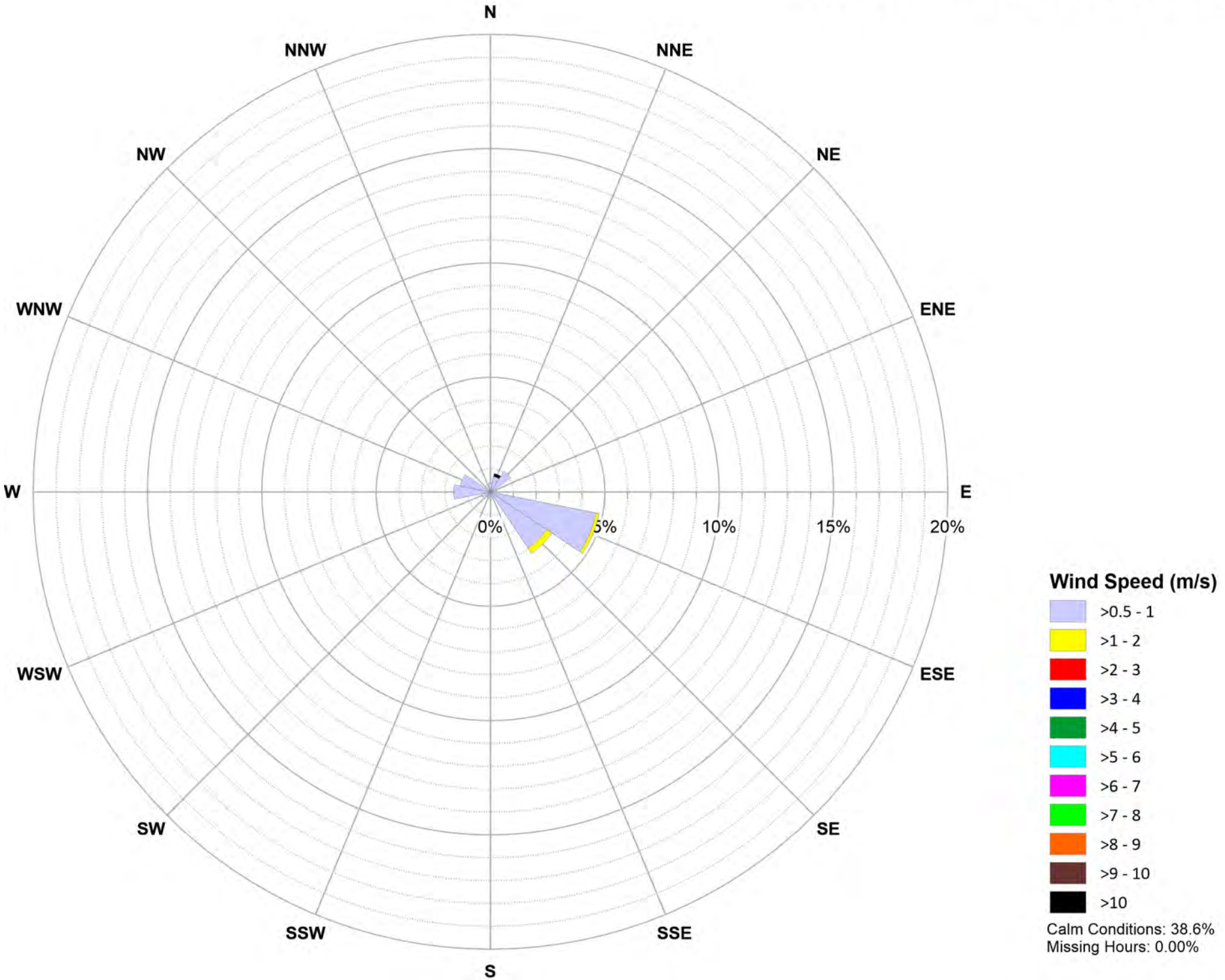
	CRAZ 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.24	-0.97	-1.05	—	—	0.00	—	0.00	0.00
Minimum (Non-Zero)	0.24	-0.97	-1.05	—	—	0.03	—	0.15	0.30
Average	8.46	9.02	7.38	—	—	12.33	—	13.21	13.36
Median	7.66	8.39	6.85	—	—	9.17	—	11.73	10.33
Maximum	29.43	36.01	40.10	—	—	**93.10**	—	52.98	**98.00**
Standard Deviation	5.15	5.63	4.92	—	—	10.68	—	7.56	11.82
Number Obs	742	725	742	0	0	743	0	742	743
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	99.7%	97.4%	99.7%	**0.0%**	**0.0%**	99.9%	**0.0%**	99.7%	99.9%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

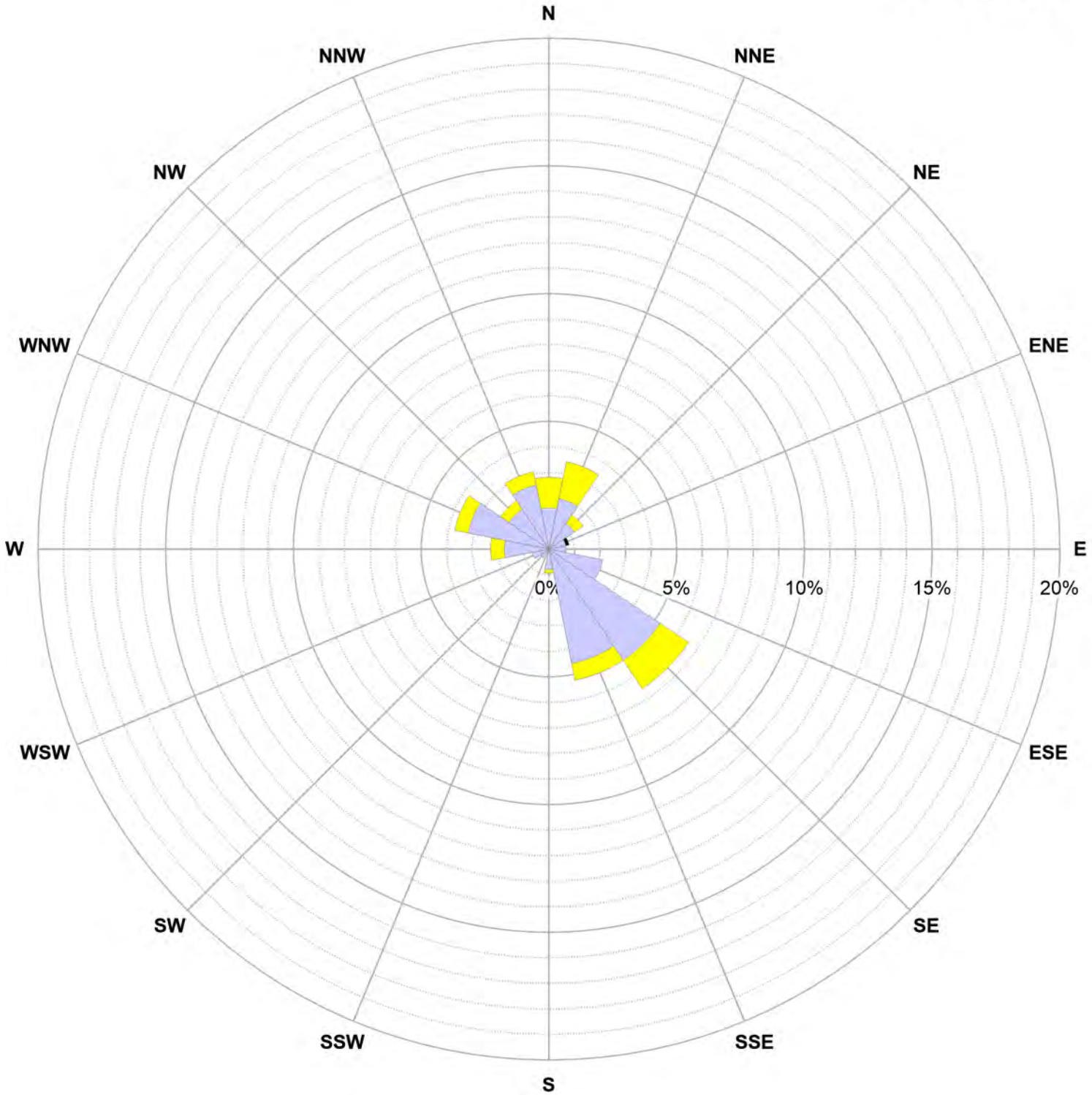
	CRAZ 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	1.70	0.69	0.32	—	—	4.98	—	6.53	5.07
Minimum (Non-Zero)	1.70	0.69	0.32	—	—	4.98	—	6.53	5.07
Average	8.46	9.04	7.40	—	—	12.33	—	13.22	13.36
Median	8.98	9.05	7.02	—	—	12.31	—	14.05	12.09
Maximum	15.62	15.69	14.53	—	—	21.66	—	17.67	**29.68**
Standard Deviation	3.74	4.00	3.78	—	—	4.17	—	2.72	5.58
Number Obs	31	30	31	0	0	31	0	31	31
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	100.0%	96.8%	100.0%	**0.0%**	**0.0%**	100.0%	**0.0%**	100.0%	100.0%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

August 2022 Site 1 Wind Rose



August 2022 Site 3 Wind Rose

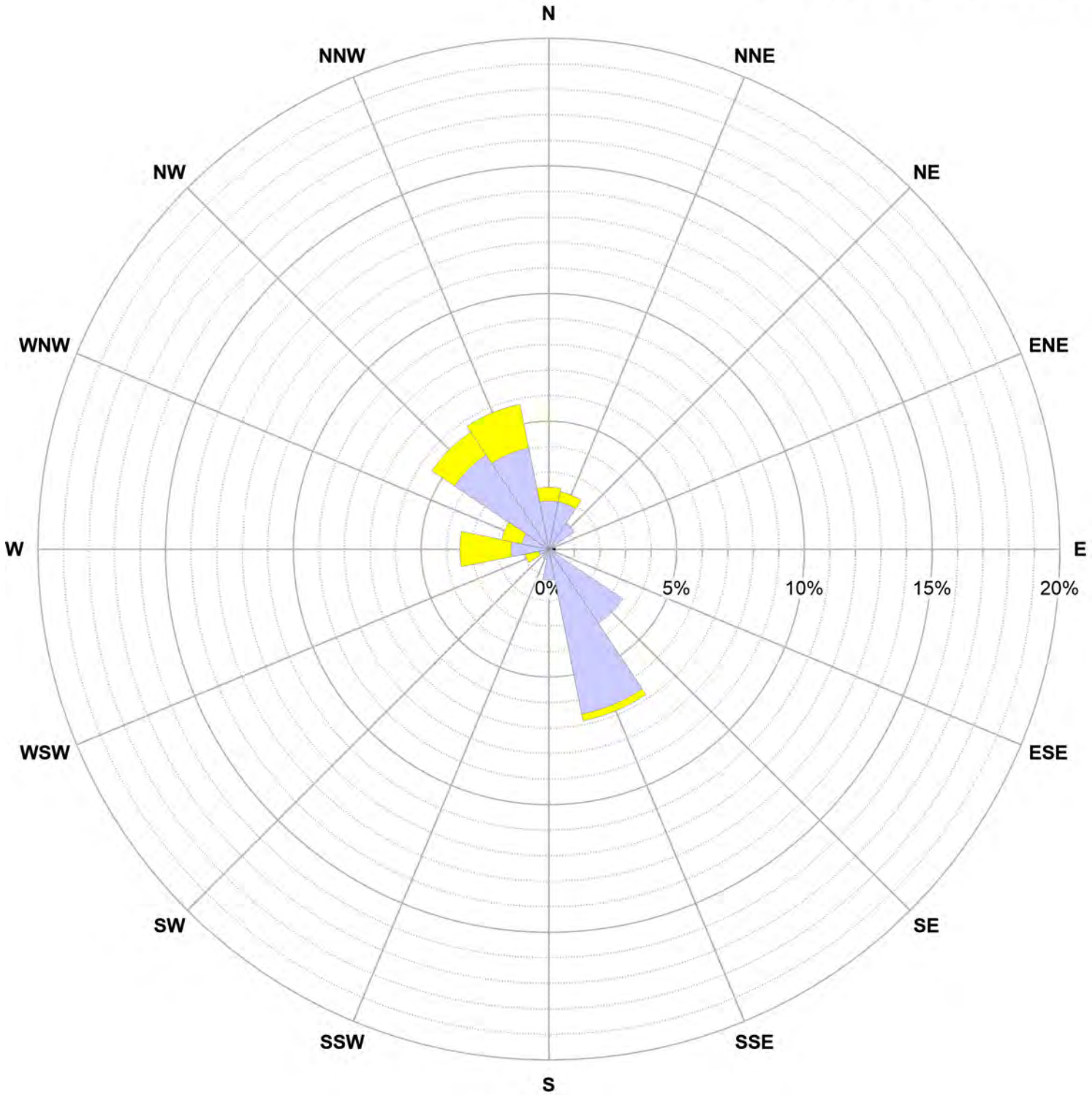


Wind Speed (m/s)

- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 4.98%
Missing Hours: 0.13%

August 2022 Calaway Park Wind Rose

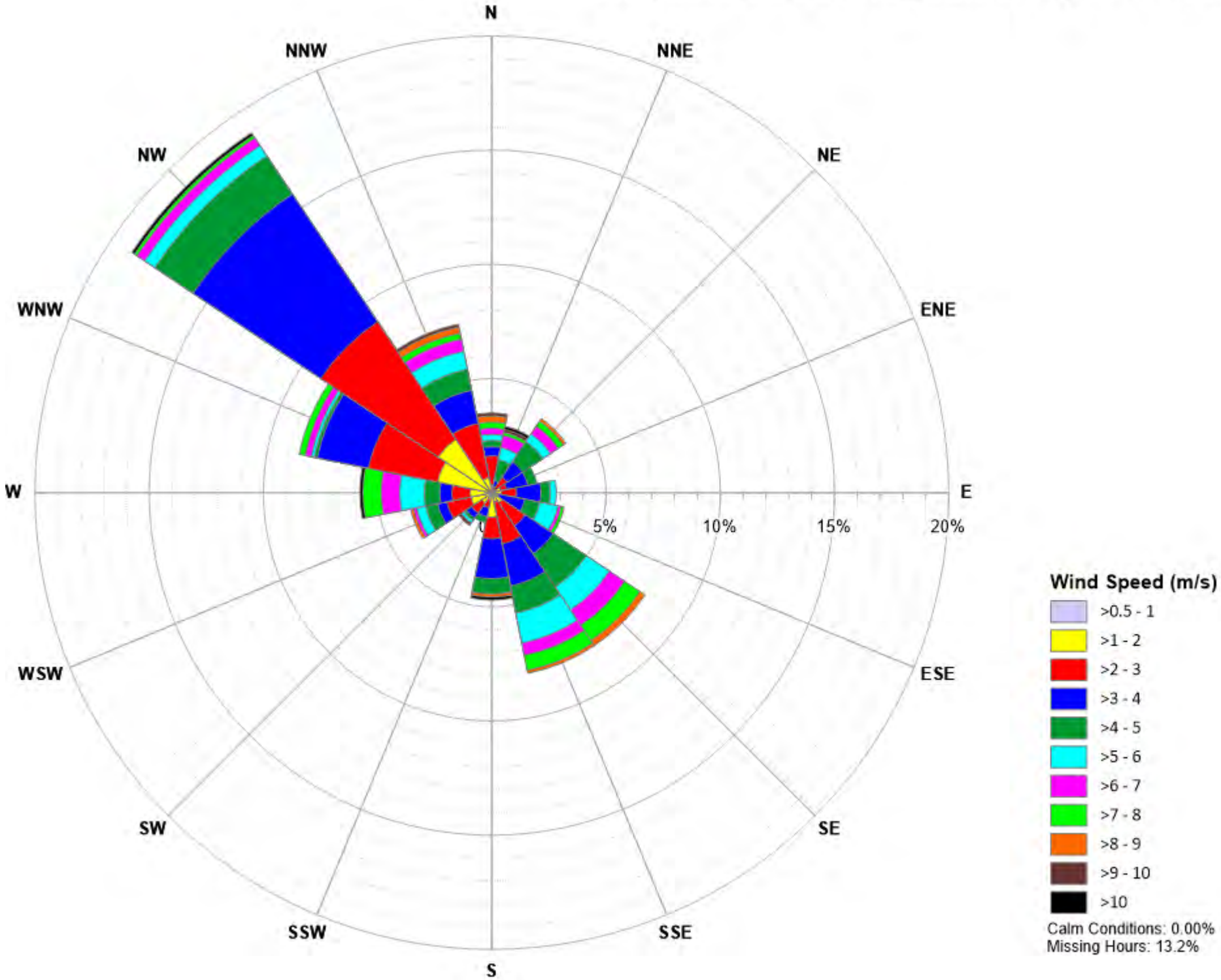


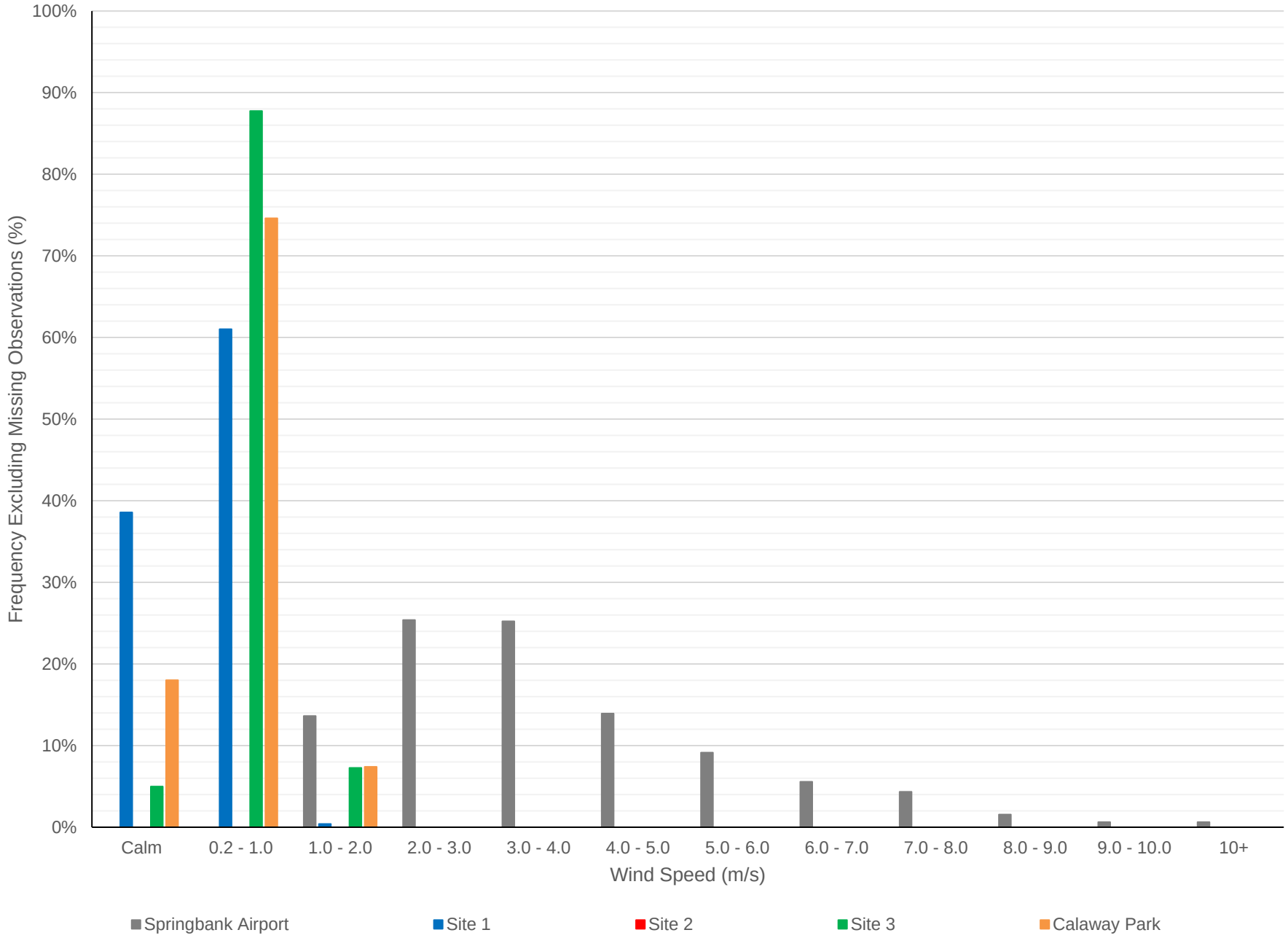
Wind Speed (m/s)

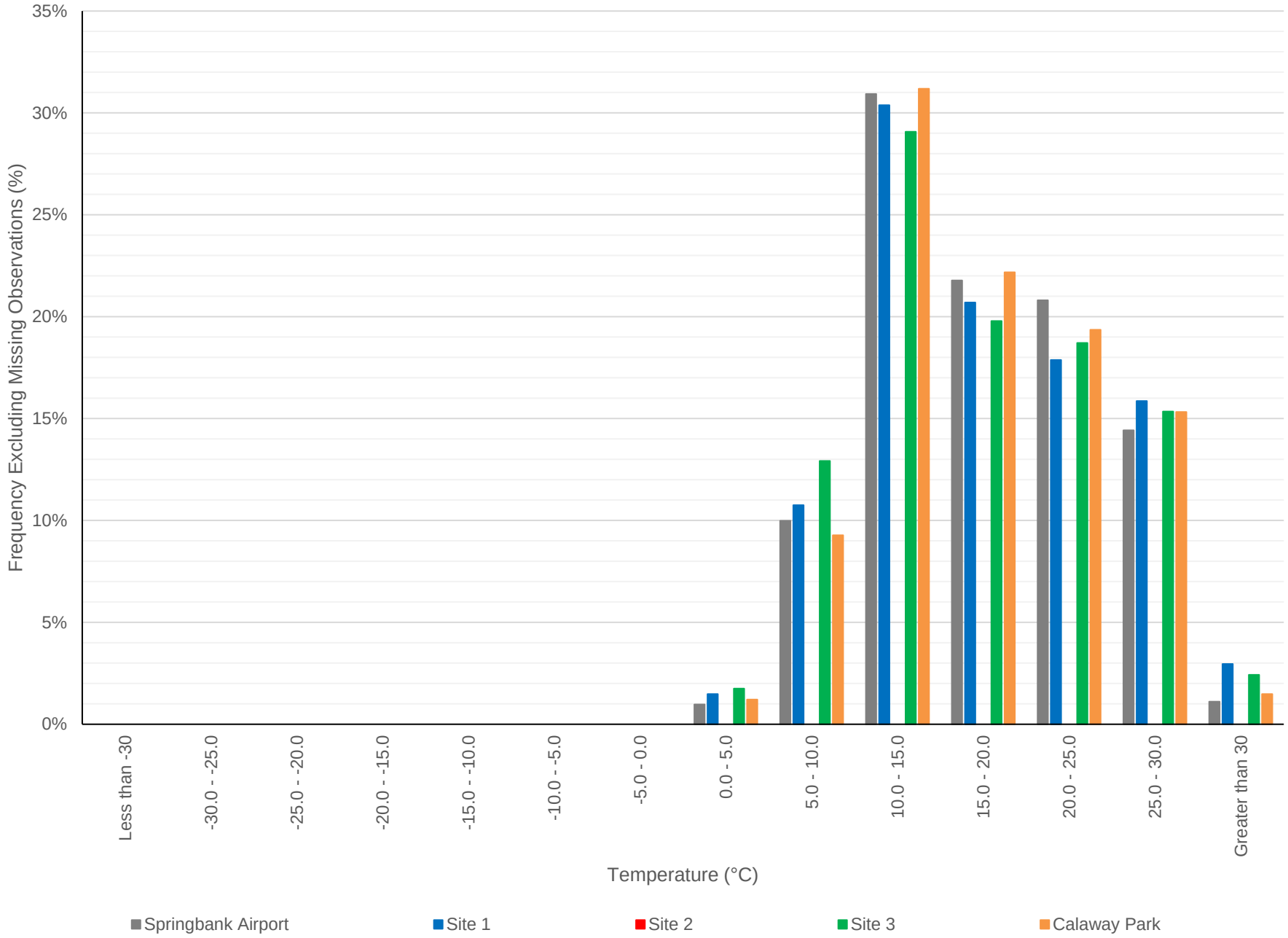
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

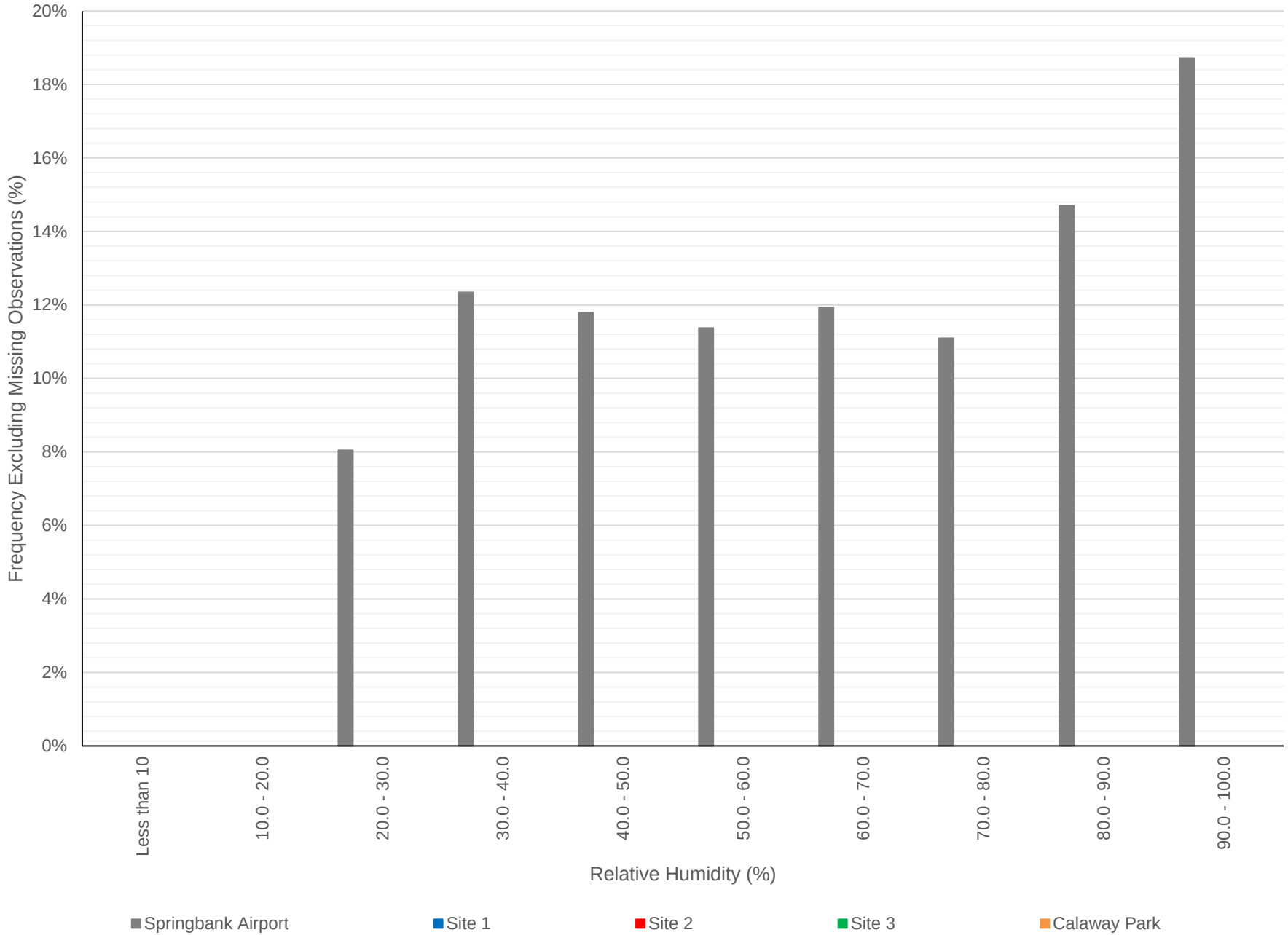
Calm Conditions: 18.0%
Missing Hours: 0.00%

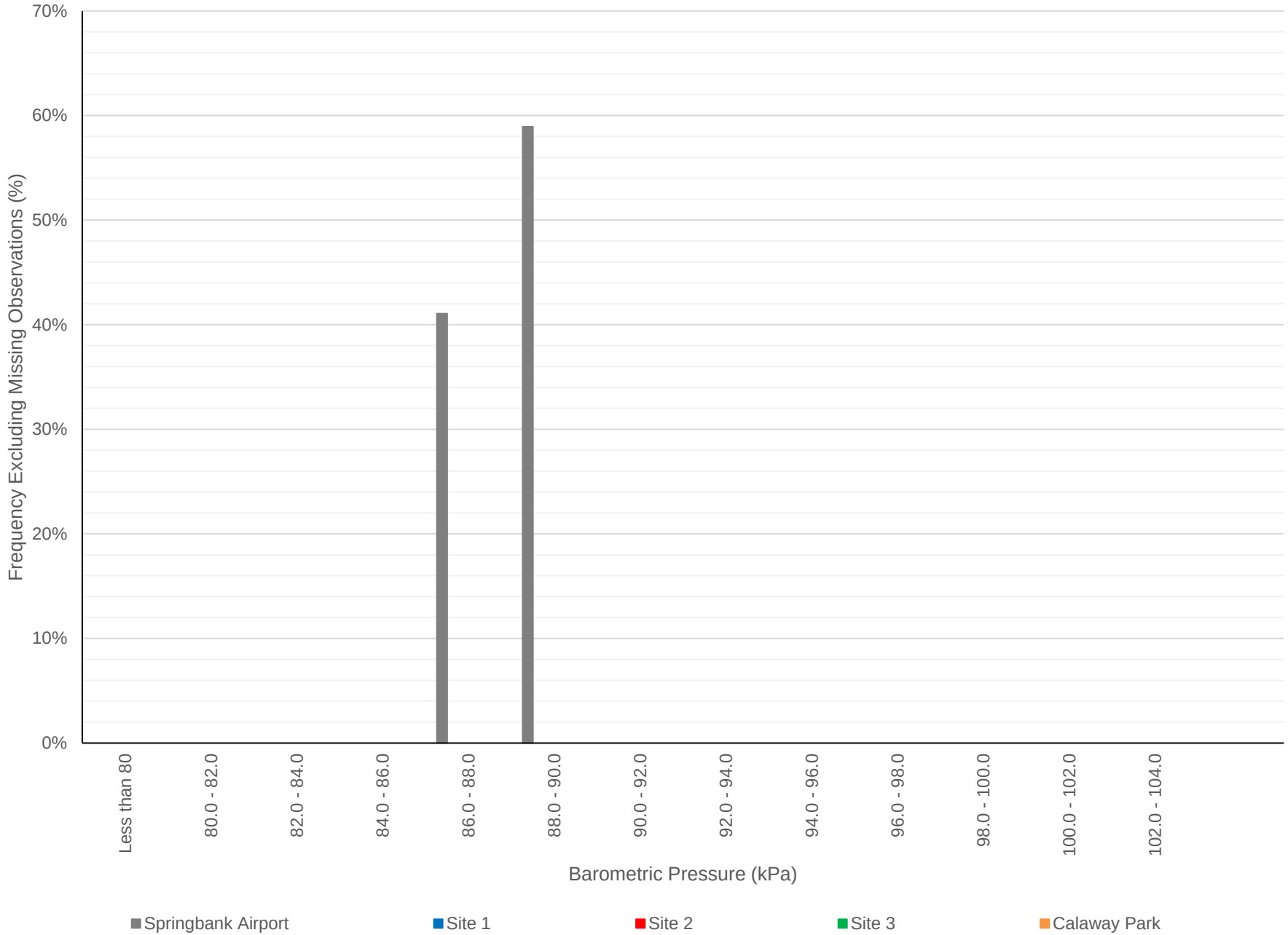
August 2022 Springbank Airport Wind Rose

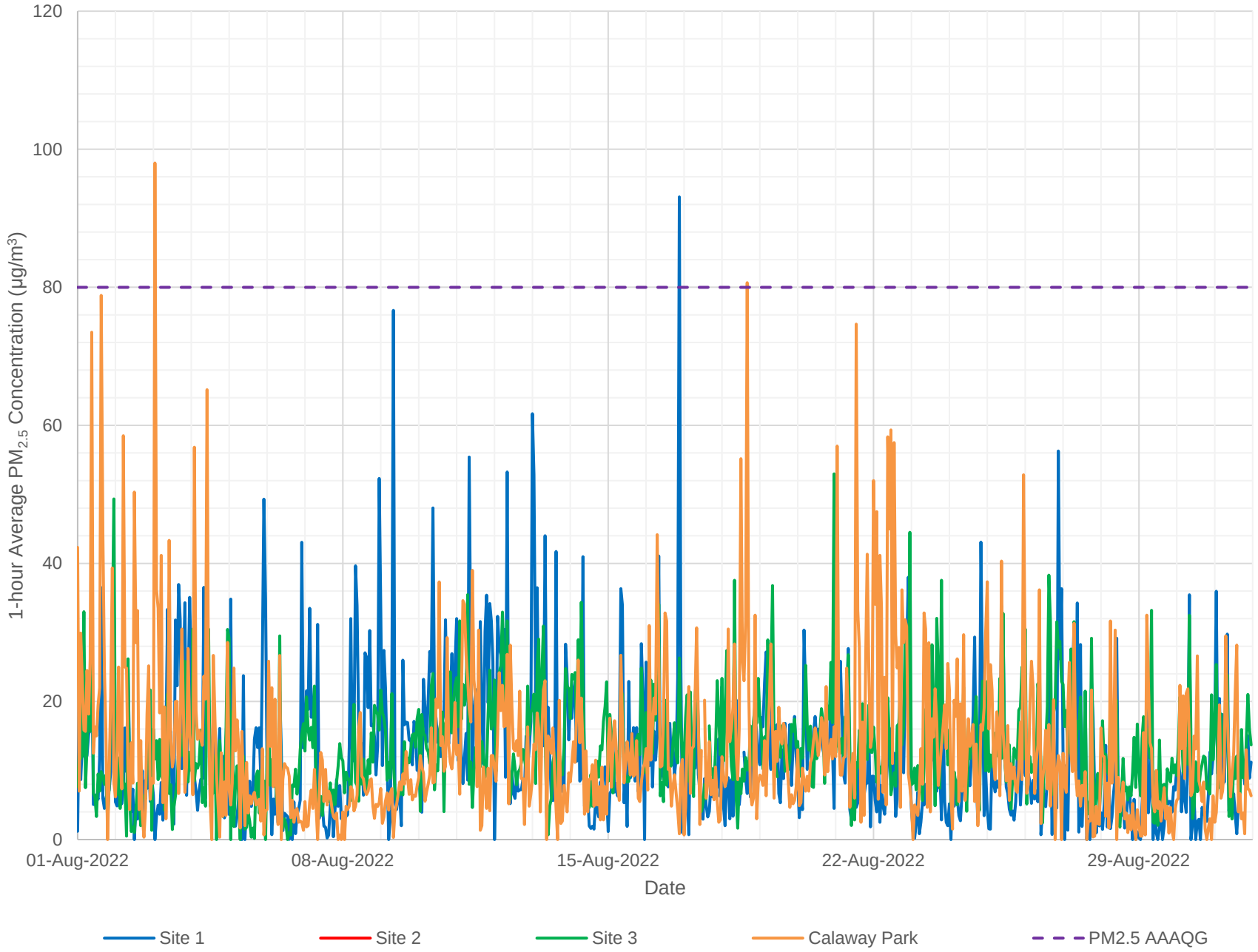


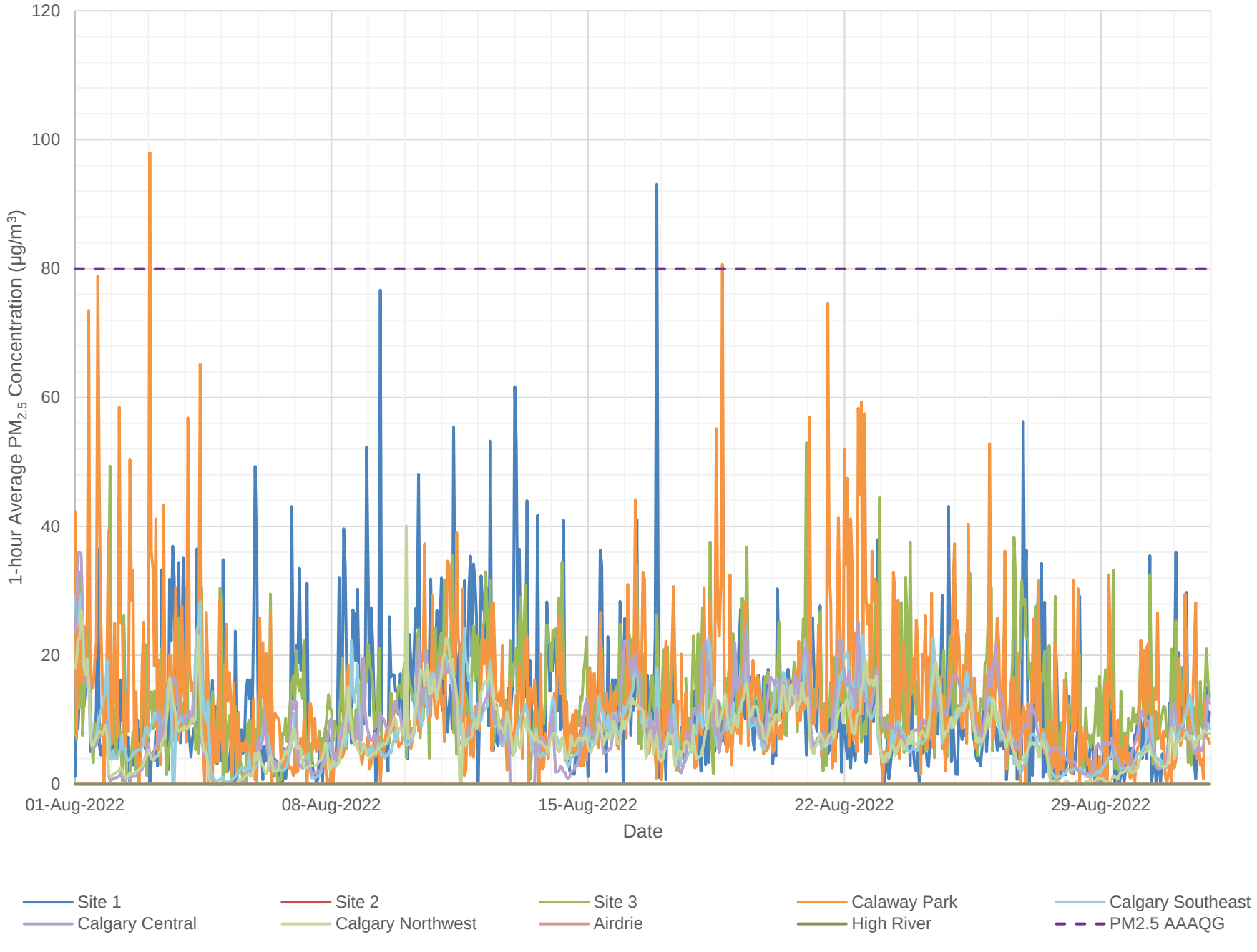

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

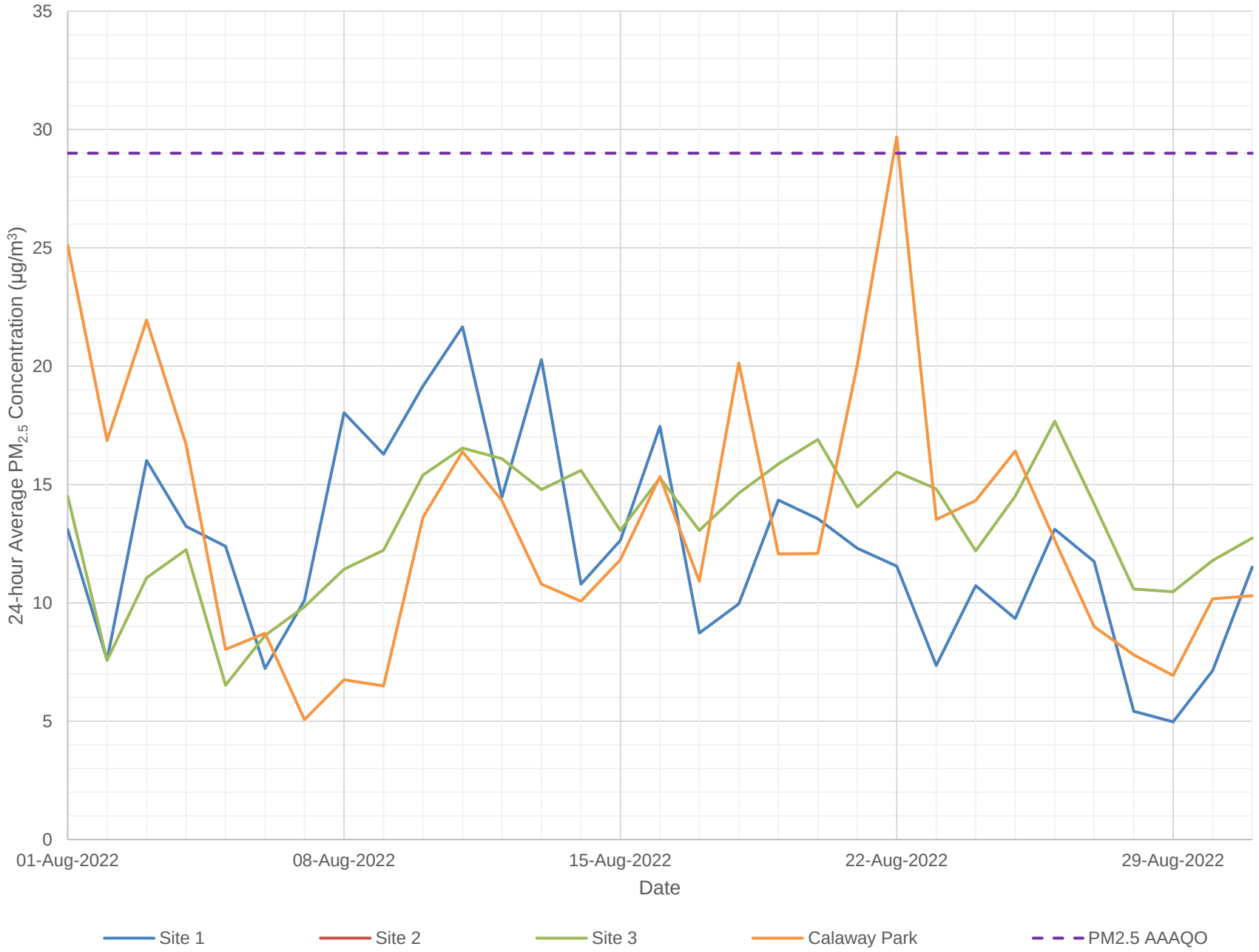

35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

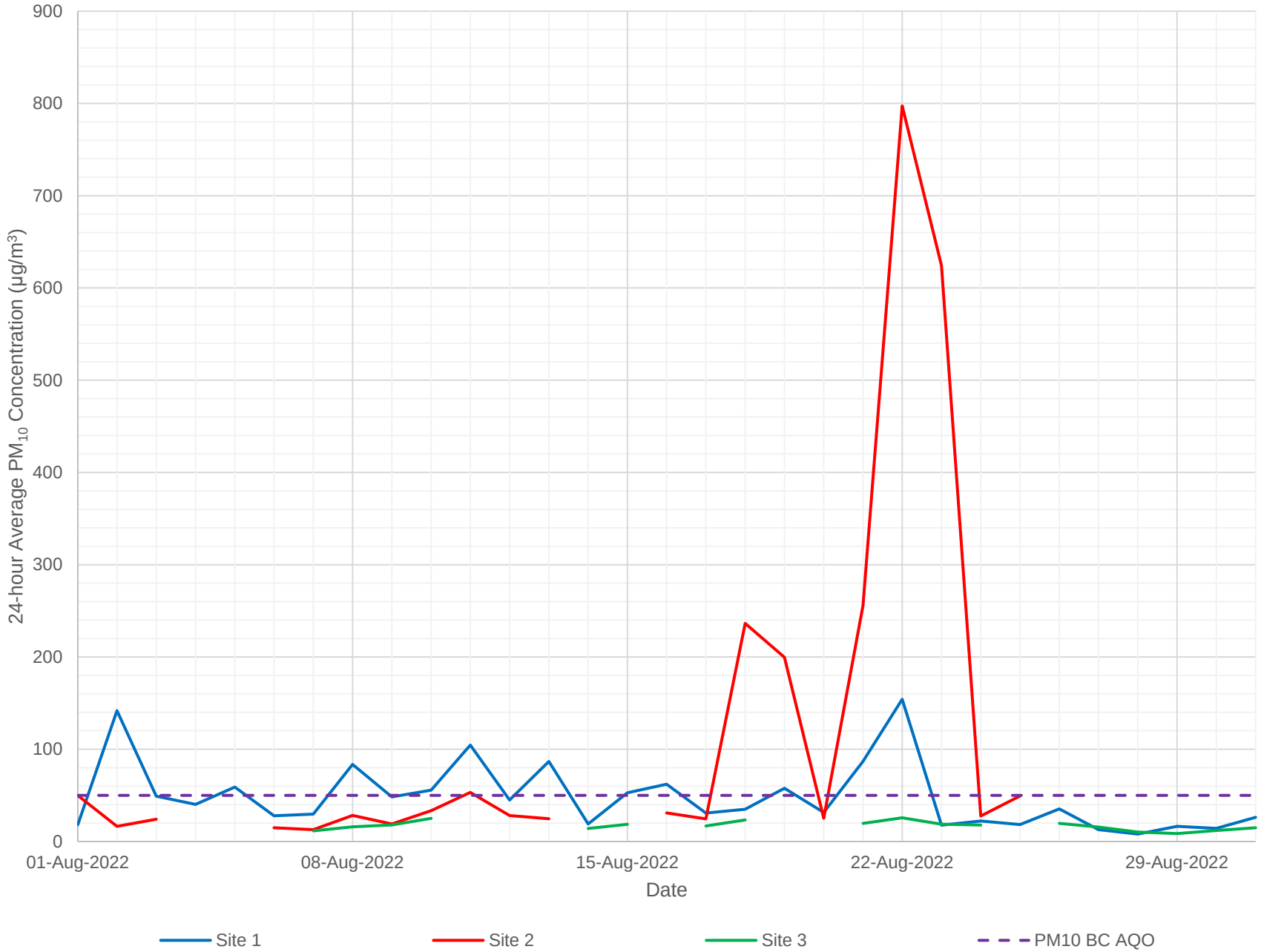

70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

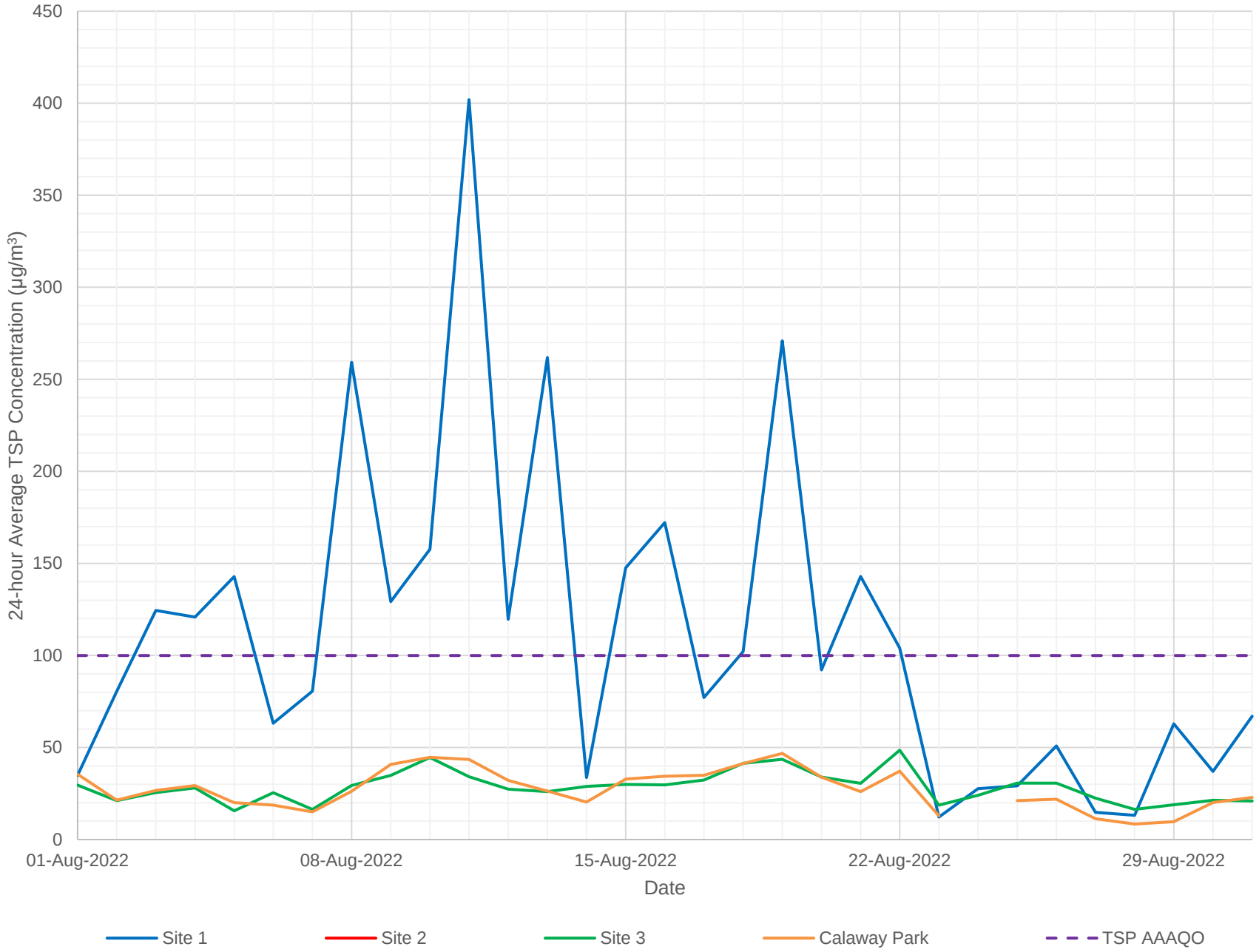

120
100
80
60
40
20
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Aug-2022
08-Aug-2022
15-Aug-2022
22-Aug-2022
29-Aug-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


120
100
80
60
40
20
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Aug-2022
08-Aug-2022
15-Aug-2022
22-Aug-2022
29-Aug-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Aug-2022
08-Aug-2022
15-Aug-2022
22-Aug-2022
29-Aug-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Aug-2022
08-Aug-2022
15-Aug-2022
22-Aug-2022
29-Aug-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


900
800
700
600
500
400
300
200
100
0
24-hour Average PM10 Concentration (µg/m3)
01-Aug-2022
08-Aug-2022
15-Aug-2022
22-Aug-2022
29-Aug-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO


450
400
350
300
250
200
150
100
50
0
24-hour Average TSP Concentration (µg/m³)
01-Aug-2022
08-Aug-2022
15-Aug-2022
22-Aug-2022
29-Aug-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for September 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-2.2	—	—
Minimum (Non-Zero)	0.05	0.50	0.33	0.08			—	—
Average	14.35	26.73	65.41	0.30	20.2 (NNE)	12.9	—	—
Median	10.97	19.50	32.83	0.25		12.1	—	—
Maximum	70.87	261.50	853.83	1.15		30.4	—	—
Standard Deviation	12.23	24.70	99.34	0.18		7.1	—	—
Number Obs	717	716	715	718	718	718	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	99.6%	99.4%	99.3%	99.7%	99.7%	99.7%	0.0%	0.0%
Calm Hours				250				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	463	484	404	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	93	108	121	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	14	14	53	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	5	34	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	4.65	6.27	10.32
Minimum (Non-Zero)	4.65	6.27	10.32
Average	14.33	26.67	65.16
Median	11.02	23.00	53.55
Maximum	29.21	79.56	273.48
Standard Deviation	7.38	15.03	57.15
Number Obs	30	30	30
Expected Obs	30	30	30
% Complete	99.6%	99.4%	99.3%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	30	30	30	3	5	10
1/3 of 24-hour AAAQO	21	22	19	10	17	33
2/3 of 24-hour AAAQO	7	9	10	19	33	67
Above 24-hour AAAQO	2	1	5	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for September 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—	—			—	—
Average	—	—	—	—	— (—)	—	—	—
Median	—	—	—	—		—	—	—
Maximum	—	—	—	—		—	—	—
Standard Deviation	—	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours				0				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	0	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	0	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	—	—	—
Minimum (Non-Zero)	—	—	—
Average	—	—	—
Median	—	—	—
Maximum	—	—	—
Standard Deviation	—	—	—
Number Obs	0	0	0
Expected Obs	30	30	30
% Complete	0.0%	0.0%	0.0%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	0	0	3	5	10
1/3 of 24-hour AAAQO	0	0	0	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for September 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	3.38	0.10		-3.4	—	—
Minimum (Non-Zero)	1.33	0.42	3.38	0.10			—	—
Average	18.05	21.00	32.05	0.50	354.8 (N)	12.1	—	—
Median	14.84	17.75	27.00	0.42		11.6	—	—
Maximum	75.57	117.33	363.48	1.56		30.2	—	—
Standard Deviation	12.27	14.37	22.83	0.27		7.5	—	—
Number Obs	718	639	717	718	718	718	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	99.7%	88.8%	99.6%	99.7%	99.7%	99.7%	0.0%	0.0%
Calm Hours				45				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	602	411	349	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	123	40	11	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	23	1	1	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	1	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	9.71	9.41	12.94
Minimum (Non-Zero)	9.71	9.41	12.94
Average	18.03	21.62	31.99
Median	15.11	19.67	29.72
Maximum	32.57	38.99	50.10
Standard Deviation	6.97	8.20	10.57
Number Obs	30	24	30
Expected Obs	30	30	30
% Complete	99.7%	88.8%	99.6%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	24	24	30	3	5	10
1/3 of 24-hour AAAQO	6	15	14	10	17	33
2/3 of 24-hour AAAQO	0	2	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for September 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.08		-2.7	—	—
Minimum (Non-Zero)	0.17	1.91	0.08			—	—
Average	17.10	33.69	0.46	29.0 (NNE)	12.7	—	—
Median	12.50	29.58	0.37		12.2	—	—
Maximum	308.33	124.81	2.06		29.9	—	—
Standard Deviation	19.90	20.13	0.33		7.0	—	—
Number Obs	716	708	718	718	718	0	0
Expected Obs	720	720	720	720	720	720	720
% Complete	99.4%	98.3%	99.7%	99.7%	99.7%	0.0%	0.0%
Calm Hours			155				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	506	377	8	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	115	8	27	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	25	0	53	184
Above 1-hour Equivalent AAAQO or AAAQG	5	0	80	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	5.14	13.88
Minimum (Non-Zero)	5.14	13.88
Average	17.09	34.19
Median	13.04	33.38
Maximum	46.46	55.73
Standard Deviation	10.05	11.65
Number Obs	30	29
Expected Obs	30	30
% Complete	99.4%	98.3%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 24-hour AAAQO	30	29	3	10
1/3 of 24-hour AAAQO	22	15	10	33
2/3 of 24-hour AAAQO	9	0	19	67
Above 24-hour AAAQO	4	0	29	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for September 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-4.3	19.0	87.1
Minimum (Non-Zero)	1.11			19.0	87.1
Average	3.73	308.0 (NW)	12.6	63.5	88.0
Median	3.61		12.2	64.0	87.9
Maximum	10.83		29.9	100.0	88.8
Standard Deviation	1.89		6.91	21.73	0.418
Number Obs	571	571	643	643	643
Expected Obs	720	720	720	720	720
% Complete	79.3%	79.3%	89.3%	89.3%	89.3%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for September 2022

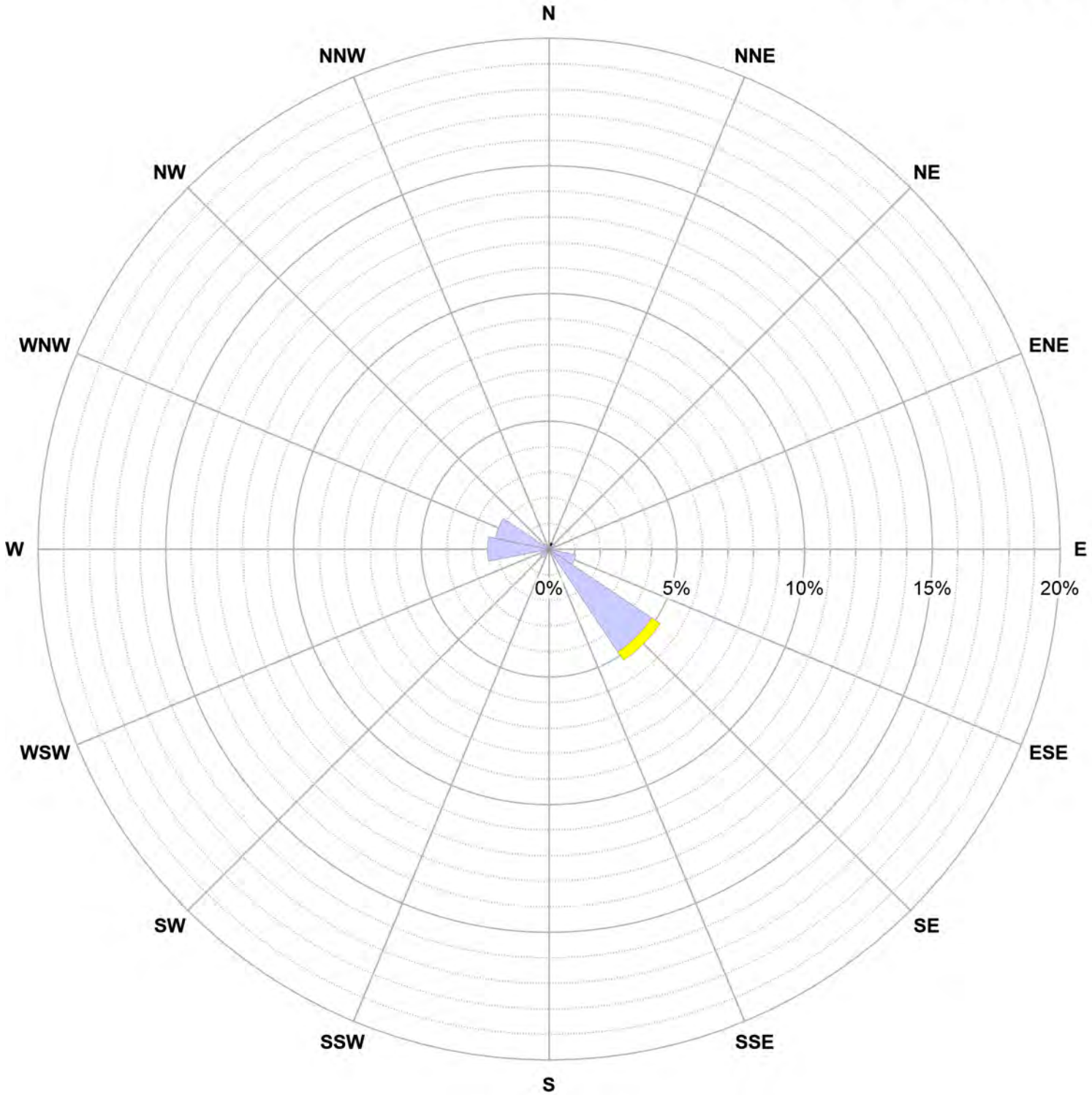
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	1.32	0.81	-0.44	1.00	—	0.00	—	0.00	0.00
Minimum (Non-Zero)	1.32	0.81	-0.44	1.00	—	0.05	—	1.33	0.17
Average	16.68	15.46	12.47	12.46	—	14.35	—	18.05	17.10
Median	12.41	10.73	8.92	8.63	—	10.97	—	14.84	12.50
Maximum	**87.68**	**148.84**	72.04	75.47	—	70.87	—	75.57	**308.33**
Standard Deviation	13.71	18.02	12.96	12.42	—	12.23	—	12.27	19.90
Number Obs	695	718	718	717	0	717	0	718	716
Expected Obs	720	720	720	720	720	720	720	720	720
% Complete	96.5%	99.7%	99.7%	99.6%	**0.0%**	99.6%	**0.0%**	99.7%	99.4%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	4.91	3.70	1.79	2.78	—	4.65	—	9.71	5.14
Minimum (Non-Zero)	4.91	3.70	1.79	2.78	—	4.65	—	9.71	5.14
Average	16.55	15.46	12.48	12.49	—	14.33	—	18.03	17.09
Median	13.67	12.44	9.93	9.85	—	11.02	—	15.11	13.04
Maximum	**37.84**	**51.15**	**33.05**	**32.12**	—	**29.21**	—	**32.57**	**46.46**
Standard Deviation	9.20	11.60	8.90	8.50	—	7.38	—	6.97	10.05
Number Obs	28	30	30	30	0	30	0	30	30
Expected Obs	30	30	30	30	30	30	30	30	30
% Complete	93.3%	100.0%	100.0%	100.0%	**0.0%**	100.0%	**0.0%**	100.0%	100.0%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

September 2022 Site 1 Wind Rose

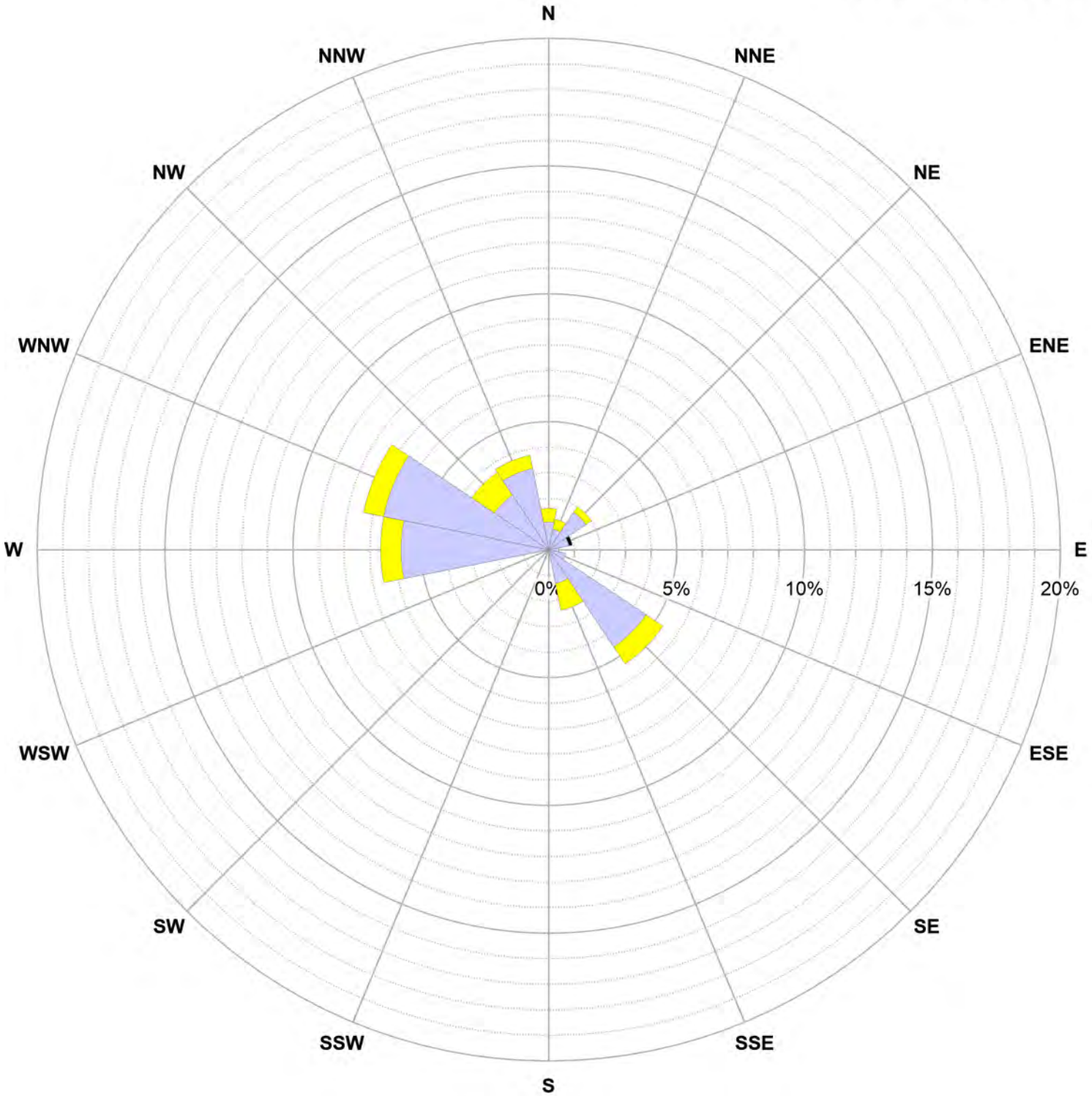


Wind Speed (m/s)

- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 34.8%
Missing Hours: 0.28%

September 2022 Site 3 Wind Rose

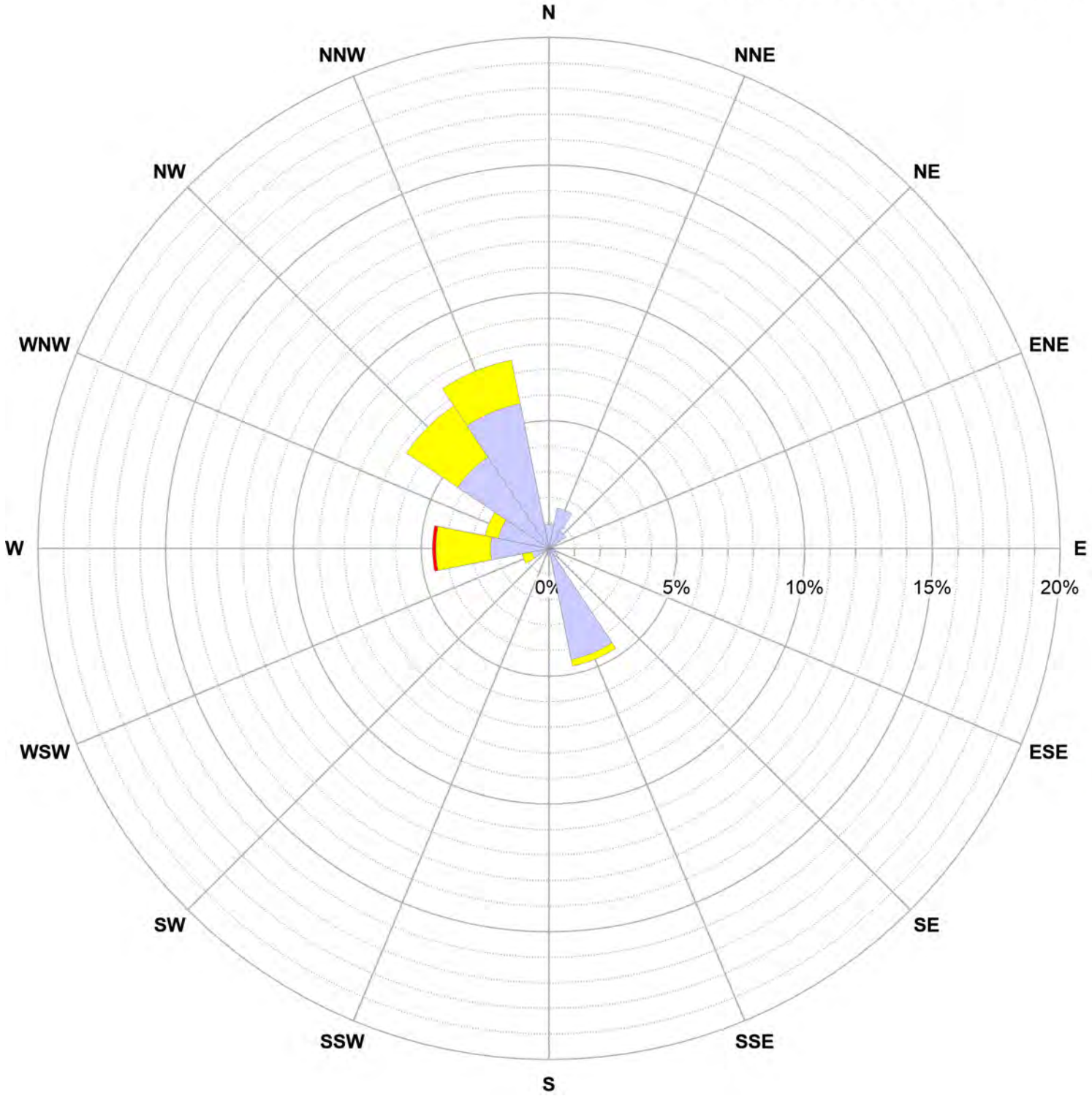


Wind Speed (m/s)

- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 6.27%
Missing Hours: 0.28%

September 2022 Calaway Park Wind Rose

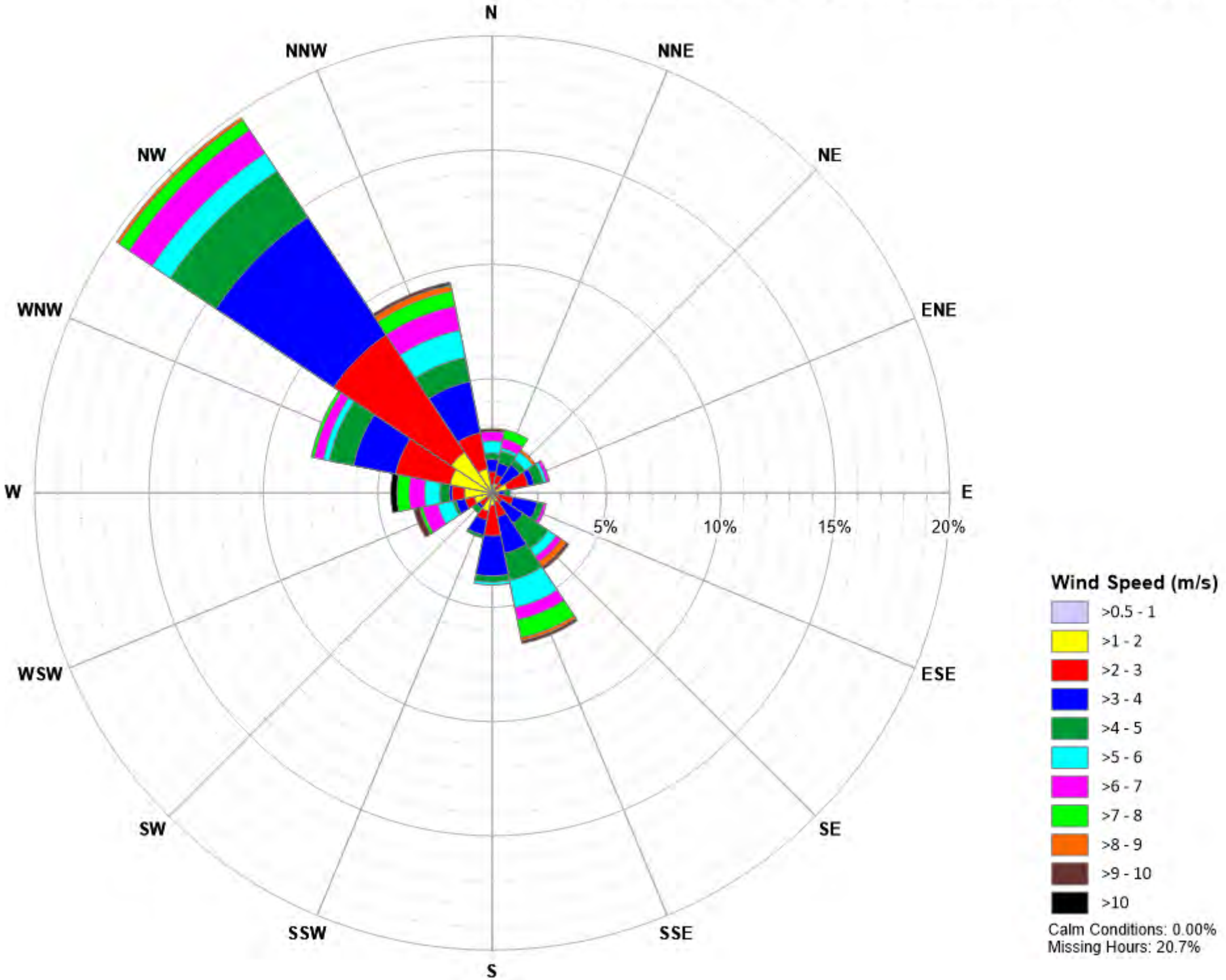


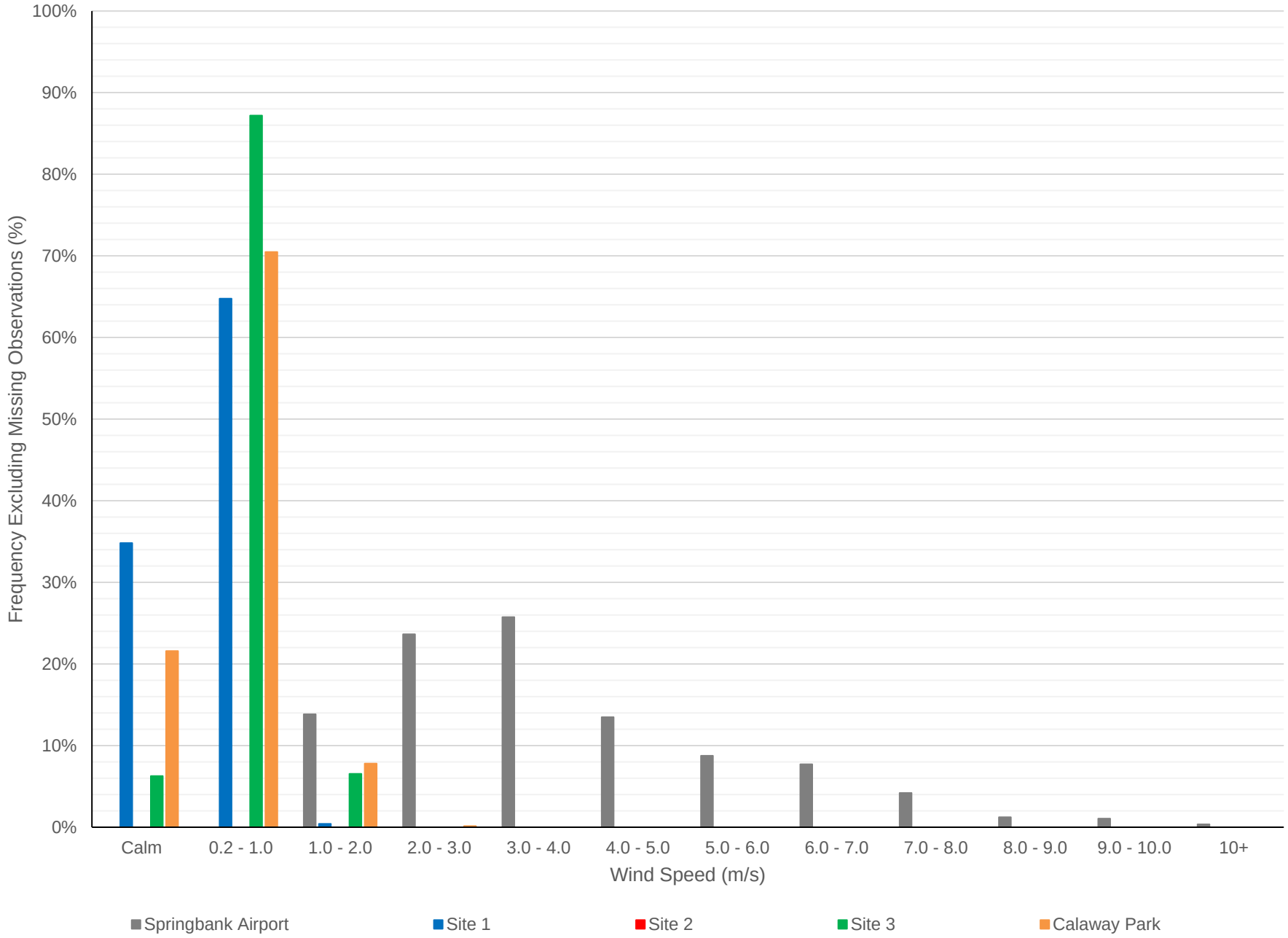
Wind Speed (m/s)

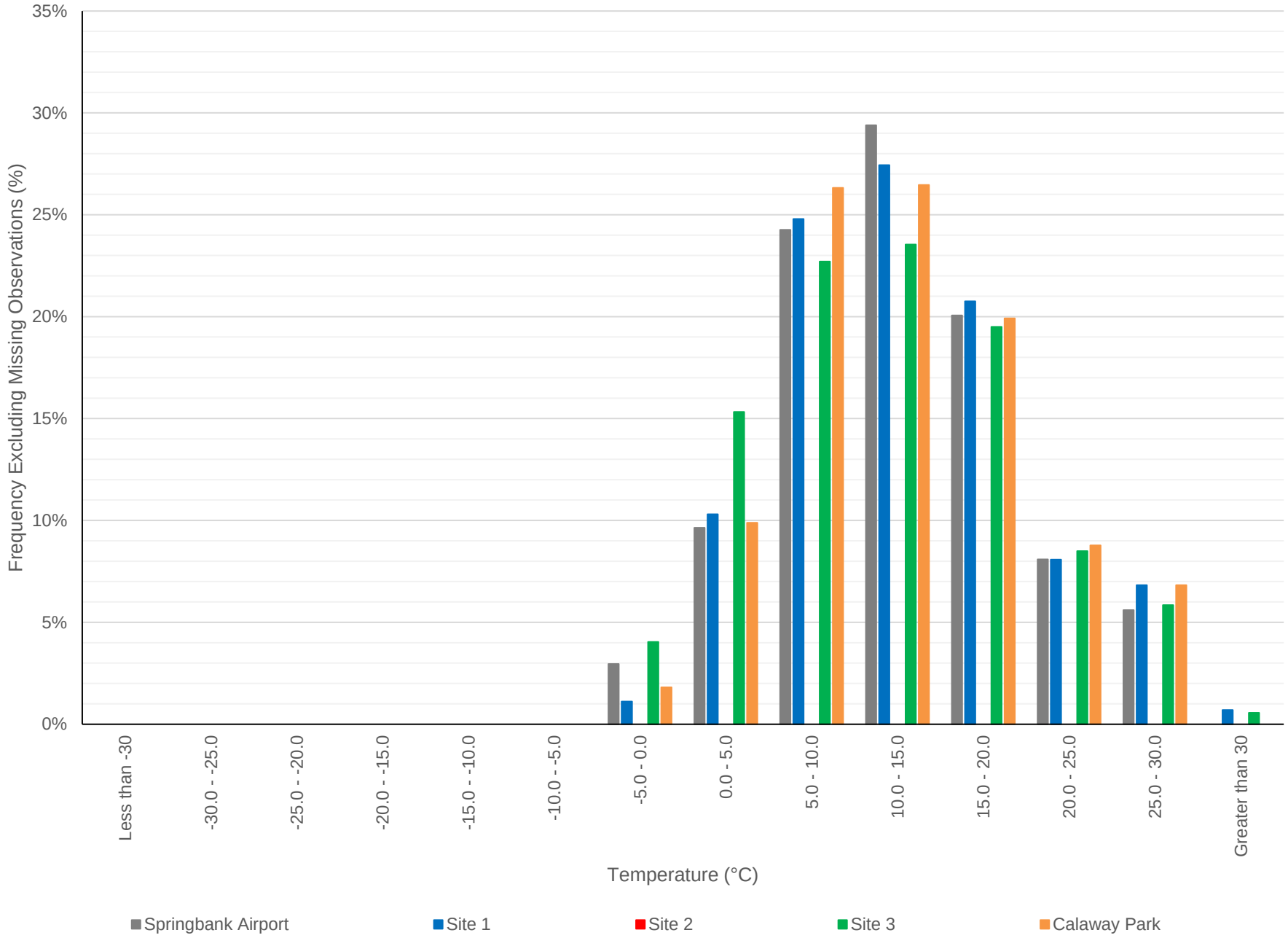
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

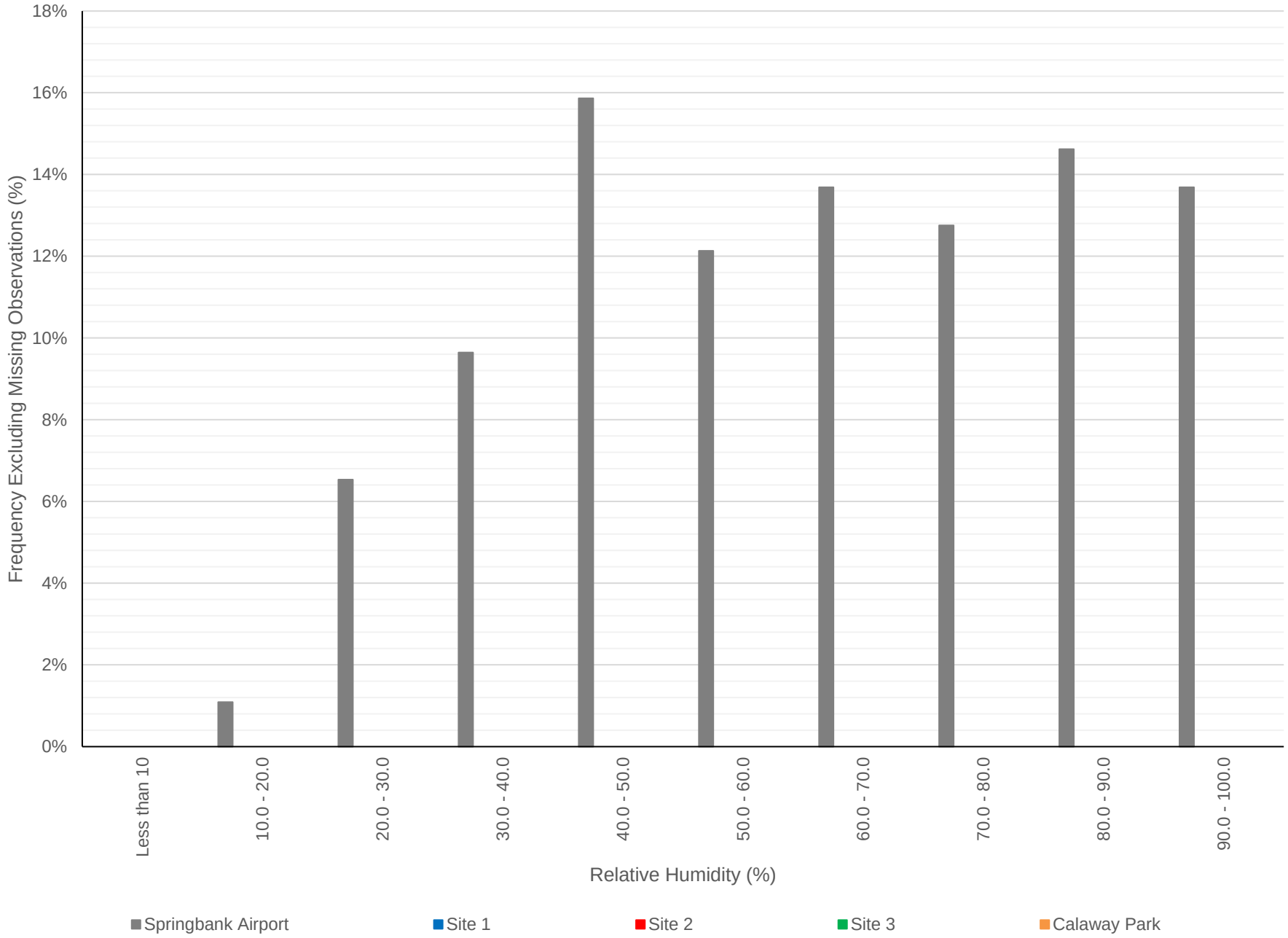
Calm Conditions: 21.6%
Missing Hours: 0.28%

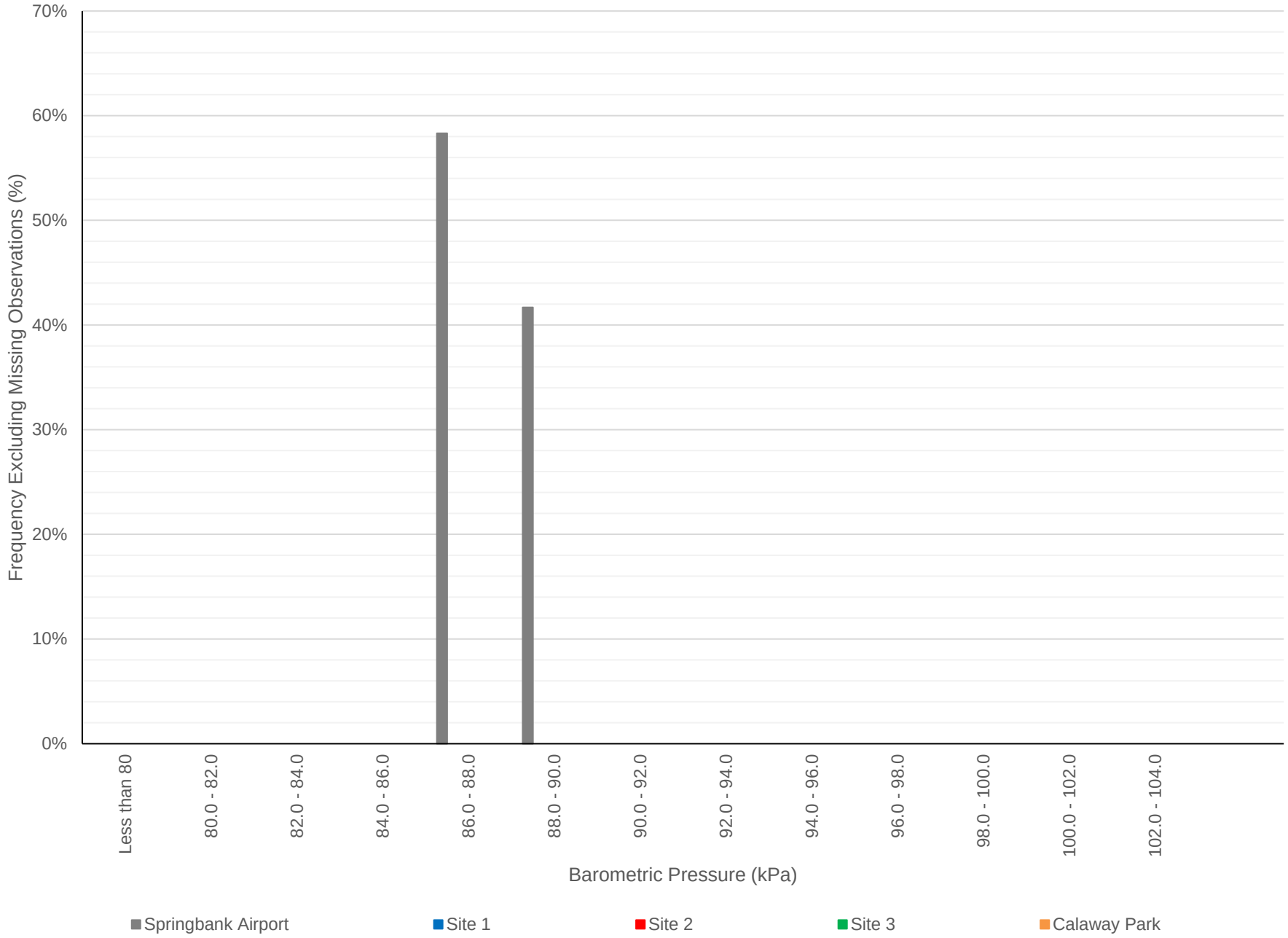
September 2022 Springbank Airport Wind Rose

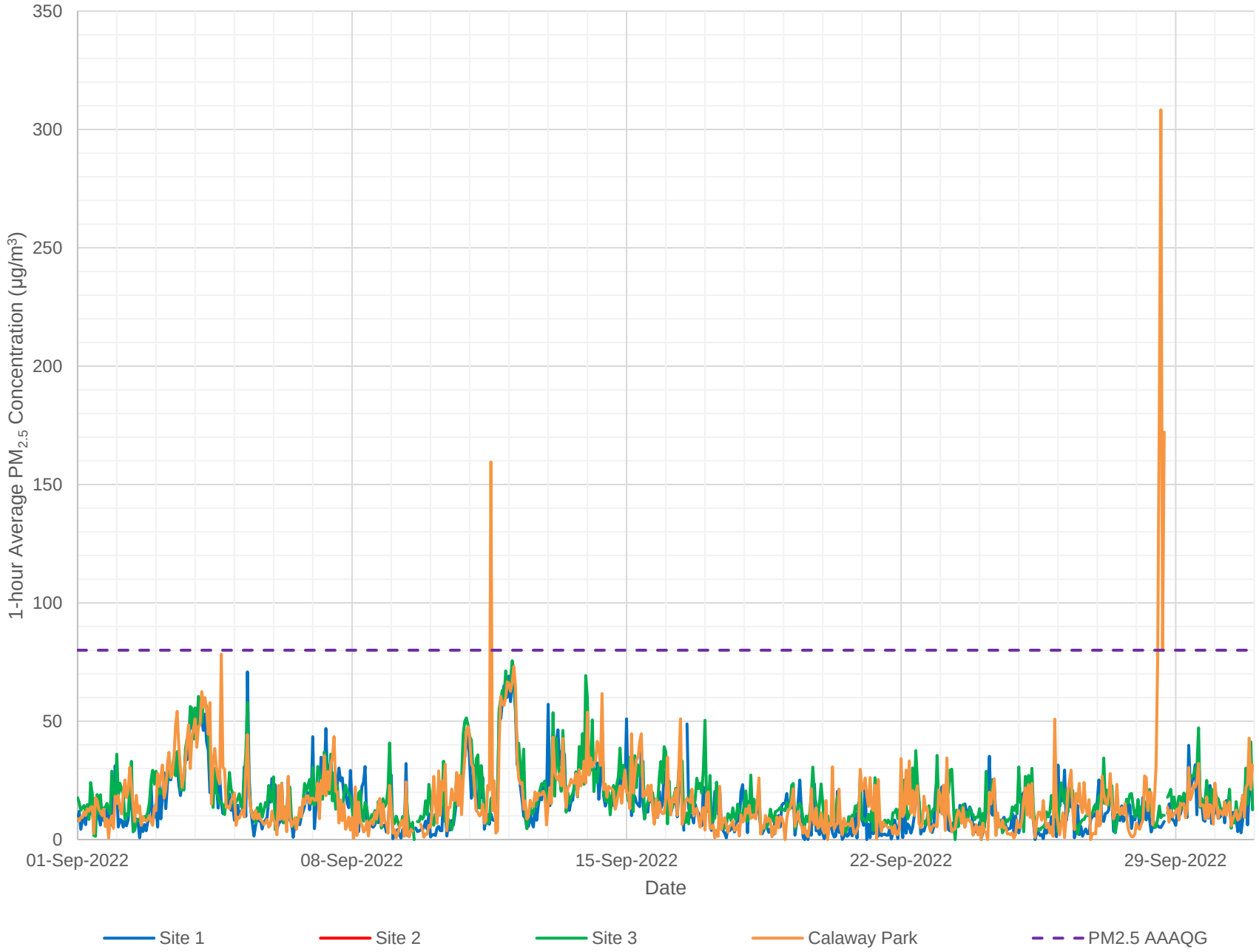


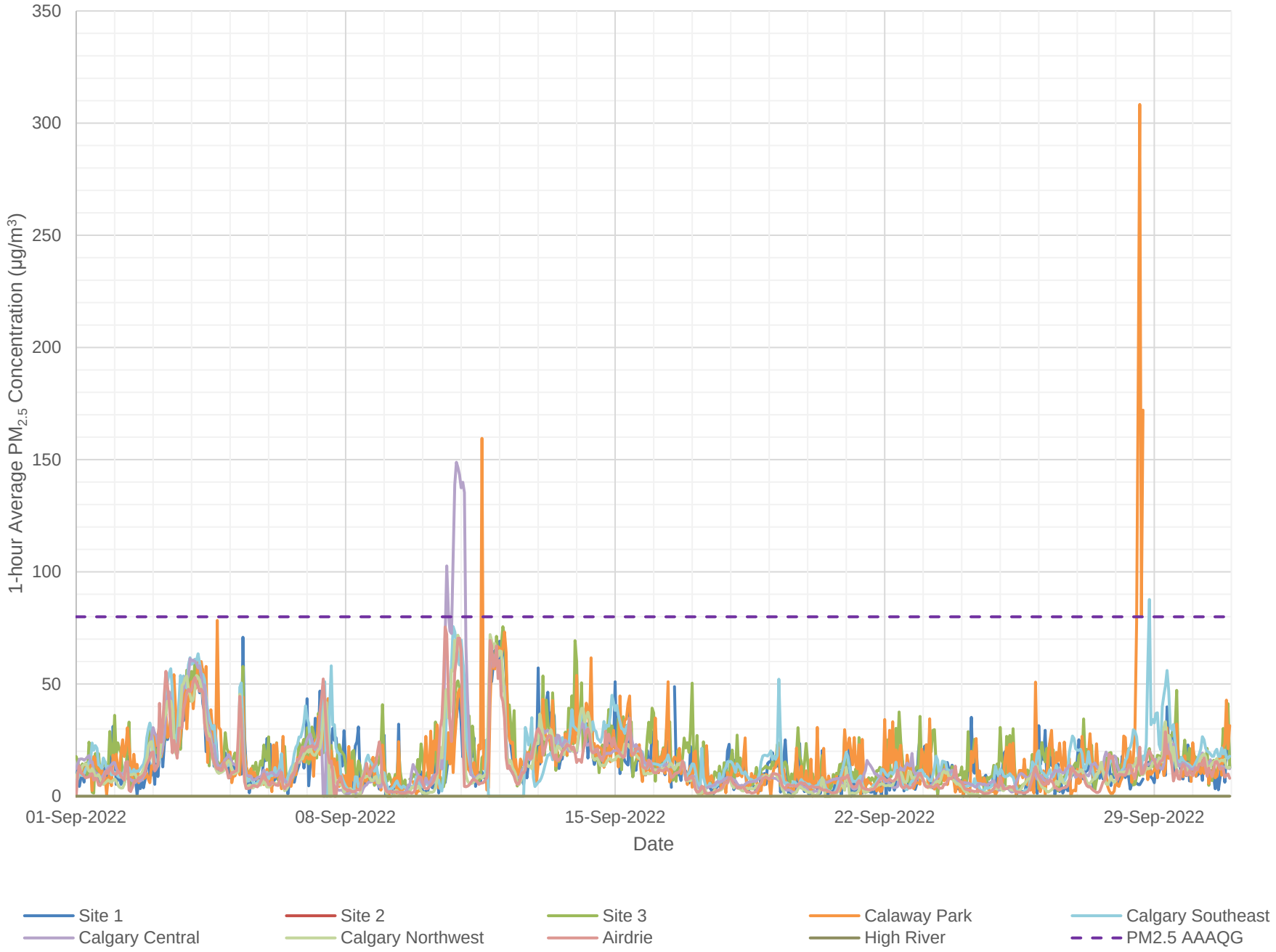

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

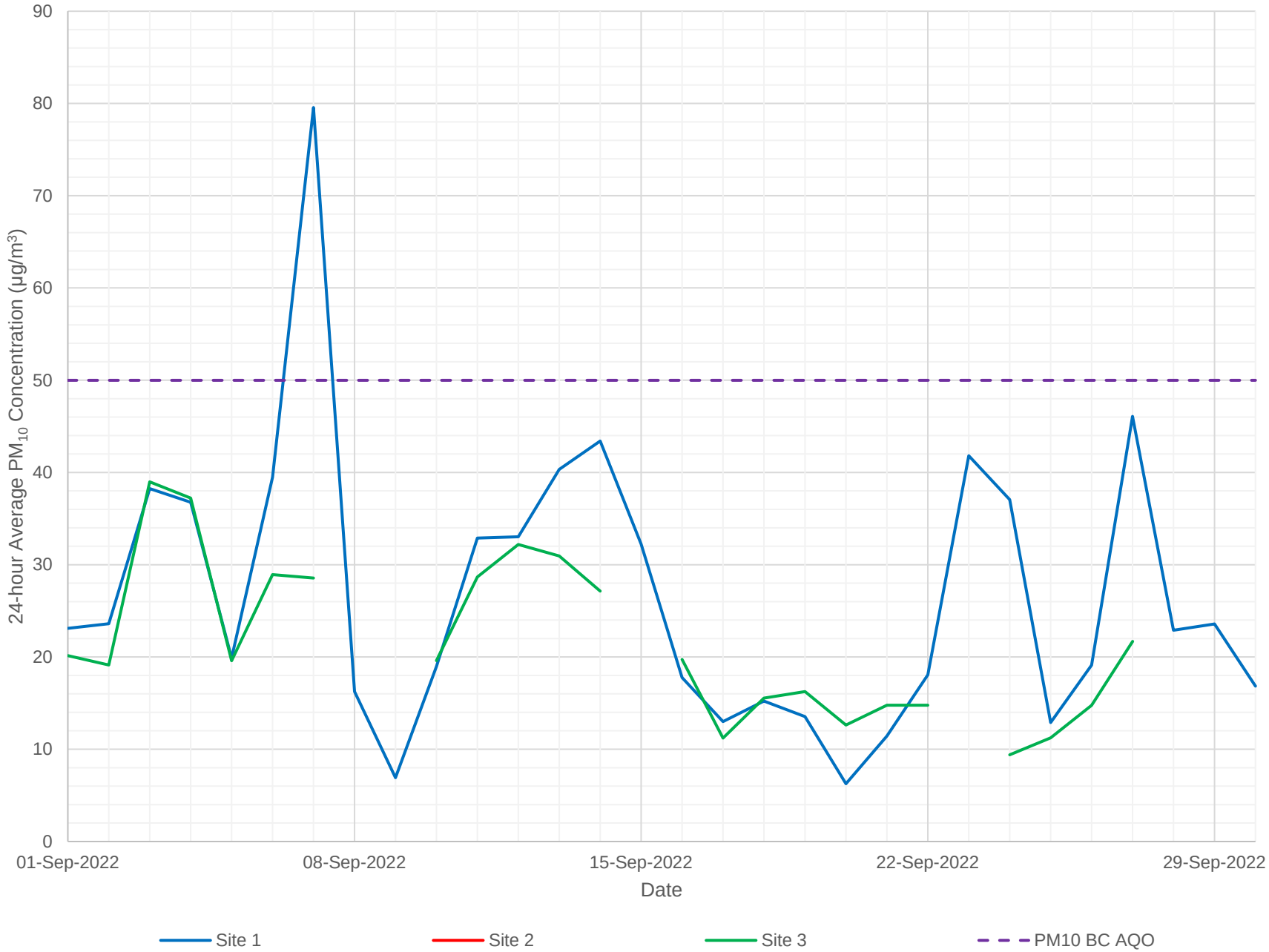

70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

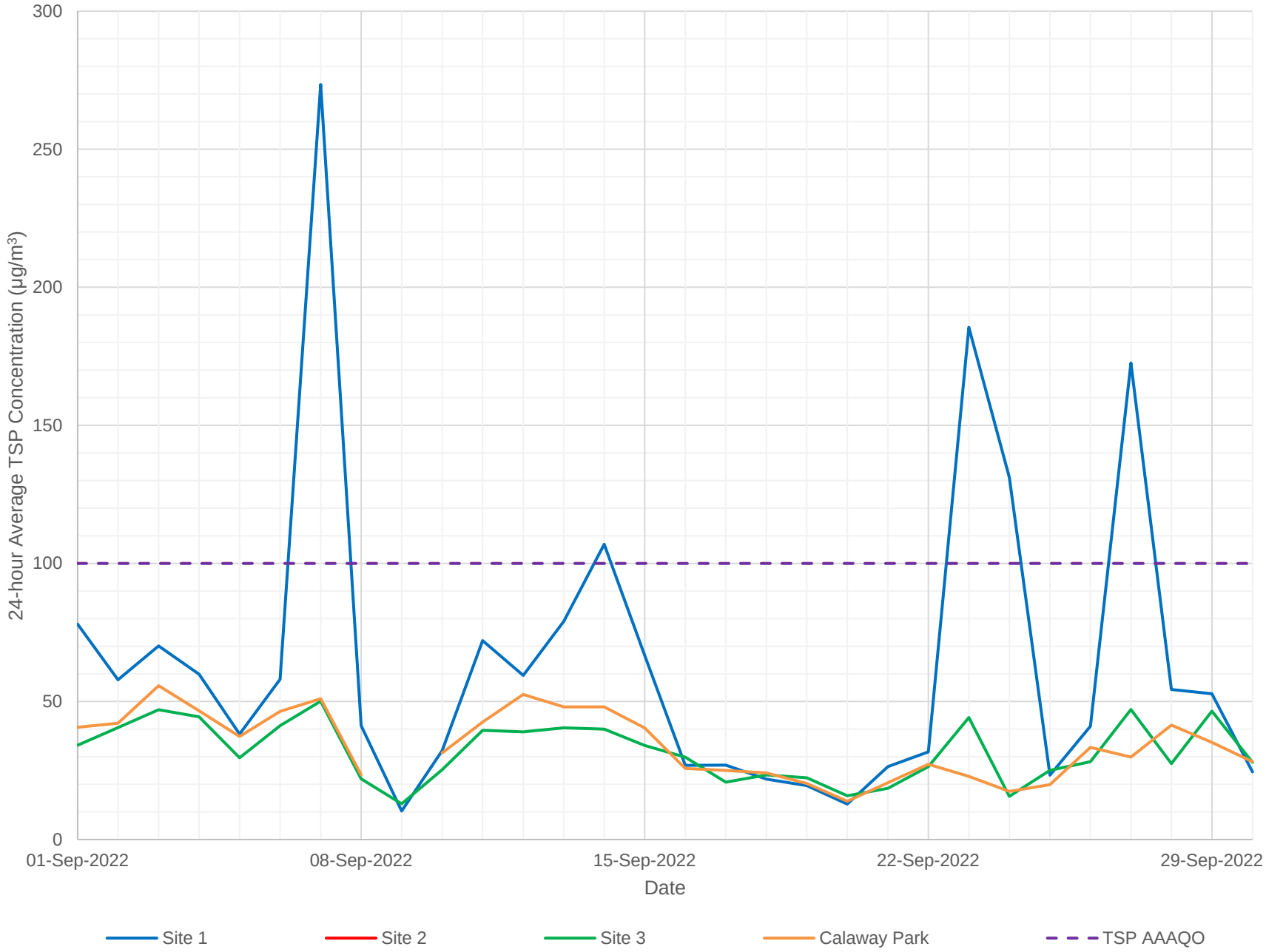

350
300
250
200
150
100
50
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Sep-2022
08-Sep-2022
15-Sep-2022
22-Sep-2022
29-Sep-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


350
300
250
200
150
100
50
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Sep-2022
08-Sep-2022
15-Sep-2022
22-Sep-2022
29-Sep-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


50
45
40
35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Sep-2022
08-Sep-2022
15-Sep-2022
22-Sep-2022
29-Sep-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


60
50
40
30
20
10
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Sep-2022
08-Sep-2022
15-Sep-2022
22-Sep-2022
29-Sep-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


90
80
70
60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Sep-2022
08-Sep-2022
15-Sep-2022
22-Sep-2022
29-Sep-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO


300
250
200
150
100
50
0
24-hour Average TSP Concentration (µg/m³)
01-Sep-2022
08-Sep-2022
15-Sep-2022
22-Sep-2022
29-Sep-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for October 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-7.9	—	—
Minimum (Non-Zero)	0.03	0.33	0.25	0.08			—	—
Average	9.23	29.48	65.84	0.33	134.1 (SE)	7.4	—	—
Median	7.17	15.20	24.00	0.26		5.9	—	—
Maximum	64.17	2,429.83	2,284.18	1.40		26.2	—	—
Standard Deviation	8.03	102.40	169.33	0.22		7.3	—	—
Number Obs	743	701	742	744	744	744	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	99.9%	94.2%	99.7%	100.0%	100.0%	100.0%	0.0%	0.0%
Calm Hours				239				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	337	379	332	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	33	71	107	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	1	28	53	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	16	27	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.70	7.64	9.41
Minimum (Non-Zero)	1.70	7.64	9.41
Average	9.23	30.08	65.89
Median	9.11	19.55	42.92
Maximum	18.28	151.08	473.64
Standard Deviation	3.49	30.53	83.03
Number Obs	31	29	31
Expected Obs	31	31	31
% Complete	99.9%	94.2%	99.7%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	29	29	29	3	5	10
1/3 of 24-hour AAAQO	14	18	20	10	17	33
2/3 of 24-hour AAAQO	0	6	10	19	33	67
Above 24-hour AAAQO	0	4	5	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for October 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	—	0.00	0.17		-2.3	—	—
Minimum (Non-Zero)	0.50	—	0.17	0.17			—	—
Average	5.74	—	17.03	0.65	— (—)	4.5	—	—
Median	4.33	—	8.08	0.59		4.5	—	—
Maximum	23.18	—	317.83	1.49		14.1	—	—
Standard Deviation	5.19	—	39.47	0.34		4.4	—	—
Number Obs	79	0	78	80	80	80	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	10.6%	0.0%	10.5%	10.8%	10.8%	10.8%	0.0%	0.0%
Calm Hours				1				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	20	0	8	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	2	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	1	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	1	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	3.19	—	7.79
Minimum (Non-Zero)	3.19	—	7.79
Average	5.49	—	17.76
Median	5.28	—	13.09
Maximum	7.99	—	32.41
Standard Deviation	1.96	—	10.58
Number Obs	3	0	3
Expected Obs	31	31	31
% Complete	10.6%	0.0%	10.5%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	3	0	2	3	5	10
1/3 of 24-hour AAAQO	0	0	0	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for October 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	1.47	0.08		-11.4	—	—
Minimum (Non-Zero)	0.17	0.86	1.47	0.08			—	—
Average	11.57	18.19	31.93	0.49	165.9 (SSE)	6.4	—	—
Median	9.92	14.11	22.42	0.40		4.5	—	—
Maximum	47.05	415.07	804.08	2.11		26.3	—	—
Standard Deviation	7.66	19.29	48.69	0.31		7.7	—	—
Number Obs	743	702	743	744	744	744	0	0
Expected Obs	744	744	744	744	744	744	744	744
% Complete	99.9%	94.4%	99.9%	100.0%	100.0%	100.0%	0.0%	0.0%
Calm Hours				57				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	458	364	289	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	36	28	26	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	1	9	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	1	5	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	4.57	7.54	12.48
Minimum (Non-Zero)	4.57	7.54	12.48
Average	11.57	18.11	31.93
Median	12.10	18.29	29.88
Maximum	18.24	34.87	93.00
Standard Deviation	3.20	6.71	16.27
Number Obs	31	29	31
Expected Obs	31	31	31
% Complete	99.9%	94.4%	99.9%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	10	29	31	3	5	10
1/3 of 24-hour AAAQO	0	15	11	10	17	33
2/3 of 24-hour AAAQO	0	1	1	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for October 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.08	0.08		-9.5	—	—
Minimum (Non-Zero)	0.17	0.08	0.08			—	—
Average	11.45	34.78	0.43	145.6 (SE)	7.1	—	—
Median	9.67	26.42	0.34		5.4	—	—
Maximum	43.00	749.50	2.63		26.1	—	—
Standard Deviation	8.49	51.00	0.37		7.7	—	—
Number Obs	656	657	658	658	658	0	0
Expected Obs	744	744	744	744	744	744	744
% Complete	88.2%	88.3%	88.4%	88.4%	88.4%	0.0%	0.0%
Calm Hours			185				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	393	309	8	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	41	15	27	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	9	53	184
Above 1-hour Equivalent AAAQO or AAAQG	0	5	80	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	2.57	10.22
Minimum (Non-Zero)	2.57	10.22
Average	11.54	35.14
Median	12.82	31.12
Maximum	19.22	146.73
Standard Deviation	3.60	24.25
Number Obs	27	27
Expected Obs	31	31
% Complete	88.2%	88.3%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 24-hour AAAQO	26	27	3	10
1/3 of 24-hour AAAQO	19	11	10	33
2/3 of 24-hour AAAQO	0	1	19	67
Above 24-hour AAAQO	0	1	29	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for October 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-8.5	10.0	86.4
Minimum (Non-Zero)	1.11			10.0	86.4
Average	3.87	283.4 (WNW)	6.5	66.1	87.9
Median	3.61		4.9	69.0	88.1
Maximum	15.00		25.4	100.0	89.4
Standard Deviation	2.23		7.29	24.50	0.793
Number Obs	648	648	739	739	739
Expected Obs	744	744	744	744	744
% Complete	87.1%	87.1%	99.3%	99.3%	99.3%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for October 2022

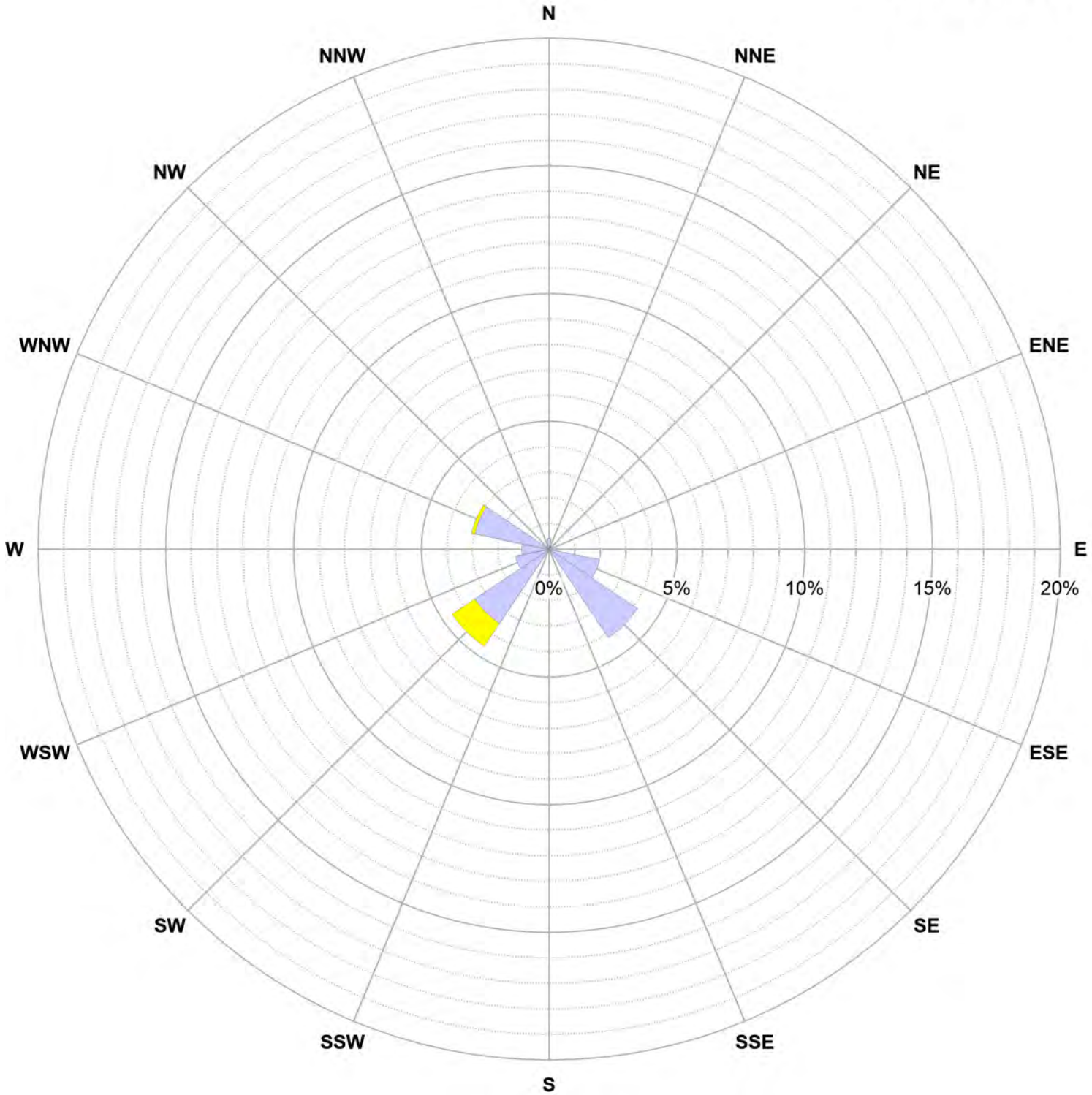
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.42	0.72	-0.94	-0.28	—	0.00	0.00	0.00	0.00
Minimum (Non-Zero)	0.42	0.72	-0.94	-0.28	—	0.03	0.50	0.17	0.17
Average	11.06	9.56	6.93	7.04	—	9.23	5.74	11.57	11.45
Median	8.93	8.72	6.31	5.71	—	7.17	4.33	9.92	9.67
Maximum	**94.07**	34.80	49.11	41.30	—	64.17	23.18	47.05	43.00
Standard Deviation	9.47	5.74	6.72	5.84	—	8.03	5.19	7.66	8.49
Number Obs	730	742	743	740	0	743	79	743	656
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	98.1%	99.7%	99.9%	99.5%	**0.0%**	99.9%	**10.6%**	99.9%	88.2%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.31	3.41	-0.15	0.63	—	1.70	3.19	4.57	2.57
Minimum (Non-Zero)	2.31	3.41	-0.15	0.63	—	1.70	3.19	4.57	2.57
Average	11.05	9.54	6.92	7.02	—	9.23	5.49	11.57	11.54
Median	9.48	9.45	6.55	6.44	—	9.11	5.28	12.10	12.82
Maximum	**33.82**	20.37	21.04	17.58	—	18.28	7.99	18.24	19.22
Standard Deviation	6.76	4.30	5.09	4.26	—	3.49	1.96	3.20	3.60
Number Obs	30	31	31	31	0	31	3	31	27
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	96.8%	100.0%	100.0%	100.0%	**0.0%**	100.0%	**9.7%**	100.0%	87.1%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

October 2022 Site 1 Wind Rose

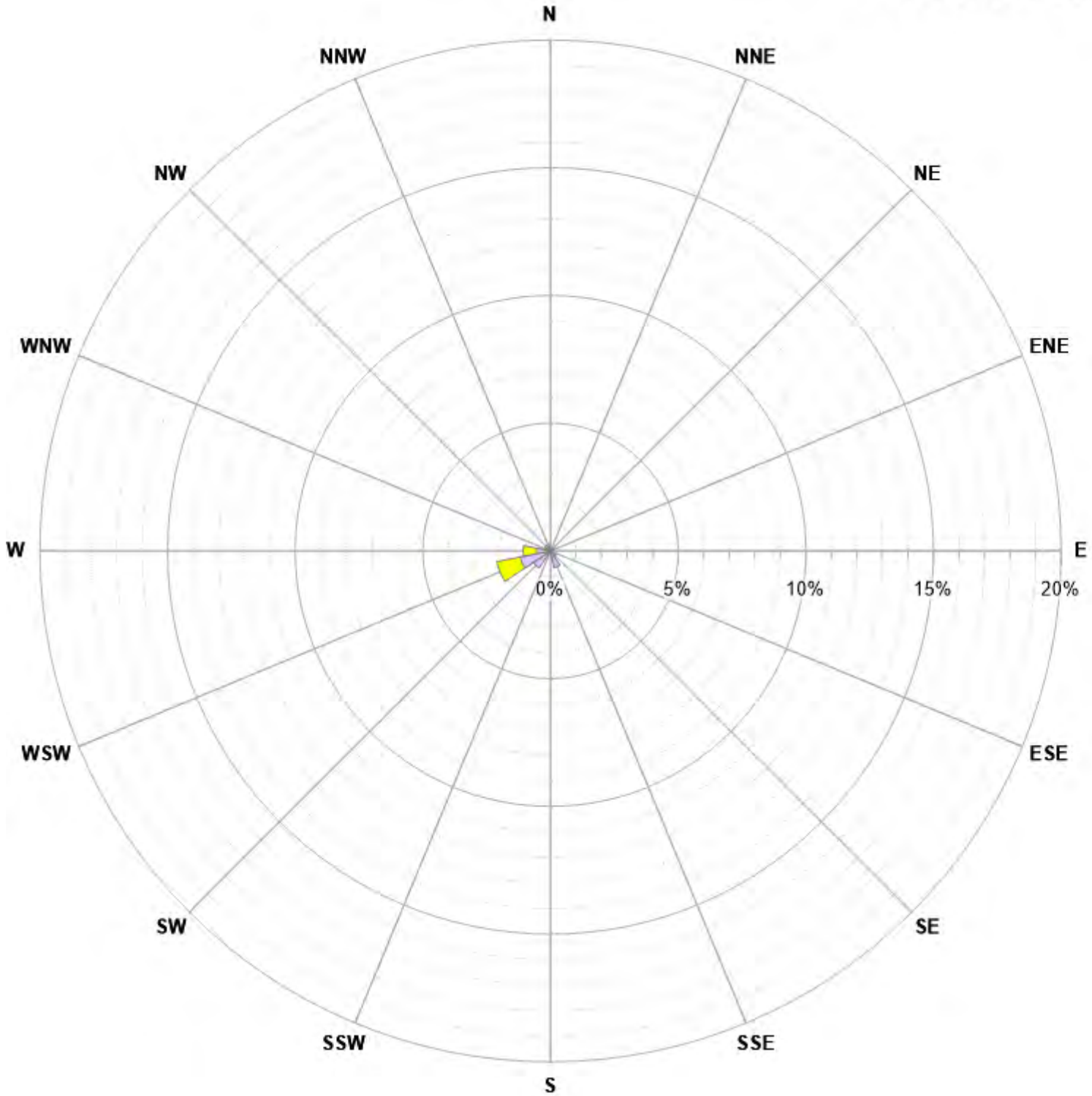


Wind Speed (m/s)

- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 32.1%
Missing Hours: 0.00%

October 2022 Site 2 Wind Rose

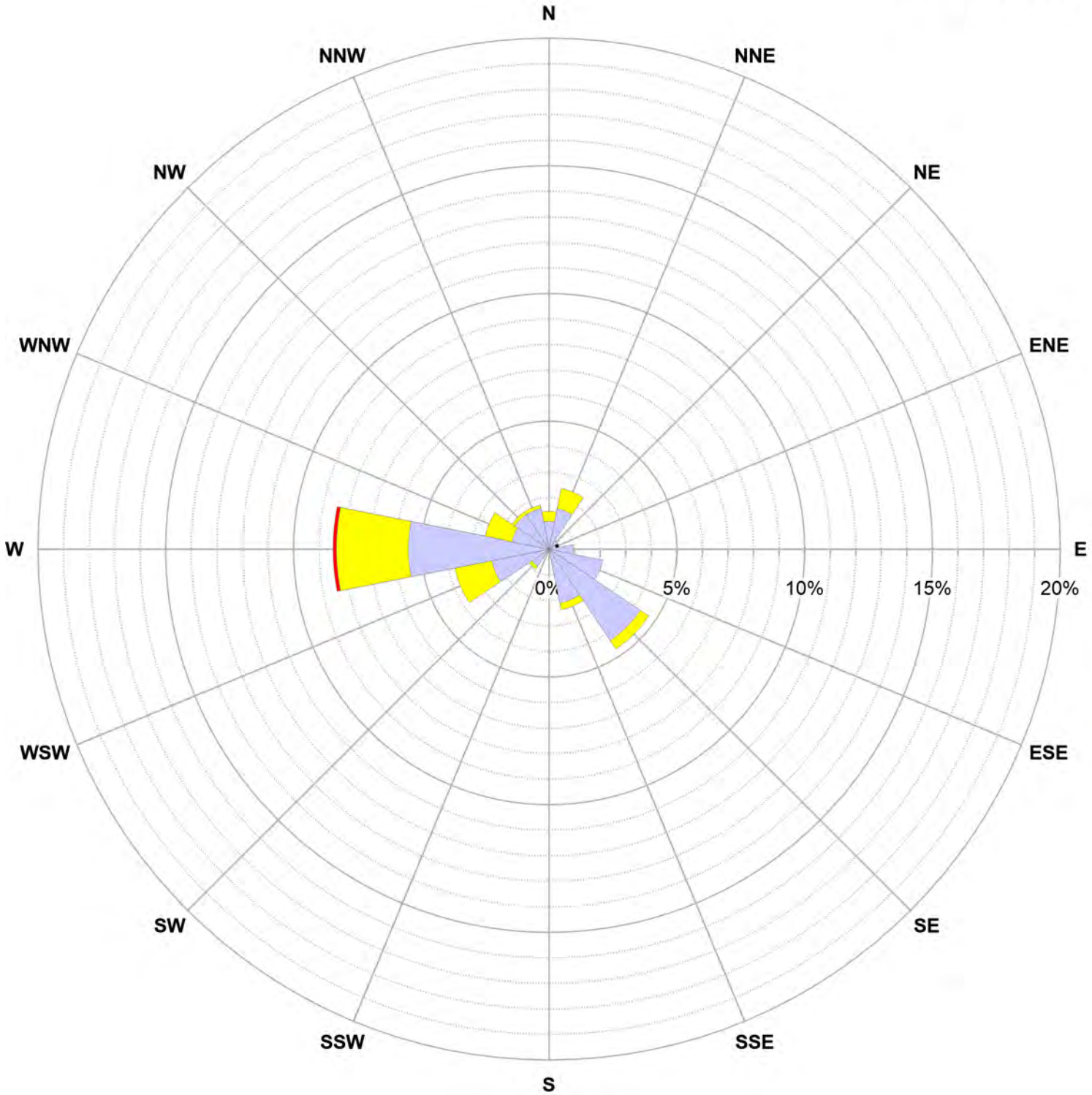


Wind Speed (m/s)

- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 0.13%
Missing Hours: 89.3%
Station Installed on: 28-Oct-2022

October 2022 Site 3 Wind Rose

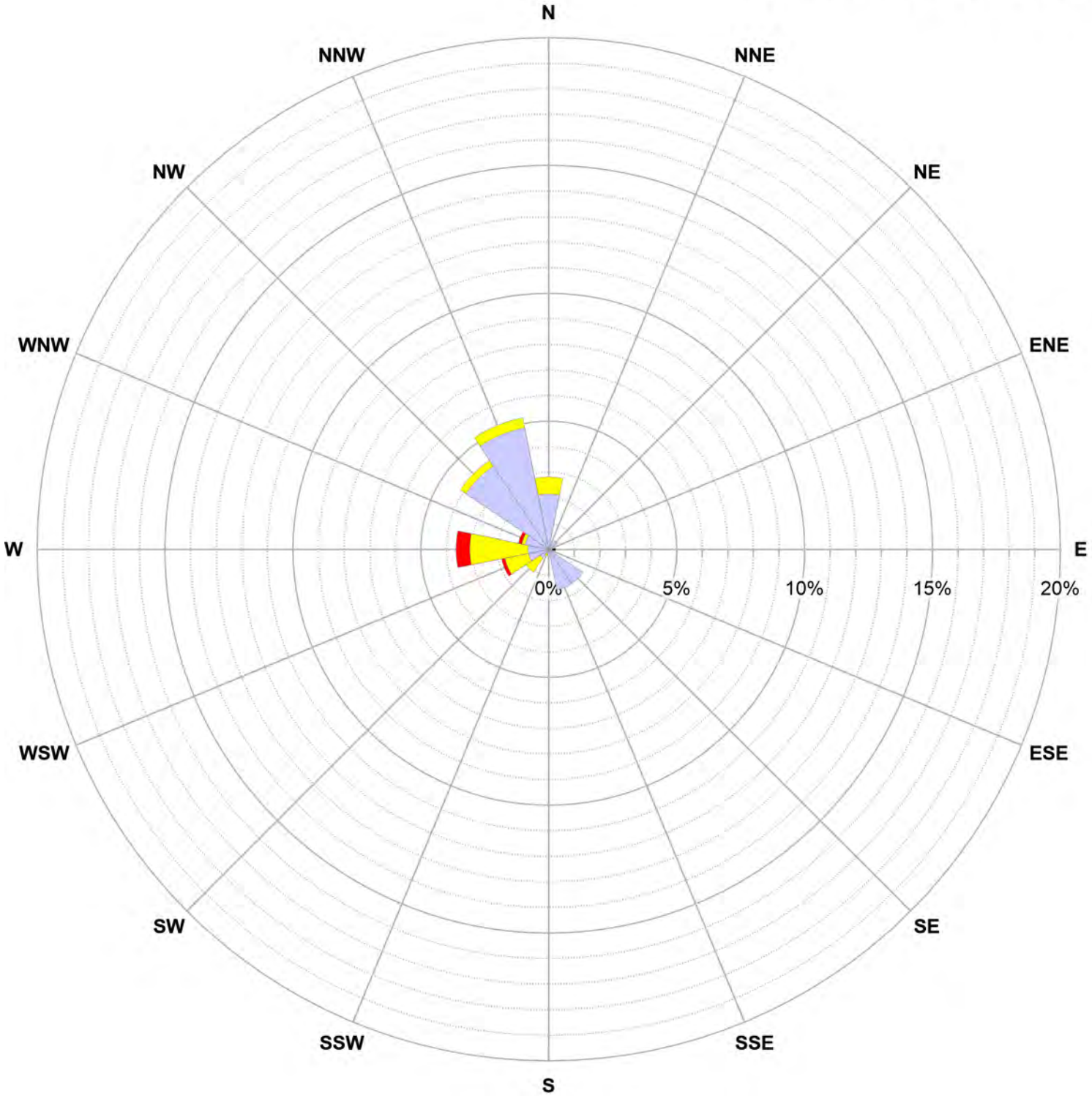


Wind Speed (m/s)

- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 7.66%
Missing Hours: 0.00%

October 2022 Calaway Park Wind Rose

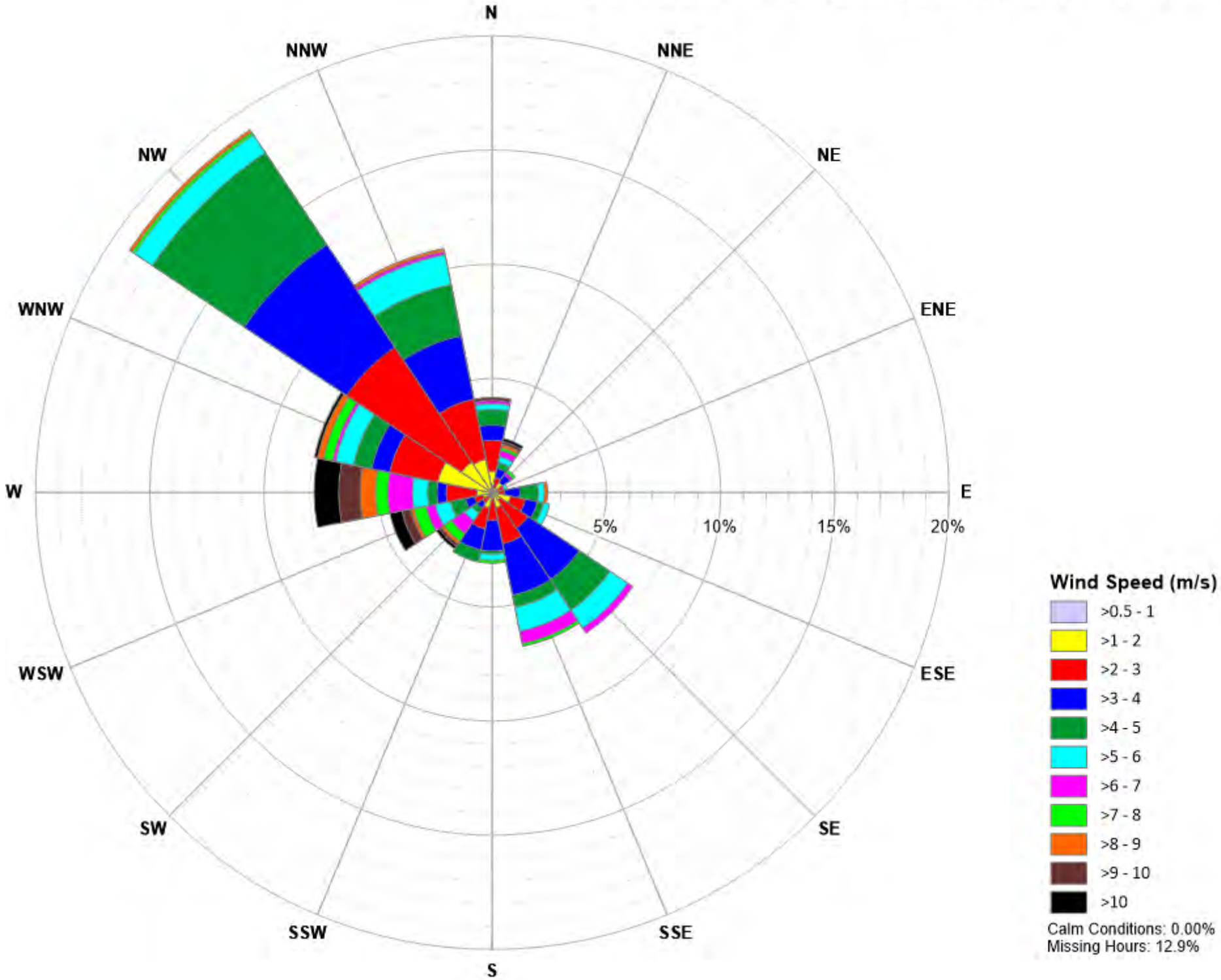


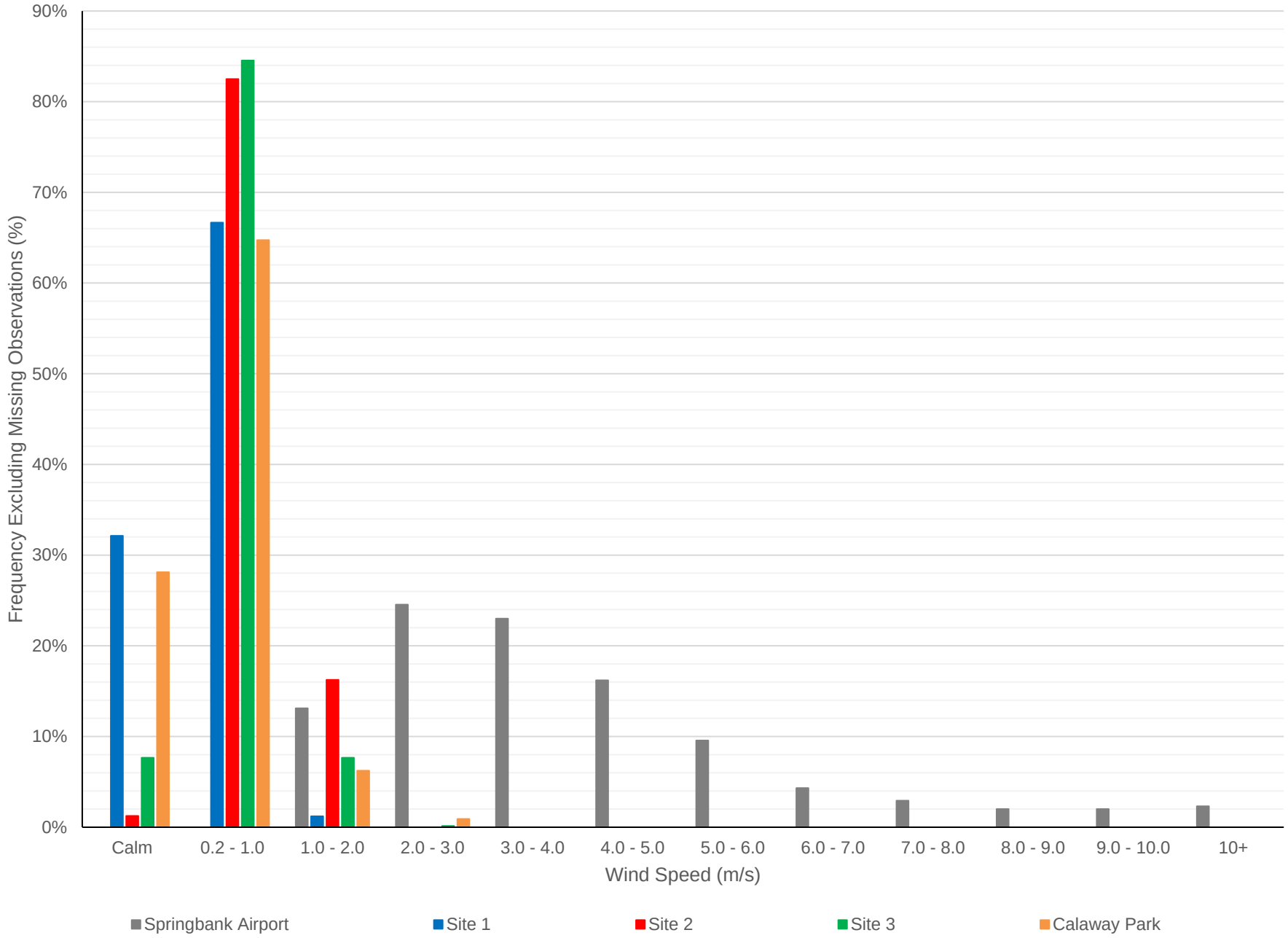
Wind Speed (m/s)

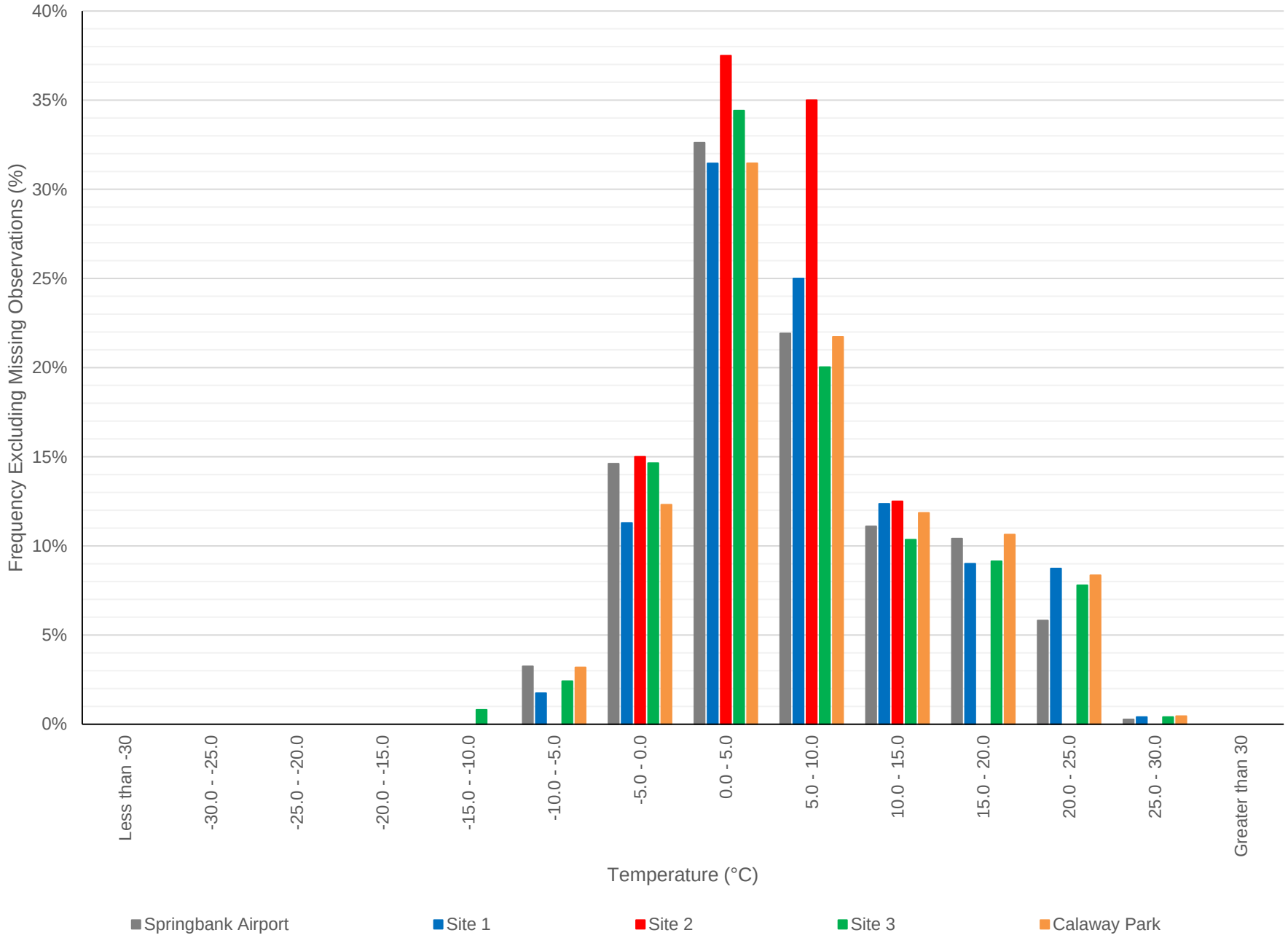
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

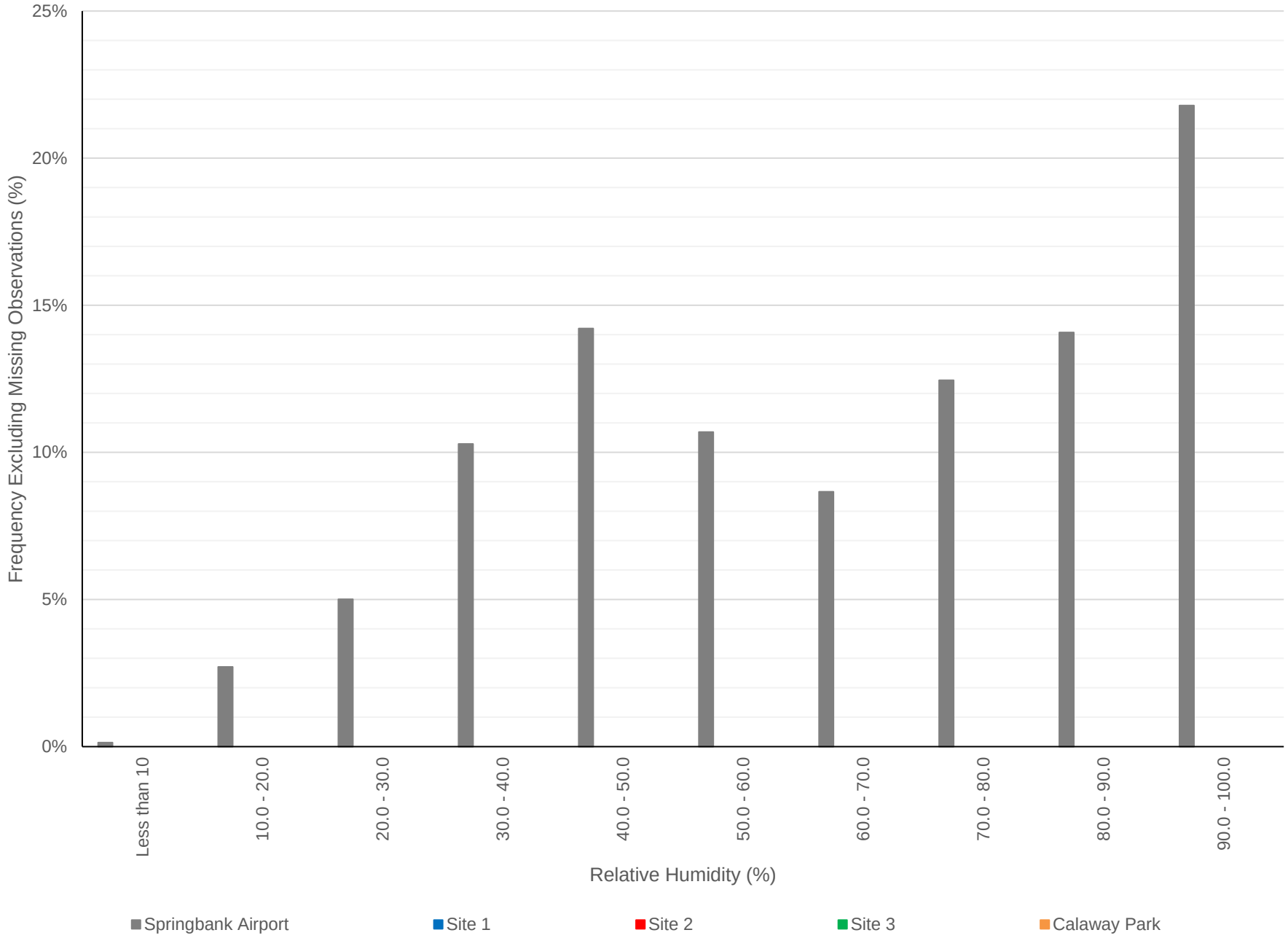
Calm Conditions: 24.9%
Missing Hours: 11.6%
Site Removed 28-Oct-2022

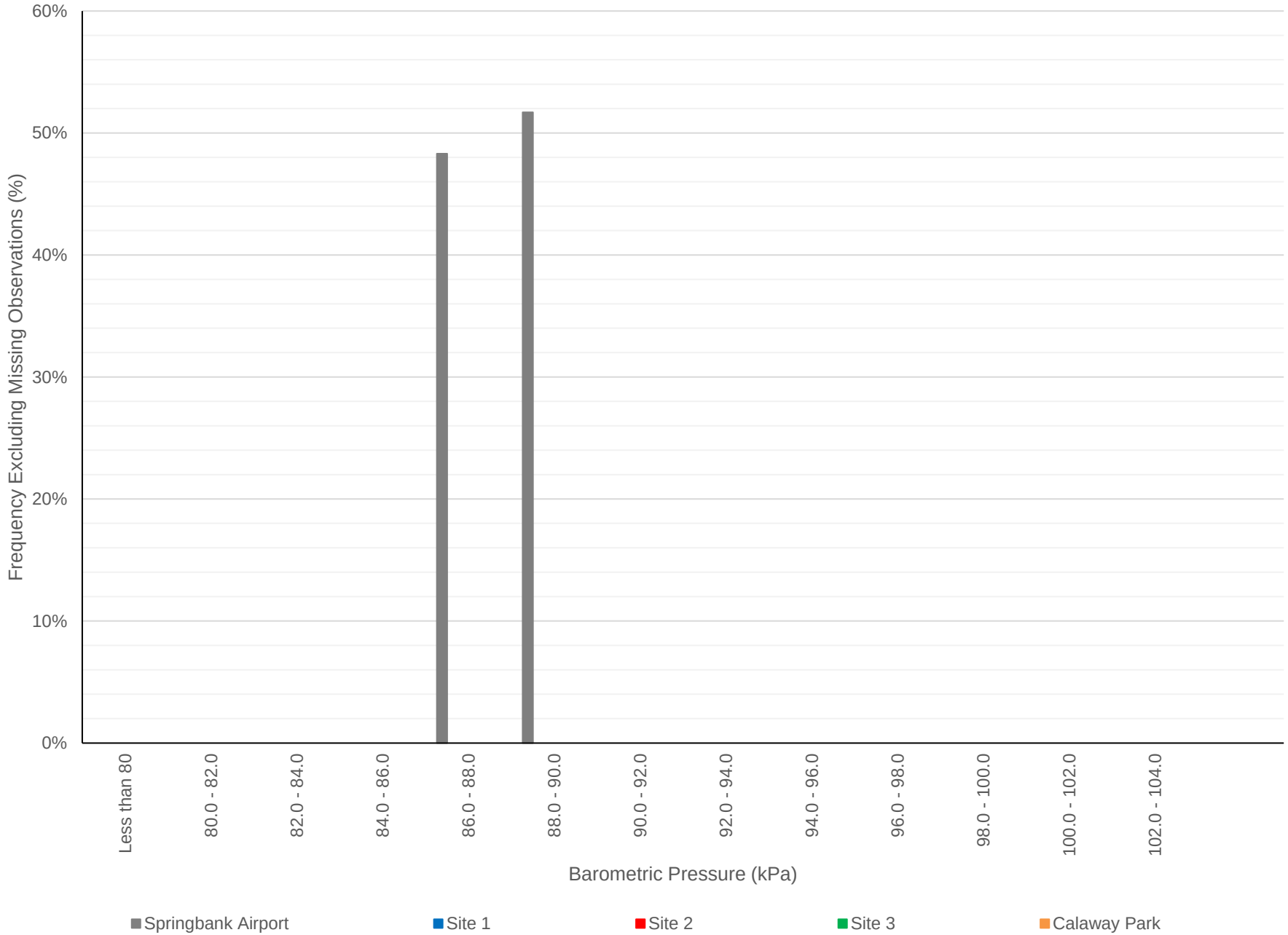
October 2022 Springbank Airport Wind Rose

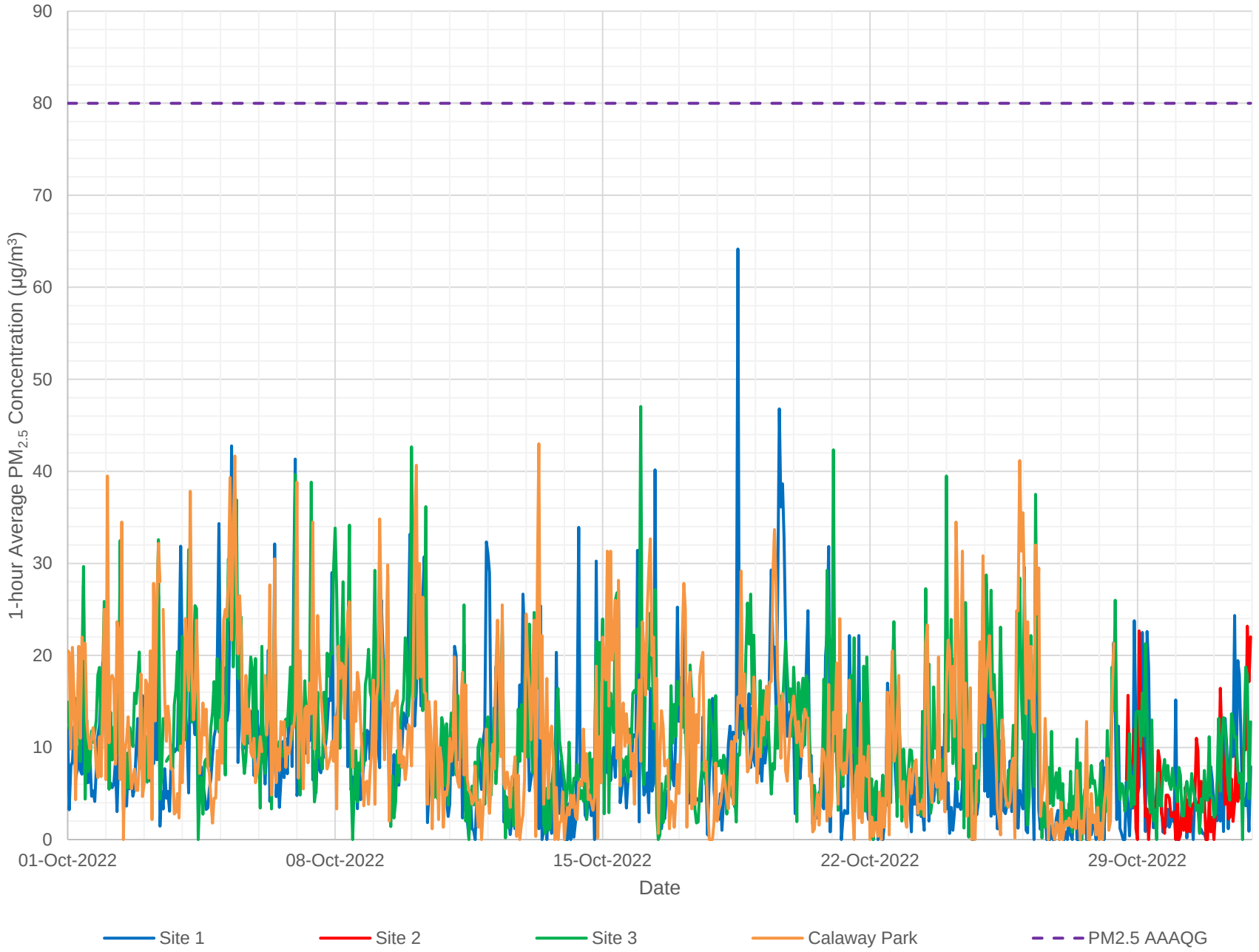


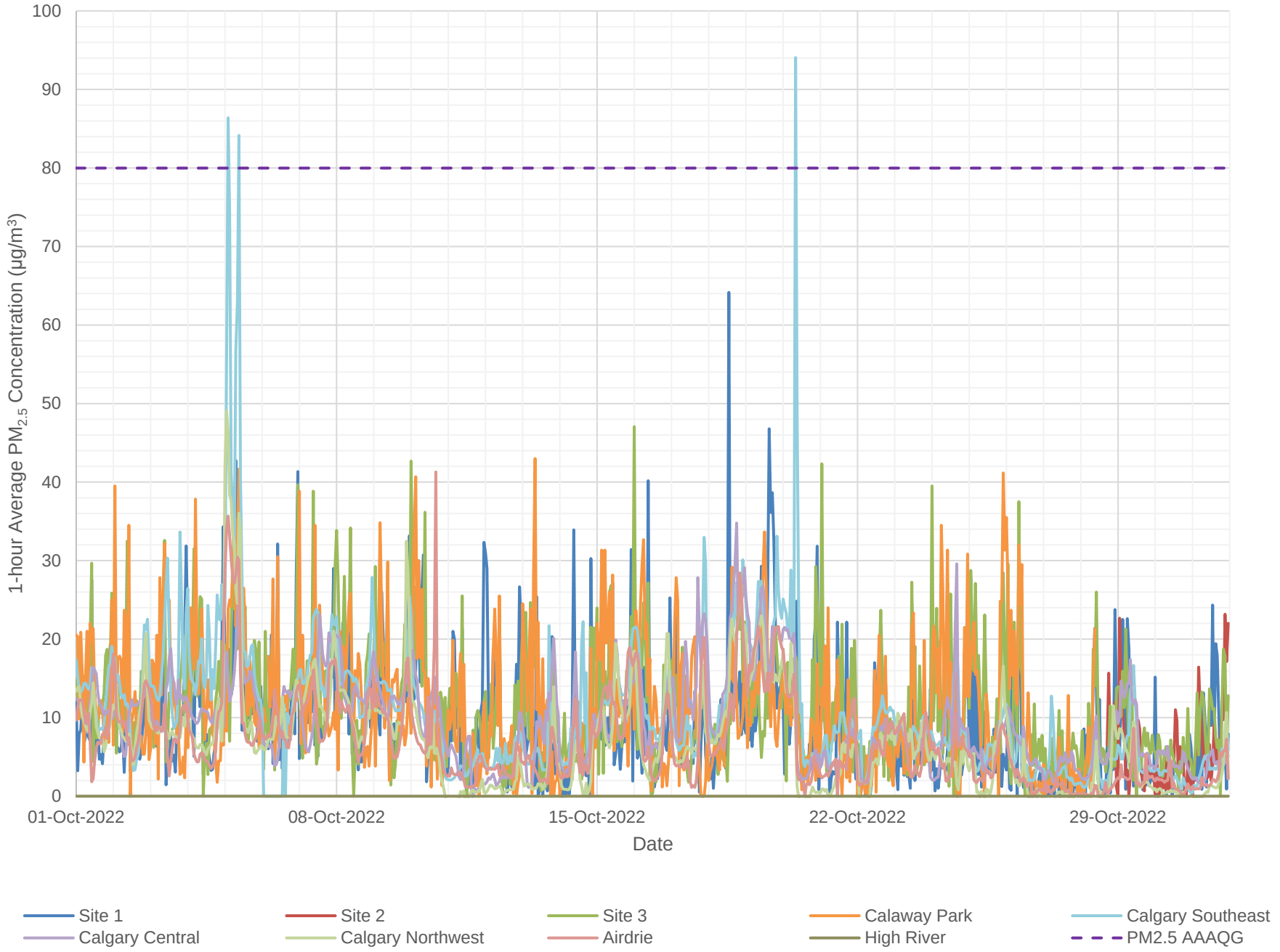

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

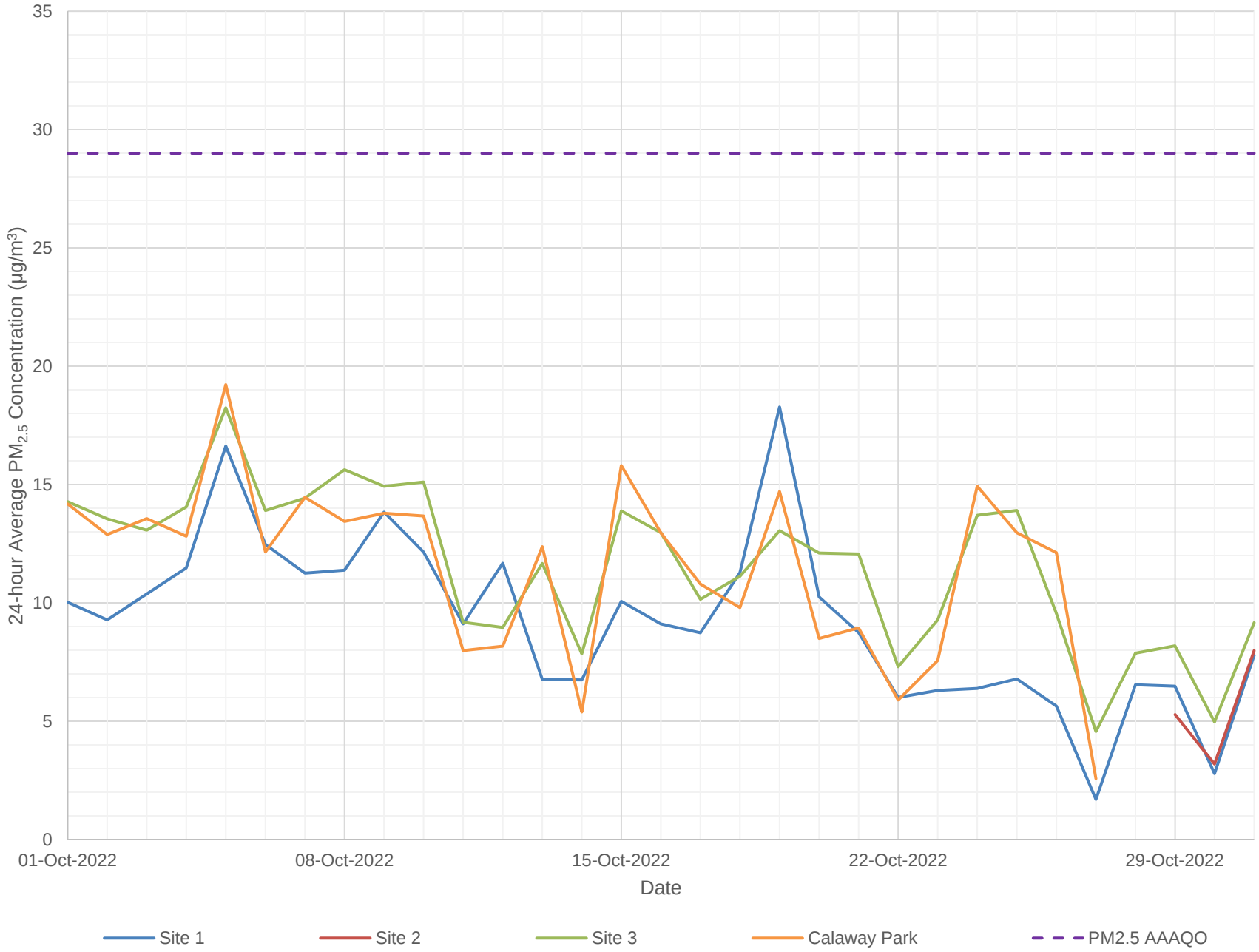

40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

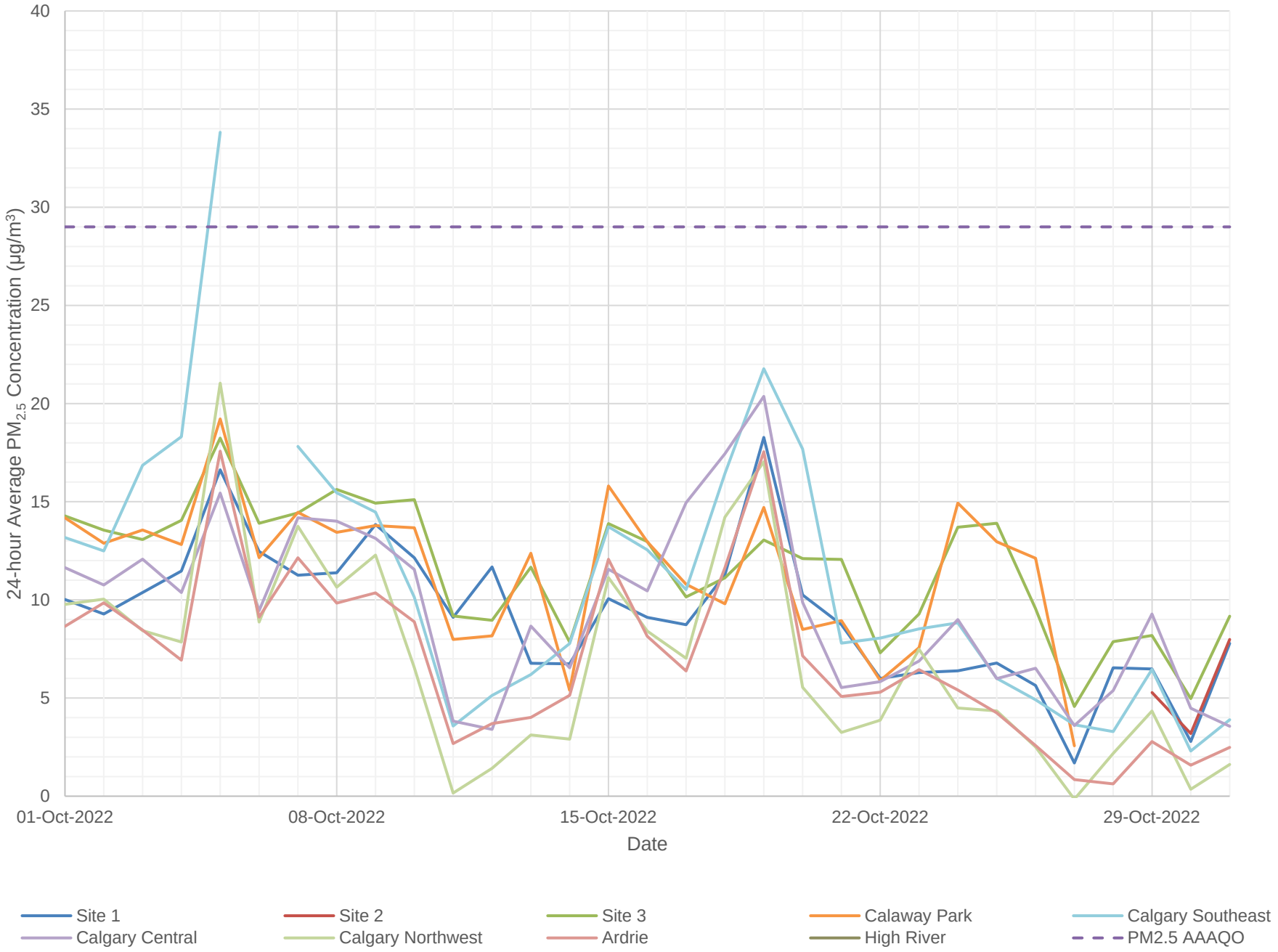

25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

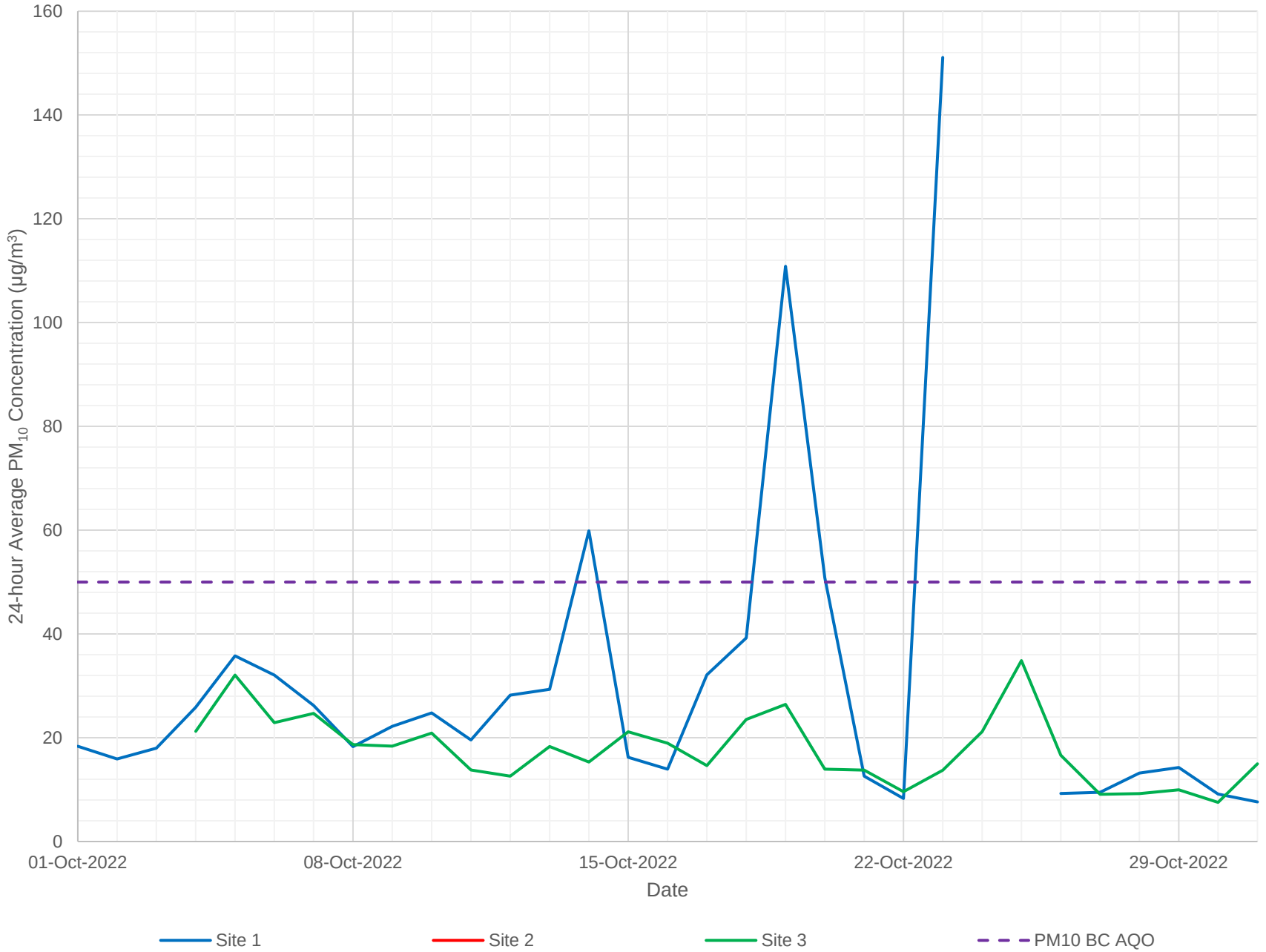

60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

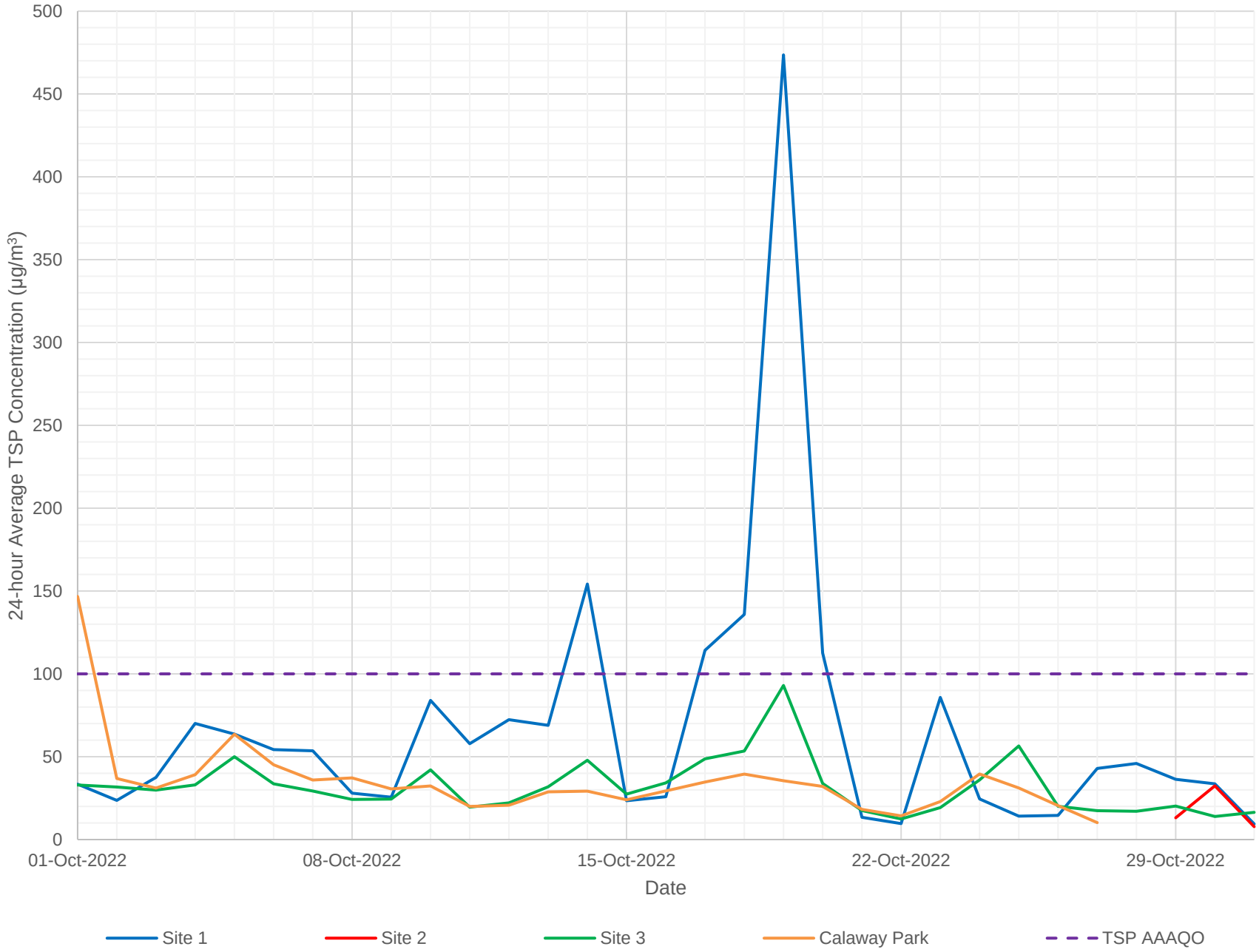

90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


100
90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


40
35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


160
140
120
100
80
60
40
20
0
24-hour Average PM10 Concentration (µg/m3)
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO


500
450
400
350
300
250
200
150
100
50
0
24-hour Average TSP Concentration (µg/m³)
01-Oct-2022
08-Oct-2022
15-Oct-2022
22-Oct-2022
29-Oct-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for November 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-28.9	—	—
Minimum (Non-Zero)	0.05	0.17	0.33	0.08			—	—
Average	8.54	27.75	36.73	0.30	314.7 (NW)	-6.7	—	—
Median	5.82	11.00	11.78	0.24		-5.5	—	—
Maximum	44.00	898.17	1,309.60	1.72		10.6	—	—
Standard Deviation	7.74	73.68	96.05	0.21		8.8	—	—
Number Obs	716	711	692	719	719	719	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	99.4%	98.8%	96.1%	99.9%	99.9%	99.9%	0.0%	0.0%
Calm Hours				270				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	289	309	171	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	26	71	61	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	36	26	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	26	14	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	3.18	5.15	6.06
Minimum (Non-Zero)	3.18	5.15	6.06
Average	8.54	27.59	39.38
Median	8.69	13.63	17.64
Maximum	15.37	210.00	329.68
Standard Deviation	3.08	39.28	60.93
Number Obs	30	30	29
Expected Obs	30	30	30
% Complete	99.4%	98.8%	96.1%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	30	30	24	3	5	10
1/3 of 24-hour AAAQO	12	13	8	10	17	33
2/3 of 24-hour AAAQO	0	6	4	19	33	67
Above 24-hour AAAQO	0	4	2	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for November 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	—	0.00	0.12		-28.0	—	—
Minimum (Non-Zero)	0.05	—	0.33	0.12			—	—
Average	9.22	—	30.15	0.63	345.2 (NNW)	-6.9	—	—
Median	6.43	—	13.85	0.49		-5.6	—	—
Maximum	50.50	—	973.17	2.44		11.4	—	—
Standard Deviation	8.53	—	61.46	0.41		8.9	—	—
Number Obs	714	0	713	716	716	716	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	99.2%	0.0%	99.0%	99.4%	99.4%	99.4%	0.0%	0.0%
Calm Hours				36				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	296	0	184	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	37	0	45	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	16	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	8	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	3.49	—	6.89
Minimum (Non-Zero)	3.49	—	6.89
Average	9.22	—	30.08
Median	9.09	—	18.94
Maximum	18.98	—	120.03
Standard Deviation	4.02	—	29.03
Number Obs	30	0	30
Expected Obs	30	30	30
% Complete	99.2%	0.0%	99.0%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	30	0	26	3	5	10
1/3 of 24-hour AAAQO	10	0	7	10	17	33
2/3 of 24-hour AAAQO	0	0	3	19	33	67
Above 24-hour AAAQO	0	0	2	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for November 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-29.7	—	—
Minimum (Non-Zero)	0.03	0.02	0.17	0.08			—	—
Average	11.07	19.56	27.37	0.60	333.2 (NNW)	-7.8	—	—
Median	8.25	10.55	12.58	0.46		-6.6	—	—
Maximum	58.38	294.67	634.47	1.97		10.2	—	—
Standard Deviation	9.19	31.00	48.21	0.40		9.0	—	—
Number Obs	710	664	697	716	716	716	0	0
Expected Obs	720	720	720	720	720	720	720	720
% Complete	98.6%	92.2%	96.8%	99.4%	99.4%	99.4%	0.0%	0.0%
Calm Hours				66				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	367	250	164	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	49	50	42	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	1	19	11	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	13	6	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	2.81	3.84	7.31
Minimum (Non-Zero)	2.81	3.84	7.31
Average	11.08	19.65	27.33
Median	10.16	12.29	17.20
Maximum	24.32	91.95	110.34
Standard Deviation	4.80	19.74	27.63
Number Obs	30	28	29
Expected Obs	30	30	30
% Complete	98.6%	92.2%	96.8%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	5	26	26	3	5	10
1/3 of 24-hour AAAQO	0	9	7	10	17	33
2/3 of 24-hour AAAQO	0	4	3	19	33	67
Above 24-hour AAAQO	0	3	2	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for November 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—			—	—
Average	—	—	—	— (—)	—	—	—
Median	—	—	—		—	—	—
Maximum	—	—	—		—	—	—
Standard Deviation	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0
Expected Obs	720	720	720	720	720	720	720
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours			0				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	—	—
Minimum (Non-Zero)	—	—
Average	—	—
Median	—	—
Maximum	—	—
Standard Deviation	—	—
Number Obs	0	0
Expected Obs	30	30
% Complete	0.0%	0.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	0	0	3	10	
1/3 of 24-hour AAAQO	0	0	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for November 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-29.7	35.0	84.6
Minimum (Non-Zero)	1.11			35.0	84.6
Average	4.89	318.1 (NW)	-7.6	70.8	87.8
Median	4.17		-6.2	73.0	87.9
Maximum	15.28		10.7	100.0	90.1
Standard Deviation	2.67		8.52	14.71	0.957
Number Obs	674	674	720	720	720
Expected Obs	720	720	720	720	720
% Complete	93.6%	93.6%	100.0%	100.0%	100.0%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for November 2022

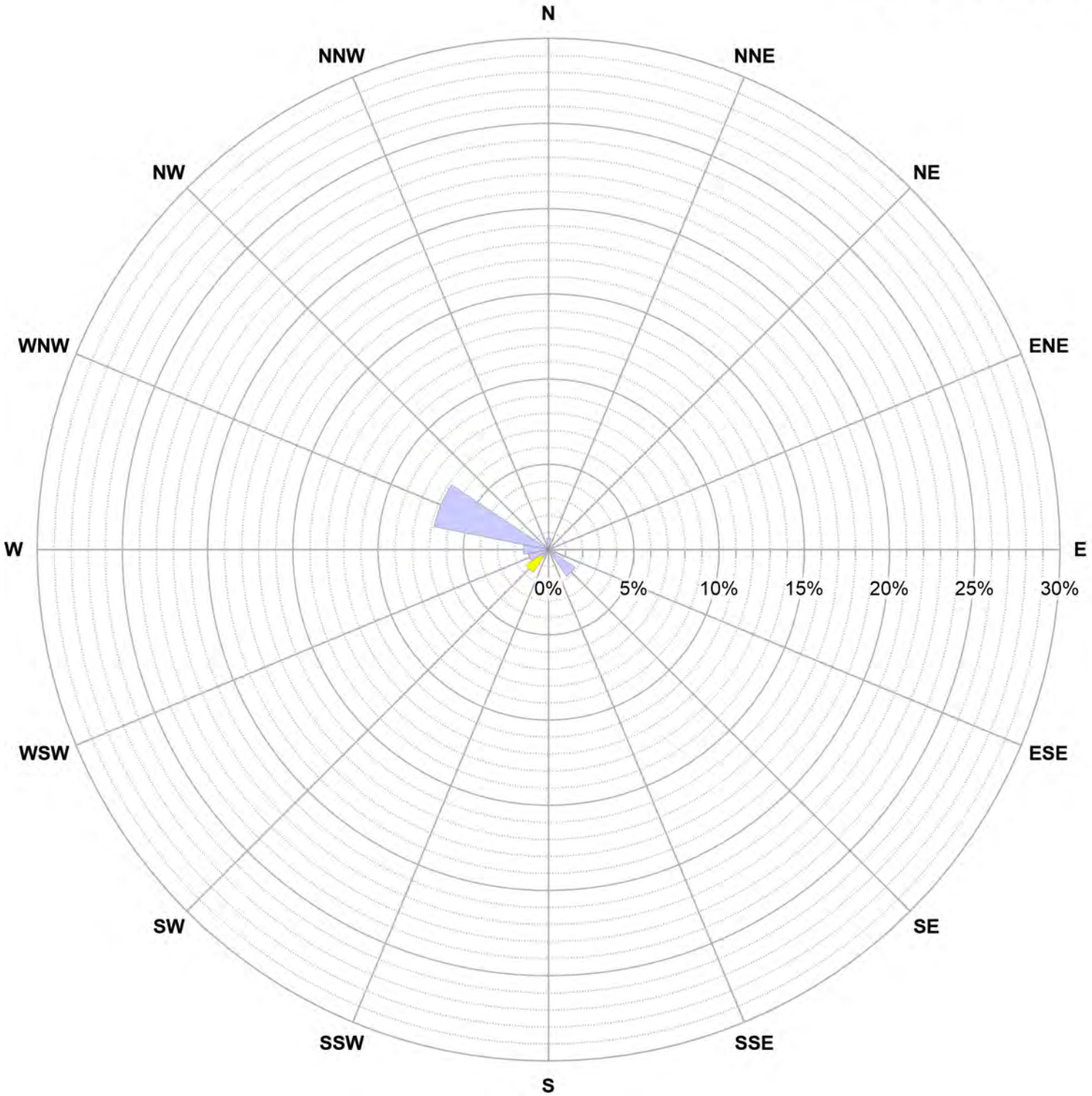
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.58	-1.74	-0.94	0.44	—	0.00	0.00	0.00	—
Minimum (Non-Zero)	0.58	-1.74	-0.94	0.44	—	0.05	0.05	0.03	—
Average	6.26	5.97	4.22	4.27	—	8.54	9.22	11.07	—
Median	5.48	4.33	3.32	3.20	—	5.82	6.43	8.25	—
Maximum	22.21	33.34	37.23	40.18	—	44.00	50.50	58.38	—
Standard Deviation	3.38	5.93	4.04	3.94	—	7.74	8.53	9.19	—
Number Obs	718	675	718	718	0	716	714	710	0
Expected Obs	720	720	720	720	720	720	720	720	720
% Complete	99.7%	93.8%	99.7%	99.7%	**0.0%**	99.4%	99.2%	98.6%	**0.0%**

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.07	-0.52	0.06	1.19	—	3.18	3.49	2.81	—
Minimum (Non-Zero)	2.07	-0.52	0.06	1.19	—	3.18	3.49	2.81	—
Average	6.26	5.97	4.22	4.27	—	8.54	9.22	11.08	—
Median	5.67	5.51	3.75	3.83	—	8.69	9.09	10.16	—
Maximum	13.11	15.49	11.91	12.59	—	15.37	18.98	24.32	—
Standard Deviation	2.56	4.29	2.86	2.47	—	3.08	4.02	4.80	—
Number Obs	30	28	30	30	0	30	30	30	0
Expected Obs	30	30	30	30	30	30	30	30	30
% Complete	100.0%	93.3%	100.0%	100.0%	**0.0%**	100.0%	100.0%	100.0%	**0.0%**

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

November 2022 Site 1 Wind Rose

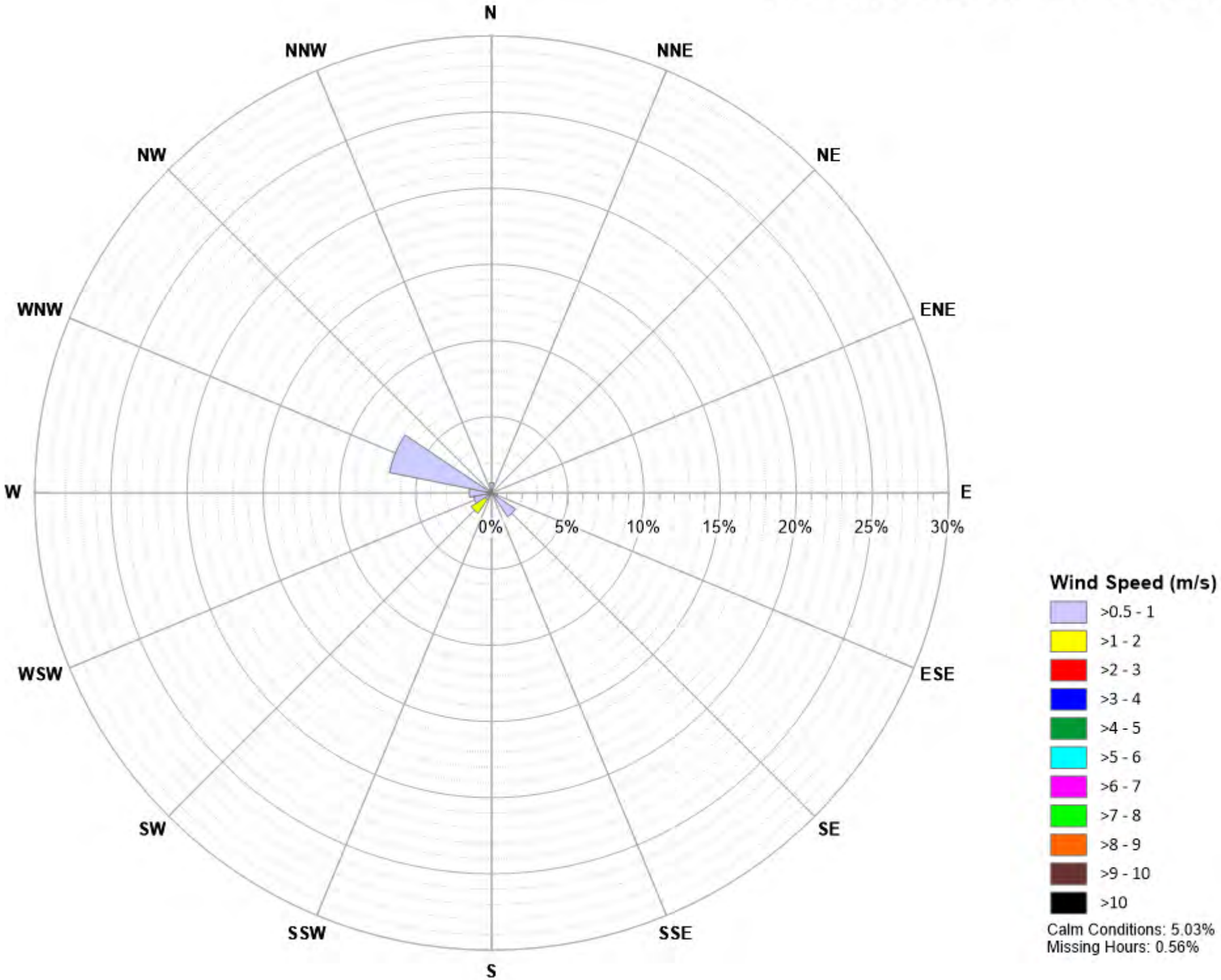


Wind Speed (m/s)

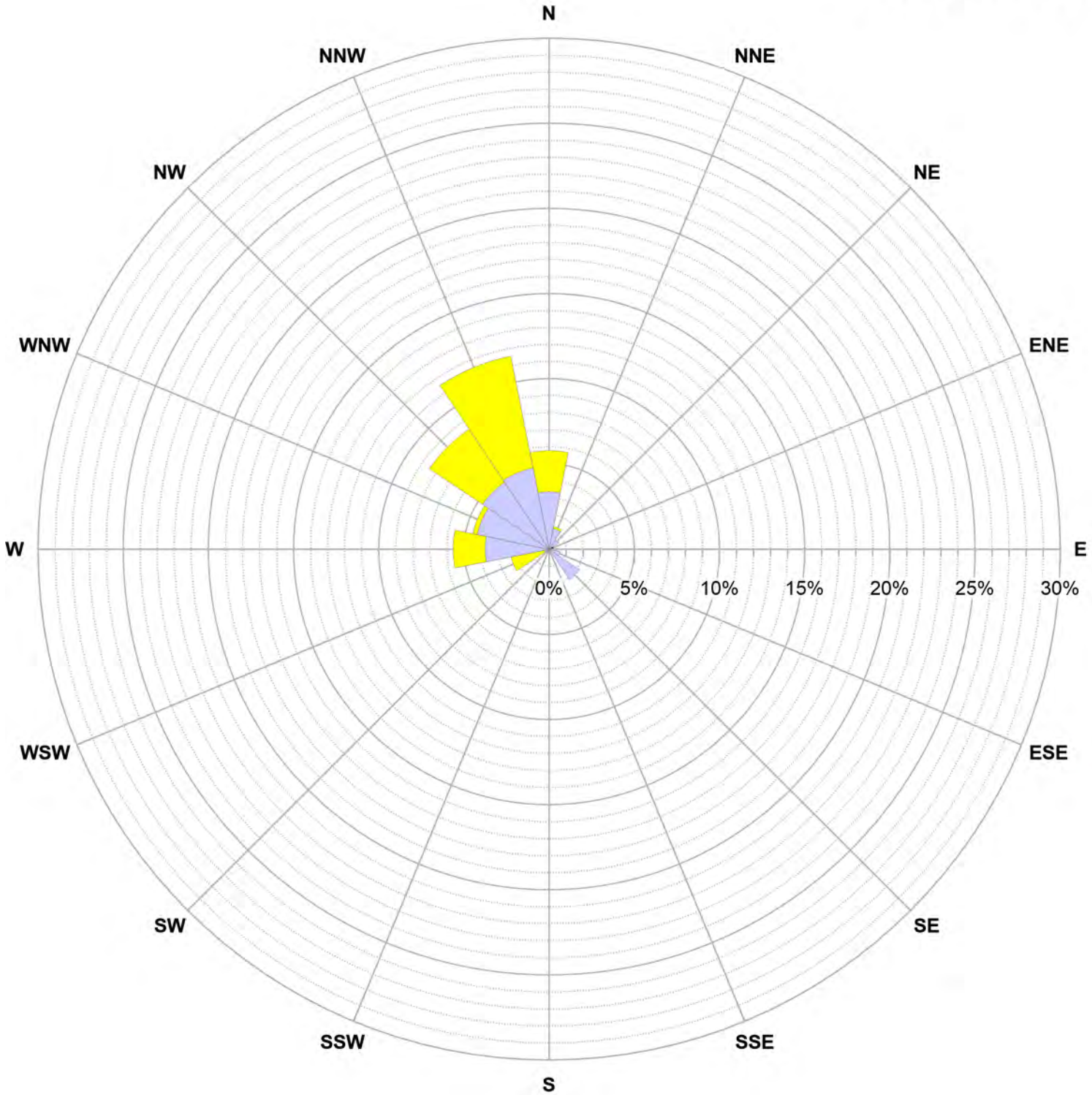
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

Calm Conditions: 37.6%
Missing Hours: 0.14%

November 2022 Site 2 Wind Rose



November 2022 Site 3 Wind Rose

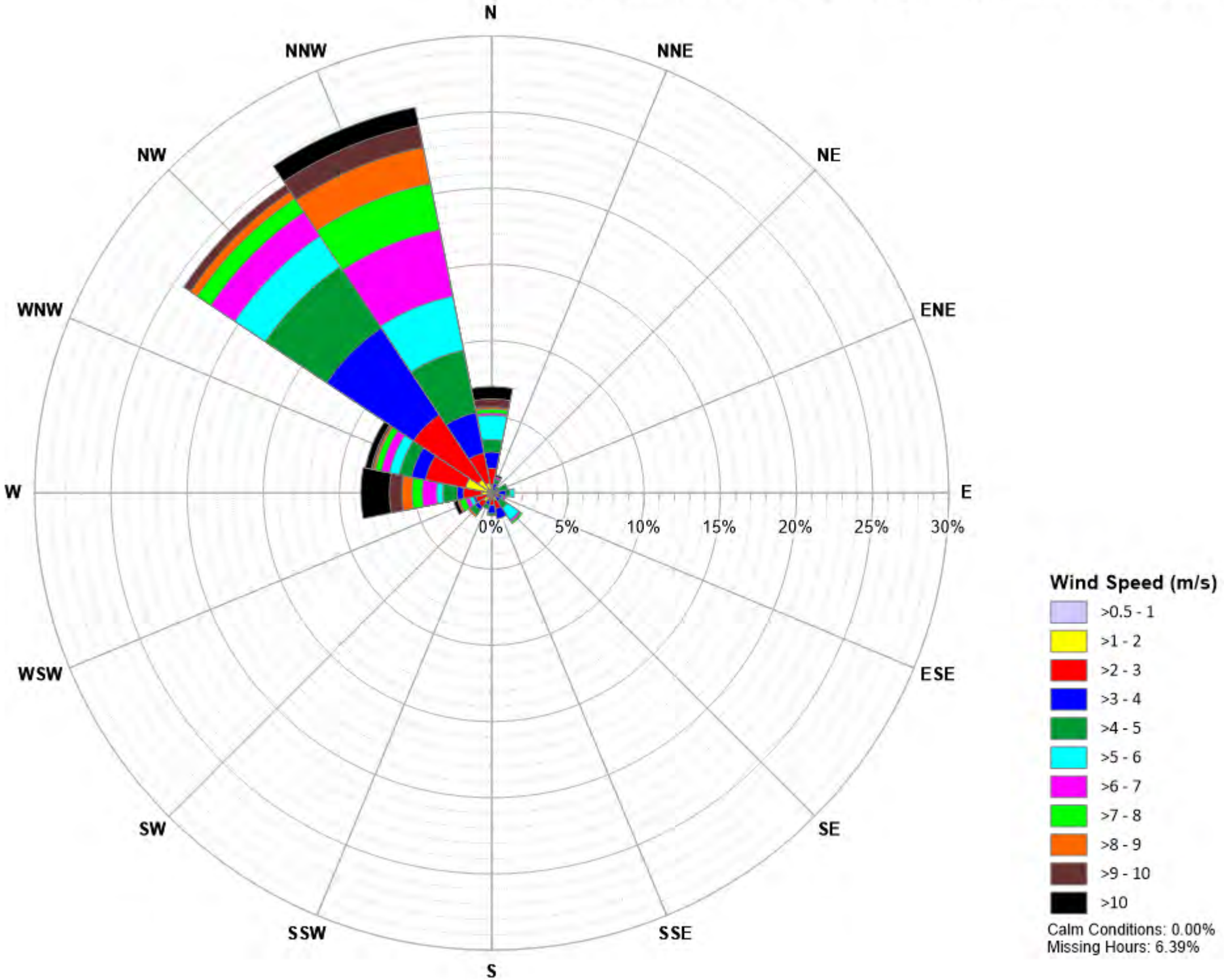


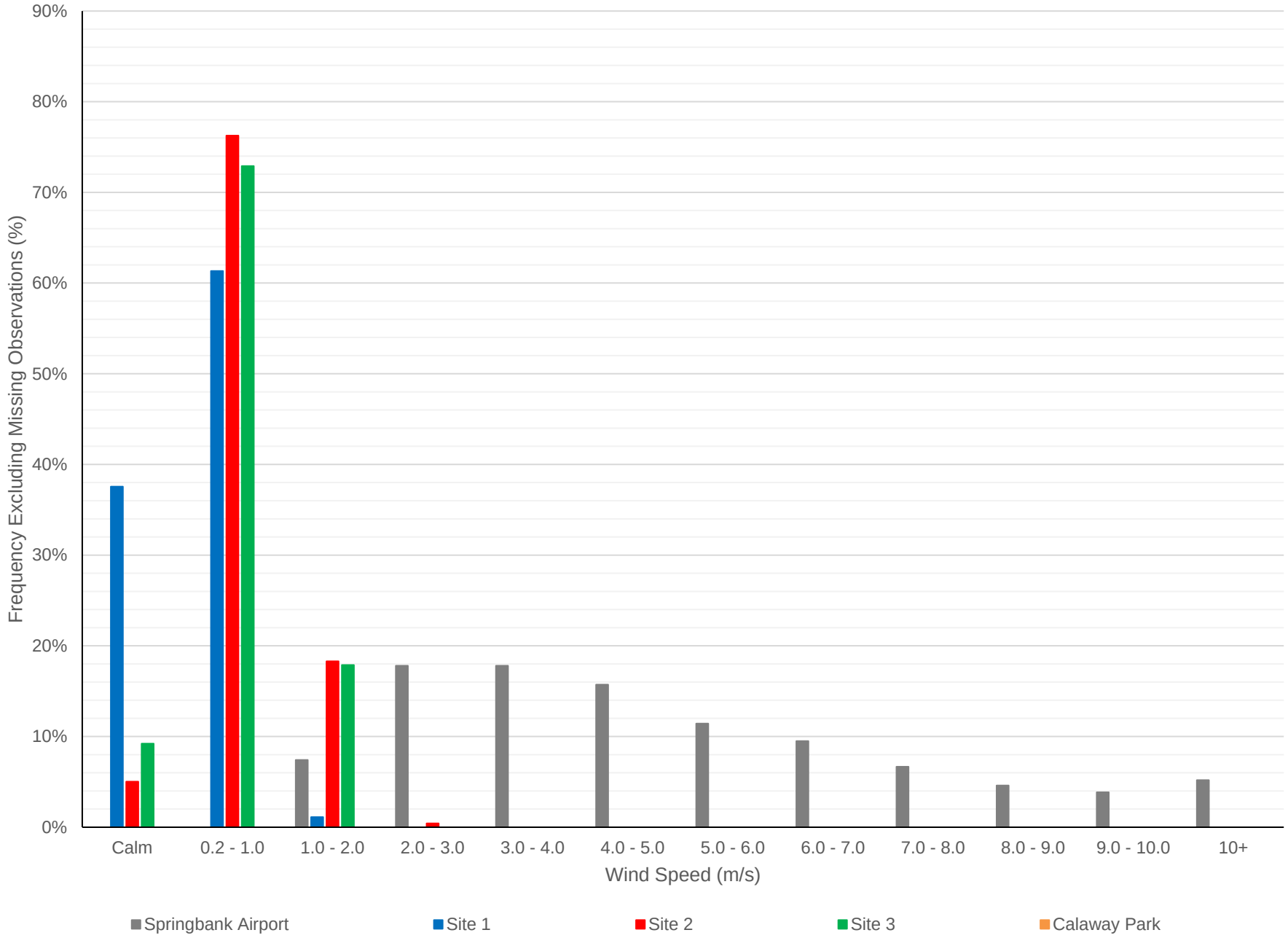
Wind Speed (m/s)

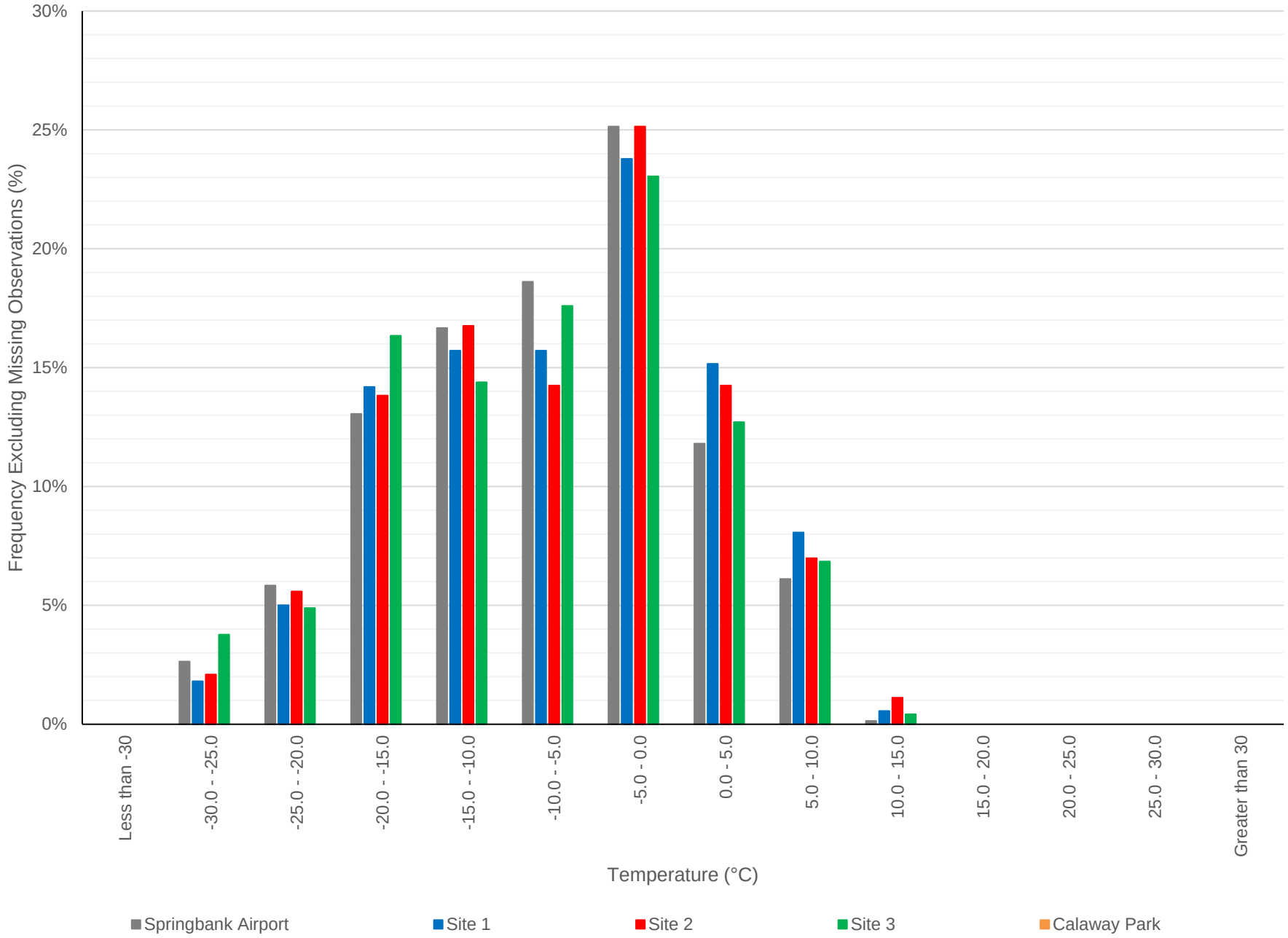
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

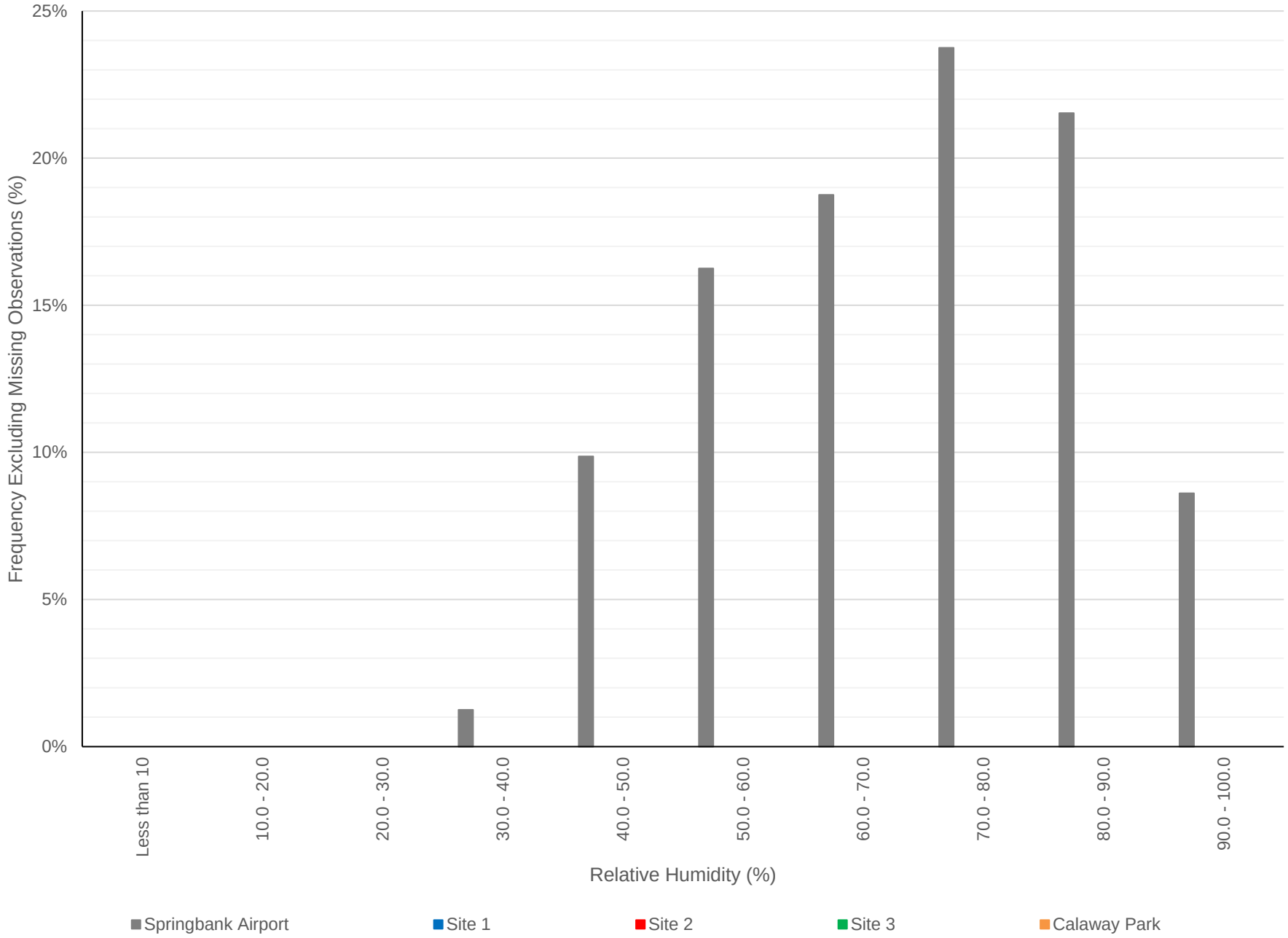
Calm Conditions: 9.22%
Missing Hours: 0.56%

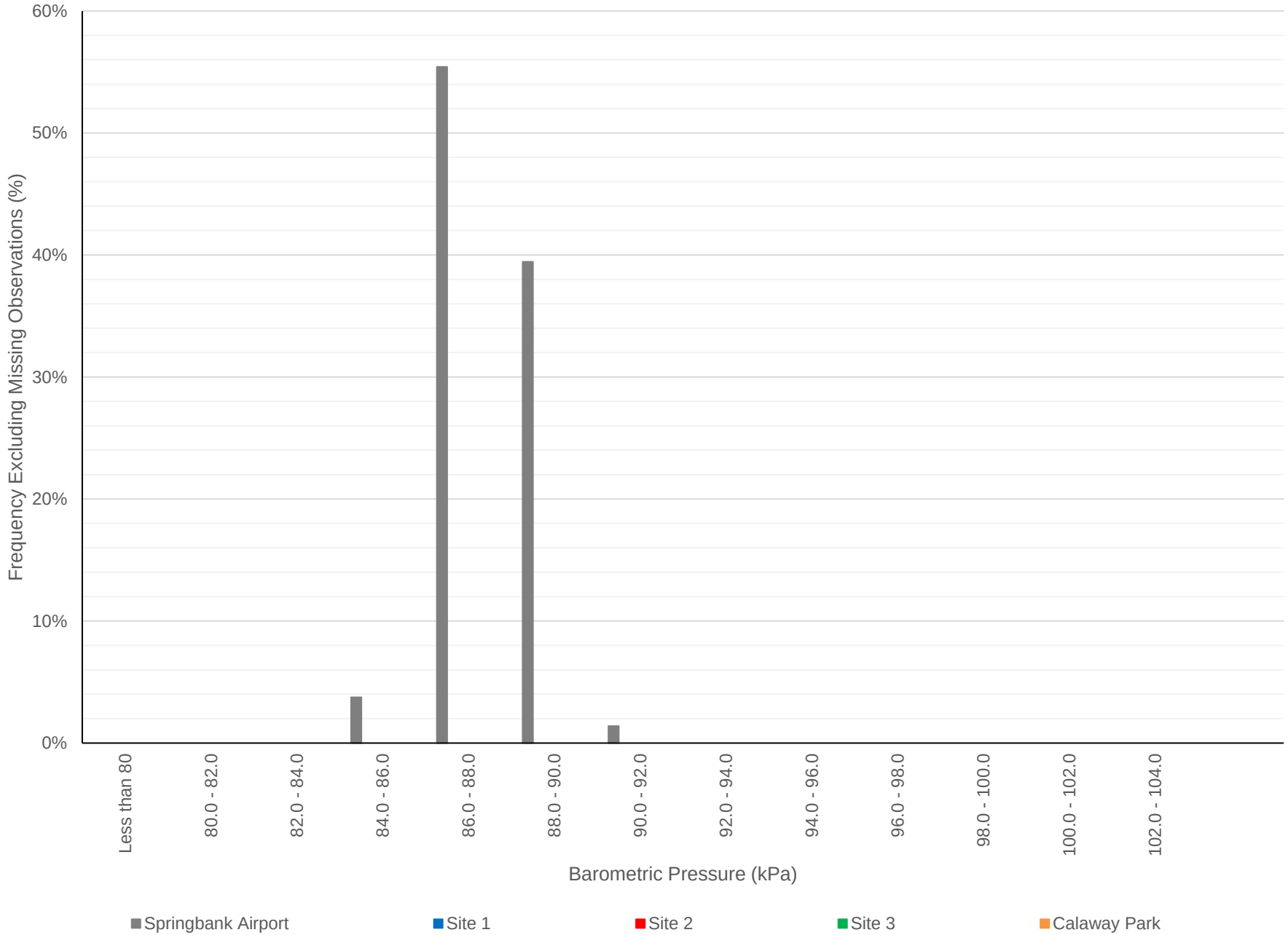
November 2022 Springbank Airport Wind Rose

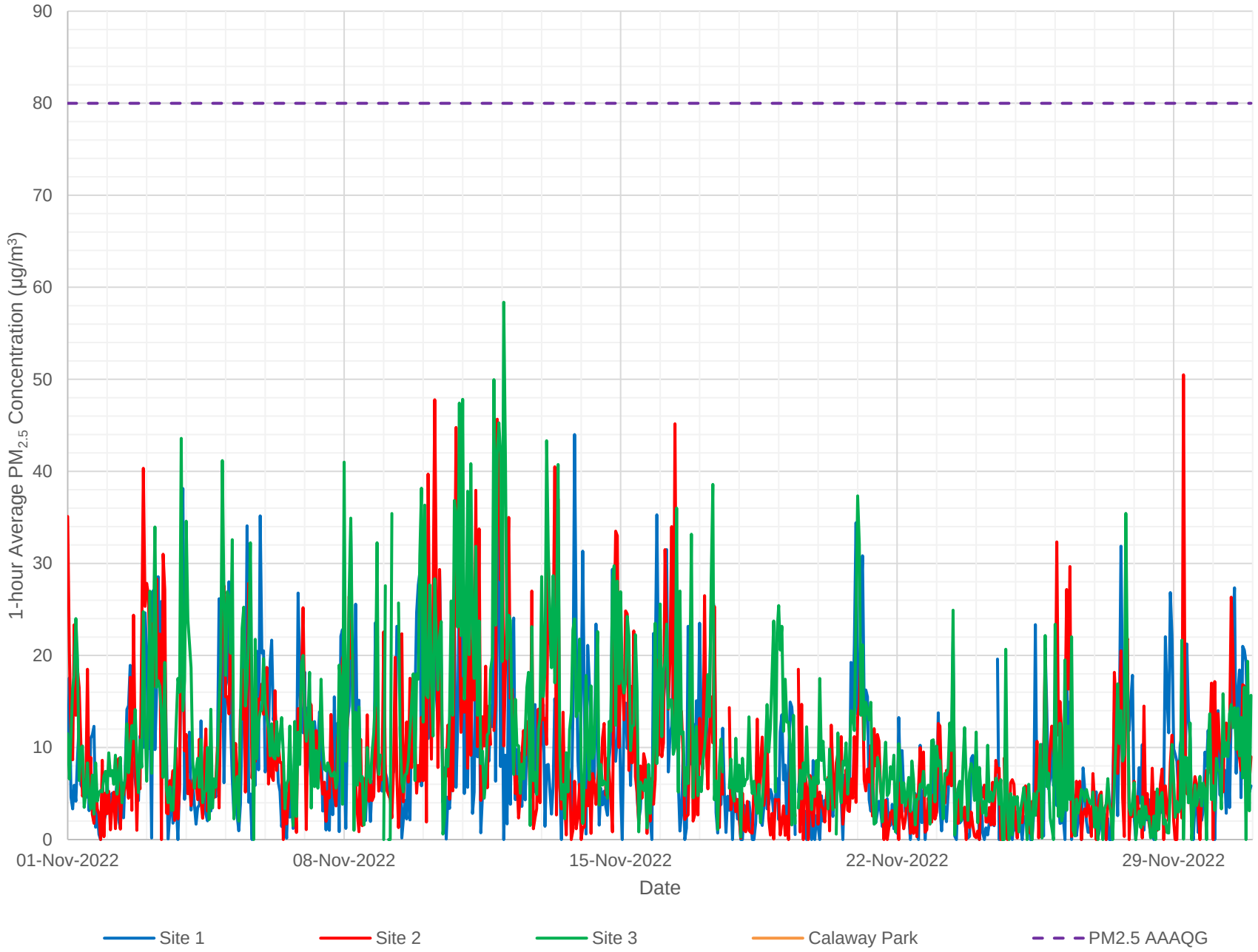


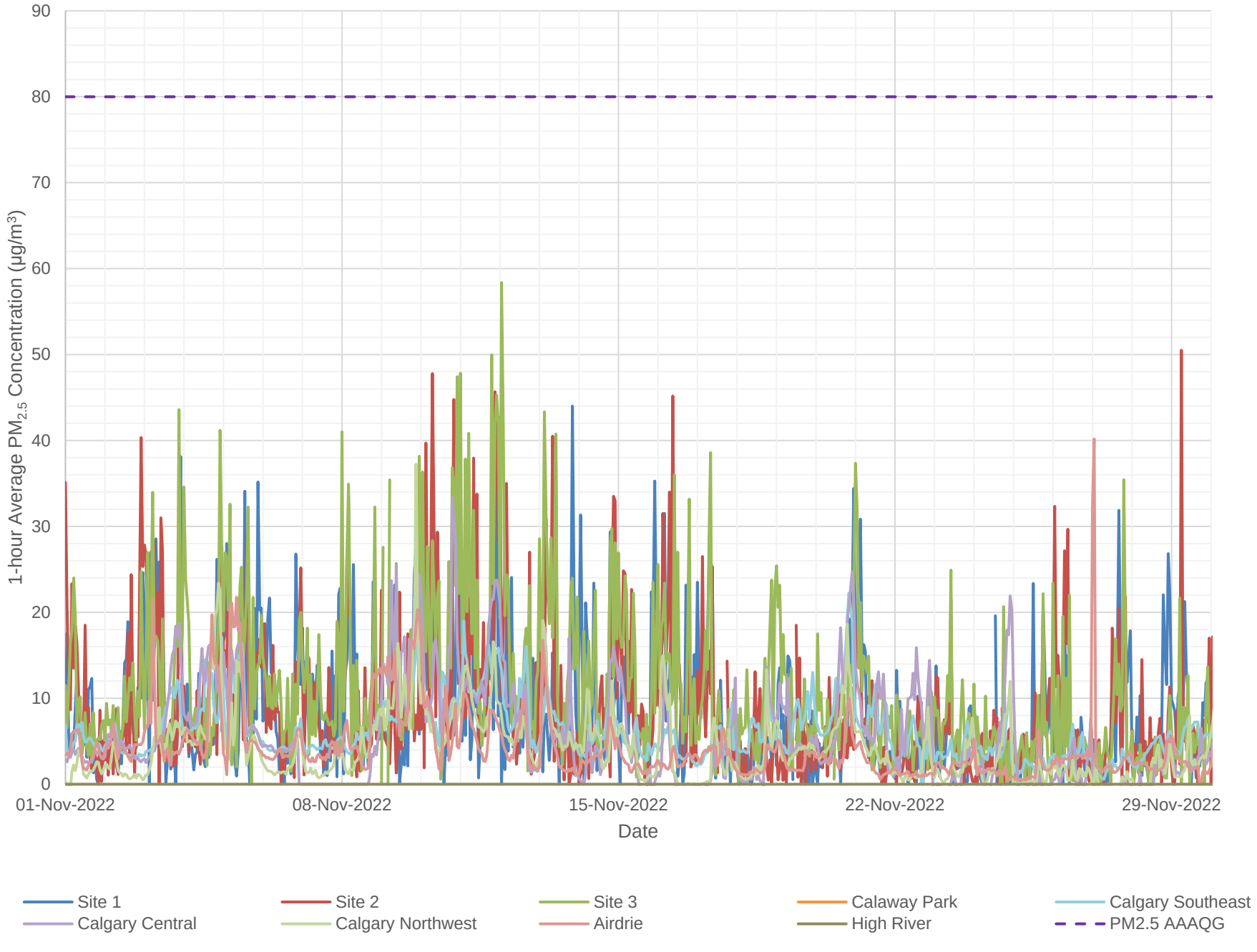

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

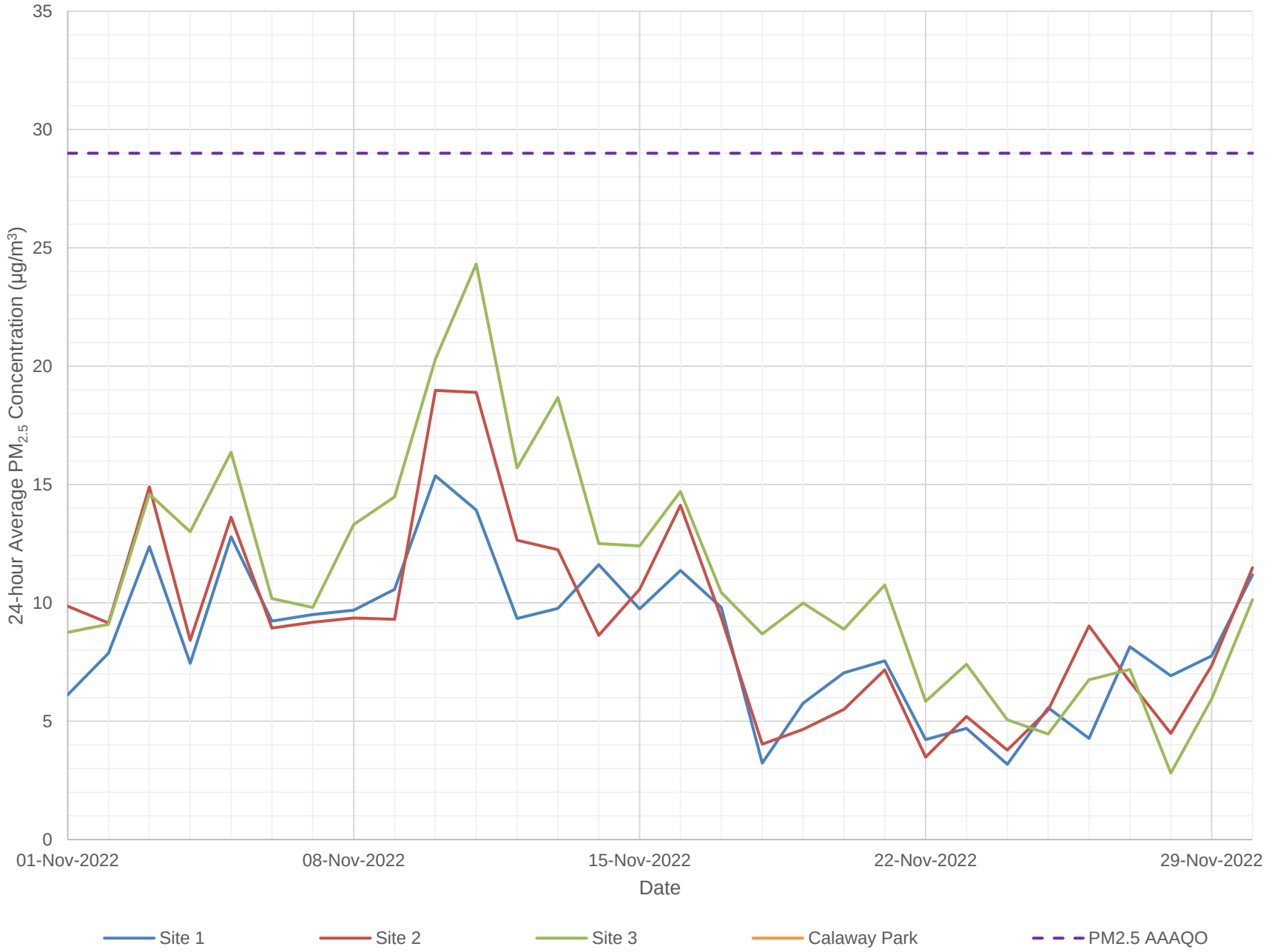

30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

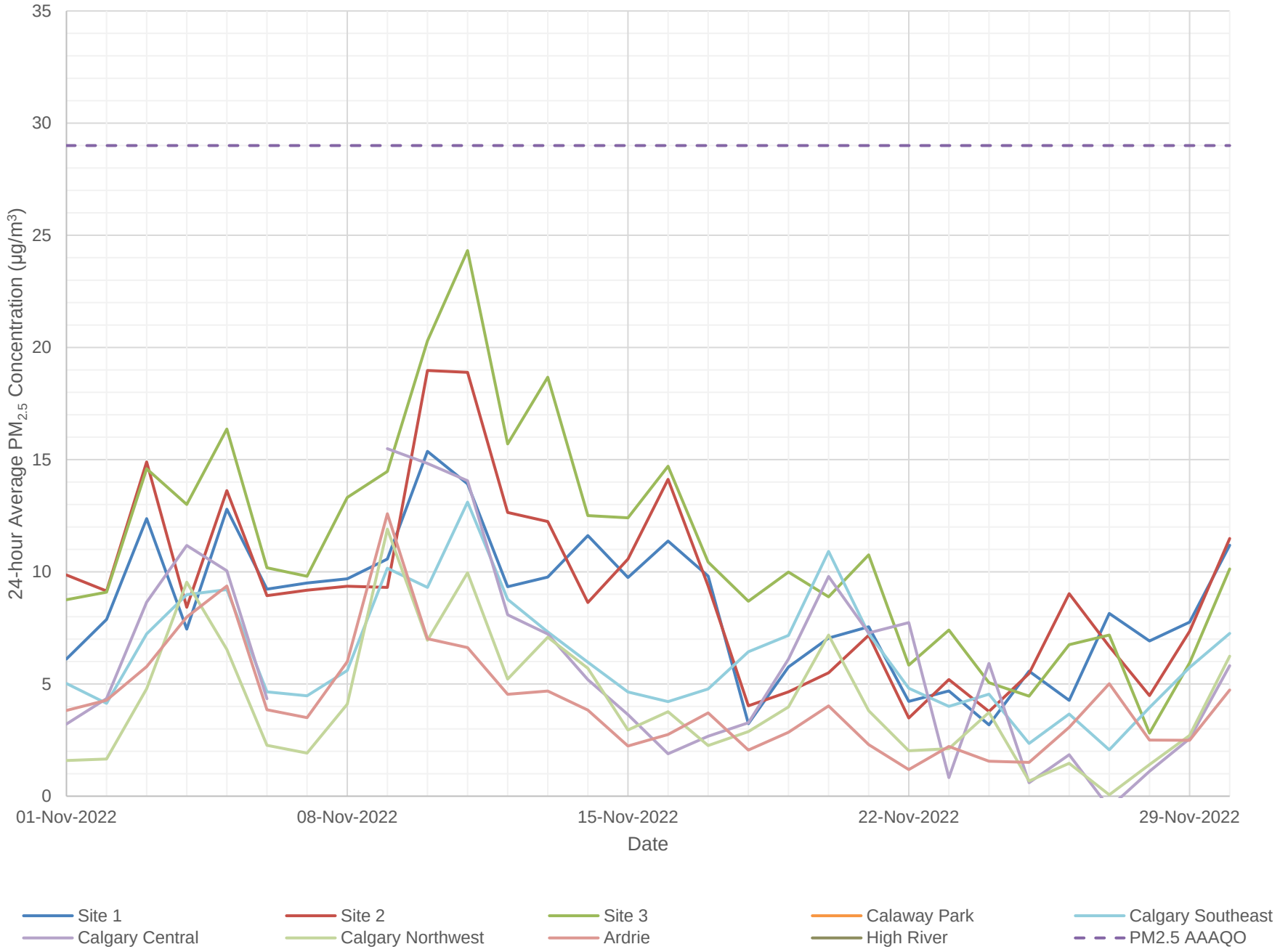

25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

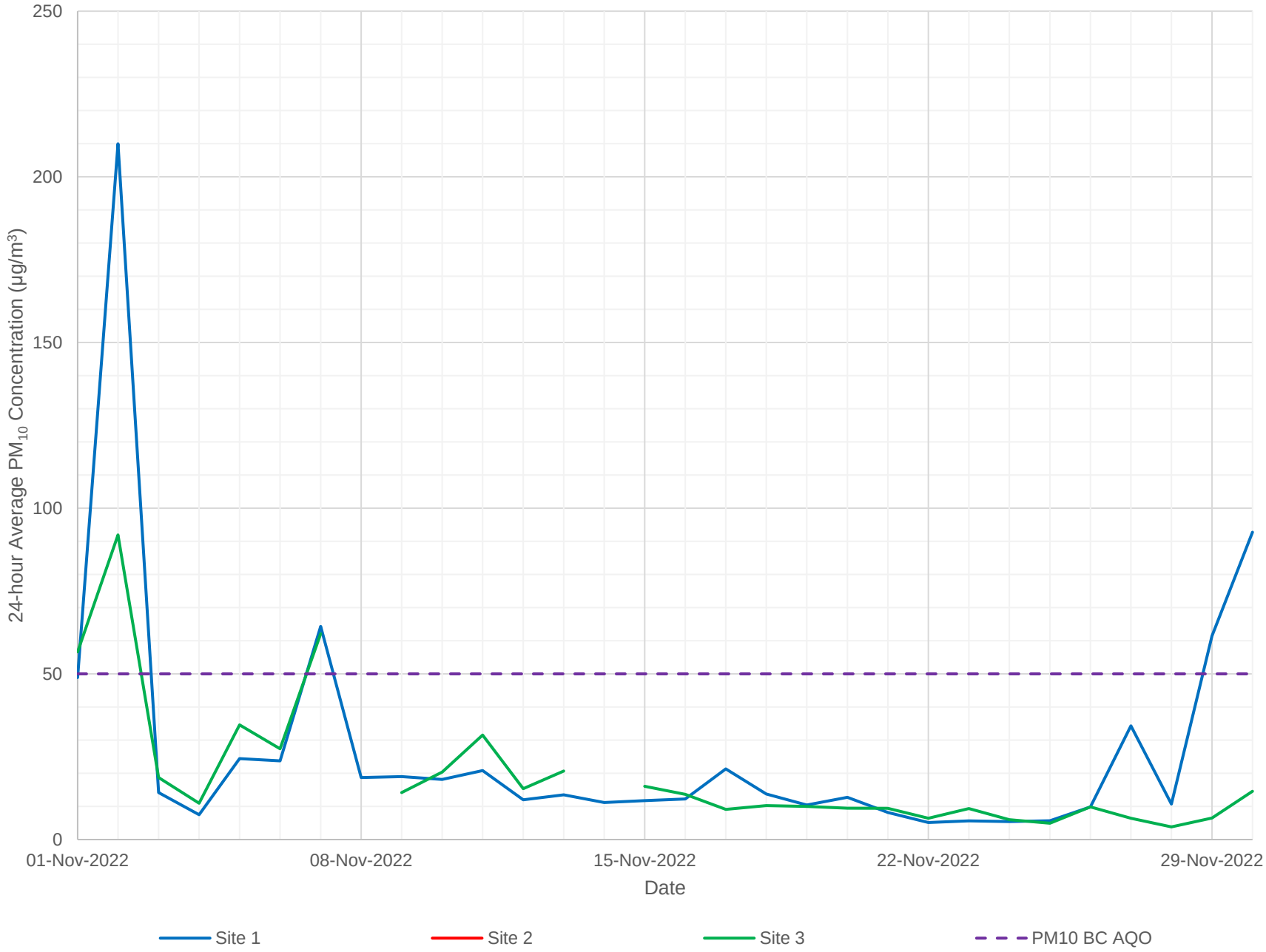

60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

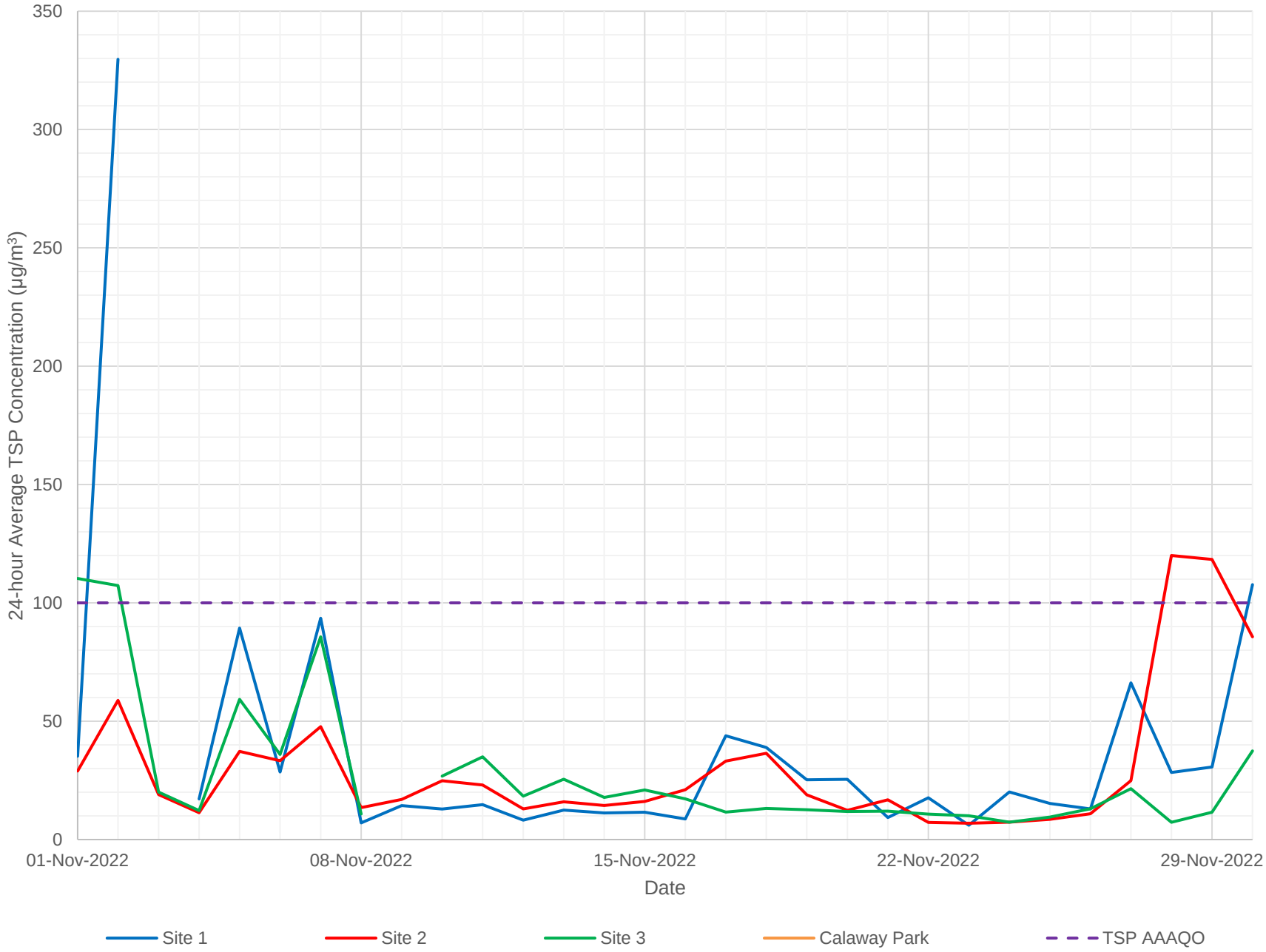

90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


250
200
150
100
50
0
24-hour Average PM10 Concentration (µg/m3)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO


350
300
250
200
150
100
50
0
24-hour Average TSP Concentration (µg/m³)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

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Summary of EBAM Station Particulate and Meteorological Monitoring for December 2022

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.06		-35.4	37.0	84.5
Minimum (Non-Zero)	0.07	0.08	0.38	0.06			37.0	84.5
Average	7.03	19.22	18.95	1.03	206.8 (SSW)	-12.8	74.1	87.4
Median	4.00	7.32	7.50	0.64		-10.5	76.0	87.6
Maximum	89.00	580.00	1,215.00	9.33		9.3	100.0	89.6
Standard Deviation	8.00	39.75	67.98	1.21		10.7	12.2	1.1
Number Obs	688	511	537	723	723	727	532	532
Expected Obs	744	744	744	744	744	744	744	744
% Complete	92.5%	68.7%	72.2%	97.2%	97.2%	97.7%	71.5%	71.5%
Calm Hours				117				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	226	183	55	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	11	52	13	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	2	23	6	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	1	5	6	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.67	2.67	3.26
Minimum (Non-Zero)	1.67	2.67	3.26
Average	6.79	18.43	15.74
Median	4.52	13.45	7.67
Maximum	18.82	73.48	66.23
Standard Deviation	4.99	18.94	17.38
Number Obs	29	21	21
Expected Obs	31	31	31
% Complete	92.5%	68.7%	72.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	24	14	10	3	5	10
1/3 of 24-hour AAAQO	7	8	2	10	17	33
2/3 of 24-hour AAAQO	0	4	0	19	33	67
Above 24-hour AAAQO	0	2	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for December 2022

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-36.1	39.0	84.4
Minimum (Non-Zero)	0.15	1.00	0.18	0.03			39.0	84.4
Average	8.27	11.32	23.61	1.07	11.5 (NNE)	-12.1	74.6	87.3
Median	5.00	6.00	12.00	0.64		-10.1	76.0	87.5
Maximum	226.00	440.00	749.33	17.67		10.4	100.0	89.6
Standard Deviation	15.70	31.48	50.54	1.40		10.8	12.7	1.2
Number Obs	518	278	569	720	720	714	451	451
Expected Obs	744	744	744	744	744	744	744	744
% Complete	69.6%	37.4%	76.5%	96.8%	96.8%	96.0%	60.6%	60.6%
Calm Hours				60				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	177	64	118	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	20	5	23	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	3	3	7	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	2	3	3	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.09	1.21	1.79
Minimum (Non-Zero)	1.09	1.21	1.79
Average	8.50	11.53	23.40
Median	6.16	7.71	21.53
Maximum	25.00	28.30	75.11
Standard Deviation	6.66	8.53	17.65
Number Obs	21	11	23
Expected Obs	31	31	31
% Complete	69.6%	37.4%	76.5%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	17	8	18	3	5	10
1/3 of 24-hour AAAQO	6	3	4	10	17	33
2/3 of 24-hour AAAQO	3	0	1	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Summary of EBAM Station Particulate and Meteorological Monitoring for December 2022

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-37.0	40.0	84.1
Minimum (Non-Zero)	0.08	0.17	0.17	0.03			40.0	84.1
Average	7.05	9.05	15.65	1.18	347.0 (NNW)	-13.7	75.6	87.1
Median	5.00	6.57	8.33	0.75		-12.2	76.0	87.3
Maximum	46.33	62.68	407.82	8.14		9.0	100.0	89.5
Standard Deviation	7.27	8.61	32.64	1.19		10.7	12.2	1.2
Number Obs	713	516	625	734	734	734	463	463
Expected Obs	744	744	744	744	744	744	744	744
% Complete	95.8%	**69.4%**	84.0%	98.7%	98.7%	98.7%	**62.2%**	**62.2%**
Calm Hours				50				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	239	122	75	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	16	3	12	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	4	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	3	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.36	1.79	2.17
Minimum (Non-Zero)	1.36	1.79	2.17
Average	7.01	9.17	15.39
Median	4.72	7.83	10.65
Maximum	21.68	19.89	58.50
Standard Deviation	5.06	5.19	14.31
Number Obs	30	20	25
Expected Obs	31	31	31
% Complete	95.8%	**69.4%**	84.0%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	3	14	14	3	5	10
1/3 of 24-hour AAAQO	1	2	2	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for December 2022

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—			—	—
Average	—	—	—	— (—)	—	—	—
Median	—	—	—		—	—	—
Maximum	—	—	—		—	—	—
Standard Deviation	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0
Expected Obs	744	744	744	744	744	744	744
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours			0				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	—	—
Minimum (Non-Zero)	—	—
Average	—	—
Median	—	—
Maximum	—	—
Standard Deviation	—	—
Number Obs	0	0
Expected Obs	31	31
% Complete	0.0%	0.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	0	0	3	10	
1/3 of 24-hour AAAQO	0	0	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for December 2022

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-37.4	36.0	84.7
Minimum (Non-Zero)	1.11			36.0	84.7
Average	3.43	318.8 (NW)	-13.3	73.0	87.5
Median	3.06		-11.1	73.0	87.6
Maximum	12.78		7.8	100.0	89.8
Standard Deviation	1.85		10.59	12.30	0.986
Number Obs	637	637	744	744	744
Expected Obs	744	744	744	744	744
% Complete	85.6%	85.6%	100.0%	100.0%	100.0%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for December 2022

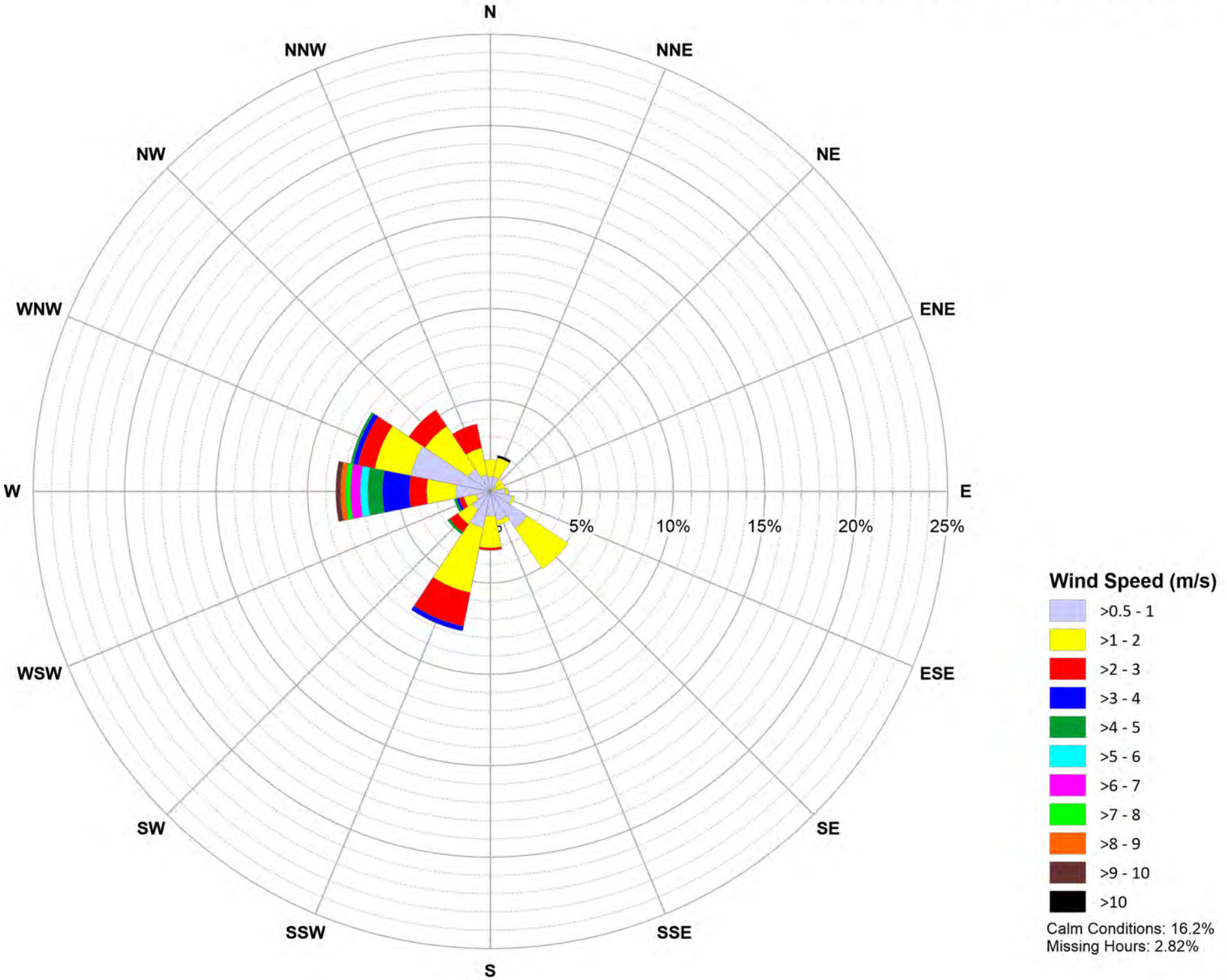
	CRAZ 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.20	1.01	-0.99	-1.02	-0.97	0.00	0.00	0.00	—
Minimum (Non-Zero)	0.20	1.01	-0.99	-1.02	-0.97	0.07	0.15	0.08	—
Average	8.79	10.86	6.72	6.32	6.00	7.03	8.27	7.05	—
Median	5.90	8.09	3.80	4.16	4.07	4.00	5.00	5.00	—
Maximum	54.71	72.11	36.62	39.00	34.91	**89.00**	**226.00**	46.33	—
Standard Deviation	7.22	8.72	6.97	7.07	6.21	8.00	15.70	7.27	—
Number Obs	741	741	737	739	730	688	518	713	0
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	99.6%	99.6%	99.1%	99.3%	98.1%	92.5%	**69.6%**	95.8%	**0.0%**

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

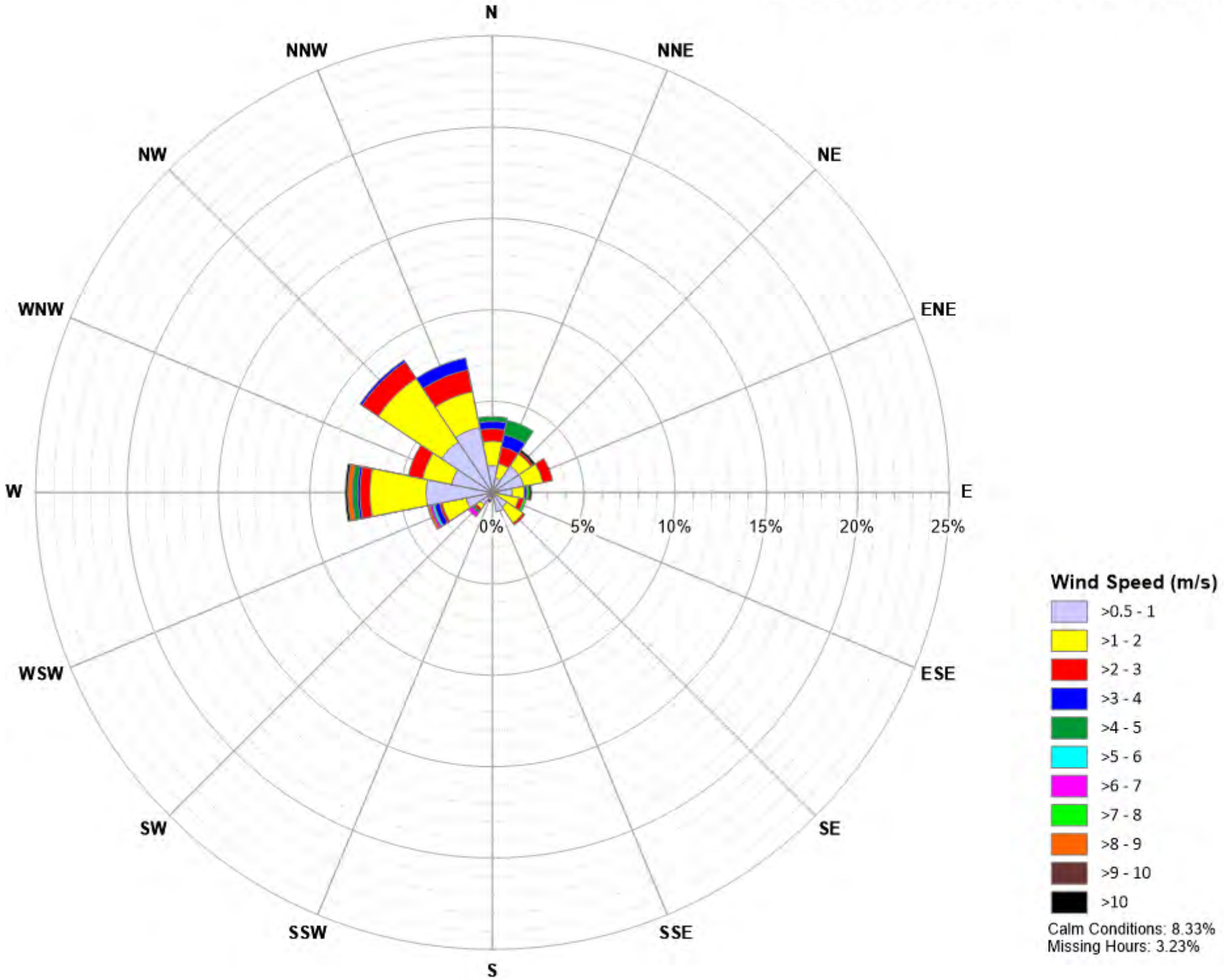
	CRAZ 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	3.83	2.71	1.39	0.11	1.20	1.67	1.09	1.36	—
Minimum (Non-Zero)	3.83	2.71	1.39	0.11	1.20	1.67	1.09	1.36	—
Average	8.78	10.84	6.69	6.31	6.02	6.79	8.50	7.01	—
Median	6.26	8.62	4.40	4.20	4.19	4.52	6.16	4.72	—
Maximum	**31.28**	**29.52**	24.60	25.76	18.72	18.82	25.00	21.68	—
Standard Deviation	6.10	6.50	5.50	5.60	5.24	4.99	6.66	5.06	—
Number Obs	31	31	31	31	30	29	21	30	0
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	100.0%	100.0%	100.0%	100.0%	96.8%	93.5%	**67.7%**	96.8%	**0.0%**

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

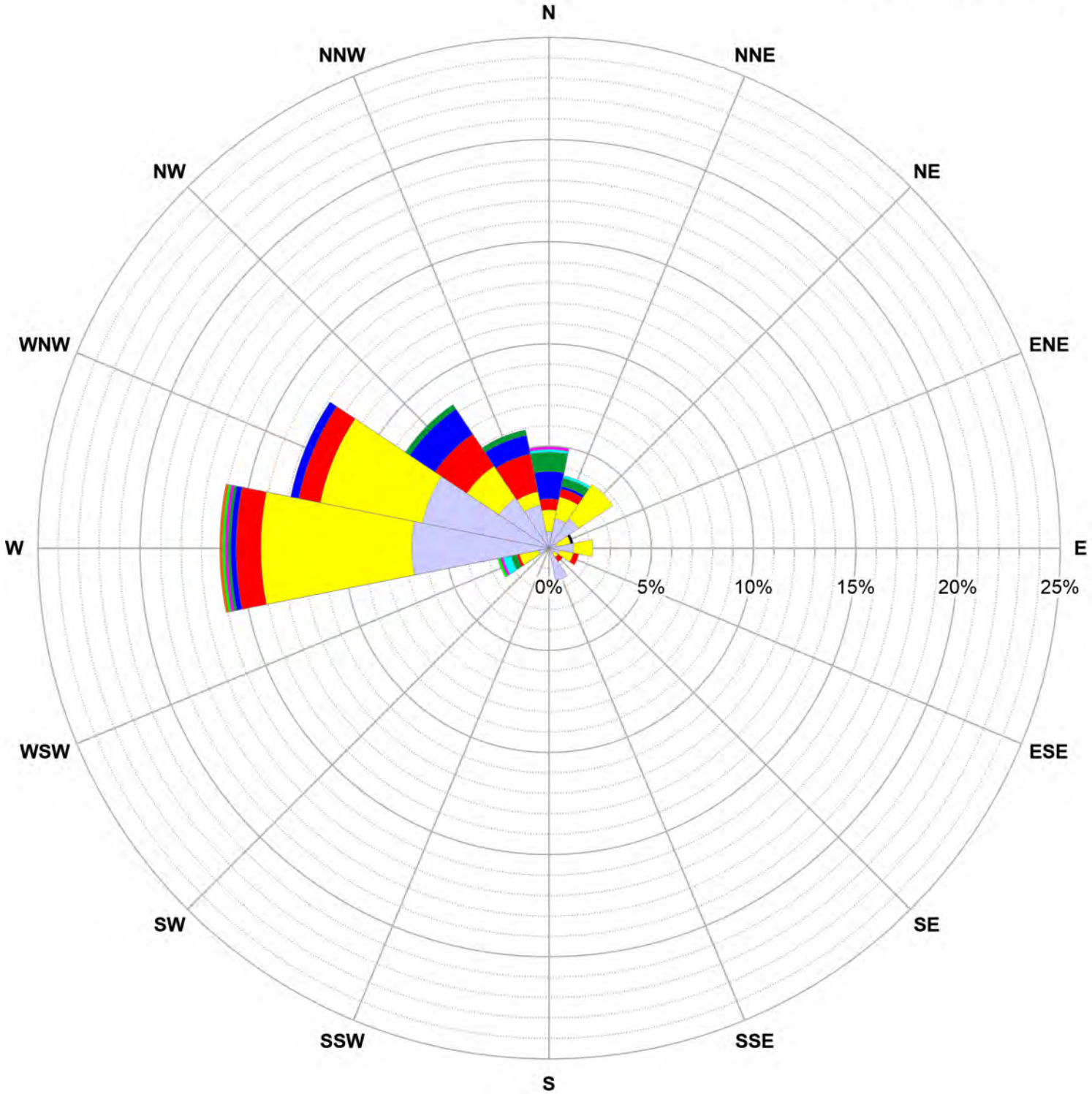
Decmber 2022 Site 1 Wind Rose



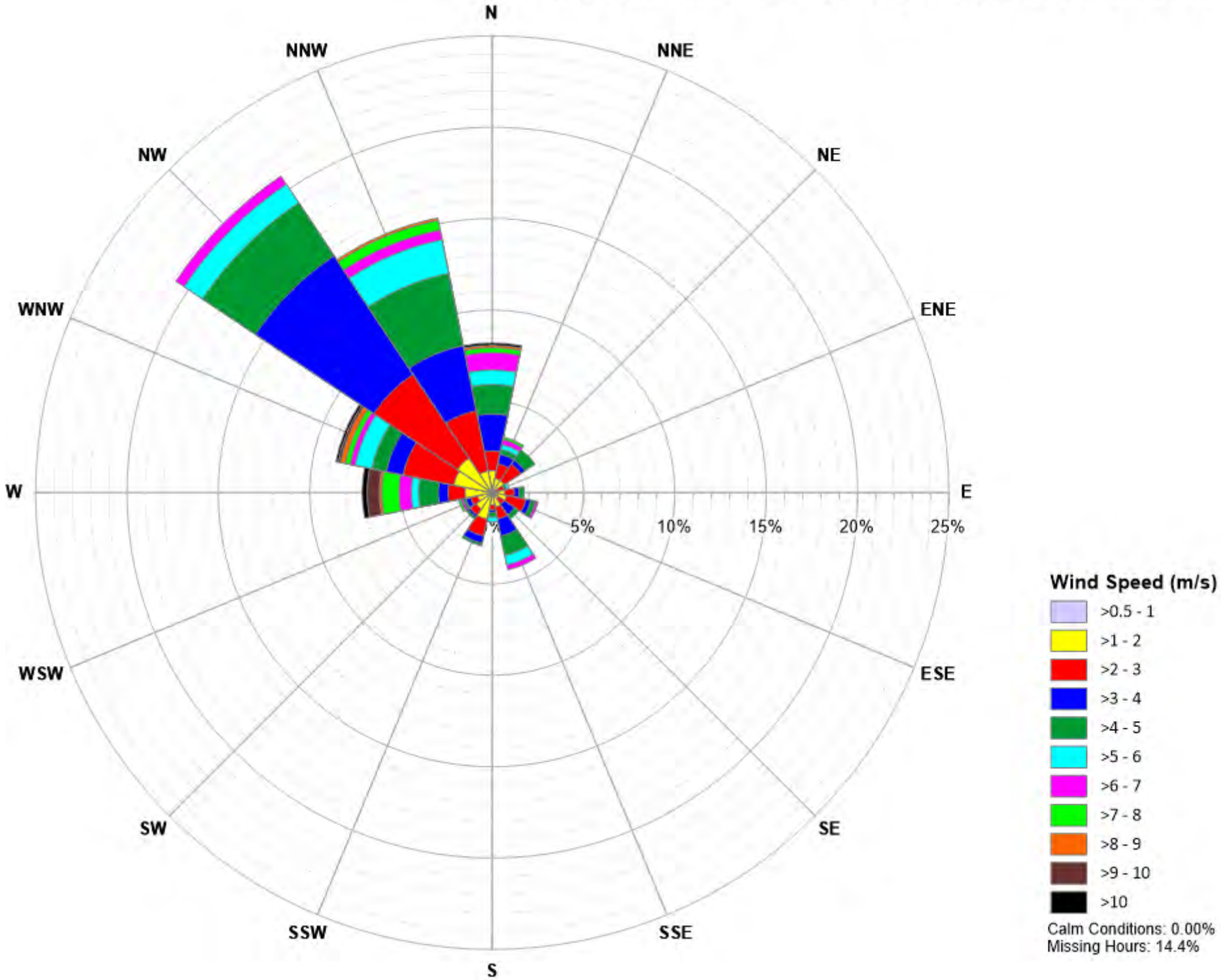
December 2022 Site 2 Wind Rose

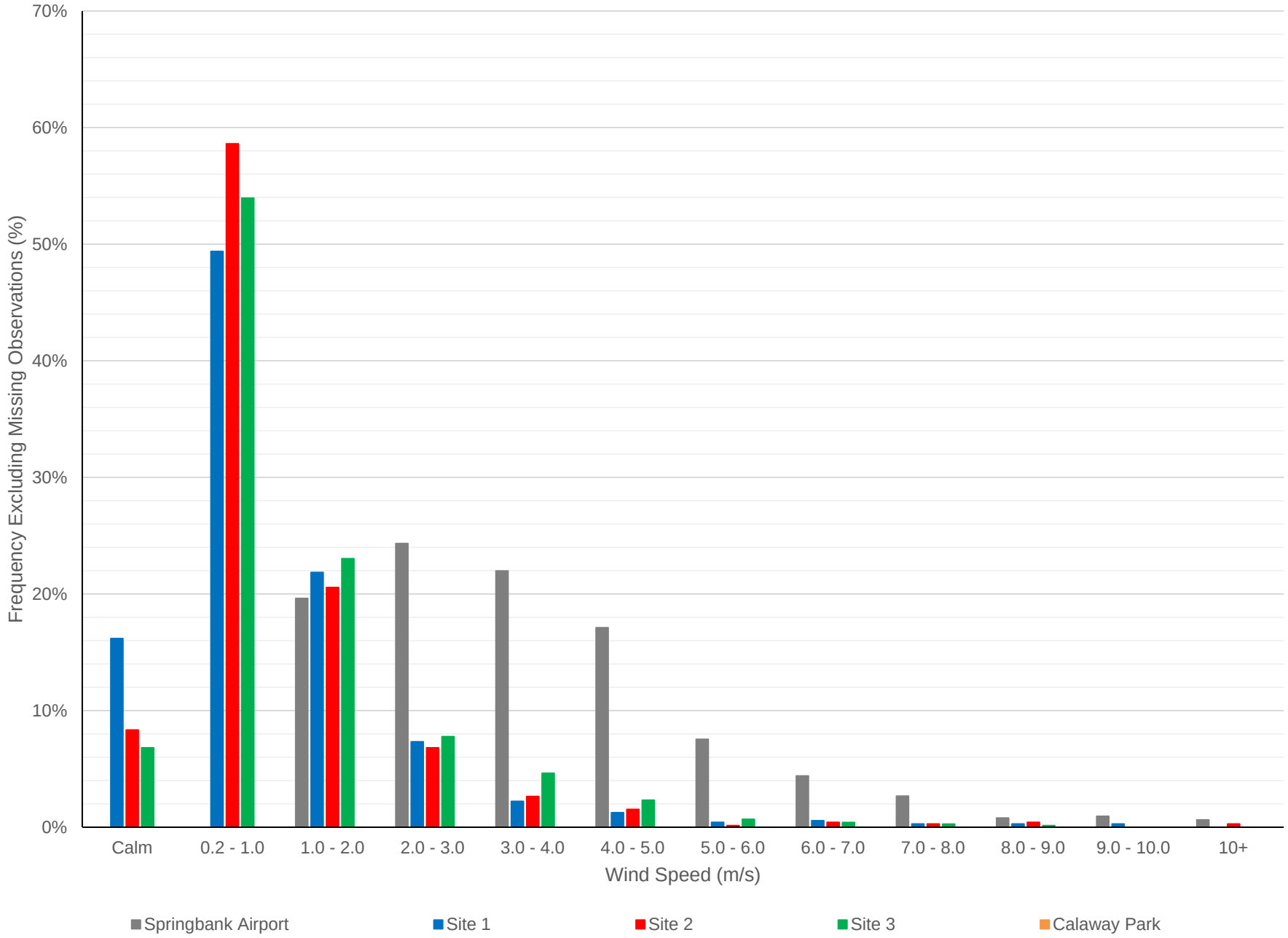


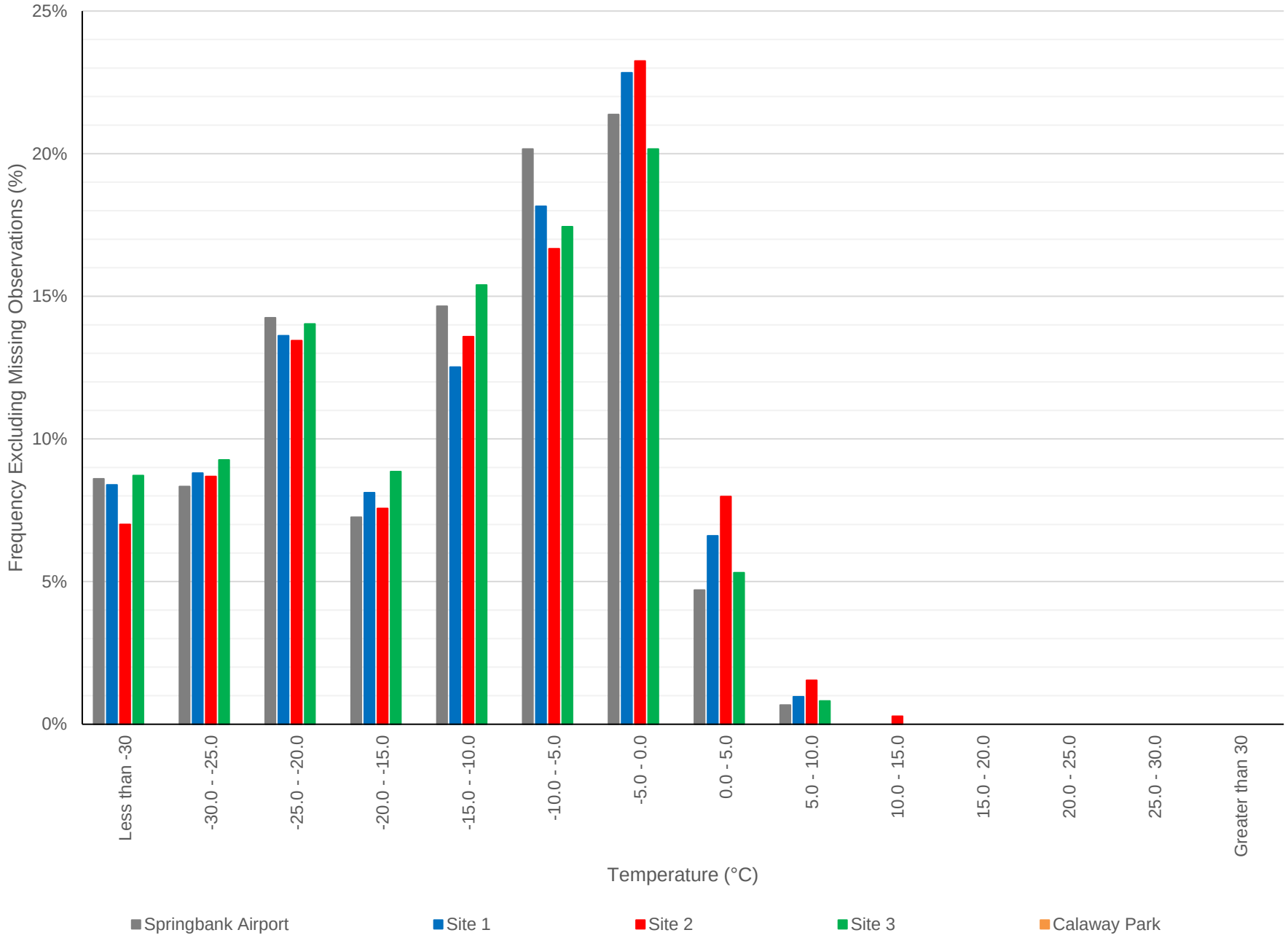
December 2022 Site 3 Wind Rose

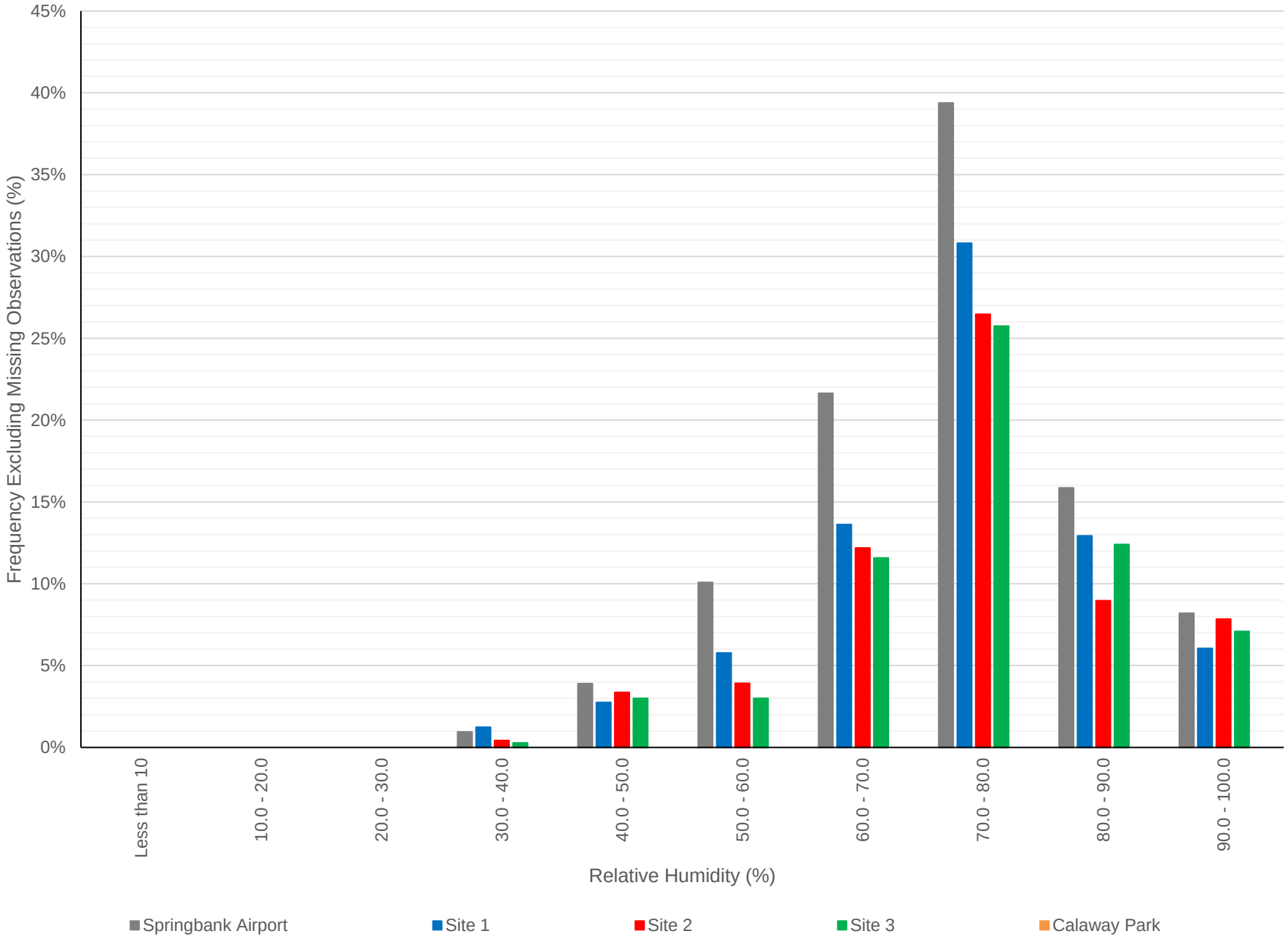


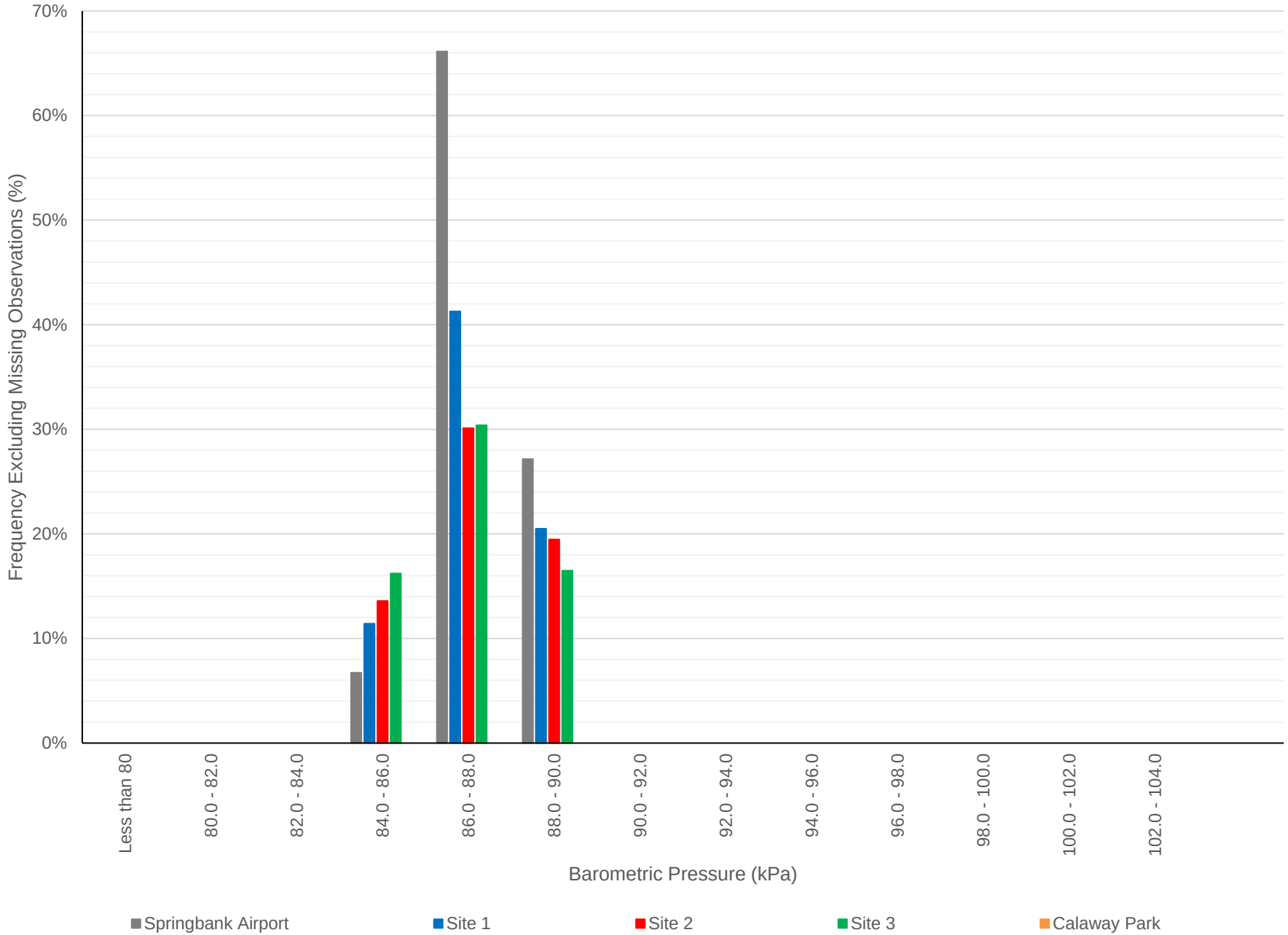
December 2022 Springbank Airport Wind Rose

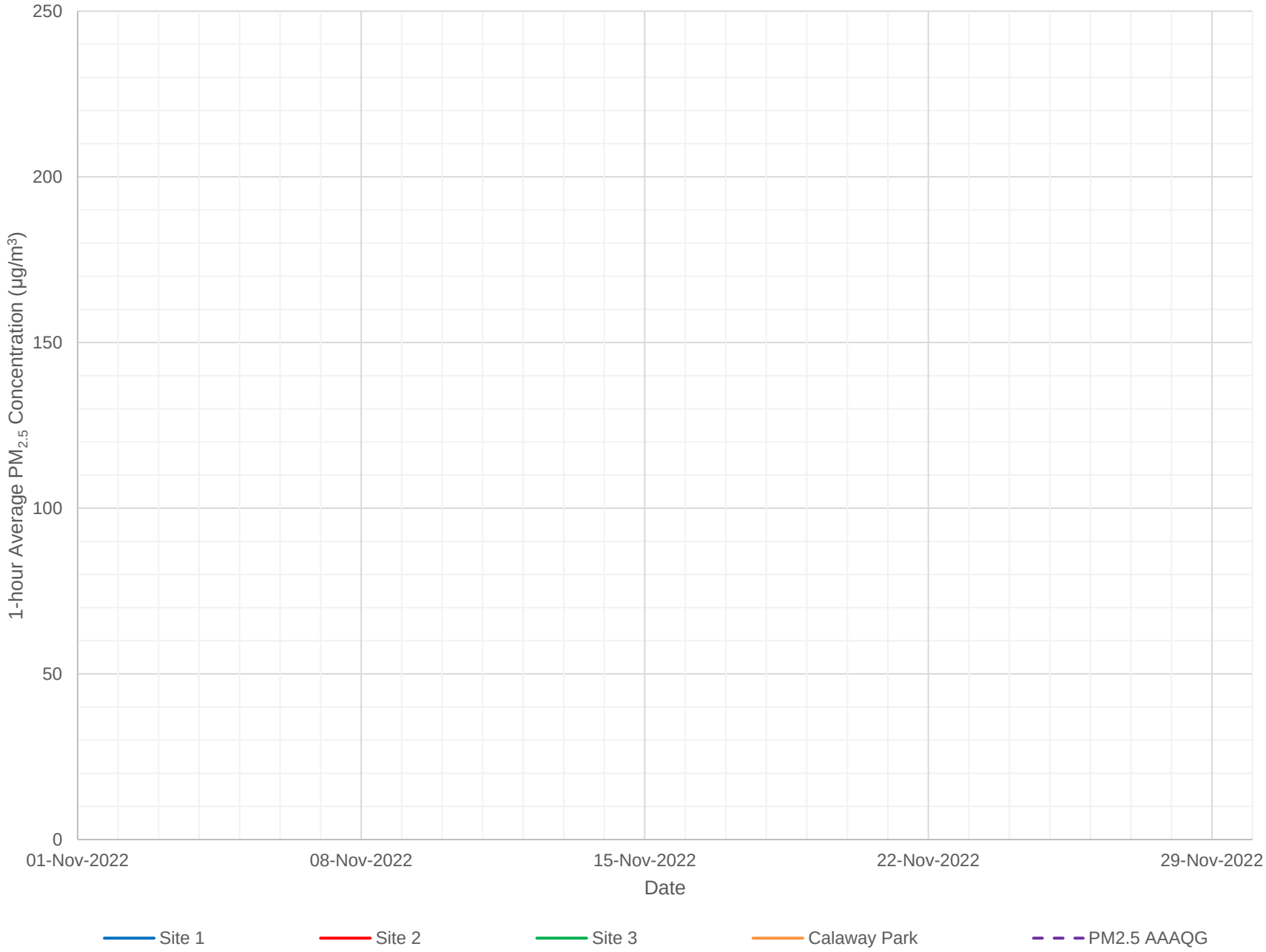


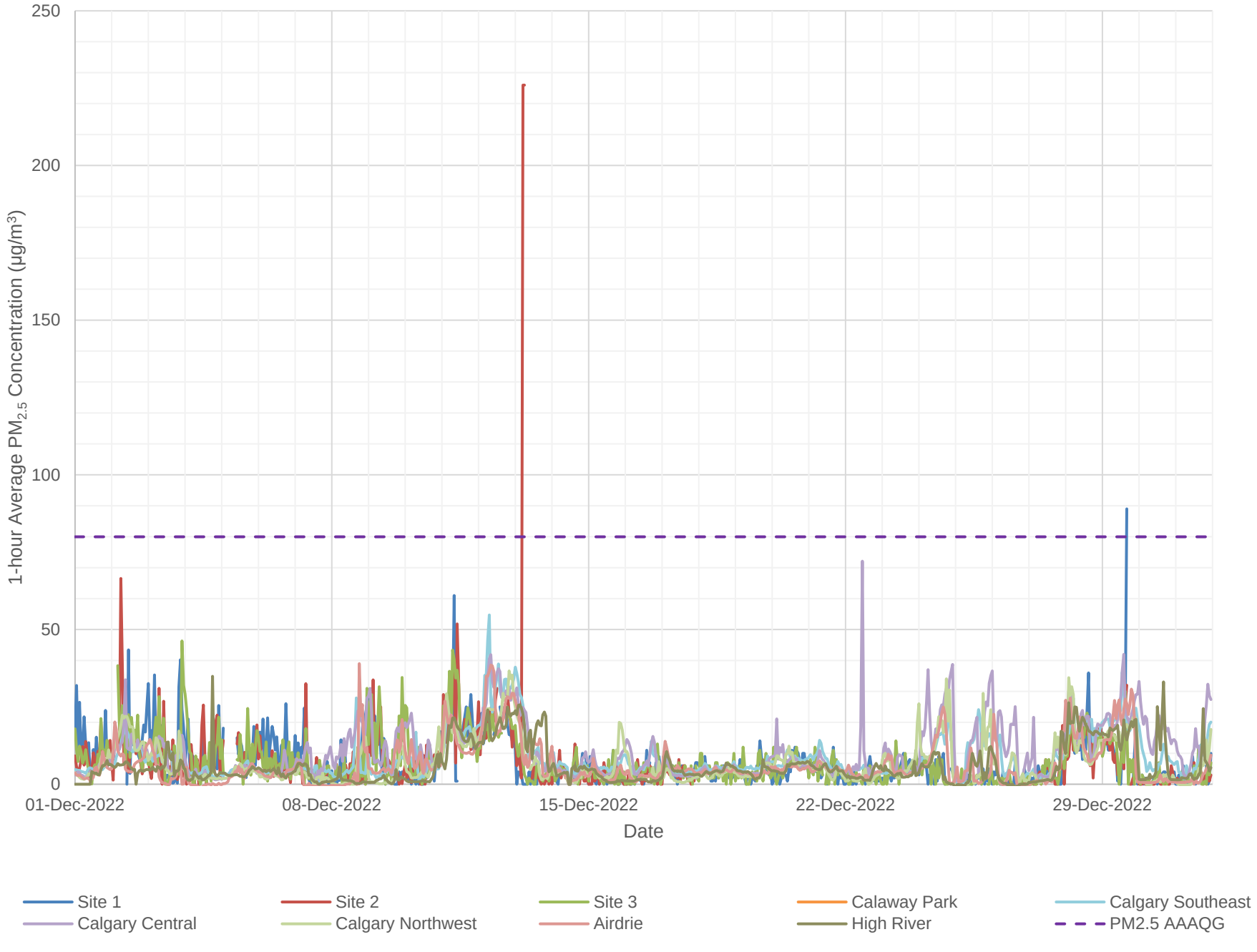

70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

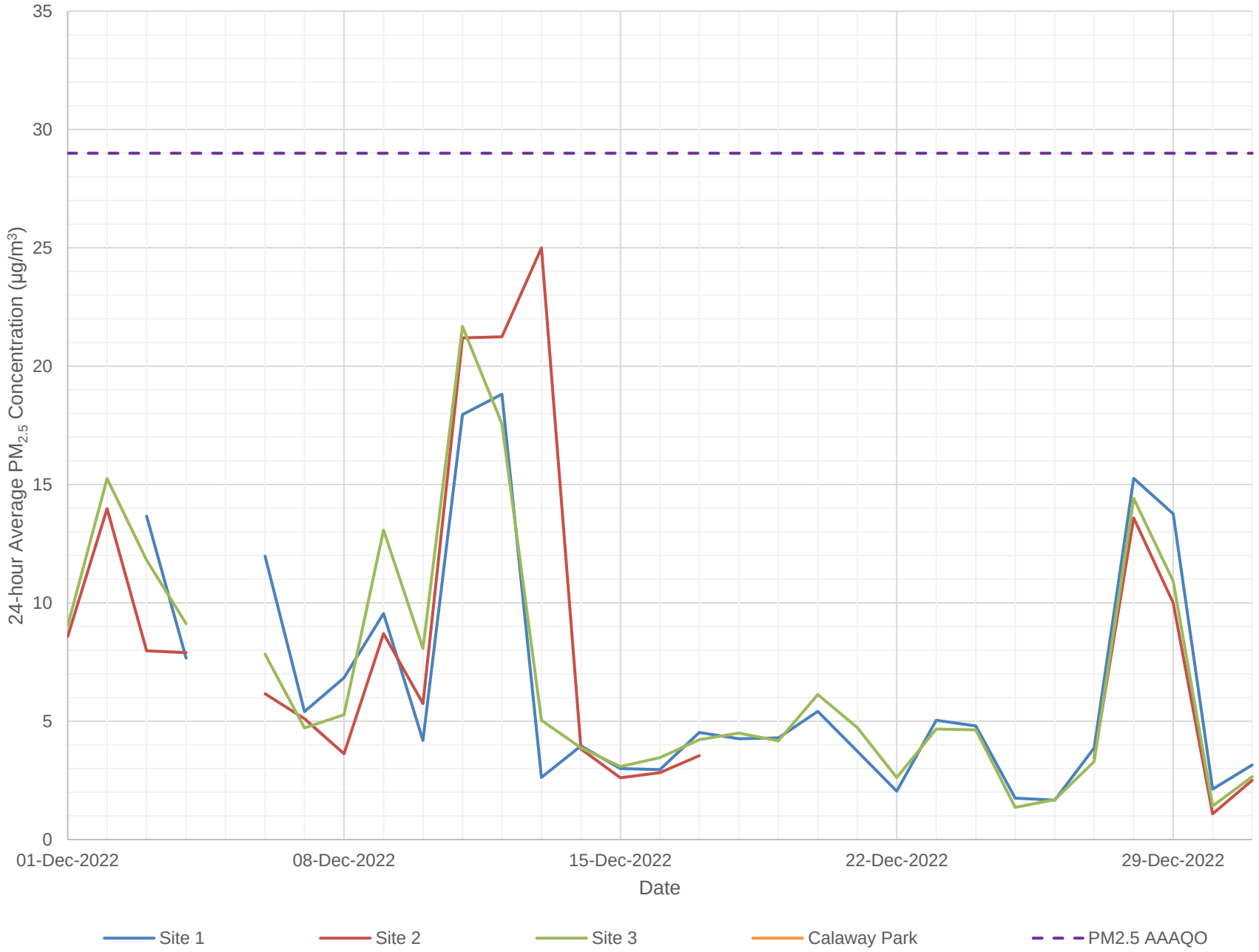

25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

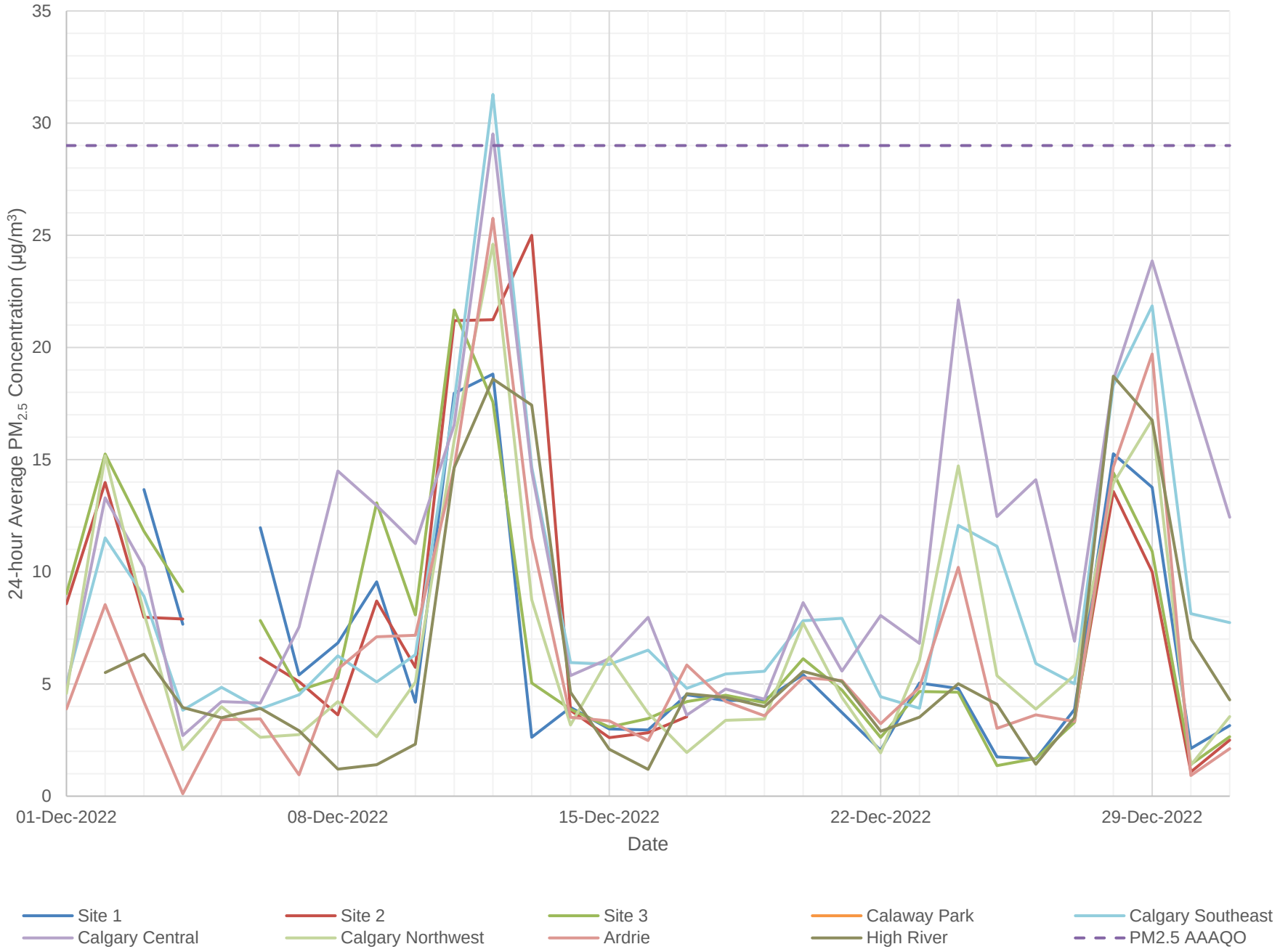

45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

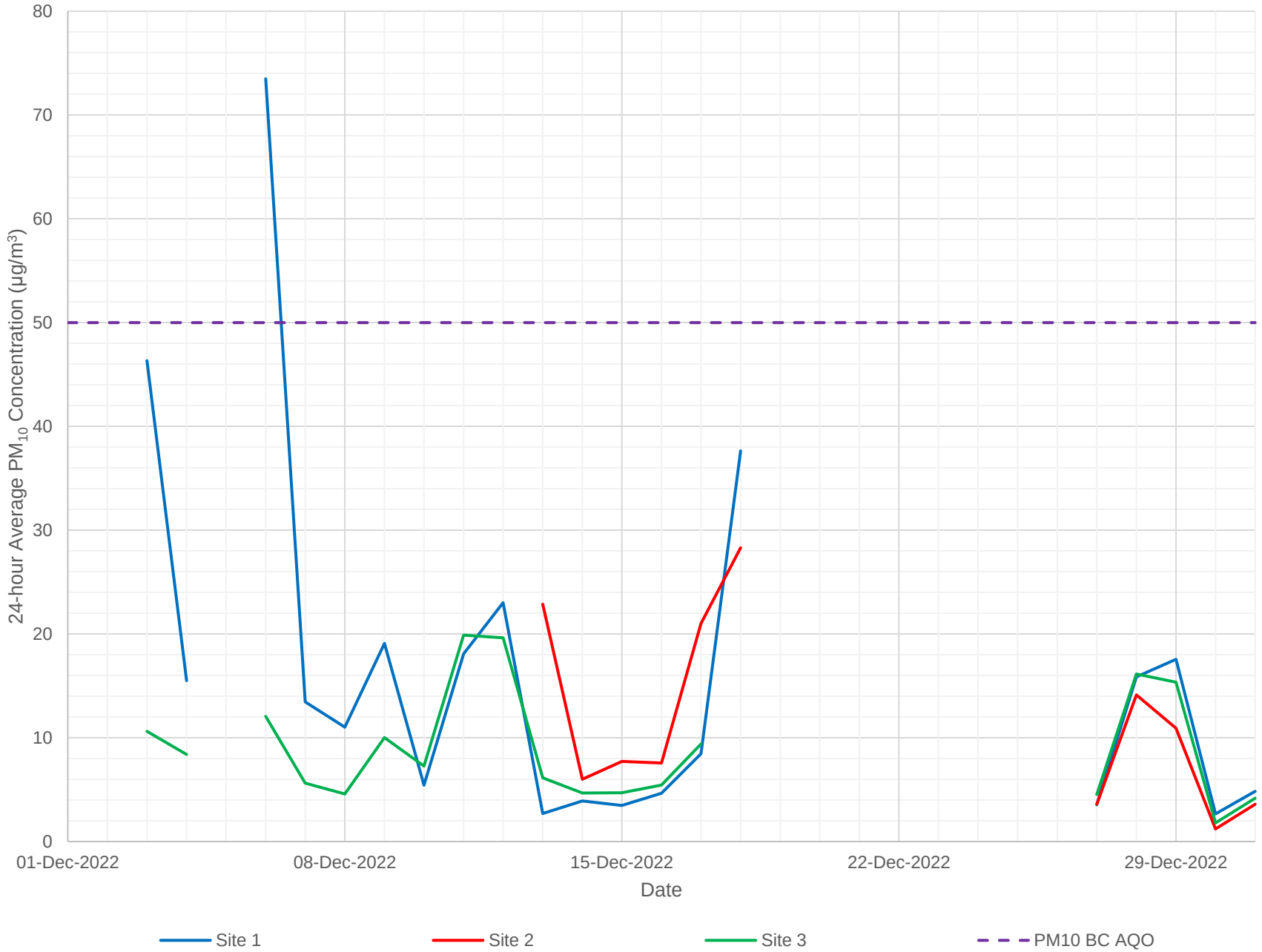

70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park


250
200
150
100
50
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Nov-2022
08-Nov-2022
15-Nov-2022
22-Nov-2022
29-Nov-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


250
200
150
100
50
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Dec-2022
08-Dec-2022
15-Dec-2022
22-Dec-2022
29-Dec-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Dec-2022
08-Dec-2022
15-Dec-2022
22-Dec-2022
29-Dec-2022
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Dec-2022
08-Dec-2022
15-Dec-2022
22-Dec-2022
29-Dec-2022
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


80
70
60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Dec-2022
08-Dec-2022
15-Dec-2022
22-Dec-2022
29-Dec-2022
Date
Site 1
Site 2
Site 3
PM10 BC AQO


120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Dec-2022
08-Dec-2022
15-Dec-2022
22-Dec-2022
29-Dec-2022
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for January 2023

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.00		-28.1	33.0	86.0
Minimum (Non-Zero)	1.00	1.00	1.00	0.06			33.0	86.0
Average	2.98	4.19	6.45	1.66	218.8 (SW)	-4.4	66.6	87.2
Median	2.00	2.00	4.00	1.17		-3.2	68.0	87.2
Maximum	62.00	75.00	136.00	9.83		9.7	98.0	88.8
Standard Deviation	4.98	6.67	10.42	1.61		6.7	15.0	0.7
Number Obs	685	680	664	729	729	729	729	729
Expected Obs	744	744	744	744	744	744	744	744
% Complete	92.1%	91.4%	89.2%	98.0%	98.0%	98.0%	98.0%	98.0%
Calm Hours				17				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	60	39	15	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	3	4	2	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	3	0	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.26	1.50	2.42
Minimum (Non-Zero)	1.26	1.50	2.42
Average	3.05	3.77	6.46
Median	2.19	3.11	6.11
Maximum	12.78	11.33	18.48
Standard Deviation	2.57	2.28	3.43
Number Obs	29	28	28
Expected Obs	31	31	31
% Complete	92.1%	91.4%	89.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	7	4	3	3	5	10
1/3 of 24-hour AAAQO	2	0	0	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for January 2023

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-27.3	34.0	85.9
Minimum (Non-Zero)	1.00	1.00	1.00	0.08			34.0	85.9
Average	2.74	6.99	15.30	1.54	303.6 (WNW)	-3.4	67.5	87.1
Median	1.00	3.00	5.00	1.08		-2.3	69.0	87.1
Maximum	62.00	190.00	888.00	10.17		10.4	99.0	88.9
Standard Deviation	5.63	15.16	54.44	1.42		6.5	15.1	0.7
Number Obs	659	669	679	687	687	692	697	697
Expected Obs	744	744	744	744	744	744	744	744
% Complete	88.6%	89.9%	91.3%	92.3%	92.3%	93.0%	93.7%	93.7%
Calm Hours				16				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	53	75	54	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	8	20	18	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	1	3	10	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	3	4	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	0.64	1.52	2.09
Minimum (Non-Zero)	0.64	1.52	2.09
Average	2.84	6.78	15.53
Median	1.71	4.20	8.26
Maximum	15.42	34.42	114.00
Standard Deviation	3.19	6.83	21.93
Number Obs	26	28	28
Expected Obs	31	31	31
% Complete	88.6%	89.9%	91.3%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	5	11	12	3	5	10
1/3 of 24-hour AAAQO	2	3	3	10	17	33
2/3 of 24-hour AAAQO	0	1	1	19	33	67
Above 24-hour AAAQO	0	0	1	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for January 2023

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-30.1	37.0	85.7
Minimum (Non-Zero)	1.00	1.00	1.00	0.08			37.0	85.7
Average	3.72	5.85	7.56	1.77	300.6 (WNW)	-5.6	70.7	87.1
Median	2.00	3.00	5.00	1.17		-4.5	73.0	87.1
Maximum	82.00	83.00	133.00	28.94		8.3	99.0	89.2
Standard Deviation	6.81	8.98	12.42	2.16		7.1	14.7	0.9
Number Obs	671	672	709	728	728	729	729	729
Expected Obs	744	744	744	744	744	744	744	744
% Complete	90.2%	90.3%	95.3%	97.8%	97.8%	98.0%	98.0%	98.0%
Calm Hours				12				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	70	62	26	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	8	9	3	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	4	0	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	1	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.52	1.50	2.38
Minimum (Non-Zero)	1.52	1.50	2.38
Average	3.73	5.95	7.67
Median	2.36	4.12	5.78
Maximum	22.96	25.25	27.71
Standard Deviation	4.05	4.85	5.28
Number Obs	28	28	29
Expected Obs	31	31	31
% Complete	90.2%	90.3%	95.3%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	12	6	3	5	10
1/3 of 24-hour AAAQO	0	1	0	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for January 2023

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—			—	—
Average	—	—	—	— (—)	—	—	—
Median	—	—	—		—	—	—
Maximum	—	—	—		—	—	—
Standard Deviation	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0
Expected Obs	744	744	744	744	744	744	744
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours			0				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	—	—
Minimum (Non-Zero)	—	—
Average	—	—
Median	—	—
Maximum	—	—
Standard Deviation	—	—
Number Obs	0	0
Expected Obs	31	31
% Complete	0.0%	0.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	0	0	3	10	
1/3 of 24-hour AAAQO	0	0	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for January 2023

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-30.2	40.0	86.2
Minimum (Non-Zero)	1.11			40.0	86.2
Average	3.68	300.0 (WNW)	-5.2	71.1	87.4
Median	3.06		-3.8	71.0	87.4
Maximum	12.78		7.0	100.0	89.0
Standard Deviation	2.27		6.64	13.23	0.665
Number Obs	668	668	744	744	744
Expected Obs	744	744	744	744	744
% Complete	89.8%	89.8%	100.0%	100.0%	100.0%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

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Summary of Regional and Project PM2.5 Monitoring for January 2023

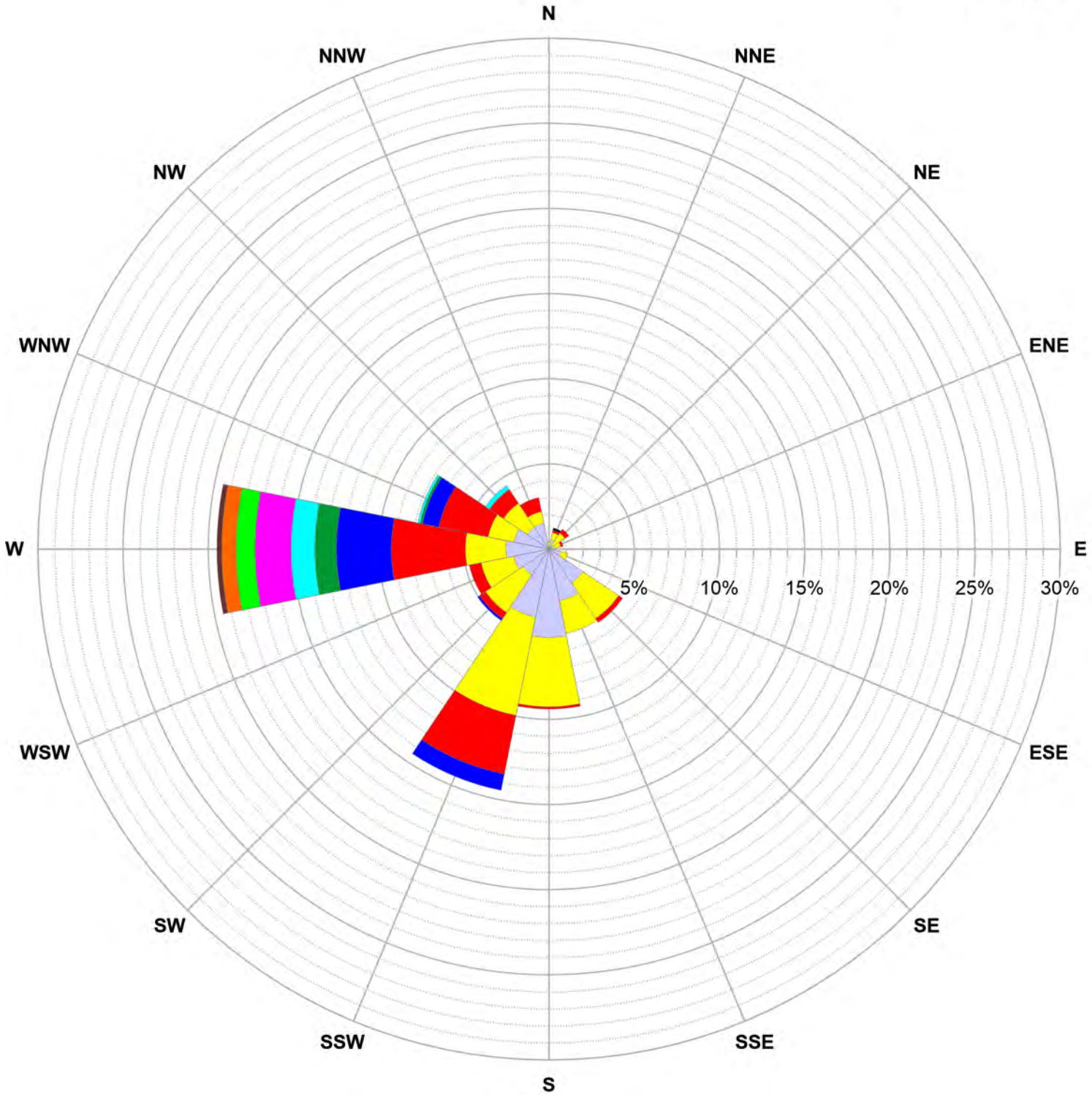
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.53	-0.36	-0.72	-0.27	-0.39	0.00	0.00	0.00	—
Minimum (Non-Zero)	0.53	-0.27	-0.72	-0.27	-0.39	1.00	1.00	1.00	—
Average	7.42	10.40	4.53	3.89	4.79	2.98	2.74	3.72	—
Median	5.48	8.31	2.22	1.87	2.65	2.00	1.00	2.00	—
Maximum	39.01	48.15	49.54	43.32	57.12	62.00	62.00	**82.00**	—
Standard Deviation	5.84	8.87	6.45	5.49	6.61	4.98	5.63	6.81	—
Number Obs	741	742	742	743	743	685	659	671	0
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	99.6%	99.7%	99.7%	99.9%	99.9%	92.1%	88.6%	90.2%	**0.0%**

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

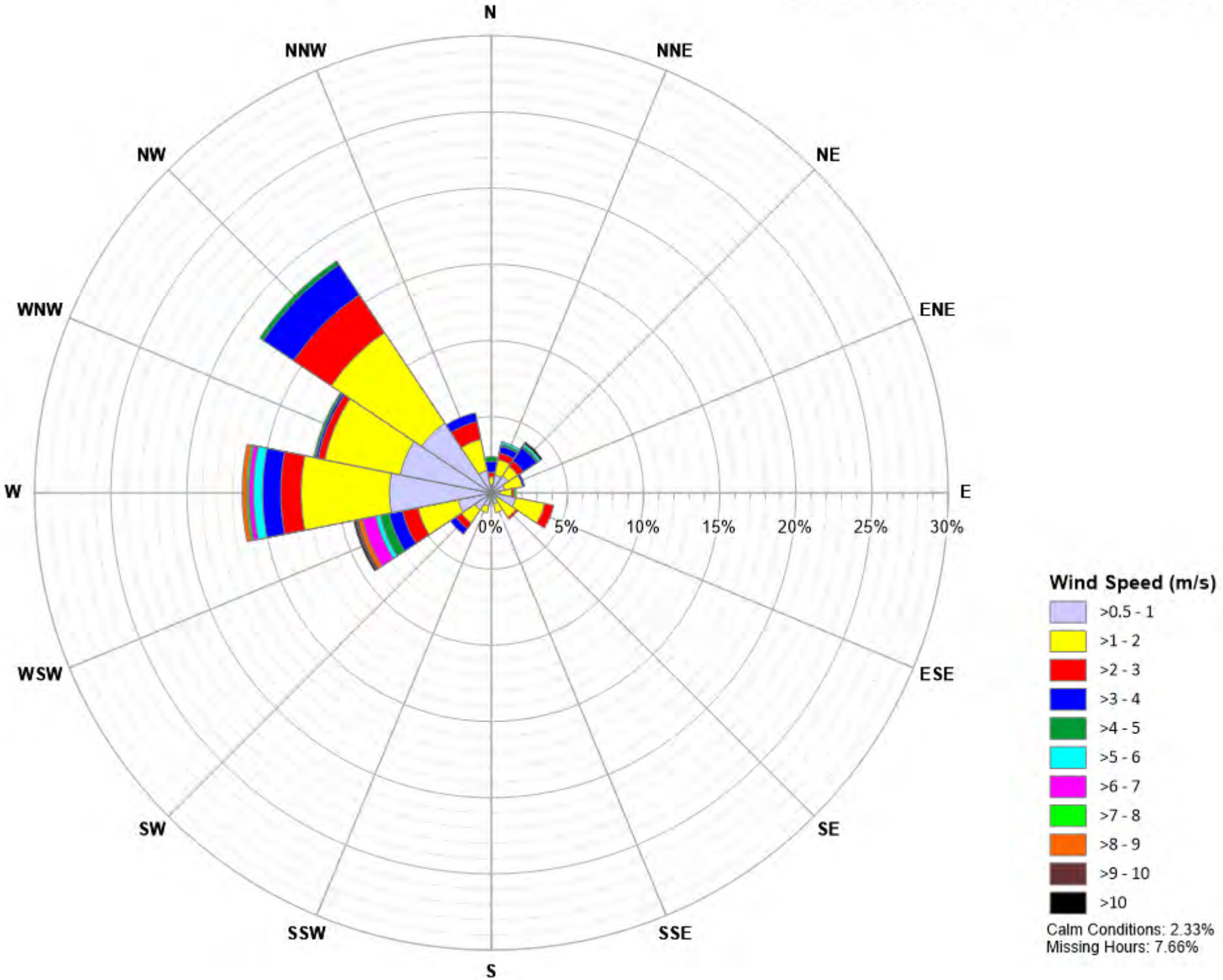
	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.72	1.96	0.66	0.59	0.46	1.26	0.64	1.52	—
Minimum (Non-Zero)	2.72	1.96	0.66	0.59	0.46	1.26	0.64	1.52	—
Average	7.45	10.38	4.52	3.90	4.79	3.05	2.84	3.73	—
Median	6.80	11.28	3.30	2.52	3.50	2.19	1.71	2.36	—
Maximum	20.28	26.65	18.08	18.23	20.31	12.78	15.42	22.96	—
Standard Deviation	3.93	6.66	3.91	4.05	4.29	2.57	3.19	4.05	—
Number Obs	31	31	31	31	31	29	26	28	0
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	100.0%	100.0%	100.0%	100.0%	100.0%	93.5%	83.9%	90.3%	**0.0%**

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

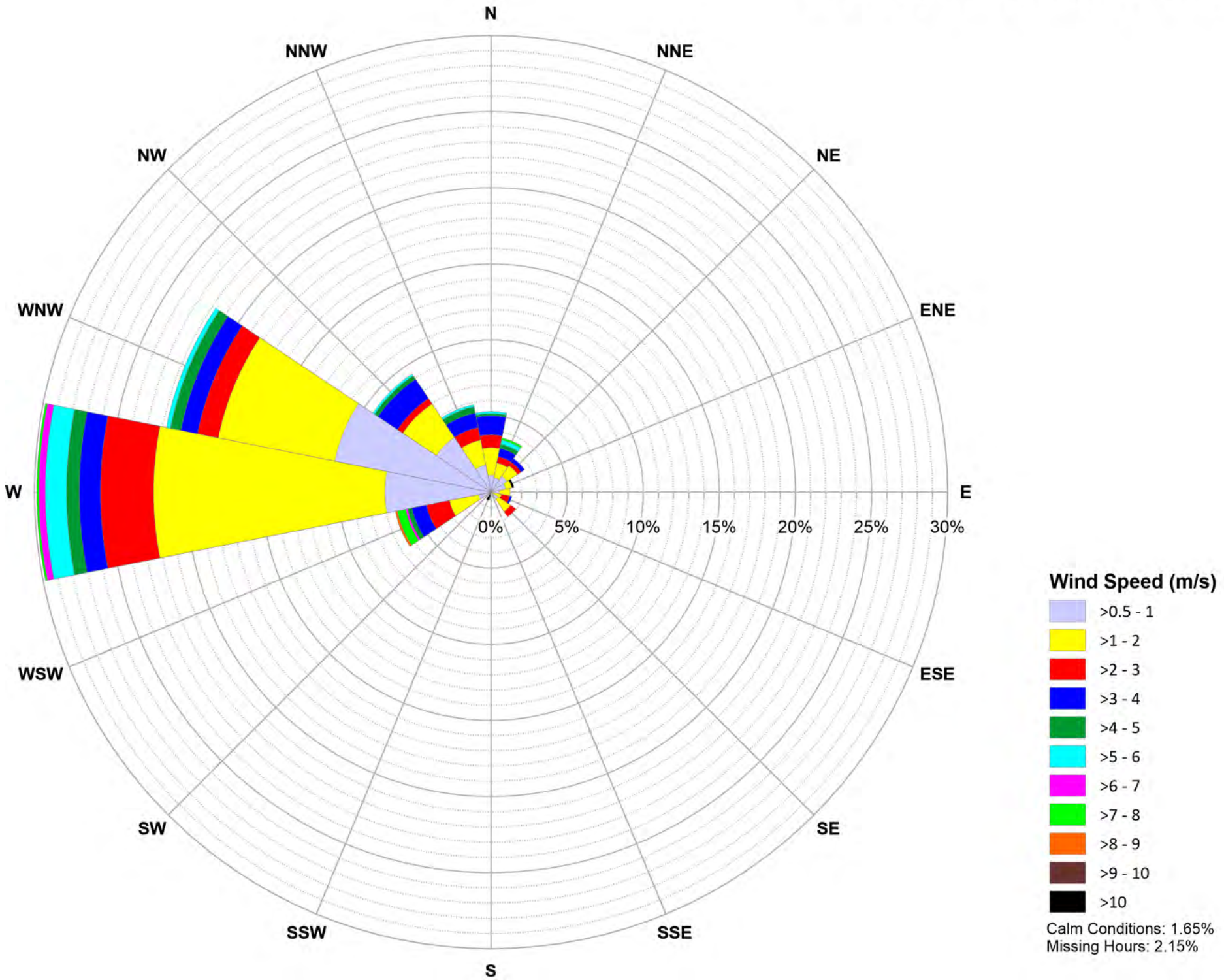
January 2023 Site 1 Wind Rose



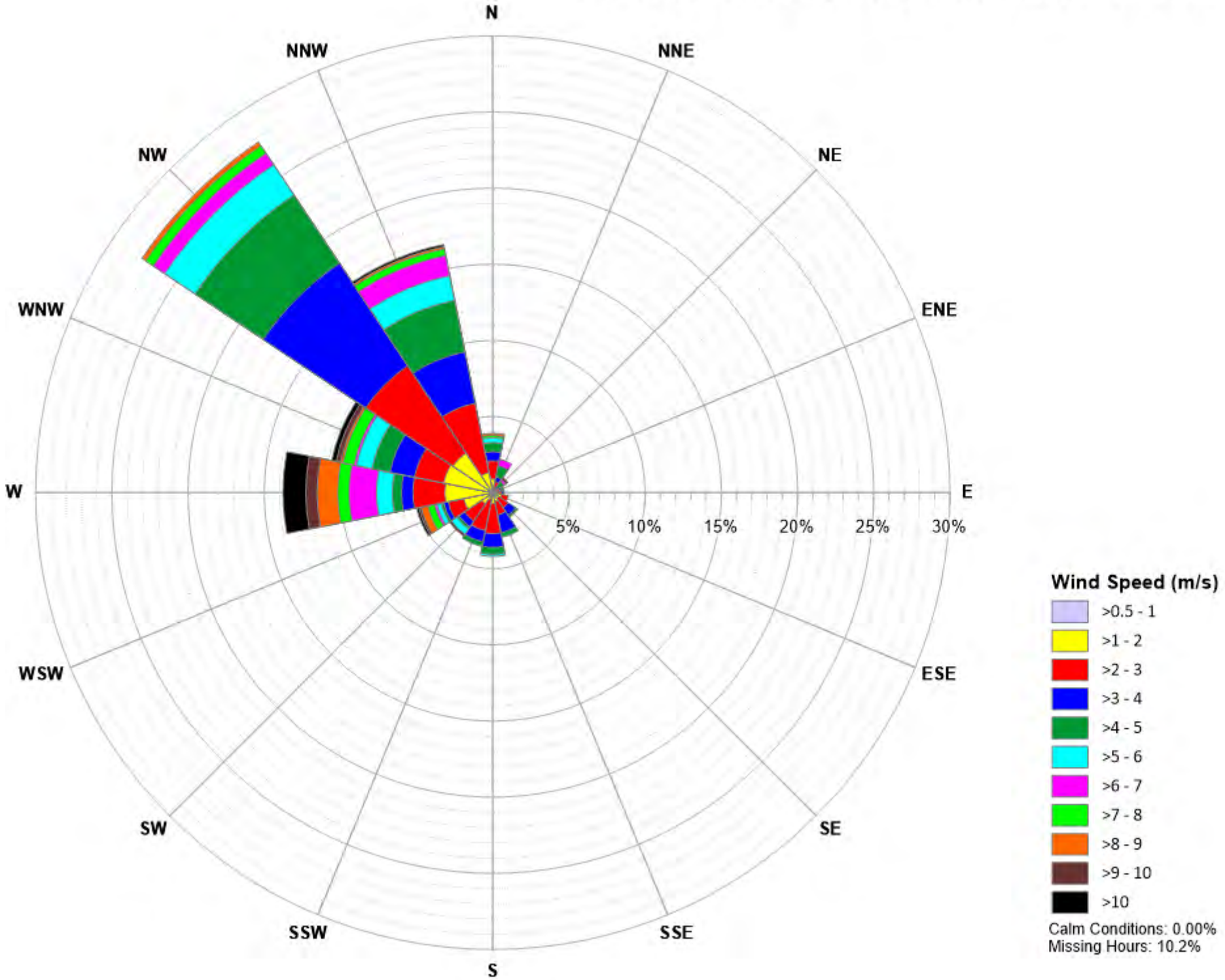
Januaray 2023 Site 2 Wind Rose

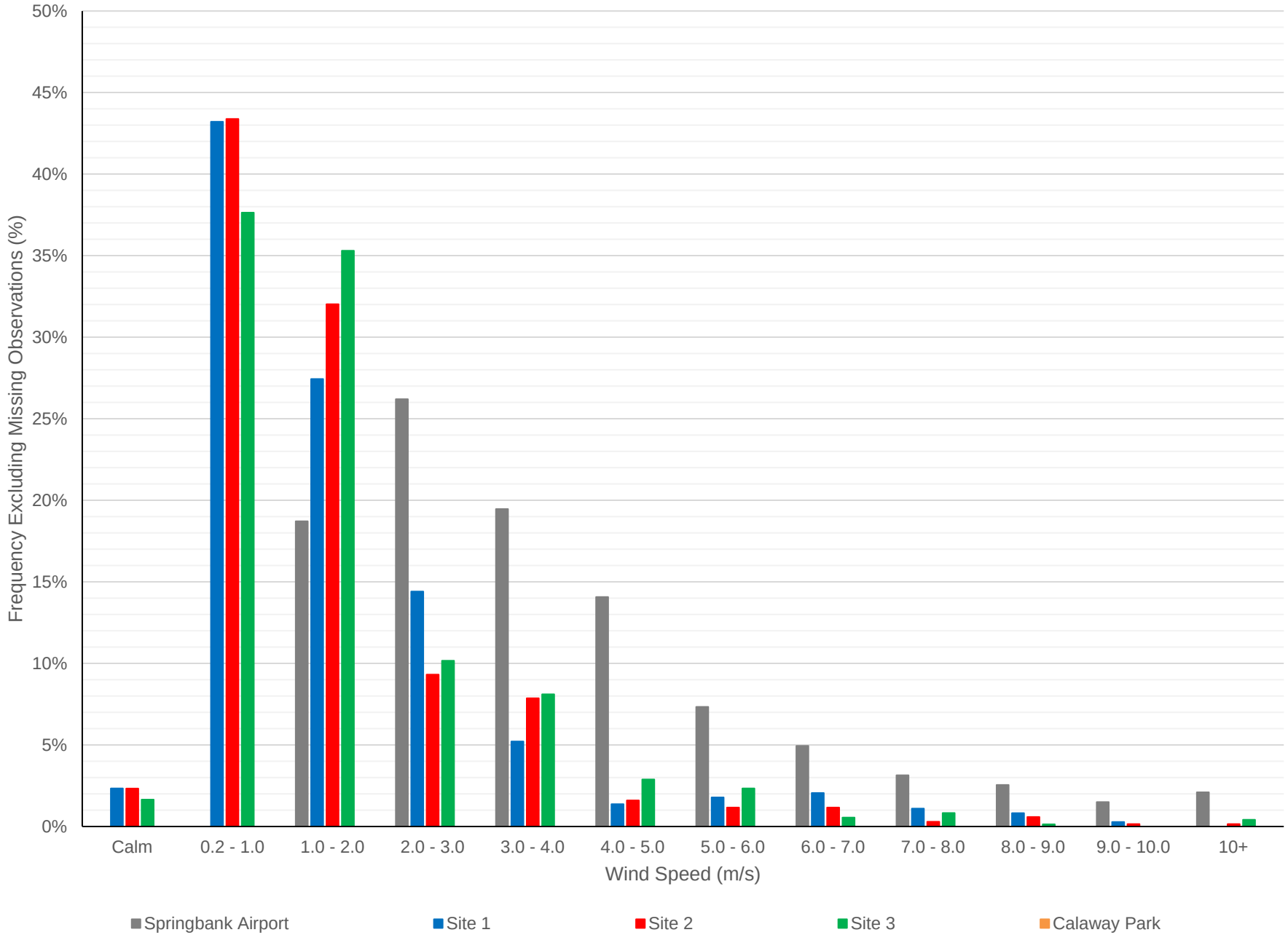


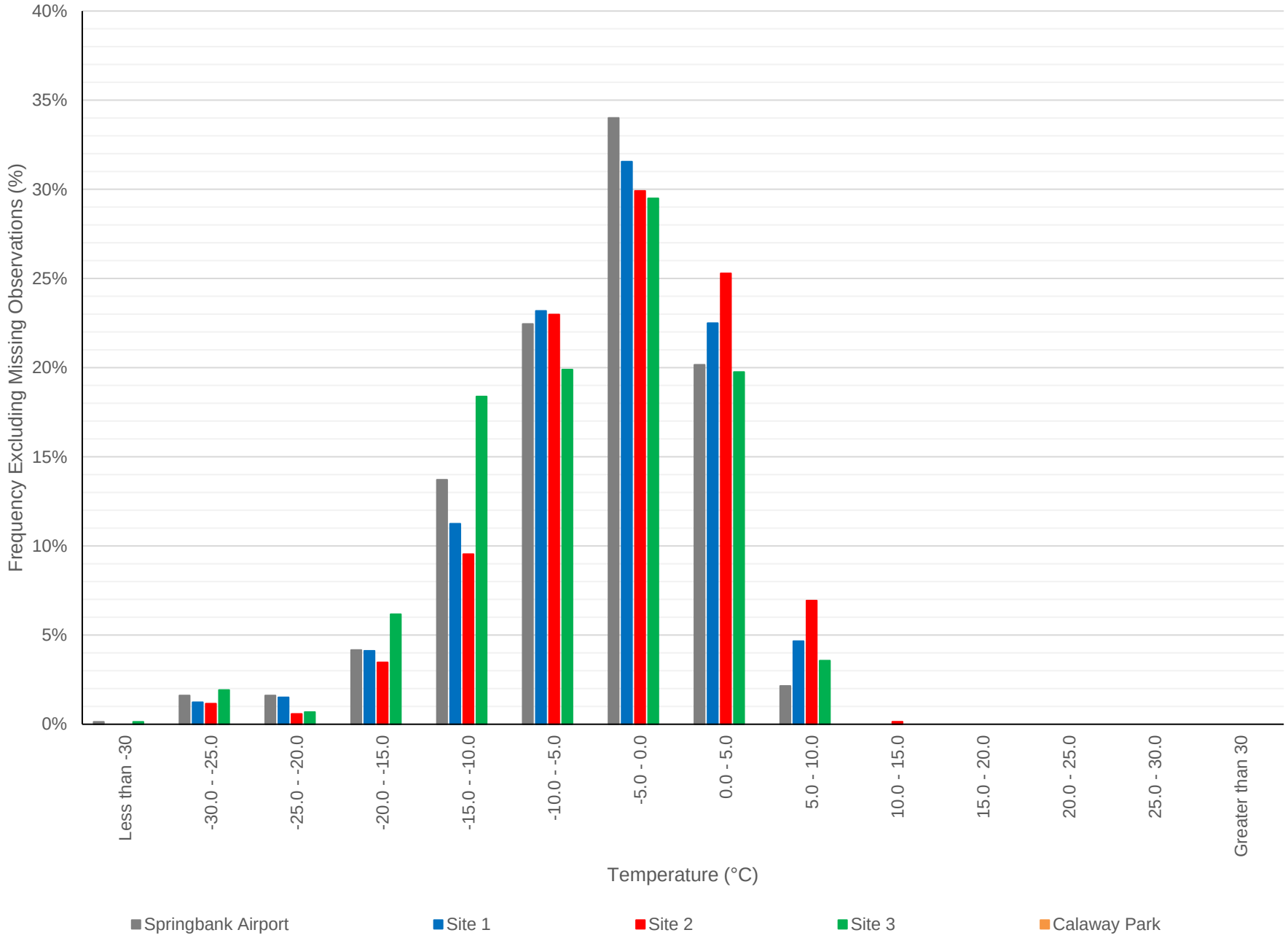
January 2023 Site 3 Wind Rose

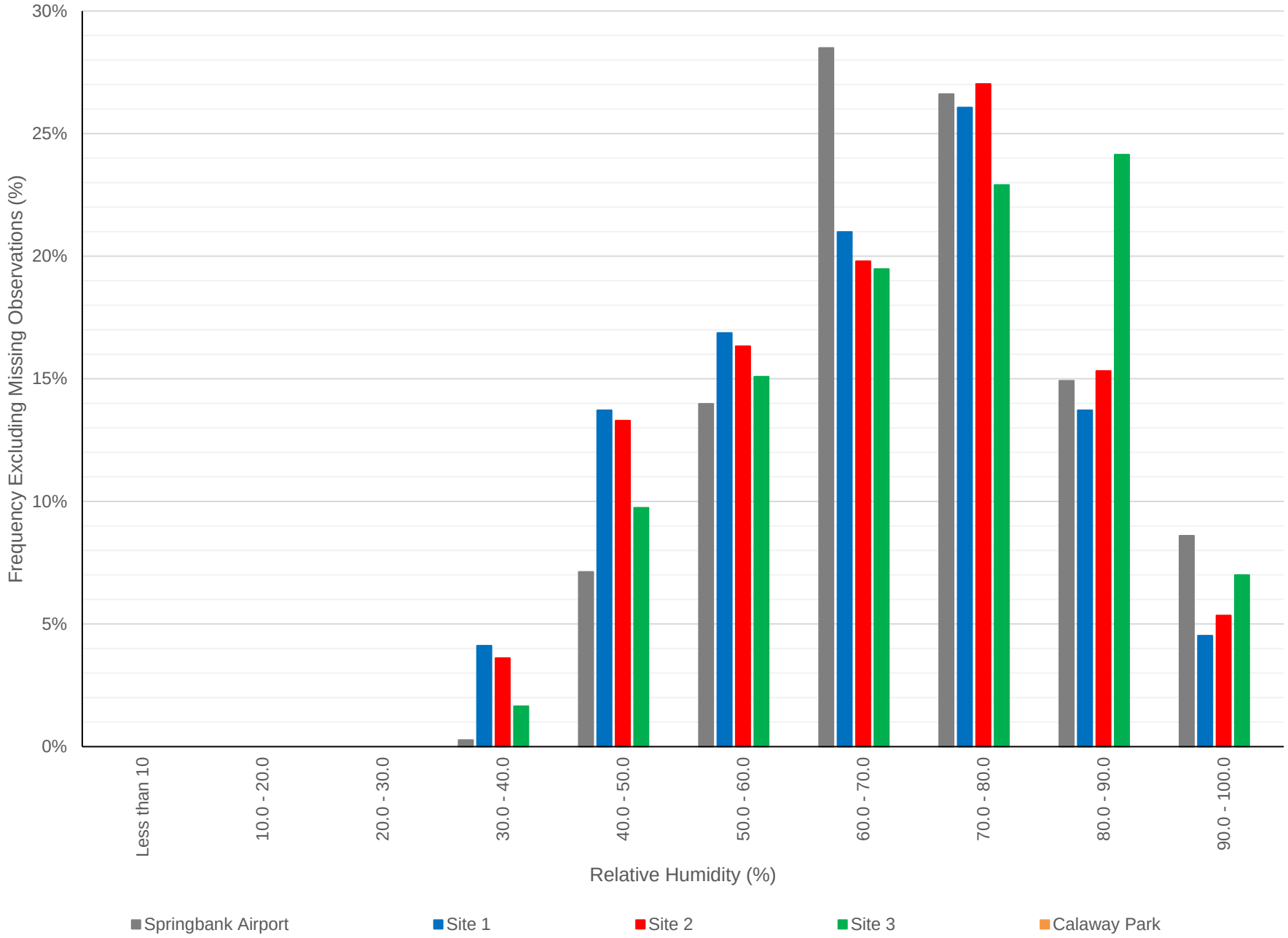


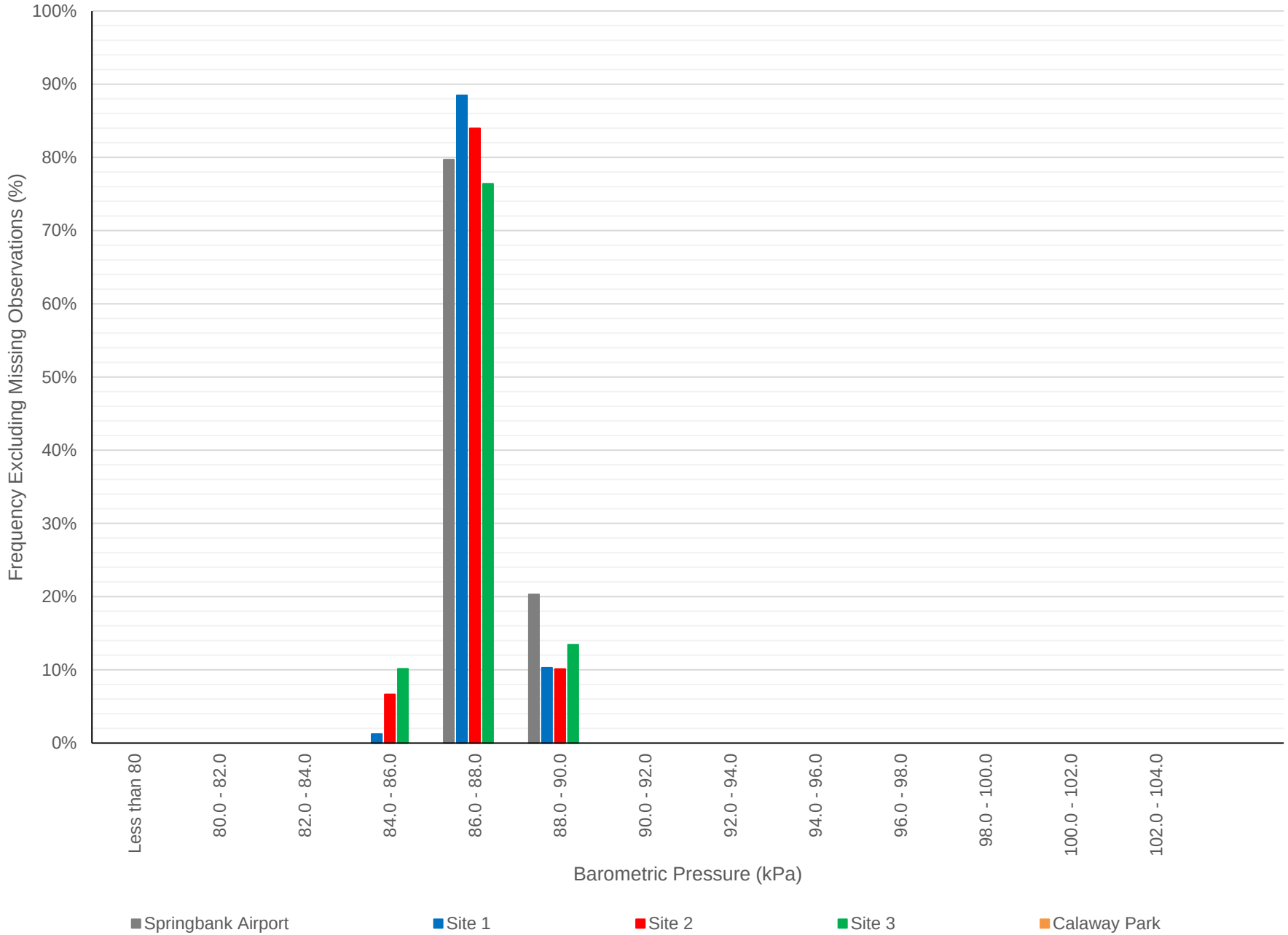
January 2023 Springbank Airport Wind Rose

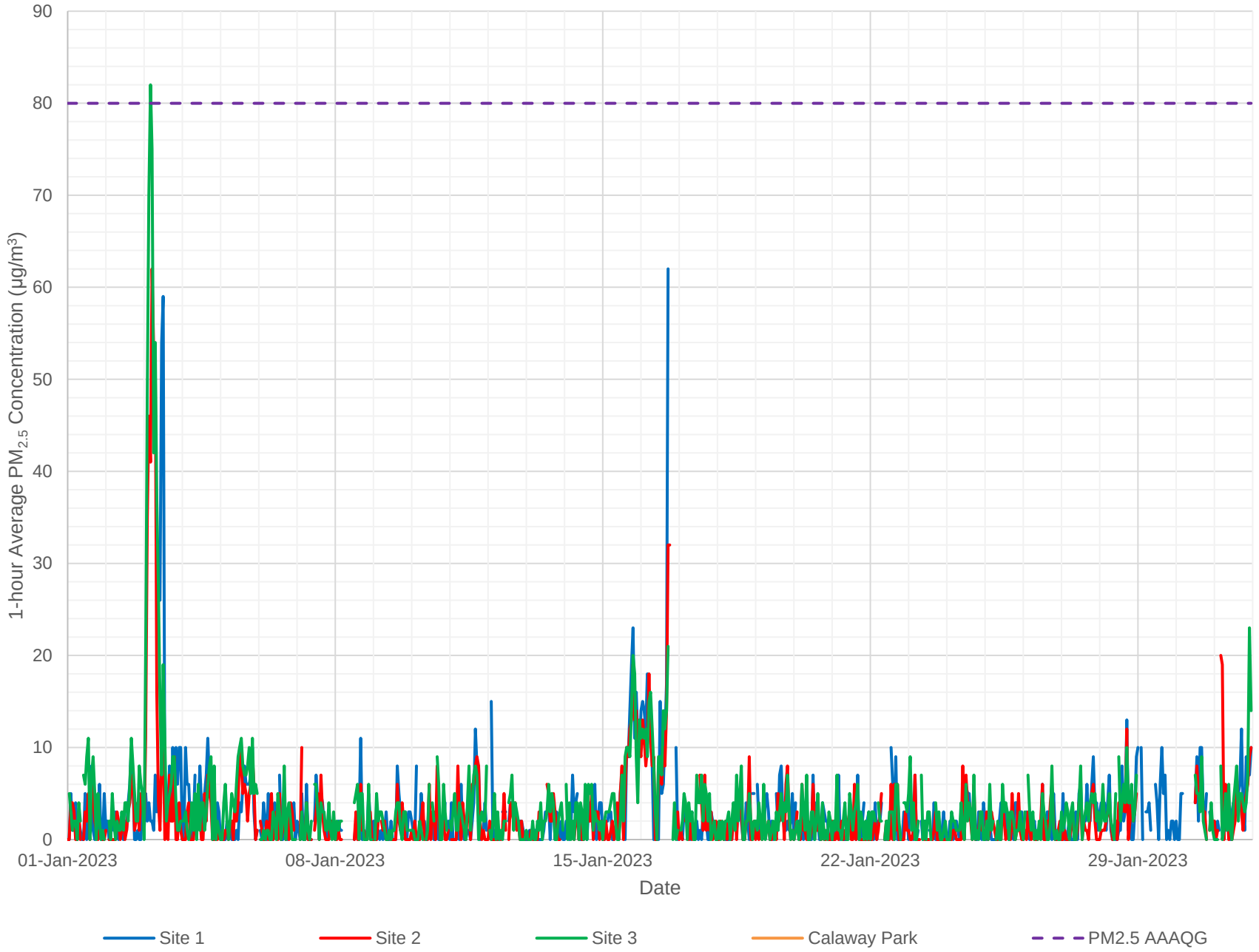


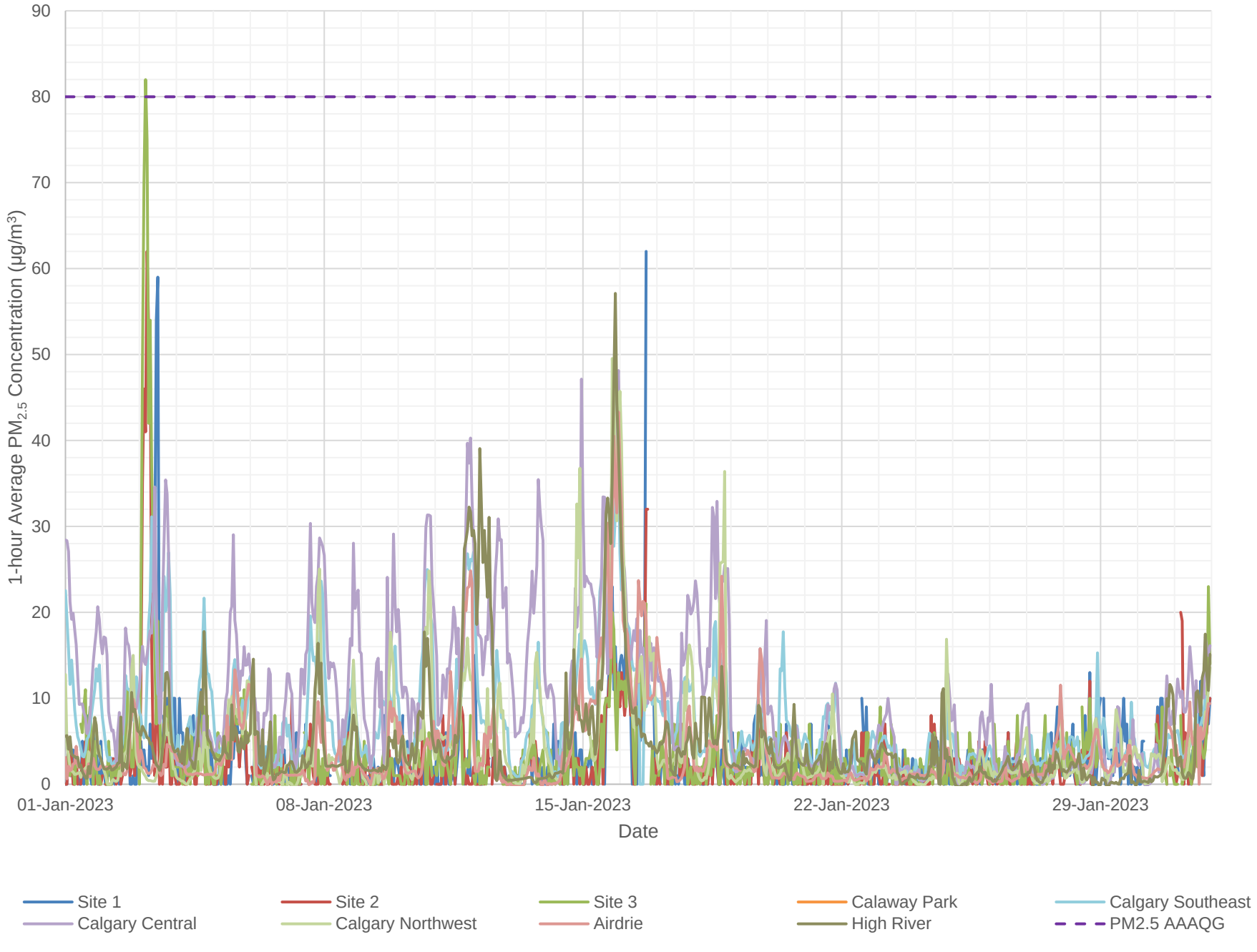

50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

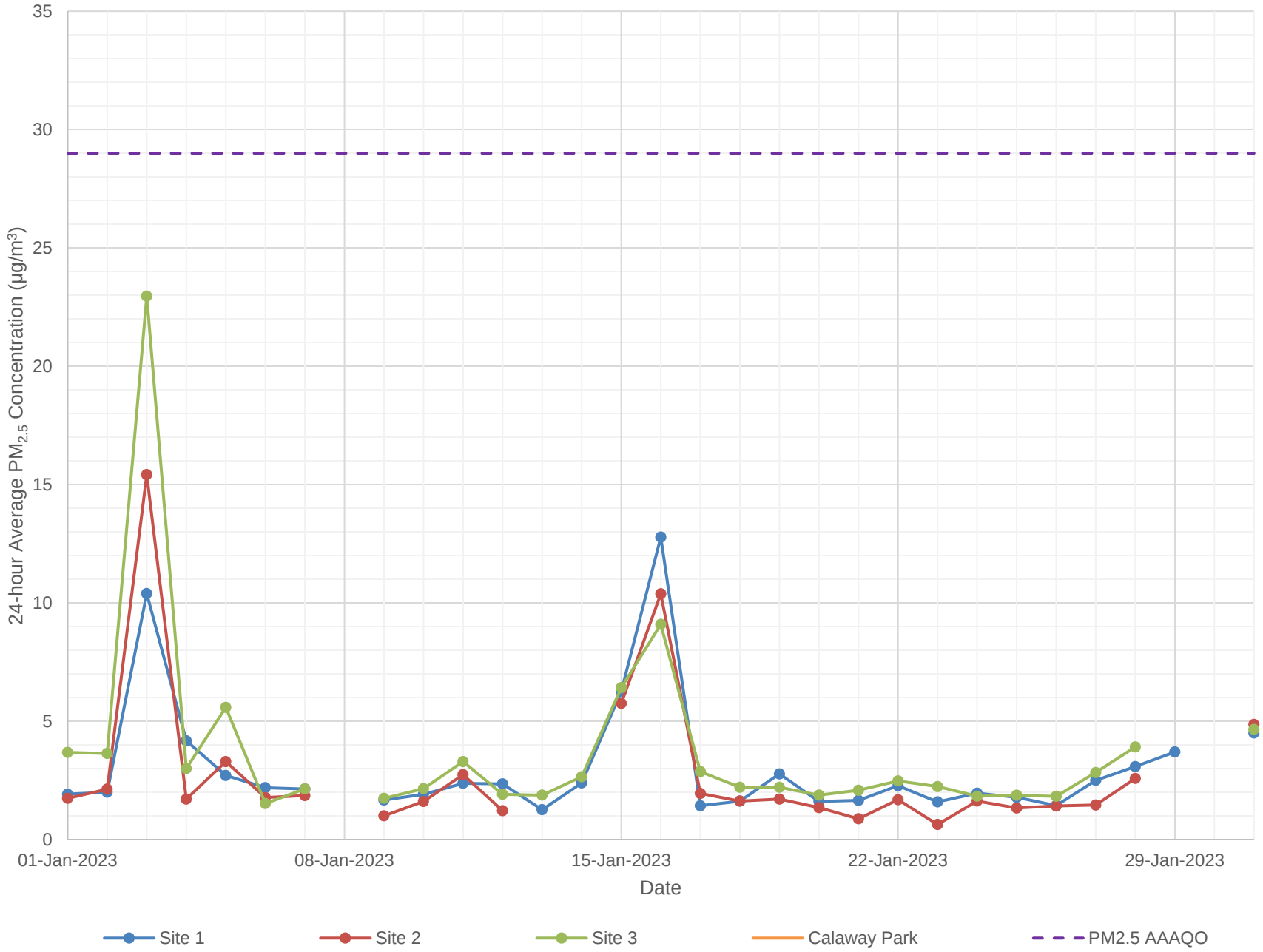

40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

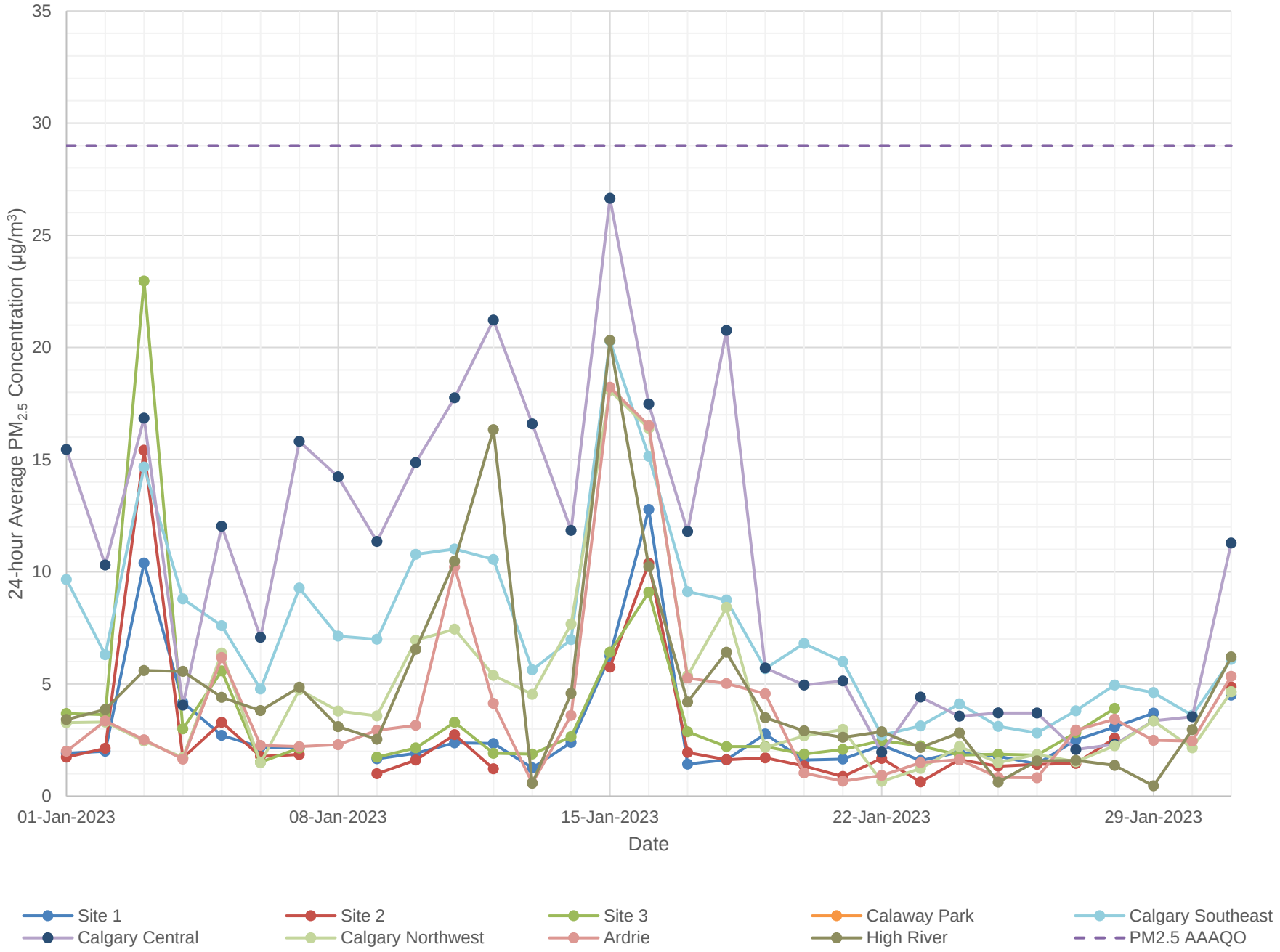

30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

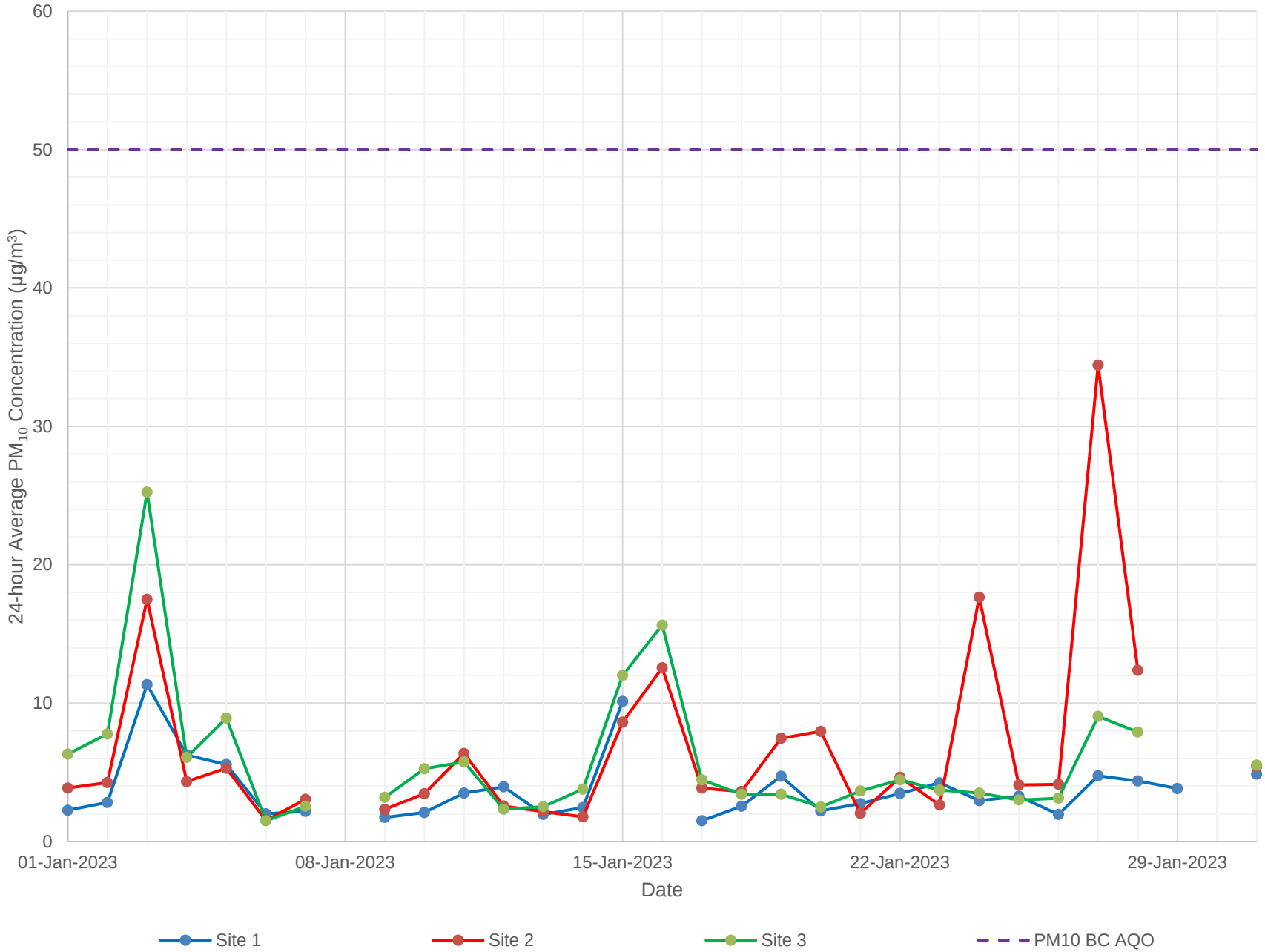

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

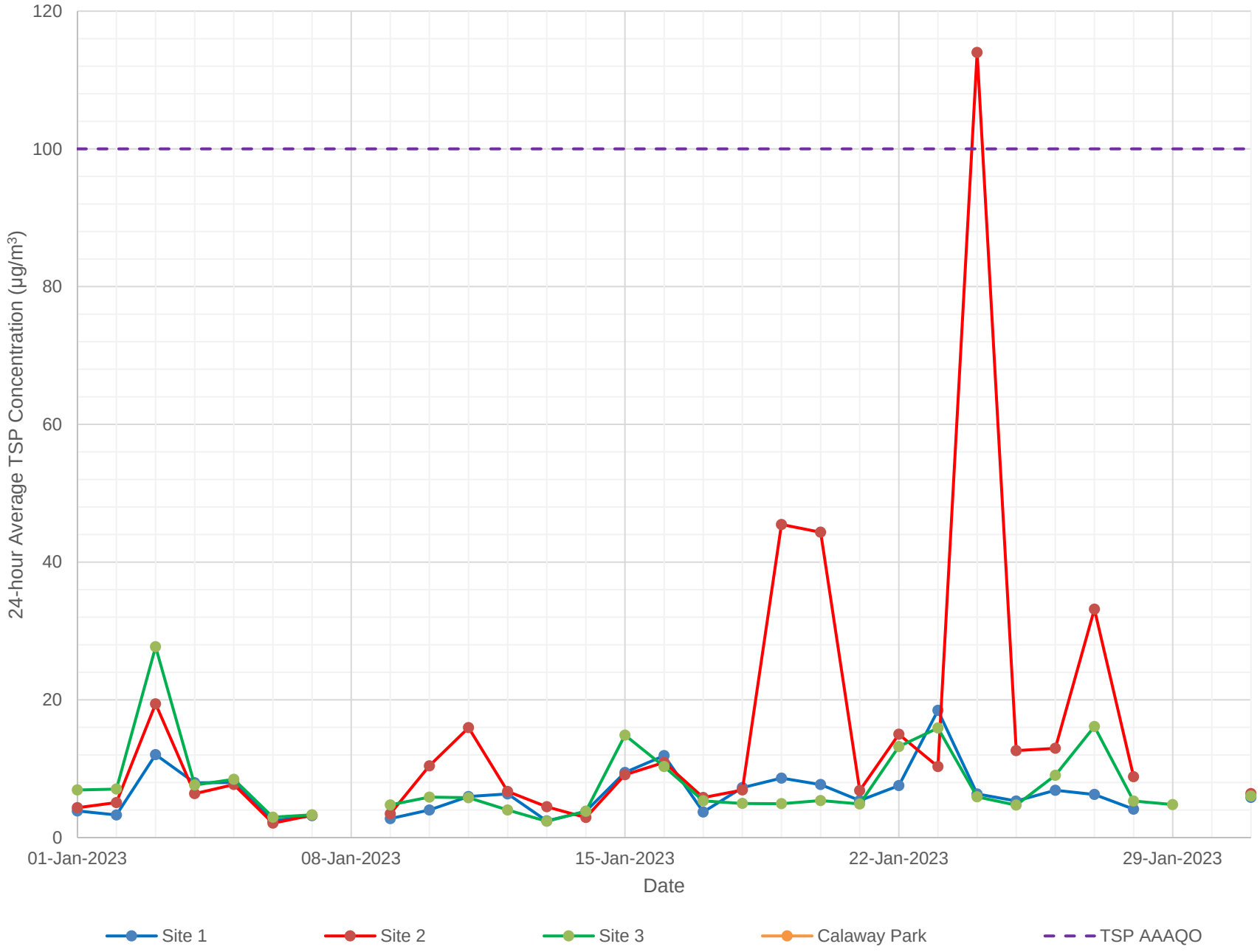

90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Jan-2023
08-Jan-2023
15-Jan-2023
22-Jan-2023
29-Jan-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Jan-2023
08-Jan-2023
15-Jan-2023
22-Jan-2023
29-Jan-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jan-2023
08-Jan-2023
15-Jan-2023
22-Jan-2023
29-Jan-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jan-2023
08-Jan-2023
15-Jan-2023
22-Jan-2023
29-Jan-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Jan-2023
08-Jan-2023
15-Jan-2023
22-Jan-2023
29-Jan-2023
Date
Site 1
Site 2
Site 3
PM10 BC AQO


120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Jan-2023
08-Jan-2023
15-Jan-2023
22-Jan-2023
29-Jan-2023
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

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Summary of EBAM Station Particulate and Meteorological Monitoring for February 2023

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-36.7	23.0	84.4
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			23.0	84.4
Average	3.85	5.44	9.04	2.33	276.9 (W)	-4.6	60.8	86.8
Median	3.00	3.00	5.00	1.86		-2.7	60.0	86.9
Maximum	28.00	78.00	71.00	8.19		10.1	98.0	88.4
Standard Deviation	4.60	7.78	11.46	1.72		9.1	20.3	0.8
Number Obs	607	594	565	635	635	635	635	635
Expected Obs	672	672	672	672	672	672	672	672
% Complete	90.3%	88.4%	84.1%	94.5%	94.5%	94.5%	94.5%	94.5%
Calm Hours				6				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	99	57	38	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	1	3	0	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	0	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.39	1.23	1.14
Minimum (Non-Zero)	1.39	1.23	1.14
Average	3.72	5.10	8.69
Median	2.77	3.63	6.42
Maximum	13.42	13.96	24.96
Standard Deviation	2.73	3.55	5.80
Number Obs	24	24	23
Expected Obs	28	28	28
% Complete	90.3%	88.4%	84.1%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	11	10	6	3	5	10
1/3 of 24-hour AAAQO	1	0	0	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for February 2023

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-36.0	22.0	84.5
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			22.0	84.5
Average	3.98	11.15	15.40	2.47	69.3 (ENE)	-5.1	62.1	87.0
Median	2.00	5.00	8.00	1.86		-3.8	64.0	87.1
Maximum	53.00	621.00	223.00	16.78		10.3	98.0	88.5
Standard Deviation	5.87	32.45	22.56	2.02		9.6	20.5	0.8
Number Obs	594	610	593	641	641	638	645	645
Expected Obs	672	672	672	672	672	672	672	672
% Complete	88.4%	90.8%	88.2%	95.4%	95.4%	94.9%	96.0%	96.0%
Calm Hours				16				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	94	123	88	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	6	20	12	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	6	2	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	6	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	0.96	2.95	4.30
Minimum (Non-Zero)	0.96	2.95	4.30
Average	3.98	10.56	15.82
Median	2.64	5.38	13.79
Maximum	12.83	51.70	28.14
Standard Deviation	2.89	11.68	7.01
Number Obs	25	25	24
Expected Obs	28	28	28
% Complete	88.4%	90.8%	88.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	10	15	19	3	5	10
1/3 of 24-hour AAAQO	1	5	0	10	17	33
2/3 of 24-hour AAAQO	0	2	0	19	33	67
Above 24-hour AAAQO	0	1	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for February 2023

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-37.6	23.0	84.5
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			23.0	84.5
Average	4.52	8.47	15.19	2.33	51.6 (NE)	-5.6	63.9	87.1
Median	3.00	5.00	7.00	1.72		-4.0	66.0	87.3
Maximum	54.00	217.00	467.00	16.25		10.1	98.0	88.8
Standard Deviation	5.55	14.36	35.08	1.84		9.6	20.4	0.8
Number Obs	615	580	640	645	645	656	656	656
Expected Obs	672	672	672	672	672	672	672	672
% Complete	91.5%	86.3%	95.2%	96.0%	96.0%	97.6%	97.6%	97.6%
Calm Hours				8				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	118	97	73	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	6	12	14	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	1	2	5	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	1	3	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.74	3.55	4.13
Minimum (Non-Zero)	1.74	3.55	4.13
Average	4.44	8.02	15.29
Median	3.43	6.10	12.38
Maximum	13.29	33.00	75.42
Standard Deviation	2.76	6.12	13.64
Number Obs	26	24	27
Expected Obs	28	28	28
% Complete	91.5%	86.3%	95.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	16	16	3	5	10
1/3 of 24-hour AAAQO	0	1	2	10	17	33
2/3 of 24-hour AAAQO	0	0	1	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for February 2023

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—			—	—
Average	—	—	—	— (—)	—	—	—
Median	—	—	—		—	—	—
Maximum	—	—	—		—	—	—
Standard Deviation	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0
Expected Obs	672	672	672	672	672	672	672
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours			0				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	—	—
Minimum (Non-Zero)	—	—
Average	—	—
Median	—	—
Maximum	—	—
Standard Deviation	—	—
Number Obs	0	0
Expected Obs	28	28
% Complete	0.0%	0.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	0	0	3	10	
1/3 of 24-hour AAAQO	0	0	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for February 2023

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-36.7	24.0	85.1
Minimum (Non-Zero)	1.11			24.0	85.1
Average	4.81	270.0 (W)	-6.1	63.2	87.2
Median	4.17		-4.1	63.0	87.2
Maximum	16.11		8.9	96.0	88.7
Standard Deviation	2.79		9.54	17.65	0.750
Number Obs	629	629	672	672	672
Expected Obs	672	672	672	672	672
% Complete	93.6%	93.6%	100.0%	100.0%	100.0%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for February 2023

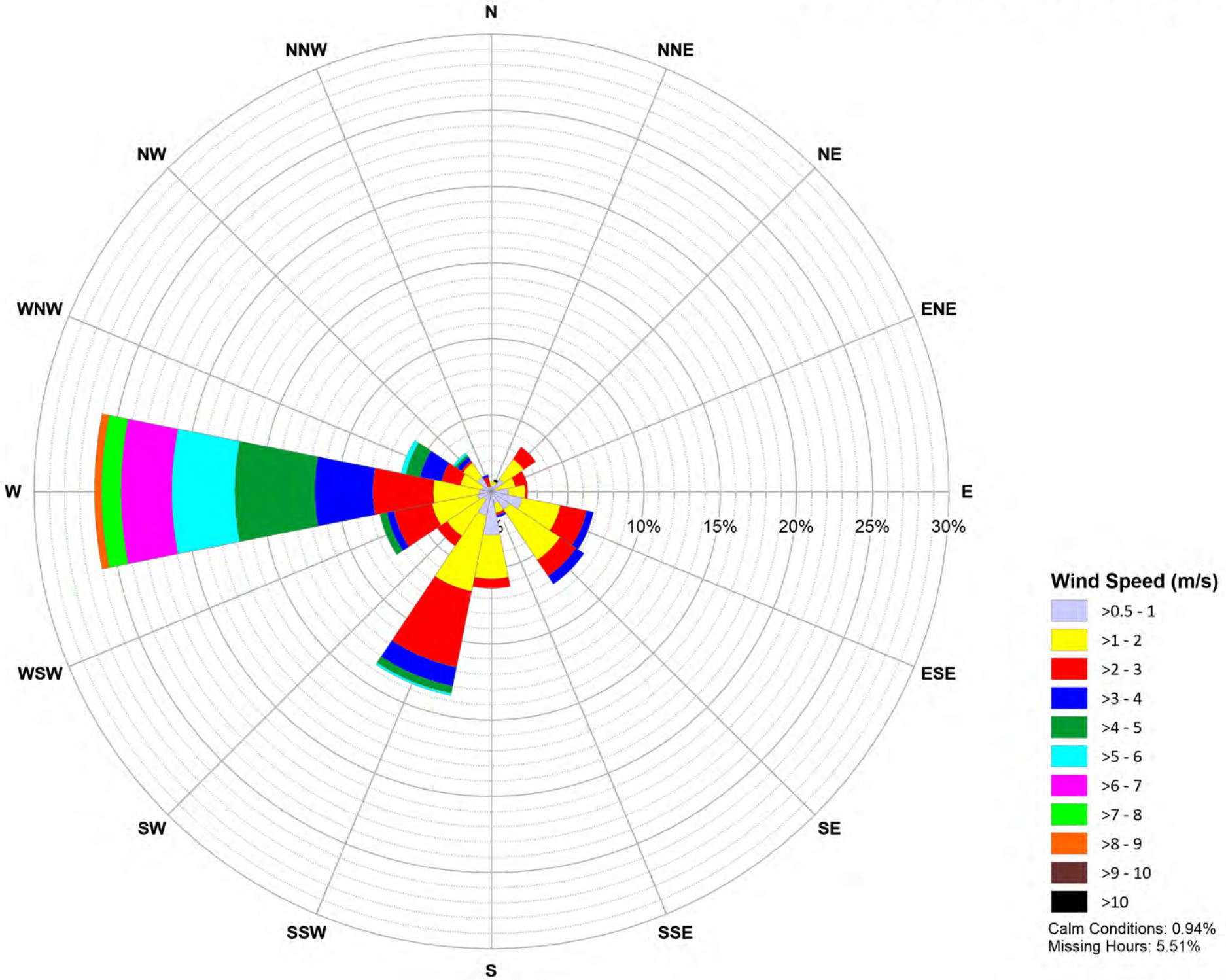
CRAZ 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations						SR1 EBAM 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.57	0.07	-1.94	-1.11	0.42	0.00	0.00	0.00	—
Minimum (Non-Zero)	0.57	0.07	-1.94	-1.11	0.42	1.00	1.00	1.00	—
Average	6.98	7.86	5.03	4.07	4.08	3.85	3.98	4.52	—
Median	5.16	5.39	3.30	1.81	2.36	3.00	2.00	3.00	—
Maximum	25.93	40.05	35.45	35.91	67.32	28.00	53.00	54.00	—
Standard Deviation	4.99	7.34	5.65	5.35	4.50	4.60	5.87	5.55	—
Number Obs	669	668	666	665	665	607	594	615	0
Expected Obs	672	672	672	672	672	672	672	672	672
% Complete	99.6%	99.4%	99.1%	99.0%	99.0%	90.3%	88.4%	91.5%	**0.0%**

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

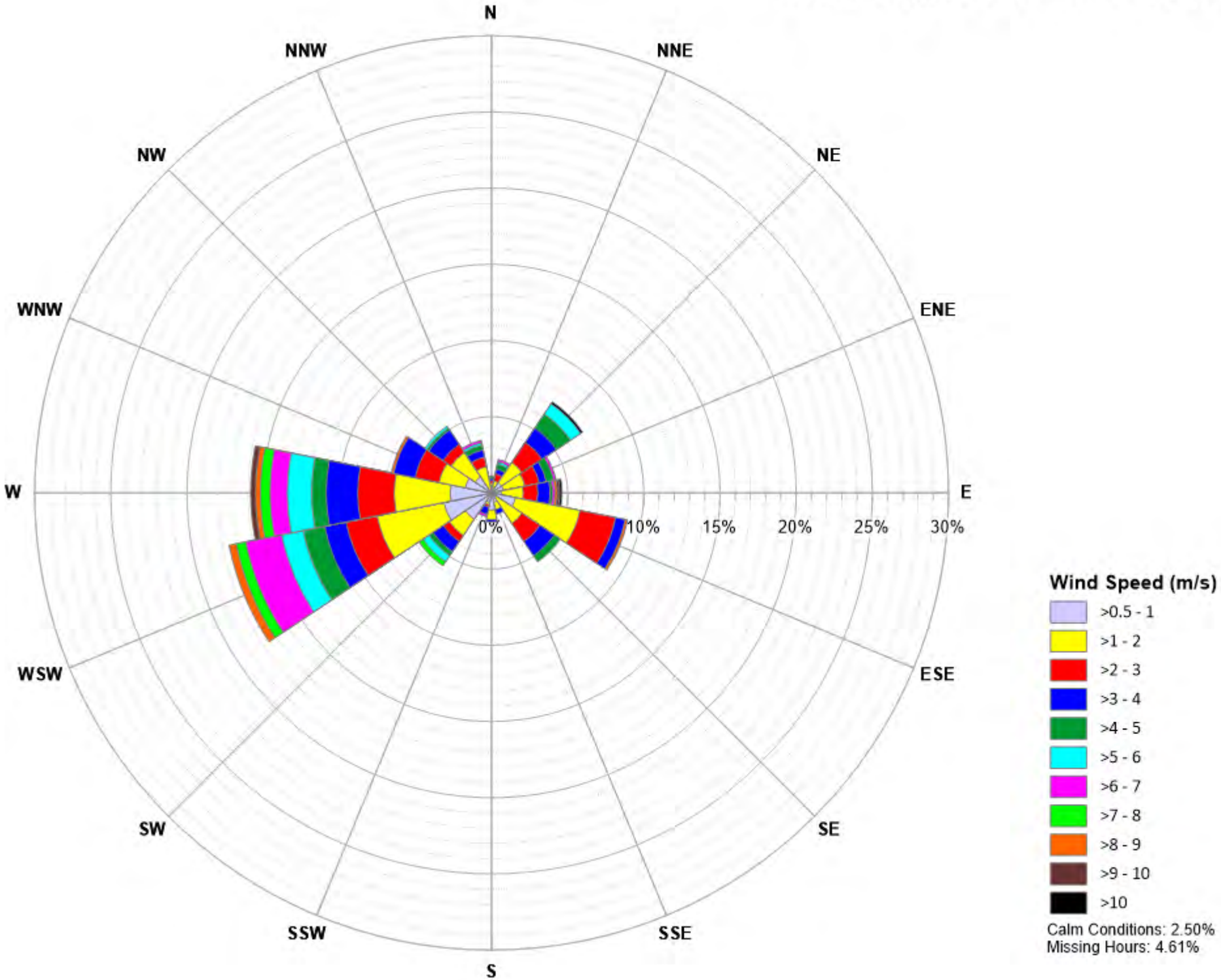
CRAZ 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations						SR1 EBAM 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.56	0.98	0.98	-0.29	1.18	1.39	0.96	1.74	—
Minimum (Non-Zero)	2.56	0.98	0.98	-0.29	1.18	1.39	0.96	1.74	—
Average	6.98	7.86	5.03	4.06	4.06	3.72	3.98	4.44	—
Median	5.87	5.94	4.39	2.85	2.94	2.77	2.64	3.43	—
Maximum	18.16	21.50	14.91	13.90	12.36	13.42	12.83	13.29	—
Standard Deviation	3.89	5.15	3.50	3.94	2.88	2.73	2.89	2.76	—
Number Obs	28	28	28	28	28	24	25	26	0
Expected Obs	28	28	28	28	28	28	28	28	28
% Complete	100.0%	100.0%	100.0%	100.0%	100.0%	85.7%	89.3%	92.9%	**0.0%**

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

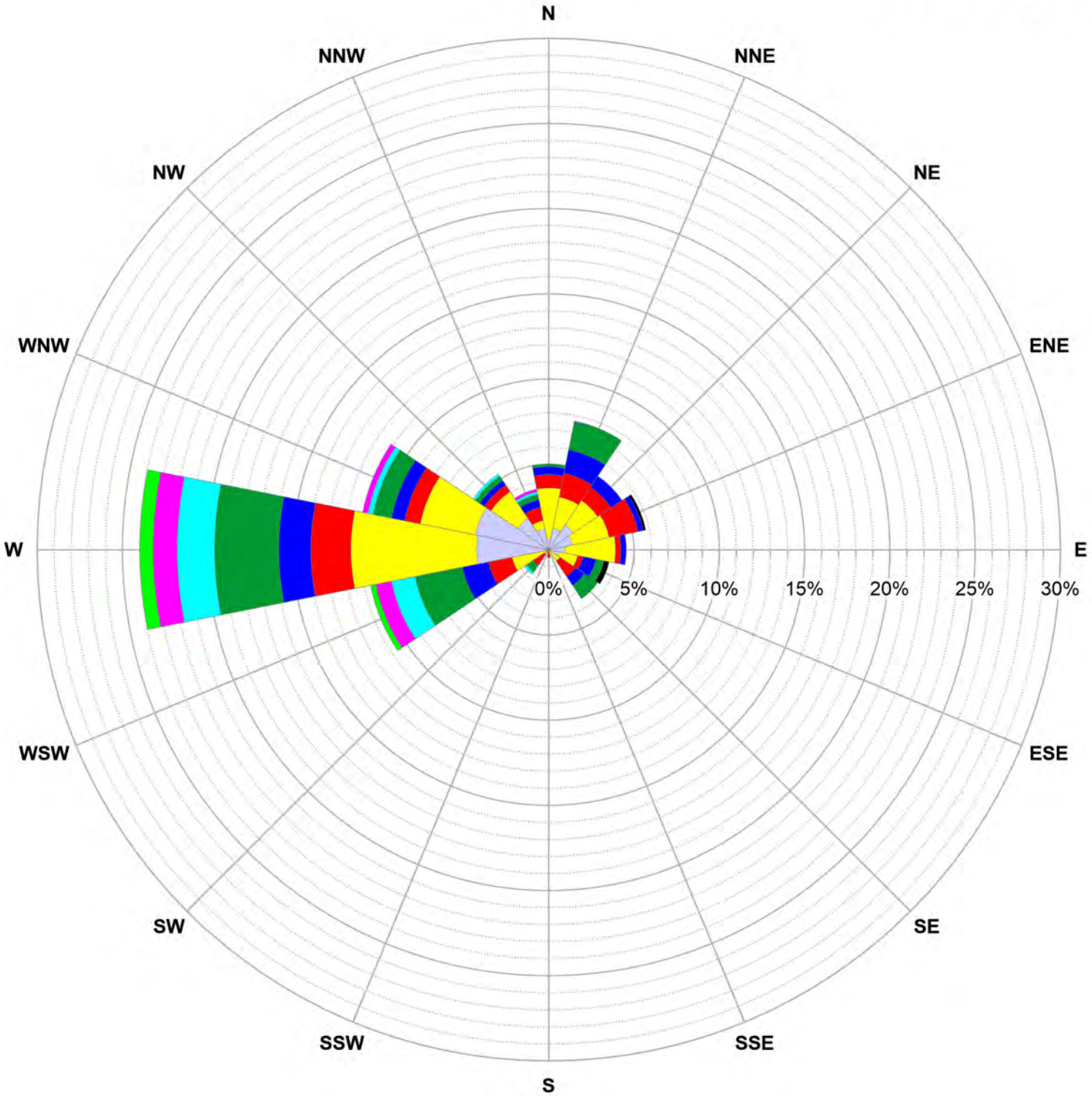
February 2023 Site 1 Wind Rose



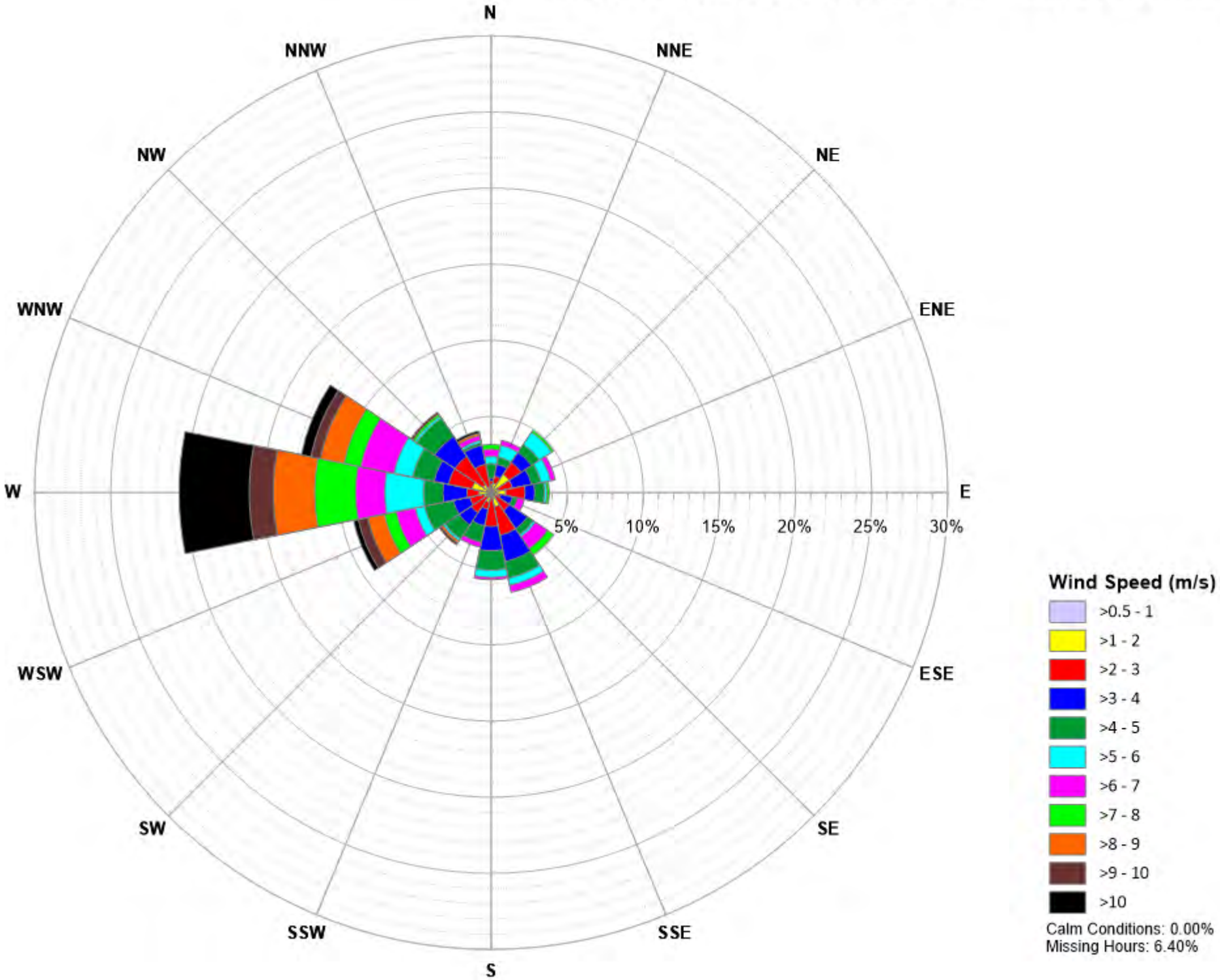
February 2023 Site 2 Wind Rose

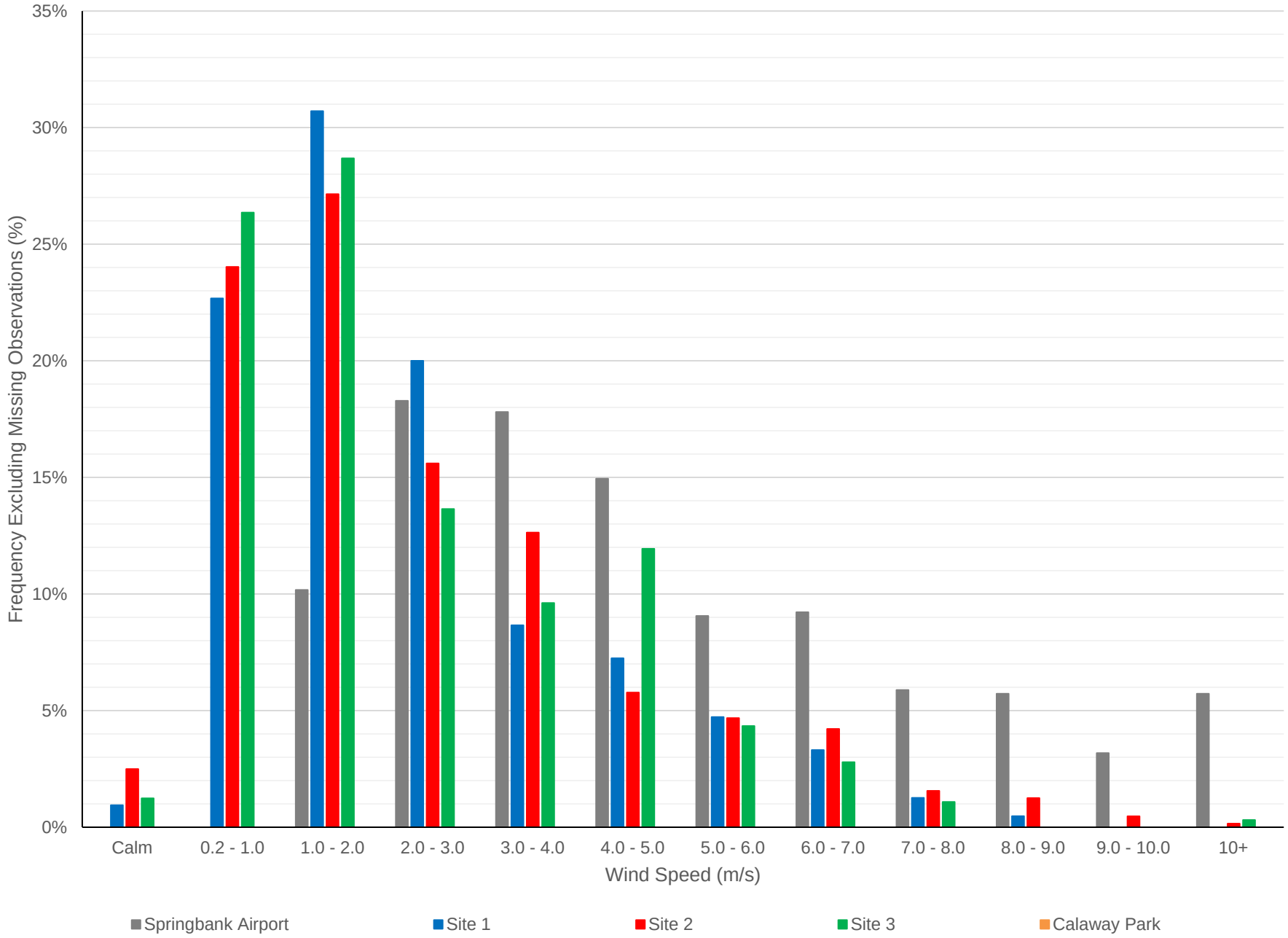


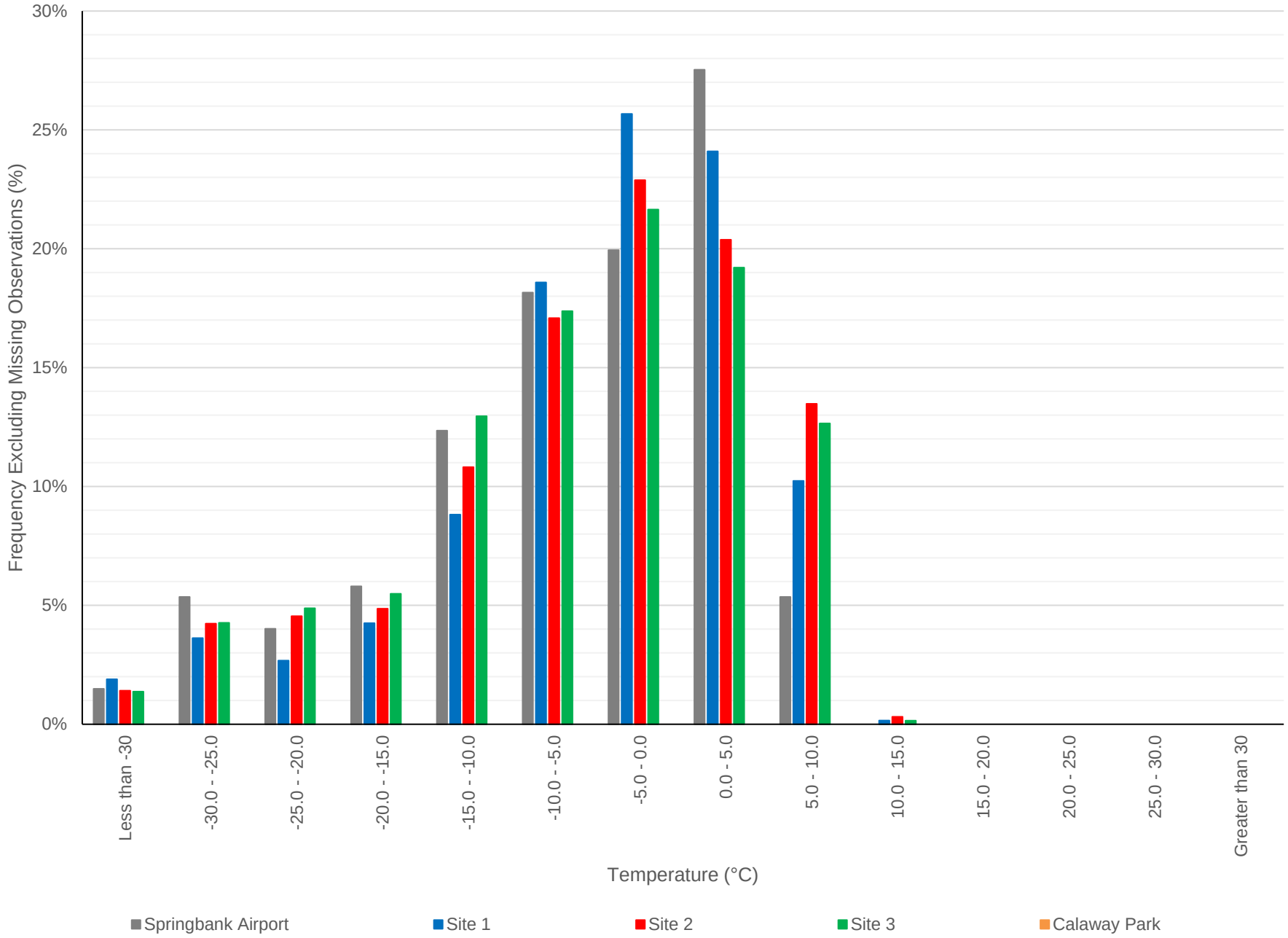
February 2023 Site 3 Wind Rose

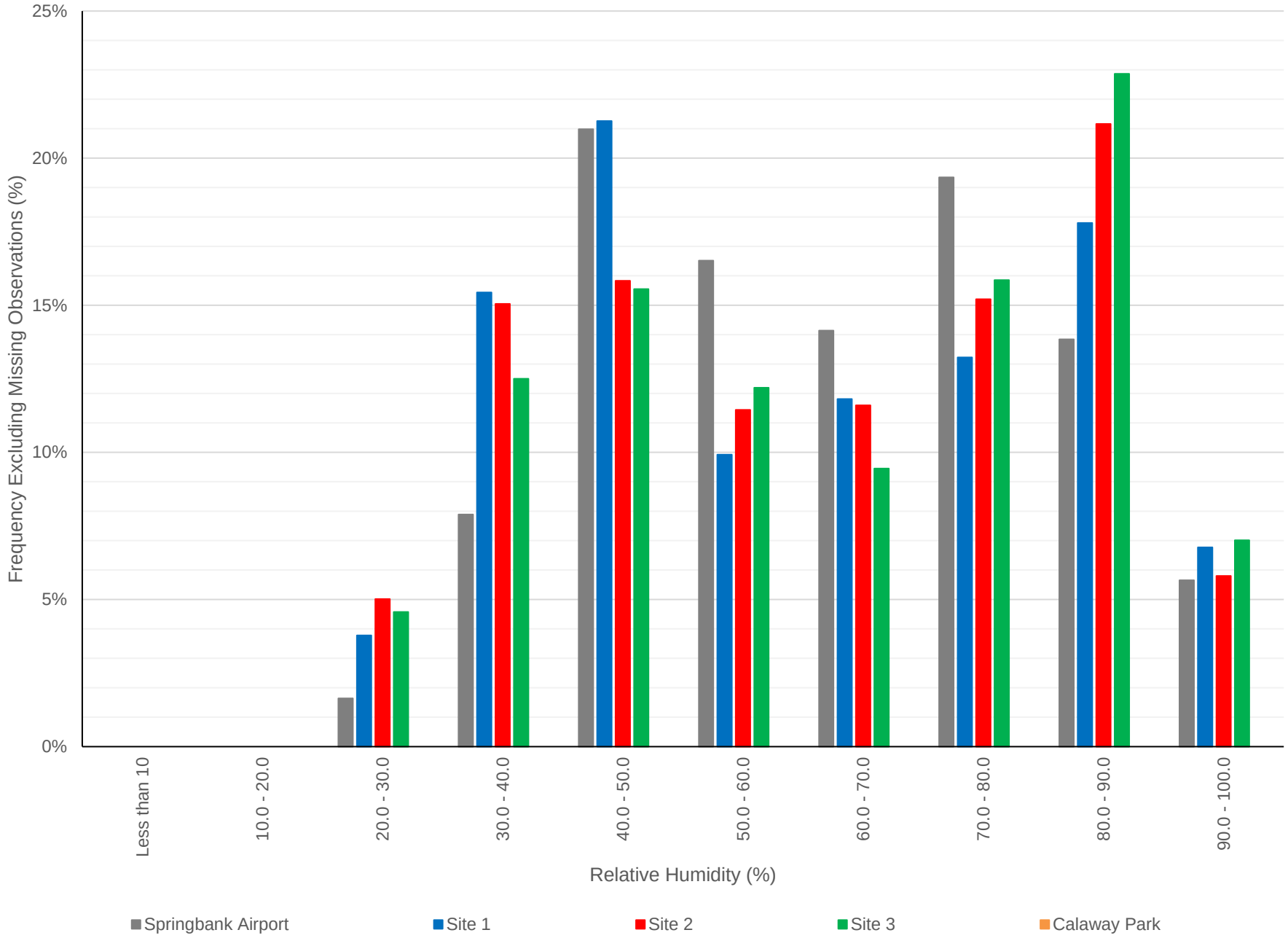


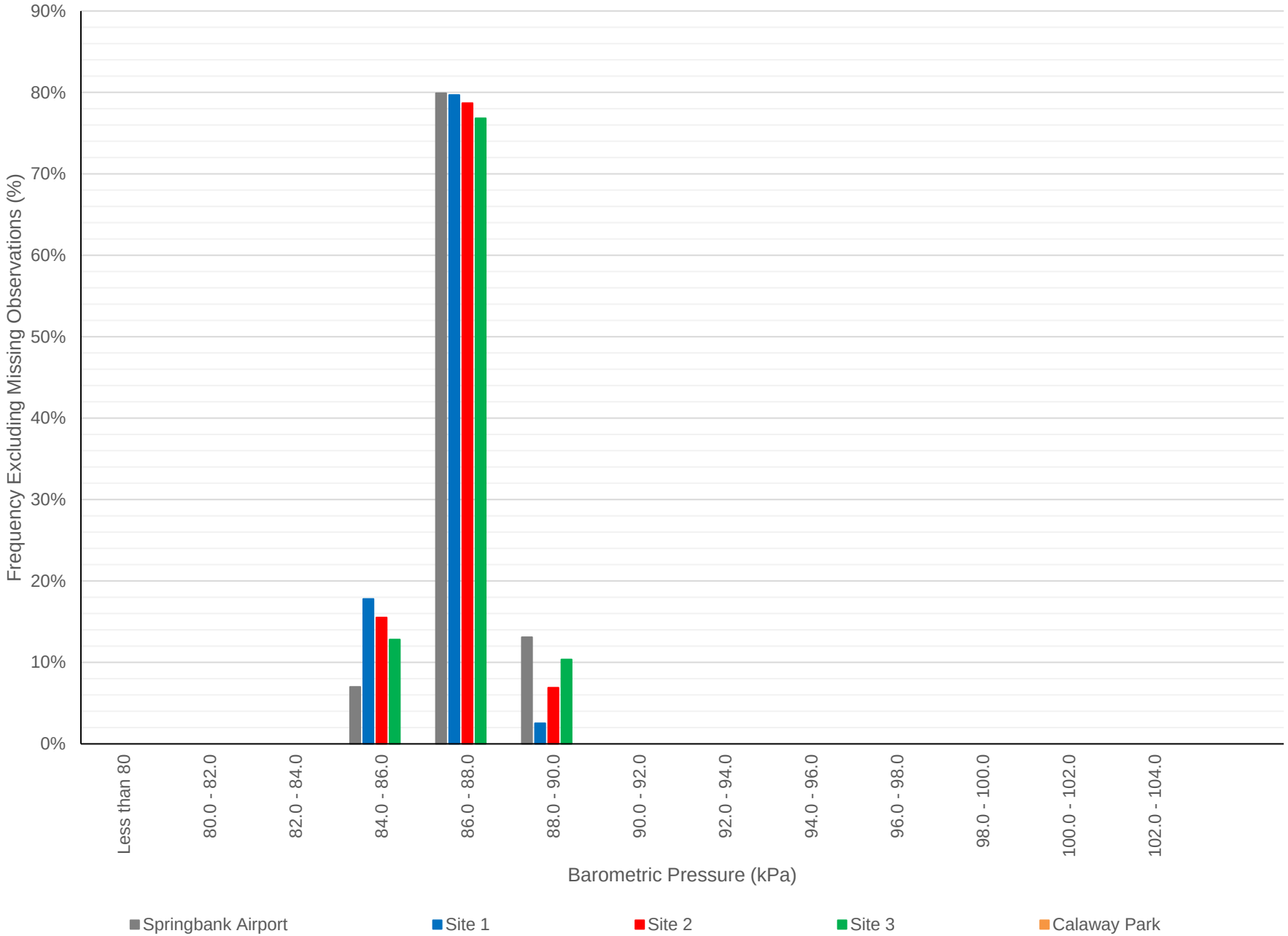
February 2023 Springbank Airport Wind Rose

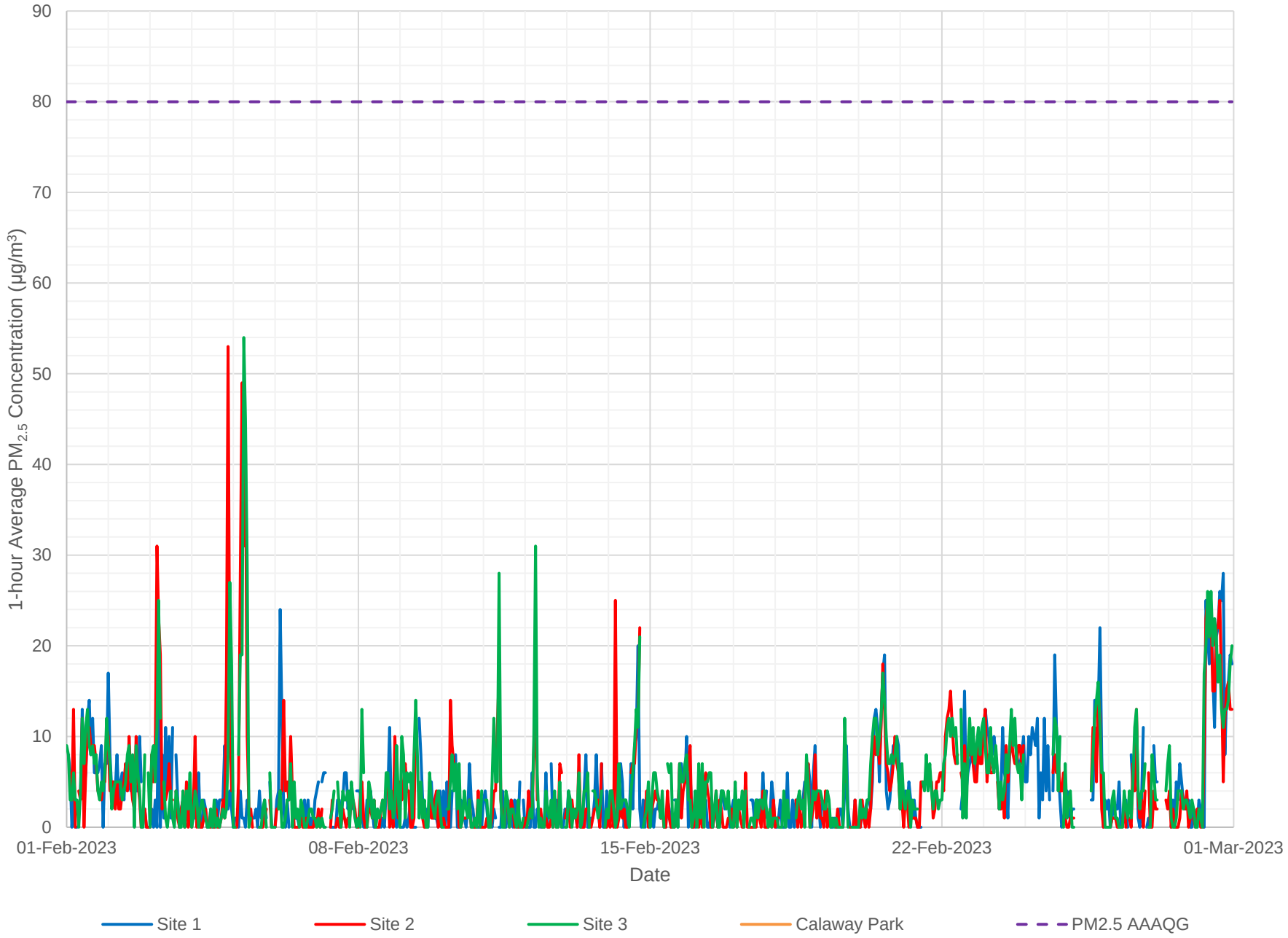


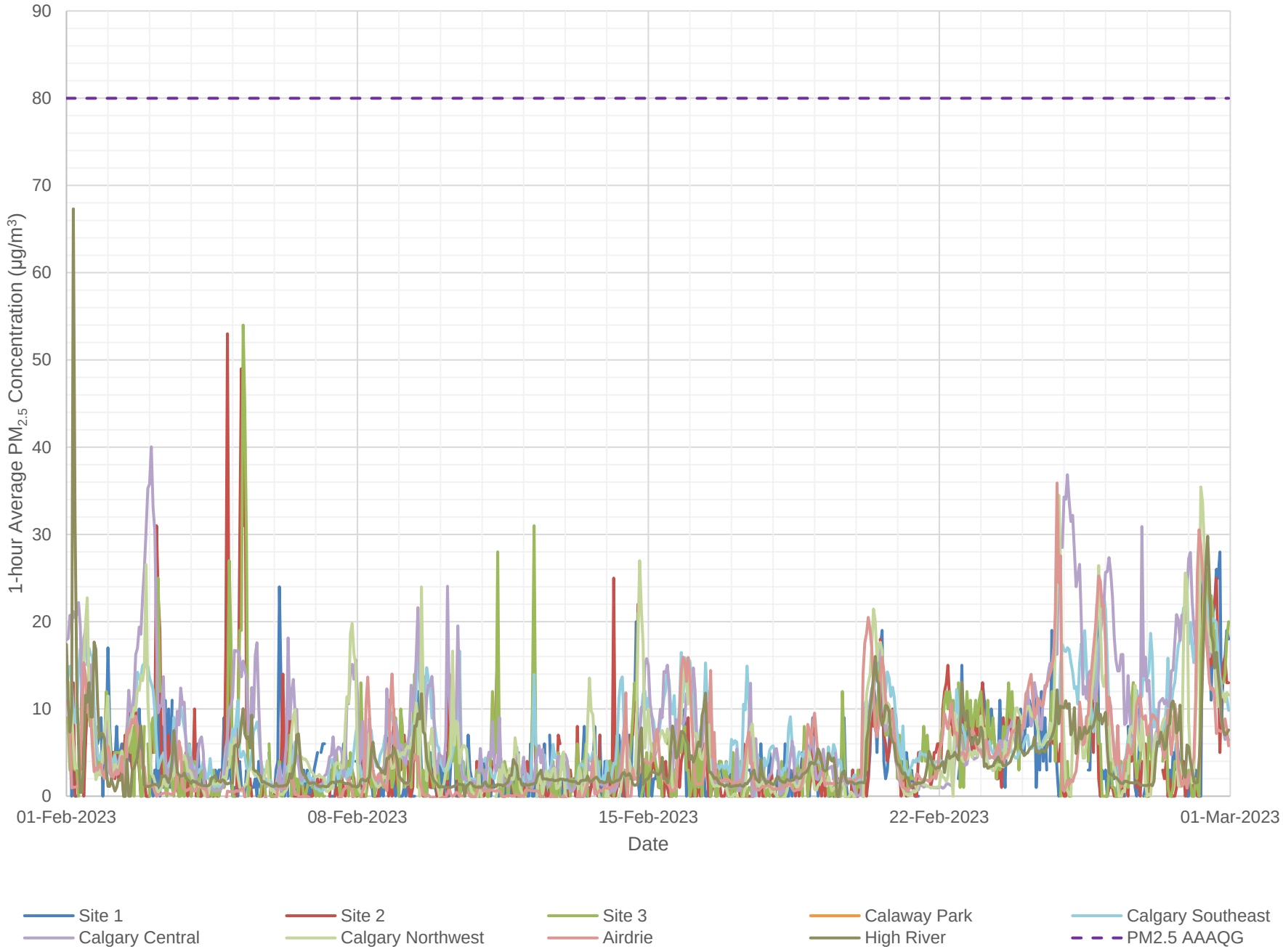

35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

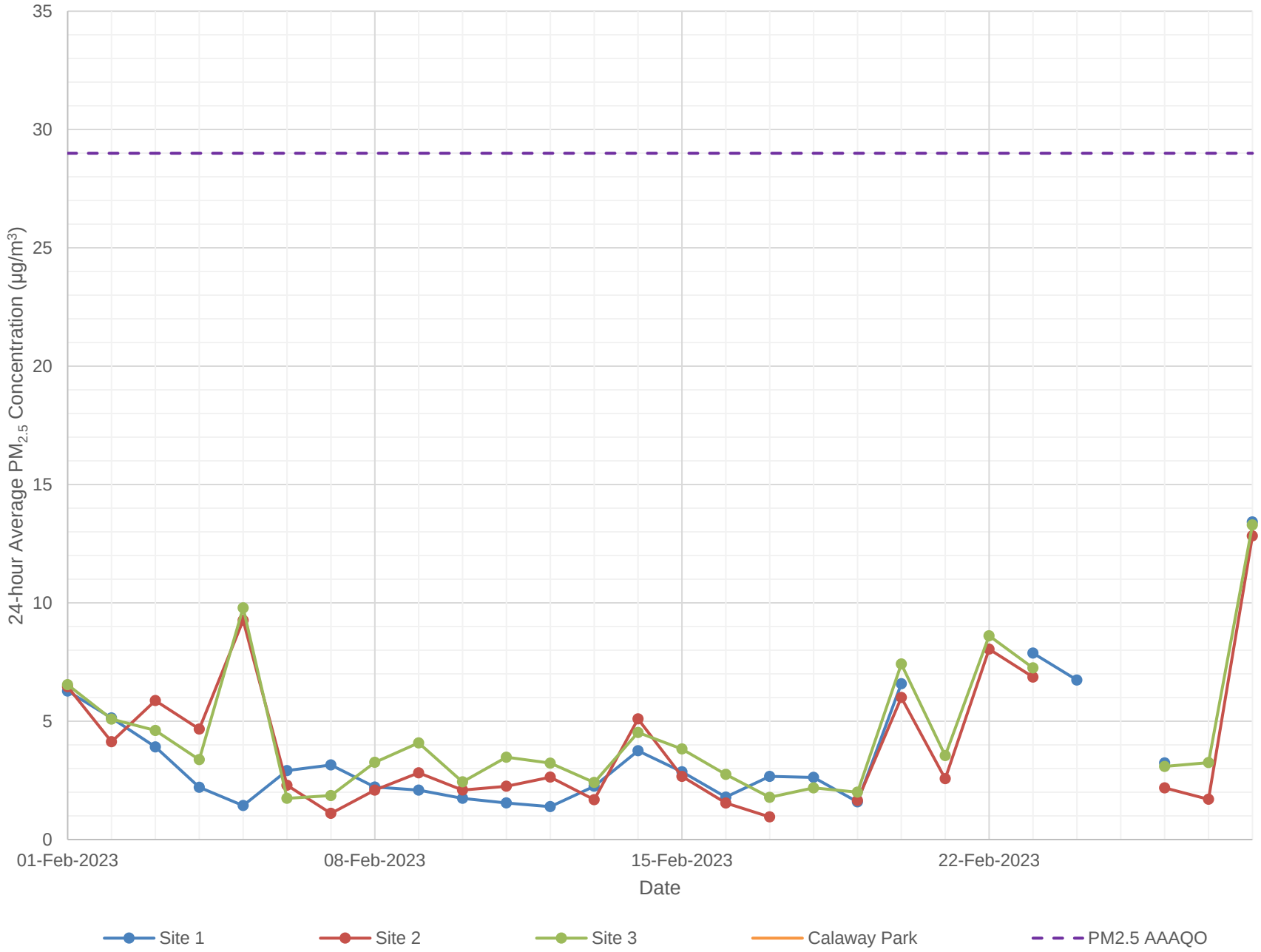

30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

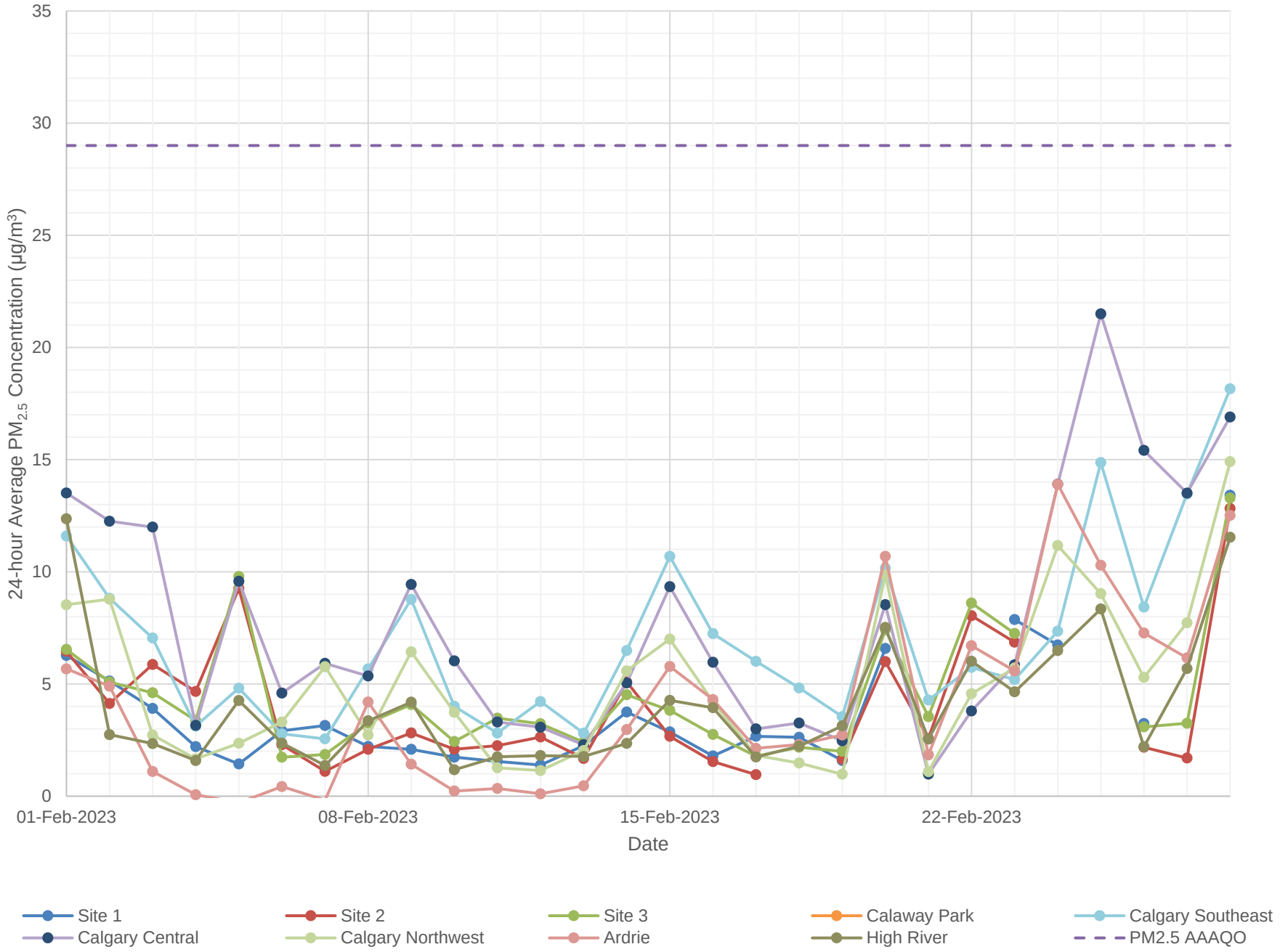

25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

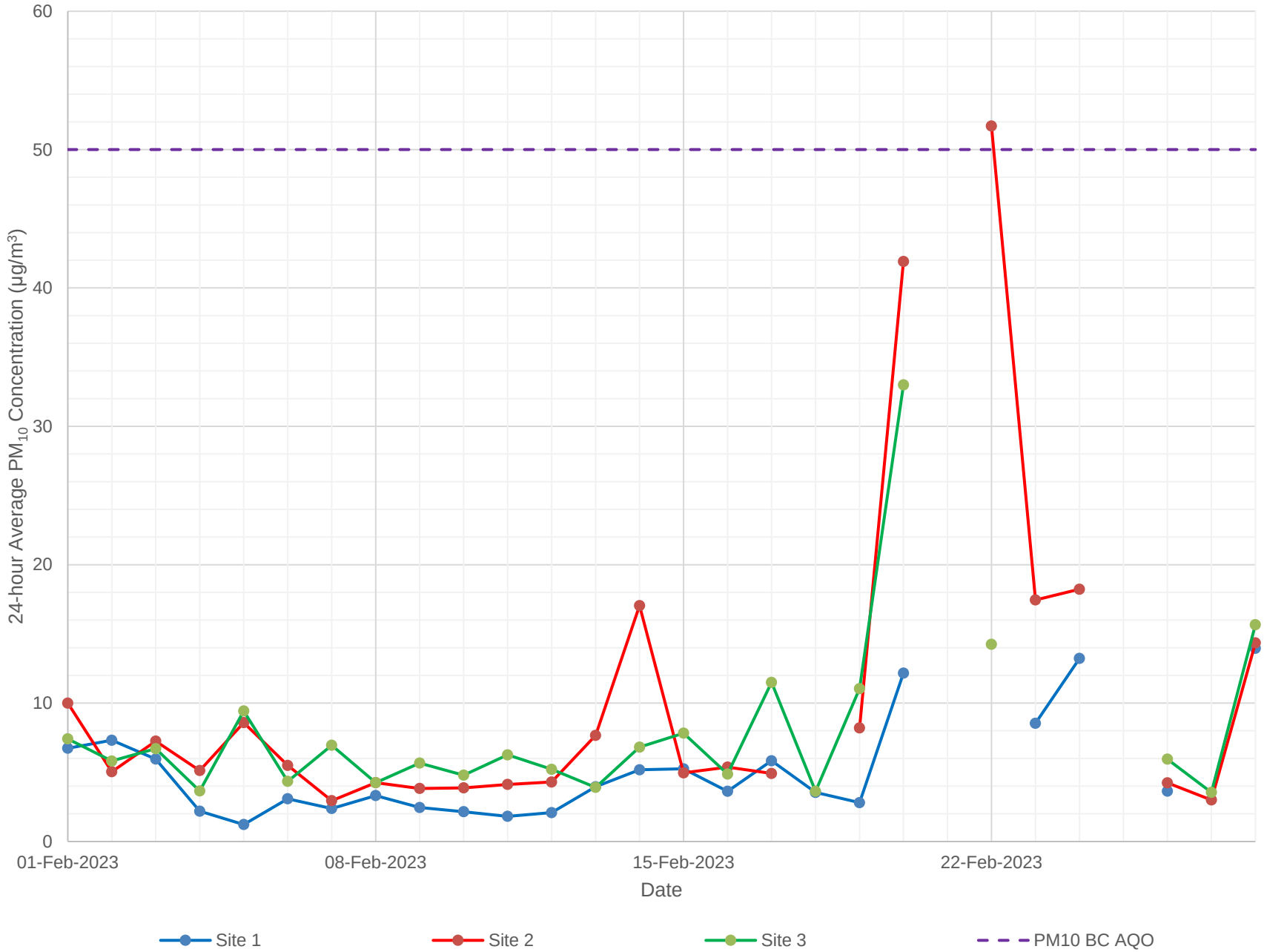

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

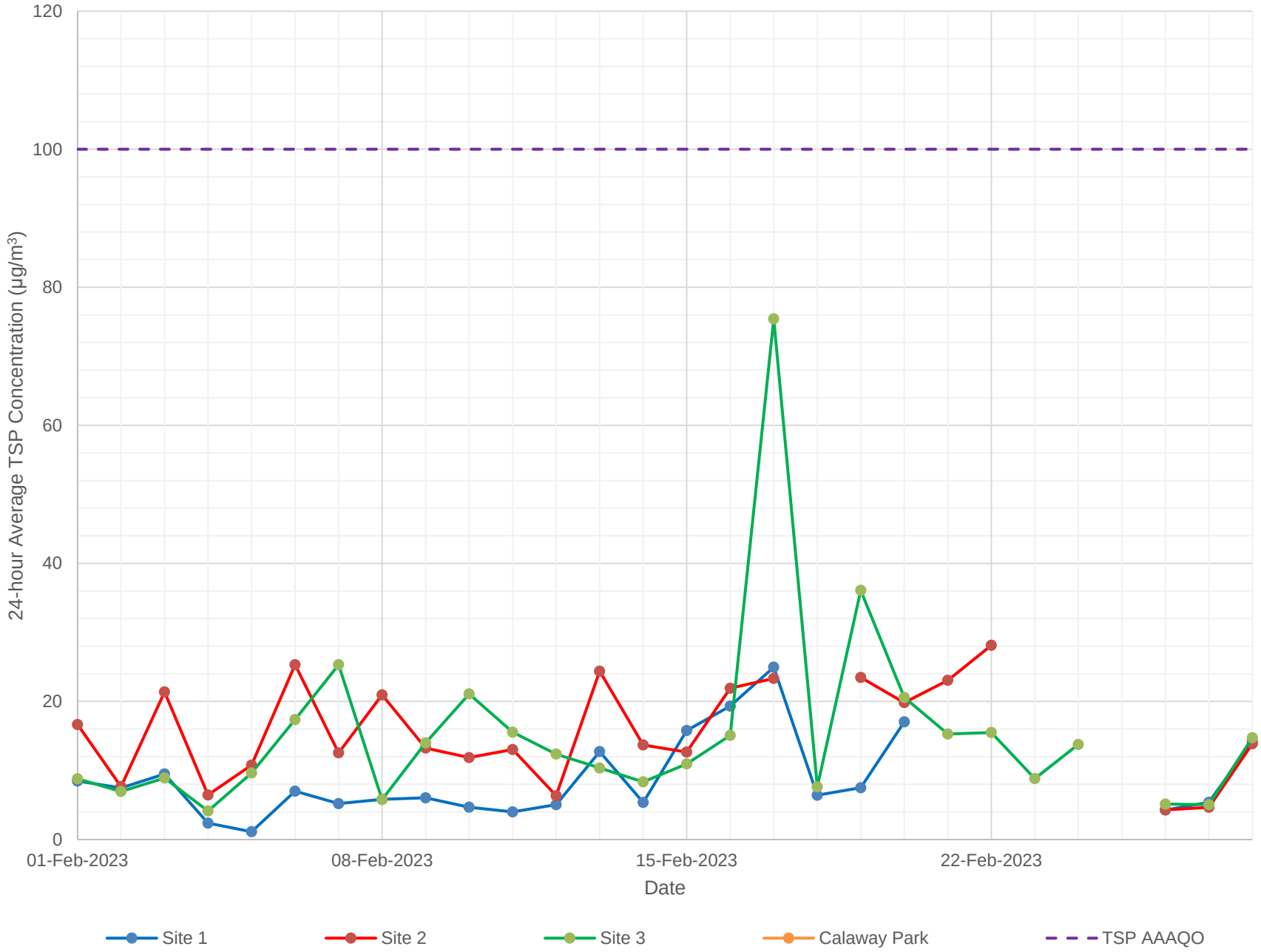

90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Feb-2023
08-Feb-2023
15-Feb-2023
22-Feb-2023
01-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Feb-2023
08-Feb-2023
15-Feb-2023
22-Feb-2023
01-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Feb-2023
08-Feb-2023
15-Feb-2023
22-Feb-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Feb-2023
08-Feb-2023
15-Feb-2023
22-Feb-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Feb-2023
08-Feb-2023
15-Feb-2023
22-Feb-2023
Date
Site 1
Site 2
Site 3
PM10 BC AQO


120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Feb-2023
08-Feb-2023
15-Feb-2023
22-Feb-2023
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for March 2023

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-26.1	19.0	85.1
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			19.0	85.1
Average	9.16	14.48	22.04	1.97	255.2 (WSW)	-7.5	69.1	86.8
Median	7.00	11.00	15.00	1.22		-7.2	71.0	86.8
Maximum	94.00	232.00	437.00	49.72		8.9	98.0	88.1
Standard Deviation	9.12	18.50	33.63	3.87		7.5	19.1	0.7
Number Obs	701	696	703	738	738	738	738	738
Expected Obs	744	744	744	744	744	744	744	744
% Complete	94.2%	93.5%	94.5%	99.2%	99.2%	99.2%	99.2%	99.2%
Calm Hours				43				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	340	269	141	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	30	27	19	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	5	8	6	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	1	2	4	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	2.24	6.48	9.00
Minimum (Non-Zero)	2.24	6.48	9.00
Average	9.23	14.58	22.20
Median	10.04	13.27	19.52
Maximum	22.74	47.53	53.94
Standard Deviation	4.31	8.07	10.86
Number Obs	31	31	31
Expected Obs	31	31	31
% Complete	94.2%	93.5%	94.5%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	30	31	30	3	5	10
1/3 of 24-hour AAAQO	16	8	4	10	17	33
2/3 of 24-hour AAAQO	1	1	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for March 2023

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-26.4	16.0	85.2
Minimum (Non-Zero)	1.00	1.00	1.00	0.08			16.0	85.2
Average	8.23	13.02	19.43	1.92	233.7 (SW)	-7.6	70.6	87.0
Median	7.00	10.00	13.00	1.67		-7.3	74.0	87.1
Maximum	94.00	127.00	554.00	8.69		9.0	97.0	88.3
Standard Deviation	7.81	13.02	33.15	1.22		7.6	19.0	0.7
Number Obs	683	684	709	701	701	693	701	701
Expected Obs	744	744	744	744	744	744	744	744
% Complete	91.8%	91.9%	95.3%	94.2%	94.2%	93.1%	94.2%	94.2%
Calm Hours				8				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	311	254	117	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	15	20	11	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	1	2	4	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	1	0	3	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	0.96	2.10	5.62
Minimum (Non-Zero)	0.96	2.10	5.62
Average	8.51	13.08	19.53
Median	8.56	12.35	15.81
Maximum	19.62	27.95	49.75
Standard Deviation	3.88	5.91	11.20
Number Obs	28	30	30
Expected Obs	31	31	31
% Complete	91.8%	91.9%	95.3%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	26	28	26	3	5	10
1/3 of 24-hour AAAQO	10	10	4	10	17	33
2/3 of 24-hour AAAQO	1	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Summary of EBAM Station Particulate and Meteorological Monitoring for March 2023

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-26.3	19.0	85.2
Minimum (Non-Zero)	1.00	1.00	1.00	0.08			19.0	85.2
Average	8.63	13.30	14.33	1.84	281.9 (WNW)	-7.7	71.5	87.1
Median	7.00	11.00	12.00	1.53		-7.5	75.5	87.1
Maximum	46.00	132.00	188.00	8.11		9.2	97.0	88.4
Standard Deviation	7.02	13.77	15.11	1.16		7.5	18.1	0.8
Number Obs	725	702	723	738	738	738	738	738
Expected Obs	744	744	744	744	744	744	744	744
% Complete	97.4%	94.4%	97.2%	99.2%	99.2%	99.2%	99.2%	99.2%
Calm Hours				4				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	351	273	60	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	19	20	5	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	5	1	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.59	2.52	5.23
Minimum (Non-Zero)	1.59	2.52	5.23
Average	8.68	13.51	14.37
Median	8.83	12.39	13.33
Maximum	17.19	33.50	30.59
Standard Deviation	4.10	7.04	5.75
Number Obs	31	31	31
Expected Obs	31	31	31
% Complete	97.4%	94.4%	97.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	3	29	24	3	5	10
1/3 of 24-hour AAAQO	0	8	0	10	17	33
2/3 of 24-hour AAAQO	0	1	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for March 2023

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—			—	—
Average	—	—	—	— (—)	—	—	—
Median	—	—	—		—	—	—
Maximum	—	—	—		—	—	—
Standard Deviation	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0
Expected Obs	744	744	744	744	744	744	744
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours			0				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	—	—
Minimum (Non-Zero)	—	—
Average	—	—
Median	—	—
Maximum	—	—
Standard Deviation	—	—
Number Obs	0	0
Expected Obs	31	31
% Complete	0.0%	0.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	0	0	3	10	
1/3 of 24-hour AAAQO	0	0	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorlogical Monitoring for March 2023

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-26.6	22.0	85.8
Minimum (Non-Zero)	1.11			22.0	85.8
Average	3.64	280.1 (W)	-8.6	73.3	87.5
Median	3.61		-8.5	77.0	87.5
Maximum	13.33		7.3	100.0	88.8
Standard Deviation	1.80		7.12	16.54	0.746
Number Obs	683	683	744	744	744
Expected Obs	744	744	744	744	744
% Complete	91.8%	91.8%	100.0%	100.0%	100.0%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

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Summary of Regional and Project PM2.5 Monitoring for March 2023

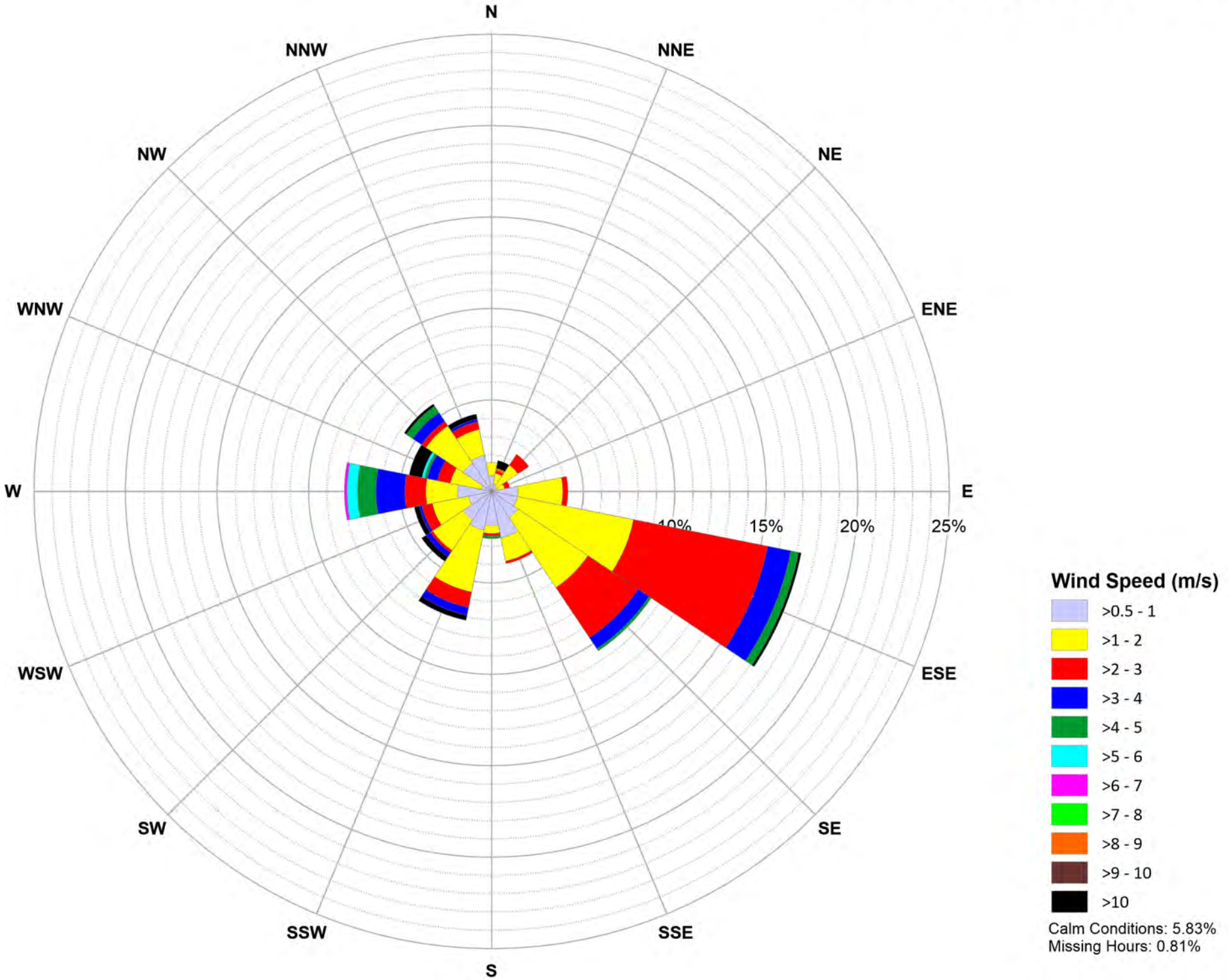
	CRAZ 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.87	0.55	-0.47	-0.23	0.17	0.00	0.00	0.00	—
Minimum (Non-Zero)	0.87	0.55	-0.47	-0.23	0.17	1.00	1.00	1.00	—
Average	12.55	11.73	9.49	9.94	8.41	9.16	8.23	8.63	—
Median	11.17	9.66	8.11	8.08	7.23	7.00	7.00	7.00	—
Maximum	70.16	56.41	34.04	47.54	43.43	**94.00**	**94.00**	46.00	—
Standard Deviation	7.65	8.19	7.29	8.31	6.15	9.12	7.81	7.02	—
Number Obs	742	741	740	740	740	701	683	725	0
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	99.7%	99.6%	99.5%	99.5%	99.5%	94.2%	91.8%	97.4%	**0.0%**

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

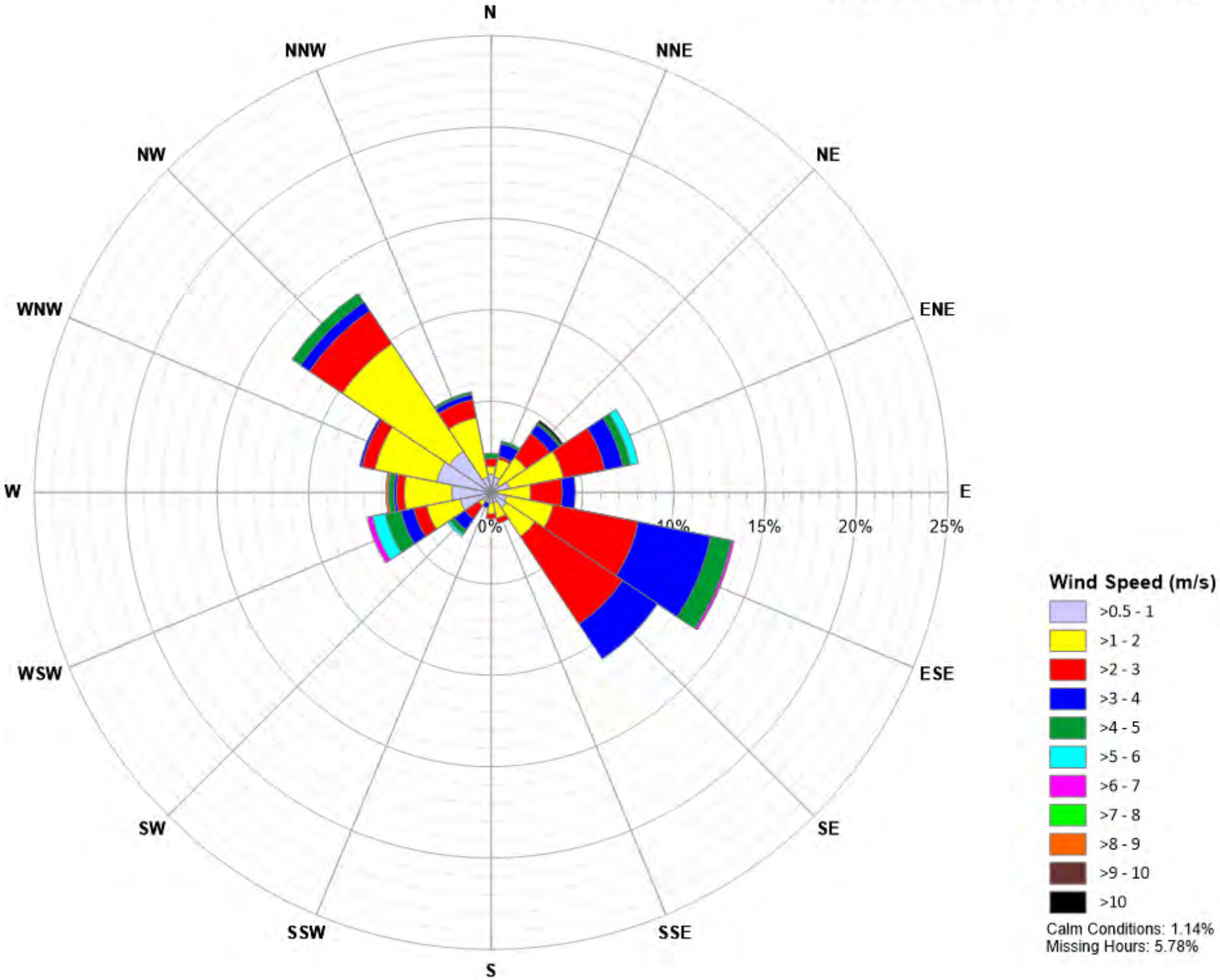
	CRAZ 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ (µg/m^3) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.76	1.47	0.14	0.35	0.93	2.24	0.96	1.59	—
Minimum (Non-Zero)	2.76	1.47	0.14	0.35	0.93	2.24	0.96	1.59	—
Average	12.56	11.73	9.49	9.91	8.41	9.23	8.51	8.68	—
Median	11.72	10.68	8.96	9.63	7.75	10.04	8.56	8.83	—
Maximum	**29.34**	**29.62**	22.49	**29.47**	16.46	22.74	19.62	17.19	—
Standard Deviation	5.79	6.08	5.42	5.94	4.23	4.31	3.88	4.10	—
Number Obs	31	31	31	31	31	31	28	31	0
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	90.3%	100.0%	**0.0%**

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

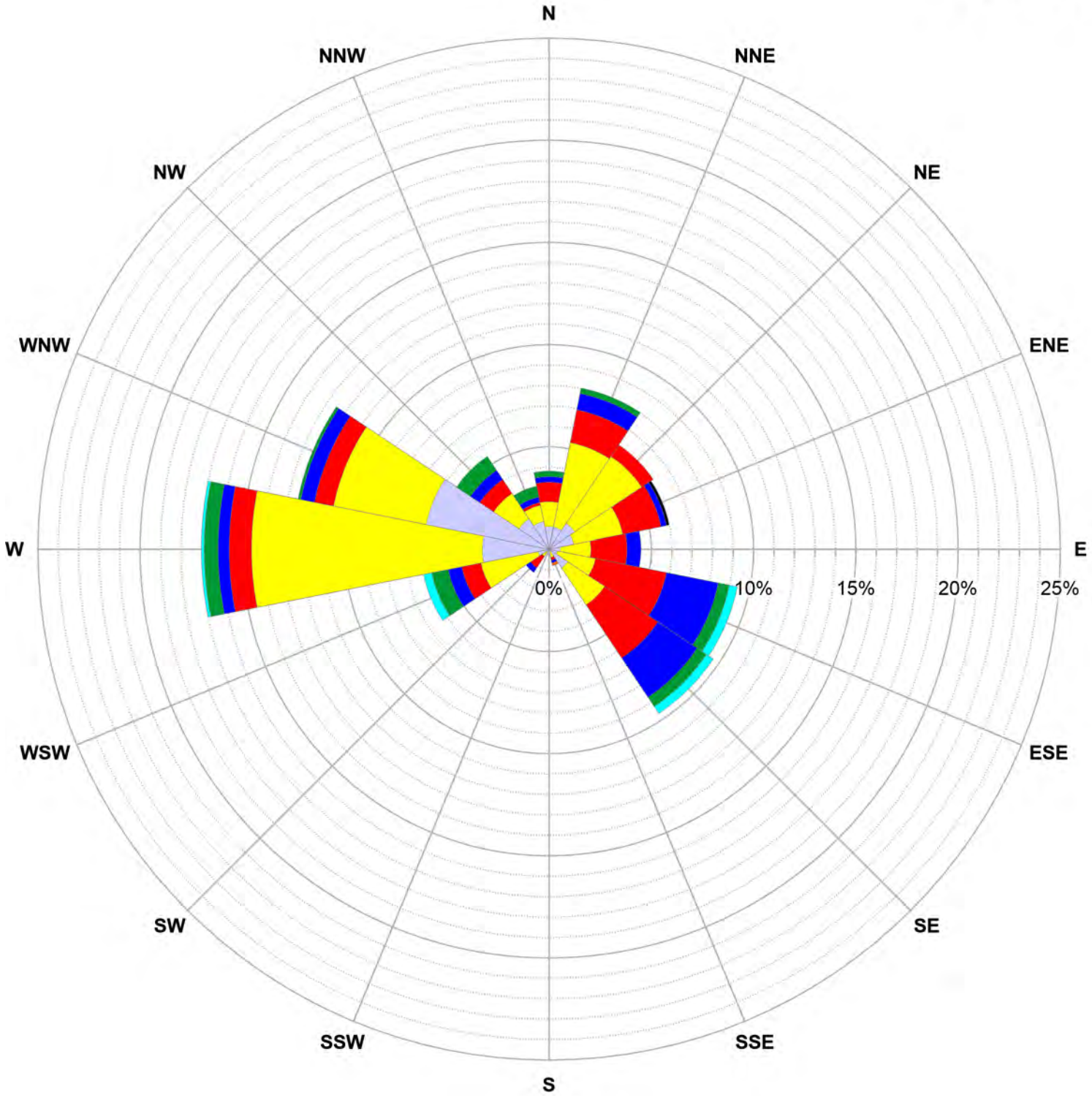
March 2023 Site 1 Wind Rose



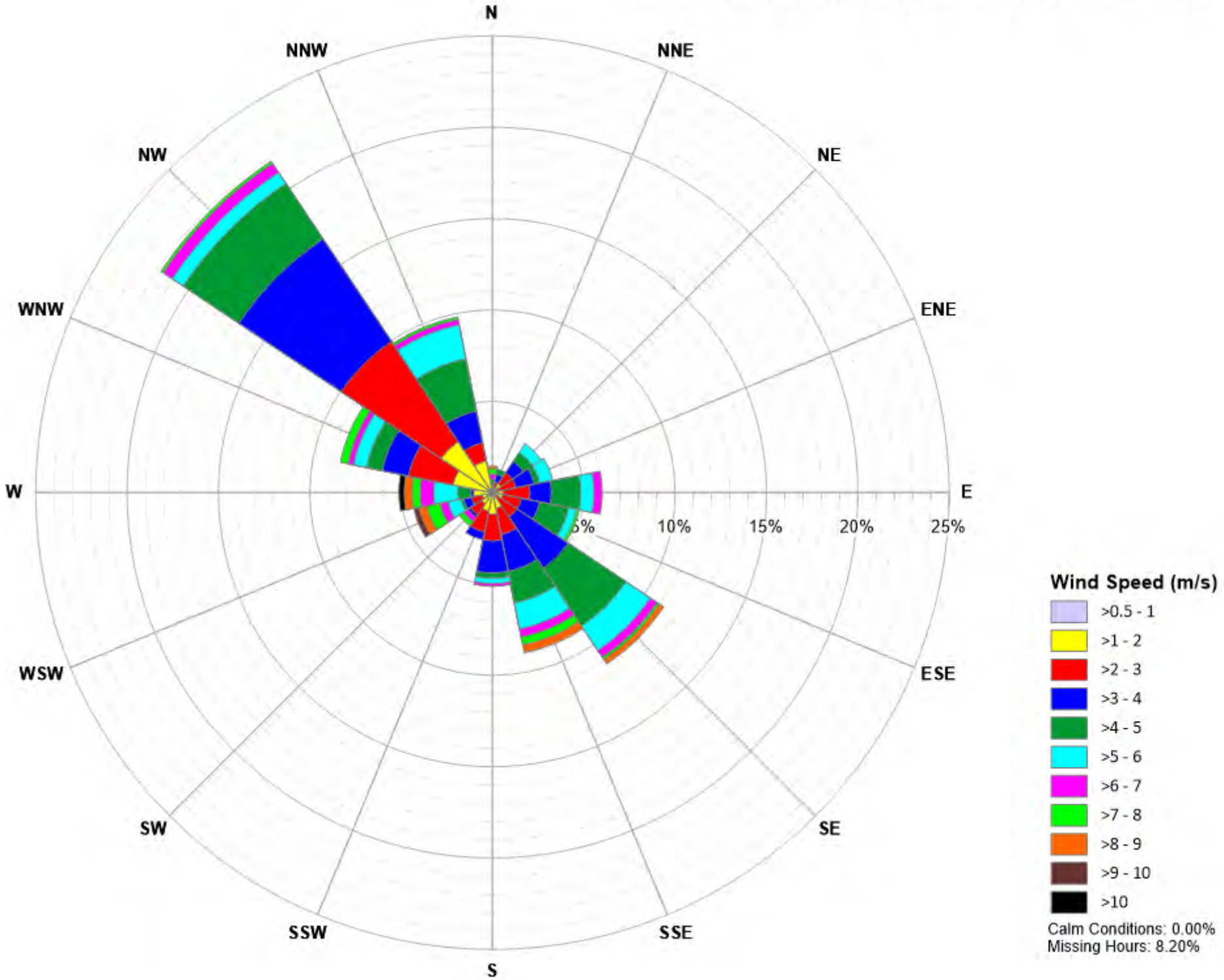
March 2023 Site 2 Wind Rose

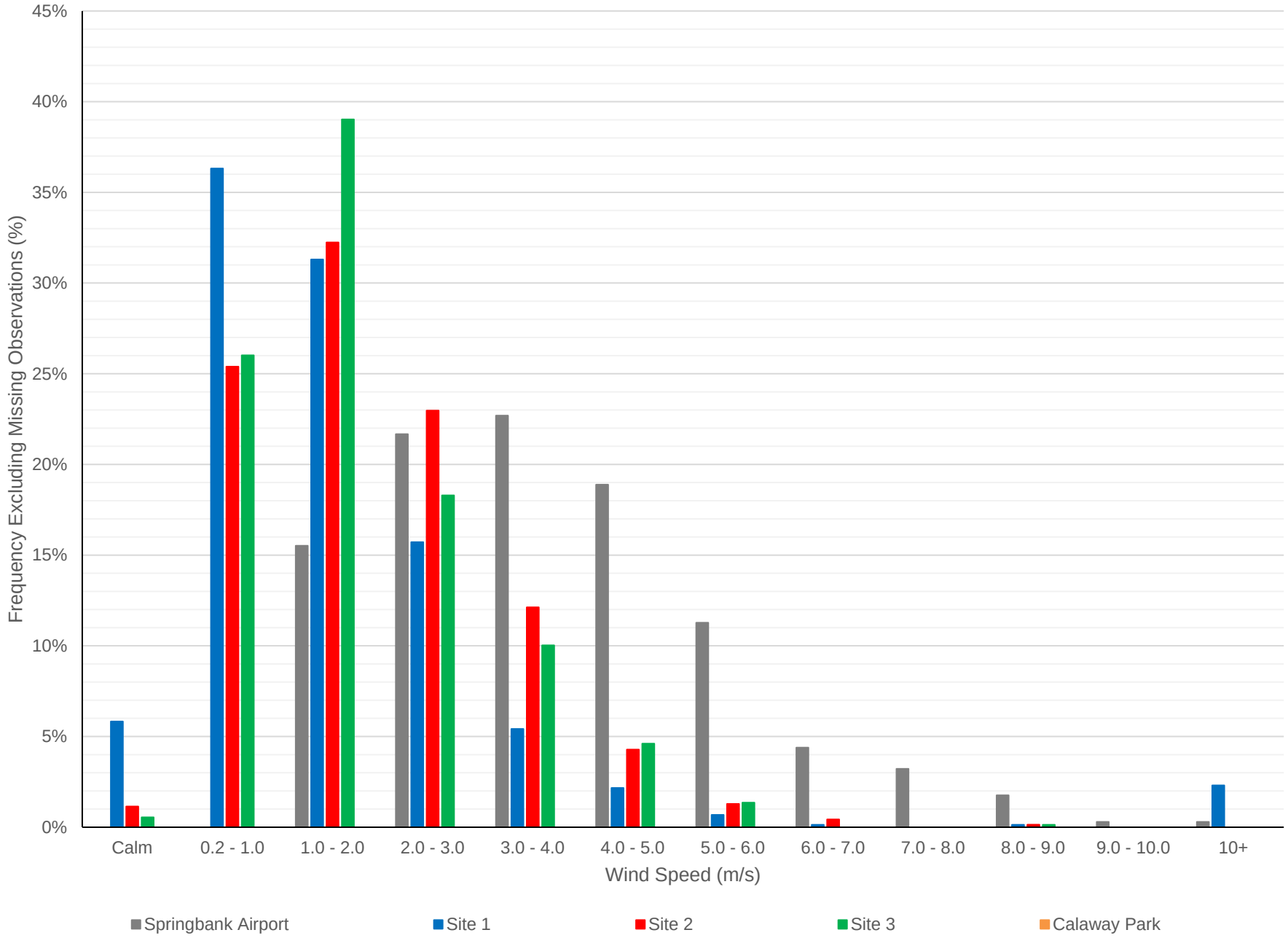


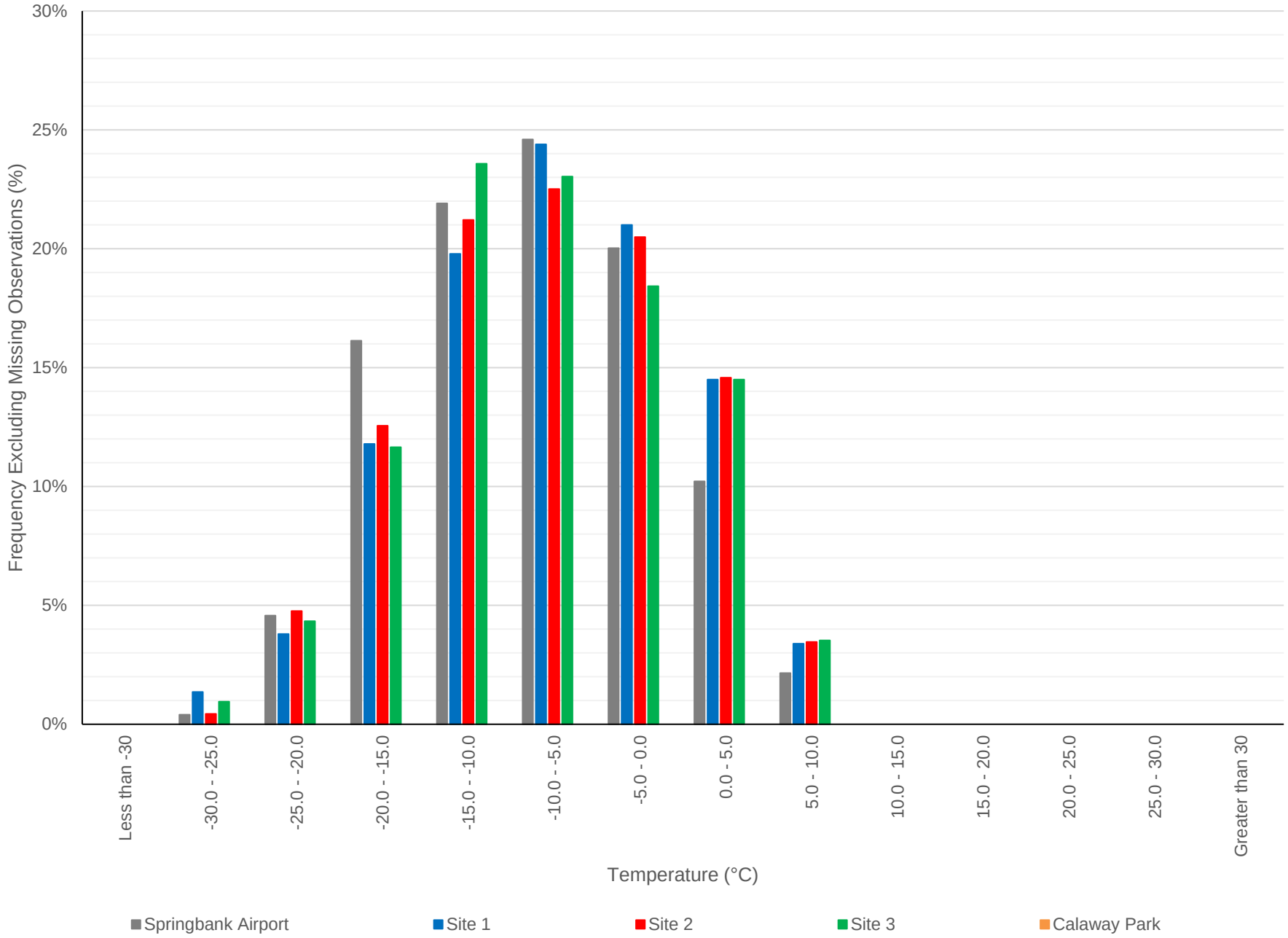
March 2023 Site 3 Wind Rose

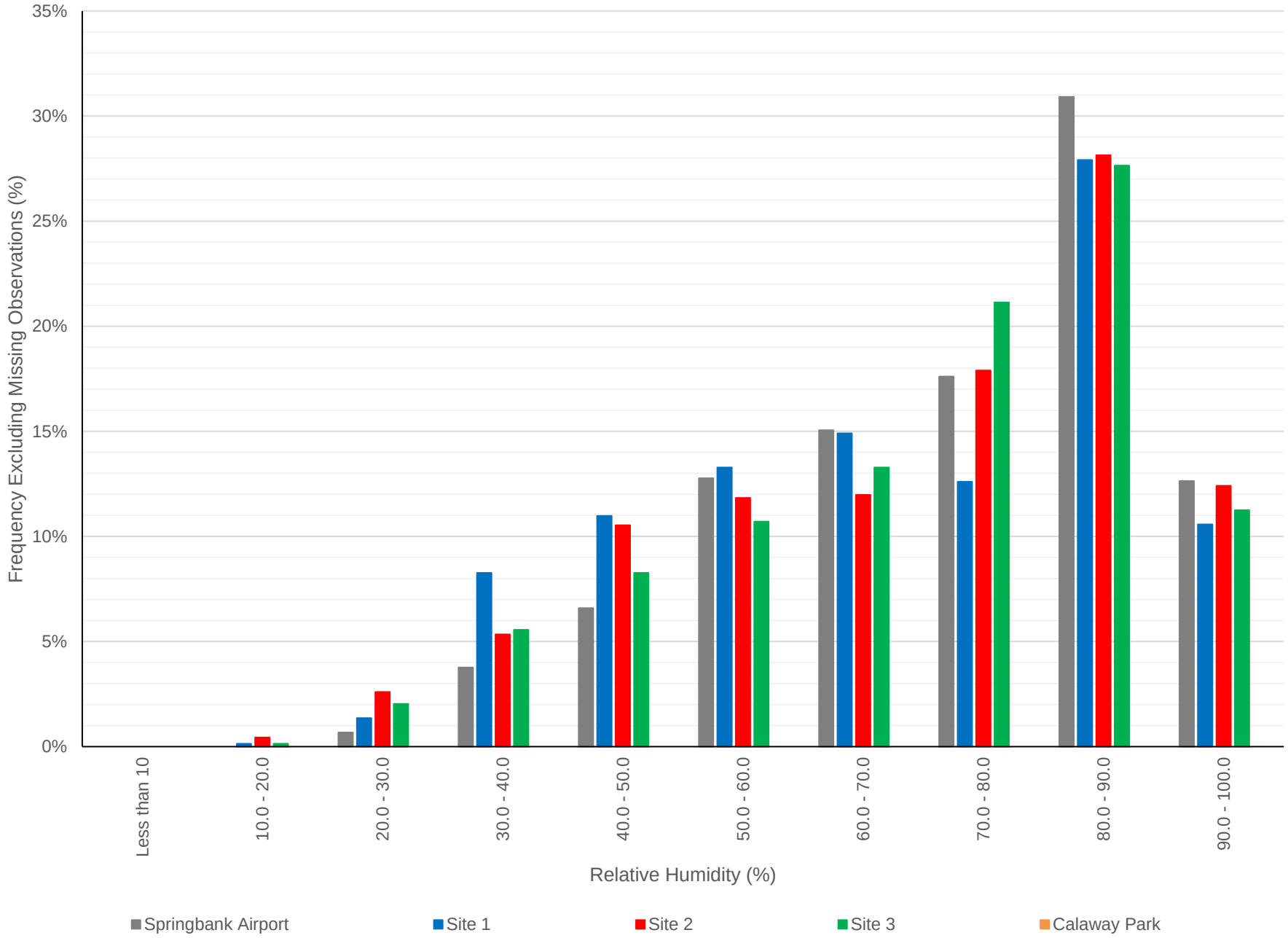


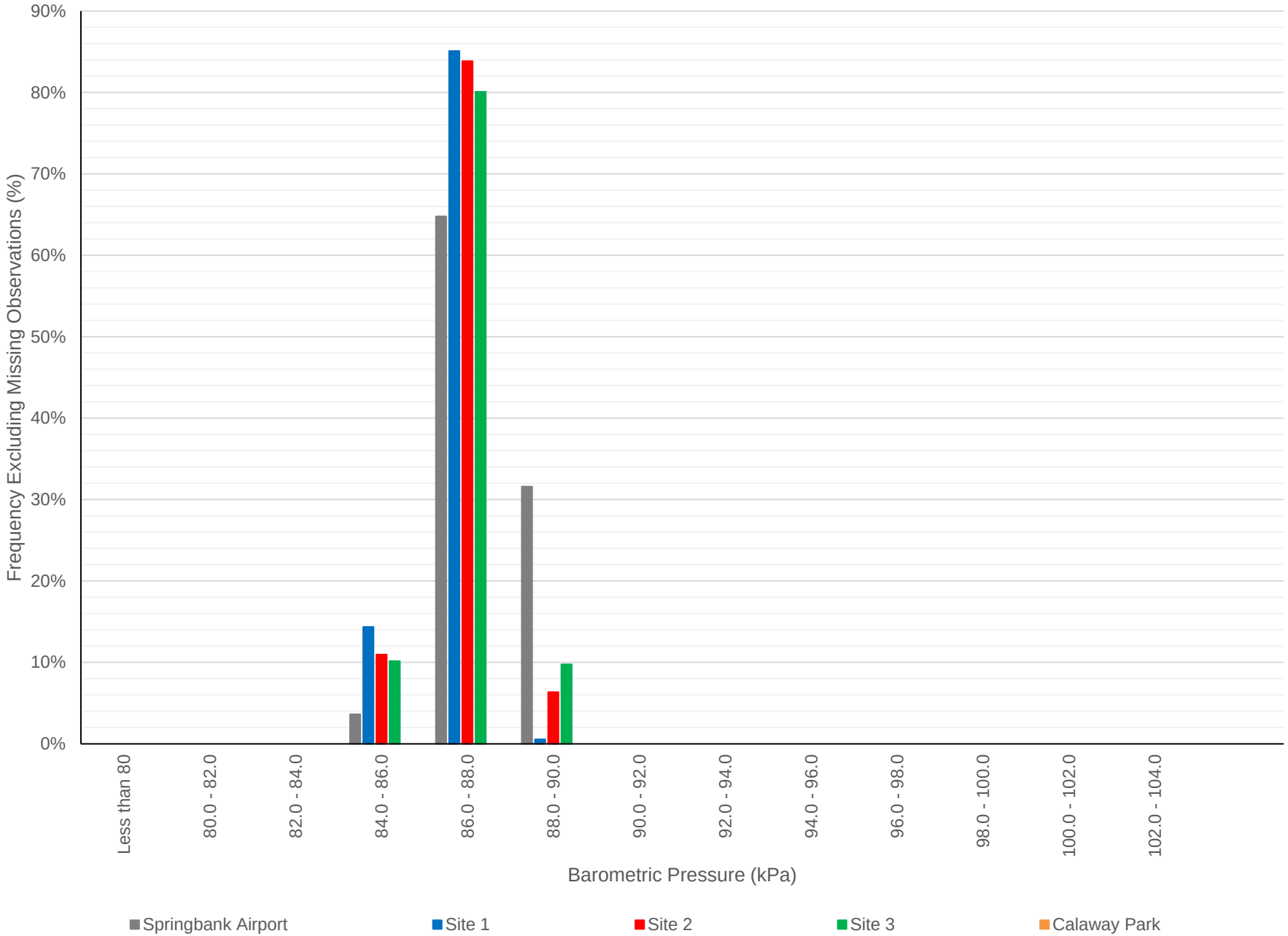
March 2023 Springbank Airport Wind Rose

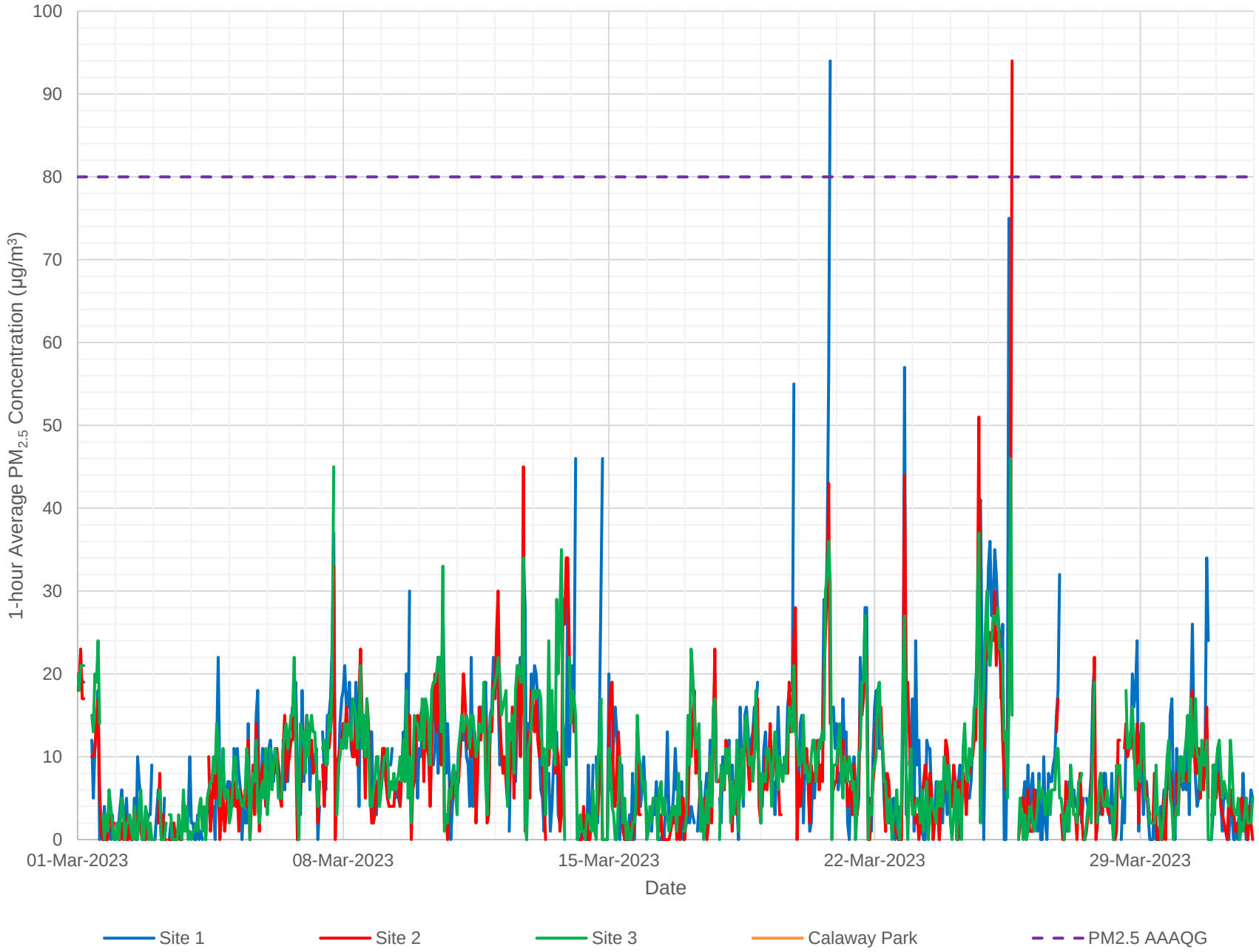


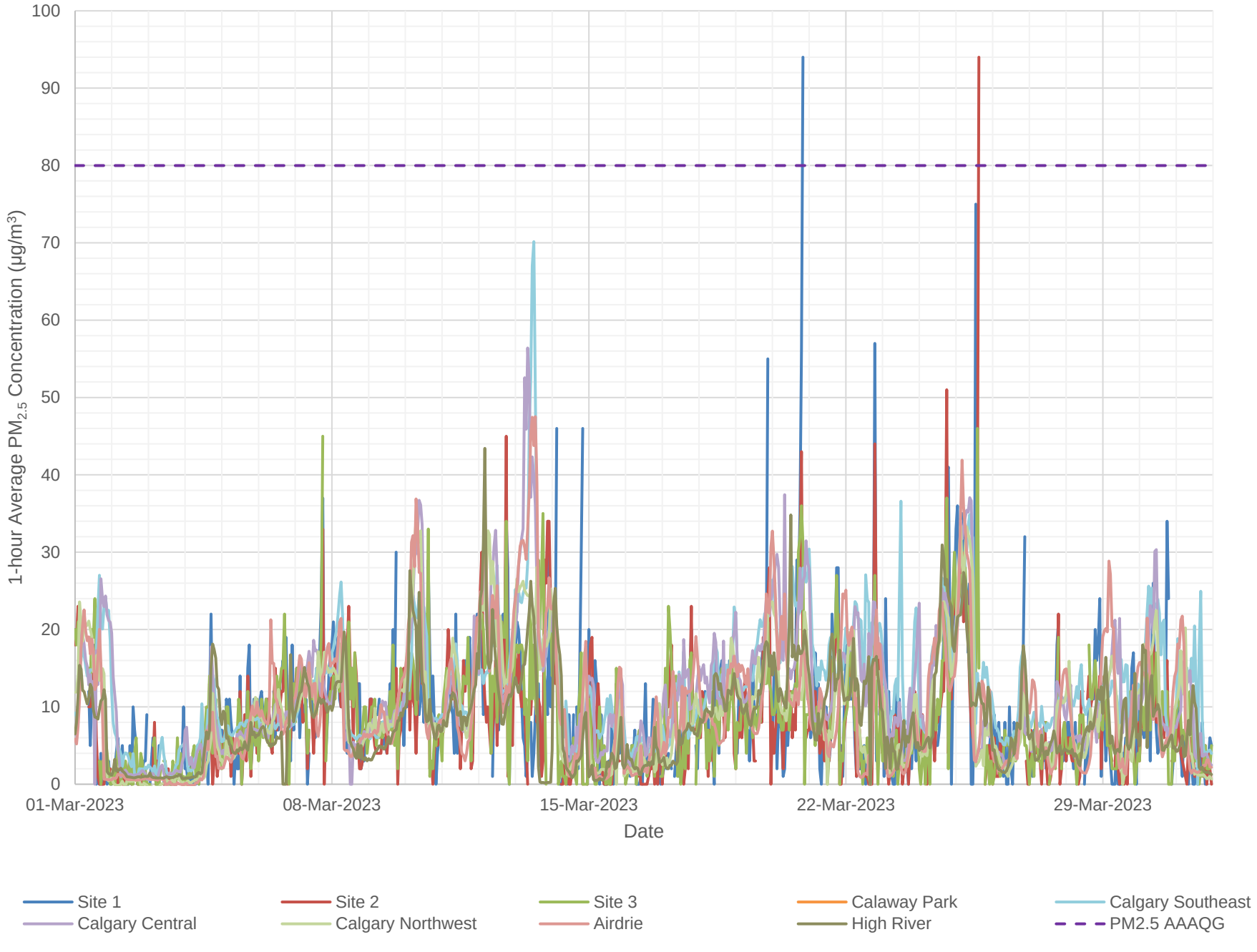

45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

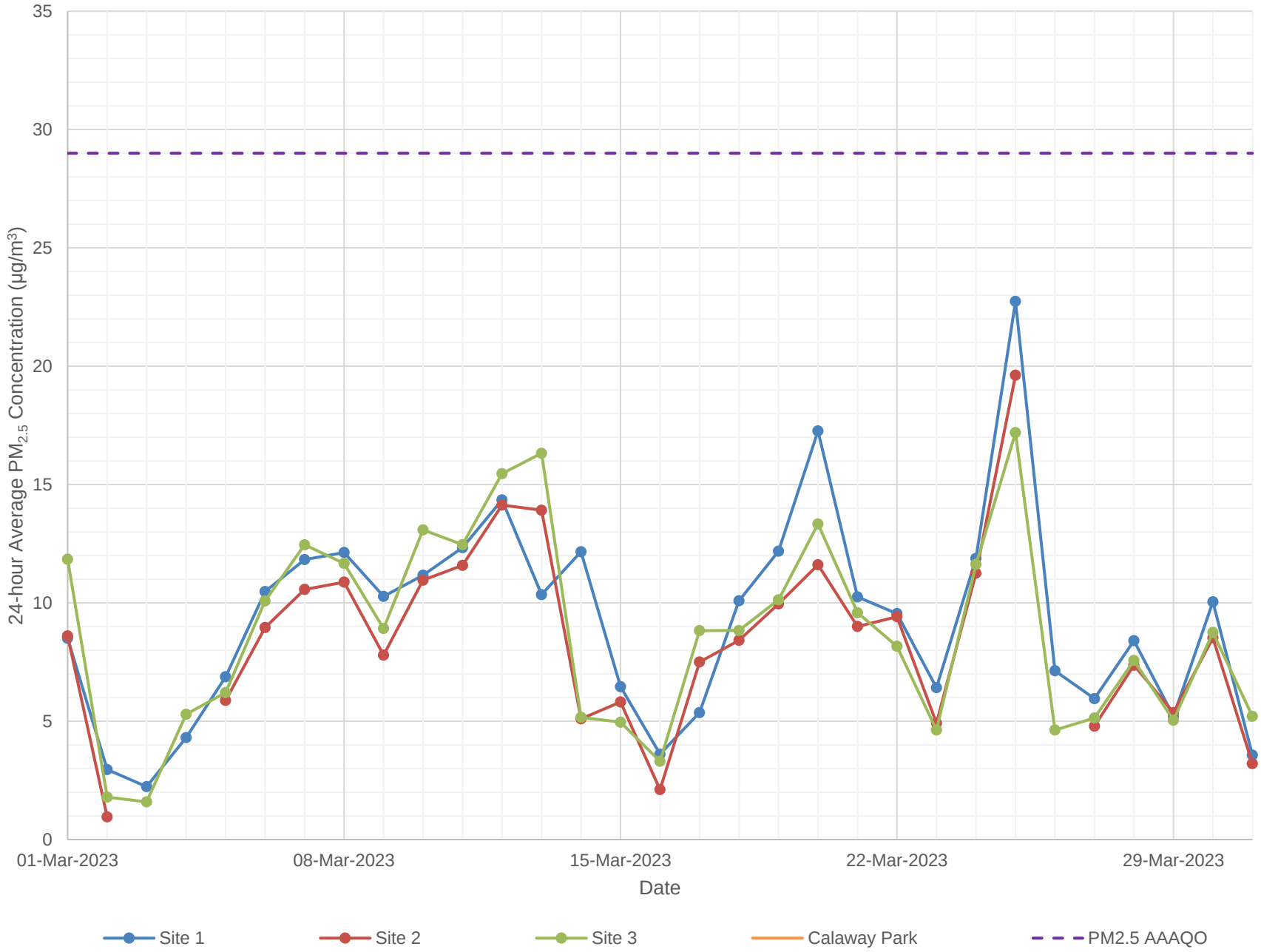

30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

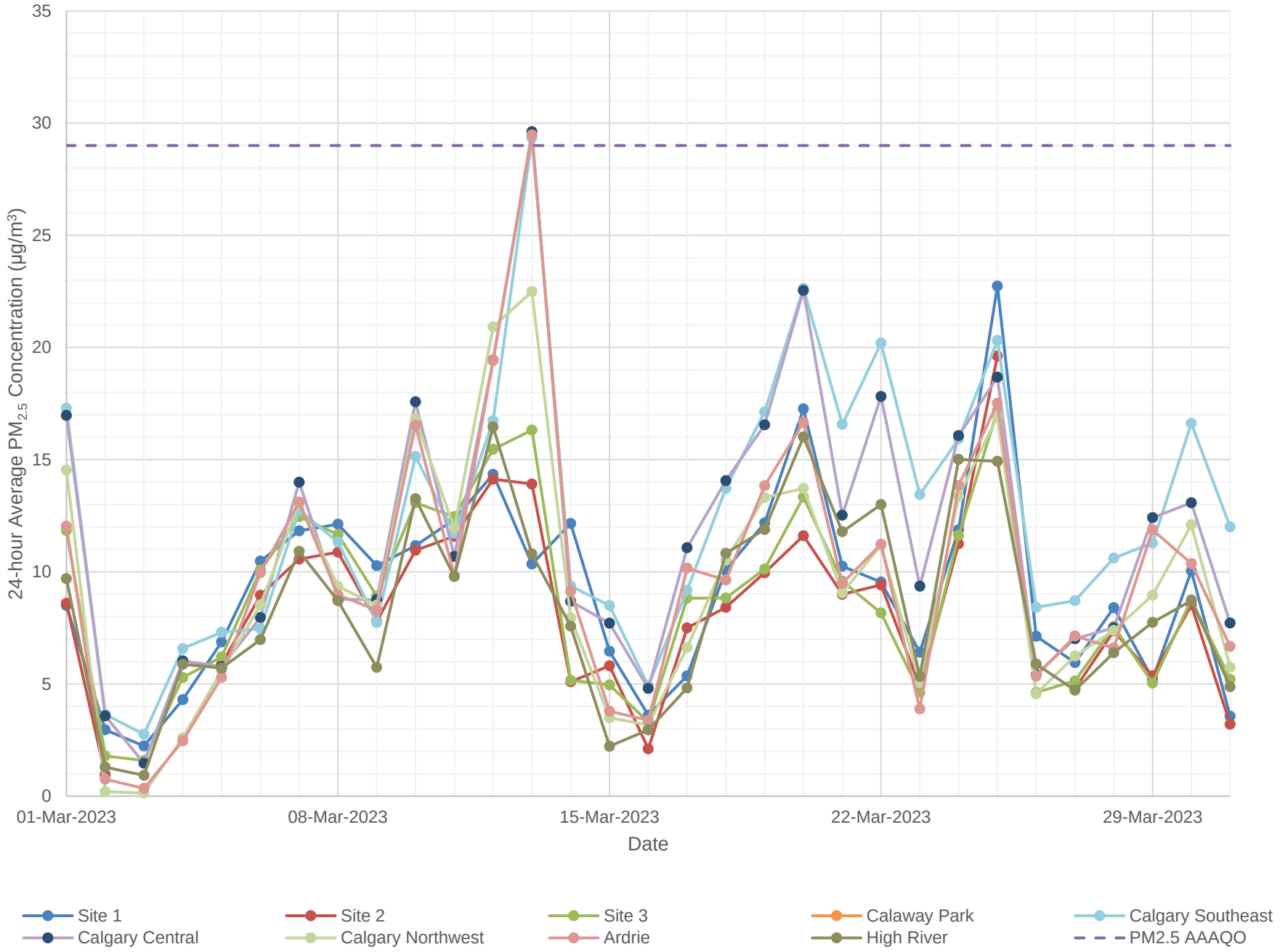

35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

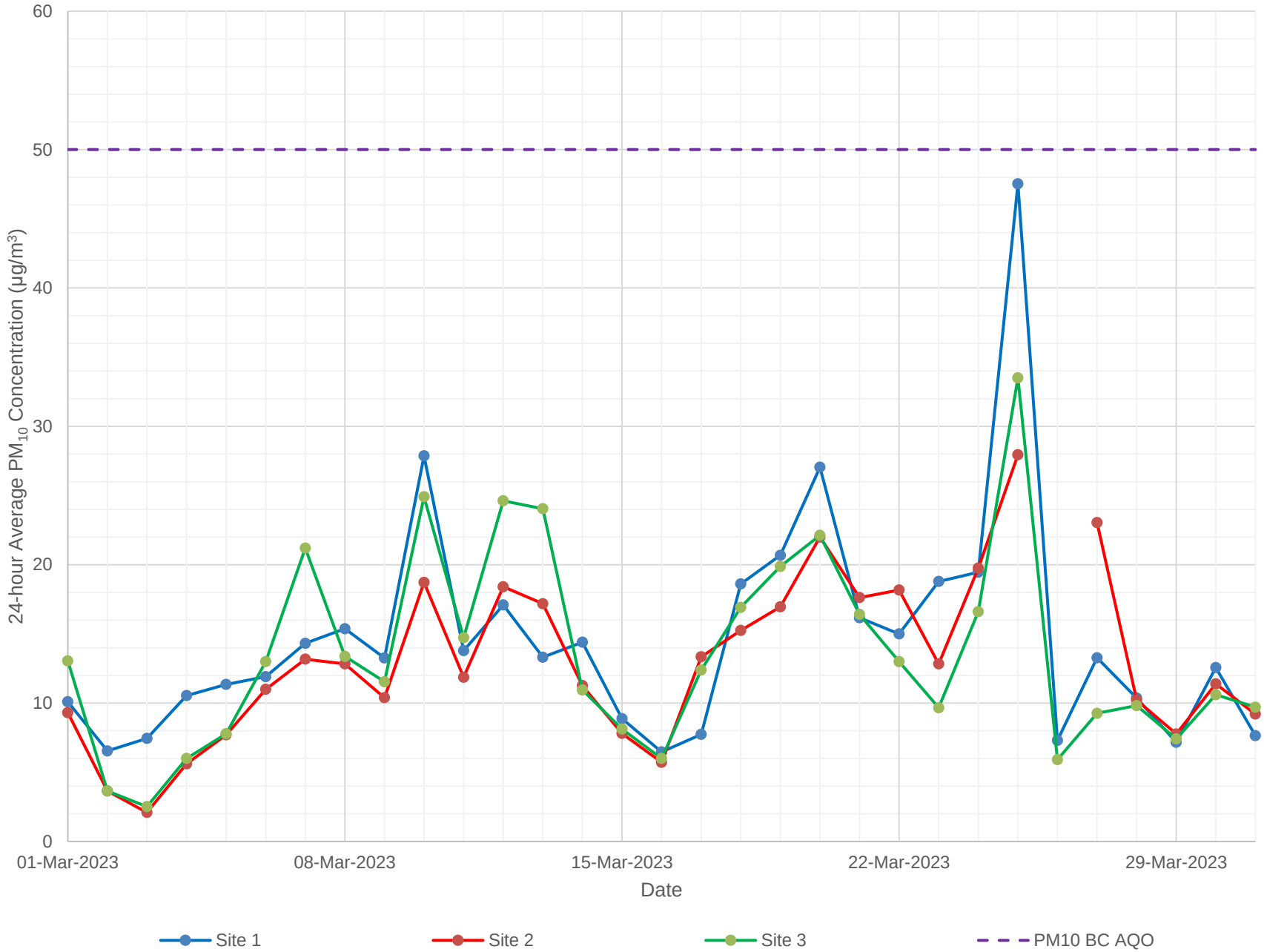

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

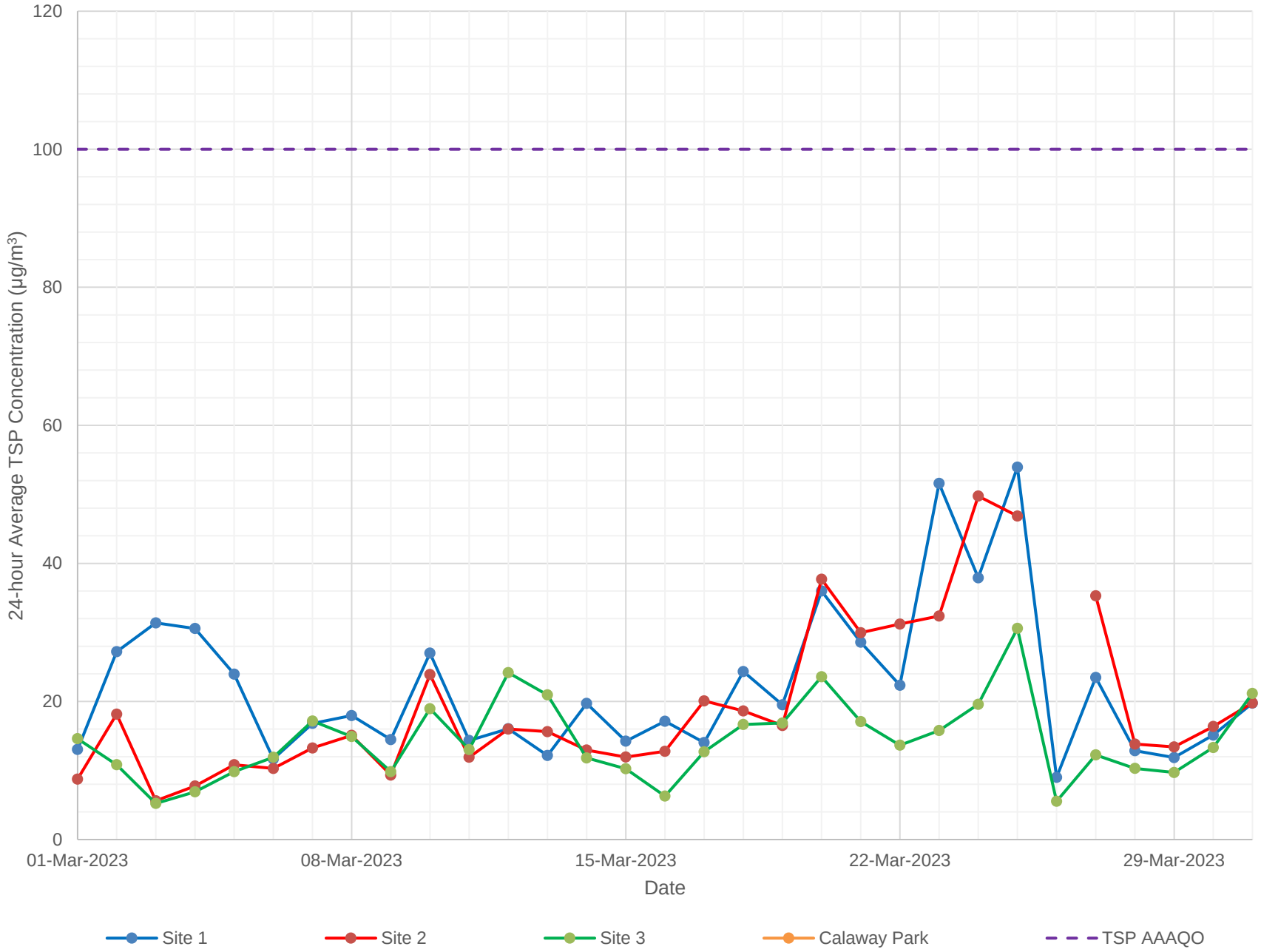

100
90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m³)
01-Mar-2023
08-Mar-2023
15-Mar-2023
22-Mar-2023
29-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


100
90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Mar-2023
08-Mar-2023
15-Mar-2023
22-Mar-2023
29-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Mar-2023
08-Mar-2023
15-Mar-2023
22-Mar-2023
29-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Mar-2023
08-Mar-2023
15-Mar-2023
22-Mar-2023
29-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Mar-2023
08-Mar-2023
15-Mar-2023
22-Mar-2023
29-Mar-2023
Date
Site 1
Site 2
Site 3
PM10 BC AQO


120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Mar-2023
08-Mar-2023
15-Mar-2023
22-Mar-2023
29-Mar-2023
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for April 2023

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		-14.5	18.0	85.9
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			18.0	85.9
Average	3.99	7.17	15.31	1.81	255.8 (WSW)	1.6	61.0	87.2
Median	3.00	5.00	8.00	1.53		0.7	60.0	87.2
Maximum	38.00	284.00	1,046.00	8.25		22.6	99.0	88.7
Standard Deviation	4.21	13.89	44.58	1.36		7.2	22.6	0.6
Number Obs	664	678	689	709	709	709	709	709
Expected Obs	720	720	720	720	720	720	720	720
% Complete	92.2%	94.2%	95.7%	98.5%	98.5%	98.5%	98.5%	98.5%
Calm Hours				30				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	83	81	83	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	4	4	14	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	3	2	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	1	1	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	2.00	1.68	3.04
Minimum (Non-Zero)	2.00	1.68	3.04
Average	4.04	7.07	15.03
Median	4.09	5.32	10.60
Maximum	8.70	28.61	88.58
Standard Deviation	1.63	5.34	15.80
Number Obs	29	30	30
Expected Obs	30	30	30
% Complete	92.2%	94.2%	95.7%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	21	18	17	3	5	10
1/3 of 24-hour AAAQO	0	2	2	10	17	33
2/3 of 24-hour AAAQO	0	0	1	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for April 2023

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.06		-13.9	16.0	86.1
Minimum (Non-Zero)	1.00	1.00	1.00	0.06			16.0	86.1
Average	3.16	7.30	18.99	2.11	260.5 (W)	2.6	61.0	87.4
Median	2.00	5.00	8.00	1.67		1.8	60.0	87.5
Maximum	31.00	117.00	577.00	9.11		22.9	99.0	88.8
Standard Deviation	3.38	10.09	43.36	1.59		7.2	23.4	0.6
Number Obs	640	647	664	673	673	668	673	673
Expected Obs	720	720	720	720	720	720	720	720
% Complete	88.9%	89.9%	92.2%	93.5%	93.5%	92.8%	93.5%	93.5%
Calm Hours				14				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	58	78	97	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	1	11	23	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	1	10	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	0	6	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.20	2.14	2.73
Minimum (Non-Zero)	1.20	2.14	2.73
Average	3.23	7.58	19.44
Median	2.85	6.89	11.17
Maximum	7.70	19.48	87.29
Standard Deviation	1.79	4.55	18.53
Number Obs	26	26	27
Expected Obs	30	30	30
% Complete	88.9%	89.9%	92.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	13	16	14	3	5	10
1/3 of 24-hour AAAQO	0	2	5	10	17	33
2/3 of 24-hour AAAQO	0	0	1	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for April 2023

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.08		-12.9	15.0	86.4
Minimum (Non-Zero)	1.00	1.00	1.00	0.08			15.0	86.4
Average	3.74	6.92	13.43	2.09	264.5 (W)	2.8	61.8	87.7
Median	3.00	5.00	7.00	1.69		2.0	62.0	87.7
Maximum	29.00	146.00	647.00	8.33		23.2	99.0	88.9
Standard Deviation	3.46	8.99	32.27	1.46		7.2	23.8	0.6
Number Obs	695	689	700	714	714	716	716	716
Expected Obs	720	720	720	720	720	720	720	720
% Complete	96.5%	95.7%	97.2%	99.2%	99.2%	99.4%	99.4%	99.4%
Calm Hours				6				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	93	74	63	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	1	4	7	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	1	4	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	0	1	3	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.46	2.14	2.92
Minimum (Non-Zero)	1.46	2.14	2.92
Average	3.72	6.90	13.39
Median	3.62	6.13	9.44
Maximum	8.08	13.70	39.91
Standard Deviation	1.60	3.61	10.25
Number Obs	30	30	30
Expected Obs	30	30	30
% Complete	96.5%	95.7%	97.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	0	20	15	3	5	10
1/3 of 24-hour AAAQO	0	0	3	10	17	33
2/3 of 24-hour AAAQO	0	0	0	19	33	67
Above 24-hour AAAQO	0	0	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for April 2023

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	—	—	—		—	—	—
Minimum (Non-Zero)	—	—	—			—	—
Average	—	—	—	— (—)	—	—	—
Median	—	—	—		—	—	—
Maximum	—	—	—		—	—	—
Standard Deviation	—	—	—		—	—	—
Number Obs	0	0	0	0	0	0	0
Expected Obs	720	720	720	720	720	720	720
% Complete	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calm Hours			0				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	0	0	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	0	0	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	0	0	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	—	—
Minimum (Non-Zero)	—	—
Average	—	—
Median	—	—
Maximum	—	—
Standard Deviation	—	—
Number Obs	0	0
Expected Obs	30	30
% Complete	0.0%	0.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	0	0	3	10	
1/3 of 24-hour AAAQO	0	0	10	33	
2/3 of 24-hour AAAQO	0	0	19	67	
Above 24-hour AAAQO	0	0	29	100	

Notes:
- Calaway Park Station Removed for Season

Summary of Springbank Airport Meteorological Monitoring for April 2023

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-11.8	13.0	86.1
Minimum (Non-Zero)	1.11			13.0	86.1
Average	4.28	227.0 (SW)	3.2	62.1	87.5
Median	4.17		2.6	61.0	87.5
Maximum	15.00		23.2	100.0	88.9
Standard Deviation	2.29		6.94	23.86	0.588
Number Obs	635	635	717	717	717
Expected Obs	720	720	720	720	720
% Complete	88.2%	88.2%	99.6%	99.6%	99.6%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for April 2023

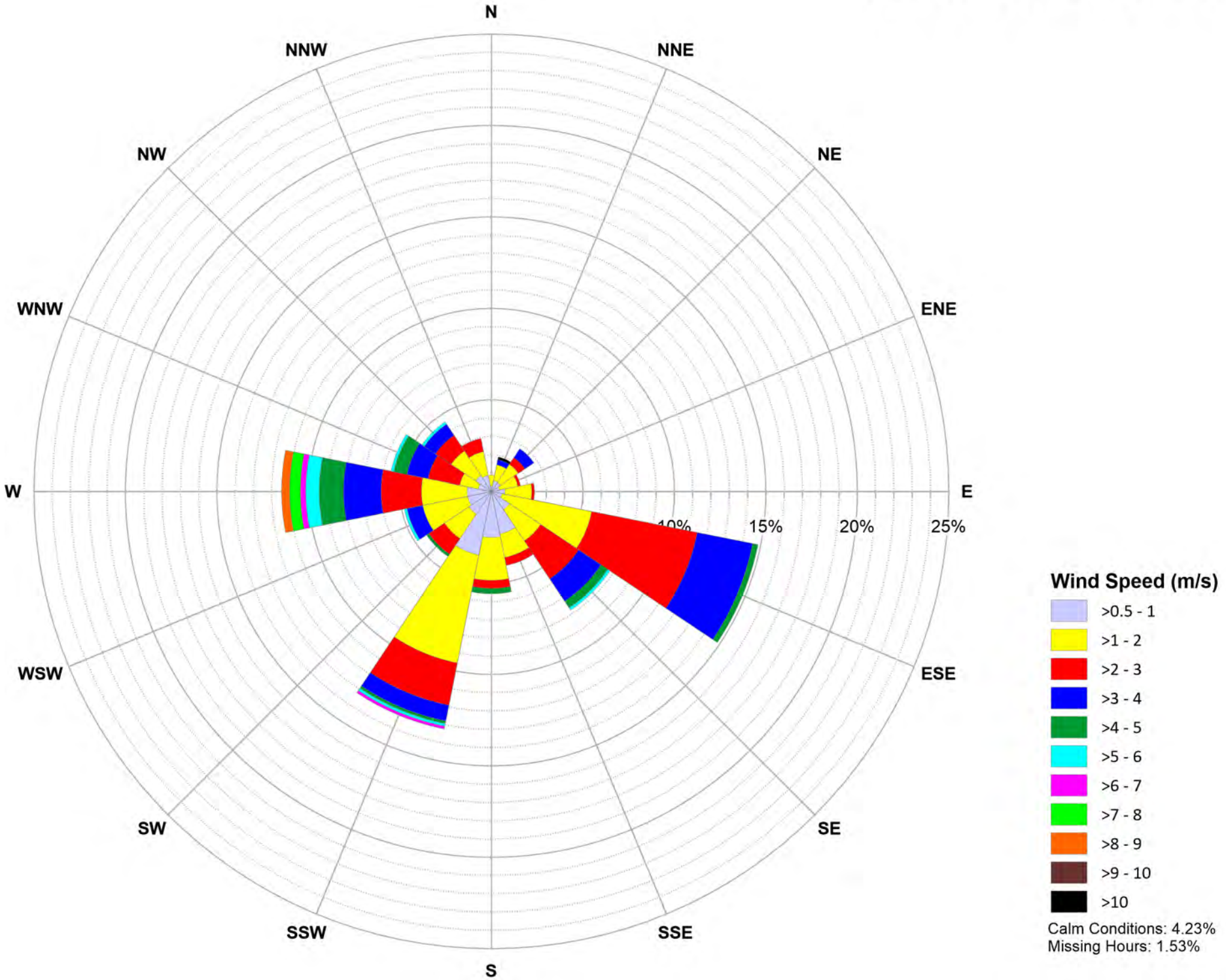
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.43	0.34	-1.12	-0.22	0.16	0.00	0.00	0.00	—
Minimum (Non-Zero)	0.43	0.34	-1.12	-0.22	0.16	1.00	1.00	1.00	—
Average	6.76	5.88	4.11	4.95	3.72	3.99	3.16	3.74	—
Median	5.89	5.17	3.47	3.71	2.86	3.00	2.00	3.00	—
Maximum	35.29	24.11	31.88	62.82	33.20	38.00	31.00	29.00	—
Standard Deviation	3.99	3.79	3.68	4.80	3.12	4.21	3.38	3.46	—
Number Obs	719	717	719	715	715	664	640	695	0
Expected Obs	720	720	720	720	720	720	720	720	720
% Complete	99.9%	99.6%	99.9%	99.3%	99.3%	92.2%	88.9%	96.5%	**0.0%**

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

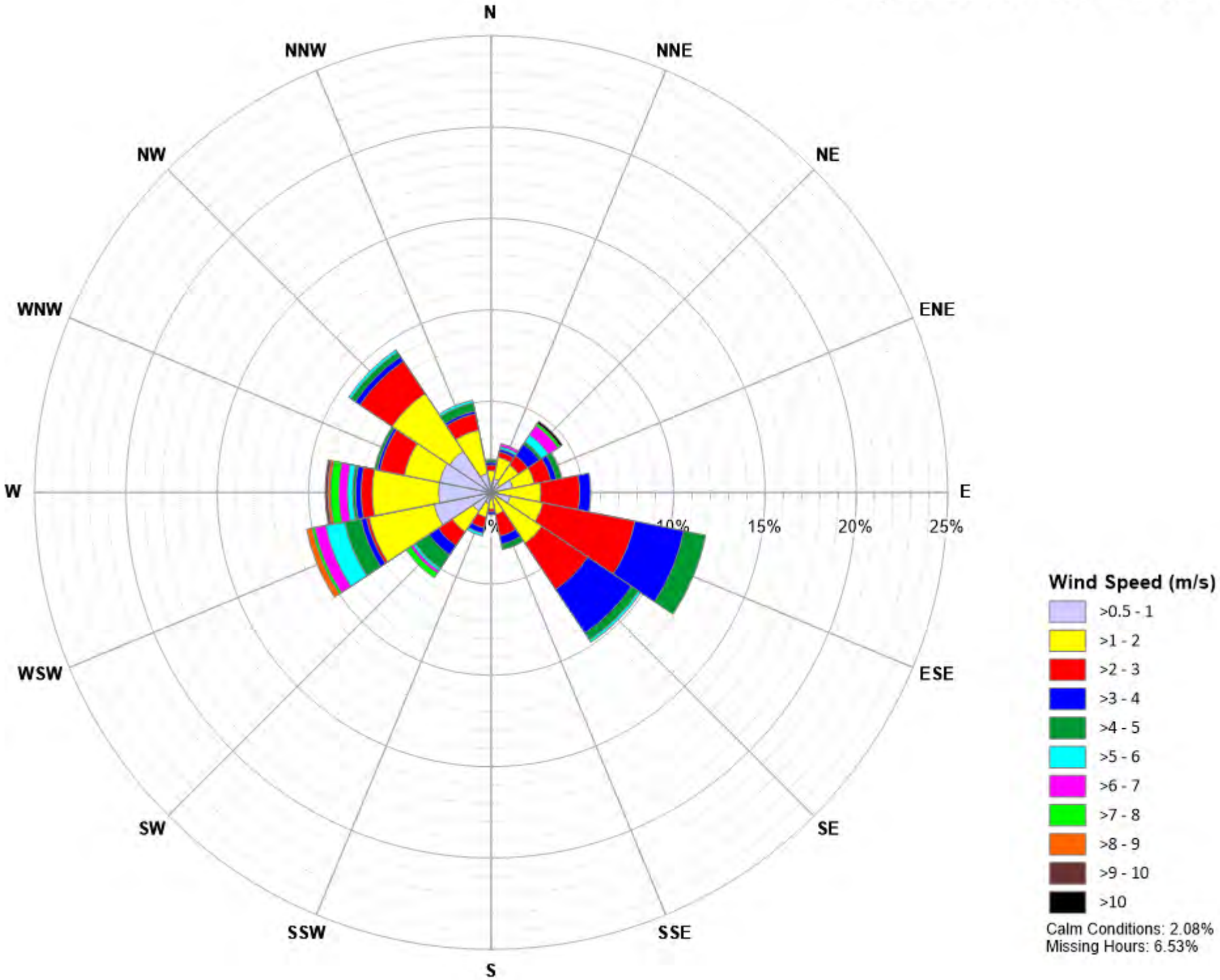
	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.57	1.61	-0.14	0.89	0.99	2.00	1.20	1.46	—
Minimum (Non-Zero)	2.57	1.61	-0.14	0.89	0.99	2.00	1.20	1.46	—
Average	6.76	5.88	4.12	4.95	3.72	4.04	3.23	3.72	—
Median	6.72	5.95	4.35	4.89	3.30	4.09	2.85	3.62	—
Maximum	11.28	11.46	9.91	12.63	9.59	8.70	7.70	8.08	—
Standard Deviation	2.43	2.42	2.55	2.57	2.06	1.63	1.79	1.60	—
Number Obs	30	30	30	30	30	29	26	30	0
Expected Obs	30	30	30	30	30	30	30	30	30
% Complete	100.0%	100.0%	100.0%	100.0%	100.0%	96.7%	86.7%	100.0%	**0.0%**

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

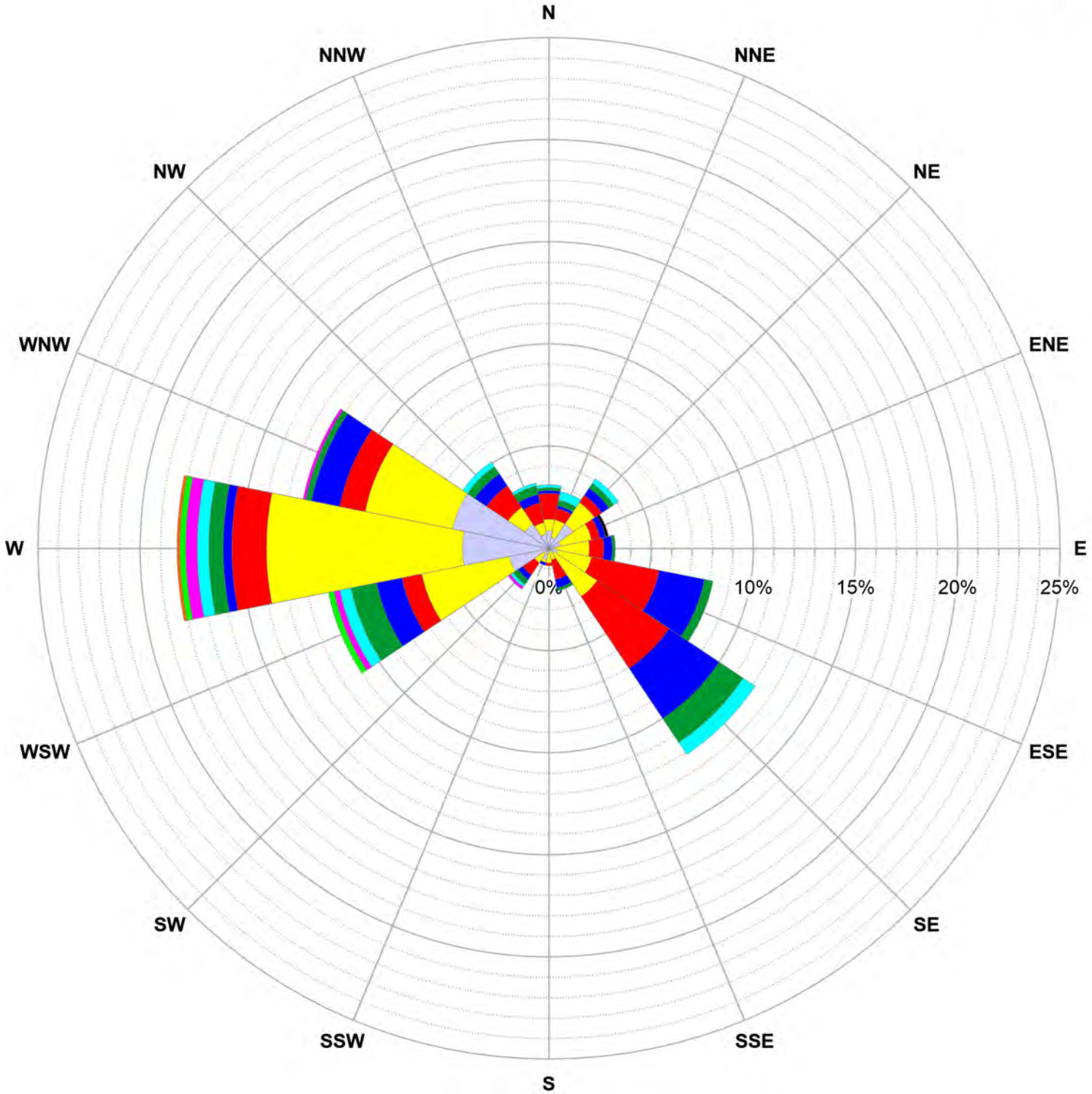
April 2023 Site 1 Wind Rose



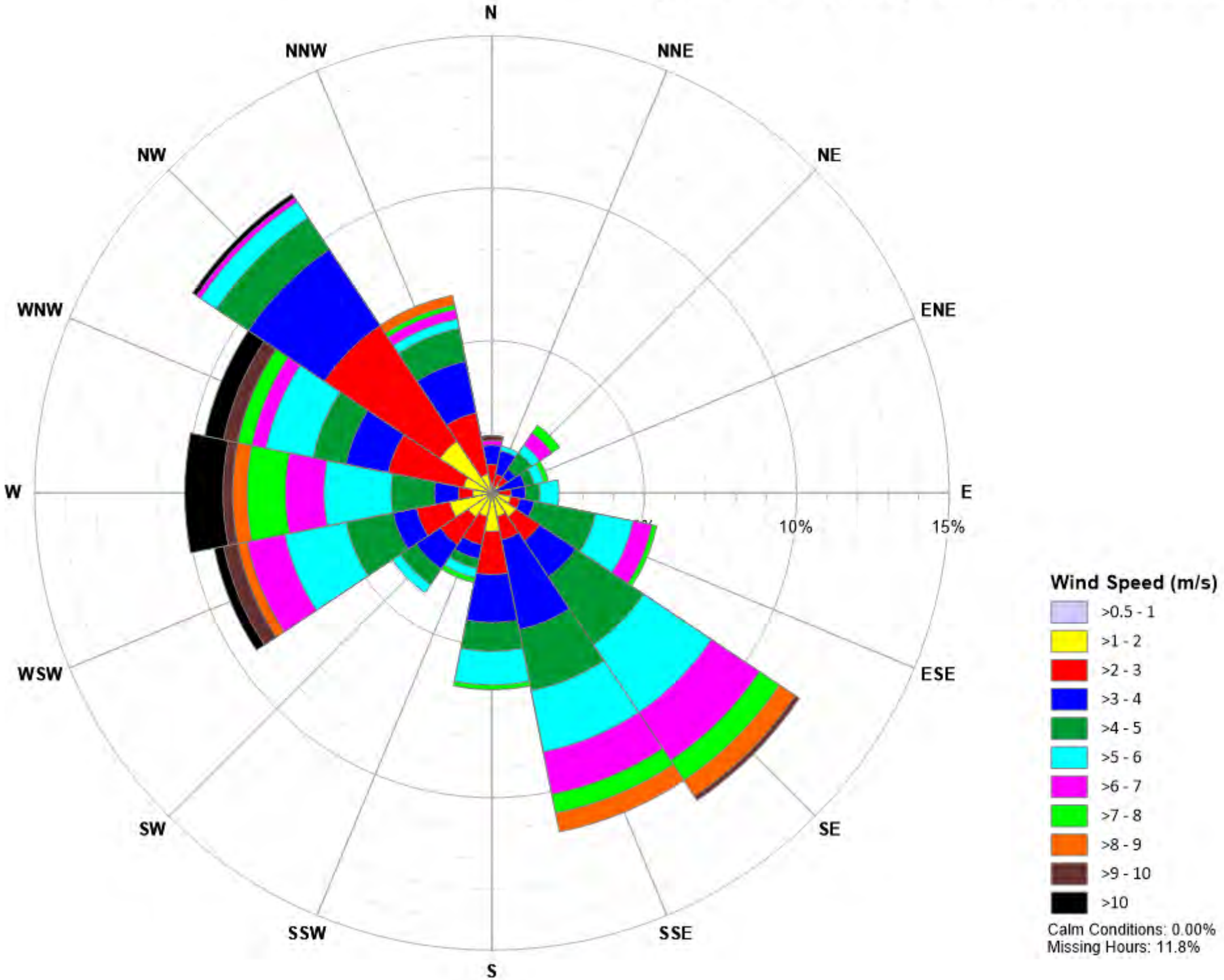
April 2023 Site 2 Wind Rose

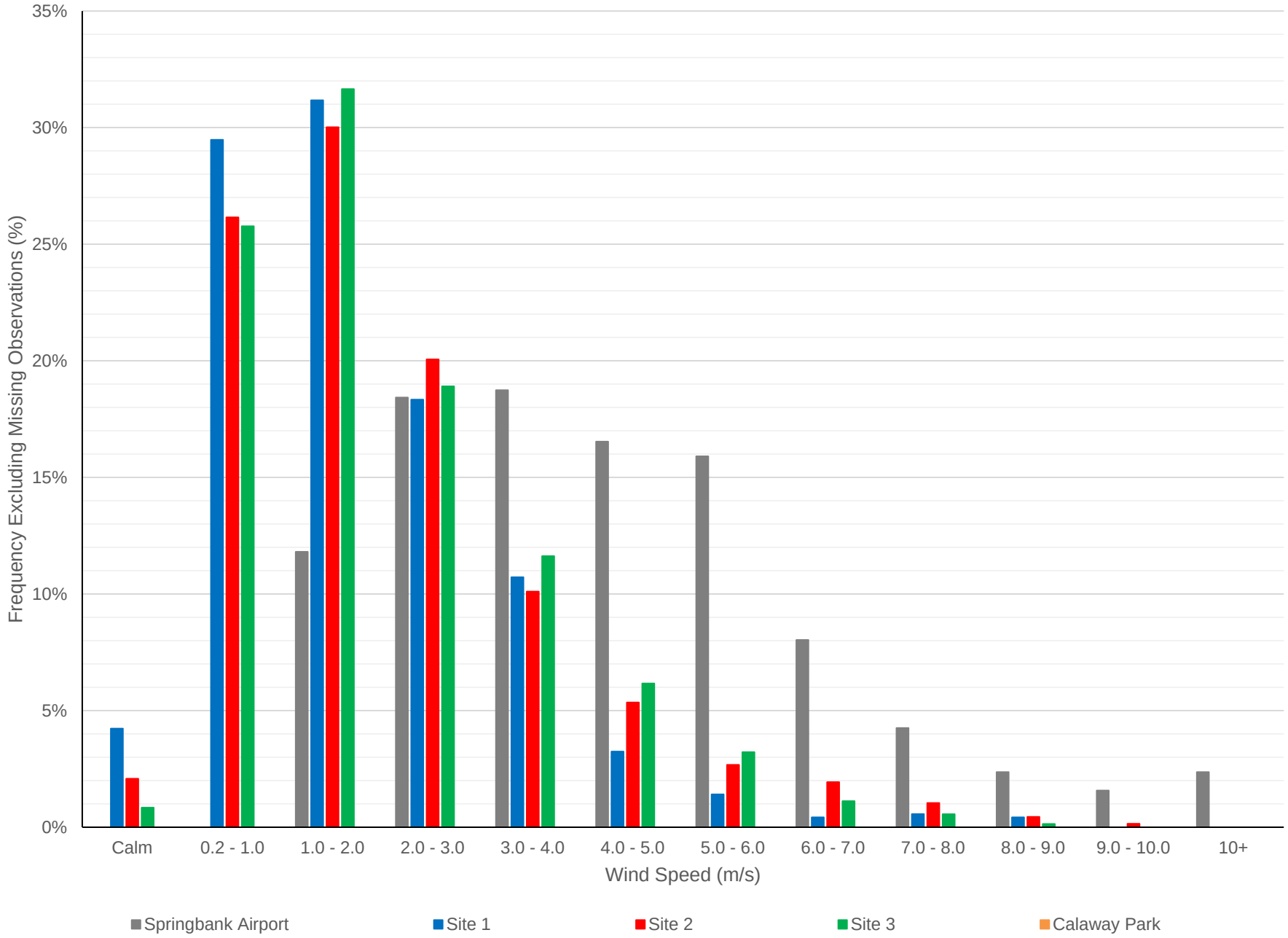


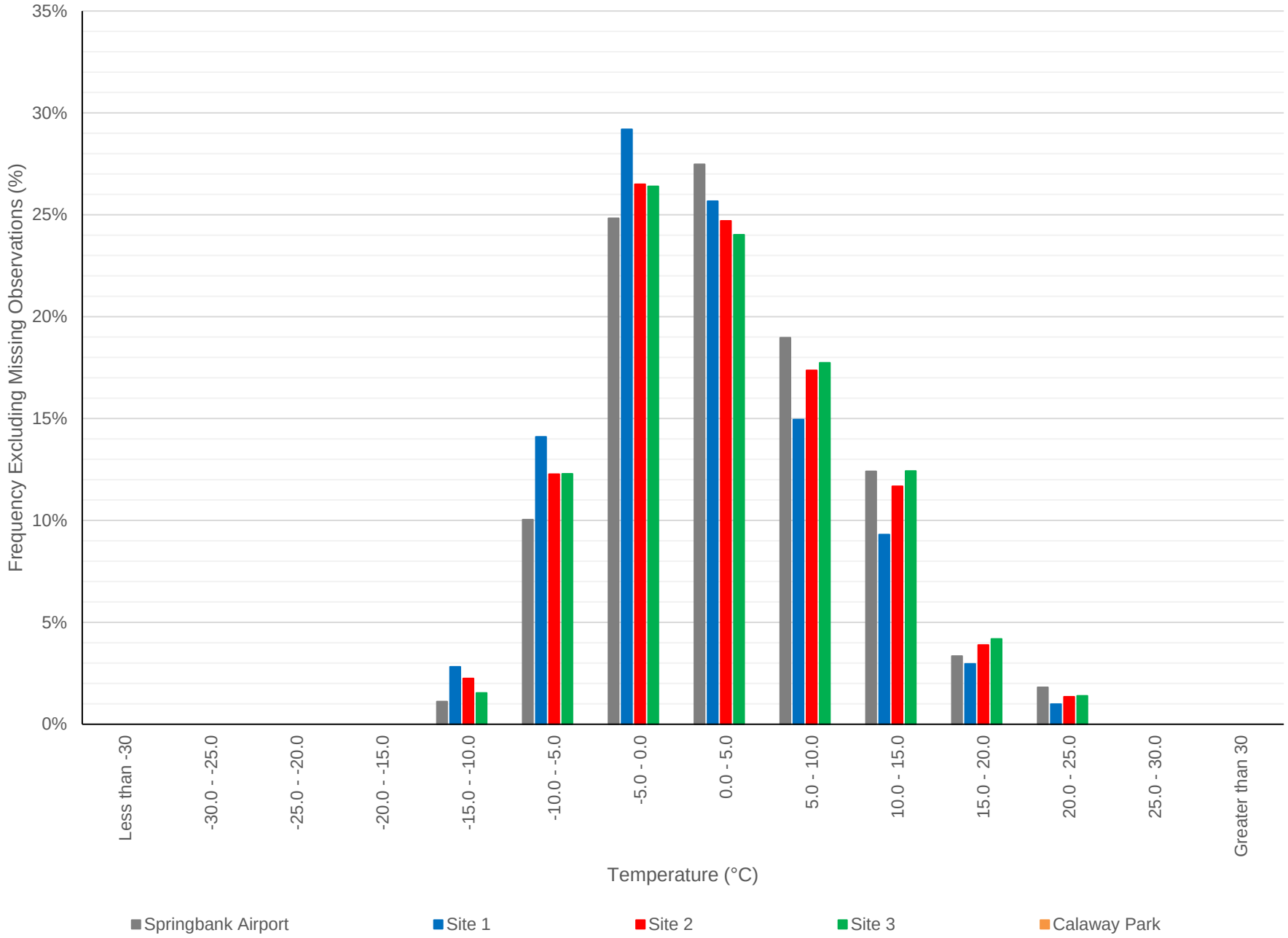
April 2023 Site 3 Wind Rose

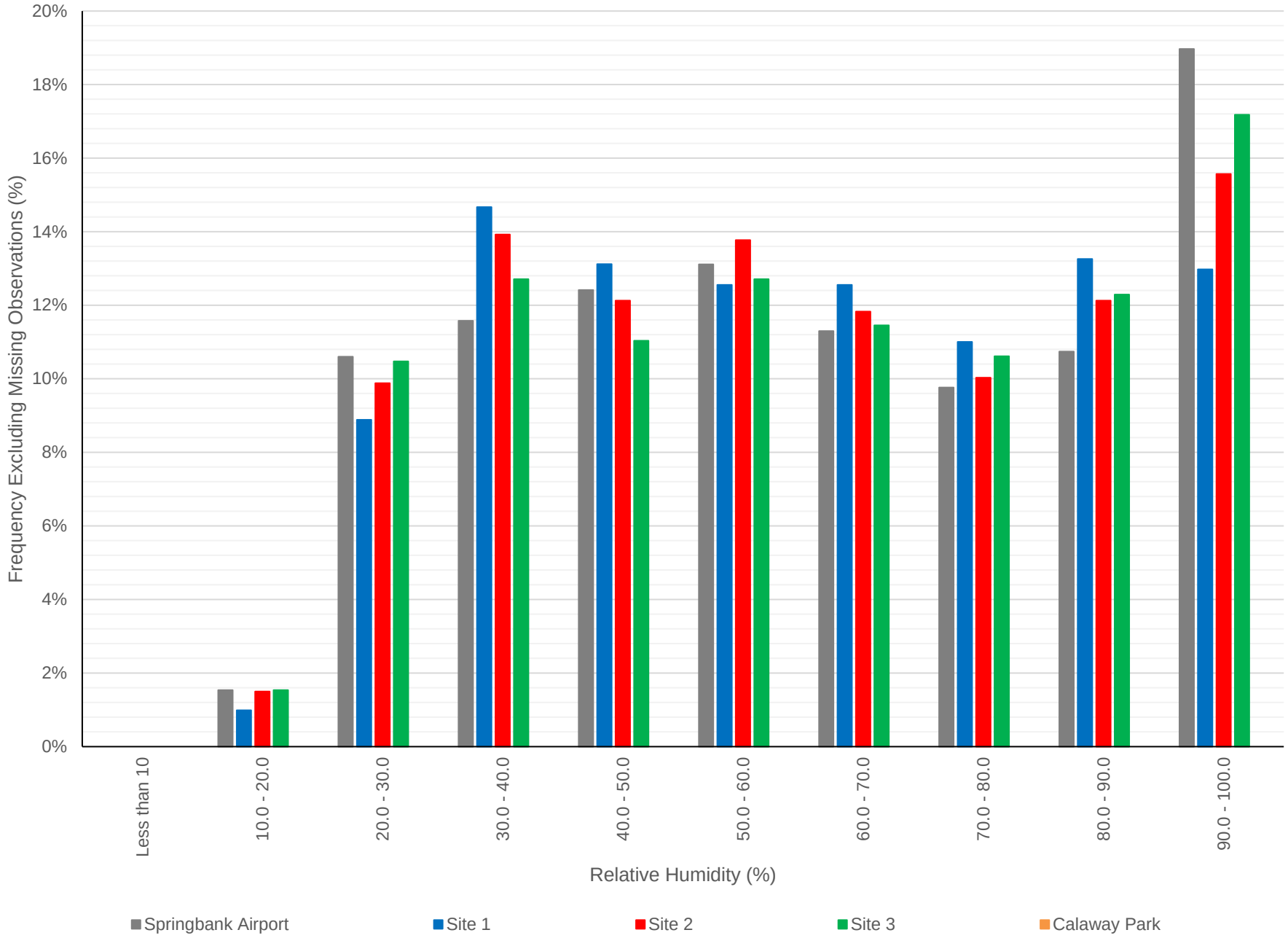


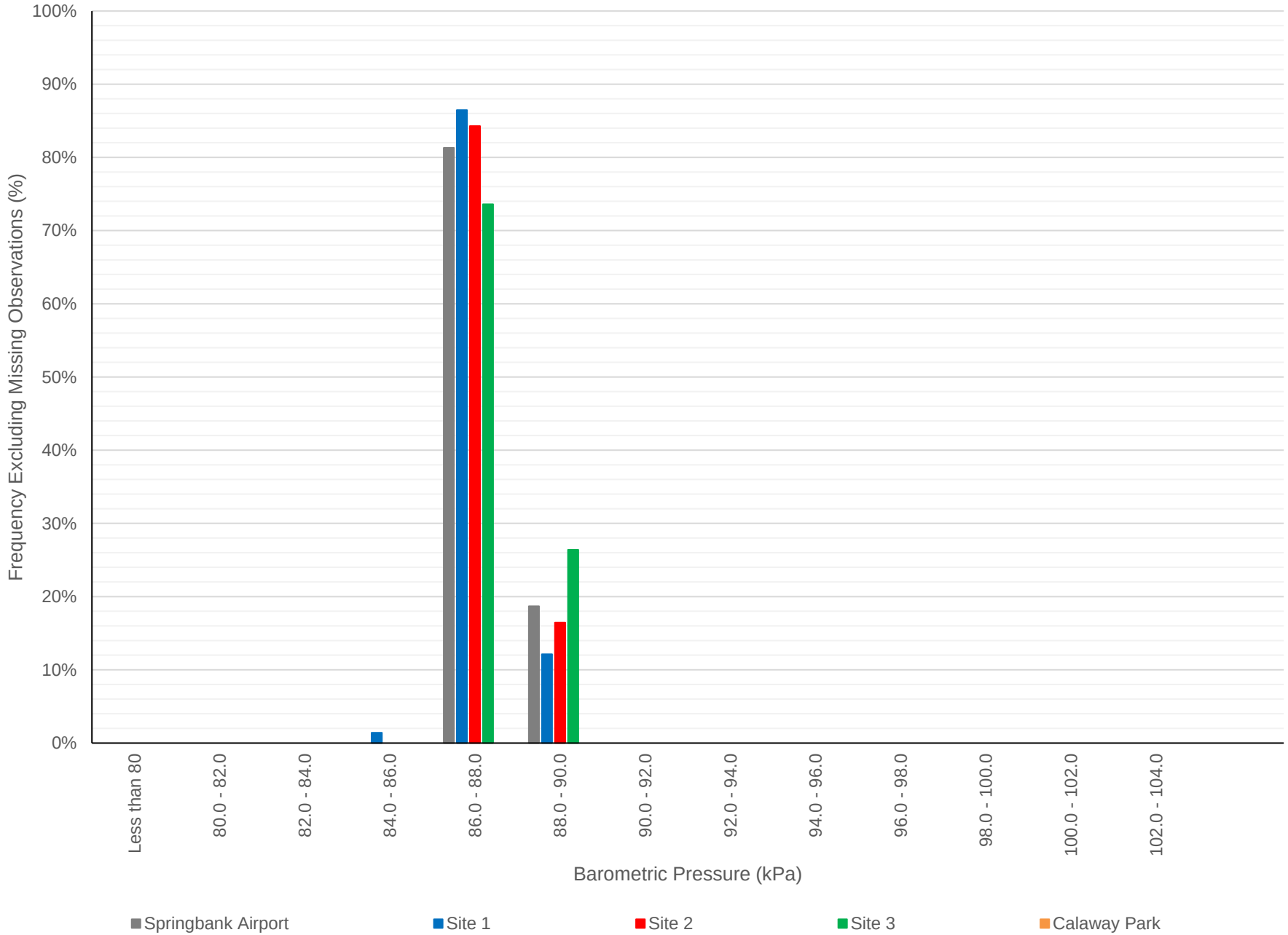
April 2023 Springbank Airport Wind Rose

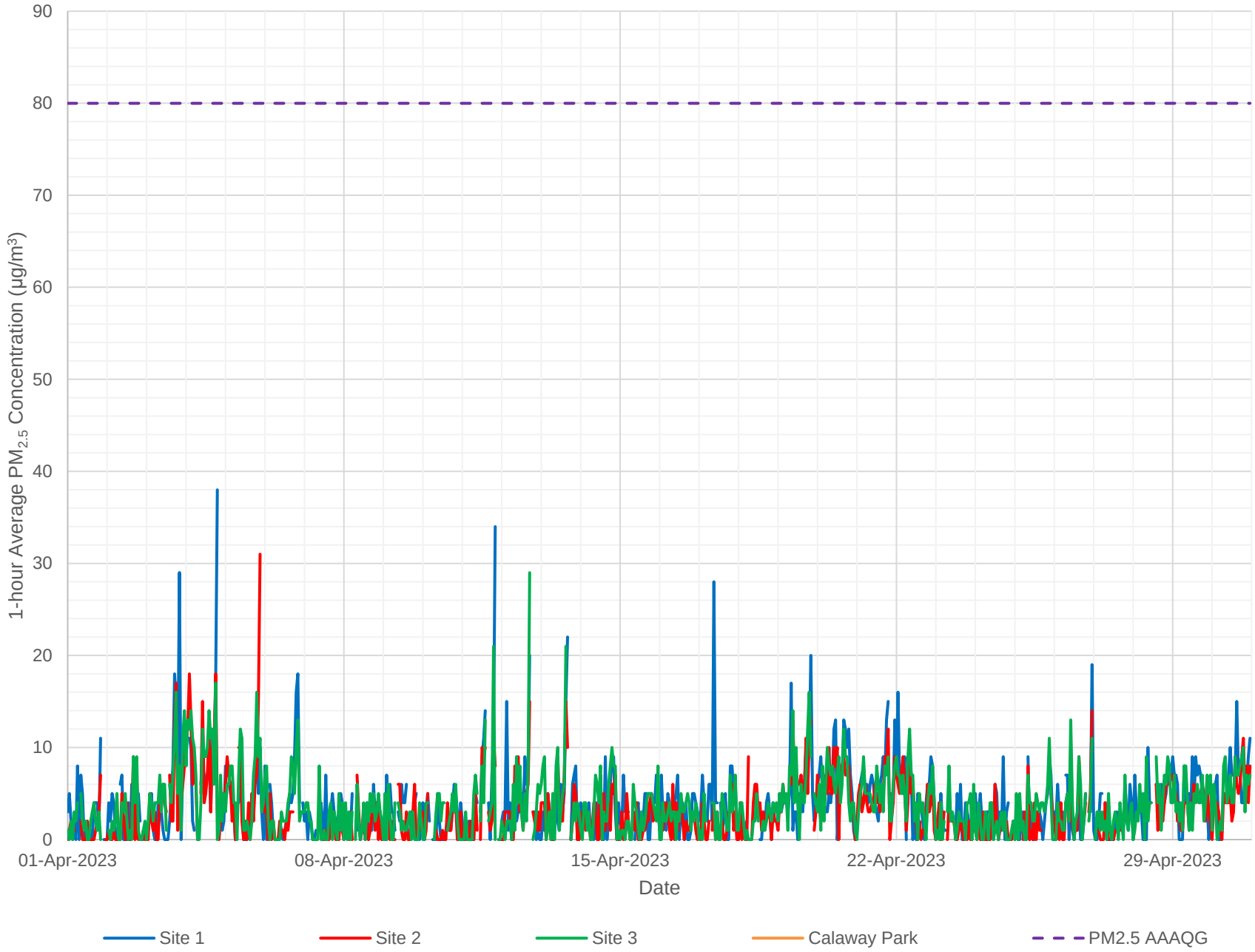


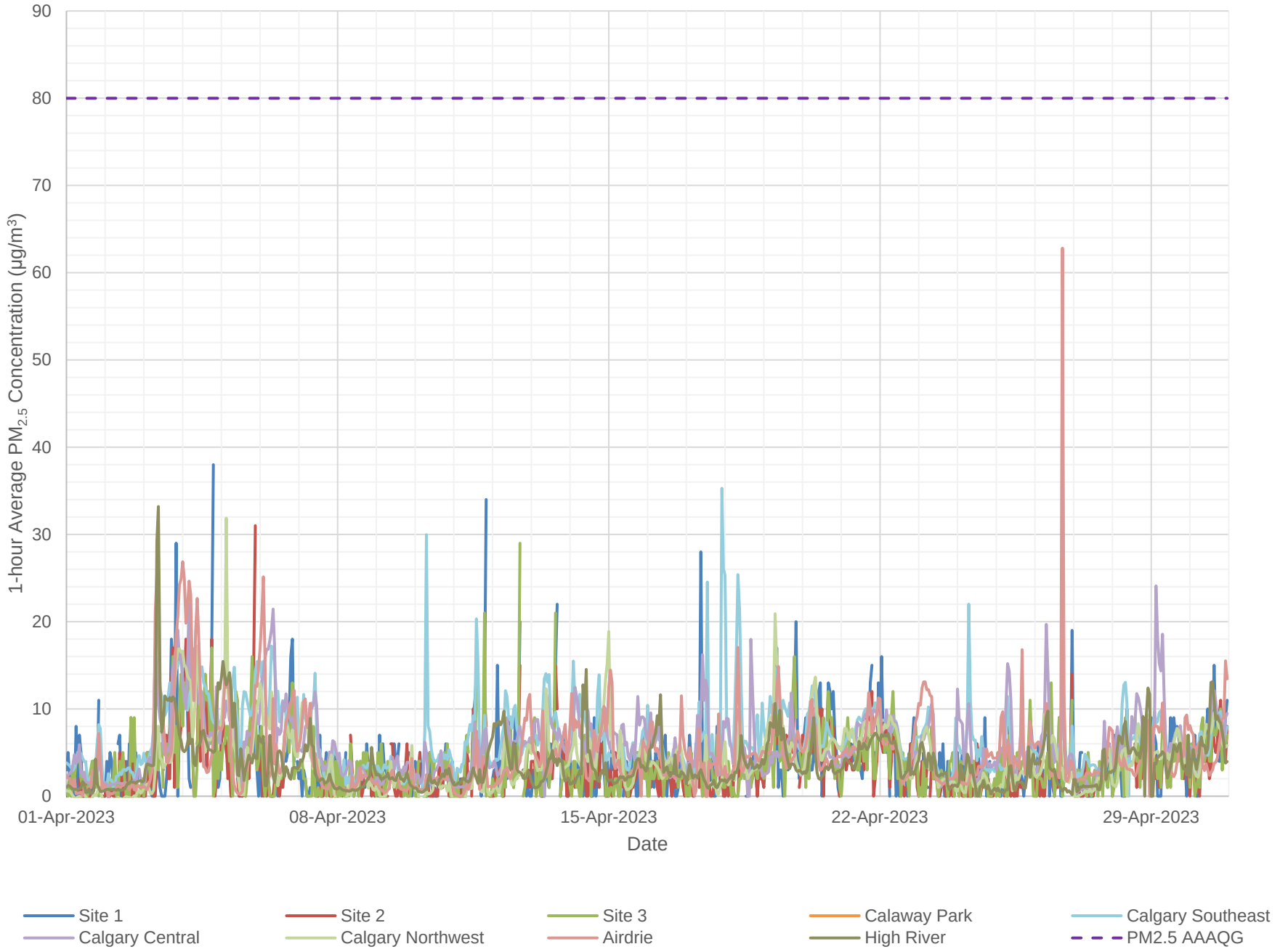

35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

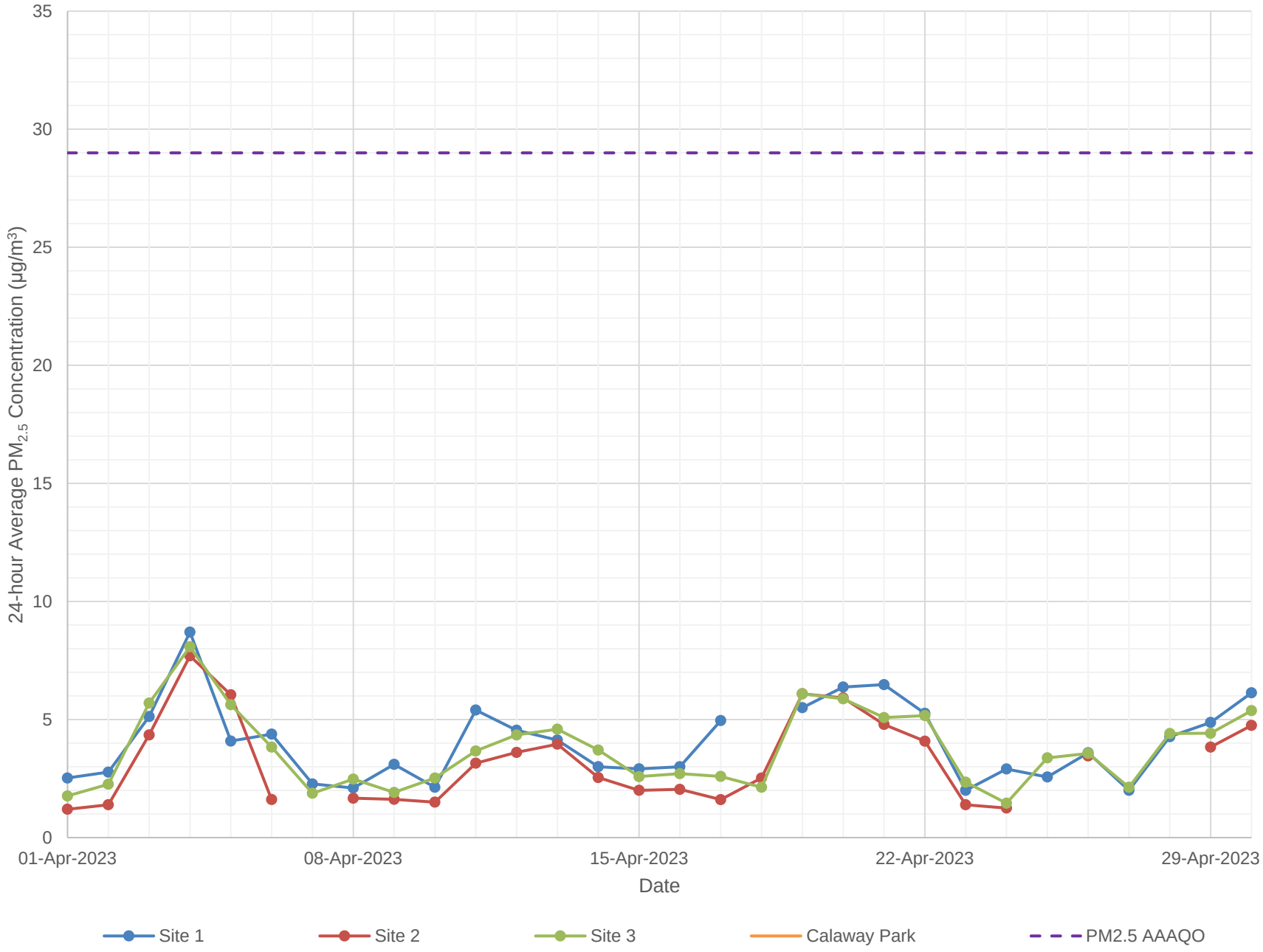

35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

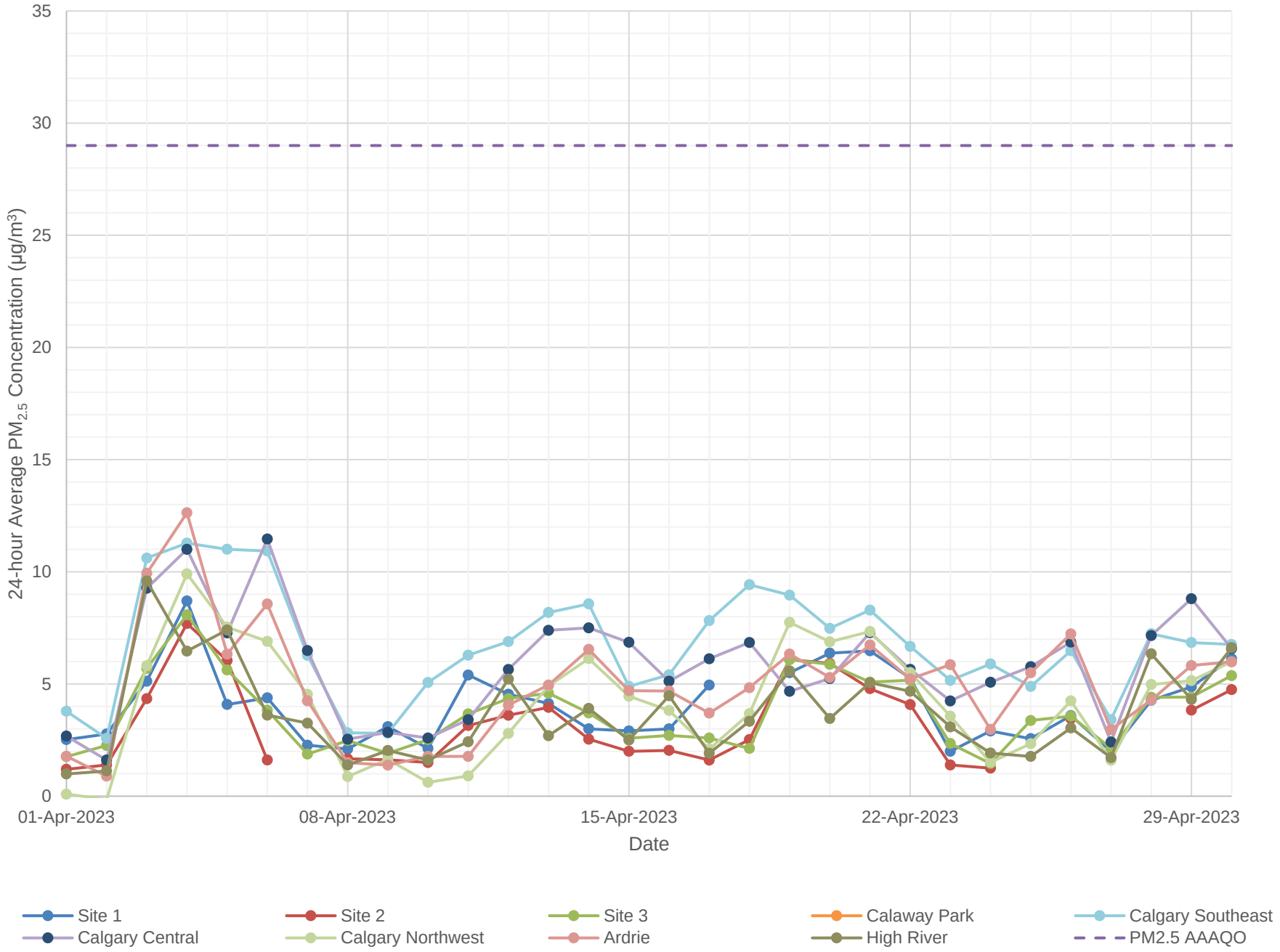

20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

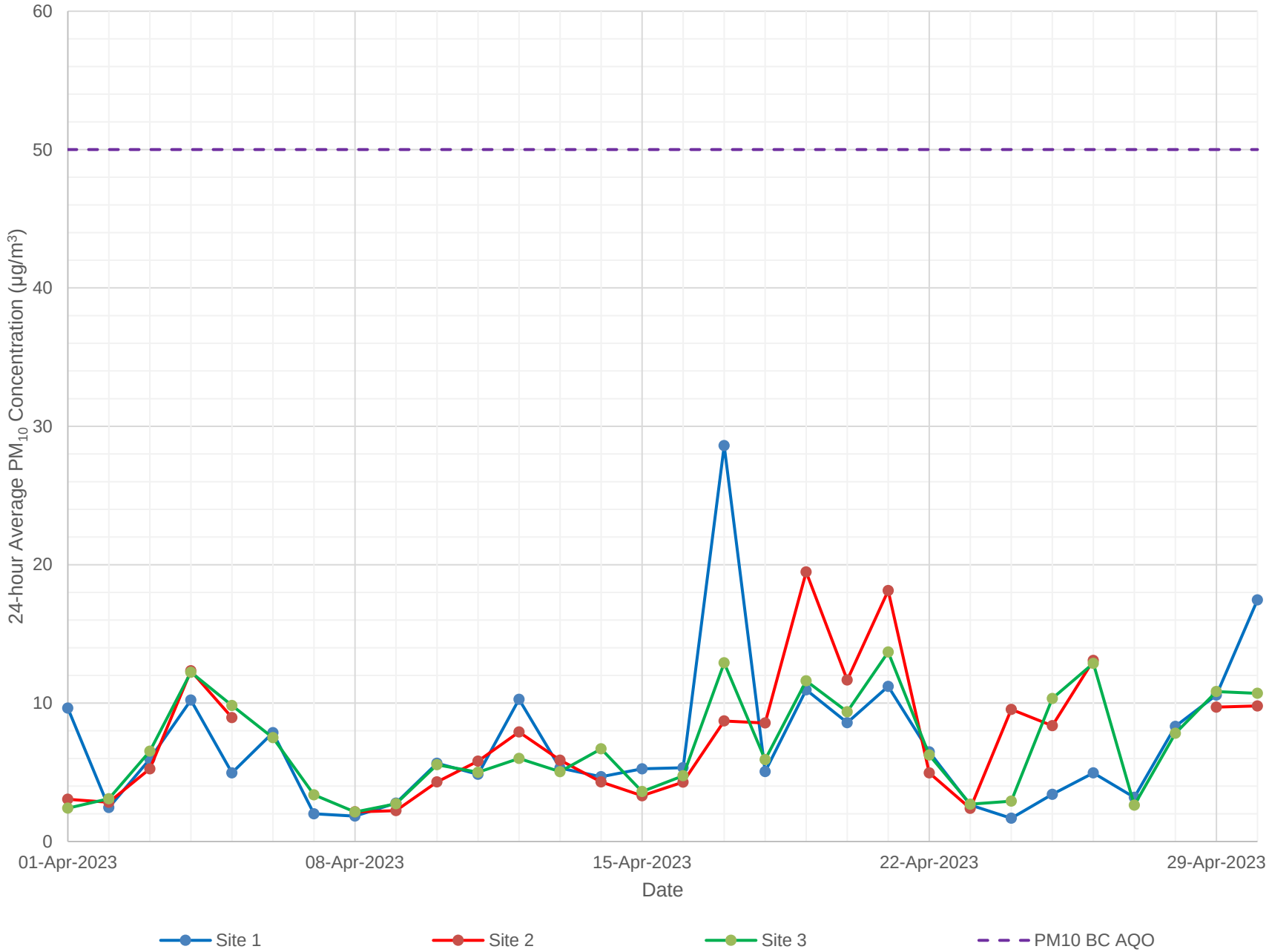

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

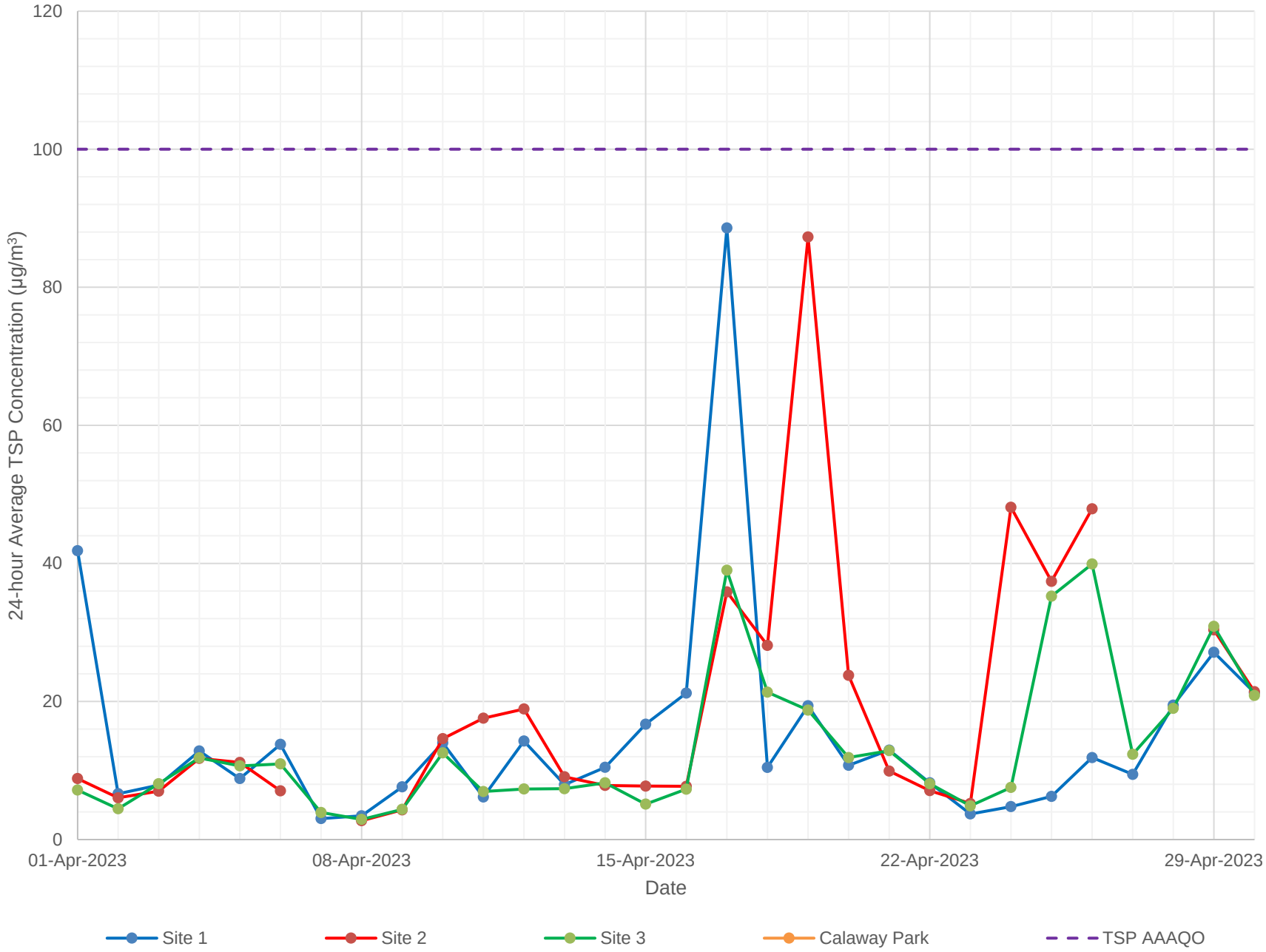

90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Apr-2023
08-Apr-2023
15-Apr-2023
22-Apr-2023
29-Apr-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


90
80
70
60
50
40
30
20
10
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Apr-2023
08-Apr-2023
15-Apr-2023
22-Apr-2023
29-Apr-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Apr-2023
08-Apr-2023
15-Apr-2023
22-Apr-2023
29-Apr-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


35
30
25
20
15
10
5
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Apr-2023
08-Apr-2023
15-Apr-2023
22-Apr-2023
29-Apr-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Apr-2023
08-Apr-2023
15-Apr-2023
22-Apr-2023
29-Apr-2023
Date
Site 1
Site 2
Site 3
PM10 BC AQO


120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Apr-2023
08-Apr-2023
15-Apr-2023
22-Apr-2023
29-Apr-2023
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

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Summary of EBAM Station Particulate and Meteorological Monitoring for May 2023

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		0.6	21.0	86.9
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			21.0	86.9
Average	21.40	27.60	40.16	1.52	124.2 (SE)	12.7	59.1	87.7
Median	8.00	13.00	23.00	1.22		11.8	59.0	87.6
Maximum	395.00	424.00	430.00	5.22		26.5	100.0	89.3
Standard Deviation	42.61	46.68	51.99	1.12		6.5	21.9	0.6
Number Obs	693	692	689	704	704	704	704	704
Expected Obs	744	744	744	744	744	744	744	744
% Complete	93.1%	93.0%	92.6%	94.6%	94.6%	94.6%	94.6%	94.6%
Calm Hours				27				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	350	336	302	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	114	94	69	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	75	52	21	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	51	30	5	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.96	4.46	5.65
Minimum (Non-Zero)	1.96	4.46	5.65
Average	21.47	27.42	39.03
Median	7.51	15.06	24.69
Maximum	141.00	157.29	171.25
Standard Deviation	35.00	38.35	40.93
Number Obs	28	28	28
Expected Obs	31	31	31
% Complete	93.1%	93.0%	92.6%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	27	27	22	3	5	10
1/3 of 24-hour AAAQO	10	9	10	10	17	33
2/3 of 24-hour AAAQO	6	4	4	19	33	67
Above 24-hour AAAQO	4	4	2	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for May 2023

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		0.7	20.0	87.2
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			20.0	87.2
Average	20.77	32.07	63.92	1.88	126.6 (SE)	13.4	58.1	88.0
Median	7.00	13.00	26.00	1.57		12.9	58.0	87.9
Maximum	396.00	441.00	725.00	6.78		28.6	100.0	89.6
Standard Deviation	42.80	50.56	96.71	1.28		6.7	22.3	0.6
Number Obs	675	688	686	690	690	690	690	690
Expected Obs	744	744	744	744	744	744	744	744
% Complete	90.7%	92.5%	92.2%	92.7%	92.7%	92.7%	92.7%	92.7%
Calm Hours				14				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	321	340	338	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	103	132	141	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	66	60	62	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	52	33	29	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.71	3.42	5.79
Minimum (Non-Zero)	1.71	3.42	5.79
Average	22.73	32.15	62.45
Median	7.06	16.75	38.83
Maximum	156.00	155.88	279.33
Standard Deviation	38.08	39.21	63.87
Number Obs	28	28	28
Expected Obs	31	31	31
% Complete	90.7%	92.5%	92.2%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	25	27	25	3	5	10
1/3 of 24-hour AAAQO	11	14	17	10	17	33
2/3 of 24-hour AAAQO	7	7	8	19	33	67
Above 24-hour AAAQO	4	4	6	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for May 2023

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.06		-0.3	18.0	87.3
Minimum (Non-Zero)	1.00	1.00	1.00	0.06			18.0	87.3
Average	21.36	28.63	42.12	2.06	134.0 (SE)	13.0	58.2	88.2
Median	7.50	14.00	23.00	1.72		12.4	58.0	88.0
Maximum	396.00	424.00	443.00	6.75		27.7	100.0	89.9
Standard Deviation	42.31	46.13	54.07	1.25		6.8	23.0	0.6
Number Obs	732	730	737	743	743	743	743	743
Expected Obs	744	744	744	744	744	744	744	744
% Complete	98.4%	98.1%	99.1%	99.9%	99.9%	99.9%	99.9%	99.9%
Calm Hours				3				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	366	367	329	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	116	110	92	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	75	63	31	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	58	32	6	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	2.13	4.58	6.29
Minimum (Non-Zero)	2.13	4.58	6.29
Average	21.16	28.32	41.93
Median	7.22	15.00	26.71
Maximum	144.83	158.71	175.63
Standard Deviation	34.14	36.58	40.15
Number Obs	31	31	31
Expected Obs	31	31	31
% Complete	98.4%	98.1%	99.1%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	8	30	29	3	5	10
1/3 of 24-hour AAAQO	4	13	13	10	17	33
2/3 of 24-hour AAAQO	2	6	5	19	33	67
Above 24-hour AAAQO	1	4	4	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

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Summary of EBAM Station Particulate and Meteorological Monitoring for May 2023

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.03		0.5	17.0	87.2
Minimum (Non-Zero)	1.00	1.00	0.03			17.0	87.2
Average	23.00	46.18	1.70	134.1 (SE)	14.2	55.6	88.1
Median	7.00	28.00	1.42		13.7	53.0	88.0
Maximum	389.00	452.00	7.22		28.3	100.0	89.6
Standard Deviation	44.32	54.98	1.28		6.8	23.6	0.6
Number Obs	647	625	658	660	660	660	660
Expected Obs	744	744	744	744	744	744	744
% Complete	87.0%	84.0%	88.4%	88.7%	88.7%	88.7%	88.7%
Calm Hours			38				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective 1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria
10% of 1-hour Equivalent AAAQO or AAAQG	294	316	8	28	
1/3 of 1-hour Equivalent AAAQO or AAAQG	110	93	27	92	
2/3 of 1-hour Equivalent AAAQO or AAAQG	80	19	53	184	
Above 1-hour Equivalent AAAQO or AAAQG	66	4	80	276	

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	1.21	9.70
Minimum (Non-Zero)	1.21	9.70
Average	23.65	45.37
Median	6.60	27.94
Maximum	142.71	174.13
Standard Deviation	35.66	40.50
Number Obs	26	26
Expected Obs	31	31
% Complete	87.0%	84.0%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP	PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective
10% of 24-hour AAAQO	24	25	3	10	
1/3 of 24-hour AAAQO	10	11	10	33	
2/3 of 24-hour AAAQO	7	4	19	67	
Above 24-hour AAAQO	5	3	29	100	

Notes:
- Calaway Park Station Installed for Season

Summary of Springbank Airport Meteorlogical Monitoring for May 2023

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		-0.5	17.0	87.1
Minimum (Non-Zero)	1.11			17.0	87.1
Average	4.08	128.0 (SE)	13.3	59.7	87.9
Median	3.61		12.6	59.0	87.7
Maximum	10.83		27.4	100.0	89.5
Standard Deviation	2.11		6.53	23.92	0.587
Number Obs	648	648	744	744	742
Expected Obs	744	744	744	744	744
% Complete	87.1%	87.1%	100.0%	100.0%	99.7%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

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Summary of Regional and Project PM2.5 Monitoring for May 2023

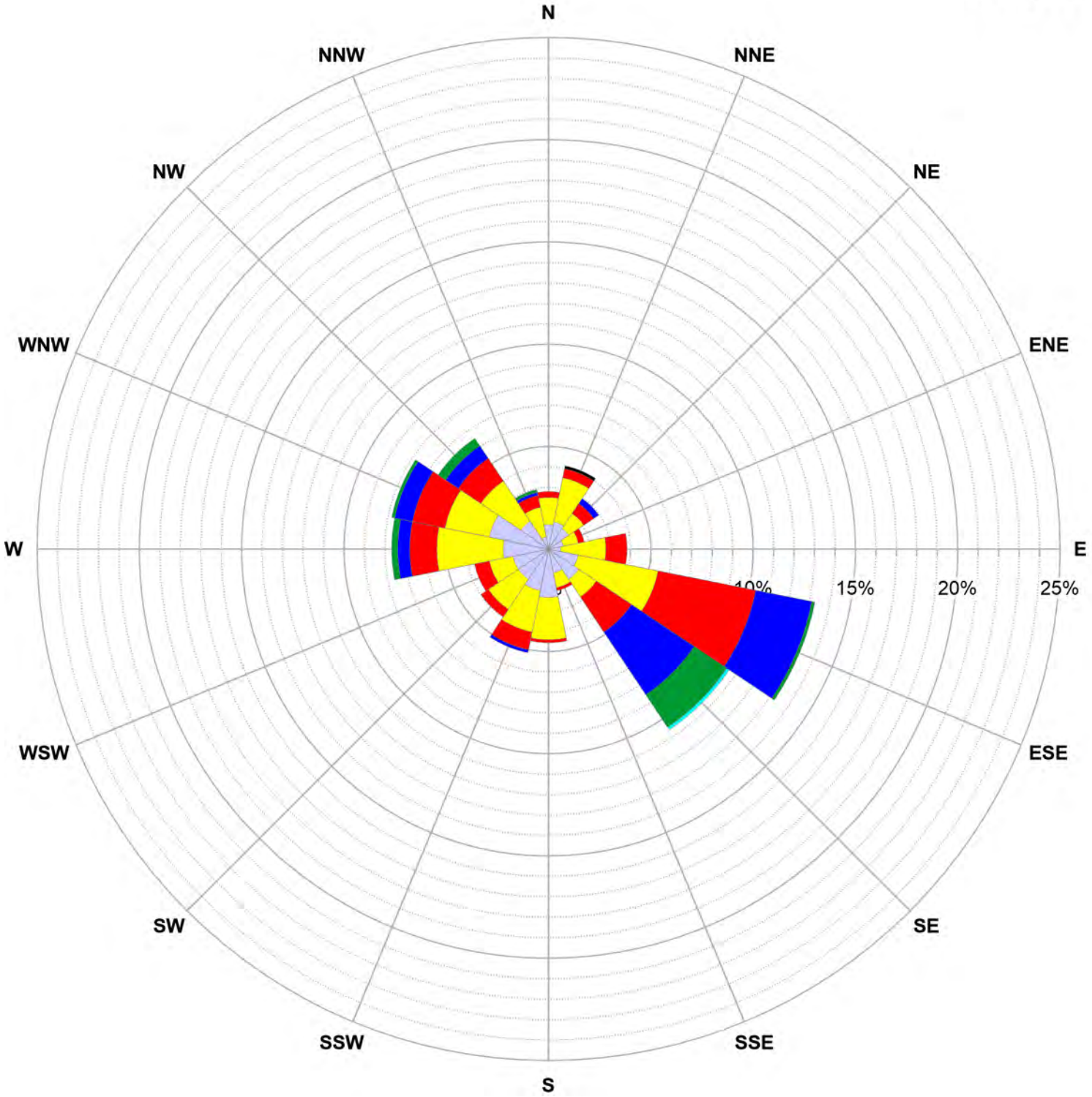
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.57	0.73	0.18	0.39	0.65	0.00	0.00	0.00	0.00
Minimum (Non-Zero)	0.57	0.73	0.18	0.39	0.65	1.00	1.00	1.00	1.00
Average	33.17	26.40	23.62	28.36	20.71	21.40	20.77	21.36	23.00
Median	11.09	10.60	8.38	9.18	7.27	8.00	7.00	7.50	7.00
Maximum	**557.85**	**433.80**	**414.98**	**442.52**	**388.06**	**395.00**	**396.00**	**396.00**	**389.00**
Standard Deviation	65.55	47.74	45.58	57.64	41.78	42.61	42.80	42.31	44.32
Number Obs	743	742	740	739	742	693	675	732	647
Expected Obs	744	744	744	744	744	744	744	744	744
% Complete	99.9%	99.7%	99.5%	99.3%	99.7%	93.1%	90.7%	98.4%	87.0%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

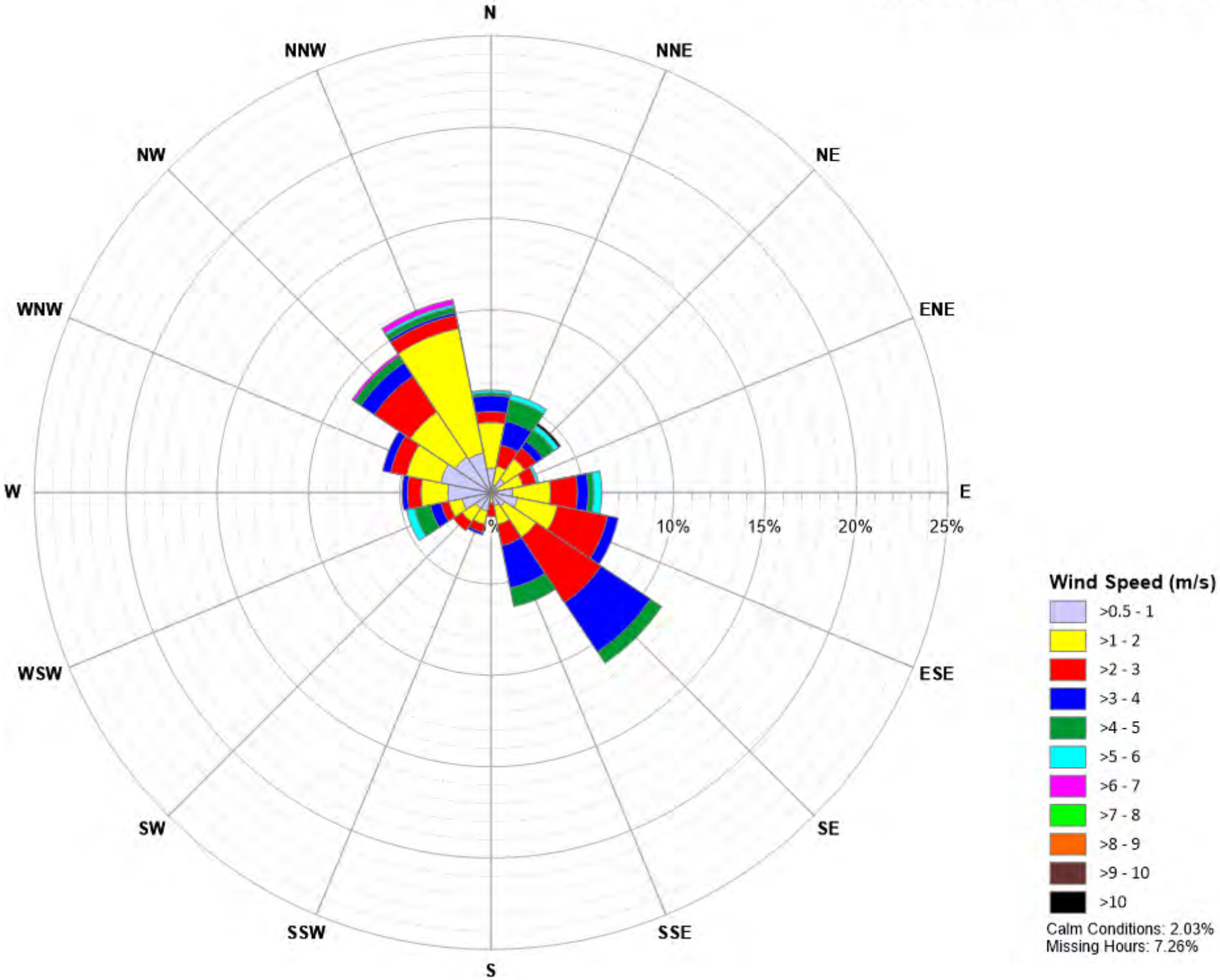
	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.46	1.82	0.71	1.01	3.06	1.96	1.71	2.13	1.21
Minimum (Non-Zero)	2.46	1.82	0.71	1.01	3.06	1.96	1.71	2.13	1.21
Average	**33.80**	26.48	23.96	28.78	21.12	21.47	22.73	21.16	23.65
Median	11.38	11.14	8.34	9.13	7.42	7.51	7.06	7.22	6.60
Maximum	**205.13**	**127.80**	**133.12**	**183.52**	**127.44**	**141.00**	**156.00**	**144.83**	**142.71**
Standard Deviation	50.85	33.94	33.63	43.68	30.93	35.00	38.08	34.14	35.66
Number Obs	30	30	30	30	30	28	28	31	26
Expected Obs	31	31	31	31	31	31	31	31	31
% Complete	96.8%	96.8%	96.8%	96.8%	96.8%	90.3%	90.3%	100.0%	83.9%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

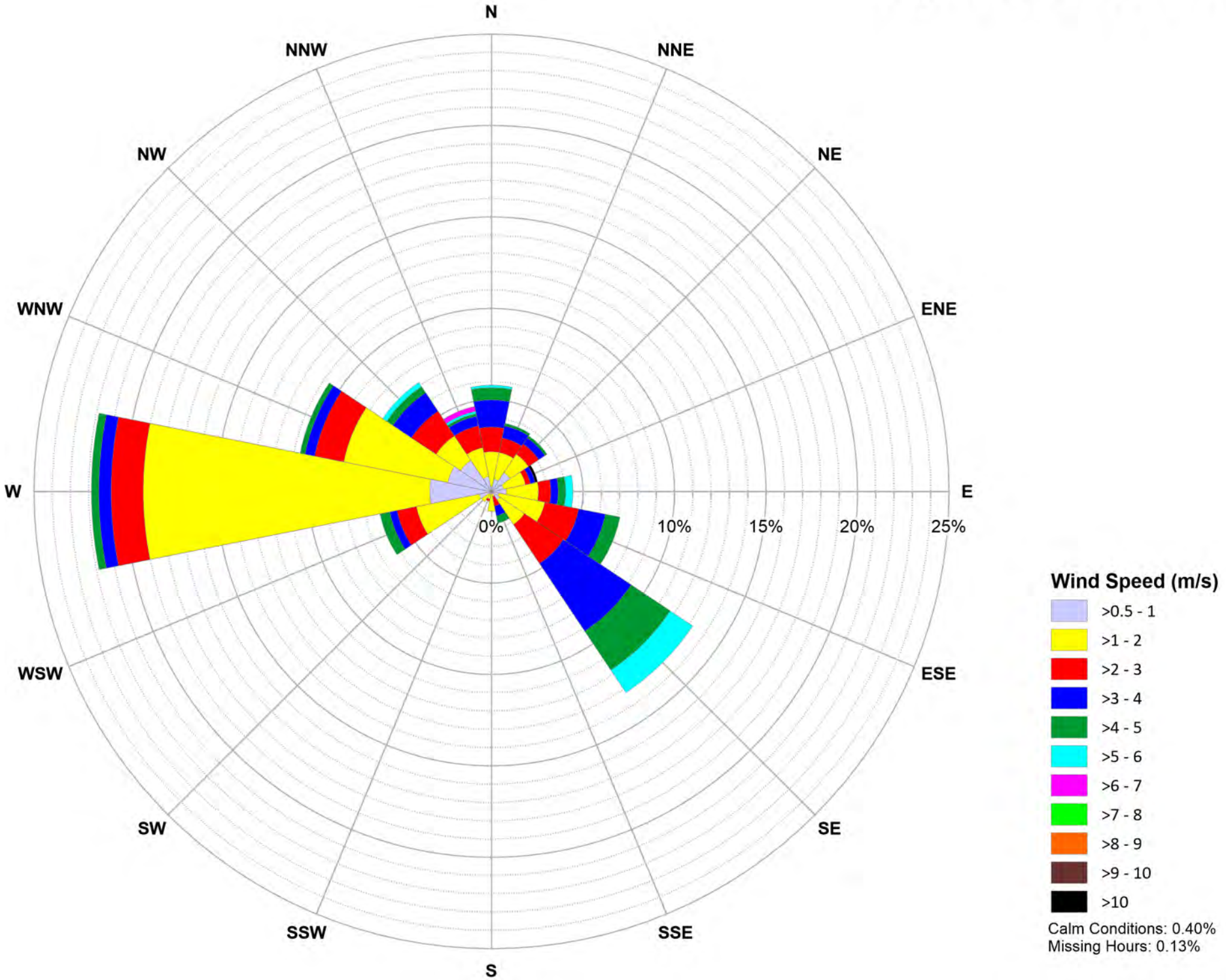
May 2023 Site 1 Wind Rose



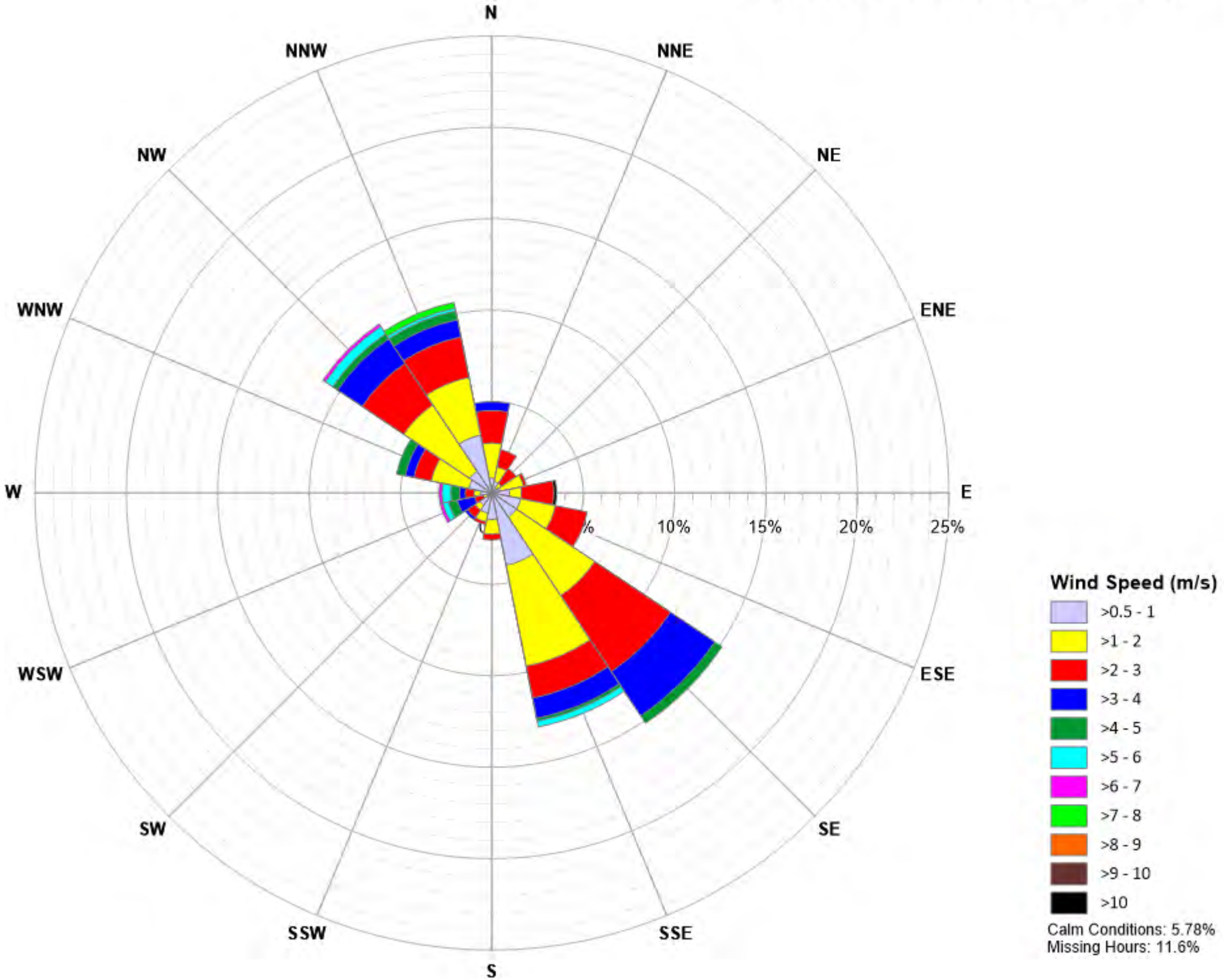
May 2023 Site 2 Wind Rose



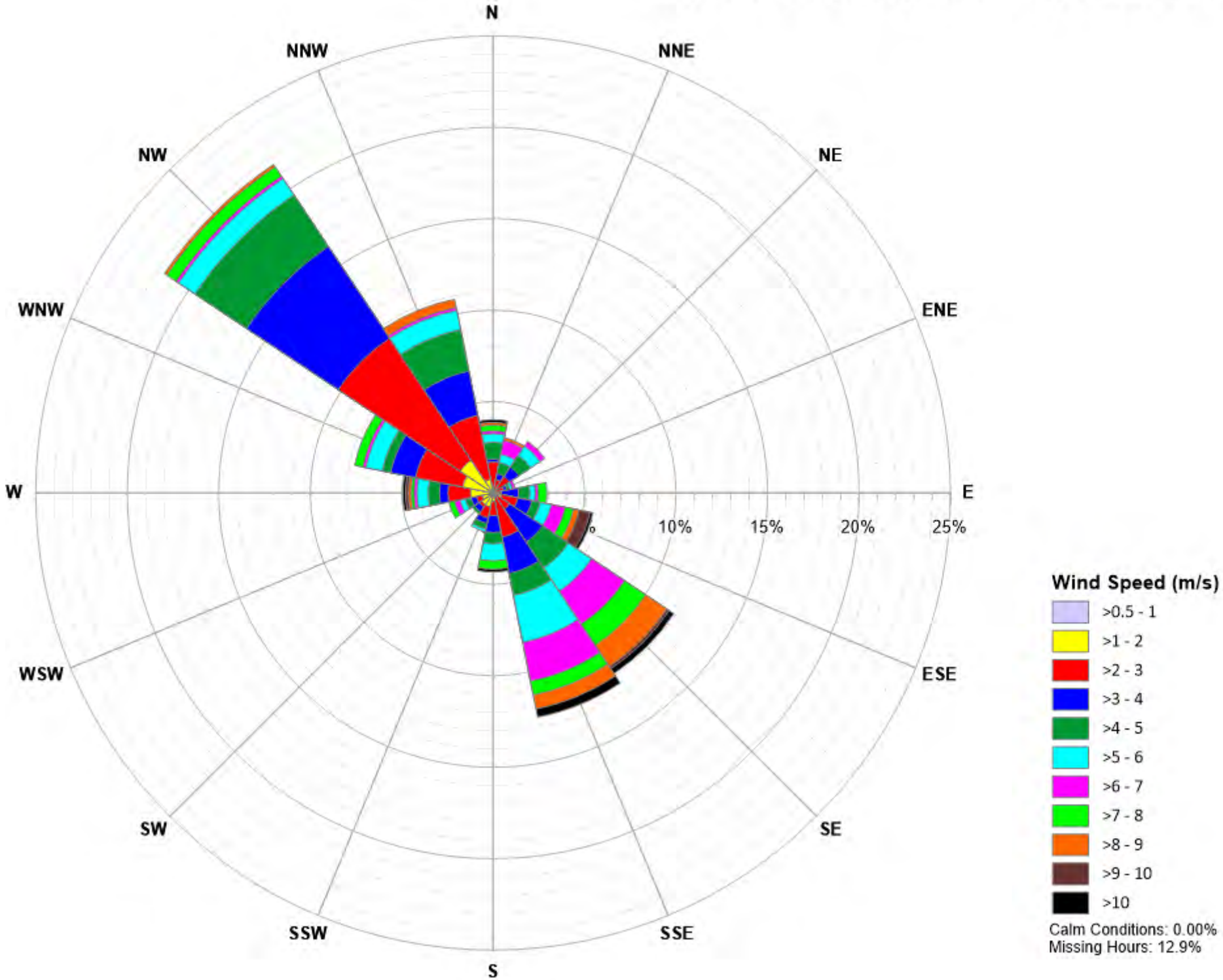
May 2023 Site 3 Wind Rose

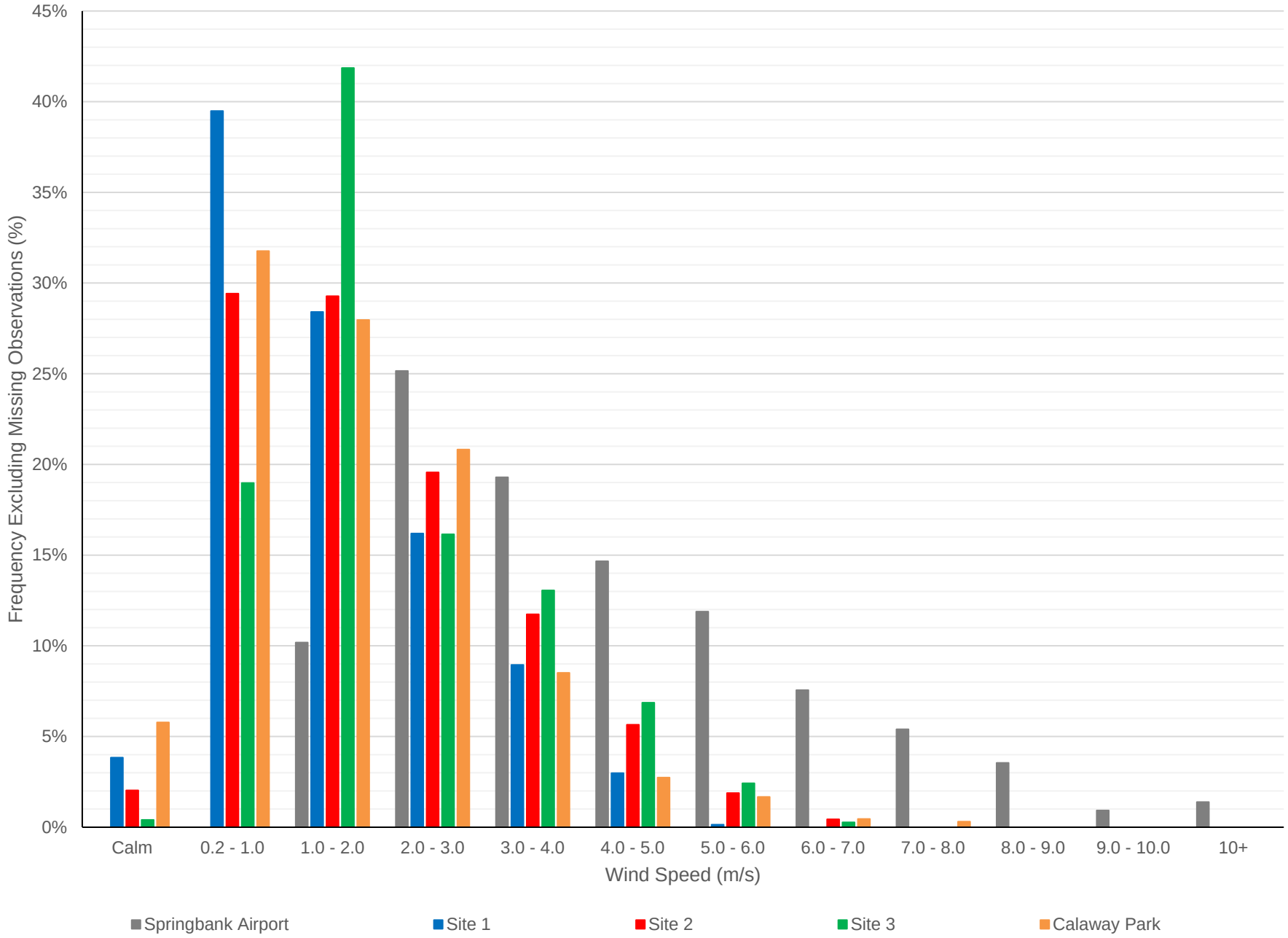


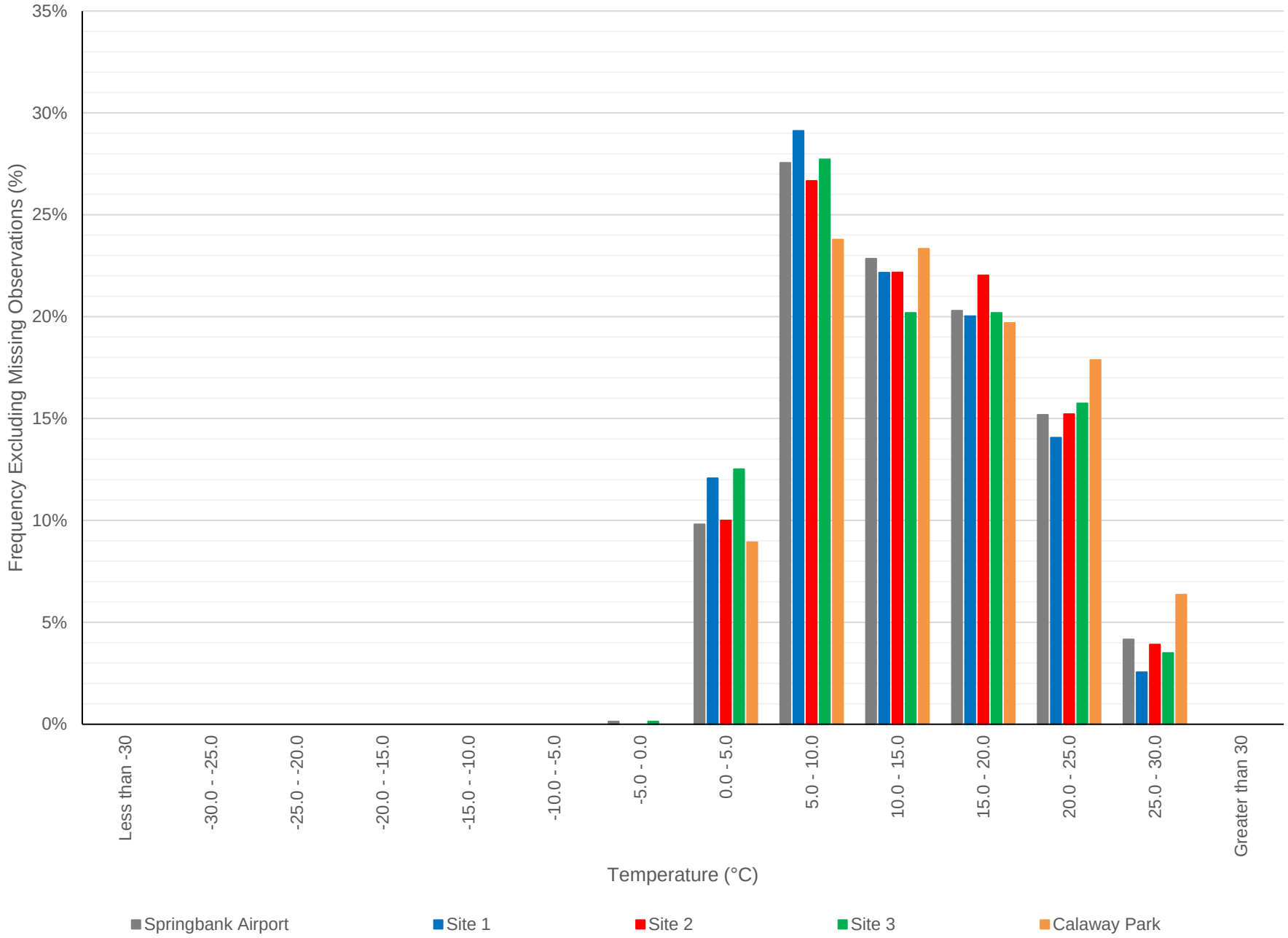
May 2023 Calaway Park Wind Rose

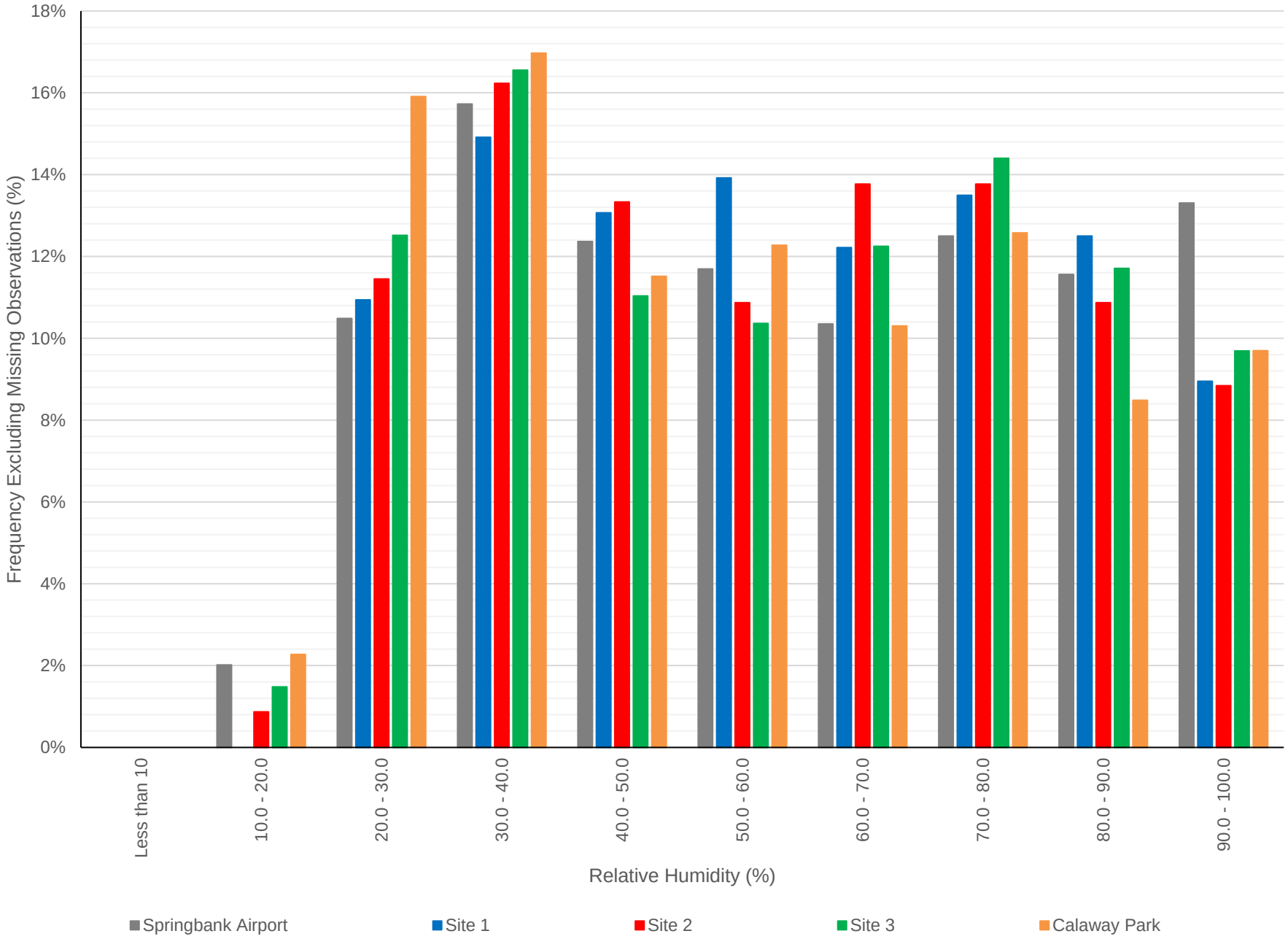


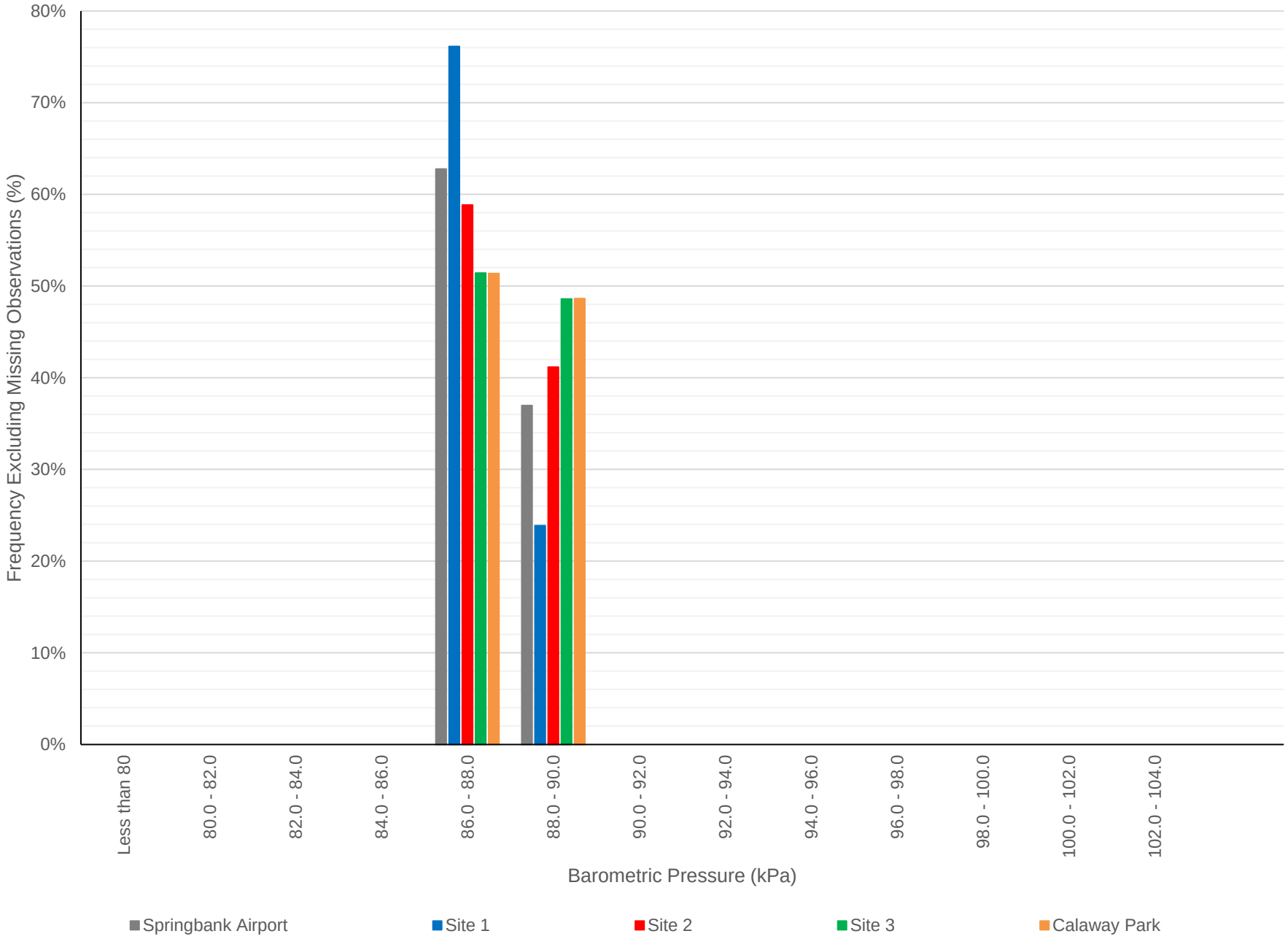
May 2023 Springbank Airport Wind Rose

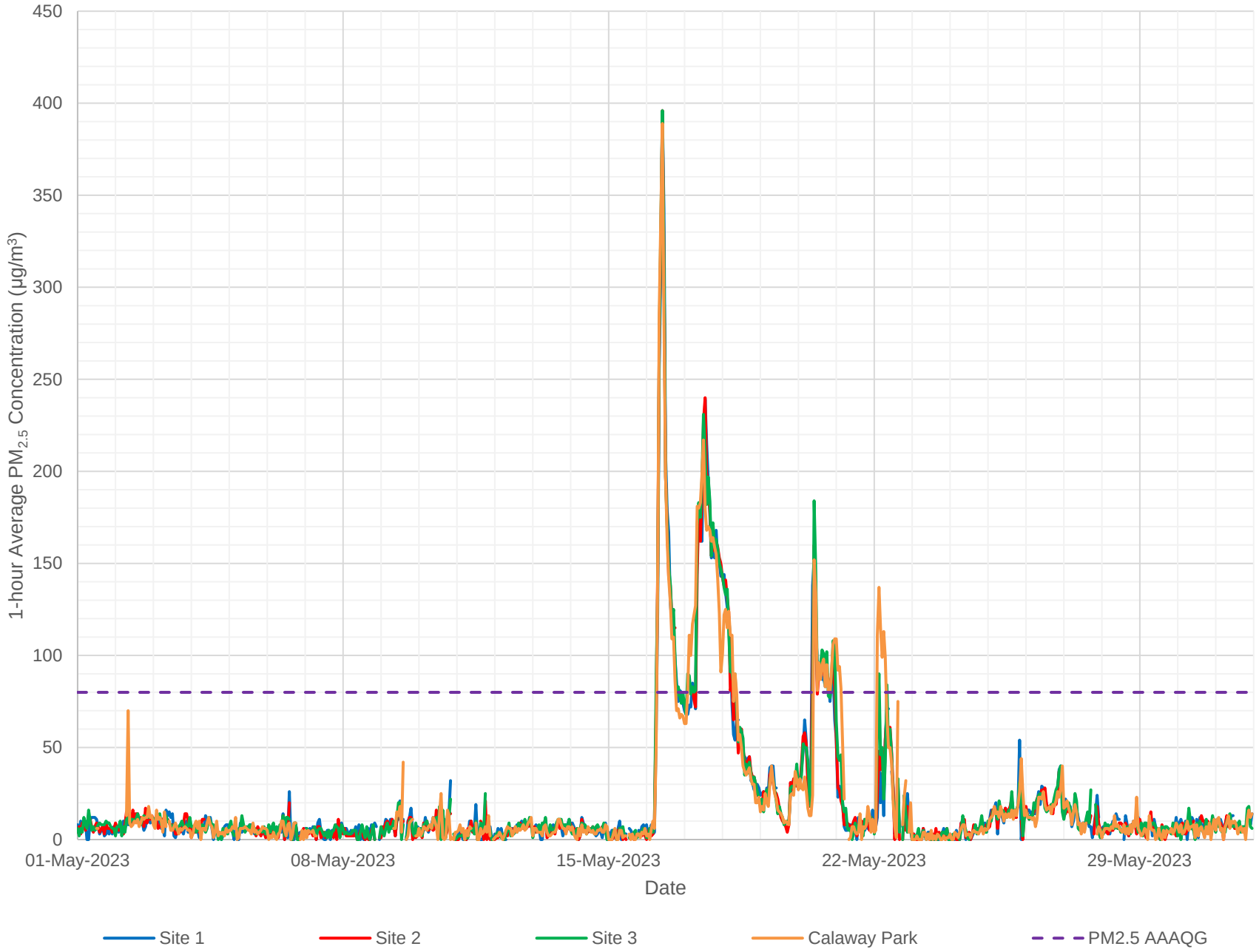


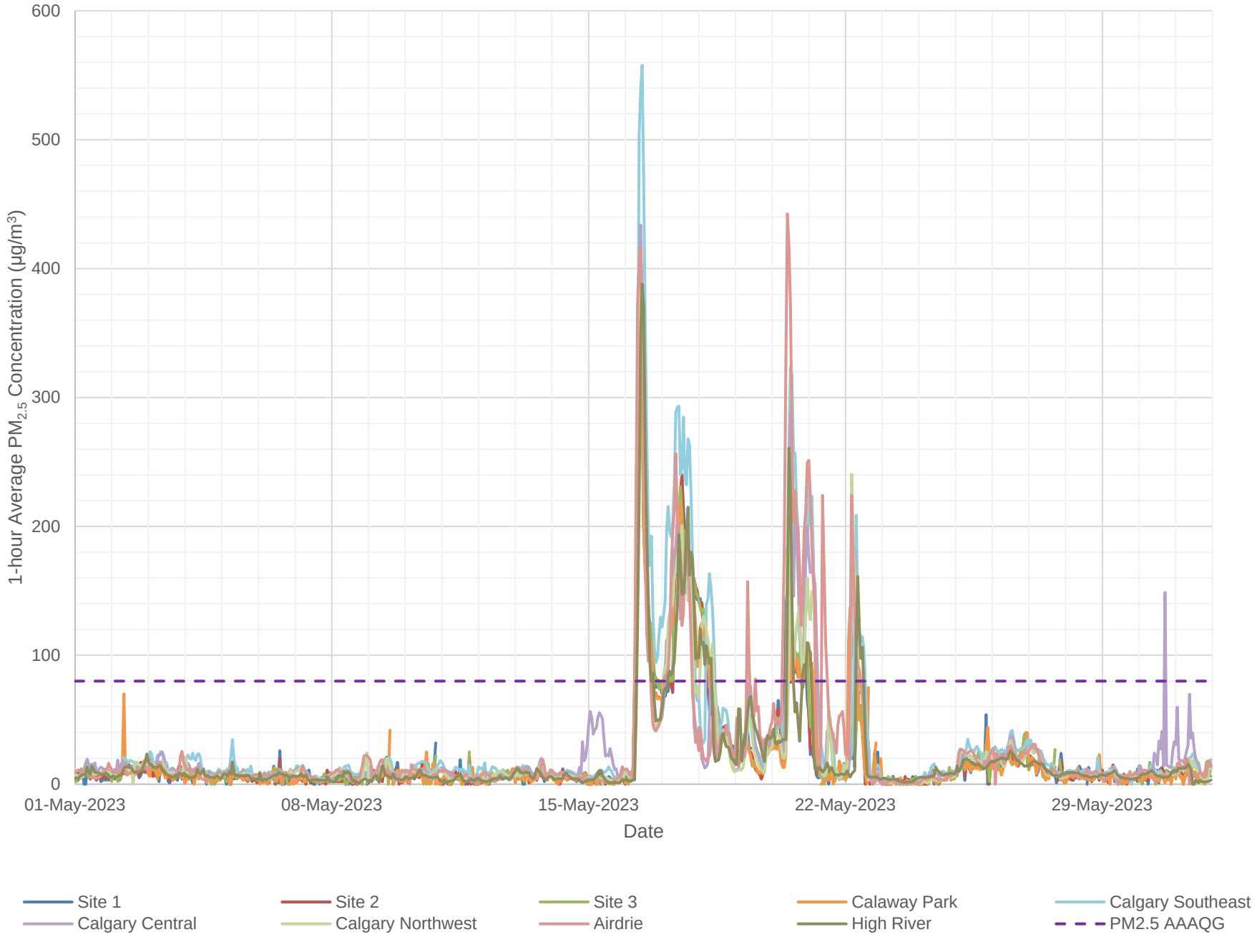

45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

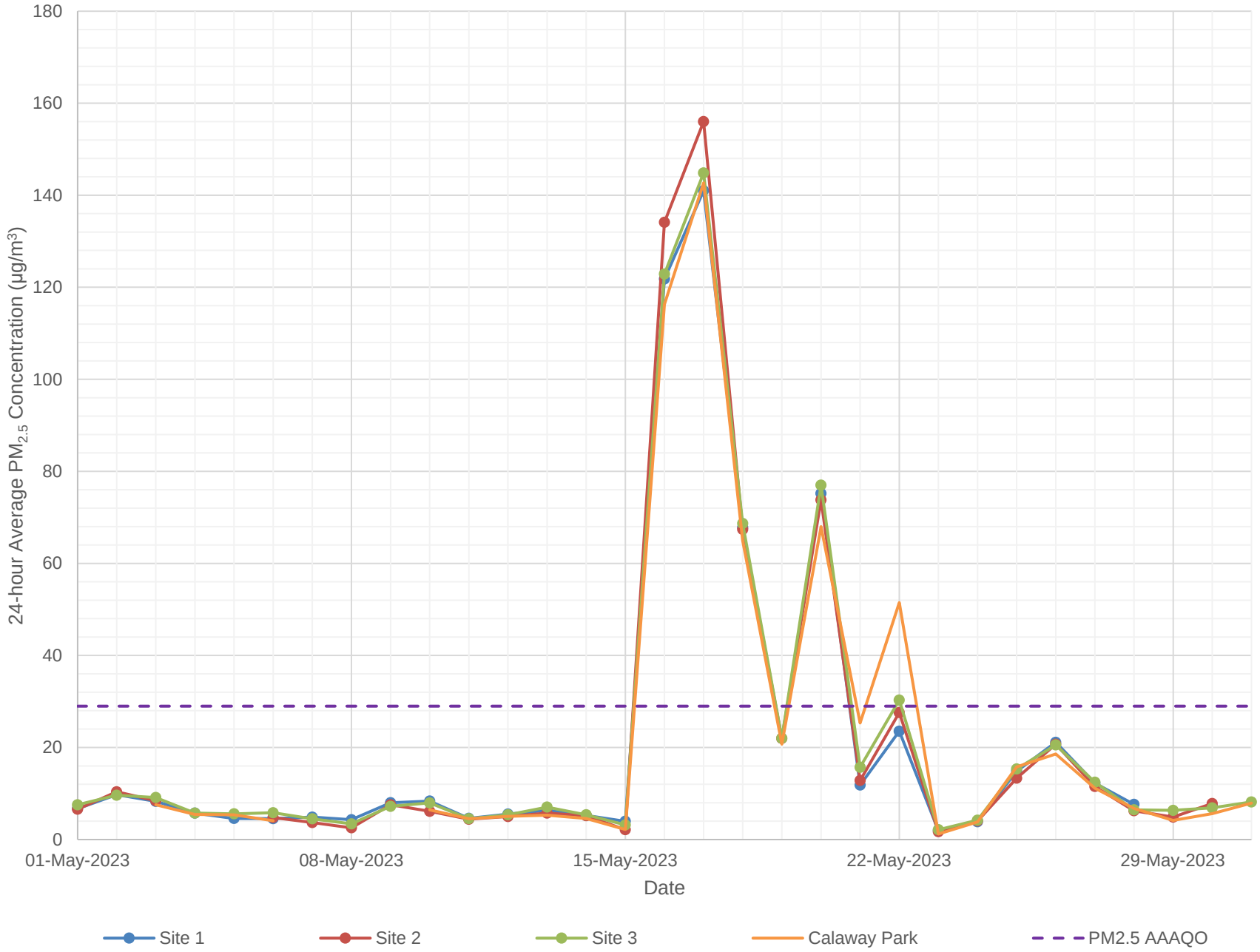

35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

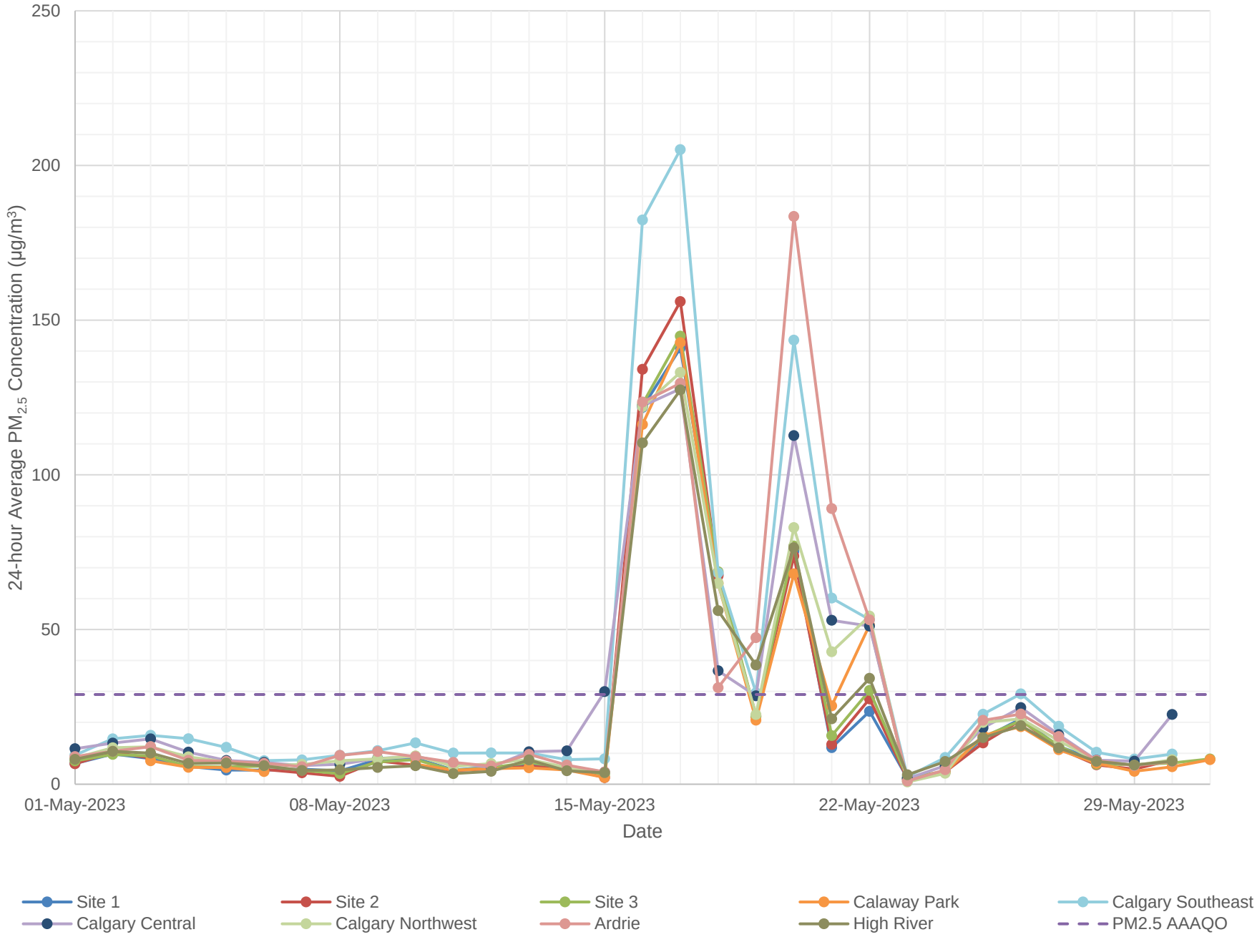

18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

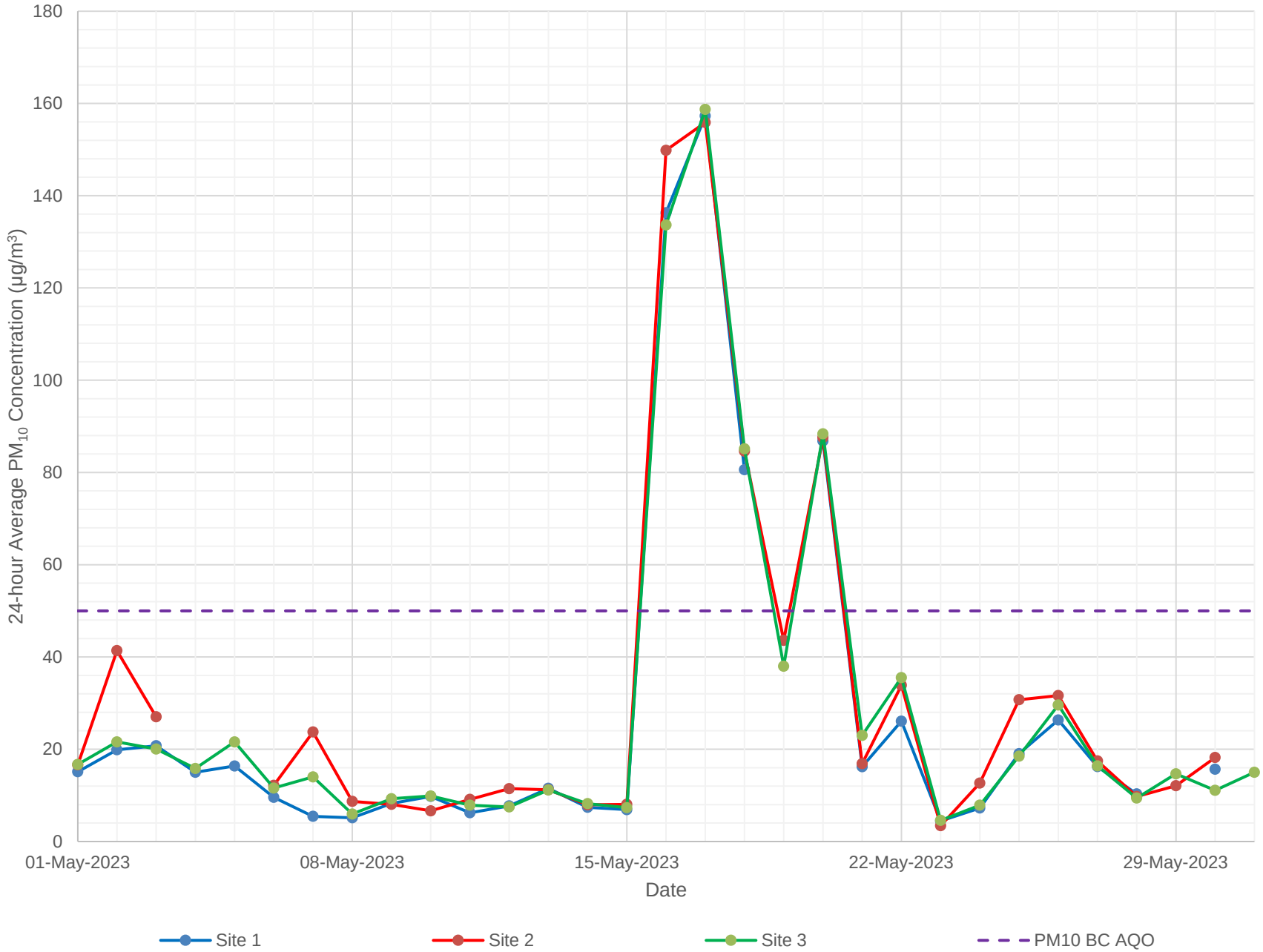

80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

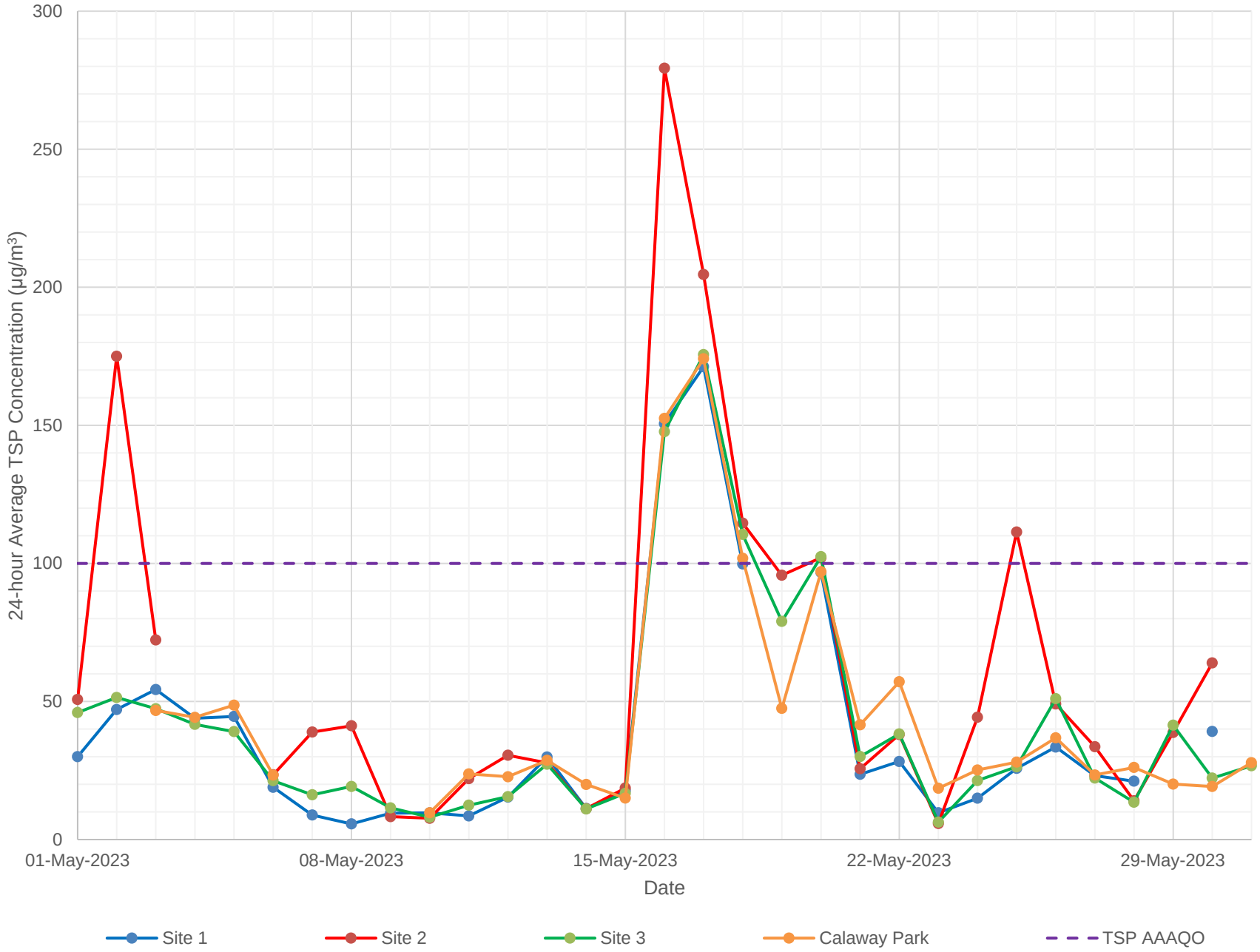

450
400
350
300
250
200
150
100
50
0
1-hour Average PM2.5 Concentration (µg/m3)
01-May-2023
08-May-2023
15-May-2023
22-May-2023
29-May-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


600
500
400
300
200
100
0
1-hour Average PM2.5 Concentration (µg/m³)
01-May-2023
08-May-2023
15-May-2023
22-May-2023
29-May-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


180
160
140
120
100
80
60
40
20
0
24-hour Average PM2.5 Concentration (µg/m3)
01-May-2023
08-May-2023
15-May-2023
22-May-2023
29-May-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


250
200
150
100
50
0
24-hour Average PM2.5 Concentration (µg/m3)
01-May-2023
08-May-2023
15-May-2023
22-May-2023
29-May-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


180
160
140
120
100
80
60
40
20
0
24-hour Average PM10 Concentration (µg/m3)
01-May-2023
08-May-2023
15-May-2023
22-May-2023
29-May-2023
Date
Site 1
Site 2
Site 3
PM10 BC AQO


300
250
200
150
100
50
0
24-hour Average TSP Concentration (µg/m³)
01-May-2023
08-May-2023
15-May-2023
22-May-2023
29-May-2023
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

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Summary of EBAM Station Particulate and Meteorological Monitoring for June 2023

Site 1 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.03		2.5	23.0	85.9
Minimum (Non-Zero)	1.00	1.00	1.00	0.03			23.0	85.9
Average	10.67	19.27	29.35	1.86	320.9 (NW)	15.1	64.3	87.6
Median	8.00	15.00	22.00	1.56		14.3	64.0	87.7
Maximum	112.00	132.00	230.00	7.19		28.2	99.0	88.3
Standard Deviation	13.79	18.43	28.24	1.29		6.3	21.0	0.5
Number Obs	605	600	601	616	616	616	616	616
Expected Obs	720	720	720	720	720	720	720	720
% Complete	84.0%	83.3%	83.5%	85.6%	85.6%	85.6%	85.6%	85.6%
Calm Hours				5				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	311	332	245	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	35	41	23	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	18	10	3	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	7	0	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 1 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	3.48	5.73	6.05
Minimum (Non-Zero)	3.48	5.73	6.05
Average	11.43	20.27	30.83
Median	8.35	19.38	28.96
Maximum	48.54	55.42	57.54
Standard Deviation	9.52	10.10	14.38
Number Obs	23	23	23
Expected Obs	30	30	30
% Complete	84.0%	83.3%	83.5%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	23	23	22	3	5	10
1/3 of 24-hour AAAQO	8	15	10	10	17	33
2/3 of 24-hour AAAQO	2	2	0	19	33	67
Above 24-hour AAAQO	1	1	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2023

Site 2 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.06		1.4	23.0	86.1
Minimum (Non-Zero)	1.00	1.00	1.00	0.06			23.0	86.1
Average	9.90	21.31	48.76	2.04	349.0 (N)	14.9	64.6	87.9
Median	7.00	15.00	29.50	1.69		14.2	65.0	88.1
Maximum	106.00	475.00	624.00	6.81		28.3	100.0	88.7
Standard Deviation	13.54	28.79	66.90	1.32		6.6	21.6	0.5
Number Obs	652	660	660	662	663	664	664	664
Expected Obs	720	720	720	720	720	720	720	720
% Complete	90.6%	91.7%	91.7%	91.9%	92.1%	92.2%	92.2%	92.2%
Calm Hours				7				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	303	351	344	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	31	70	85	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	19	14	33	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	8	3	10	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 2 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.08	1.58	1.79
Minimum (Non-Zero)	1.08	1.58	1.79
Average	10.21	20.79	47.02
Median	7.59	19.29	45.19
Maximum	49.08	52.54	151.29
Standard Deviation	9.90	14.38	36.09
Number Obs	25	26	26
Expected Obs	30	30	30
% Complete	90.6%	91.7%	91.7%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	21	24	21	3	5	10
1/3 of 24-hour AAAQO	10	16	15	10	17	33
2/3 of 24-hour AAAQO	2	5	7	19	33	67
Above 24-hour AAAQO	1	1	1	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2023

Site 3 - 1-hour Average	$PM_{2.5}$	PM_{10}	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.00	0.22		1.0	23.0	86.3
Minimum (Non-Zero)	1.00	1.00	1.00	0.22			23.0	86.3
Average	11.09	18.26	27.57	2.26	329.4 (NNW)	14.5	65.7	88.1
Median	7.00	12.00	18.00	1.86		13.7	66.5	88.3
Maximum	117.00	205.00	269.00	7.08		28.6	100.0	88.8
Standard Deviation	15.34	22.66	31.70	1.36		6.7	21.8	0.5
Number Obs	695	697	706	718	718	718	718	718
Expected Obs	720	720	720	720	720	720	720	720
% Complete	96.5%	96.8%	98.1%	99.7%	99.7%	99.7%	99.7%	99.7%
Calm Hours				0				

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	332	318	249	8	14	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	45	51	30	27	46	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	25	16	6	53	92	184
Above 1-hour Equivalent AAAQO or AAAQG	10	3	0	80	138	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site 3 - 24-hour Average	$PM_{2.5}$	PM_{10}	TSP
	µg/m³	µg/m³	µg/m³
Minimum	1.78	1.59	1.58
Minimum (Non-Zero)	1.78	1.59	1.58
Average	11.11	18.01	27.38
Median	8.79	13.16	20.48
Maximum	53.67	58.25	69.17
Standard Deviation	10.13	12.91	18.91
Number Obs	30	30	30
Expected Obs	30	30	30
% Complete	96.5%	96.8%	98.1%

	Number of Hours Above Criteria			$PM_{2.5}$	PM_{10}	TSP
10% of 24-hour AAAQO	7	27	24	3	5	10
1/3 of 24-hour AAAQO	0	12	11	10	17	33
2/3 of 24-hour AAAQO	0	3	1	19	33	67
Above 24-hour AAAQO	0	1	0	29	50	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:

Stantec

Summary of EBAM Station Particulate and Meteorological Monitoring for June 2023

Site Calaway Park - 1-hour Average	$PM_{2.5}$	TSP	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	µg/m³	µg/m³	m/s	Deg. From North	°C	%	kPa
Minimum	0.00	0.00	0.03		0.5	21.0	86.1
Minimum (Non-Zero)	1.00	1.00	0.03			21.0	86.1
Average	9.22	24.54	1.97	327.2 (NNW)	14.5	64.9	87.9
Median	6.00	19.00	1.53		13.9	64.5	88.1
Maximum	106.00	335.00	8.53		29.2	100.0	88.7
Standard Deviation	14.06	26.77	1.60		6.8	22.5	0.5
Number Obs	689	666	701	701	708	708	708
Expected Obs	720	720	720	720	720	720	720
% Complete	95.7%	92.5%	97.4%	97.4%	98.3%	98.3%	98.3%
Calm Hours			35				

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 1-hour Equivalent AAAQO or AAAQG	275	220	8	28
1/3 of 1-hour Equivalent AAAQO or AAAQG	36	19	27	92
2/3 of 1-hour Equivalent AAAQO or AAAQG	21	2	53	184
Above 1-hour Equivalent AAAQO or AAAQG	7	1	80	276

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

1-hour equivalent for PM_{10} and TSP calculated from 24-hour Air Quality Criteria

Site Calaway Park - 24-hour Average	$PM_{2.5}$	TSP
	µg/m³	µg/m³
Minimum	0.95	1.57
Minimum (Non-Zero)	0.95	1.57
Average	9.06	23.51
Median	6.17	20.48
Maximum	50.63	66.96
Standard Deviation	9.88	13.98
Number Obs	29	29
Expected Obs	30	30
% Complete	95.7%	92.5%

	Number of Hours Above Criteria		$PM_{2.5}$	TSP
10% of 24-hour AAAQO	26	24	3	10
1/3 of 24-hour AAAQO	7	7	10	33
2/3 of 24-hour AAAQO	2	1	19	67
Above 24-hour AAAQO	2	0	29	100

PM_{10} 24-hour Average Criteria is based on the British Columbia Air Quality Objective

Notes:
- Calaway Park Station Installed for Season

Summary of Springbank Airport Meteorlogical Monitoring for June 2023

Springbank Airport	Wind Speed	Wind Direction	Temperature	Relative Humidity	Barometric Pressure
	m/s	Deg. From North	°C	%	kPa
Minimum	1.11		0.9	21.0	86.0
Minimum (Non-Zero)	1.11			21.0	86.0
Average	4.20	311.5 (NW)	14.4	67.6	87.8
Median	3.61		13.9	69.0	87.9
Maximum	12.78		28.8	100.0	88.4
Standard Deviation	2.32		6.51	22.69	0.510
Number Obs	648	648	720	720	720
Expected Obs	720	720	720	720	720
% Complete	90.0%	90.0%	100.0%	100.0%	100.0%
Calm Hours	0				

Notes:
- Hourly data obtained from Environment and Climate Change Canada for the climate station at the Springbank Airport

Summary of Regional and Project PM2.5 Monitoring for June 2023

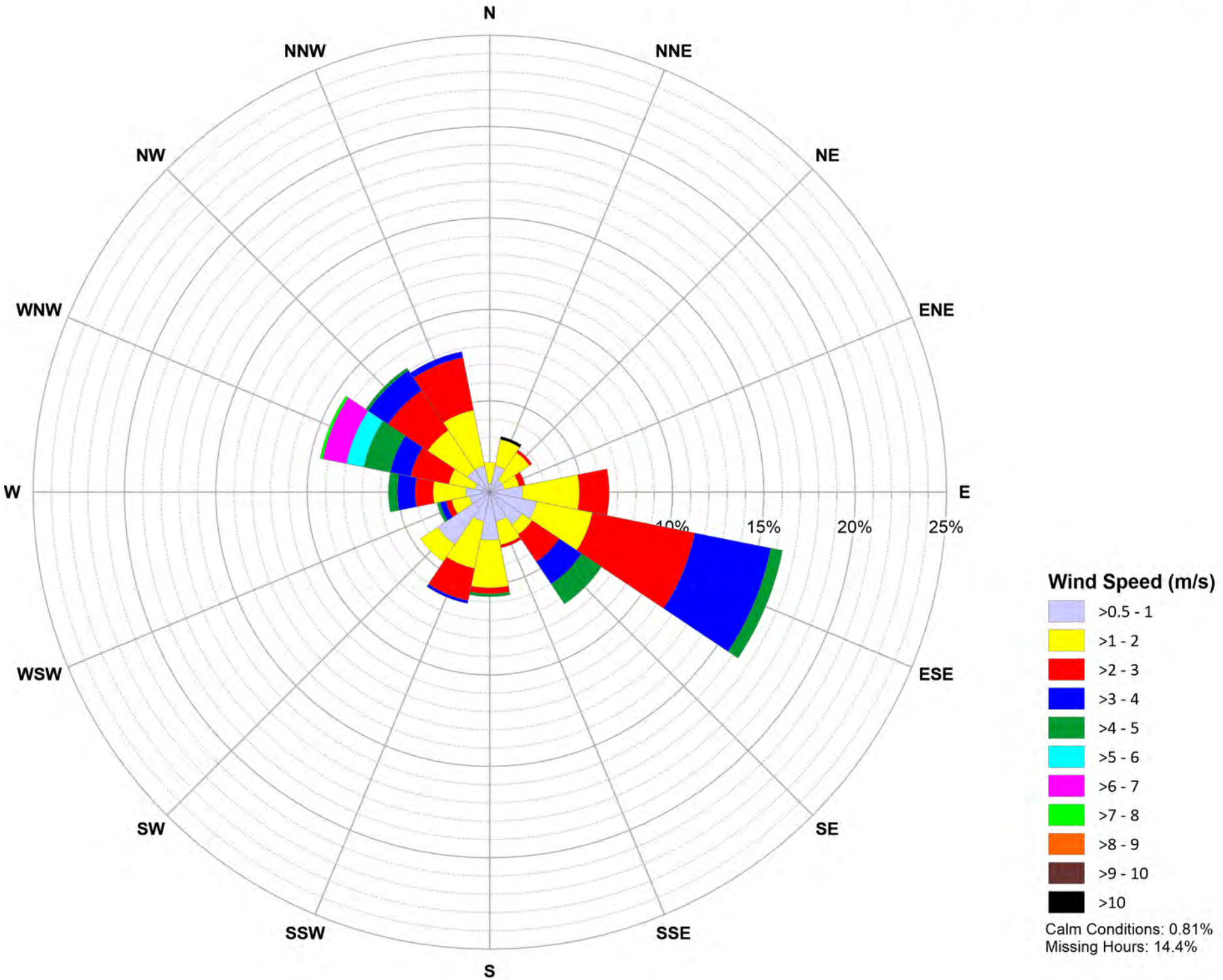
	CRAZ 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 1-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	0.36	-0.33	-2.24	0.59	-3.24	0.00	0.00	0.00	0.00
Minimum (Non-Zero)	0.36	-0.33	-2.24	0.59	-3.24	1.00	1.00	1.00	1.00
Average	15.64	13.94	12.77	13.48	31.29	10.67	9.90	11.09	9.22
Median	10.15	9.35	8.38	8.10	9.75	8.00	7.00	7.00	6.00
Maximum	**157.52**	**153.82**	**226.89**	**121.73**	**1,525.02**	**112.00**	**106.00**	**117.00**	**106.00**
Standard Deviation	22.84	17.92	19.19	16.73	**101.15**	13.79	13.54	15.34	14.06
Number Obs	698	718	693	712	683	605	652	695	689
Expected Obs	720	720	720	720	720	720	720	720	720
% Complete	96.9%	99.7%	96.3%	98.9%	94.9%	84.0%	90.6%	96.5%	95.7%

Notes:
- 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

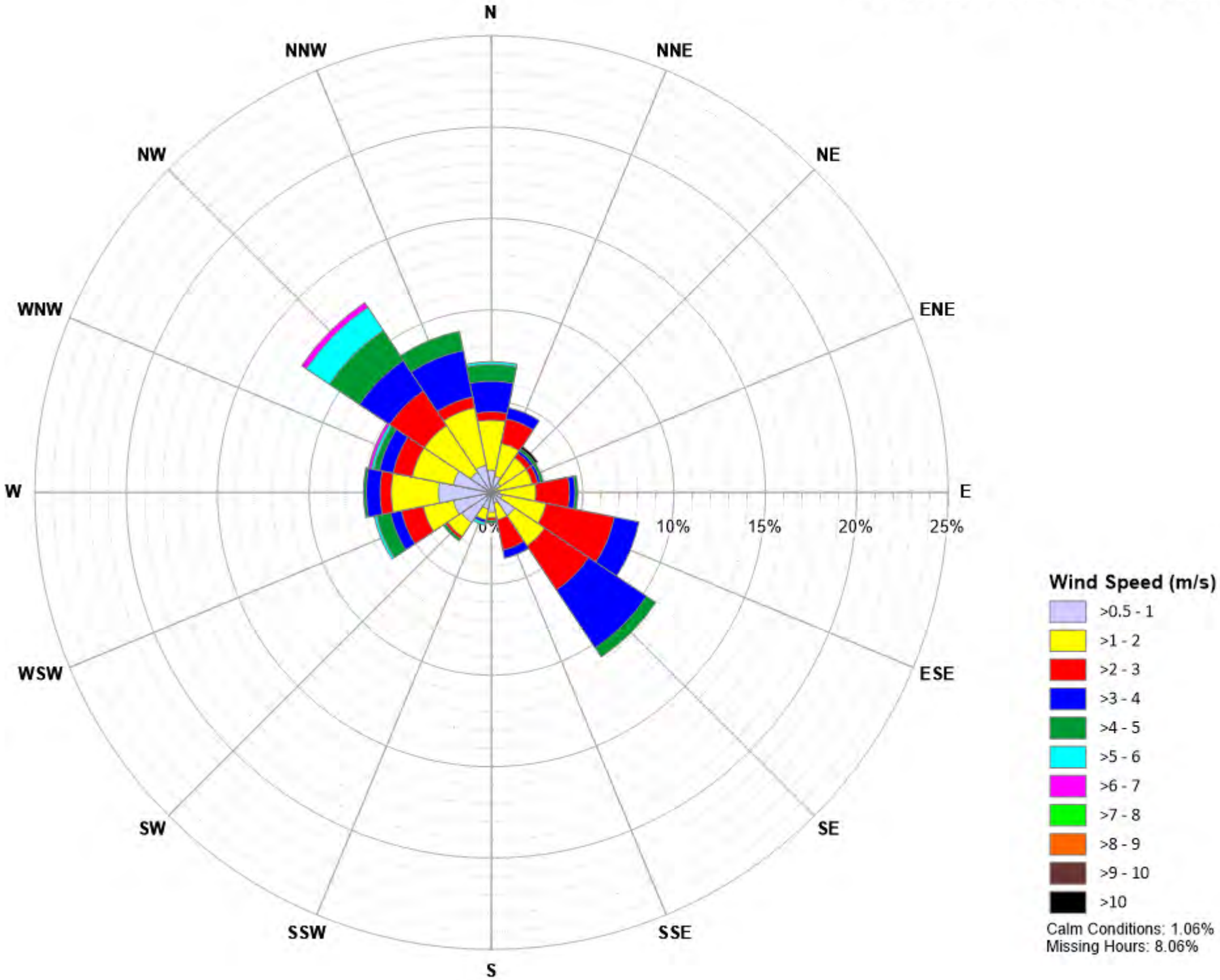
	CRAZ 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations					SR1 EBAM 24-hour Average $PM_{2.5}$ ($\mu g/m^3$) Concentrations			
Statistic	**Calgary SE**	**Calgary Central**	**Calgary NW**	**Airdrie**	**High River**	**Site 1**	**Site 2**	**Site 3**	**Calaway Park**
Minimum	2.12	1.17	-1.25	1.91	2.07	3.48	1.08	1.78	0.95
Minimum (Non-Zero)	2.12	1.17	-1.25	1.91	2.07	3.48	1.08	1.78	0.95
Average	14.36	13.94	12.25	13.44	22.08	11.43	10.21	11.11	9.06
Median	11.55	11.30	8.55	8.95	10.57	8.35	7.59	8.79	6.17
Maximum	**86.32**	**58.76**	**55.11**	**61.25**	**126.50**	**48.54**	**49.08**	**53.67**	**50.63**
Standard Deviation	15.84	12.27	12.59	11.93	27.95	9.52	9.90	10.13	9.88
Number Obs	28	30	28	30	28	23	25	30	29
Expected Obs	30	30	30	30	30	30	30	30	30
% Complete	93.3%	100.0%	93.3%	100.0%	93.3%	76.7%	83.3%	100.0%	96.7%

Notes:
- 24-hour averages calculated from 1-hour Average $PM_{2.5}$ data obtained from the Calgary Region Air Zone (CRAZ) website

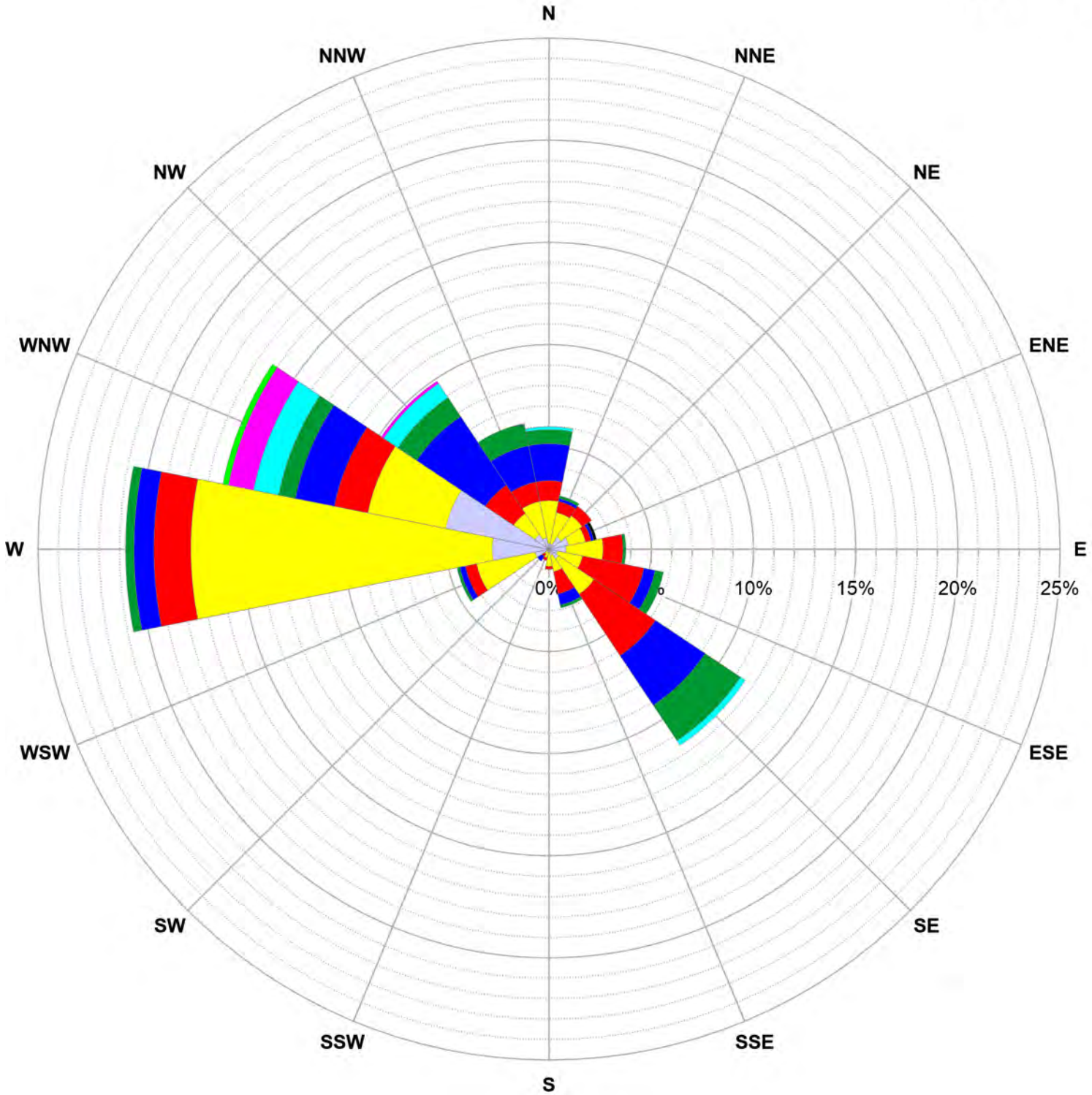
June 2023 Site 1 Wind Rose



June 2023 Site 2 Wind Rose



June 2023 Site 3 Wind Rose

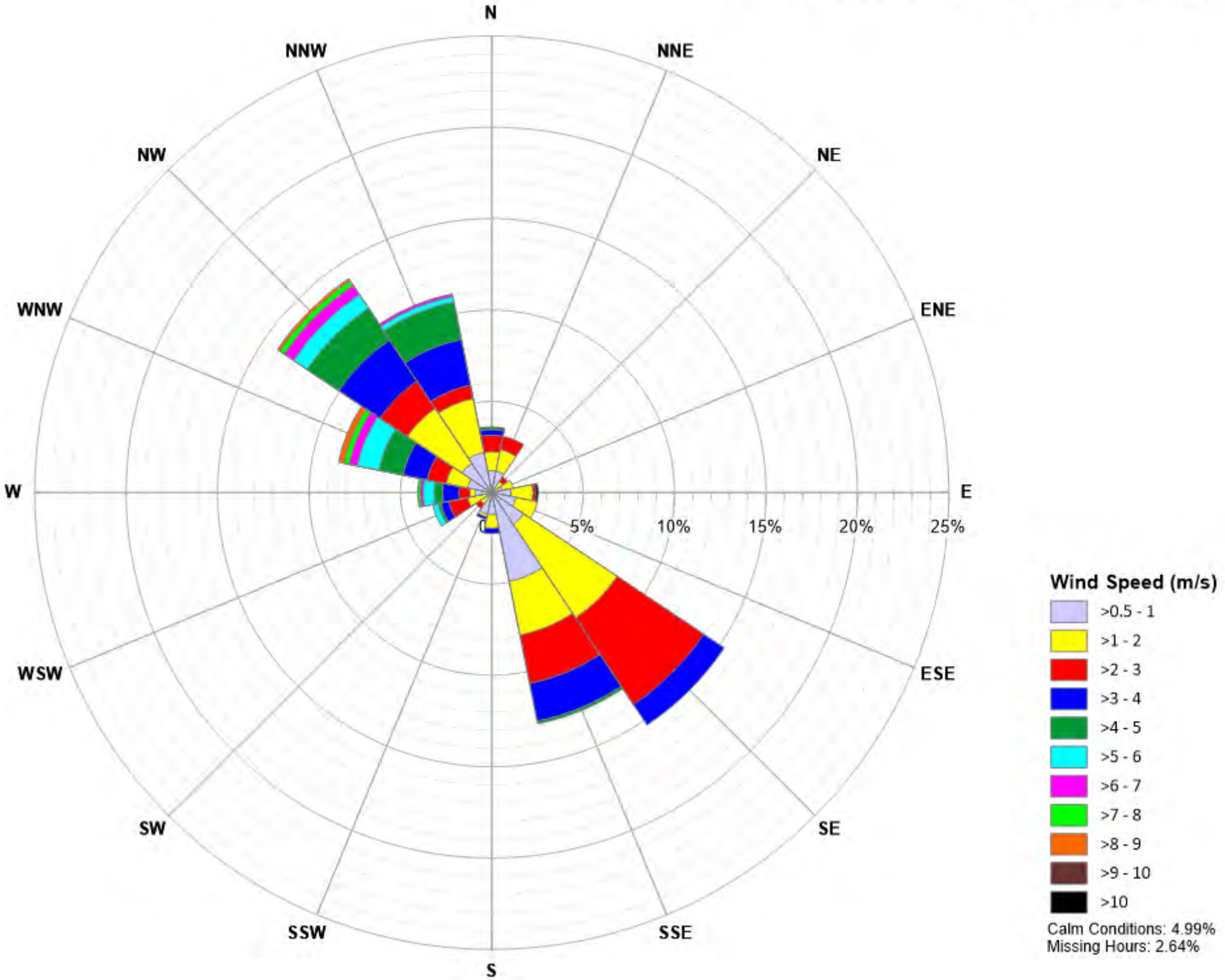


Wind Speed (m/s)

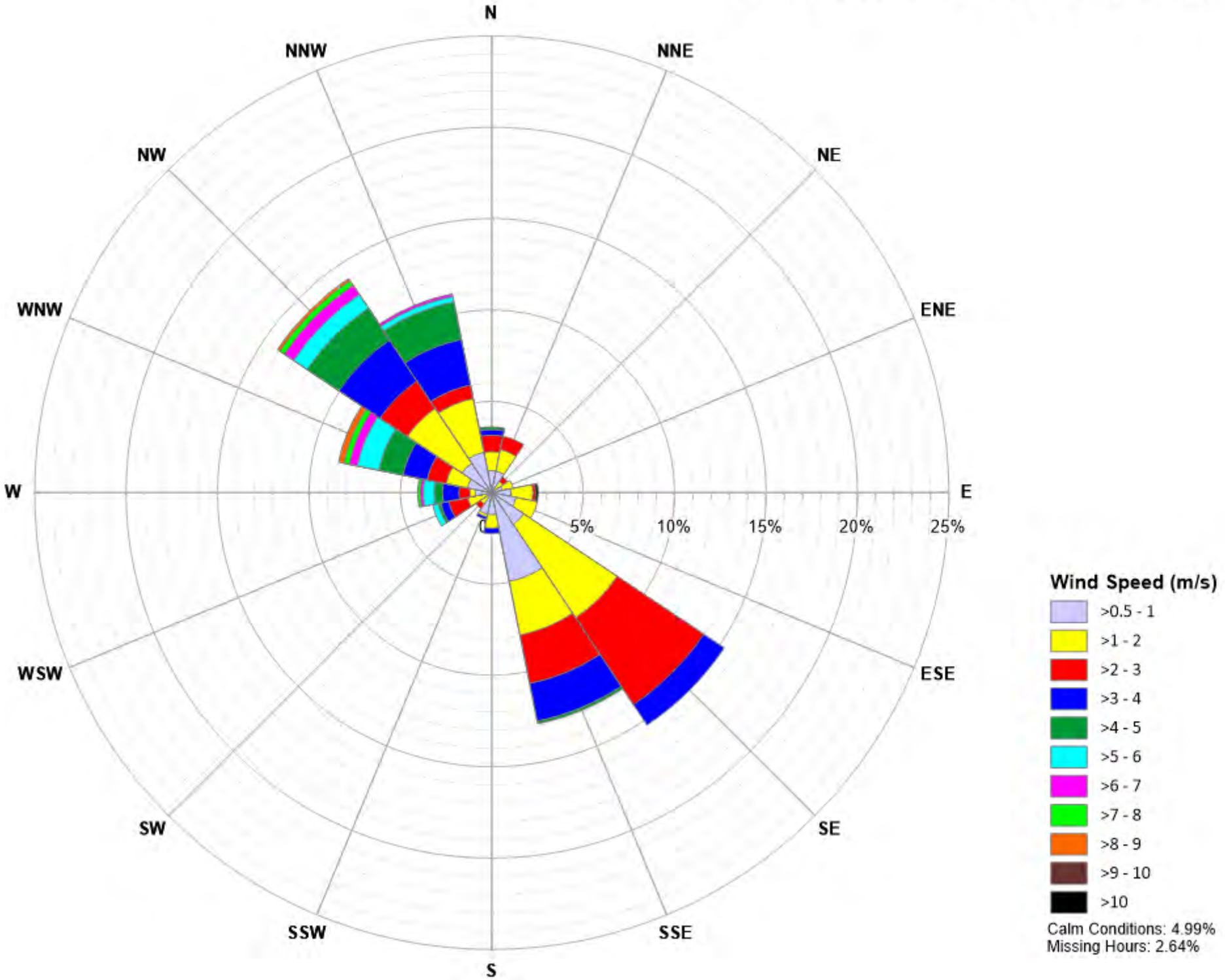
- >0.5 - 1
- >1 - 2
- >2 - 3
- >3 - 4
- >4 - 5
- >5 - 6
- >6 - 7
- >7 - 8
- >8 - 9
- >9 - 10
- >10

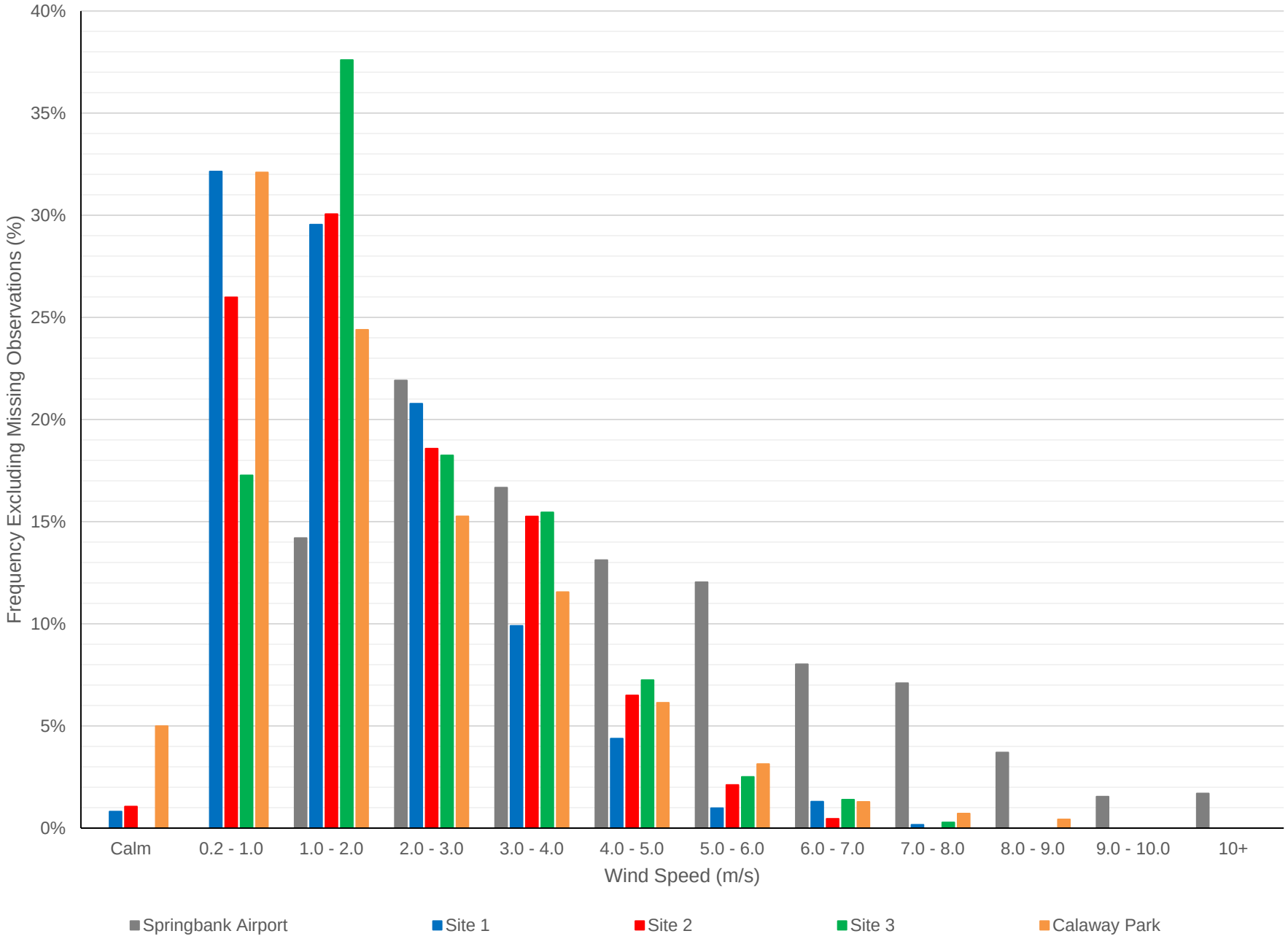
Calm Conditions: 0.00%
Missing Hours: 0.28%

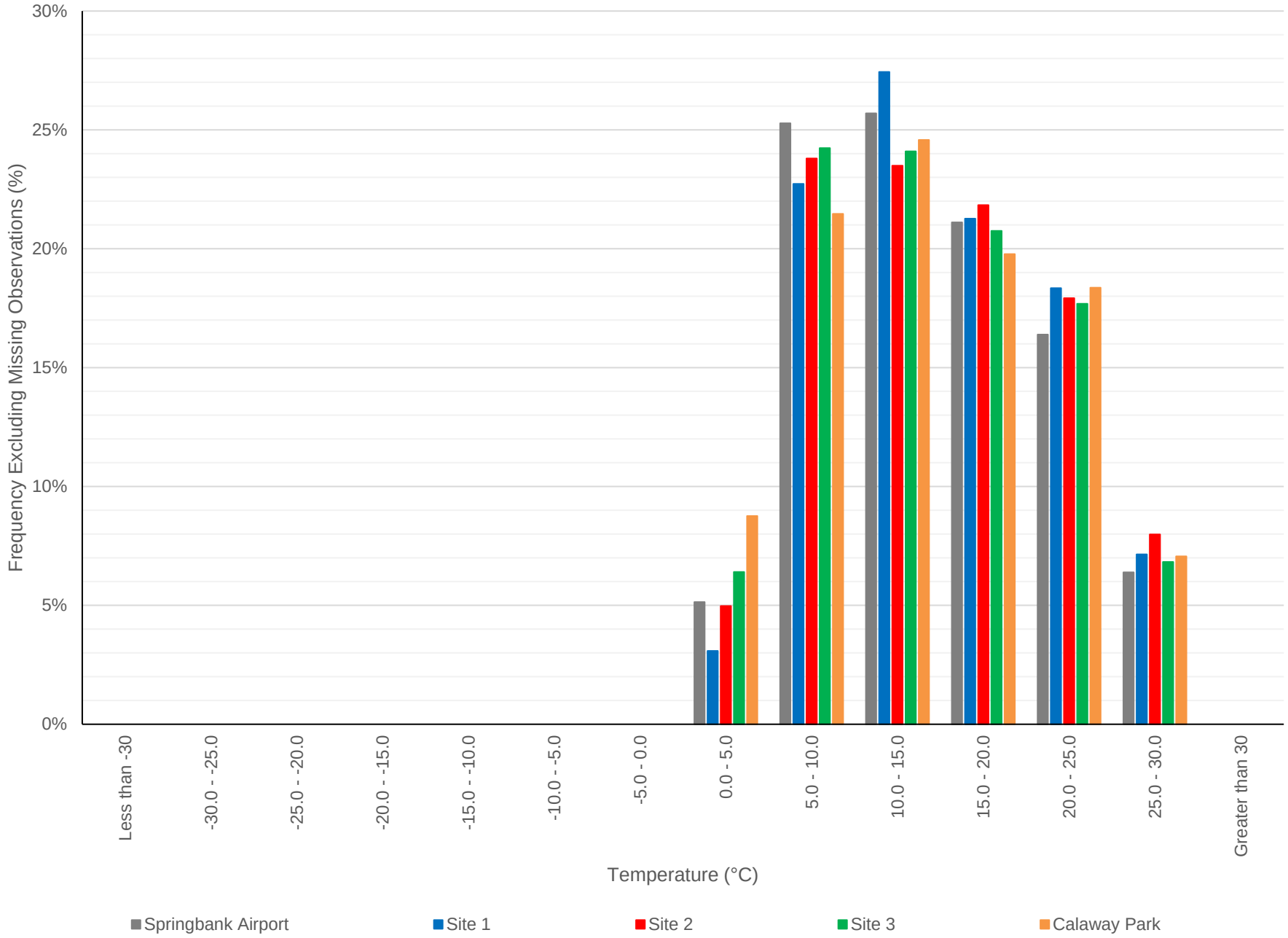
June 2023 Calaway Park Wind Rose

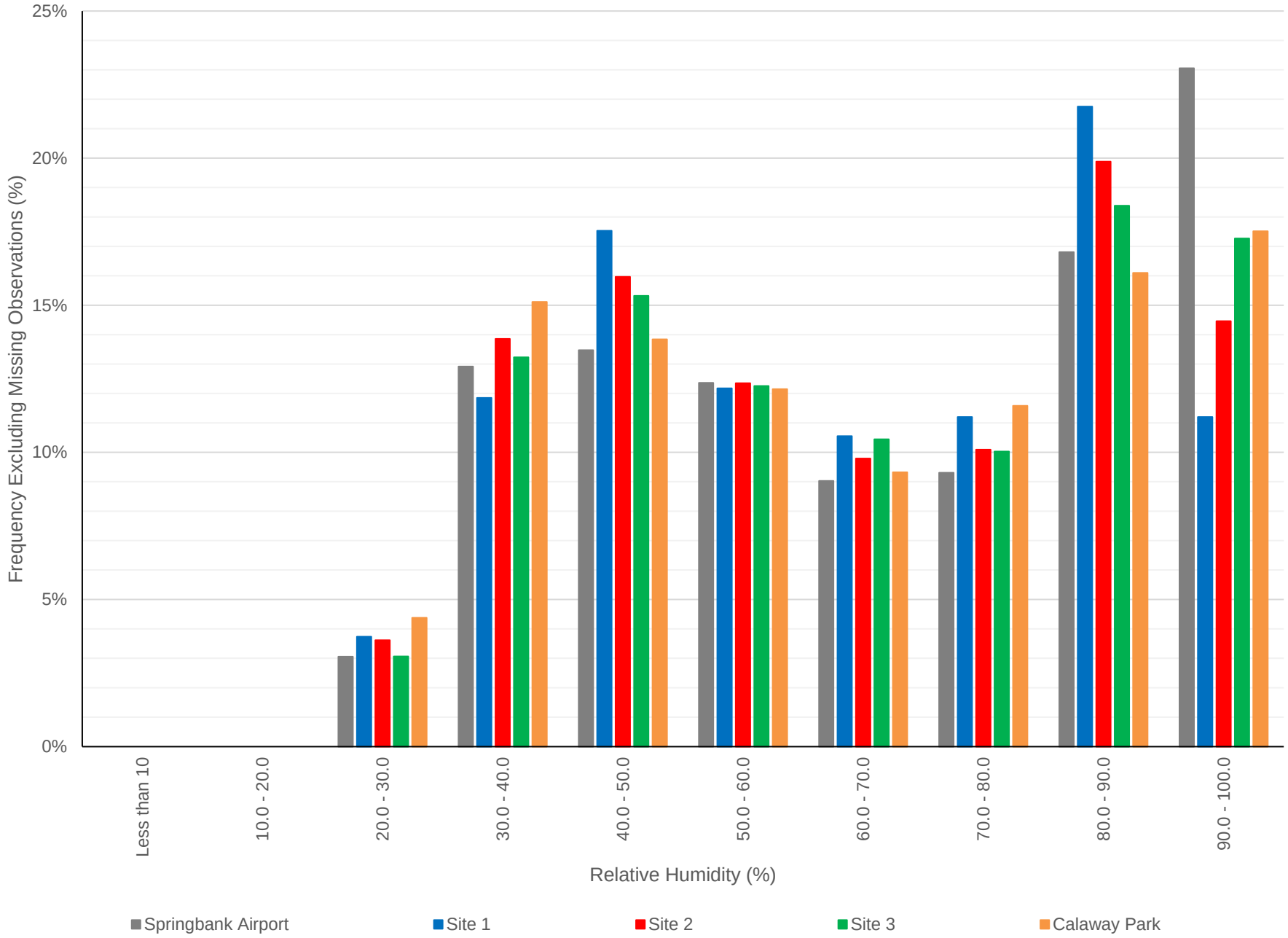


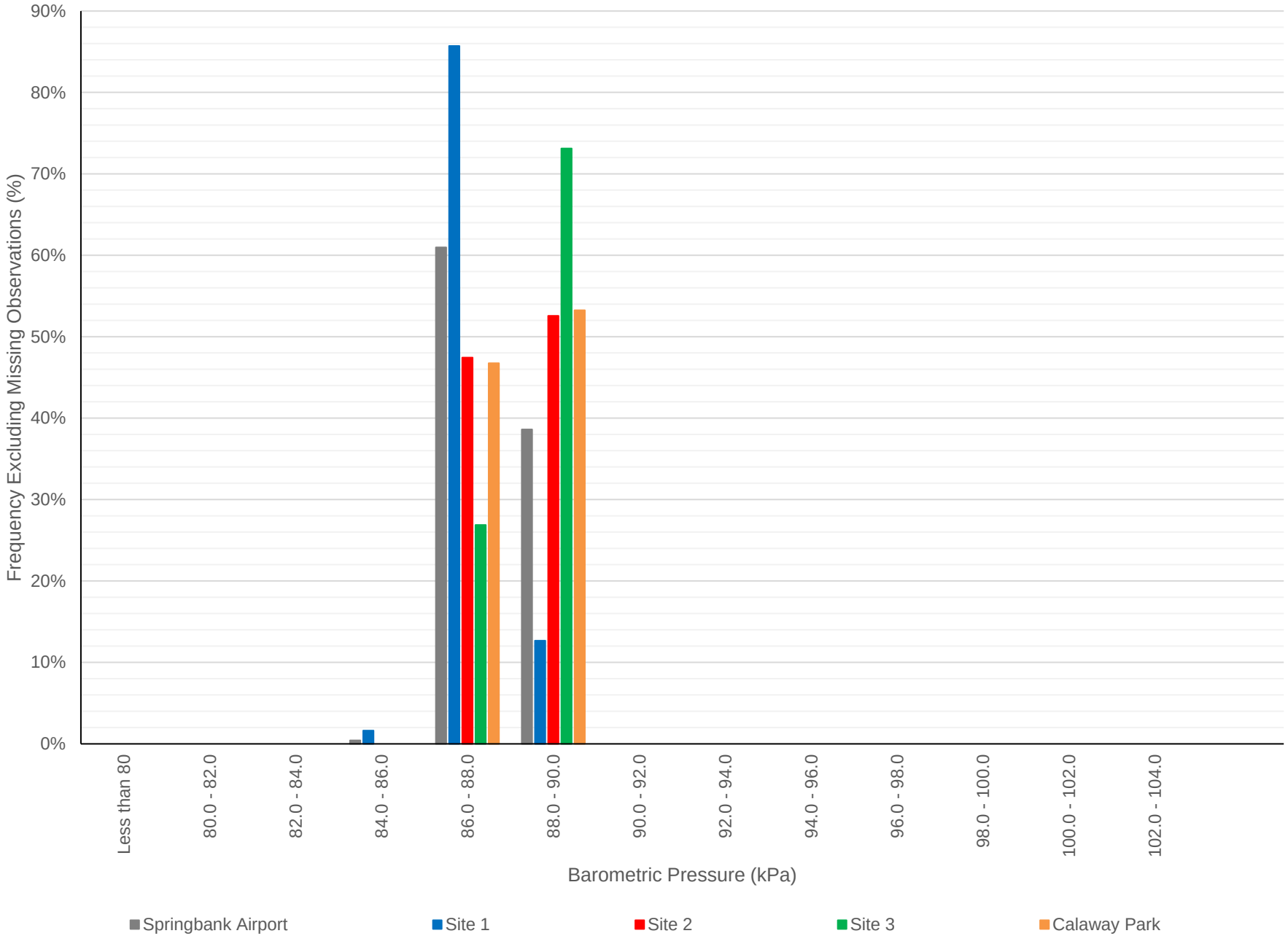
June 2023 Calaway Park Wind Rose

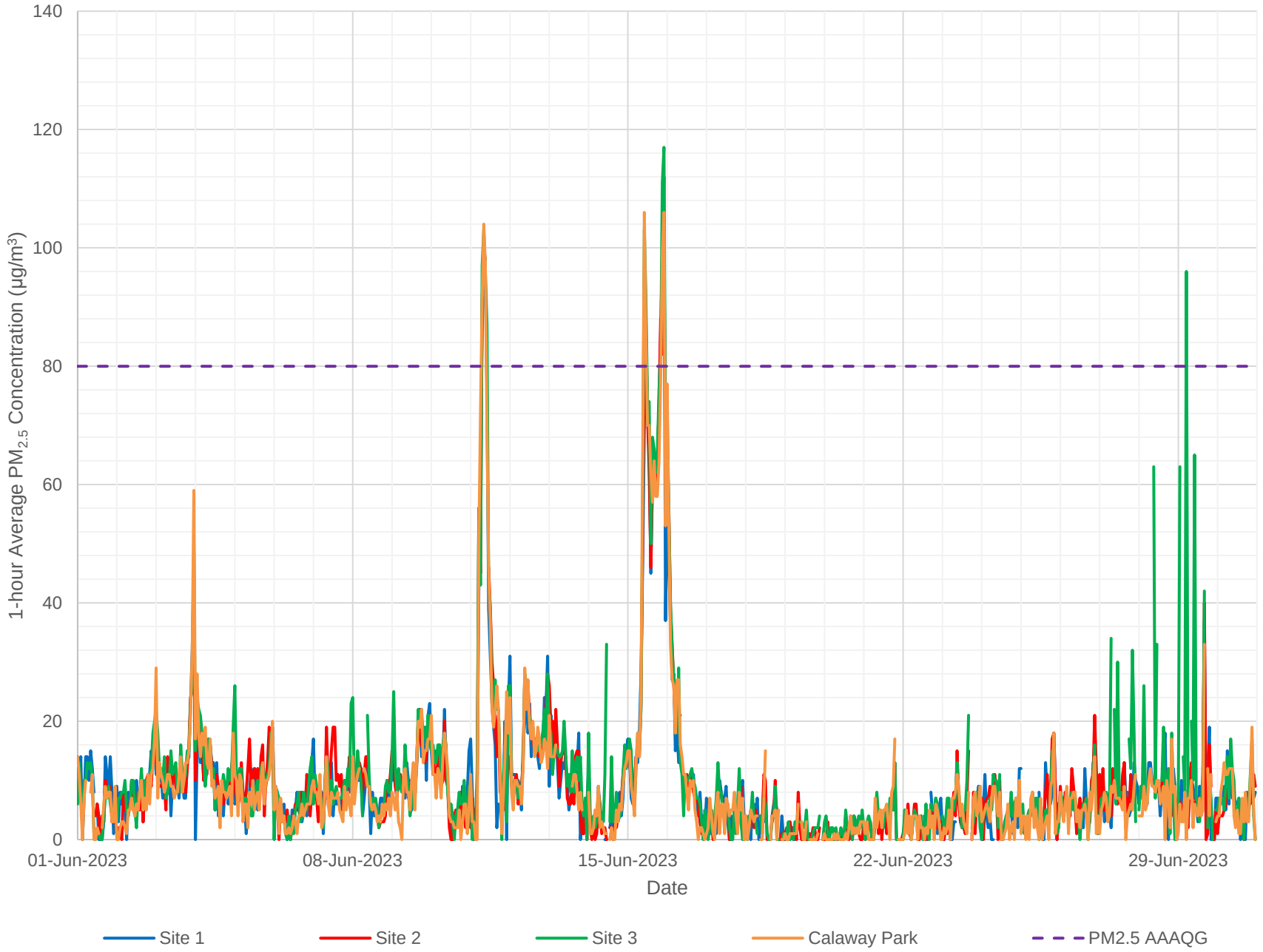


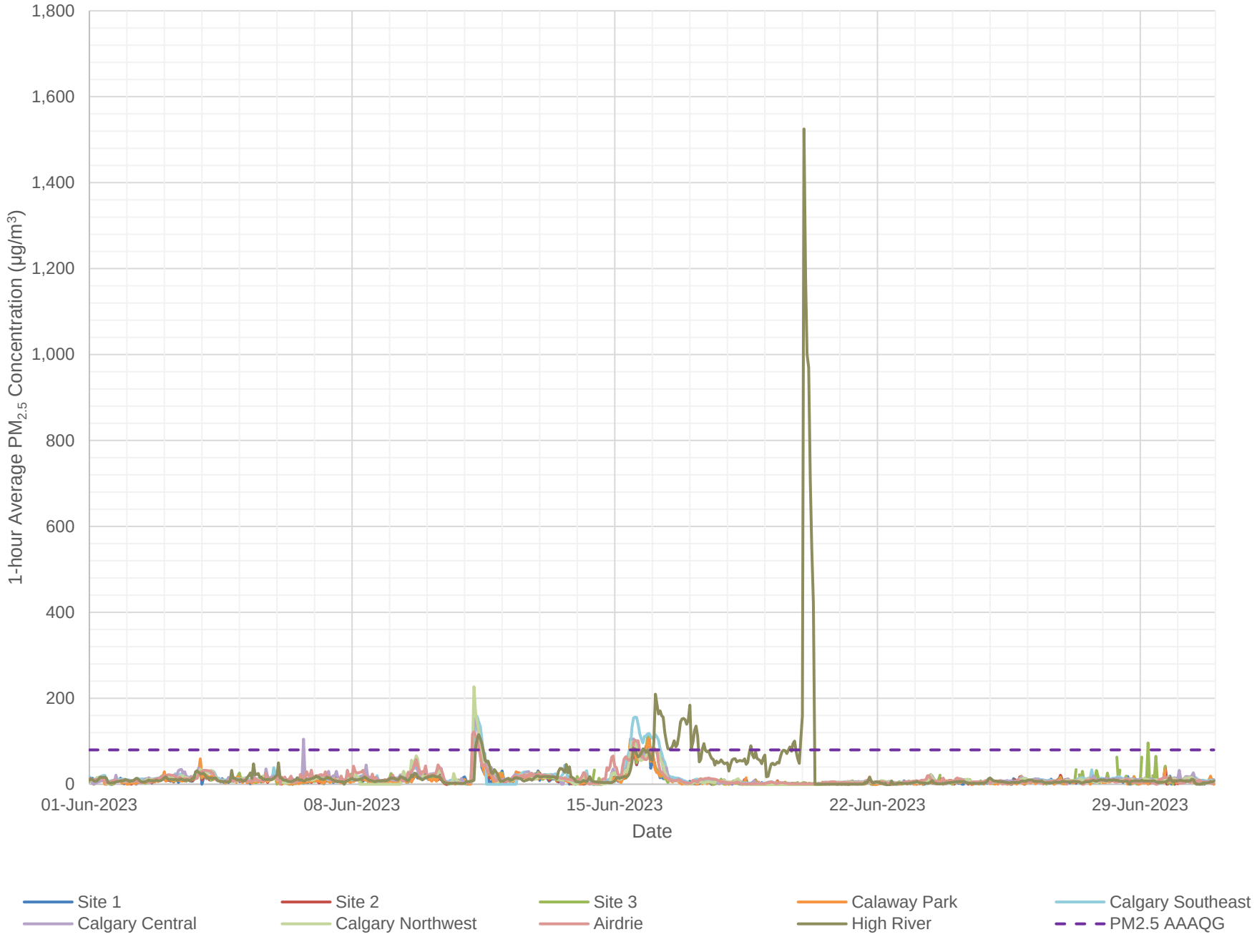

40%
35%
30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Calm
0.2 - 1.0
1.0 - 2.0
2.0 - 3.0
3.0 - 4.0
4.0 - 5.0
5.0 - 6.0
6.0 - 7.0
7.0 - 8.0
8.0 - 9.0
9.0 - 10.0
10+
Wind Speed (m/s)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

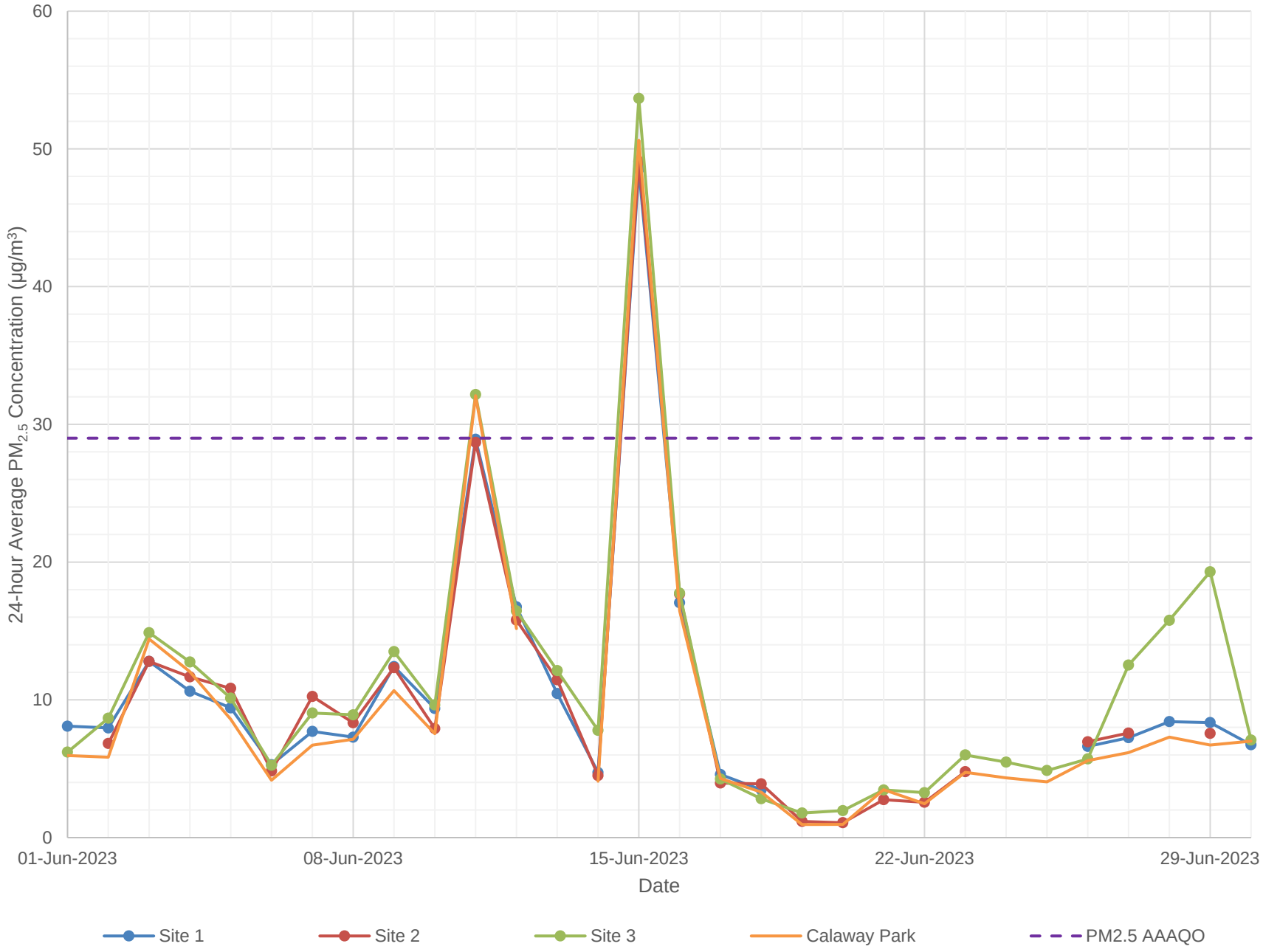

30%
25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than -30
-30.0 - -25.0
-25.0 - -20.0
-20.0 - -15.0
-15.0 - -10.0
-10.0 - -5.0
-5.0 - 0.0
0.0 - 5.0
5.0 - 10.0
10.0 - 15.0
15.0 - 20.0
20.0 - 25.0
25.0 - 30.0
Greater than 30
Temperature (°C)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

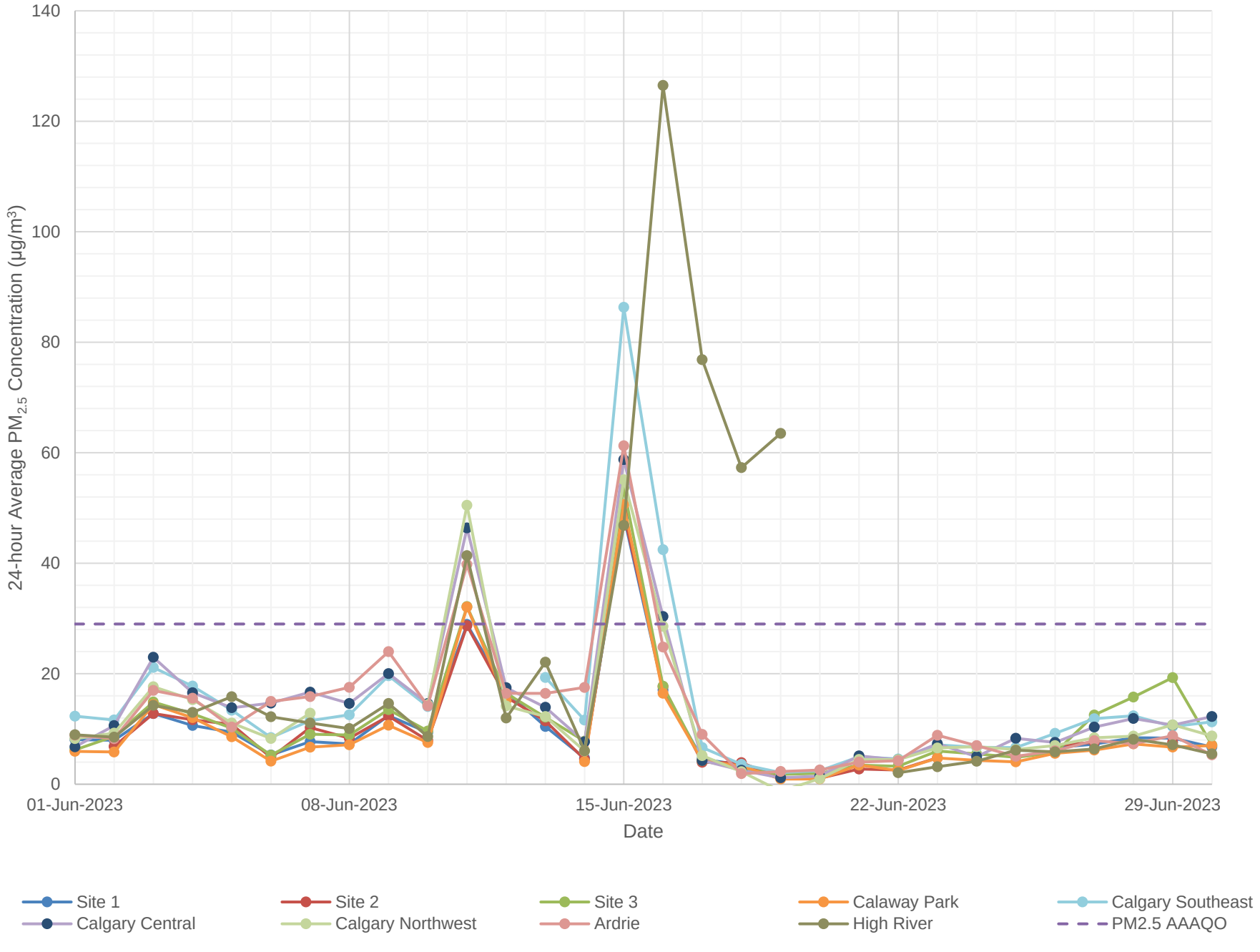

25%
20%
15%
10%
5%
0%
Frequency Excluding Missing Observations (%)
Less than 10
10.0 - 20.0
20.0 - 30.0
30.0 - 40.0
40.0 - 50.0
50.0 - 60.0
60.0 - 70.0
70.0 - 80.0
80.0 - 90.0
90.0 - 100.0
Relative Humidity (%)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

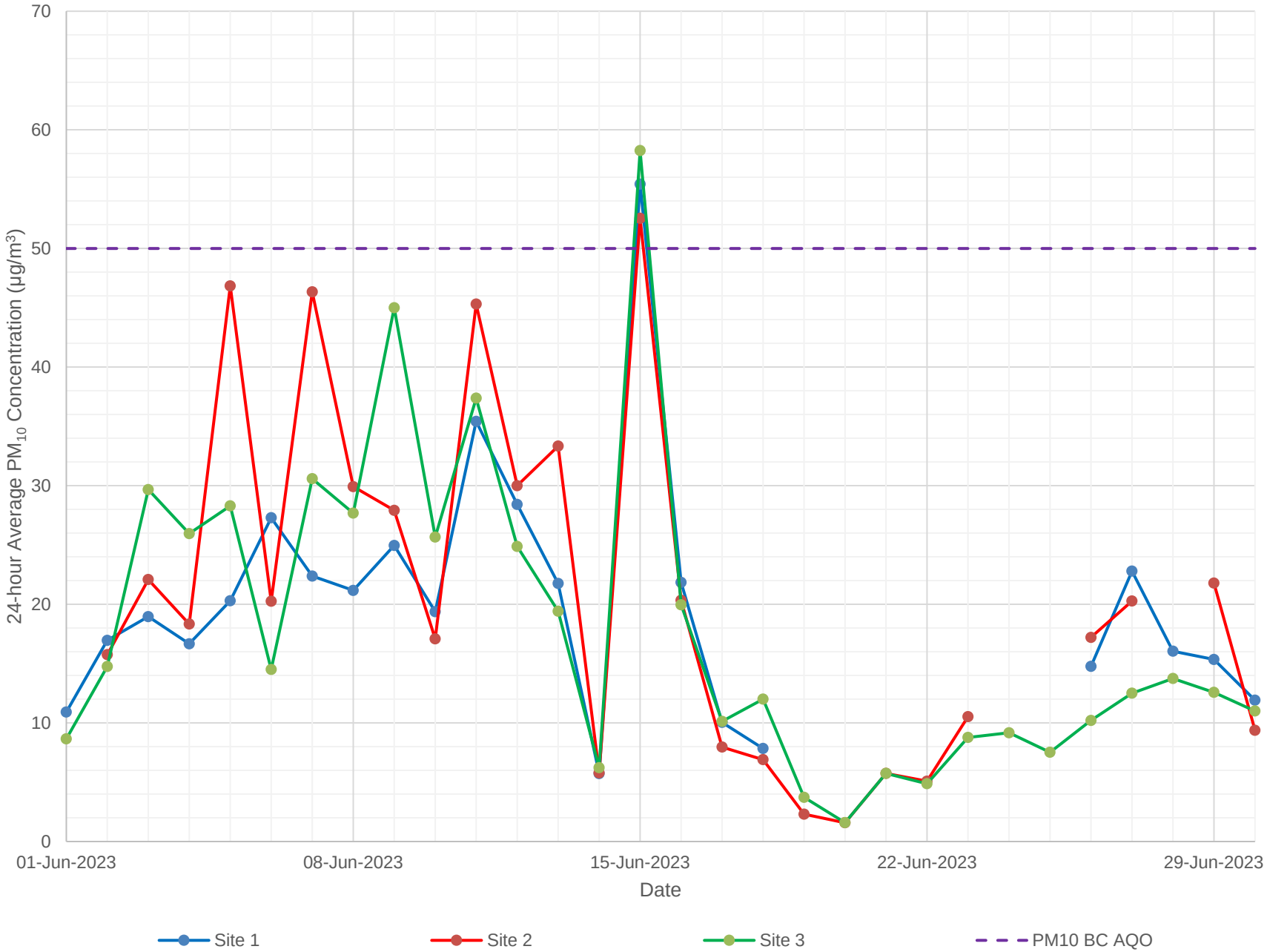

90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Frequency Excluding Missing Observations (%)
Less than 80
80.0 - 82.0
82.0 - 84.0
84.0 - 86.0
86.0 - 88.0
88.0 - 90.0
90.0 - 92.0
92.0 - 94.0
94.0 - 96.0
96.0 - 98.0
98.0 - 100.0
100.0 - 102.0
102.0 - 104.0
Barometric Pressure (kPa)
Springbank Airport
Site 1
Site 2
Site 3
Calaway Park

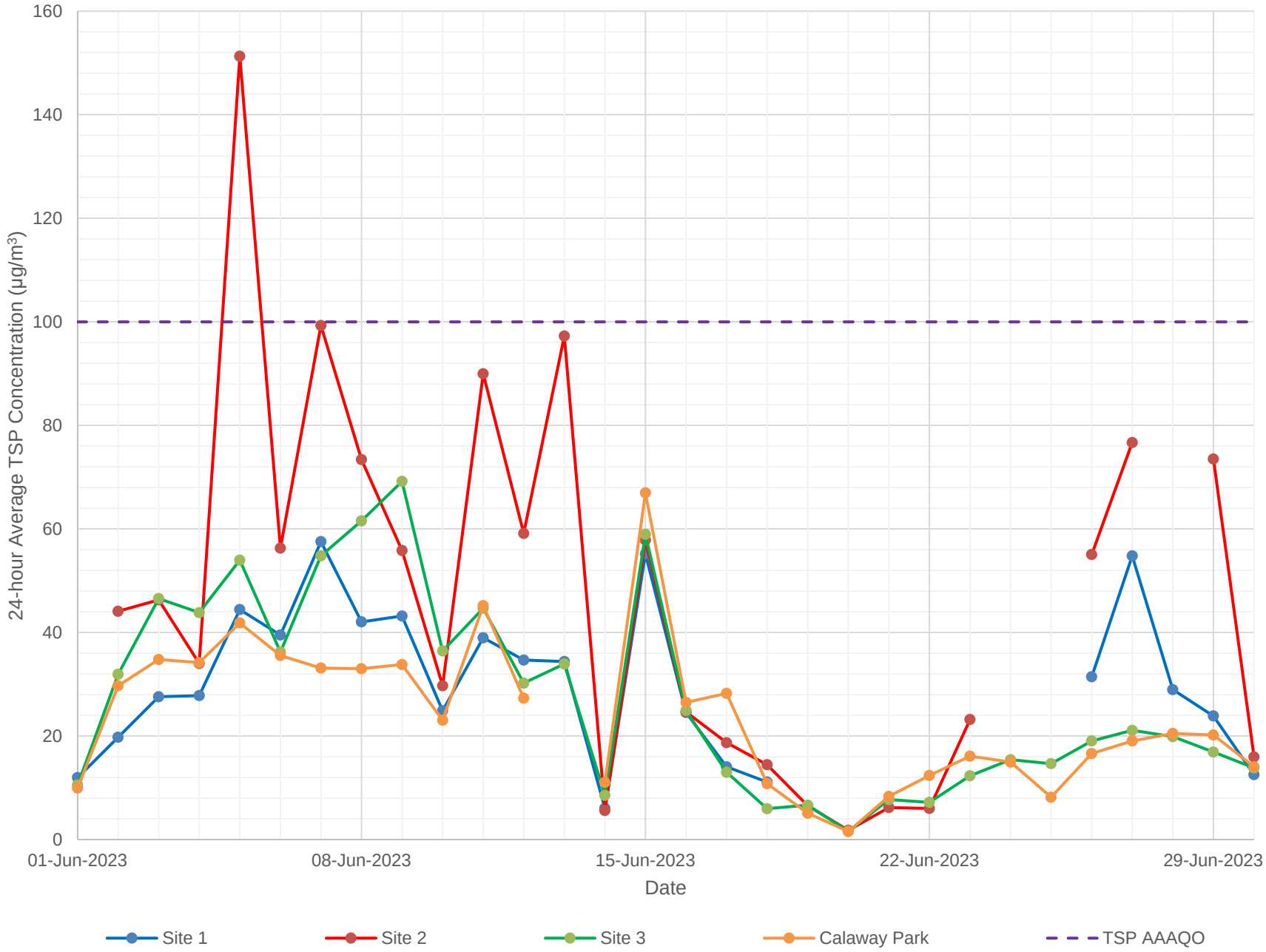

140
120
100
80
60
40
20
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2023
08-Jun-2023
15-Jun-2023
22-Jun-2023
29-Jun-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQG


1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
1-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2023
08-Jun-2023
15-Jun-2023
22-Jun-2023
29-Jun-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Airdrie
High River
PM2.5 AAAQG


60
50
40
30
20
10
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2023
08-Jun-2023
15-Jun-2023
22-Jun-2023
29-Jun-2023
Date
Site 1
Site 2
Site 3
Calaway Park
PM2.5 AAAQO


140
120
100
80
60
40
20
0
24-hour Average PM2.5 Concentration (µg/m3)
01-Jun-2023
08-Jun-2023
15-Jun-2023
22-Jun-2023
29-Jun-2023
Date
Site 1
Site 2
Site 3
Calaway Park
Calgary Southeast
Calgary Central
Calgary Northwest
Ardrie
High River
PM2.5 AAAQO


70
60
50
40
30
20
10
0
24-hour Average PM10 Concentration (µg/m3)
01-Jun-2023
08-Jun-2023
15-Jun-2023
22-Jun-2023
29-Jun-2023
Date
Site 1
Site 2
Site 3
PM10 BC AQO


160
140
120
100
80
60
40
20
0
24-hour Average TSP Concentration (µg/m³)
01-Jun-2023
08-Jun-2023
15-Jun-2023
22-Jun-2023
29-Jun-2023
Date
Site 1
Site 2
Site 3
Calaway Park
TSP AAAQO

APPENDIX C
IAAC CONDITION 12.1 AND 12.2

IAAC condition 12.1: *The Proponent shall submit to the Agency a schedule for all conditions set out in this Decision Statement no later than 60 days prior to the start of construction. This schedule shall detail all activities planned to fulfill each condition set out in this Decision Statement and the commencement and estimated completion month(s) and year(s) for each of these activities.*
IAAC condition 12.4: *The Proponent shall provide Indigenous groups with the schedules referred to in conditions 12.1 and 12.2, and any update to the initial schedule made pursuant to condition 12.3 at the same time the Proponent provides these documents to the Agency.*

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Definitions and General Conditions	**1.1 to 1.37**	Definitions	N/A	N/A
	2.1 to 2.3	General conditions	N/A	N/A
Consultation	**2.4.1, 2.4.3, 2.4.4, 2.5**	Consultation conditions	08-Jul-21	No end date
	2.4.2	Provide all information available and relevant to the scope and subject matter - not to be less than 30 days for consultation pertaining to current use of lands and resources for traditional purposes, physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance, and species at risk, and not less than 15 days for other consultation activities	As required	As required
Follow-up requirements	**2.6, 2.7, 2.9**	Follow-up requirements (see conditions)	As required	As required
	2.8	The Proponent shall also provide any update made pursuant to condition 2.7 to the Agency and to the party or parties being consulted during the development of each follow-up program within 30 days of the follow-up program being updated.	within 30 days of the follow-up program being updated	
	2.10	Where consultation with Indigenous groups is a requirement of a follow-up program, the Proponent shall discuss the follow-up program with each group and shall determine, in consultation with each group, opportunities for their participation in the implementation of the follow-up program, including the conduct of monitoring, the analysis and reporting of follow-up results and whether modified or additional mitigation measure(s) are required, as set out in condition 2.9	2019	As required
Annual reporting	**2.11**	The Proponent shall prepare an annual report that sets out, for that reporting year (see sub-sections 2.11.1 - 2.11.8)	Annual report; due by October 31	
	2.12	The first reporting year for which the Proponent shall prepare an annual report pursuant to condition 2.11 shall start on the day the Minister of the Environment issues the Decision Statement to the Proponent pursuant to subsection 54 (1) of the *Canadian Environmental Assessment Act, 2012*.	08-Jul-22	Jun-2022
	2.13	The Proponent shall submit to the Agency and the First Nation Land Use Committee referred to in condition 8.11 the annual report referred to in condition 2.11, including a plain language executive summary in both official languages, no later than October 31 following the reporting year to which the annual report applies.	October 31 of each year	
Information Sharing	**2.14**	The Proponent shall keep these documents publicly available for 15 years following their publication	15 year period from issue date	
	2.15	When the development of any plan is a requirement of a condition set out in this Decision Statement, the Proponent shall submit the plan to the Agency prior to construction	N/A	Feb-2022
Change in Proponent	**2.16**	The Proponent shall notify the Agency and Indigenous groups in writing no later than 30 days after the day on which there is any transfer of ownership, care, control of Management of the Designated Project in whole or in part	30 days from transfer date	
Change to the Designated Project	**2.17.1 - 2.17.3**	If the Proponent is proposing to carry out the Designated Project in a manner other than described in condition 1.5, the Proponent shall notify the Agency in writing in advance.	As required	
	2.18	The Proponent shall submit to the Agency any additional information required by the Agency about the proposed change(s) referred to in condition 2.18, which may include the results of consultation with Indigenous groups and relevant authorities on the proposed change(s) and environmental effects referred to in condition 2.18.1 and the modified or additional mitigation measures and follow-up requirements referred to in condition 2.18.2	As required	

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Fish and fish habitat	**3.1**	The Proponent shall develop, prior to construction, and implement and maintain during all phases of the Designated Project, measures to control erosion and sedimentation within the project development area in a manner consistent with the *Fisheries Act* and its regulations. See 3.1.1 to 3.16 for additional conditions.	Dec-2021	Feb-2022
	3.1.1 - 3.1.6	See specific conditions on what the Proponent shall do in terms of physical structures or activities relating to sediment and erosion protection	Feb-2022	Oct-2025
	3.2 - 3.8	See specific conditions on physical activities the Proponent shall so during construction	Feb-2022	Oct-2025
	3.9	The Proponent shall finalize, prior to construction, in consultation with Indigenous groups and to the satisfaction of Fisheries and Oceans, an offsetting plan related to the bull trout (*Salvenlinus confluentus*) and the fish population of the Elbow River. When finalizing the plan, the Proponent shall include the adaptive offset measures approach proposed in its Conceptual Offset Measures Plan (Canadian Impact Assessment Registry Reference Number 80123, Document Number 1366). The Proponent shall implement the plan. The Proponent shall submit any approved offsetting plan(s) to the Agency prior to implementation.	Jul-2021	Feb-2022
	3.10	The Proponent shall, for any fish habitat offsetting measure(s) proposed in any offsetting plan(s) referred to in condition 3.9 that may cause adverse environmental effects not considered in the environmental assessment, develop and implement measures to mitigate those effects. The Proponent shall submit these measures to the Agency before implementing them.	Q1 2022	Oct-2022
	3.11 - 3.15	See specific conditions on physical activities the Proponent shall do during and install construction specific to working in water (i.e. debris removal, maintain fish passage, rock v-weir, temporary water intake system, graded drainage)	Feb-2022	Oct-2025
	3.16	The Proponent shall develop and implement, prior to operation, a protocol to rescue juvenile and adult fish during post-flood operation. See 3.16.1 to 3.16.4 for conditions specific to the protocol.	2020	Spring 2024
	3.17	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to fish passage in the Elbow River. See 3.17.1 to 3.17.3 for conditions to be included in the program.	Spring 2021	Spring 2024
	3.18	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to fish rescue. See 3.18.1 to 3.18.2 for conditions to be included in the program.	2020	Spring 2024
	3.19	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to water quality. See sub-sections 3.19.1 to 3.19.6 for conditions to be included in the program.	2019	Spring 2024
	3.20	The Proponent shall develop and implement a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to channel morphology. As part of the follow-up program, the Proponent shall monitor channel morphology of the Elbow River and outlet channel during post-flood operation.	Fall 2021	As required
Migratory Birds	**4.1 - 4.3**	The Proponent shall carry out the Designated Project in a manner that protects migratory birds and avoids harming, killing or disturbing migratory birds or destroying, disturbing or taking their nests or eggs. In this regard, the Proponent shall take into account Environment and Climate Change Canada's *Guidelines to reduce risk to migratory birds*. The Proponent's actions when carrying out the Designated Project shall be in compliance with the *Migratory Birds Convention Act, 1994, the Migratory Birds Regulations and with the Species at Risk Act.*	Feb-2022	As required
	4.2	The Proponent shall give preference to the use of existing access roads and disturbed areas for temporary workspaces and transportation activities over building new access roads and temporary workspace in undisturbed areas, and shall revegetate any area where native vegetation was removed for temporary workspace.	Feb-2022	May-2025
	4.3	The Proponent shall control the lighting required for Designated Project activities throughout all phases of the Designated Project, including its direction, duration of use, intensity, spectrum colour and brightness, to mitigate the adverse effects of the Designated Project on migratory birds and species at risk caused by sensory disturbances due to light, while complying with operational health and safety requirements.	Feb-2022	May-2025

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Migratory Birds (cont'd)	**4.4**	The Proponent shall identify, in consultation with Indigenous groups and relevant authorities, dates of breeding season for migratory birds and notify the Agency of these dates prior to construction.	Fall 2021	Feb-2022
	4.5	The Proponent shall develop, prior to construction, in consultation with Environment and Climate Change Canada and taking into account Environment and Climate Change Canada's *Description of Residence for bank swallow (Riparia riparia) in Canada*, measures to mitigate the adverse environmental effects on bank swallow (*Riparia riparia*) attributed to the Designated Project. The Proponent shall establish a schedule for the implementation of the measures and shall, as part of these measures: see specific conditions (4.5.1 - 4.5.4)	Fall 2021	Feb-2022
	4.5.1	maintain foraging habitat within 500 metres of bank swallow residences. If it is not technically feasible for the Proponent to maintain a distance of 500 metres, the Proponent shall provide a rationale to relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid effects on bank swallow. The Proponent shall submit these measures to the Agency prior to implementing them;	Fall 2021	Feb-2022
	4.5.2	install, prior to construction, and in consultation with Environment and Climate Change Canada, artificial nesting structures in suitable habitat to compensate for the loss of nesting sites within the project development area and identified in Appendix H, Figure 3- 1, of the Environmental Impact Statement. The Proponent shall perform maintenance on the nesting structures annually and maintain their accessibility and integrity during all phases of the Designated Project and shall ensure the presence of foraging habitat within 500 metres of the artificial nesting structures. If it is not technically feasible for the Proponent to ensure the presence of foraging habitat within a distance of 500 metres, the Proponent shall provide a rationale to relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid effects on bank swallow. The Proponent shall submit these measures to the Agency prior to implementing them;	Fall 2021	Feb-2022
	4.5.3	maintain the slope of topsoil, soil and sediment stockpiles located within the project development area and not used as artificial nesting structures in accordance with condition 4.5.2 at less than 70 degrees; and	Feb-2022	Oct-2025
	4.5.4	demonstrate how any other offsetting measures implemented by the Proponent will compensate for the adverse environmental effects on bank swallow (*Riparia riparia*) attributed to the Designated Project in the project development area.	As required	
	4.6	The Proponent shall conduct vegetation removal, and any other activity that could potentially disturb migratory birds, within the project development area outside of the breeding season(s) for migratory birds identified in condition 4.4. If vegetation removal or the conduct of other disturbance activity outside of the breeding season(s) is not technically feasible during any given year, the Proponent shall develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid harm to migratory birds and their nests or eggs. The Proponent shall submit these measures to the Agency prior to implementing them.	Feb-2022	As required
	4.7	The Proponent shall remove debris in the off-stream reservoir within seven days after the draining of the reservoir. If it is not technically feasible for the Proponent to remove debris within seven days after the draining of the reservoir, the Proponent shall provide a rational to Indigenous groups and relevant authorities and develop and implement additional mitigation measures, in consultation with relevant authorities, to avoid harm to migratory birds and their nests or eggs. The Proponent shall submit these measures to the Agency prior to implementing them.	seven days after the draining of the reservoir	
	4.8	For any active migratory bird nests identified during construction or operation, the Proponent shall establish and implement, in consultation with relevant authorities, mitigation measures to avoid destroying, disturbing or taking the nest(s), including by implementing a disturbance setback buffer during construction and dry operation and by following the approach outlined in the Response to Information Request Round 2 Package 4 -01 to -04, IR4-03 (Canadian Impact Assessment Registry Reference Number 80123, Document Number 1311) during flood operation.	Feb-2022	As required
	4.9	The Proponent shall develop and implement, in consultation with Indigenous groups and relevant authorities, a protocol to prevent harm to migratory birds, including migratory birds species at risk identified in Table 3 of the environmental assessment report, within the project development area. The Proponent shall develop the protocol prior to construction and implement it prior to flood operation. The protocol shall include: 4.9.1 flood forecasting undertaken prior to inventories conducted in accordance with condition 4.10; and 4.9.2 measures to rescue migratory birds chicks and eggs.	Fall 2021	Feb-2022

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Migratory Birds (cont'd)	**4.10***	The Proponent shall conduct, in consultation with Indigenous groups, inventories of potential migratory bird habitat, including the collection of information on breeding bird densities and the presence of ground nesting birds, as well as mapping of important habitat features, shrub lands, wetlands and grassland within the project development area every five years starting the first year of operation, and update the migratory bird protocol referred to in condition 4.9 based on the results of the inventories.	Spring 2024	every 5 years from the 1st year of operation
	4.11	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of all mitigation measures to avoid harm to migratory birds, including migratory birds that are listed species at risk, their eggs and nests. The follow-up program shall include the mitigation measures used to comply with conditions 4.1 to 4.10. As part of the development of the follow-up program, the Proponent shall identify performance indicators that shall be used by the Proponent to evaluate the effectiveness of mitigation measures. The Proponent shall implement the follow-up program during all phases of the Designated Project. As part of the follow-up program, the Proponent shall: 4.11.1 monitor, annually during construction, for the first three years of operation and every five years thereafter, bank swallow use of the project development area.	Jun-2019	Feb-2022 for plan development
Species at Risk	**5.1**	The Proponent shall conduct pre-construction surveys to determine the presence of little brown myotis (*myotis lucifugus*) roosting sites in the project development area. The Proponent shall establish, in consultation with Indigenous groups and relevant authorities, buffer zones around little brown myotis (*myotis lucifugus*) active roosts identified during the pre-construction surveys or found by the Proponent or brought to the attention of the Proponent by an Indigenous group during any phase of the project. The Proponent shall maintain the buffer zones until it is determined the roosts are no longer active.	late summer 2021	Fall 2021
	5.2	The Proponent shall conduct breeding habitat surveys for the northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) within the project development area.	Summer 2021	Fall 2022
	5.3	For any construction activity within 100 metres of breeding habitat identified under condition 5.2 for the northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), or western tiger salamander (*Ambystoma mavoritium*) during the breeding season, the Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, measures to prevent northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) from accessing the active construction areas. See 5.3.1 and 5.3.2 for measures.	Fall 2021	Feb-2022
	5.5	The Proponent shall develop and implement, in consultation with Indigenous groups and relevant authorities, a protocol to prevent the mortality of amphibians, including northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) during flood operation within the reservoir footprint. The Proponent shall develop the protocol prior to construction, taking into account the flood forecasting undertaken in accordance with condition 4.9.1. The protocol shall include measures to rescue and relocate northern leopard frog (*Lithobates pipiens*), western toad (*Anaxyrus boreas*), and western tiger salamander (*Ambystoma mavoritium*) to suitable habitat outside the reservoir footprint.	Fall 2021	Feb-2022
	5.8	The Proponent shall direct during construction any drainage pathway, constructed or modified as part of the Designated Project, away from wetlands and shall identify prior to construction wetlands where drainage pathway should not be directed during operation. The Proponent shall provide a map of the wetlands to be avoided to the Agency prior to construction.	Dec-2021	Feb-2022
	5.9	The Proponent shall submit to the Agency, prior to construction, a map of all wetlands that will be permanently removed for the construction of the Designated Project and shall not grub vegetation when undertaking construction work in wetlands except for those wetlands that will be permanently removed.	Dec-2021	Feb-2022
	5.4; 5.6; 5.7; 5.10	See specific conditions	As required	

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Atmospheric Environment	**6.1**	See specific condition regarding vehicles and emission standards	N/A	
	6.2	The Proponent shall develop, prior to construction, and implement, during construction, a no-idling policy for all vehicles within the project development area. The Proponent shall require that all persons abide by this policy, unless not technically feasible or not feasible for health or safety reasons. The Proponent shall submit the policy to the Agency prior to construction.	Dec-2021	Feb-2022
	6.3	The Proponent shall develop, prior to construction and in consultation with relevant authorities, and implement during all phases of the Designated Project, measures to maintain baseline air quality and prevent exceedance of the Canadian Council of Ministers of the Environment' Canadian Ambient Air Quality Standards.	Jul-2020	Feb-2022
	6.4	The Proponent shall develop, prior to construction, and implement during all phases of the Designated Project, a follow-up program to verify the accuracy of the environmental assessment and determine the effectiveness of mitigation measures as it pertains to adverse changes to air quality attributed to the Designated Project. See 6.4.1 to 6.4.6 for conditions to include in the program.	Jul-2020	Feb-2022
	6.5	The Proponent shall provide Indigenous groups with the results of the follow-up program referred to in condition 6.4 in plain language at a minimum twice annually, at a time determined in consultation with Indigenous groups.	Twice annually	
Human Health	**7.1 and 7.2**	See specific condition regarding noise and blasting requirements	NA	
	7.3	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, a protocol for receiving complaints related to exposure to noise attributable to the Designated Project. The Proponent shall provide the protocol to the Agency prior to construction and shall implement it during construction. As part of the implementation of the protocol, the Proponent shall respond to any noise complaint attributed to any component of the Designated Project within 48 hours of the complaint being received and shall implement any corrective action, if required to reduce exposure to noise, in a timely manner.	Dec-2021	Feb-2022
	7.4	The Proponent shall develop a communication plan in consultation with Indigenous groups. The Proponent shall develop the communication plan prior to construction and shall implement and keep it up to date during all phases of the Designated Project. See 7.4.1 - 7.4.3 for conditions to include in the plan.	Dec-2021	As required
	7.5	The Proponent shall implement, during all phases of the Project, measures to mitigate fugitive dust emissions attributable to the Designated Project. As part of the measures, the Proponent shall: 7.5.1 establish speed limits on Designated Project roads during all phases of the Designated Project and require that all persons abide by these speed limits; and 7.5.2 apply dust suppressant on the Designated Project permanent access roads and parking areas during all phases of the Designated Project. The Proponent shall select, in consultation with relevant authorities, dust suppressants with the least potential effects on human health and the environment.	Feb-2022	No end date
	7.6	The Proponent shall decommission and plug off water wells located within the project development area that are not used to monitor groundwater quality pursuant to condition 7.9.1, prior to the start of operation.	Feb-2022	Oct-2025
	7.7	The Proponent shall monitor, at a minimum twice prior to construction and weekly during flood operation, total mercury and methylmercury levels in the Elbow River upstream of the diversion system, in the off-stream reservoir, and in the low-level outlet downstream of the off-stream reservoir outlet gate, unless not feasible for safety reasons.	Twice prior to (Fall 2021 - January 2022)	As required
	7.8	The Proponent shall develop, in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to contamination of country food. See 7.8.1 to 7.8.4 for conditions to be included in the program.	summer 2021	As required
	7.9	The Proponent shall develop prior to operation, and implement, in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures as it pertains to drinking water quality. See 7.9.1 to 7.9.3 for conditions that need to be included in the plan.	Jun-2019	Oct-2025

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Human Health (cont'd)	**7.10***	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of all measures to mitigate fugitive dust emissions attributable to the Designated Project.	Jun-2020	Feb-2022
	7.11*	The Proponent shall provide Indigenous groups with the results of the follow-up program referred to in condition 7.10 in plain language at a minimum twice annually, at a time determined in consultation with Indigenous groups.	Twice annually	
Current use of lands and resources for traditional purposes	**8.1**	The Proponent shall undertake, in consultation with Indigenous groups and relevant authorities, progressive reclamation of areas disturbed by the Designated Project, including bank and riparian areas. See 8.1.1 to 8.1.4 for additional conditions.	Jun-2019	Oct-2025
	8.2	The Proponent shall manage noxious weeds and invasive alien species as necessary to promote successful revegetation that includes traditional plant establishment and growth. In doing so, the Proponent shall not use herbicide within 30 metres of wetlands and waterbodies in the project development area.	Feb-22	As required
	8.3	The Proponent shall conduct pre-construction surveys to determine the presence of grizzly bear (Ursus arctos) western population active dens in the project development area. The Proponent shall establish, in consultation with Indigenous groups and relevant authorities, no-work buffer zones around grizzly bear (*Ursus arctos*) western population active dens identified during the pre- construction surveys or found by the Proponent or brought to the attention of the Proponent by an Indigenous group during any phase of the Designated Project. The Proponent shall maintain the buffer zones from their establishment and until the active den is no longer occupied.	Nov-2021	Oct-2025
	8.4	The Proponent shall follow the timing restrictions on industrial activities identified in the Alberta's Recommended Land Use Guidelines: Key Wildlife and Biodiversity Zones when undertaking construction and maintenance activities in the Key Wildlife and Biodiversity Zone identified along the Elbow River. 8.4.1 If it is not economically or technically feasible for the Proponent to follow the timing restrictions on industrial activities identified in the Alberta's *Recommended Land Use Guidelines: Key Wildlife and Biodiversity Zones*, develop and implement additional mitigation measures, in consultation with Environment and Climate change Canada and other relevant authorities. The Proponent shall submit these measures to the Agency prior to implementing them.	As required	
	8.5	The Proponent shall install and maintain, during construction and operation, one underpass under Highway 22 where it crosses the diversion channel and wildlife friendly fences to provide passage for grizzly bear western population (*Ursus arctos*) and ungulates. The Proponent shall install the wildlife friendly fences as identified in Figure IR 15-1 submitted in the Response to Information Requests Round 1 Package 2 (Canadian Impact Assessment Registry Reference Number 80123, Document Number 1260), taking into account Alberta Conservation Association *Landholder's Guide to Wildlife Friendly Fencing*, to prevent access by livestock and allow safe passage for wildlife. The Proponent shall maintain the fences during all phases of the Designated Project.	May-25	As required
	8.6	The Proponent shall maintain navigation on the Elbow River during all phases of the Designated Project. The Proponent shall establish and maintain a portage route around the diversion system gate and the service spillway locations to maintain navigation on the Elbow River during construction of these project components and install safety signage to signal the presence of the diversion system gate and location of the portage route until such time that the portage route is no longer required to maintain navigation on the Elbow River.	Sep-2020	Fall 2023
	8.7	The Proponent shall provide the Agency and Indigenous groups with the final project design within seven days of its finalization and shall consult with Indigenous groups at least 60 days in advance of construction activities to understand locations and timing needed to allow Indigenous groups to catalogue, harvest and transplant traditional and medicinal plants present within the project development area, in a culturally appropriate way.	Jul-2021	Dec-2021
	8.8	The Proponent shall start developing, prior to construction and complete at the latest 1 year prior to start of operation, in consultation with Indigenous groups, a Land Use Plan to support Indigenous groups' use of the project development area, and implement the plan during all phases of the Designated Project. The Proponent shall submit the final plan to the First Nation Land Use Advisory Committee referred to in condition 8.11, First Nations and the Agency within seven days of its finalization. See sub-section 8.8.1 to 8.8.4 for conditions to be captured in the plan.	Dec-2021	Spring 2024

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Current use of lands and resources for traditional purposes (cont'd)	**8.9**	The Proponent shall establish, in consultation with First Nations, a staging area for traditional use activities in close proximity to the land use areas identified in condition 8.8. The Proponent shall allow and provide sufficient space within the staging area for the construction of semi-permanent structures. The Proponent shall provide maps to the Agency and First Nations of the staging area prior to construction.	Dec-2021	Jun-2024
	8.10	The Proponent shall provide unimpeded access for First Nations to the staging area identified in condition 8.9, except during the flood operation, when access to the staging area may be prohibited for safety reasons and if not possible for maintenance purposes. The Proponent shall communicate to First Nations the closure of the staging area when required for safety reasons and during flood season	As required	
	8.11	The Proponent shall establish, prior to construction and in consultation with First Nations, and maintain, throughout construction and operation, a First Nation Land Use Advisory Committee (the committee) to support the development and implementation of the plan identified in condition 8.8. When establishing the committee, the Proponent shall consult with each First Nation with respect to whether they wish to participate as members of the committee and shall prioritize the selection of representatives from First Nations who wish to participate as members in the committee. As part of the establishment of the committee, the Proponent shall co-develop Terms of Reference for the committee with First Nations and update the Terms of Reference every 10 years. The Proponent shall provide the completed Terms of Reference to the Agency prior to construction and any update within 30 days of the Terms of Reference being updated. See sub-sections 8.11.1 - 8.1.11-7 for Terms of Reference conditions.	Nov-2021	Apr-2022 (update every 10 years)
	8.12	The Proponent shall include any Indigenous groups for which Aboriginal or Treaty Rights under section 35 of *The Constitution Act, 1982* are recognized by the Government of Alberta after the issuance of this Decision Statement in the Land Use Plan, the staging area and the First Nations Land Use Advisory Committee referred to in conditions 8.9, 8.10 and 8.11.	No date required	
	8.13	The Proponent shall develop, prior to operation, and in consultation with Indigenous groups, a follow-up program to verify the accuracy of the environmental assessment as it pertains to natural re-vegetation of the drained reservoir during post-flood operation. See sub-sections 8.13.1 and 8.13.2 for items to include in the follow up program.	Sep-2021	Oct-2025
	8.14	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of mitigation measures as it pertains to the adverse environmental effects of the Designated Project on the current use of lands and resources for traditional purposes. See sub-sections 8.14.1 - 8.14.5 for monitoring conditions.	Fall 2021	Feb-2022
Physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance	**9.1**	The Proponent shall retain, prior to construction, the services of Indigenous monitors to observe, record, and report to the Proponent and Indigenous groups on the implementation, throughout construction, of requirements set out in this Decision Statement including the archeological and heritage management plan referred to in condition 9.3. Prior to retaining the services of Indigenous monitors, the Proponent shall consult with each Indigenous group with respect to whether they wish to participate as Indigenous monitor. When retaining the services of Indigenous monitors from each Indigenous group who wishes to participate, the Proponent shall determine, in consultation with these Indigenous groups, the scope, purpose and objectives of the participation of each Indigenous monitor and shall provide that information to the Agency	Dec-2021	Apr-2022
	9.2	The Proponent shall develop and implement, prior to construction and in consultation with Indigenous groups and Alberta Ministry of Culture, Multiculturalism and Status of Women, a historic resource impact assessment of the project development area. The Proponent shall apply the archaeological and heritage management plan pursuant to condition 9.3 to structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources identified as part of the historic resource impact assessment.	2016	end of 2022
	9.3	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, Alberta Ministry of Culture, Multiculturalism and Status of Women, and implement, during construction and operation, an archaeological and heritage management plan for any structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources within the project development area, including, but not limited to sites and things subject to the *Alberta Historical Act*. See sub-sections 9.3.1 - 9.3.4 for conditions to include in the plan.	Fall 2021	Feb-2022

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance (cont'd)	**9.4**	The Proponent shall develop, prior to construction and in consultation with Indigenous groups, cultural awareness training for all employees associated with the Designated Project. The Proponent shall implement the training prior to the start of construction and during all phases of the Designated Project.	Fall 2021	Apr-2022 - construction As required - post construction
	9.5	The Proponent shall, prior to construction and in consultation with Indigenous groups, provide access to Indigenous groups to the project development area for the purpose of conducting ceremonies, to the extent that such access is safe.	Jan-2022	Feb-2022
	9.6	The Proponent shall provide the Agency and Indigenous groups with a map of the final construction site within seven days of its finalization	within 7 days of finalization	Dec-2021
	9.7	The Proponent shall have a qualified individual conduct paleontological monitoring during construction when: 9.7.1 excavating bedrock for the diversion system; 9.7.2 excavating 4 metres of bedrock or greater, including for the emergency spillway; 9.7.3 excavating bedrock for new road alignments including on Highway 22; and 9.7.4 pipeline operators are using open cut methods for relocation of pipelines and utilities under the diversion channel.	Feb-2022	Oct-2025
	9.8	The Proponent shall strip and stockpile topsoil during construction and shall prevent mixing of topsoil with other soil horizons. The Proponent shall replace the topsoil during progressive reclamation pursuant to condition 8.1.	As required	
	9.9	The Proponent shall develop, prior to construction and in consultation with Indigenous groups and Alberta Ministry of Culture, Multiculturalism and Status of Women, a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of all mitigation measures for effects to any structures, sites, or things of historical, archaeological, paleontological, or architectural significance or physical or cultural heritage resources. The Proponent shall implement the follow-up program during all phases of the Designated Project and submit the results of the follow-up program to Alberta Ministry of Culture, Multiculturalism and Status of Women.	Fall 2021	As required
Independent Environmental Monitor	**10.1**	The Proponent shall retain, prior to construction, the services of a third-party independent environmental monitor, who is a qualified individual as it pertains to environmental monitoring in Alberta, to independently observe and record on the implementation of the conditions set out in this Decision Statement during construction and to report findings to the Proponent and the Agency.	Dec-2021	Feb-2022
	10.2	The Proponent shall require the independent environmental monitor to report to the Proponent, in writing, about the implementation of any condition set out in this Decision Statement during construction. The Proponent shall also require the independent environmental monitor to recommend to the Proponent, in writing, which action(s) in their view should be taken by the Proponent with respect to the implementation of conditions set out in this Decision Statement during construction	Feb-2022	Oct-2025
	10.3	The Proponent shall require the independent environmental monitor to provide to the Agency, at a frequency to be determined in consultation with the Agency, the information reported to the Proponent pursuant to condition 10.2 at the same time that the Proponent receives that information.	Feb-2022	Oct-2025
	10.4	The Proponent shall require the independent environmental monitor to retain the information reported to the Proponent pursuant to condition 10.2 for five years following submission to the Agency pursuant to condition 10.3.	2022	2030
Accidents and Malfunctions	**11.1**	The Proponent shall take all reasonable measures to prevent accidents and malfunctions that may result in adverse environmental effects and to mitigate any adverse environmental effect from accidents and malfunctions that do occur. See sub-sections 11.1.1 to 11.1.5 for measures.	As required	
	11.2	The Proponent shall consult, prior to construction, Indigenous groups on the measures to be implemented to prevent accidents and malfunctions.	Jan-2022	Apr-2022
	11.3	The Proponent shall develop an accident and malfunction response plan in relation to, and for the construction of the Designated Project and an accident and malfunction response plan in relation to, and for the operation of the Designated Project. The Proponent shall develop the accident and malfunction response plan in relation to, and for construction of the Designated Project prior to construction and the accident and malfunction response plan in relation to, and for the operation of the Designated Project prior to the first flood operation. See 11.3.1 to 11.3.6 for conditions that need to captured in the plan.	Jan-2022	Spring 2024

	Condition #	Summary of Condition	Start Date (month and year)	End Date (month and year)
Accidents and Malfunctions (cont'd)	**11.4**	The Proponent shall maintain the accident and malfunction response plan referred to in condition 11.3 up-to-date during all phases of the Designated Project. The Proponent shall submit any updated accident and malfunction response plan to the Agency and to the parties being consulted during the development of the plan within 30 days of the plan being updated	within 30 days of the plan being updated	
	11.5	In the event of an accident or malfunction with the potential to cause adverse environmental effects, the Proponent shall immediately implement the measures appropriate to the accident or malfunction referred to in condition 11.3.2. See sub-sections 11.5.1 - 11.5.4 for measures.	As required	
	11.6	The Proponent shall develop, in consultation with Indigenous groups and potentially affected parties, a communication plan for accidents and malfunctions occurring in relation to the Designated Project, including accidents and malfunctions occurring within the project development area which may affect area(s) outside of the project development area. The Proponent shall develop the communication plan prior to construction and shall implement and keep it up-to-date during all phases of the Designated Project. See sub-section 11.6.1 to 11.6.3 for plan specifics.	Jan-2022	Spring 2024
Schedules	**12.1**	The Proponent shall submit to the Agency a schedule for all conditions set out in this Decision Statement no later than 60 days prior to the start of construction. This schedule shall detail all activities planned to fulfill each condition set out in this Decision Statement and the commencement and estimated completion month(s) and year(s) for each of these activities.	Dec-2021	Dec-2021
	12.2	The Proponent shall submit to the Agency a schedule outlining all activities required to carry out all phases of the Designated Project no later than 60 days prior to the start of construction. The schedule shall indicate the commencement and estimated completion month(s) and year(s) and duration of each of these activities.	Dec-2021	Dec-2021
	12.3	The Proponent shall submit to the Agency in writing an update to schedules referred to in conditions 12.1 and 12.2 every year no later than October 31.	By October 31 of each year	
	12.4	The Proponent shall provide Indigenous groups with the schedules referred to in conditions 12.1 and 12.2, and any update to the initial schedule made pursuant to condition 12.3 at the same time the Proponent provides these documents to the Agency.	By October 31 of each year	
Records	**13.1**	The Proponent shall maintain all records relevant to the implementation of the conditions set out in this Decision Statement. The Proponent shall provide the aforementioned records to the Agency upon demand within a timeframe specified by the Agency.	Jul-2021	As required
	13.2	The Proponent shall retain all records referred to in condition 13.1 at a facility in Canada and shall provide the address of the facility to the Agency. The Proponent shall notify the Agency at least 30 days prior to any change to the physical location of the facility where the records are retained, and shall provide to the Agency the address of the new location.	30 days prior to any change in location	

IAAC condition 12.2: *The Proponent shall submit to the Agency a schedule outlining all activities required to carry out all phases of the Designated Project no later than 60 days prior to the start of construction. The schedule shall indicate the commencement and estimated completion month(s) and year(s) and duration of each of these activities*		
IAAC condition 12.4: *The Proponent shall provide Indigenous groups with the schedules referred to in conditions 12.1 and 12.2, and any update to the initial schedule made pursuant to condition 12.3 at the same time the Proponent provides these documents to the Agency.*		
Construction Schedule	**Start Date**	**End Date**
Pre-construction Submittals	Jan-2022	Apr-2022
Clearing and Grubbing	Feb-2022	Mar-2022
Diversion Structure		
River Diversion	Jul-2022	Apr-2024
Service Spillway	Sep-2022	Feb-2024
Diversion Inlet	Sep-2022	Aug-2024
Floodplain and Auxiliary Spillway	Sep-2023	Sept-2024
Diversion Channel		
Stage 1 Excavation	May-2022	Oct-2024
Stage 2 Excavation	May-2024	Oct-2024
Off-stream Storage Dam		
Low Level Outlet Works	Mar-2022	May-2023
Stage 1 Embankment	May-2022	Oct-2024
Stage 2 Embankment	May-2024	Oct-2024
Operation Schedule	**Start Date**	**End Date**
Operational for Design Flood	Mar-2025	NA

APPENDIX D
SUMMARY OF WILDLIFE SPECIES OBSERVED DURING THE 2022/2023 ANNUAL REPORTING YEAR

Table D.1 Summary of Wildlife Observations between December 2022 to June 2023

Date	Species Observed	Coordinates (latitude/longitude)	Location Description
December 12, 2022	Bald eagle (2)	51.065270, -114.396519	Range Road 35
December 12, 2022	Elk herd	51.067804, -114.450384	North of Springbank Road, east of Highway 22
December 12, 2022	Flock of geese	51.063161, -114.396674	Range Road 35
December 13, 2022	Whitetail deer	51.055857, -114.442212	Field East of Range Road 41
December 13, 2022	Flock of Geese	51.063819, -114.395608	-
December 13, 2022	Hawk	51.053517, -114.443640	-
December 13, 2022	Hawk	51.057275, -114.397082	Range Road 35
December 14, 2022	Deer (3)	51.028412, -114.4802780	-
December 14, 2022	Mule Deer (7)	51.036248, -114.474362	-
December 15, 2022	Deer	51.058783, -114.464644	East of Highway 22
December 15, 2022	Deer	51.062209, -114.470067	West of Highway 22
December 15, 2022	Elk	51.058786, -114.463708	East of Highway 22
December 16, 2022	Elk	51.058786, -114.463708	North of Springbank Road, west of Range Road 35
December 28, 2022	Elk herd	51.067866, -114.406553	East of Unnamed Creek
January 3, 2023	Pack of coyotes (5)	51.06194, -114.39702	Along Springbank Road
January 5, 2023	Elk herd	-	
January 5, 2023	Deer herd	51.05492N, 114.39697W	East of Off-Stream Storage Dam
January 6, 2023	Elk herd	51.05208N, 114.45.396W	East of Highway 22
January 13, 2023	Elk and Deer	-	North and south of Springbank Road
January 14, 2023	Elk in field	-	Low-level outlet
January 14, 2023	Whitetail deer (2)	-	North side of Diversion Inlet overlook
January 16, 2023	Elk herd (approximately 10)	51.059766, -114.403552	North of Unnamed Creek on hill
January 16, 2023	Elk herd (approximately 300 or 400)	51.059766, -114.403552	West of Range Road 35
January 17, 2023	Elk herd (approximately100)	51.059809, -114.406661	West of Range Road 35 in the trees
January 18, 2023	Elk herd (approximately 300 or 400)	-	South of Springbank Road, west of Range Road 35
January 19, 2023	Elk herd	51.067390, -114.413841	North of Springbank Road

Date	Species Observed	Coordinates (latitude/longitude)	Location Description
January 19, 2023	Elk herd (approximately 150 or so)	51.058421, -114.410777	South of Springbank Road, west of Range Road 35
January 20, 2023	Elk herd (approximately 50)	51.067486, -114.414286	North of Springbank Road
January 20, 2023	Elk herd (approximately 50)	51.053030, -114.423044	Low-level outlet
January 21, 2023	Elk herd (approximately 300)	51.0595190, -114.4345735	East of Range Road 41
January 30, 2023	Coyotes (2)	51.052314, -114.432140	East of Range Road 41 near access road to site office
January 30, 2023	White-tailed deer	51.057749, -114.444250	West of Range Road 41
January 31, 2023	Coyote	51.0571268, -114.3966805	East of Range Road 35
February 2, 2023	Elk herd (approximately 150-200)	51.056256, -114.413423	On Hill overlooking low-level outlet
February 4, 2023	White-tailed deer (5)	51.0631760, -114.3968522	Range Road 35
February 9, 2023	Coyotes (2)	-	Range Road 35
February 9, 2023	Elk herd	51.053285, -114.438039	Near Range Road 41
February 13, 2023	Elk herd (approximately 200)	51.058712, -114.463909	Near Highway 22
February 14, 2023	Elk herd (approximately 200-300)	51.057130, -114.413944	Hill overlooking low-level outlet
February 15, 2023	Elk herd	51.061503, -114.401448	Trees west of Range Road 35
February 16, 2023	Deer (3)	51.062260, -114.399406	West of Range Road 35
February 16, 2023	Deer (3)	51.049038, -114.433164	West of Farmhouse Site Office
February 16, 2023	Geese (15)	51.025014, -114.481339	Along Elbow River
February 16, 2023	Deer (7)	51.047133, -114427831	Site office
February 17, 2023	Elk herd (approximately 200)	51.068865, -114.404152	North of Springbank Road and West of Range Road 35
March 2, 2023	Herd of Elk	51.0556687, -114.4108788	North of low-level outlet
March 7, 2023	Coyotes (6) and one (1) bald eagle near a deer carcass	-	East of low-level outlet
March 13, 2023	Elk herd	51.059351, -114.454226	West of Diversion Outlet
March 13, 2023	Elk herd	51.061103, -114.456941	South of Springbank Road, west of Range Road 41

Date	Species Observed	Coordinates (latitude/longitude)	Location Description
March 14, 2023	Elk herd	51.061103, -114.456941	East of Highway 22, south of Springbank Road
March 15, 2023	Deer (6)	51.046934, -114.431758	-
March 17, 2023	Bald eagles (2)	51.068413, -114.460981 51.032994, -114.467659	East of Highway 22, north of Springbank Road
March 22, 2023	Deer (4)	51.051086, -114.437060	-
March 22, 2023	Elk herd	-	East of dam
April 10, 2023	Otter or mink	51.025408, -114.480461	Near Elbow River, Diversion Inlet
April 10, 2023	Geese		Range Road 35
April 10, 2023	Bald eagle	-	Diversion Inlet
April 11, 2023	Elk herd (approximately 150-200)	51.057917, -114.461545	Along Highway 22
April 11, 2023	Elk herd (approximately 250-300)	51.059421, -114.432913	East of Range Road 41
April 14, 2023	Deceased elk (2)	-	Springbank Road and Range Road 41
April 17, 2023	Geese	-	Along Elbow River
April 19, 2023	Heron	-	Kiwanis Pond near HWY8 roundabout
April 19, 2023	Geese	-	Kiwanis Pond near HWY8 roundabout
April 19, 2023	Grouse	-	South of Diversion Inlet
April 19, 2023	Herons (2)	-	Near Diversion Inlet
April 20, 2023	Moose (2)	-	Unnamed Creek, low-level outlet, HRA Section 31 Find Area
April 20, 2023	White-tailed deer (2)	-	South of farmhouse area
April 22, 2023	Hawk (2)	-	End of Rand Road 35
April 25, 2023	Elk herd (approximately 50)	51.0522256, -114.4227402	West of low-level outlet
May 12, 2023	Elk herd	-	Diversion Outlet area
May 18, 2023	Fox	-	Kiwanis Area, crossed access road past main entrance
May 18, 2023	Flock of geese	-	Near Elbow River near the Kiwanis Camp Area
May 18, 2023	Coyote	-	West of Range Road 41, south of Springbank Road, crossing Springbank Road

Date	Species Observed	Coordinates (latitude/longitude)	Location Description
May 30, 2023	Red-tailed hawks	-	Kiwanis Camp Area, near floodplain berm
May 31, 2023	Moose	-	Highway 22, adjacent landowner Driveway
June 12, 2023	Deer	51.0579583, -114.4657055	Along Highway 22, east of highway
June 12, 2023	Deer	-	Near Elbow River and Dugout 1
June 13, 2023	Deceased red fox	-	Kiwanis Camp area, near stockpiles
June 13, 2023	Injured coyote	-	Near PME area
June 15, 2023	Deer (4)	-	Near Kiwanis Camp area
June 15, 2023	Geese(9; 2 adults, 7 juvenile)	-	Near Kiwanis Camp area
June 17, 2023	Deer	-	Across from Volker Stevin yard
June 17, 2023	Geese (6; 2 adults, 4 juvenile)	-	Kiwanis Camp pond
June 17, 2023	Bald eagle	-	Hilltop buffer zone
June 22, 2023	Elk and calves (3; 1 adult and 2 calves)	51.0569997, -114.4079445	Field west of Range Road 35
June 22, 2023	Black bear	-	Near the control building, Diversion Structure
June 28, 2023	Bald eagles (2)	51.050704, -114.396961	Near Range Road 35