Appendix A

Approvals

Approval to Construct (MCC)

Approval to Discharge Wastewater (RM of Rosser)

Approval to Strip Soil (RM of Rosser)

Approval of Land Use #19-3009 (NavCanada)

****All email addresses, phone numbers, and signatures have been redacted from the listed approvals****

MacBride, Lyndsey

From: Webb, Bruce (SD) [redacted]
Sent: August 9, 2019 1:18 PM
To: 'Camila Jerger'; Bill Coulter; [redacted] MacBride, Lyndsey
Cc: +WPG530 - Environmental Approvals Branch Director (SD); Burland Ross, Siobhan (SD); Boswick, Robert (SD)
Subject: RE: RESPONSE REQUIRED - Environment Act - Seeking approval for construction (not operation) of new building

Hello! As discussed with Bill Coulter this morning, construction of the Merit Foods facility can proceed without an Environment Act licence. A licence is necessary before operation commences. We look forward to working with Merit Foods and SNC-Lavalin on this project.

Bruce Webb, P. Eng.
Water Development and Control Assessment Officer
Environmental Approvals Branch
Manitoba Sustainable Development
1007 Century Street
Winnipeg MB R3H 0W4
[redacted]

From: Camila Jerger [redacted]
Sent: August-09-19 12:20 PM
To: Webb, Bruce (SD) [redacted]
Cc: Bill Coulter [redacted]
Subject: FW: RESPONSE REQUIRED - Environment Act - Seeking approval for construction (not operation) of new building
Importance: High

Hello Bruce,

Thank you for your time this morning to discuss the Merit Foods project. We've been working with them from the initial planning stages of their new facility in the Winnipeg region and it's a very exciting opportunity for our jurisdiction.

As discussed, Ryan Bracken, Co-CEO of Merit Foods, together with SNC-Lavalin, submitted a request to your branch to start construction of their facility prior to the environmental license being issued. As per the first paragraph in the attached letter/document, they fully understand they need to have the license approved prior to starting operations next year, and are prepared to take on the risk of constructing the building prior to receiving this license. Below is their request to the Director of your branch, including a few additional details that were compiled/ prepared by their contractor, SNC-Lavalin.

Given your comments that this project can move forward and start construction ASAP, with the understanding that they cannot commence operations prior to obtaining an environmental license, we would kindly request a reply to the company confirming this and copying the Director's email and ourselves.

Thank you,

Camila

Camila Jerger
Business Development Manager
YES! WINNIPEG
[redacted]
Suite 810, One Lombard Place
Winnipeg, Manitoba CANADA R3B 0X3

Website | Facebook | Twitter | Instagram

As Winnipeg's business development team, YES! Winnipeg attracts new companies to the city, assists entrepreneurs in bringing their ideas to life and helps

This transmission may contain privileged or confidential information. Any unauthorized distribution, copying, disclosure or dissemination of this transmission or taking of any action in reliance

Camila Jerger
Business Development Manager
YES! WINNIPEG
[redacted]
Suite 810, One Lombard Place
Winnipeg, Manitoba CANADA R3B 0X3

Website | Facebook | Twitter | Instagram

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From: [redacted]
Sent: August 6, 2019 4:50 PM
To: [redacted]
Cc: 'Burland Ross, Siobhan (SD)' [redacted]; Prince, Leo (AGR) [redacted] MacBride, Lyndsey [redacted]; 'Barry Tomiski' [redacted]; Richard Marshall [redacted]; 'Boswick, Robert (SD)' [redacted]
Subject: RESPONSE REQUIRED - Environment Act - Seeking approval for construction (not operation) of new building
Importance: High

Director, Environmental Approvals Branch
Manitoba Sustainable Development

Please find attached a letter seeking your approval for the commencement of construction (not operation) on our 65,000sf pea/ canola processing facility in the RM of Rosser (400 Goldenrod Drive within the BrookPort Industrial Park). We understand that pursuant to Section 11(1) of the Environment Act, we are required to obtain a valid and subsisting

licence from the director for the development prior to construction and operation. Based on timelines associated with winter construction and the need to expedite the construction of this project to meet global plant protein needs (prior to it being filled by other countries), we are seeking your approval to allow us to move our project forward to construction. We understand that by doing so, we are taking on full responsibility to receive a Environment License prior to our operational start-up (planned for August 2020).

We will ensure that adhere to any all conclusions/ recommendations of the Environmental Approvals Branch prior to start-up. We are a Manitoba owned company, with ambitions of being a global provider of the highest quality plant proteins. We look forward to collaborating with your team to bring this Manitoba grown project to successful completion.

All the best,

Ryan Bracken
Co-CEO, Merit Functional Foods
[redacted]

From: Boswick, Robert (SD) [redacted]
Sent: August 2, 2019 1:01 PM
To: 'rbracken@meritfoods.com' [redacted]
Cc: Burland Ross, Siobhan (SD) [redacted]
Subject: RE: Environmental Permitting

Good afternoon Ryan,

Further to our discussions this morning, as the development being proposed will require an Environment Act Licence and preparation of the required Environment Act Proposal is in a very early stage, if you so choose, as an initial step, please forward an initial letter of intent to establish a pea/canola protein manufacturing facility to:

Director
Environmental Approvals Branch
Manitoba Sustainable Development
1007 Century Street
Winnipeg, MB R3H 0W4

or by email to:

[redacted]

That initial letter should aid in our Branch's understanding of the proposed development as well as allow for some early discussion relative to preparation of the Environment Act Proposal. The Branch would then look forward to receiving the Environment Act Proposal at the earliest opportunity such that review of the Proposal would be able to be initiated and completed in a timely manner.

Please contact me for further discussion as necessary.

Thank you,

Robert Boswick, P.Eng.

Rural Municipality of Rosser

Reeve Frances Smee
Chief Administrative Officer
Larry Wandowich

www.rmofrosser.com

Box 131,
Rosser, Manitoba
R0H 1E0
Ph: 467-5711 Fax 467-5958
Email: info@rmofrosser.com

August 7, 2019

VIA EMAIL

Ryan Bracken, Co-CEO
Merit Functional Foods

Re: Approval from Burcon to Merit Functional Foods

As per your written request of July 18, 2019 and explanation of the joint venture between Burcon Nutrascience Corp. and your partners, this letter will serve as approval for Merit Functional Foods Corporation to discharge wastewater in accordance with Burcon's letter of request dated June 6, 2019.

As part of this approval your corporation is acknowledging that you are obligated to Burcon's previously submitted information and that you must comply with the provisions of the Rural Municipality of Rosser By-law # 11-17 which apply fully to this discharge.

Please feel free to contact me if you have any questions.

Sincerely,

RURAL MUNICIPALITY OF ROSSER

[redacted]

Larry Wandowich
Chief Administrative Officer

Cc: Randy Willardsen
Barry Tomiski
Robert Scaletta
Barry MacBride

Burcon
A New World in Protein®

Larry Wandowich
Chief Administrative Officer
R.M. of Rosser
Rosser, MB R0H 1E0

June 6, 2019

Larry, Burcon Nutrascience is intending to build a Pea Protein Isolate and Canola Protein Isolate facility on lots 6 & 7 in the Brookport development in the RM of Rosser and wishes to make formal application for approval to discharge effluent as described below.

Our Protein Facility will be built in two phases. In phase one we will have a single process line that will switch between our two proteins at a limited capacity. From this initial installation we expect to discharge 300 m3 per day effluent that meets the city of Winnipeg's effluent bylaws, except as this is a new facility we have to expect while we are in the commissioning and "debugging" stage we may have instances where we temporarily exceed the published limits for BOD (300 mg/L) and total nitrogen (60 mg/L). The city has published surcharges for BOD ($1.25 per kilogram in 2019) and nitrogen ($5 per kilogram in 2019) for discharges over the bylaw limits and we understand that these charges would apply. We would expect after the first year in operation we would be able to comply with the bylaw limits on a daily basis and will work diligently to do so. We will be installing an equalisation tank for effluent which will allow us to discharge at a consistent rate over 24 hours.

Phase Two will be an expansion to expand our capacity. From the expanded plant we would expect to discharge up to but not exceeding 1,000 m3 of effluent which would also meet the city of Winnipeg's currently published bylaws. The timing for this expansion will depend on the market for our proteins and could happen very quickly or may take a couple of years.

We expect to begin construction on our protein plant late this summer and have phase one completed by August of next year.

Please let me know if this information is sufficient or if you need any additional information.

Sincerely

Randy Willardsen
Senior VP Process Technology
Burcon Nutrascience

Rural Municipality of Rosser

Reeve Frances Smee
Chief Administrative Officer
Larry Wandowich

www.rmofrosser.com

Box 131,
Rosser, Manitoba
R0H 1E0
Ph: 467-5711 Fax 467-5958
Email: info@rmofrosser.com

August 23, 2019

VIA EMAIL

Ryan Bracken, Co-CEO
Merit Functional Foods

RE: Brookport Industrial Park – 400 Goldenrod Drive - Request for site work

Thank you for your letter of August 20, 2019.

After consulting with our municipal engineer, Jessica Manness, I am pleased to provide you the following permissions:
Permission to strip the organic layer, as per your letter. Please note, you are in compliance with the Soil Stripping Bylaw of the RM of Rosser, as Council has previously granted the developer, Whiteland Services, approval to strip the soil. I have carried this approval over to your lot.
Permission to scarify and compact.
Permission to supply and install the layer of fill, as described in your letter.

I continue to wish you good luck on this exciting project.

Sincerely,

RURAL MUNICIPALITY OF ROSSER

[redacted]

Larry Wandowich
Chief Administrative Officer

Cc Jessica Manness
Eric Shaw
Richard Marshall
Lori Sheldon

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navcanada.ca

August 9, 2019

Your file
(Vicinity CYWG) Merit Functional Foods 406 Goldentod Drive, Stony Mountain, MB
Our file
19-3009

Mr. Ryan Bracken
Merit Functional Food Corporation
P.O. Box 53053 South St. Vital
Winnipeg, MB
R2N 3X2

RE: Development Proposal/Plans: Industrial Building - Winnipeg, MB
Centered (N49° 57' 55.0482" W97° 13' 50.8544" / 85.9580' AGL / 863.5171' AMSL)-(Spreadsheet attached)

Mr. Bracken,

NAV CANADA has evaluated the captioned proposal and has no objection to the project as submitted.

It was noted that crane(s) will be used for construction. Any cranes must be submitted separately to the NAV CANADA Land Use Office for full assessment.

In the interest of aviation safety, it is incumbent on NAV CANADA to maintain up-to-date aeronautical publications. To assist us in that end, we ask that you notify us upon completion of construction. This notification requirement can be satisfactorily met by returning a completed, signed copy of the attached form and accompanying spreadsheet by e-mail to [redacted] or fax at [redacted]. In the event that you should decide not to proceed with this project or if the structure is dismantled, please advise us accordingly so that we may formally close the file.

If you have any questions, contact the Land Use Department by telephone at [redacted] or e-mail at [redacted]

NAV CANADA's land use evaluation is valid for a period of 12 months. Our assessment is limited to the impact of the proposed physical structure on the air navigation system and installations; it neither constitutes nor replaces any approvals or permits required by Transport Canada, other Federal Government departments, Provincial or Municipal land use authorities or any other agency from which approval is required. Innovation, Science and Economic Development Canada addresses any spectrum management issues that may arise from your proposal and consults with NAV CANADA engineering as deemed necessary.

This document contains information proprietary to NAV CANADA. Any disclosure or use of this information or any reproduction of this document for other than the specific purpose for which it is intended is expressly prohibited except as NAV CANADA may otherwise agree in writing.

[redacted]

Olivier Meier | NAV CANADA
Manager – AIM Land Use

cc NOPR - Northern and Prairie Region, Transport Canada
CYWG - JAMES ARMSTRONG RICHARDSON INTL
CWH7 - WINNIPEG (HEALTH SCIENCES CENTRE (HELI)

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www.navcanada.ca

Land Use Proposal Submission Form

NAV CANADA file N°./ Ref N°	Transport Canada File N° / Ref N°

GENERAL INFORMATION:

Company/Owner Name: Merit Functional Foods Corporation		Contact Person: Ryan Bracken, P.Eng., Co-CEO	
Address: P.O. Box 53053 South St. Vital	City: Winnipeg	Prov: MB	Postal Code: R2N 3X2
Tel: [redacted]	Cell: [redacted]	Email: [redacted]	
Applicant: Bird Construction		Contact Person: Richard Marshall [redacted]	
Address: 1055 Erin Street	City: Winnipeg	Prov: MB	Postal Code: R3G 2X1
Tel: [redacted]	Cell: [redacted]	Email: [redacted]	

DETAILS OF PROPOSAL:

- Please provide the data in the highest resolution as it was obtained.
- For geographic coordinates, provide up to four (4) decimal places of a second.
- For ground elevation and tower height, provide up to four (4) decimal places of a metre or foot.

Project Identification: Merit Functional Foods	Nearest Town: Winnipeg
Street Address, etc.: 406 Goldentod Drive, Stony Mountain, MB,	Province: MB

Geographic Coordinates of Site in NAD 83: Lat. N 49 (Degrees) / 57 (Minutes) / 56.65351 (Seconds) Long. W 97 (Degrees) / 13 (Minutes) / 52.48061 (Seconds) **For submissions containing more than one location, please complete the Multiple Obstacle Template and return in Excel format. (Examples: Linear Structures, Wind Farms, Building Corner Coordinates, Multiple Cranes, etc.)**

Type of Structure: Industrial Building	New Structure? ☒Yes ☐No	Height Added (If Existing)		☐ft ☐m
Cranes to be used? ☒Yes ☐ No **If Yes: Crane details shall be submitted separately if not included with this form.**		Ground Elevation (Above Sea Level)	237.0	☐ft ☒m
Dimensions: 99.0m x 67.0m		Structure Height (Above Ground Level) **Including all appurtenances**	26.2	☐ft ☒m
Materials & Roof Shape (If Building): Steel Frame & cladding, rectangular, flat roof		Total Height (Above Sea Level) Structure Height + Ground Elevation	263.2	☐ft ☒m
Proposed Construction Start Date: Sept 1, 2019		Approximate Duration of Construction: 12 months		
If Temporary Structure, indicate Removal Date:		From: hrs	To: hrs	

Comments: There will be two buildings constructed on the site, a large processing and office building, and a smaller loading facility.

Processing and office bulsing:

The majority of the building will have a roof height of 14.3m (parapet height 250.3m above sea level). A small portion of the building enclosing higher-height equipment, comprising appreoximately square meters, will have a parapet height of 262.2m.

Loading facility:

The loading facility will be 67.0m x 40.0m with a roof height of approximately 7.3m

Please refer to the file 19-0766-2 AZR, prepared by Barnes & Duncan Land Surveyors, for a sketch showing the building in relation to the Airport Zoning Restriction for runway threshold 18L of the Winnipeg James A Richardson International Airport

Known co-location with/on NAV CANADA Site: YES/ NO NO
A Third-Party Submission Form may be required for complex applications, fee applicable.

ELECTRONIC / TELECOMMUNICATION INTERFERENCE (Check off the items that may cause interference and provide details)	
High Voltage Equipment	☒ Details Hydro distribution equipment
Arc Welding	☒ Details Welding may be used during construction
Radar Emission	☐ Details
High Powered Transmissions	☐ Details
VHF Radio	☐ Details
Other	☐ Details

OBSTRUCTION TO VISION ON AIRPORT WITH NAV CANADA SERVICES/CONTROL TOWER, FSS, CARS:	
Check the items that may cause obstructions to vision to the installation:	
Line of Sight	☐ Details
Generation of Smoke/Vapour	☐ Details
Reflectivity	☐ Details
Aircraft Parking	☐ Details
Exterior Lighting	☐ Details

Applicant/Representative Signature	Print Name	Date
[redacted]	Richard Marshall	July 31/19

Acknowledgement of reading Proponent Education Package (Submitter's Initials) RM

For a detailed description on NAV CANADA's requirements and additional information, refer to the NAV CANADA website at www.navcanada.ca > PRODUCTS & SERVICES > Land Use Program.

NAV CANADA's land use evaluation is valid for a period of 12 months. Our assessment is limited to the impact of the proposed physical structure on the air navigation system and installations; it neither constitutes nor replaces any approvals or permits required by Transport Canada, other Federal Government departments, Provincial or Municipal land use authorities or any other agency from which approval is required. Innovation, Science and Economic Development Canada addresses any spectrum management issues that may arise from your proposal and consults with NAV CANADA Engineering as deemed necessary.

Appendix B

Land Title

STATUS OF TITLE

Title Number **3024809/1**
Title Status **Accepted**
Client File 111223-2

The Property Registry
A Service Provider for the Province of Manitoba

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

11410083 CANADA LTD.

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

LOT 8 PLAN 64621 WLTO
IN SE 1/4 34-11-2 EPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

Instrument Type:	**Caveat**
Registration Number:	**206831/1**
Instrument Status:	**Accepted**
Registration Date:	1967-10-06
From/By:	MANITOBA TELEPHONE SYSTEM
To:	
Amount:	
Notes:	No notes
Description:	No description

Instrument Type:	**Caveat**
Registration Number:	**2193361/1**
Instrument Status:	**Accepted**
Registration Date:	1997-10-07
From/By:	THE MANITOBA HYDRO-ELECTRIC BOARD
To:	
Amount:	
Notes:	No notes
Description:	RIGHT-OF-WAY AGREEMENT

Instrument Type:	**Mortgage**
Registration Number:	**5017385/1**
Instrument Status:	**Accepted**
Registration Date:	2018-11-13
From/By:	WHITELAND SERVICES INC.
To:	THE ASSINIBOINE CREDIT UNION LIMITED
Amount:	$12,100,000.00
Notes:	No notes
Description:	No description

Instrument Type:	**Easement**
Registration Number:	**5052093/1**
Instrument Status:	**Accepted**
Registration Date:	2019-03-22
From/By:	BROOKPORT BUSINESS PARK INC. & WHITELAND SERVICES INC.
To:	The Manitoba Hydro-Electric Board and Bell Canada
Amount:	
Notes:	No notes
Description:	STATUTORY EASEMENT

Instrument Type:	**Easement**
Registration Number:	**5052094/1**
Instrument Status:	**Accepted**
Registration Date:	2019-03-22
From/By:	BROOKPORT BUSINESS PARK INC. & WHITELAND SERVICES INC.
To:	Centra Gas Manitoba Inc.
Amount:	
Notes:	No notes
Description:	STATUTORY EASEMENT

Instrument Type:	**Caveat**
Registration Number:	**5052095/1**
Instrument Status:	**Accepted**
Registration Date:	2019-03-22
From/By:	Rural Municipality of Rosser
To:	
Amount:	
Notes:	No notes
Description:	DEVELOPMENT AGREEMENT. THE PLANNING ACT

3. ADDRESSES FOR SERVICE

11410083 CANADA LTD.
98 Vadeboncoeur Drive
Winnipeg MB
R2N 4P8

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

2999097/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	**Transfer Of Land**
Registration Number:	**5104755/1**
Registration Date:	2019-09-06
From/By:	WHITELAND SERVICES INC.
To:	11410083 CANADA LTD.
Consideration:	$3,795,671.73

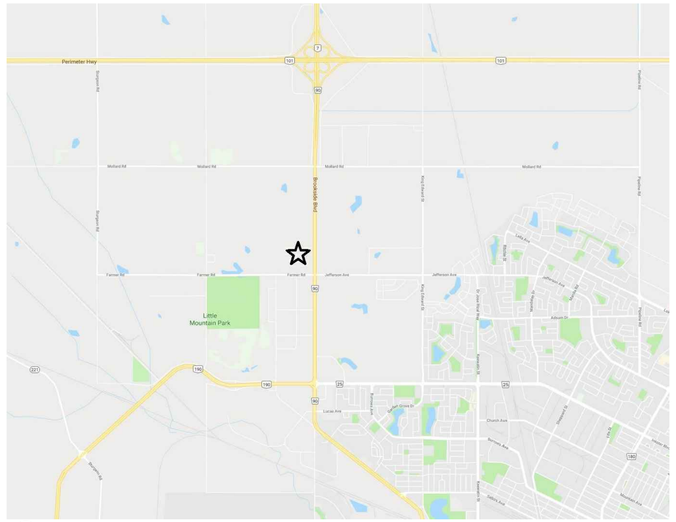
10. LAND INDEX

Lot 8 Plan 64621

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 3024809/1

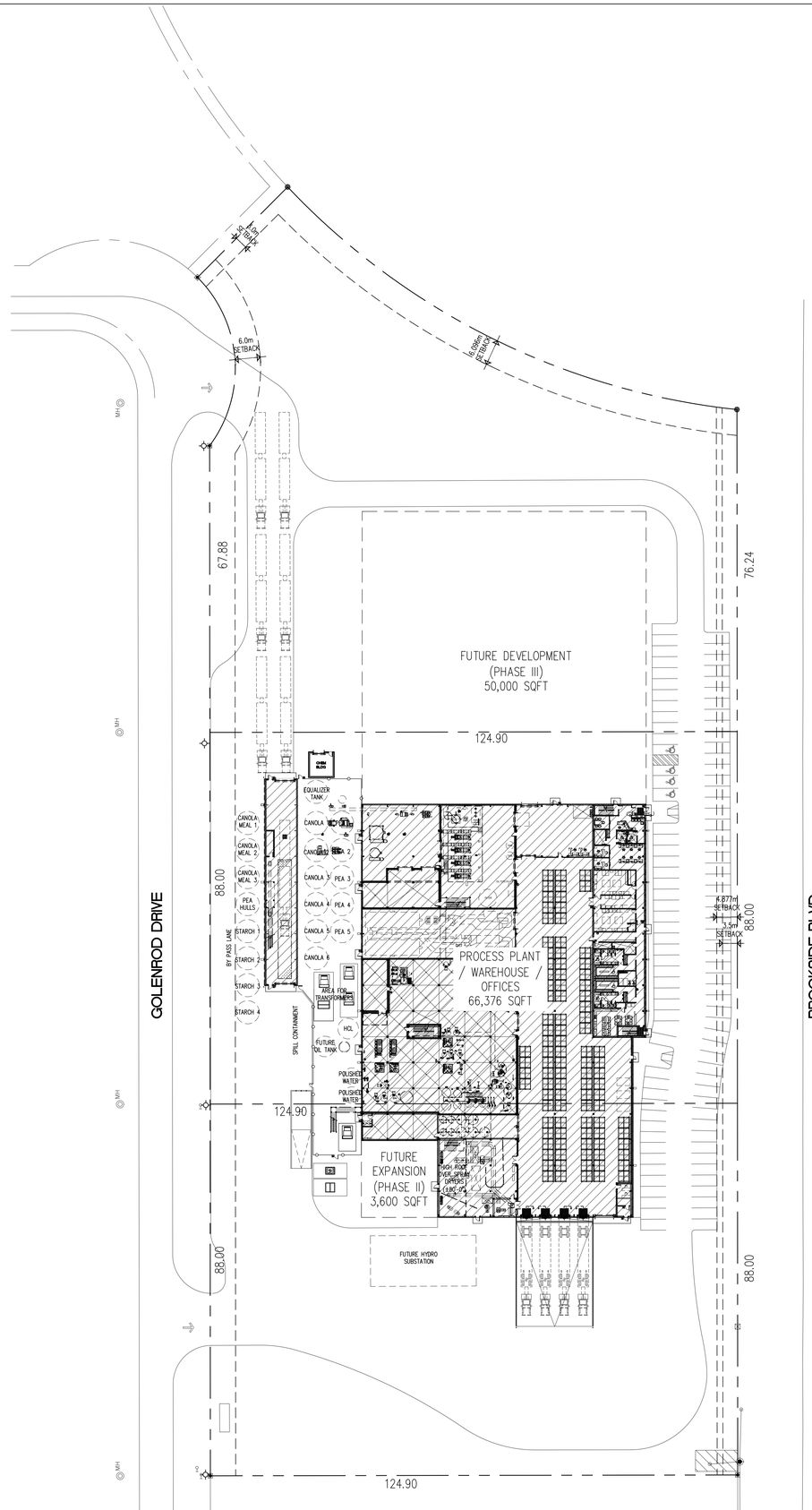
Appendix C

Drawing



SITE VICINITY PLAN

NORTH



SITE KEY PLAN

SCALE: N.T.S.

NORTH PARKING STALLS = 90 (4 HANDICAP)

No:	Date:	Revision
1	2019 11 06	- ISSUE FOR TENDER
2	2019 12 18	- RE-ISSUE FOR TENDER
3	2020 01 04	- ISSUED FOR TENDER, PERMIT & CONSTRUCTION
4		
5		

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RAYMOND S.C. WAN, ARCHITECT
50 WILLOW AVENUE, WINNIPEG, MANITOBA, R3N 0G8
TEL: 204-287-8668 FAX: 204-287-8388

CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL DIMENSIONS AT JOB SITE.

SEAL

PROVINCE OF MANITOBA
RAYMOND S.C. WAN ARCHITECT INC. No. 049
APPROVED ARCHITECTURAL CORPORATION

PROVINCE OF MANITOBA
2020/01/06
RAYMOND S.C. WAN
REGISTERED ARCHITECT

CONSULTANT

RAYMOND S.C. WAN
ARCHITECT
50 WILLOW AVENUE
WINNIPEG MANITOBA
R3N 0G8
TEL: 204-287-8668
FAX: 204-287-8388

OWNER

Merit™ Functional Foods

PROJECT

MERIT FUNCTIONAL FOODS CORPORATION

BIRD

400 GOLDENROD DRIVE
RM ROSSER, MANITOBA

DO NOT SCALE DRAWINGS

ALL DIMENSIONS ARE TO BE CHECKED VERIFIED ON JOB. CONTRACTOR SHALL NOT SCALE DRAWINGS. NOTIFY CONSULTANTS OF ANY DISCREPANCIES.

DRAWN BY: JE/ND

CHECKED BY: RW

DATE: JAN 2020

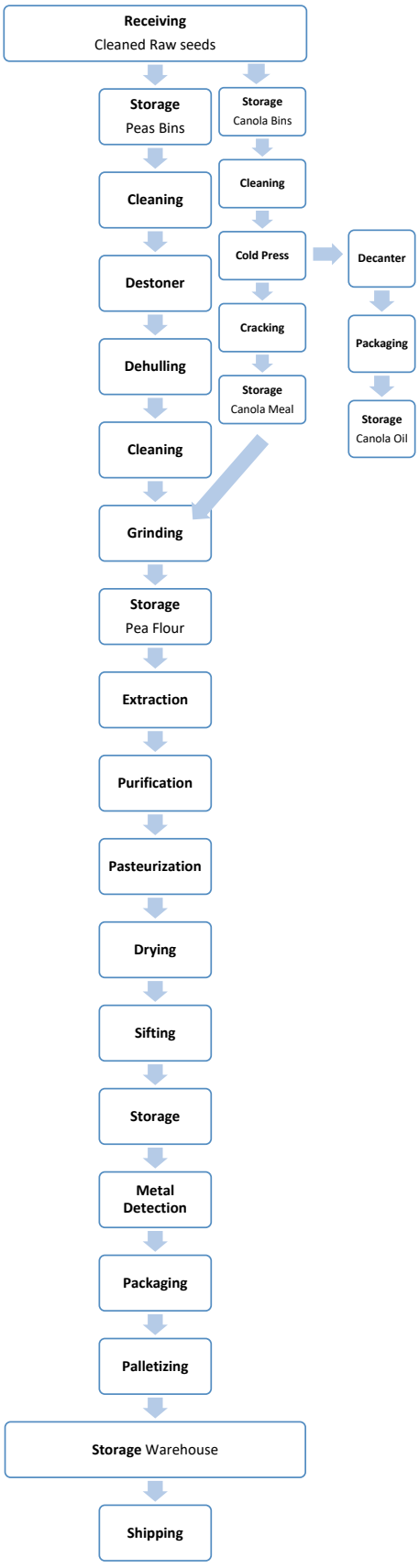
PROJECT	SHEET NO.
19-1984	A0.2

SITE KEY PLAN

Appendix D

Process Flow Overview

Merit Process Flow Overview



Appendix E

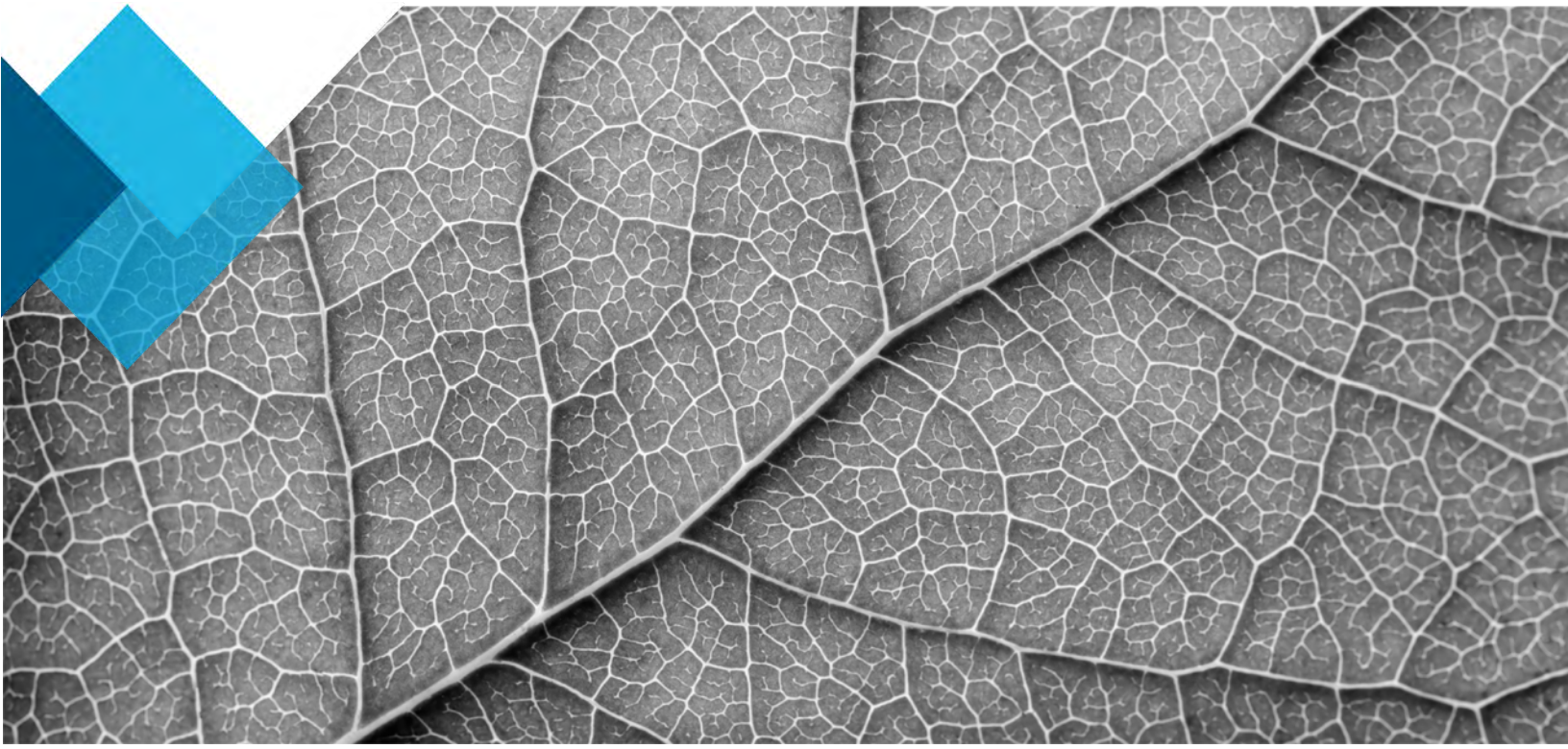
Air Quality Assessment

SNC·LAVALIN

Air Quality Assessment

Merit Pea Canola Protein Processing Plant, Winnipeg MB

Merit Functional Foods Corporation



Environment & Geoscience

10 February 2020

Internal Ref: 667646

Notice to Reader

This report has been prepared and the work referred to in this report has been undertaken by SNC-Lavalin Inc. (SNC-Lavalin), for the exclusive use of Merit Functional Foods Corporation (the Client), who has been party to the development of the scope of work and understands its limitations. The methodology, findings, conclusions and recommendations in this report are based solely upon the scope of work and subject to the time and budgetary considerations described in the proposal and/or contract pursuant to which this report was issued. Any use, reliance on, or decision made by a third party based on this report is the sole responsibility of such third party. SNC-Lavalin accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report.

The findings, conclusions and recommendations in this report (i) have been developed in a manner consistent with the level of skill normally exercised by professionals currently practicing under similar conditions in the area, and (ii) reflect SNC-Lavalin's best judgment based on information available at the time of preparation of this report. No other warranties, either expressed or implied, are made with respect to the professional services provided to the Client. or the findings, conclusions and recommendations contained in this report. The findings and conclusions contained in this report are valid only as of the date of this report and may be based, in part, upon information provided by others. If any of the information is inaccurate, new information is discovered or project parameters change, modifications to this report may be necessary.

This report must be read as a whole, as sections taken out of context may be misleading. If discrepancies occur between the preliminary (draft) and final version of this report, it is the final version that takes precedence. Nothing in this report is intended to constitute or provide a legal opinion.

The contents of this report are confidential and proprietary. Other than by the Client, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of Merit Functional Foods Corporation and SNC-Lavalin.

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Executive Summary

An air quality analysis was completed for Merit Functional Foods Corporation (Merit Foods), addressing the expected air contaminant emissions as well as water vapour emissions during the initial operation phase (Phase 1) as well as a possible later operational phase (Phase 2). Suspended particulate matter (PM, as PM_{10} and $PM_{2.5}$) and plume visibility (including potential surface fogging and icing) are the key focal points of the study.

Dispersion modelling was completed using the expected maximum PM emission rates for the various sources. Emission estimates for NO_x and CO were also completed and used in the dispersion model. The maximum predicted ground-level ambient concentrations at various time averaging periods are shown in **Table A.1**, compared to the applicable government ambient air quality objectives (AQOs). These predictions are at the maximum predicted locations, which are at the facility fenceline in each case. Exceedances of the AQOs are shown in bold. The model also considered sensitive receptors, which include the nearest residences and public facilities such as care homes, recreational centres and hospitals. In all cases, there are no exceedances of the AQOs at any sensitive receptor, for any air contaminant assessed.

Exceedances of the AQOs are predicted, but only at or very near the facility fenceline. These relatively high model predictions are associated with building downwash, which may infrequently fold the plume over towards the ground during moderate to high winds. However, the project $PM_{2.5}$ emissions were conservatively estimated by assuming that all emitted particulate would be the smallest size category ($PM_{2.5}$) and that the emission controls (cyclones and baghouses) would release particulate at their maximum level of 5 mg/m^3 at all hours of the day during a five-year simulation period. The performance of the emissions controls is expected to be better. Monitoring of $PM_{2.5}$ is recommended during the Phase 1 operations to validate the model, and mitigation of the PM emissions if required.

Table A.1 Summary of air quality modelling results at the location of maximum model prediction, Phase 1 and Phase 2

Air contaminant and averaging period	Maximum ground-level model prediction (µg/m^3) Phase 1		Maximum ground-level model prediction (µg/m^3) Phase 2		AQO
	Project contributions	Project + background	Project contributions	Project + background	
$PM_{2.5}$ 24-hour	26.6	**44.6**	**30.2**	**48.2**	28
$PM_{2.5}$ annual	6.3	**12.3**	7.8	**13.8**	10.0
PM_{10} 24-hour	29.7	**71.4**	34.2	**75.9**	50
NO_2 1-hour	319.4	373.0	**458.2**	**511.8**	400
NO_2 24-hour	86.2	125.0	115.7	154.5	200
NO_2 annual	10.3	24.6	13.9	28.2	40
CO 1-hour	812.3	813.2	1023.6	1024.5	34,500
CO 8-hour	326.0	326.8	409.7	410.5	15,000

The NO_2 predictions assume 100% conversion of NO to NO_2 upon release, which is expected to be a gross over-estimate. While an exceedance of the 1-hour objective is shown in **Table A.1** (for Phase 2 only), no exceedances of the NO_2 AQOs are expected, for either phase of operations. The ambient CO predictions are much lower than the AQOs.

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Additional dispersion modelling was conducted for the water vapour that will be released from the facility dryers. The water vapour has the potential for forming visible plumes in the air, as well as surface fogging or icing.

The Phase 1 water vapour emissions, from three facility dryers, were simulated to cause visible plumes longer than 500 m in length up to 81 hours over the five-year simulation period. In rare conditions, the visible plume was simulated up to 2,250 m in length from the facility (one hour over the five-year model period). The plume heights tend to be low, with infrequent heights up to 160 m. Surface fogging and icing was infrequently predicted during cold temperatures with clear skies near to the facility, associated with moderate to high wind speeds and building downwash. Up to 12 hours of surface fogging and 110 hours of surface icing were predicted right at the facility boundary. The potential area of surface fogging and icing extends just beyond Brookside Blvd. adjacent to the facility.

The Phase 2 water vapour emissions from six facility dryers were simulated to cause visible plumes longer than 500 m in length up to 411 hours during the five-year simulation period. In this case the visible plume was simulated to extend up to 3,960 m once during the five years, under similar weather conditions noted for the simulated extreme plume lengths for Phase 1. Up to 43 hours of surface fogging and 447 hours of surface icing were predicted, close to the facility but extending further than the Phase 1 predictions.

The potential surface fogging and icing is associated with building downwash which is influenced by the current plan of short stacks on the dryers (5 feet high). Use of higher stacks would reduce the likelihood of surface fogging and icing and should be considered, particularly for the Phase 2 expansion. If the Phase 1 plans move ahead as expected, monitoring of the Brookside Blvd. for fogging or icing during cold ambient conditions (early morning hours, early evening hours) will be conducted, and mitigation measures to reduce surface fogging and icing will be implemented if required.

Due to the facility's proximity to the Winnipeg International Airport (YWG), flight path data was obtained to evaluate potential water vapour plume effects on air traffic. The great majority of time the visible plumes for both Phase 1 and Phase 2 emissions are predicted to be under 70 m in height and 500 m in length. Even the extreme plume heights and lengths infrequently predicted by the model, which may not occur in reality, do not intersect the flight paths in any cases.

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List of Abbreviations and Acronyms

Term	Definition
AQO	air quality objectives
BPIP	Building Profile Input Program
CAAQS	Canadian Ambient Air Quality Standards
CAC	criteria air contaminants
CALMET	California Meteorological model
CALPUFF	California Puff Model
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
CWS	Canada Wide Standards
ECCC	Environment and Climate Change Canada
MCC	Manitoba Conservation and Climate
Merit Foods	Merit Functional Foods Corporation
MPOI	maximum point of impingement
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NPRI	National Pollutant Release Inventory
$PM_{2.5}$	particulate matter of aerodynamic diameter 2.5 µm or less
PM_{10}	particulate matter of aerodynamic diameter 10 µm or less
RH	relative humidity
SRTM	Shuttle Radar Topography Mission
TSP	total suspended particulates
US EPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator (coordinate system)

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List of Units

Term	Definition
°C	degrees Celsius
g/s	grams per second
^{o}K	degrees Kelvin
kg/h	kilogram per hour
km	kilometre
m	metre
m/s	metres per second
m^3/min	cubic metre per minute
Sm^3/min	standard cubic metres per minute
masl	metres above seal level
mg/m^3	milligrams per cubic metre
µg/m^3	micrograms per cubic metre
SCFH	standard cubic feet per hour

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1 Introduction

SNC-Lavalin Inc. (SNC-Lavalin) was retained by Merit Functional Foods Corporation (Merit Foods) to develop a project emissions inventory and air dispersion model for their proposed Merit Pea Canola Protein Processing Plant. The air dispersion model will support the Environment Act Proposal for the project.

Merit Foods plans to develop a 20,000 t/y pea and canola processing facility (Phase 1) and expand to a 50,000 t/y facility (Phase 2). The proposed facility is located just northwest of the City of Winnipeg, Manitoba, in the Rural Municipality (RM) of Rosser (**Figure 1.1**). The facility will process protein from yellow field peas and canola for use as an ingredient in other food products.

This report describes the air dispersion model, including an emissions inventory of the facility for both Phase 1 and Phase 2 and the model predictions of maximum predicted off-site air concentrations. Modelling is completed for both criteria air contaminants (CACs) and water vapour. Predictions of CACs are required to establish conformance with the provincial ambient air quality objectives (AQOs) and predictions of visible water vapour are used to assess potential fogging and icing in the local area. The plant's emission sources are primarily associated with suspended particulate matter (PM) and water vapour, due to use of industrial dryers. In addition to PM, estimates of nitrogen oxide (NO_x) and carbon monoxide (CO) are made to establish conformance with the AQOs for these air contaminants.

1.1 Facility Overview

The property is located on approximately 3.43 ha of land in the BrookPort Business Park at 400 Goldenrod Drive in the RM of Rosser, just northwest of the City of Winnipeg, Manitoba (**Figure 1.1**). One 88,000 square foot main building will be used to house the operations, including warehouse, offices and processing rooms. The processing rooms include a milling room, a wet-process room, a starch drying room and a spray drying room. An additional, adjacent outbuilding will be used for loading and weighing operations. All product to and from the facility will be moved by B-trains (tractor-trailers). The facility will also have grain bins for raw materials and by-products.

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LEGEND

- SITE LOCATION
- RAILWAY
- HIGHWAY

NOTES

1. COORDINATE SYSTEM: NAD 1983 UTM ZONE 14N.
2. SERVICE LAYER CREDITS: © 2020 MICROSOFT CORPORATION © 2020 HEREIN© 2020 MICROSOFT CORPORATION EARTHSTAR GEOGRAPHICS SIO.

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REFERENCE DRAWINGS

DWG No.	DESCRIPTION

REVISIONS

REV	DATE	DESCRIPTION	DES	DRN	CHK	APP
00	2020 02 07	ISSUED FOR INFORMATION	LM	KG	BM	LM

0 500 1,000 2,000 3,000 4,000 METRES

SCALE: 1:100,000

SNC·LAVALIN

CLIENT	PROJECT LOCATION
MERIT FUNCTIONAL FOODS	RM OF ROSSER

TITLE

LOCATION PLAN

DATE	2019 08 13	DWG No.	667646-0000-4GDD-0012	FIG No.1.1	REV	00

SIZE 11x17

Path: \\SLI16531\Projects QMS\Merit Functional Foods\667646_EA Proposal Merit Pea Canola Protein Proc. Plant\40_Execution\45_GIS_Dwgs\4.5.1 GIS\667646-0000-4GDD-0012 Location Plan Air.mxd

2 Dispersion Model

The 2006 *Guidelines for Air Dispersion Modelling in Manitoba* (MCC, 2006) was reviewed to identify an appropriate computer dispersion model and configuration choice. Of the supported models in the guideline, the California Puff Model (CALPUFF) was chosen for its ability to represent multi-source, conventional emission sources as well as water vapour plumes. A dispersion model plan was developed and shared with the Environmental Approvals Branch of Manitoba Conservation and Climate (MCC), as summarized in the following sections.

2.1 Meteorological Simulation

The site is flat and located near several surface meteorological stations. A five-year simulation period was used, to account for the potential variability in surface winds and other meteorological parameters that influence transport and dispersion of contaminants. Data from the Winnipeg International Airport surface meteorological station and The Pas upper air meteorological station were retrieved from Environment and Climate Change Canada (ECCC) and the National Oceanic and Atmospheric Administration (NOAA) Center for Atmospheric Sciences and Meteorology (NOAA, 2019), respectively. The collected datasets were reviewed for errors and quality control before being processed. A summary of the meteorological data review is provided in Attachment I.

The California Meteorological model (CALMET) is part of the CALPUFF suite of computer simulation and processing tools. CALMET requires the definition of a modelling domain, including surface topographical heights and geophysical parameters. Data and definitions for the meteorological modelling domain are as follows:

- Grid spacing and extent: 250 m horizontal resolution, 24 km by 24 km, centered on the proposed plant;
- Terrain heights from Shuttle Radar Topography Mission (SRTM), made available from MCC (2019b) (**Figure 2.1**); and
- Geophysical assignments from Open Government Canada (Government of Canada, 2019), 2010 land use data at 30 m resolution (**Figure 2.2**).

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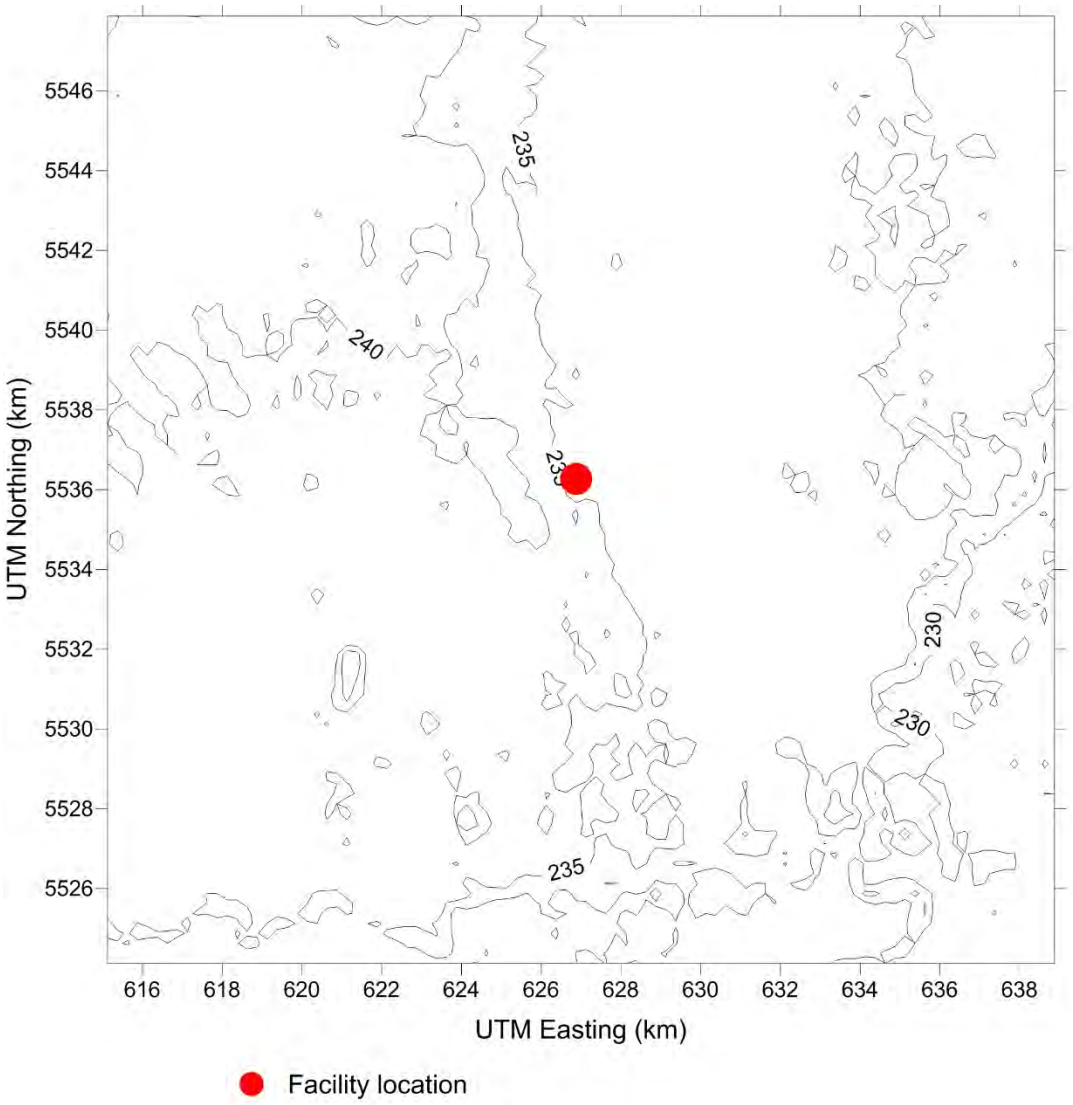

Figure 2.1 CALMET topographical heights (metres above sea level)

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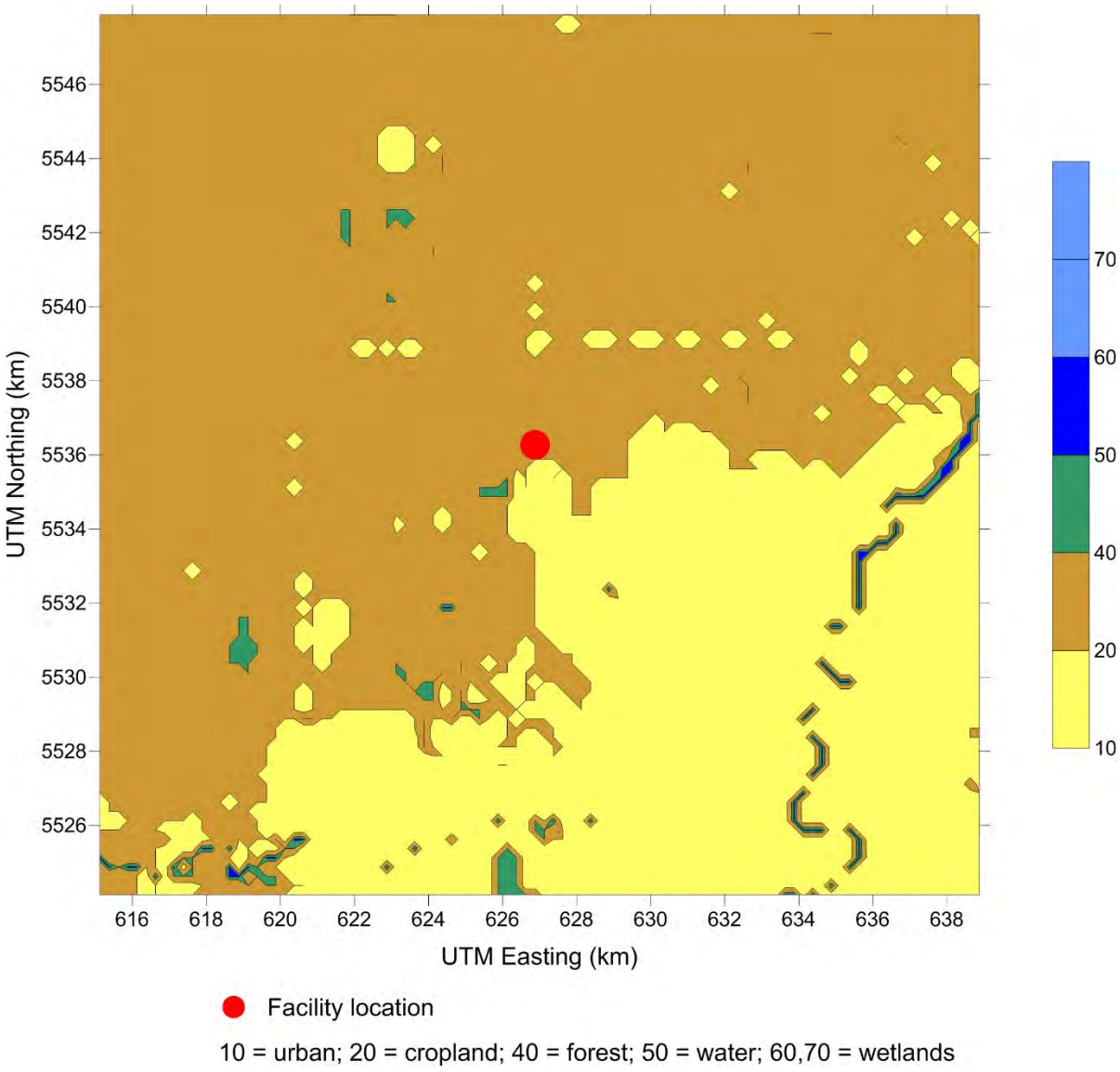

Figure 2.2 CALMET land use assignments

The predicted surface wind distribution at the proposed facility is plotted on a windrose diagram (**Figure 2.3**). The dominant wind is from the northwest, although there are contributions from all directions over the five-year period.

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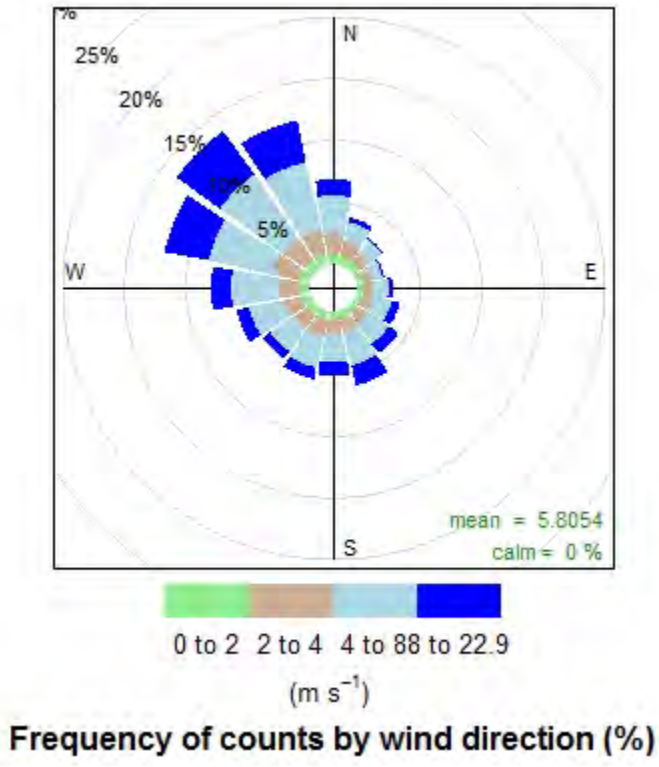

Figure 2.3 CALMET predicted surface winds (windrose diagram) at the proposed plant, 2014 to 2018

2.2 Air Quality Simulation

2.2.1 Facility Sources

The facility layout is shown in **Figure 2.4**, including all Project sources for both Phases 1 and 2.

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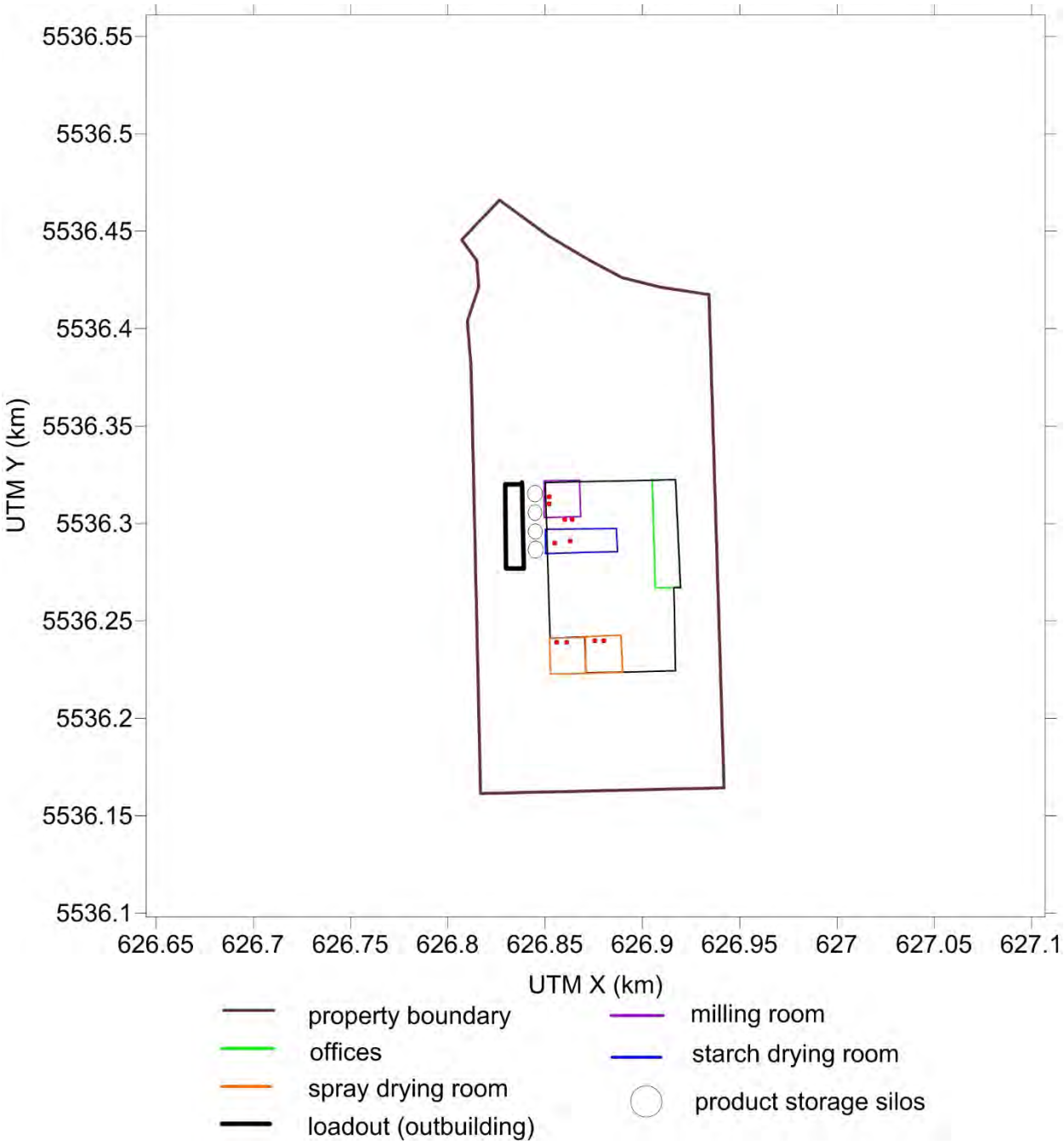

Figure 2.4 Facility layout

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Emission estimates were developed based on the emission source criteria and the emission controls expected to be used (for particulate matter). In addition to the source criteria provided by the equipment manufacturers, Merit Foods provided the estimated annual gas consumption for the boilers and heaters. The gas consumption by source, in standard cubic feet per hour (SCFH), is identified in **Table 2.1**.

Table 2.1 Natural gas consumption by source

Operations Phase	Source	Consumption in Winter (SCFH)
1	Mariot Walker Model 14T dryer	8,776
1	Mariot Walker Model 10.5T dryer	3,466
1	Bepex Dryer 1	22,500
1	Boiler 1	16,239
1	Boiler 2	16,239
1	Facility heating	1,700
1	Makeup air loads	3,000
2	Bepex dryer 2	22,500
2	Mariot Walker Model 14T dryer	8,776
2	Mariot Walker Model 10.5T dryer	3,466
Phase 1 total		71,920
Phase 2 total		106,662

A summary of the source emission rates is shown in **Table 2.2**. Further discussion of emission estimates is provided in **Section 2.2.1.2**. The additional source characteristics required for the dispersion model are shown in **Table 2.3**. Some of the source parameters were not available at the time and conservative estimates were made. These estimates are shown in **Table 2.3** in red.

Table 2.2 Source emission rates

Source Name and Location	Operations Phase (1 or 2)	PM Concentration (mg/m^3)	PM Emission (g/s)	NO_x Emission (g/s)	CO Emission (g/s)
Marriot Walker Model 10.5T dryer	1	5	0.032	0.022	0.037
Marriot Walker Model 14T dryer	1	5	0.074	0.055	0.093
Marriot Walker Model 10.5T dryer	2	5	0.032	0.022	0.037
Marriot Walker Model 14T dryer	2	5	0.074	0.055	0.093
Boiler 1 (400 hp)	1	n/a	0.016	0.103	0.172
Boiler 2 (400 hp)	1	n/a	0.016	0.103	0.172
Bepex Dryer 1	1	5	0.108	0.142	0.239
Bepex Dryer 2	2	5	0.054	0.142	0.239
Baghouse 1	1	5	0.021	0.000	0.000
Baghouse 2	1	5	0.007	0.000	0.000
Total (Phase 1)			**0.273**	**0.424**	**0.713**
Total (Phase 2)			**0.433**	**0.644**	**1.081**

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Table 2.3 Source characteristics (estimated parameters shown in red)

Source Name and Location	Operations Phase (1 or 2)	Location in Figure	Stack Volumetric Flow (m^3/min)	Stack Height from Ground (m)	Stack Diameter (m)	Location (UTM X)	Location (UTM Y)	Exit Velocity (m/s)	Exit Temp (°C)	Building Tier Height (m)
Marriot Walker Model 10.5T dryer	1	spray drying room	383	25.9	0.76	626.880	5536.240	14.1	38.5 - 53.8	24.4
Marriot Walker Model 14T dryer	1	spray drying room	887	25.9	1.14	626.876	5536.240	14.5	38.6 - 54.3	24.4
Marriot Walker Model 10.5T dryer	2	spray drying room	383	25.9	0.76	626.861	5536.240	14.1	38.5 - 53.8	24.4
Marriot Walker Model 14T dryer	2	spray drying room	887	25.9	1.14	626.856	5536.240	14.5	38.6 - 54.3	24.4
Boiler 1 (400 hp)	1	adjacent to milling room	n/a	14.3	0.3	626.860	5536.302	10.0	100	12.8
Boiler 2 (400 hp)	1	adjacent to milling room	n/a	14.3	0.3	626.864	5536.302	10.0	100	12.8
Bepex Dryer 1	1	starch drying room	1,300	14.3	1.4	626.855	5536.290	19.2	52	12.8
Bepex Dryer 2	2	Starch drying room	1,300	14.3	1.4	626.855	5536.290	19.2	52	12.8
Baghouse 1	1	Milling room	251	14.3	0.4	626.852	5536.314	10.0	27	12.8
Baghouse 2	1	Milling room	79	14.3	0.3	626.852	5536.310	10.0	27	12.8

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2.2.1.1 Other Facility Sources

While all of the significant conventional sources identified by Merit Foods to SNC-Lavalin are identified in **Table 2.2** and **Table 2.3**, the 'loadout' area shown in **Figure 2.4** may be a source of fugitive dust and further information was received from Merit Foods to characterize the potential dust emissions. The loadout area is planned to be a covered structure open on either end for trucks to enter and exit. Raw peas and canola will be unloaded within a closed garage. The loading of by-products will also take place in a closed garage, where material will flow through a red wing nozzle to minimize dust. For these reasons, the loadout area is not expected to be a significant source of dust. Fugitive dust emissions from the movement of trucks throughout the property are also not expected to be significant, as a recycled asphalt material is planned to be used for the traffic areas.

2.2.1.2 Other Industrial Sources

There are no existing industrial emission sources within 5 km of the proposed plant (based on 2017 NPRI data) and therefore no additional emission sources were included in the dispersion modelling.

2.2.1.3 Emission Controls

The emission rates shown in **Table 2.2** relate to the expected processing operations and emissions controls that will be used for each source. With the exception of the boilers, baghouses will be used on all sources. The dryers will additionally use a cyclone paired with a baghouse (termed cyclofilter) to ensure the PM emissions are as low as possible. The cyclones are effective at removing larger particulate from the exhaust stream. The baghouses that follow the cyclones will be effective at removing much of the remaining PM. All dryers are characterized with a maximum PM concentration in the exhaust of 5 mg/m^3 based on expectations provided by the equipment manufacturers. The baghouses in the milling room are also characterized with a 5 mg/m^3 limit. The boilers, including the dryer burners have low NO_x burners and do not require further exhaust treatment as PM emissions are very low. Both the NO_x and the CO emission rates for the boilers and dryer burners were calculated using the United States Environmental Protection Agency (EPA) AP-42 Compilation of Emission Factors (US EPA, 2006).

The PM controls are considered to be best practice treatment for sources of this nature and the actual performance of the cyclofilters is expected to be better than 5 mg/m^3.

2.2.1.4 Structure Downwash

The Building Profile Input Program (BPIP) was used to calculate the additional source parameters required to estimate the influence of buildings and structures on the stack emissions. These structures were simulated in the program AERMOD View 9.7.0 to develop the BPIP parameters directly (**Table 2.4**).

Table 2.4 Building parameters used for BPIP

Structure	Tier	Height (m)	Length (m)	Width (m)
Main building	1	12.8	99	66
Main building (spray drying room)	2	24.4	39	20
Loadout	1	10	38	9
Storage silos (8)	1	10	dia. = 8.5	dia. = 8.5

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2.2.1.5 Receptors

CALPUFF requires specific locations or 'receptors' to make its ambient predictions. These receptors are set on a defined grid according to requirements in the provincial modelling guidelines (MCC, 2006). Sensitive receptors are also required, at nearby locations such as schools, hospitals and care homes. The sensitive receptors used in the model are identified in **Table 2.5** and **Figure 2.5** and a visualization of the full receptor grid is shown in **Figure 2.6**. There are no sensitive receptors near to the facility.

Table 2.5 Sensitive receptor locations

Name	Number	UTM x (km)	UTM y (km)	Elevation (m)
O.V. Jewitt Community School	1	630.576	5534.837	231
Maples Recreation Association Rink	2	630.842	5535.111	231
Maples Personal Care Home	3	630.280	5535.765	232
Gurd Wara Kalgidhar Darbar	4	628.621	5535.836	232
Seven Oaks General Hospital	5	632.793	5535.159	232
Little Mountain Sportsplex	6	625.096	5535.308	240
Farm: King Edward St. and Mayberry St.	7	628.420	5537.945	232
Farm: Hyacinth St.	8	627.314	5537.696	233

2.2.1.6 Water Vapour

Water vapour emissions are required to be estimated for every hour of the year using temperature profiles. The CALPUFF Flue Gas Emission (FGEMISS, V1.0_L011107) utility was used to develop an hour by hour water vapour emission file used for CALPUFF in 'FOG' mode. The inputs for FGEMISS for the Bepex 1 source are shown in **Table 2.6**. Profiles for each water vapour source were developed from data provided by the dryer manufacturers.

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Table 2.6 Temperature profile information for Bepex 1

Ambient Temp (ºC)	Outlet Air Flow (sm^3/min)	Assumed Relative Humidity (%)	Product Feed Rate (kg/hour)	Moisture Loss (%)	Moisture Loss (kg/h)	Moisture from Combustion Reaction (kg/h)	Moisture From Inlet Air (kg/h)	Condensed Moisture in System (kg/h)	Total Moisture Emission (kg/h)	Exhaust Temp (ºC)	Exhaust Flow (m^3/min)	Exit V (m/s)
-35	1,300	70	6,810	55	3,745.5	796.1	10.1	413.0	4,138.7	46.7	1,522.4	16.5
-30	1,300	70	6,810	55	3,745.5	794.7	17.2	413.0	4,144.3	46.8	1,522.9	16.5
-25	1,300	70	6,810	55	3,745.5	793.7	36.9	413.0	4,163.1	47.0	1,523.7	16.5
-20	1,300	70	6,810	55	3,745.5	792.3	57.4	413.0	4,182.2	47.1	1,524.2	16.5
-15	1,300	70	6,810	55	3,745.5	790.9	92.9	413.0	4,216.2	47.2	1,524.7	16.5
-10	1,300	70	6,810	55	3,745.5	789.5	129.7	413.0	4,251.6	47.4	1,525.5	16.5
0	1,300	70	6,810	55	3,745.5	786.9	275.4	413.0	4,394.8	47.7	1,526.9	16.5
5	1,300	70	6,810	55	3,745.5	785.5	413.5	413.0	4,531.5	47.8	1,527.4	16.5
15	1,300	70	6,810	55	3,745.5	782.6	808.8	413.0	4,923.9	48.1	1,528.7	16.6
20	1,300	70	6,810	55	3,745.5	781.5	1,069.7	413.0	5,183.6	48.2	1,529.5	16.6
30	1,300	70	6,810	55	3,745.5	779.1	1,970.9	413.0	6,082.5	48.4	1,530.6	16.6
40	1,300	70	6,810	55	3,745.5	776.7	3,491.0	413.0	7,600.3	48.7	1,531.8	16.6

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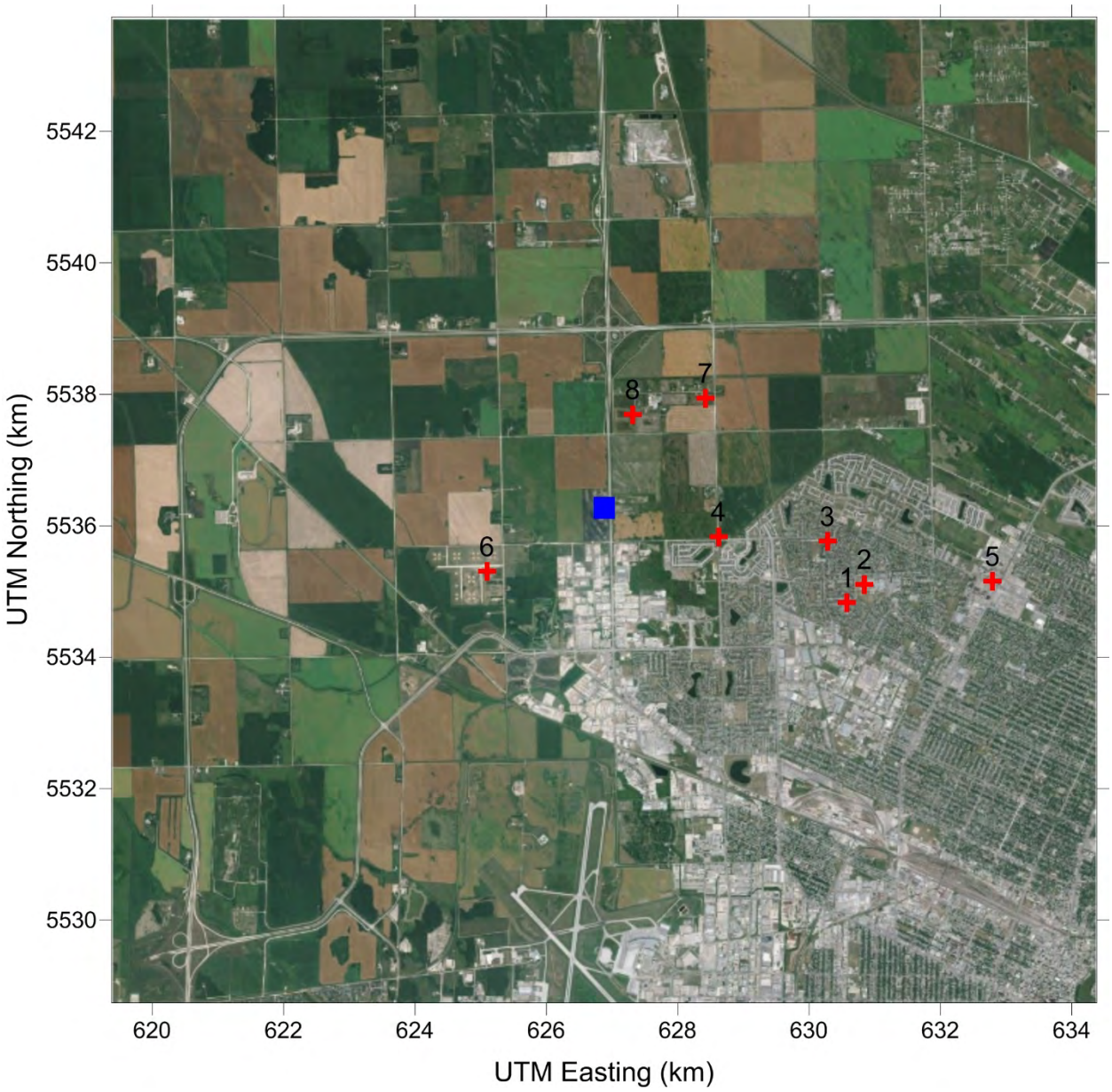

Figure 2.5 Location of sensitive receptors in model (proposed plant shown in blue)

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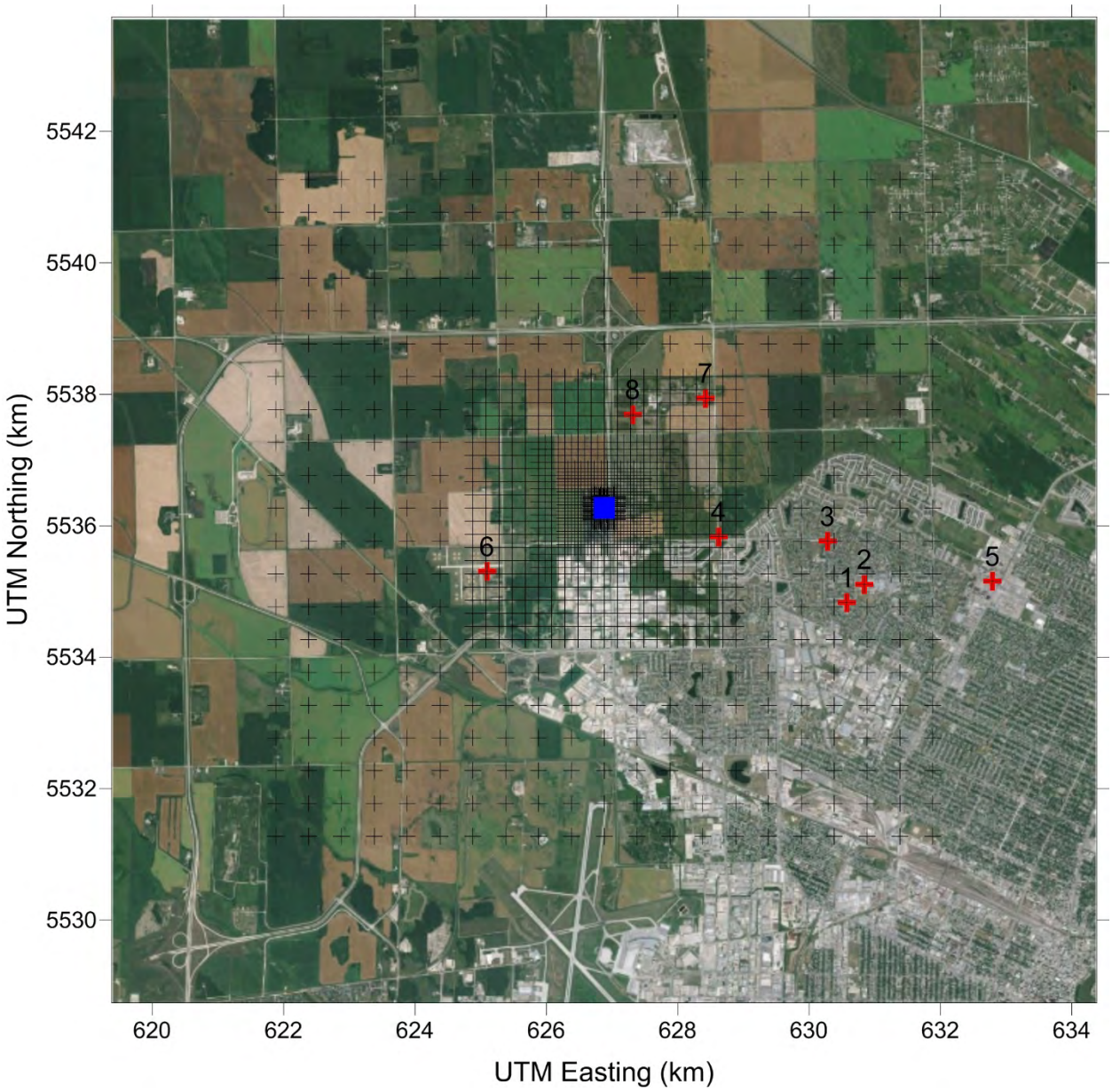

Figure 2.6 Model receptor grid (proposed plant shown in blue)

2.2.2 Government Air Quality Objectives

Relevant government ambient air quality objectives (AQOs) are shown in **Table 2.7** for the provincial standards and **Table 2.8** for the national standards. The current 24-hour $PM_{2.5}$ AQO is 28 µg/m^3, as the Canadian Ambient Air Quality Standard (CAAQS) for $PM_{2.5}$ is used by the province directly. The other CAAQS values are relevant to community air quality levels and are not used for fenceline compliance evaluation in this study.

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Table 2.7 Manitoba ambient air quality criteria[a]

Substance	Averaging Time	AQO (µg/m³)
Nitrogen Dioxide (NO_2)	1-hour	400
	24-hour	200
	Annual	60[b]
Carbon Monoxide (CO)	1-hour	34,500 (30 ppm)
	8-hour	15,000 (13 ppm)
Total Suspended Particulate Matter (TSP)	24-hour	120
	Annual	70
Particulate Matter <10 µm (PM_{10})	24-hour	50
Particulate Matter <2.5 µm ($PM_{2.5}$)[c]	24-hour	30[d]

[a] https://www.gov.mb.ca/sd/envprograms/airquality/pdf/criteria_table_update_july_2005.pdf
[b] maximum desirable level
[c] The three-year average of the annual 98th percentile of the daily 24-hour average concentrations
[d] The Canada Wide Standard (CWS) is adopted, which is now considered to be superseded by the CAAQS value of 28 (98th percentile average over 3 years)

Table 2.8 Canadian Ambient Air Quality Standards (CAAQS)

Substance	Averaging Time	CAAQS (ppb)	CAAQS (µg/m³)	Year
Nitrogen Dioxide (NO_2)	1-hour [a]	-	-	Current
	1-hour [a]	60	113	2020
	Annual [b]	-	-	Current
	Annual [b]	17	32	2020
Fine Particulate Matter <2.5 µm ($PM_{2.5}$)	24-hour [c]	-	28	Current
	24-hour [c]	-	27	2020
	Annual [d]	-	10	Current
	Annual [d]	-	8.8	2020

[a] Three-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
[b] Average over a single calendar year of all 1-hour concentrations
[c] Three-year average of the annual 98th percentile of the daily 24-hour average concentrations
[d] Three-year average of annual average of all 1-hour concentrations

2.2.3 Background Concentrations

'Background' air quality concentrations are added to the model predictions for conformance with the relevant air quality objectives (AQOs). The background values are calculated according to the Ontario Dispersion Modelling Guidelines where applicable (Ontario Ministry of Environment, 2017). For short-term concentrations, the 98th percentile value ('98th') is used. Annual averages are used for annual average background concentrations. The available air quality stations, indicating the parameters measured, are identified in **Table 2.9**. The data for the two stations are summarized in **Table 2.10** and **Table 2.11.** Data were downloaded from the provincial data repository (MCC, 2019a)**.**

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Table 2.9 Available monitoring data for background

Station Name	Period of Record	Contaminants Measured
Winnipeg Scotia St.	2016 to 2018	CO, NO, NO_2, $PM_{2.5}$
Winnipeg Ellen St.	2016 to 2018	CO, NO, NO_2, SO_2, $PM_{2.5}$, PM_{10}

Each of the station datasets have missing periods and additionally have erroneous data (multiple negative values). For this reason, some of the data cannot be used. In addition, the influence of forest fires is suspected for at least one of the recent years. Where data are identified in the two tables below, the annual datasets are more than 75% complete.

Table 2.10 Summary of Winnipeg Scotia St. data

Species		2016		2017		2018		Average
		max	98th	max	98th	max	98th	98th
CO (ppm)	1 hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8 hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NO_2 ($\mu g/m^3$)	1 hr	n/a	44.0	n/a	50.9	n/a	n/a	47.5
	24 hr	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	annual	18.6	n/a	21.8	n/a	n/a	n/a	20.2
$PM_{2.5}$ ($\mu g/m^3$)	24 hr	n/a	17.2	n/a	18.5	n/a	26.2	17.8
	annual	6.3	n/a	10.7	n/a	11.7	n/a	8.5

Notes: $PM_{2.5}$ and NO_2 averages use 2016-2017 data only (2018 data influenced by forest fires for $PM_{2.5}$ and has bad data for NO_2); CO datasets are incomplete for each year

Table 2.11 Summary of Winnipeg Ellen St. data

Species		2016		2017		2018		Average
		max	98th	max	98th	max	98th	98th
CO (ppm)	1 hr	3.3	0.9	n/a	n/a	n/a	n/a	0.9
	8 hr	2.0	0.8	n/a	n/a	n/a	n/a	0.8
NO_2 ($\mu g/m^3$)	1 hr	n/a	59.2	n/a	51.7	n/a	50.0	53.6
	24 hr	n/a	43.6	n/a	35.2	n/a	37.6	38.8
	annual	15.0	n/a	14.0	n/a	13.9	n/a	14.3
$PM_{2.5}$ ($\mu g/m^3$)	24 hr	n/a	11.2	n/a	18.6	n/a	24.2	18.0
	annual	5.0	n/a	6.2	n/a	6.7	n/a	6.0
PM_{10} ($\mu g/m^3$)	24 hr	66.7	46.6	62.0	36.8	109.8	43.1	41.7

Notes: CO datasets for 2017 and 2018 are incomplete

The Ellen St. data are chosen for the background concentrations since the data are more complete than the Scotia St. data. The $PM_{2.5}$ and PM_{10} background levels are considered high and may be affected by forest fire or other influences.

2.3 Dispersion Model Predictions: Phase 1 CACs

Model predictions are available for the five years modelled (2014 to 2018). Where needed to establish conformance with the AQO, the maximum three-year average (from three contiguous years) is shown. Otherwise, the maximum value from the model is identified. All plots of the model concentrations are shown on a background 3 km by 3 km map, since the model impacts are very low beyond approximately 500 m from the property. There are no sensitive receptors within this area. However, the model predictions at all

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sensitive receptor locations, as well as the maximum point of impingement (MPOI) are shown in the summary tables for each air contaminant assessed.

2.3.1 $PM_{2.5}$

$PM_{2.5}$ predictions are made by conservatively assuming that all of the particulate in the exhaust streams is $PM_{2.5}$. In reality, some of the particulate would be within the larger size groupings (PM_{10} and to a lesser degree TSP). However, it is expected that most of the particulate will be $PM_{2.5}$, since the emission controls are more effective with the larger sized particulates.

The maximum ground-level model predictions are displayed in **Table 2.12**. The maximum 3-year average is shown for the 24-hour (98th percentile) concentrations, consistent with the CAAQS standard. The maximum is associated with the first three years of data in the model (2014 to 2016). Model predictions for every simulated year are provided in Attachment II. Any prediction exceeding an AQO is displayed in bold.

Table 2.12 $PM_{2.5}$ maximum model predictions (24-hour AQO = 28; annual AQO = 10)

Receptor	Maximum 24-hour prediction (µg/m^3)			Maximum annual prediction (µg/m^3)		
	Model	Background	Model + background	Model	Background	Model + background
MPOI	26.6	18	**44.6**	6.3	6	**12.3**
1	0.1	18	18.1	0.0	6	6.0
2	0.1	18	18.1	0.0	6	6.0
3	0.1	18	18.1	0.0	6	6.0
4	0.5	18	18.5	0.1	6	6.1
5	0.0	18	18.0	0.0	6	6.0
6	0.3	18	18.3	0.0	6	6.0
7	0.3	18	18.3	0.0	6	6.0
8	0.6	18	18.1	0.1	6	6.1

An exceedance of the 24-hour AQO and the annual average AQO is predicted at the maximum point of impingement (MPOI), but only when the background concentration is added to the Project contributions. As shown in **Figure 2.7** and **Figure 2.8**, the predicted 24-hour exceedance when background is added occurs right at the east and west property fencelines and extends less than 100 m.

The predicted annual average concentrations are shown in **Figure 2.9** and **Figure 2.10** for Project contributions and Project contributions with background, respectively. The model predictions are very low except right near the property fenceline. The predictions at all sensitive receptors are compliant with the CAAQS.

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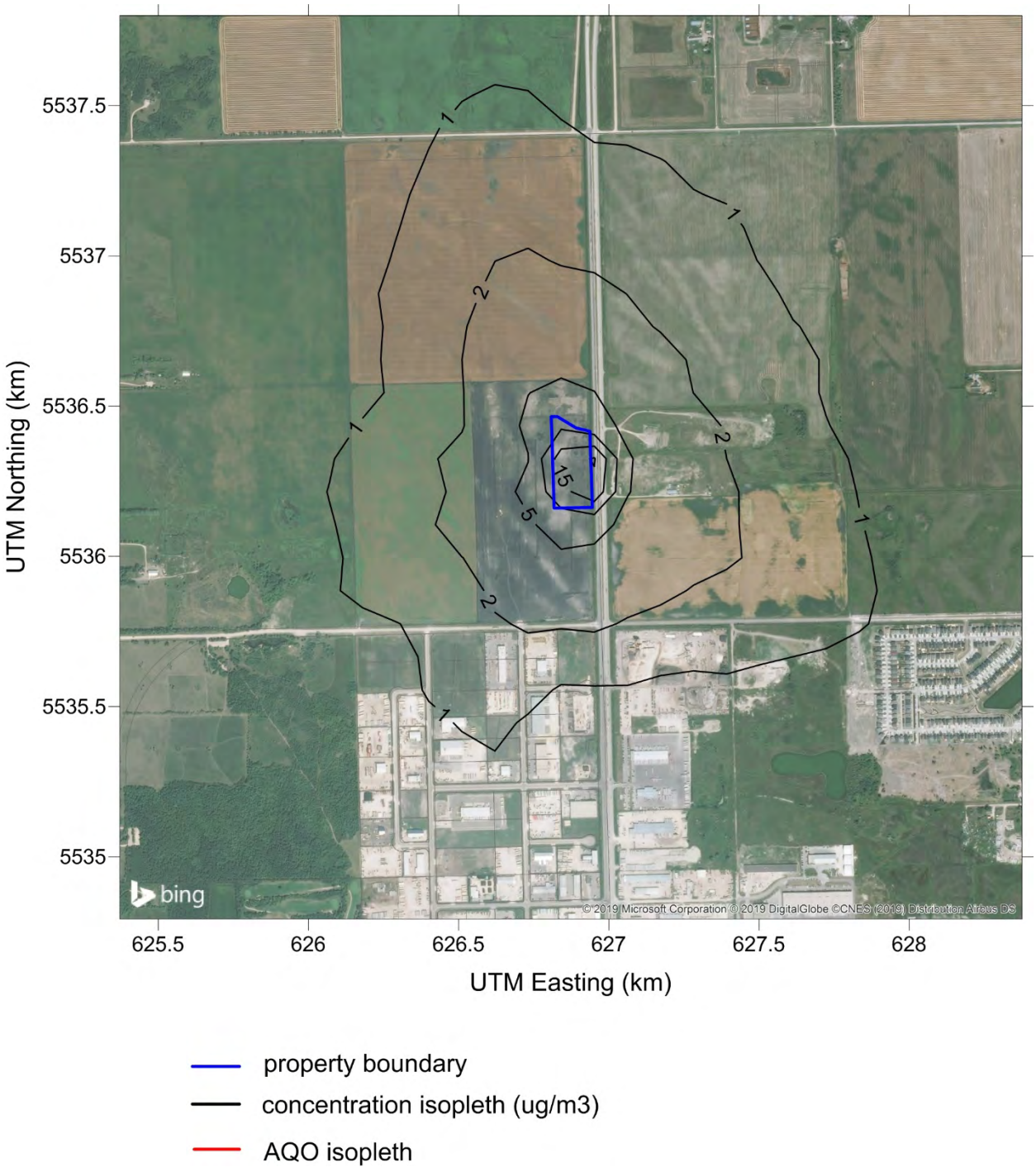

Figure 2.7 Maximum predicted 24-hour $PM_{2.5}$ concentrations (average 98th percentile 2014 to 2016), Project sources only (Phase 1)

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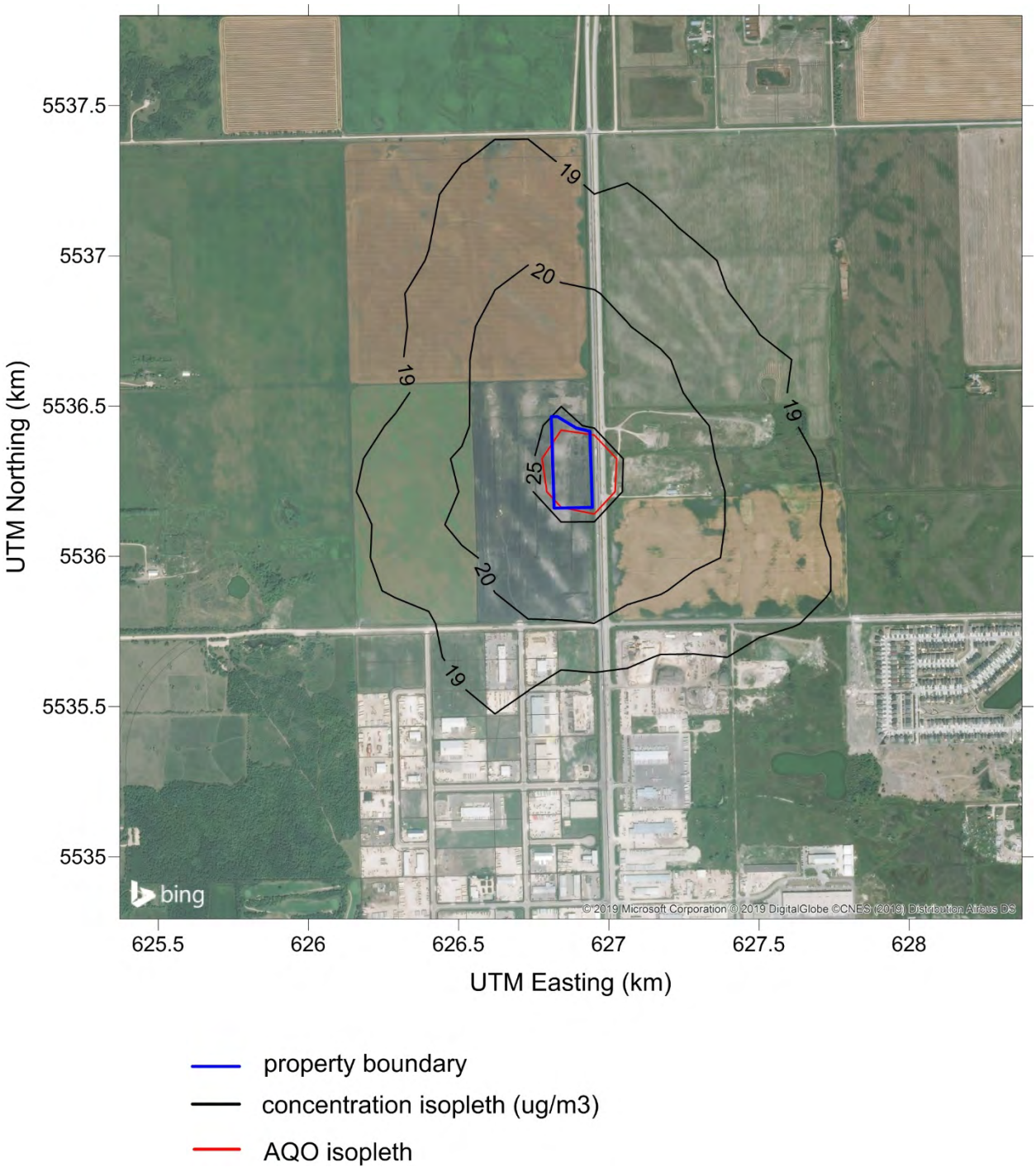

Figure 2.8 Maximum predicted 24-hour $PM_{2.5}$ concentrations (average 98th percentile 2014 to 2016), Project sources with background (Phase 1)

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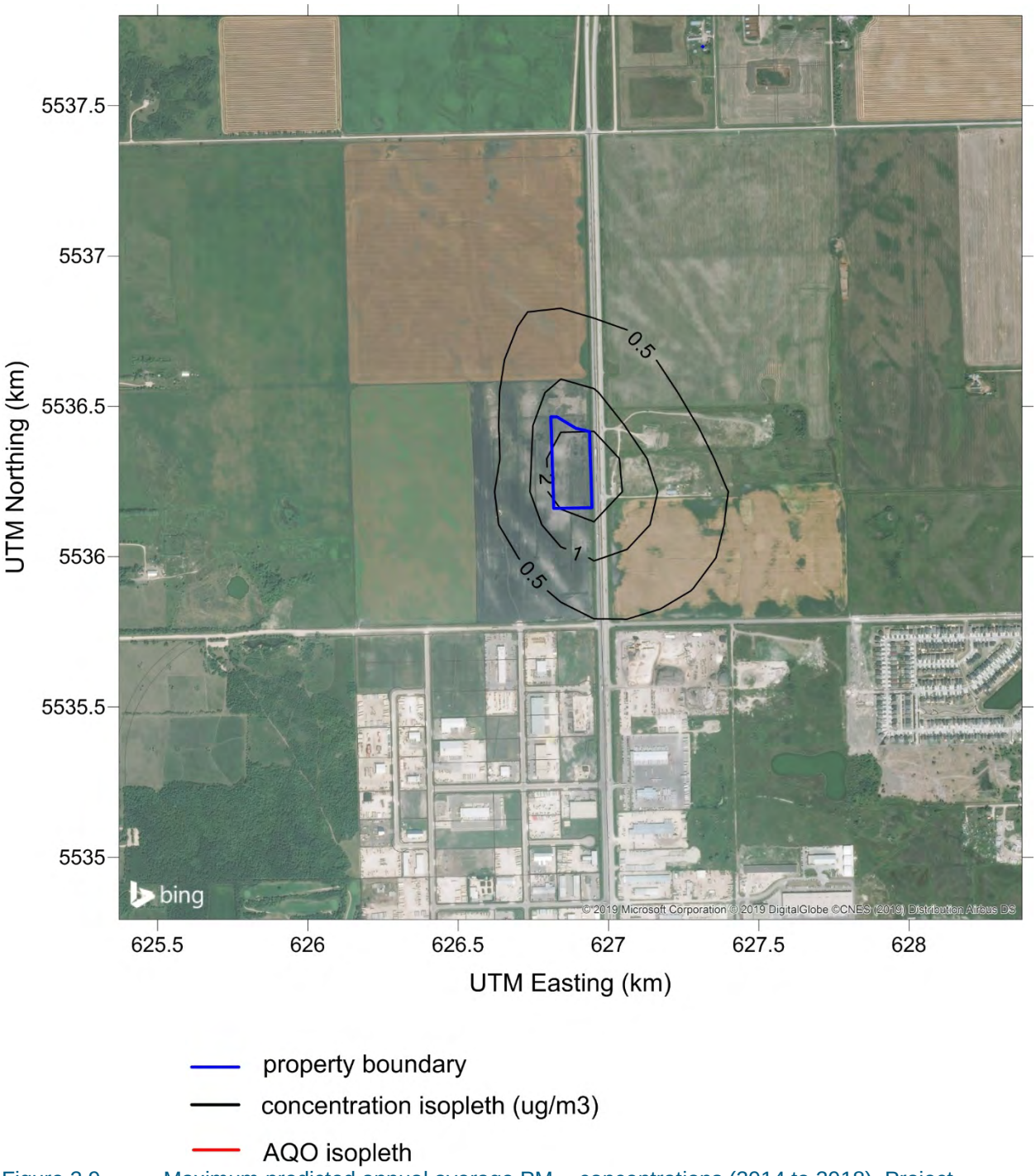

Figure 2.9 Maximum predicted annual average $PM_{2.5}$ concentrations (2014 to 2018), Project sources only (Phase 1)

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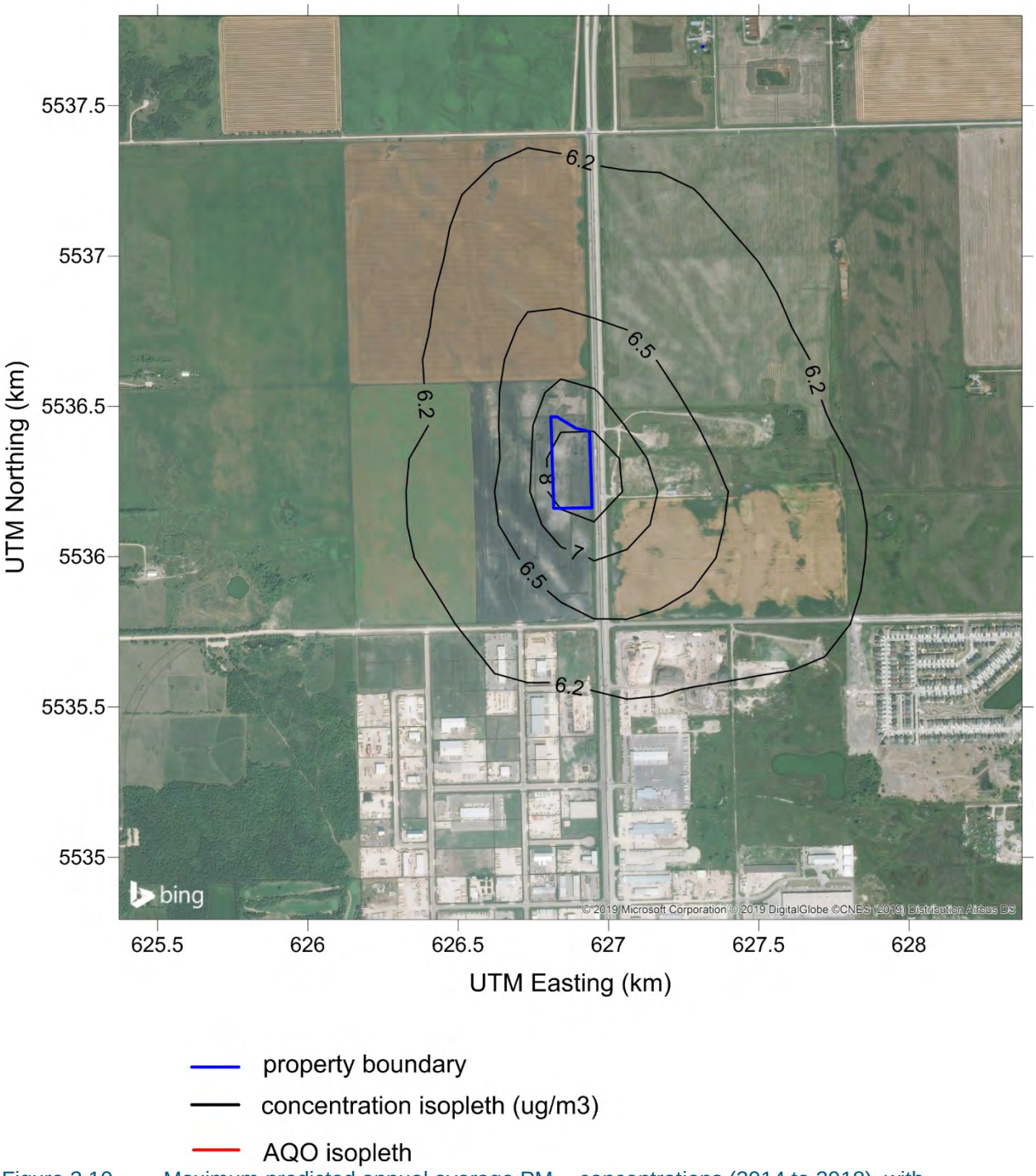

Figure 2.10 Maximum predicted annual average $PM_{2.5}$ concentrations (2014 to 2018), with background (Phase 1)

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