

APPENDIX II

SUMMARY RESULTS OF AIR QUALITY MODELLING

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II.1 INTRODUCTION

This appendix summarizes all air quality dispersion modelling results for the updated Air Quality Assessment for the proposed Gahcho Kué Project (Project).

II.2 REGIONAL PREDICTIONS FOR YEAR 1, YEAR 5 AND YEAR 8 EMISSION SCENARIOS

The tables and figures in this section summarize the predicted concentrations for the proposed Project in operational Years 1, 5, and 8, respectively, and for the updated Application Case. The maximum predicted concentrations of these three years, for SO₂, NO₂, CO, PM_{2.5}, and TSP are presented.

Table II.2-1 SO₂ Predictions - Comparison of the Updated Application Case

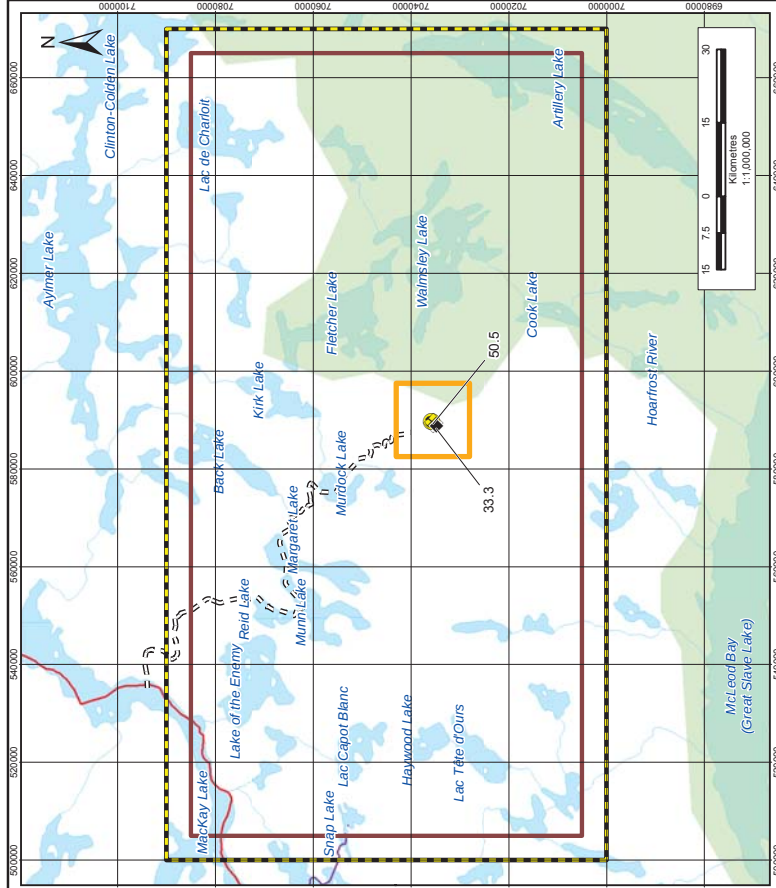
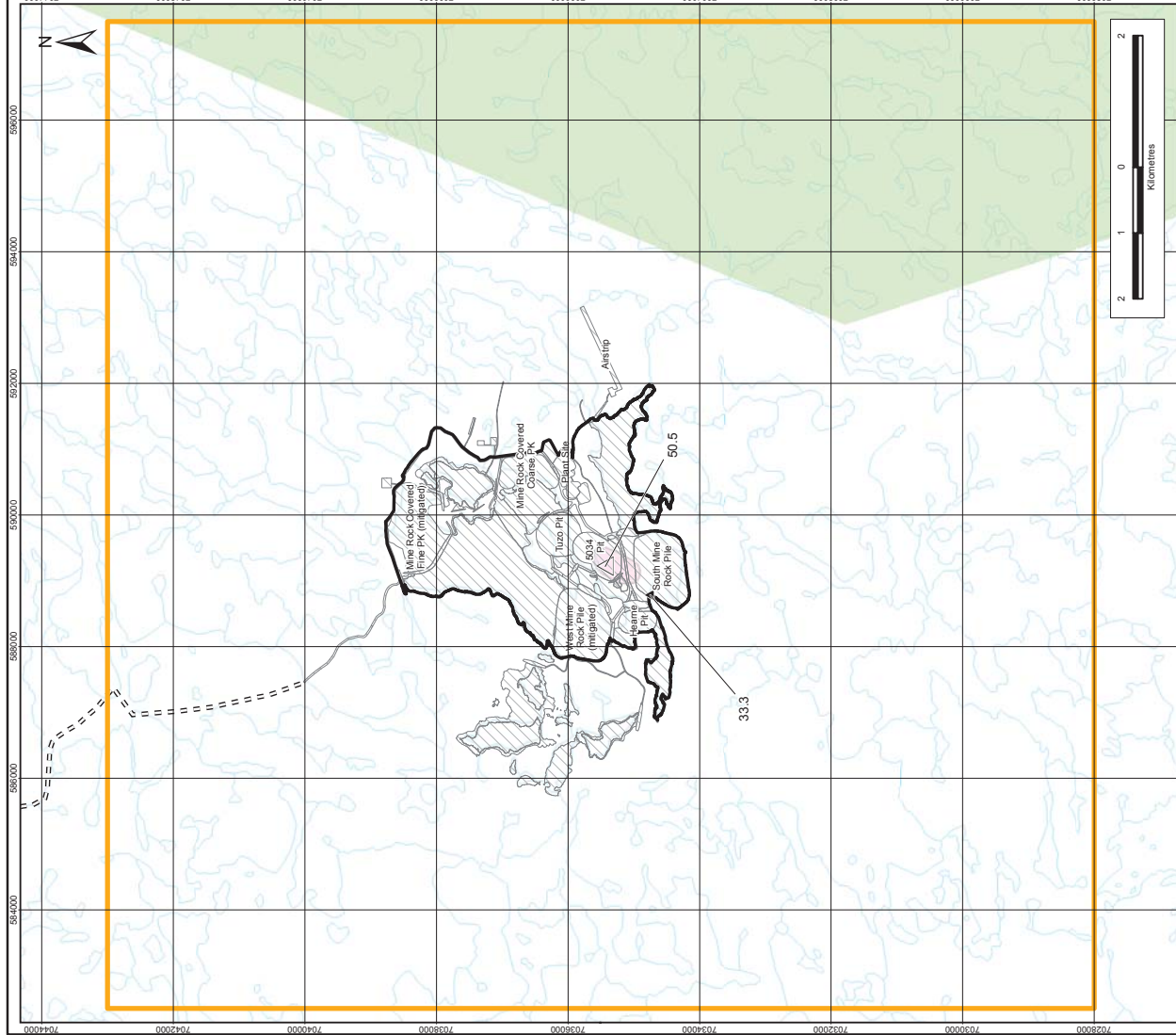
Study Area	Averaging Period		Maximum Predicted Concentrations [µg/m ³]			
			Year 1	Year 5	Year 8	Application Case
LSA	1-hour ^(a)	Overall	69.1	35.8	61.9	69.1
		Excluding Development Area	43.4	35.8	38.4	43.4
	24-hour ^(b)	Overall	50.5	29.6	39.1	50.5
		Excluding Development Area	33.3	29.6	21.8	33.3
	Annual ^(c)	Overall	7.4	5.5	7.4	7.4
		Excluding Development Area	3.7	4.8	3.2	4.8
RSA	1-hour ^(a)	Overall	69.1	35.8	61.9	69.1
		Excluding Development Area	43.4	35.8	38.4	43.4
	24-hour ^(b)	Overall	50.5	29.6	39.1	50.5
		Excluding Development Area	33.3	29.6	21.8	33.3
	Annual ^(c)	Overall	7.4	5.5	7.4	7.4
		Excluding Development Area	3.7	4.8	3.2	4.8

^(a) NWT Air Quality Standard (AQS) for 1-hour SO₂ is 450 µg/m³ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for 24-hour SO₂ is 150 µg/m³ (GNWT 2011).

^(c) NWT Air Quality Standard (AQS) for annual SO₂ is 30 µg/m³ (GNWT 2011).

LSA = local study area; RSA = regional study area; SO₂ = sulphur dioxide gas; µg/m³ = micrograms per cubic metres.



LEGEND

- Garcho Kué Project
- Existing Winter Road
- Tibbitt-to-Contwoyto Winter Road
- Proposed Winter Access Road
- Watercourse
- Waterbody
- Maximum Prediction Within LSA
- Excluding Development Area
- Maximum Prediction Within LSA
- Maximum Prediction Within RSA
- Maximum Prediction Within RSA
- Excluding Development Area
- Development Area Boundary
- Local Study Area
- Modelling Domain
- Project Footprint

Concentration ($\mu\text{g}/\text{m}^3$)

- ≥ 150
- 75 to < 150
- 37.5 to < 75
- 0 to < 37.5

NMT Standard = $150 \mu\text{g}/\text{m}^3$ GNWT (2010)

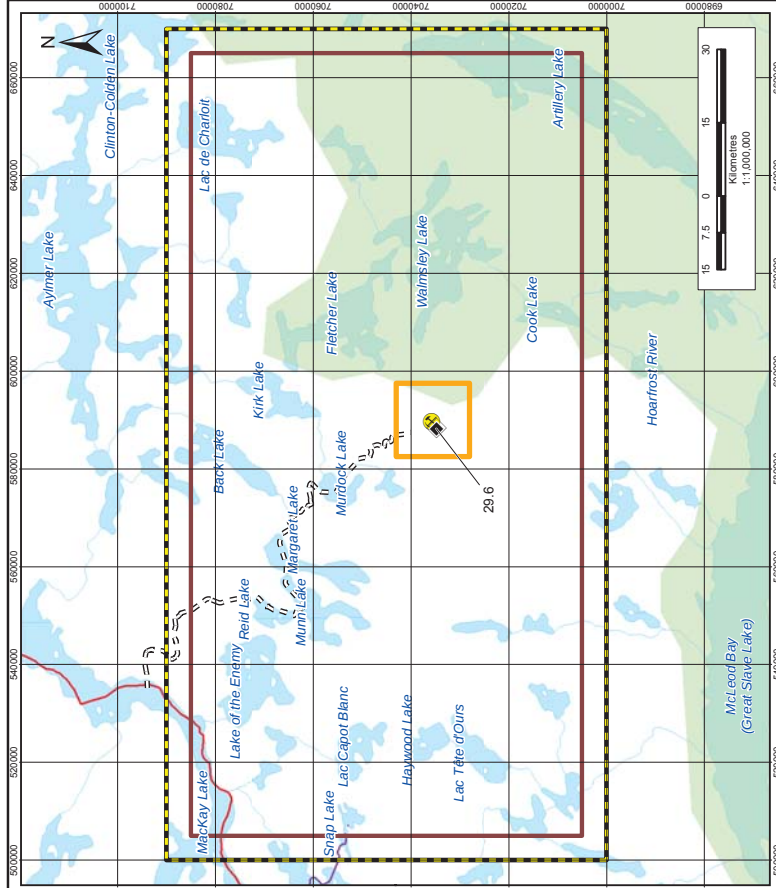
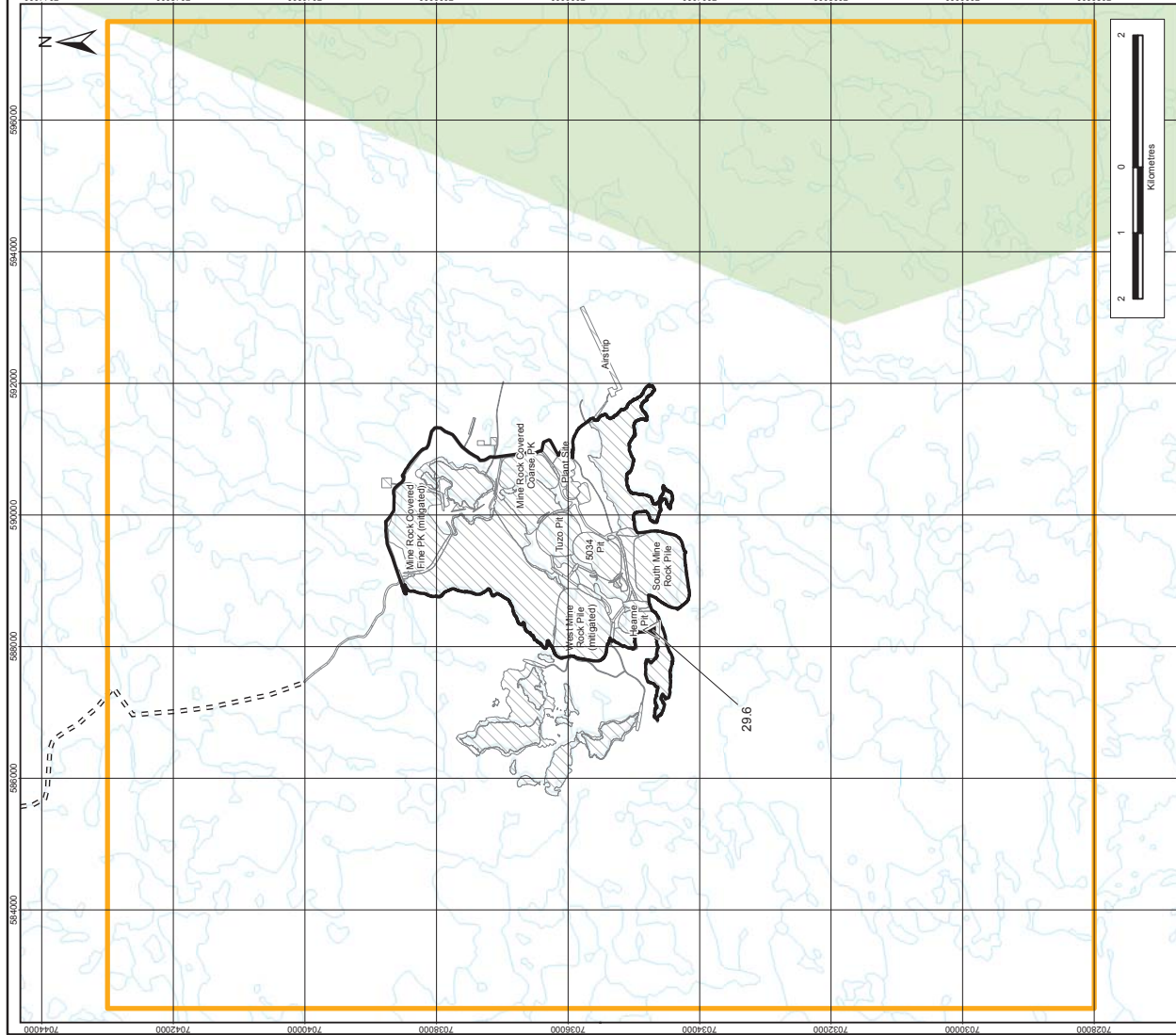
Scale: 1:70,000 (LSA)

Scale: 1:1,000,000

GAHCHO KUÉ PROJECT	
Maximum 24-hour SO ₂ Concentrations - Year 1	
PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:70,000 (LSA)	
FILE NO: E2012-Air-025-GIS	DATE: June 12, 2012
JOINT NO: 11-1365-0001	REVISION NO: 0
OFFICE: GOLD-CAL	CHECK: SK
DRAWN: DC	

NOTES:
Base data source: National Topographic Base Data (NTDB) 1:50,000.

Figure II.2-1



LEGEND

- Garcho Kué Project
 - Existing Winter Road
 - Tibbitt-to-Contwoyo Winter Road
 - Proposed Winter Access Road
 - Watercourse
 - Waterbody
 - Maximum Prediction Within LSA
 - Excluding Development Area
 - Maximum Prediction Within LSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA
 - Excluding Development Area
 - Development Area Boundary
 - Local Study Area
 - Modelling Domain
 - Project Footprint
- Concentration ($\mu\text{g}/\text{m}^3$)**
- ≥ 150
 - 75 to < 150
 - 37.5 to < 75
 - 0 to < 37.5
- NMT Standard = $150 \mu\text{g}/\text{m}^3$
GNWT (2010)

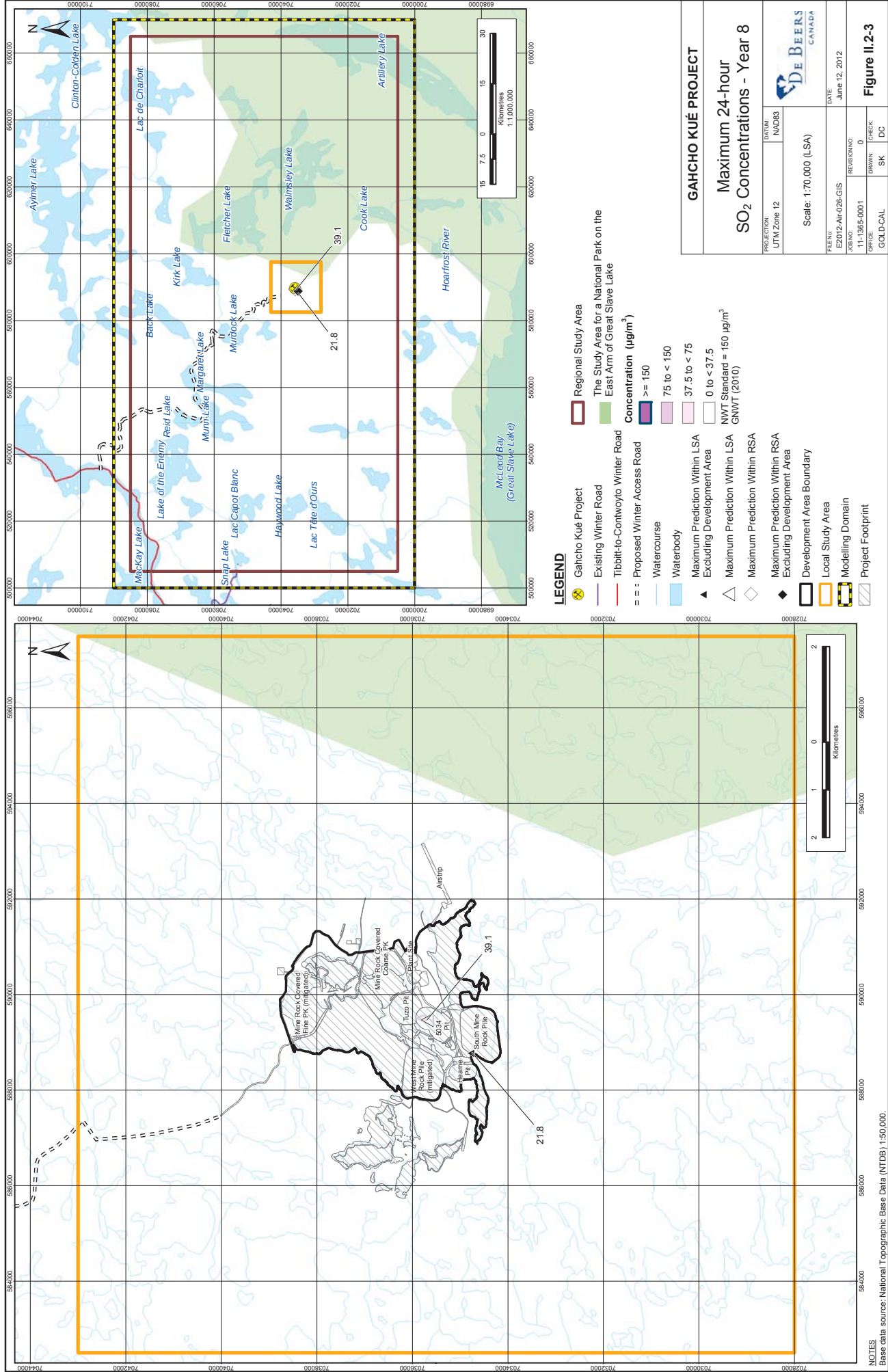
GAHCHO KUÉ PROJECT

Maximum 24-hour
SO₂ Concentrations - Year 5

PROJECTION:	UTM Zone 12	DATUM:	NAD83
Scale:	1:70,000 (LSA)		
FILE NO:	E2012-Air-Q60-GIS	DATE:	June 22, 2012
JOINT:	11-1365-0001	REVISION:	0
OFFICE:	GOLD-CAL	DRAWN:	SK
		CHECK:	DC

Figure II.2-2

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.



NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.

GAHCHO KUÉ PROJECT	
Maximum 24-hour SO ₂ Concentrations - Year 8	
PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:70,000 (LSA)	
FILE NO: E2012-Air-026-GIS	DATE: June 12, 2012
JOB NO: 11-1365-0001	REVISION: 0
OFFICE: GOLD-CAL	CHECK: SK
DRAWN: DC	
Figure II.2-3	

Table II.2-2 NO₂ Predictions - Comparison of the Updated Application Case

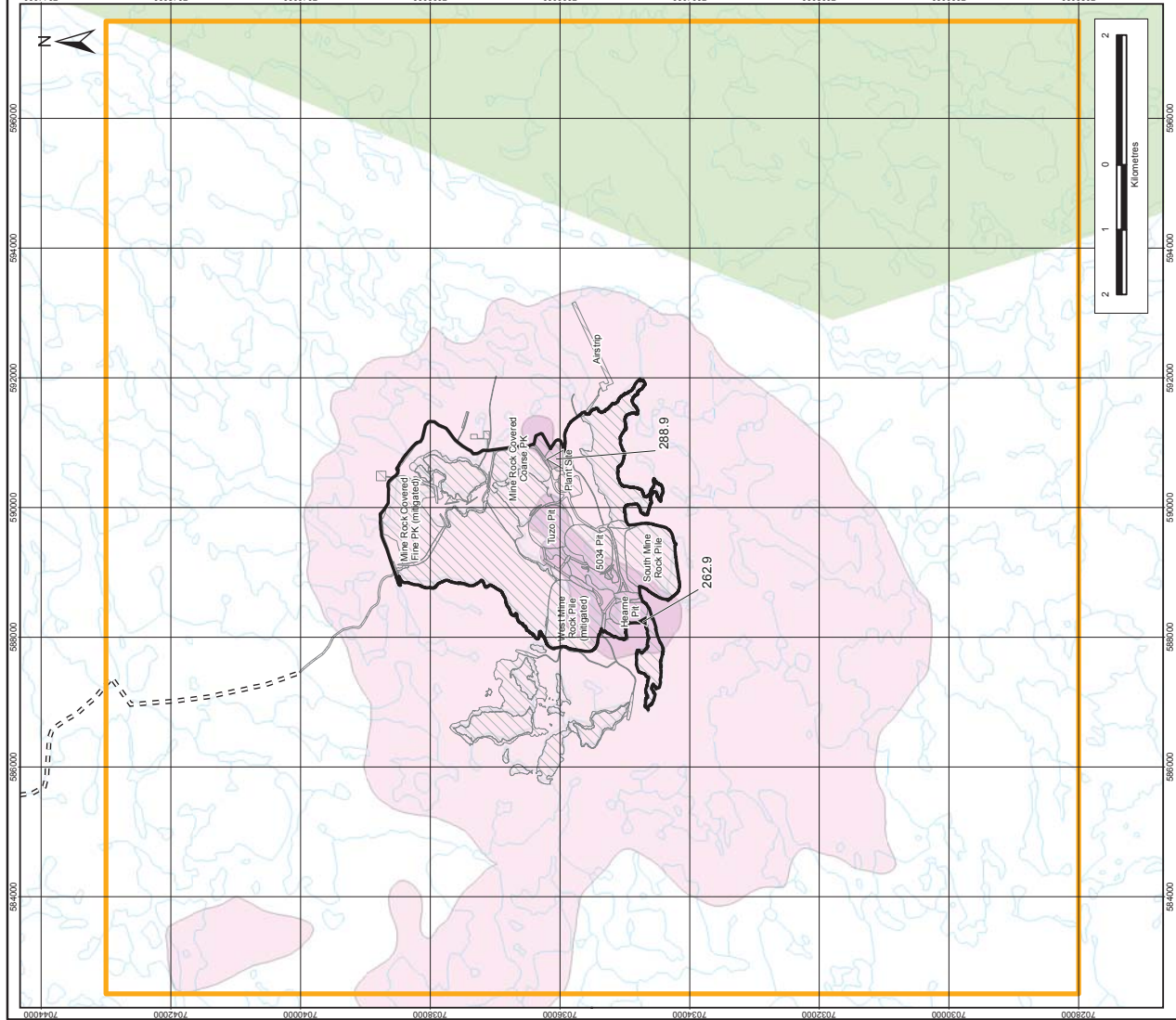
Study Area	Averaging Period		Maximum Predicted Concentrations [µg/m ³]			
			Year 1	Year 5	Year 8	Application Case
LSA	1-hour ^(a)	Overall	361.5	288.9	358.4	361.5
		Excluding Development Area	314.8	262.9	249.8	314.8
	24-hour ^(b)	Overall	268.5	258.8	258.8	268.5
		Excluding Development Area	207.6	224.4	180.5	224.4
	Annual ^(c)	Overall	70.5	65.2	72.1	72.1
		Excluding Development Area	62.1	58.9	56.7	62.1
RSA	1-hour ^(a)	Overall	361.5	288.9	358.4	361.5
		Excluding Development Area	314.8	262.9	249.8	314.8
	24-hour ^(b)	Overall	268.5	258.8	258.8	268.5
		Excluding Development Area	207.6	224.4	180.5	224.4
	Annual ^(c)	Overall	70.5	65.2	72.1	72.1
		Excluding Development Area	62.1	58.9	56.7	62.1

^(a) NWT Air Quality Standard (AQS) for 1-hour NO₂ is 400 µg/m³ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for 24-hour NO₂ is 200 µg/m³ (GNWT 2011).

^(c) NWT Air Quality Standard (AQS) for annual NO₂ is 60 µg/m³ (GNWT 2011).

LSA = local study area; RSA = regional study area; NO₂ = nitrogen dioxide; µg/m³ = micrograms per cubic metres.



LEGEND

- Garcho Kué Project
 - Regional Study Area
 - The Study Area for a National Park on the East Arm of Great Slave Lake
 - Existing Winter Road
 - Tibbitt-to-Contwoyto Winter Road
 - Proposed Winter Access Road
 - Watercourse
 - Waterbody
 - Maximum Prediction Within LSA
 - Excluding Development Area
 - Maximum Prediction Within LSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA Excluding Development Area
 - Development Area Boundary
 - Local Study Area
 - Modelling Domain
 - Project Footprint
- Concentration ($\mu\text{g}/\text{m}^3$)**
- ≥ 400
 - 200 to < 400
 - 100 to < 200
 - 0 to < 100
- NWT Standard = $400 \mu\text{g}/\text{m}^3$ GNWT (2011)

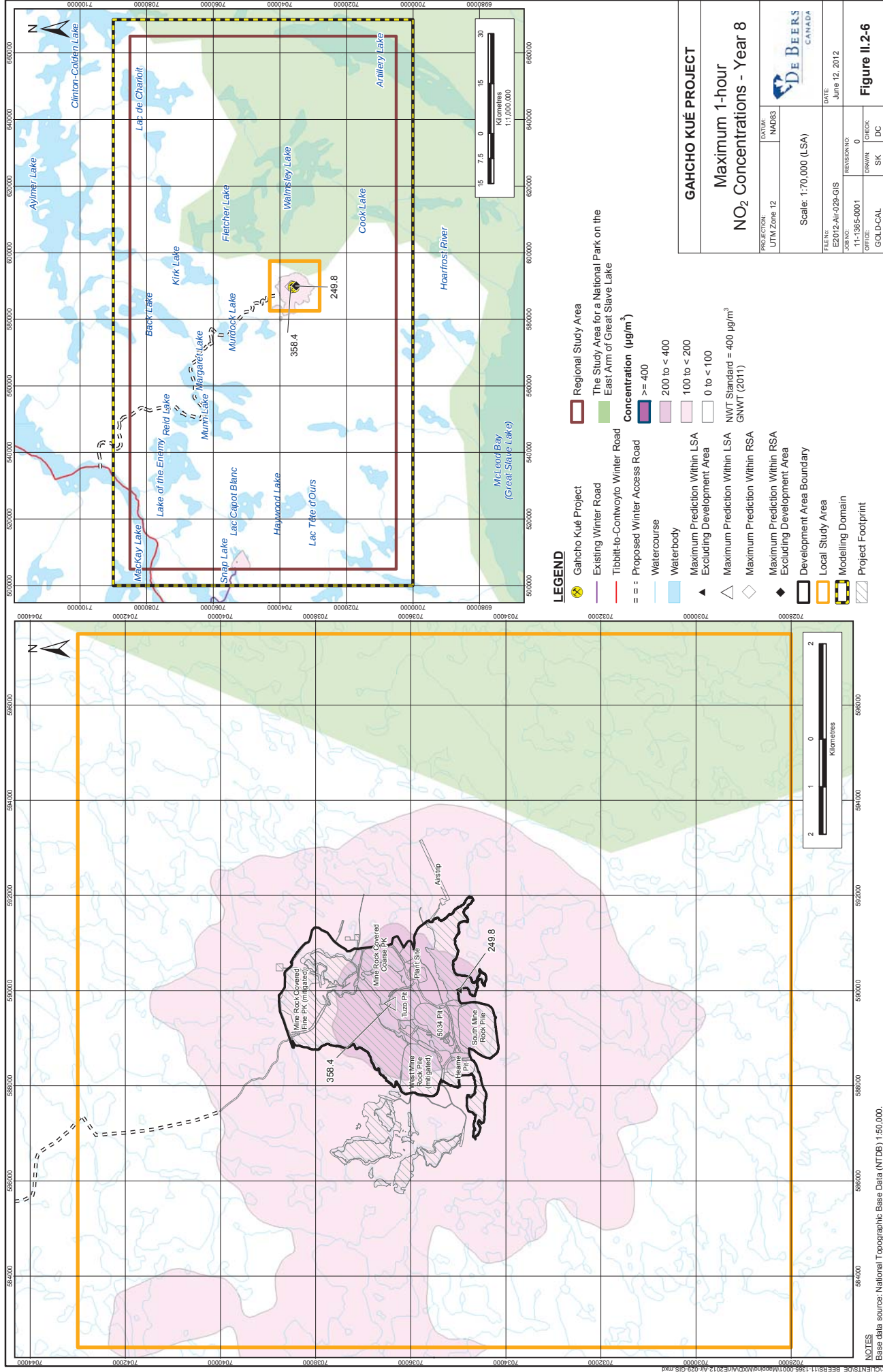
GAHCHO KUÉ PROJECT

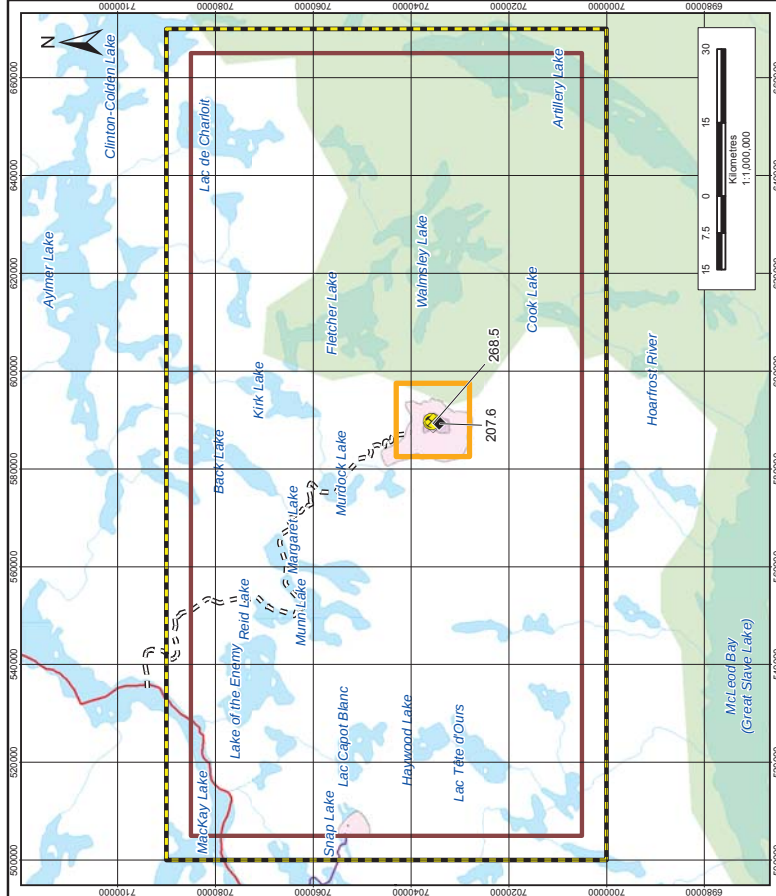
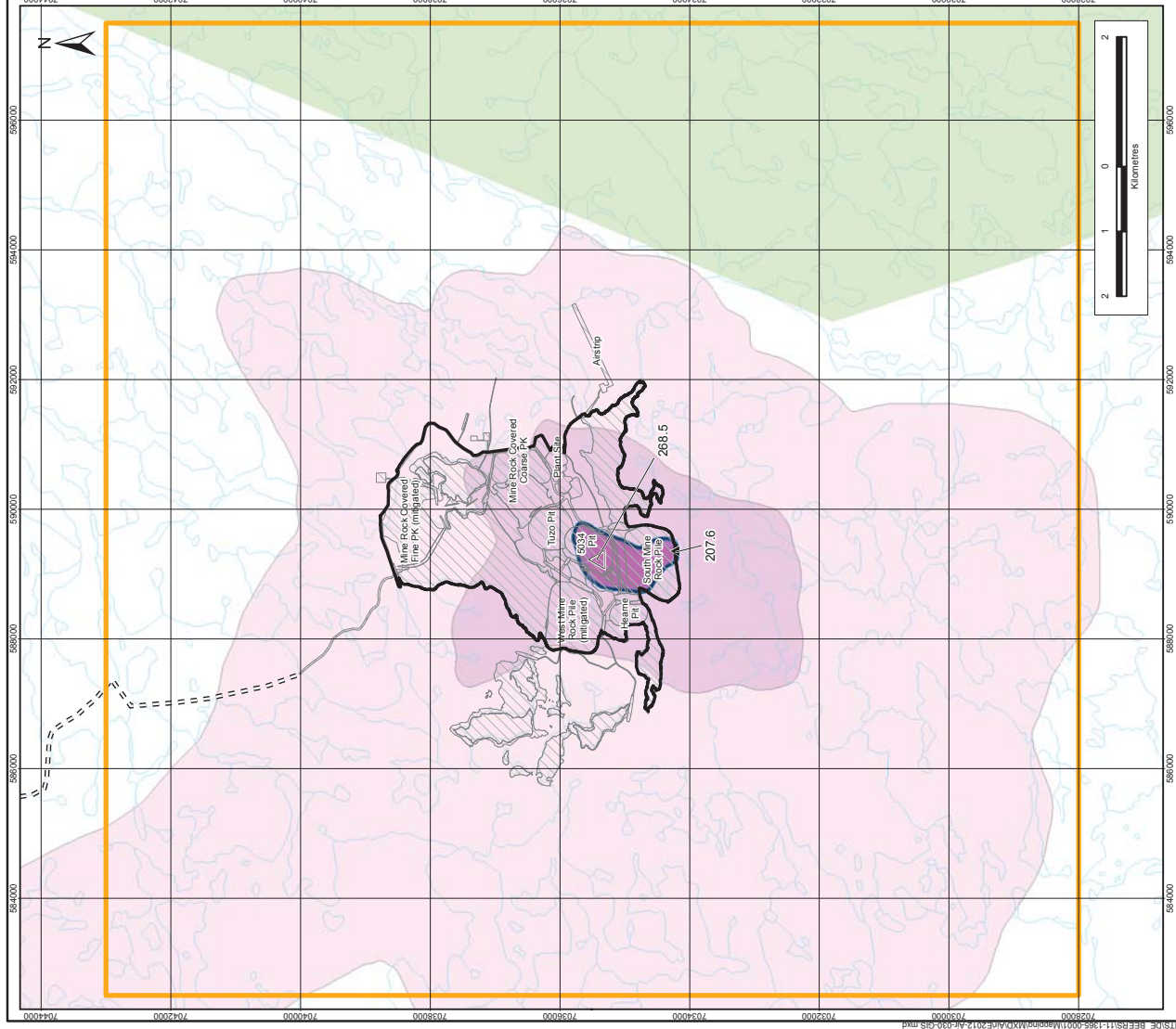
Maximum 1-hour
NO₂ Concentrations - Year 5

PROJECTION:	UTM Zone 12	DATUM:	NAD83
Scale:	1:70,000 (LSA)		
FILE NO:	E2012-Air-028-GIS	DATE:	June 12, 2012
JOB NO:	11-1365-0001	REVISION:	0
OFFICE:	GOLD-CAL	DRAWN:	SK
		CHECK:	DC

Figure II.2-5

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.





LEGEND

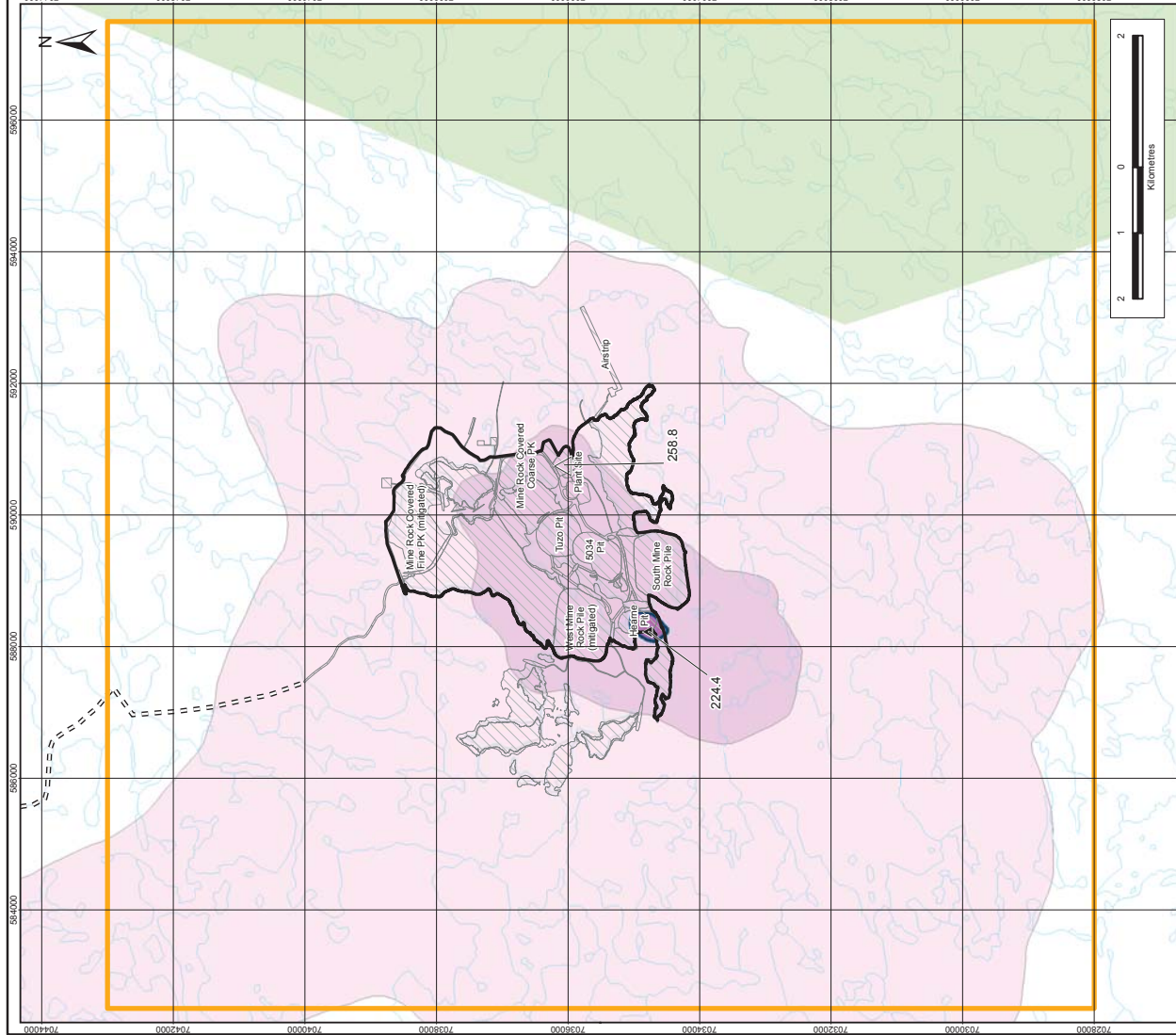
- Legend**
- | | | | |
|--|---|--|--|
| | Gahcho Kué Project | | Regional Study Area |
| | Existing Winter Road | | The Study Area for a
East Arm of Great Slave Lake |
| | Tibbitt-to-Contwoyo Winter Road | Concentration ($\mu\text{g}/\text{m}^3$) | |
| | Proposed Winter Access Road | | $> = 200$ |
| | Watercourse | | $100 < 200$ |
| | Waterbody | | $50 < 100$ |
| | Maximum Prediction Within LSA
Excluding Development Area | | $0 < 50$ |
| | Maximum Prediction Within LSA | | NWT Standard = $200 \mu\text{g}/\text{m}^3$
GNWT (2011) |
| | Maximum Prediction Within RSA | | |
| | Maximum Prediction Within RSA
Excluding Development Area | | |
| | Development Area Boundary | | |
| | Local Study Area | | |
| | Modelling Domain | | |
| | Project Footprint | | |

GAHCHO KUÉ PROJECT

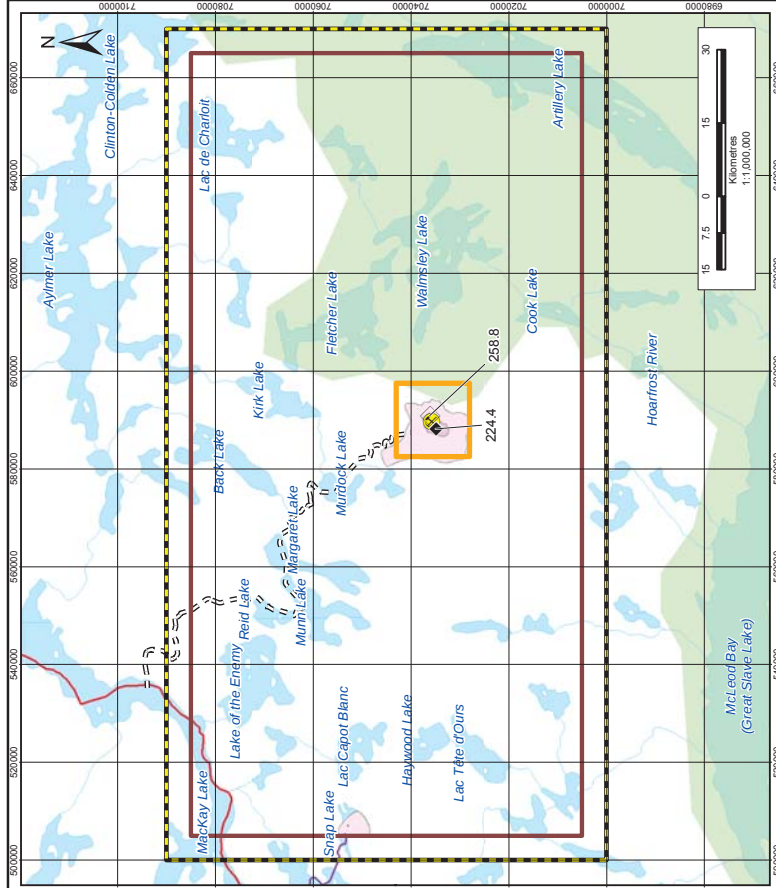
Maximum 24-hour
NO₂ Concentrations - Year 1

PROJECTION: UTM Zone 12	DATE: June 12, 2012	
DATUM: NAD83	Scale: 1:70,000 (LSA)	
		
FILE No E2012-AI-030-GIS	REVISION NO 11-1365-0001	CHECK 0
JOB NO 11-1365-0001	DRAWN OFFICE	SK DC
GOLD-CAL		Figure II.2-7

NOTES



NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.



LEGEND

- Garcho Kué Project
 - Existing Winter Road
 - Tibbitt-to-Contwoyo Winter Road
 - Proposed Winter Access Road
 - Watercourse
 - Waterbody
 - Maximum Prediction Within LSA
 - Excluding Development Area
 - Maximum Prediction Within LSA
 - Maximum Prediction Within LSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA
 - Development Area Boundary
 - Local Study Area
 - Modelling Domain
 - Project Footprint
- Concentration ($\mu\text{g}/\text{m}^3$)**
- > 200
 - $100 \text{ to } < 200$
 - $50 \text{ to } < 100$
 - $0 \text{ to } < 50$
- NMT Standard = $200 \mu\text{g}/\text{m}^3$
GNWT (2011)

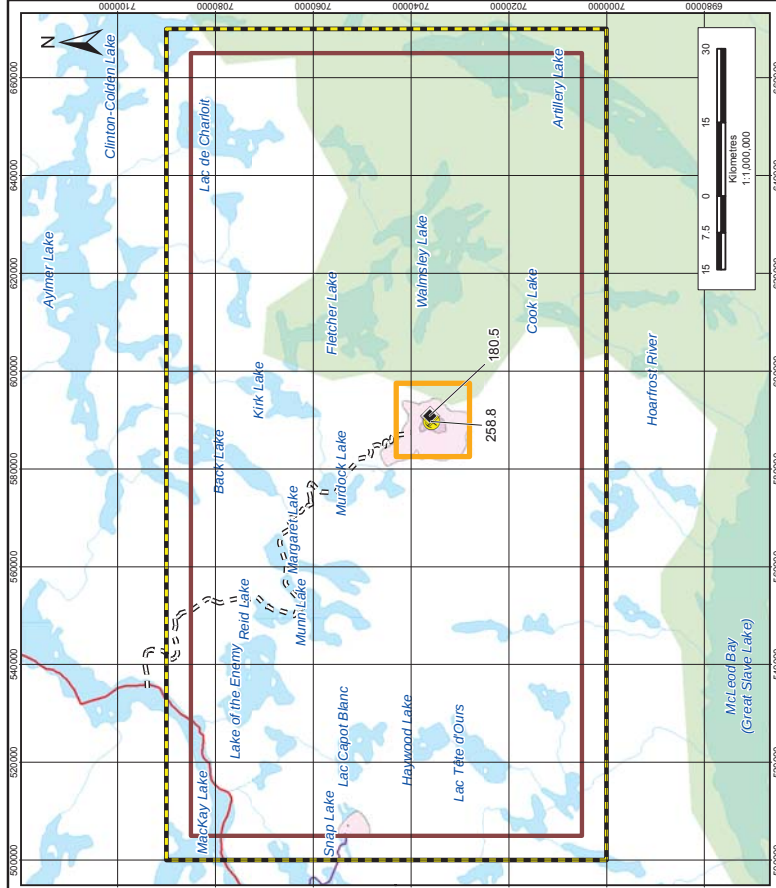
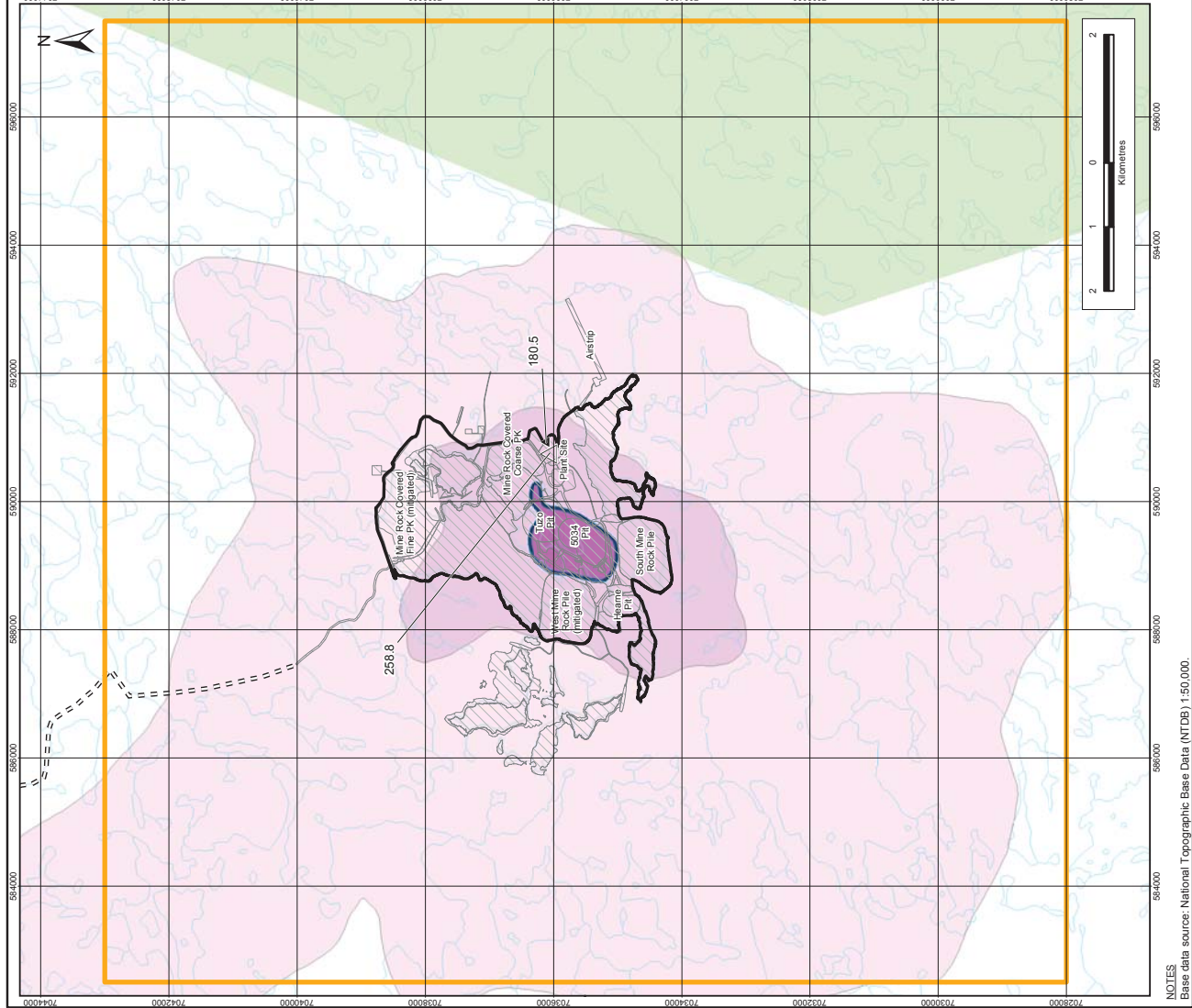
GAHCHO KUÉ PROJECT

Maximum 24-hour
 NO_2 Concentrations - Year 5

PROJECTION:	UTM Zone 12	DATUM:	NAD83
Scale:	1:70,000 (LSA)		
FILE NO:	E2012-AH-031-GIS	DATE:	June 12, 2012
JOBN:	11-1365-0001	REVISION:	0
OFFICE:	GOLD-CAL	CHECK:	SK
		DRAWN:	DC

Figure II.2-8





LEGEND

- Garcho Kué Project
- Existing Winter Road
- Tibbitt-to-Contwoyto Winter Road
- Proposed Winter Access Road
- Watercourse
- Waterbody
- Maximum Prediction Within LSA
- Excluding Development Area
- Maximum Prediction Within LSA
- Maximum Prediction Within RSA
- Maximum Prediction Within RSA
- Excluding Development Area
- Development Area Boundary
- Local Study Area
- Modelling Domain
- Project Footprint

Concentration ($\mu\text{g}/\text{m}^3$)

- ≥ 200
- 100 to < 200
- 50 to < 100
- 0 to < 50

Scale: 1:70,000 (LSA)

GAHCHO KUÉ PROJECT

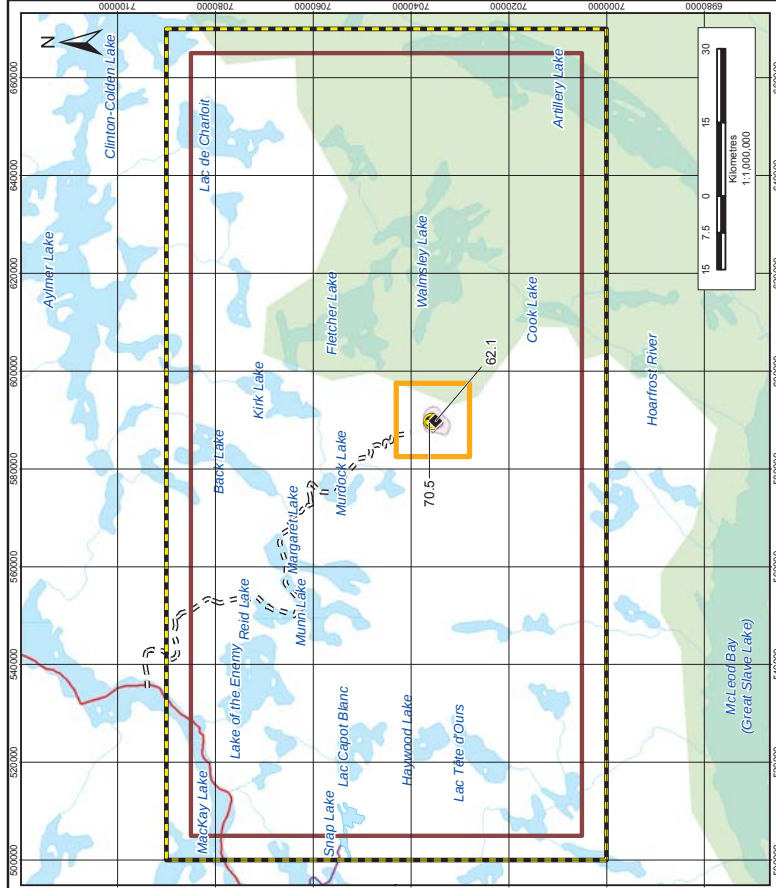
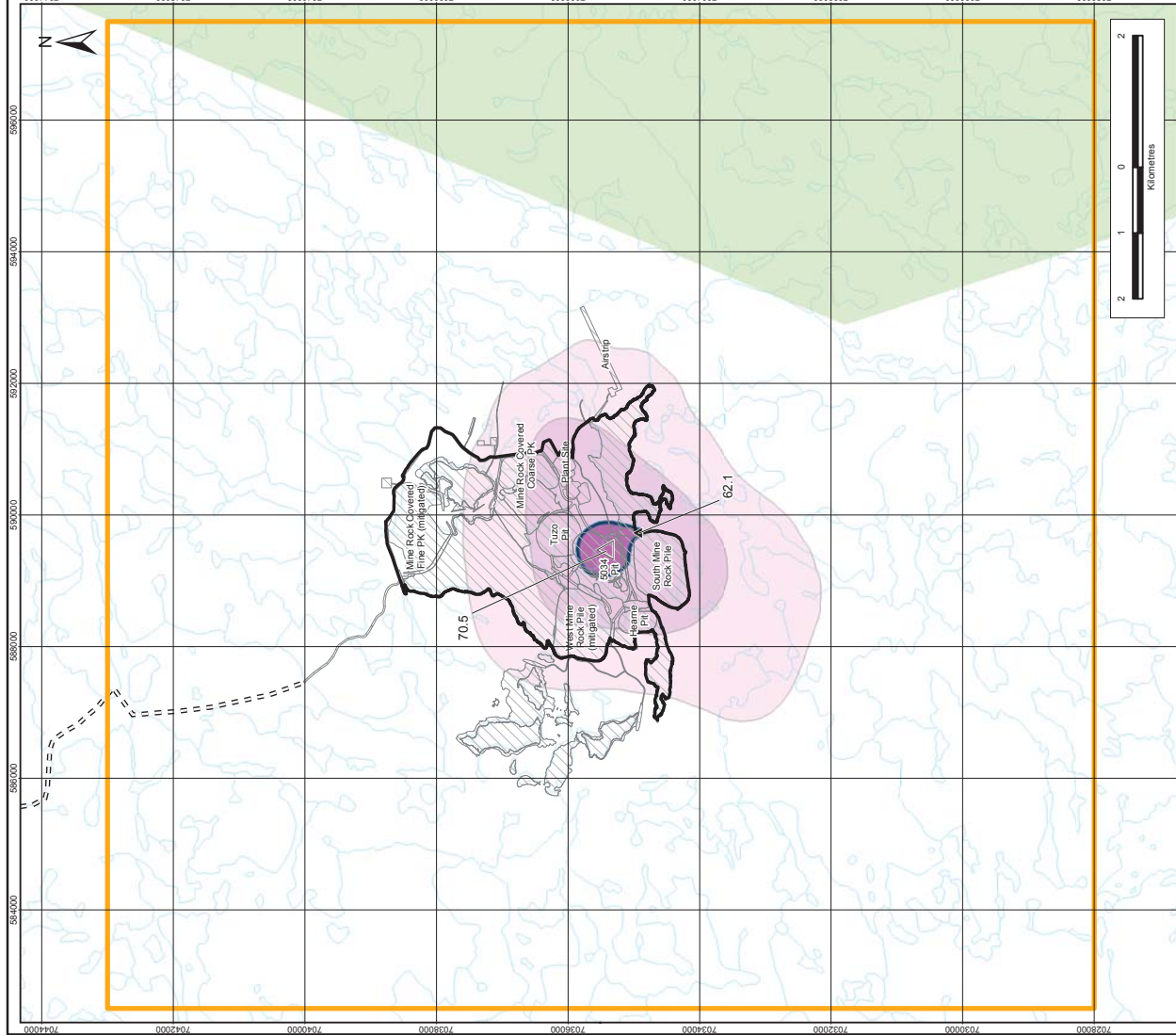
Maximum 24-hour

NO_2 Concentrations - Year 8

De Beers CANADA

Figure II.2-9

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.



LEGEND

- Garcho Kué Project
 - The Study Area for a National Park on the East Arm of Great Slave Lake
 - Tibbitt-to-Contwoyto Winter Road
 - Proposed Winter Access Road
 - Watercourse
 - Waterbody
 - Maximum Prediction Within LSA
 - Excluding Development Area
 - Maximum Prediction Within LSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA
 - Excluding Development Area
 - Development Area Boundary
 - Local Study Area
 - Modelling Domain
 - Project Footprint
- Concentration ($\mu\text{g}/\text{m}^3$)
- ≥ 60
 - 30 to < 60
 - 15 to < 30
 - 0 to < 15
- NMT Standard = $60 \mu\text{g}/\text{m}^3$ GNWT (2011)

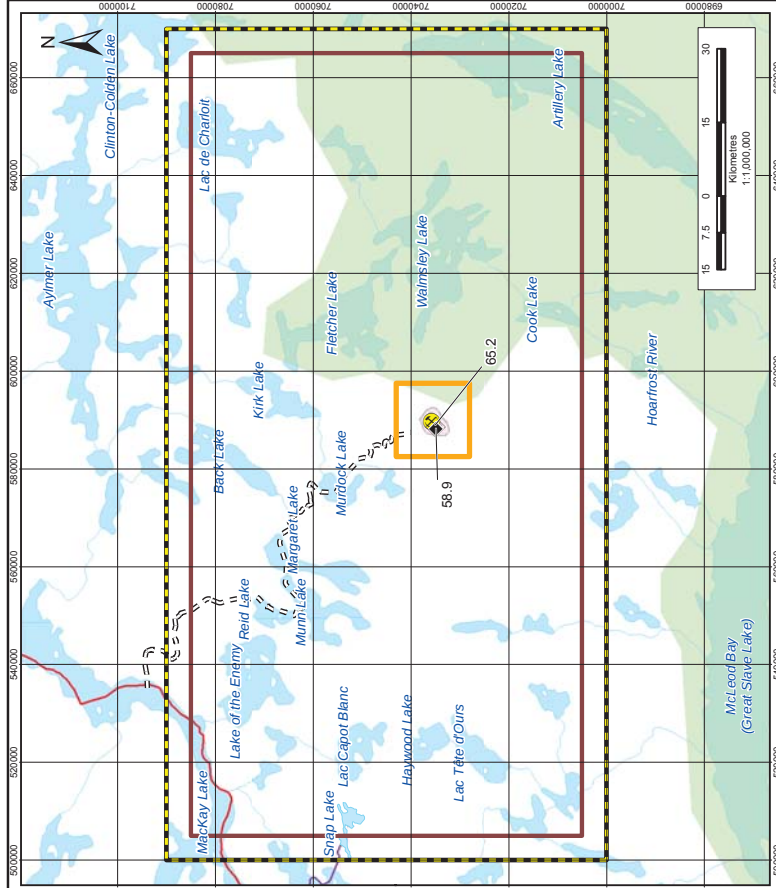
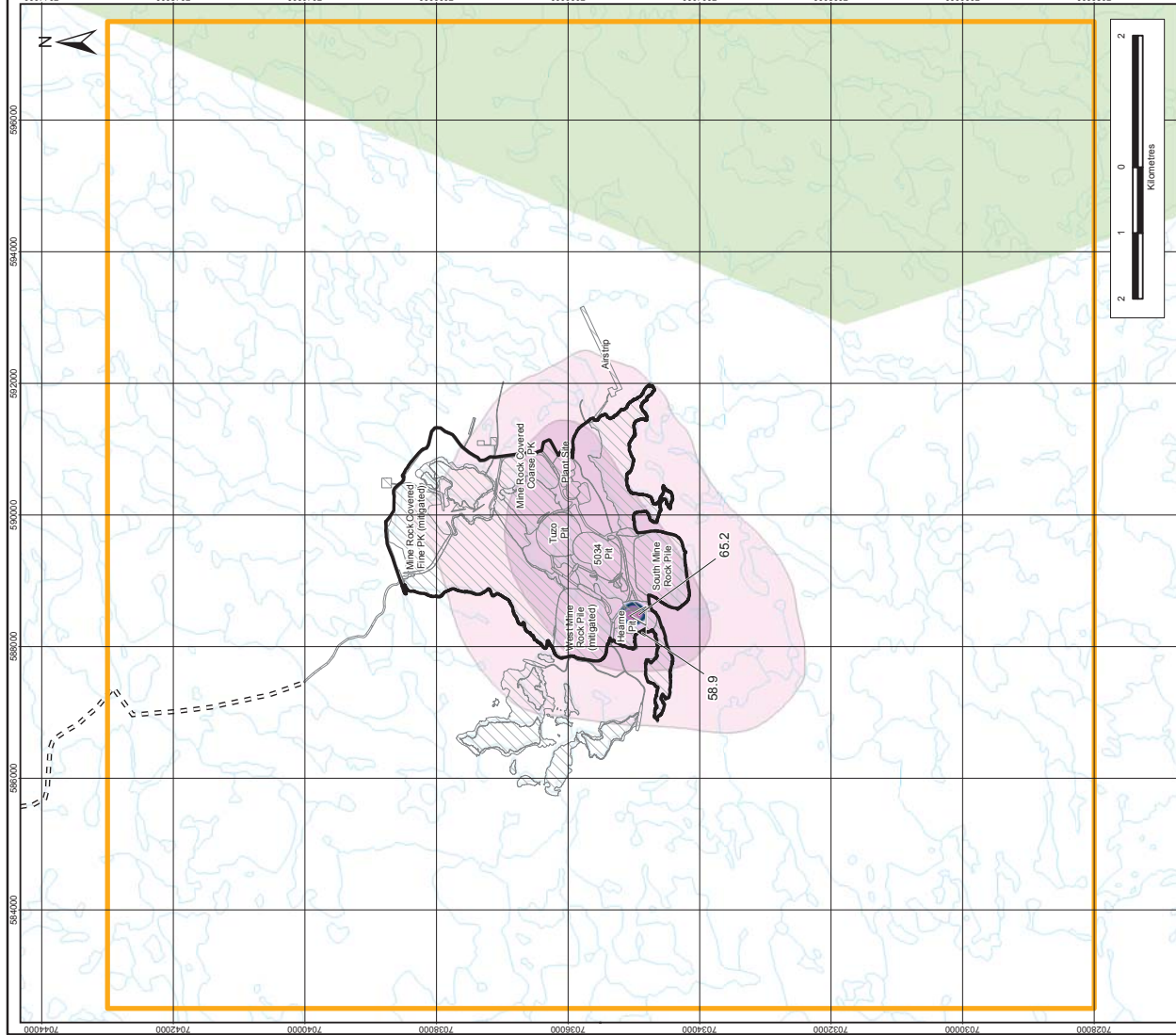
GAHCHO KUÉ PROJECT

Annual Average NO₂ Concentrations - Year 1

PROJECTION:	UTM Zone 12	DATUM:	NAD83
Scale:	1:70,000 (LSA)		
FILE NO:	E2012-Air-033-GIS	DATE:	June 12, 2012
JOB NO:	11-1365-0001	REVISION:	0
OFFICE:	GOLD-CAL	CHECK:	SK
		DRAWN:	DC

Figure II.2-10

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.



LEGEND

- Garcho Kué Project
 - Existing Winter Road
 - Tibbitt-to-Contwoyo Winter Road
 - Proposed Winter Access Road
 - Watercourse
 - Waterbody
 - Maximum Prediction Within LSA
 - Excluding Development Area
 - Maximum Prediction Within LSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA
 - Excluding Development Area
 - Development Area Boundary
 - Local Study Area
 - Modelling Domain
 - Project Footprint
- Regional Study Area
- The Study Area for a National Park on the East Arm of Great Slave Lake
- Concentration ($\mu\text{g}/\text{m}^3$)
- ≥ 60
 - 30 to < 60
 - 15 to < 30
 - 0 to < 15
- NMT Standard = $60 \mu\text{g}/\text{m}^3$ GNWT (2011)

GAHCHO KUÉ PROJECT

Annual Average NO₂ Concentrations - Year 5

PROJECTION:	UTM Zone 12	DATUM:	NAD83
Scale:	1:70,000 (LSA)		
FILE NO:	E2012-AH-034-GIS	DATE:	June 12, 2012
JOB NO:	11-1365-0001	REVISION:	0
OFFICE:	GOLD-CAL	CHECK:	SK
		DRAWN:	DC

Figure II.2-11

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.

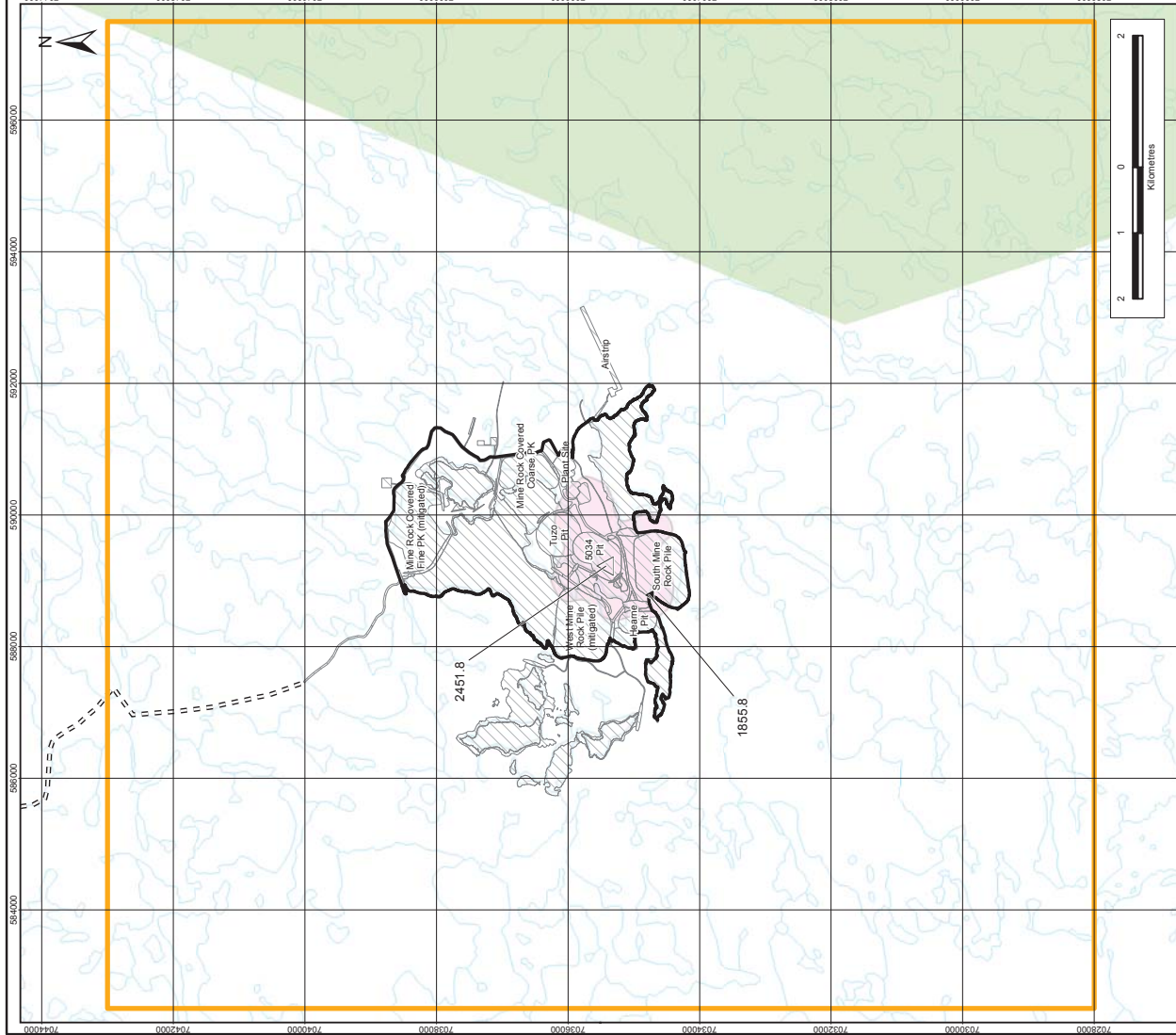
Table II.2-3 CO Predictions - Comparison of the Updated Application Case

Study Area	Averaging Period		Maximum Predicted Concentrations [$\mu\text{g}/\text{m}^3$]			
			Year 1	Year 5	Year 8	Application Case
LSA	1-hour ^(a)	Overall	3,239.3	1,814.9	2,969.7	3,239.3
		Excluding Development Area	2,144.0	1,814.9	1,871.7	2,144.0
	8-hour ^(b)	Overall	2,451.8	1,614.4	2,173.8	2,451.8
		Excluding Development Area	1,855.8	1,614.4	1,368.3	1,855.8
RSA	1-hour ^(a)	Overall	3,239.3	1,814.9	2,969.7	3,239.3
		Excluding Development Area	2,144.0	1,814.9	1,871.7	2,144.0
	8-hour ^(b)	Overall	2,451.8	1,614.4	2,173.8	2,451.8
		Excluding Development Area	1,855.8	1,614.4	1,368.3	1,855.8

^(a) NWT Air Quality Standard (AQS) for 1-hour CO is 15,000 $\mu\text{g}/\text{m}^3$ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for 8-hour CO is 6,000 $\mu\text{g}/\text{m}^3$ (GNWT 2011).

LSA = local study area; RSA = regional study area; CO = carbon monoxide; $\mu\text{g}/\text{m}^3$ = micrograms per cubic metres.



NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.

LEGEND

- Garcho Kué Project
 - The Study Area for a National Park on the East Arm of Great Slave Lake
 - Tibbitt-to-Contwoyo Winter Road
 - Proposed Winter Access Road
 - Watercourse
 - Waterbody
 - Maximum Prediction Within LSA
 - Excluding Development Area
 - Maximum Prediction Within LSA
 - Maximum Prediction Within RSA
 - Maximum Prediction Within RSA
 - Development Area Boundary
 - Local Study Area
 - Modelling Domain
 - Project Footprint
- Concentration ($\mu\text{g}/\text{m}^3$)**
- ≥ 6000
 - 3000 to < 6000
 - 1500 to < 3000
 - 0 to < 1500
- NMT Standard = $6000 \mu\text{g}/\text{m}^3$
GNWT (2011)

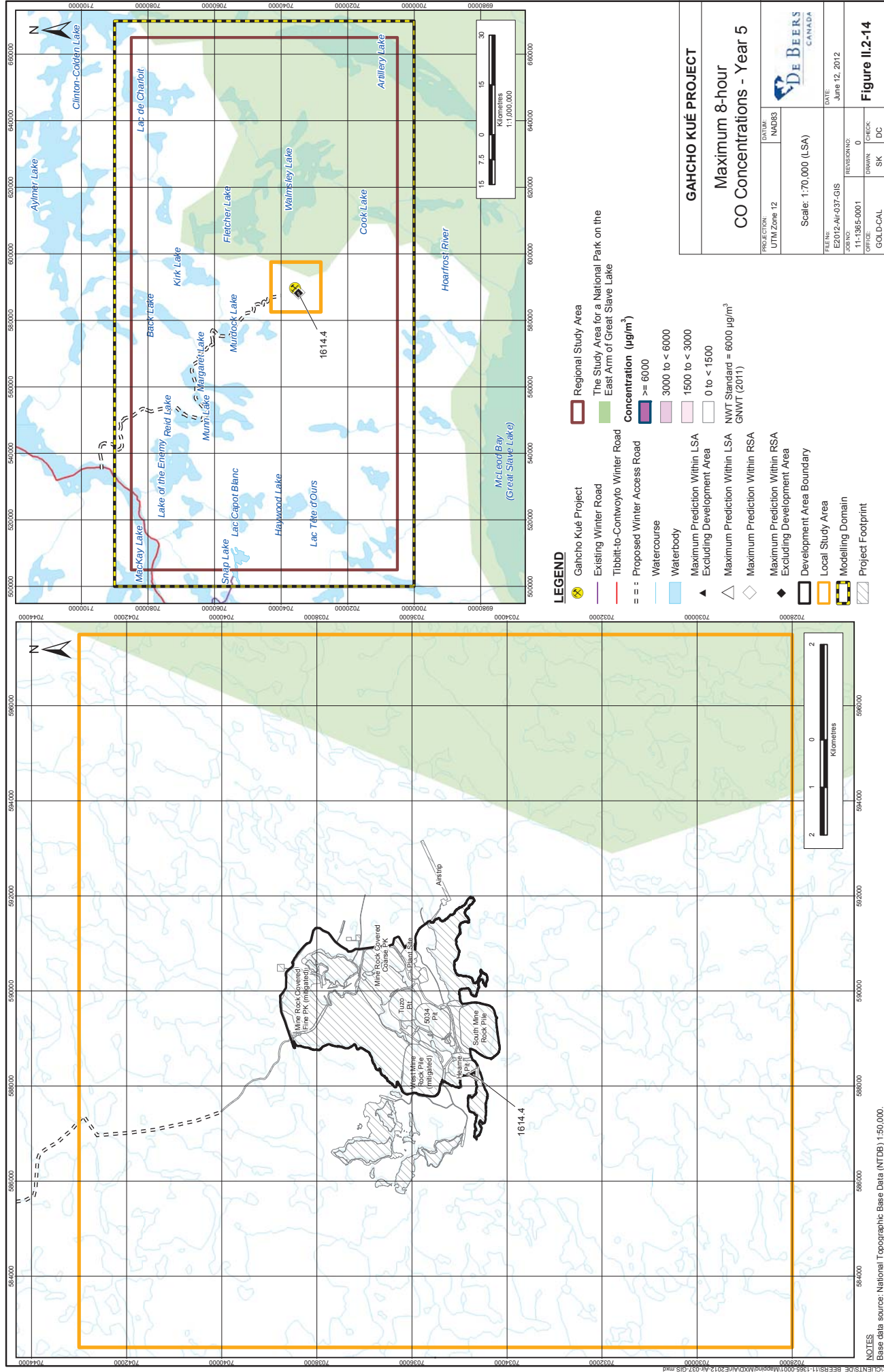
GAUCHO KUÉ PROJECT

**Maximum 8-hour
CO Concentrations - Year 1**

PROJECTION:	UTM Zone 12	DATUM:	NAD83
Scale:	1:70,000 (LSA)		
FILE NO:	E2012-Air-Q36-GIS	DATE:	June 12, 2012
JOB NO:	11-1365-0001	REVISION:	0
OFFICE:	GOLD-CAL	CHECK:	SK
		DRAWN:	DC

Figure II.2-13





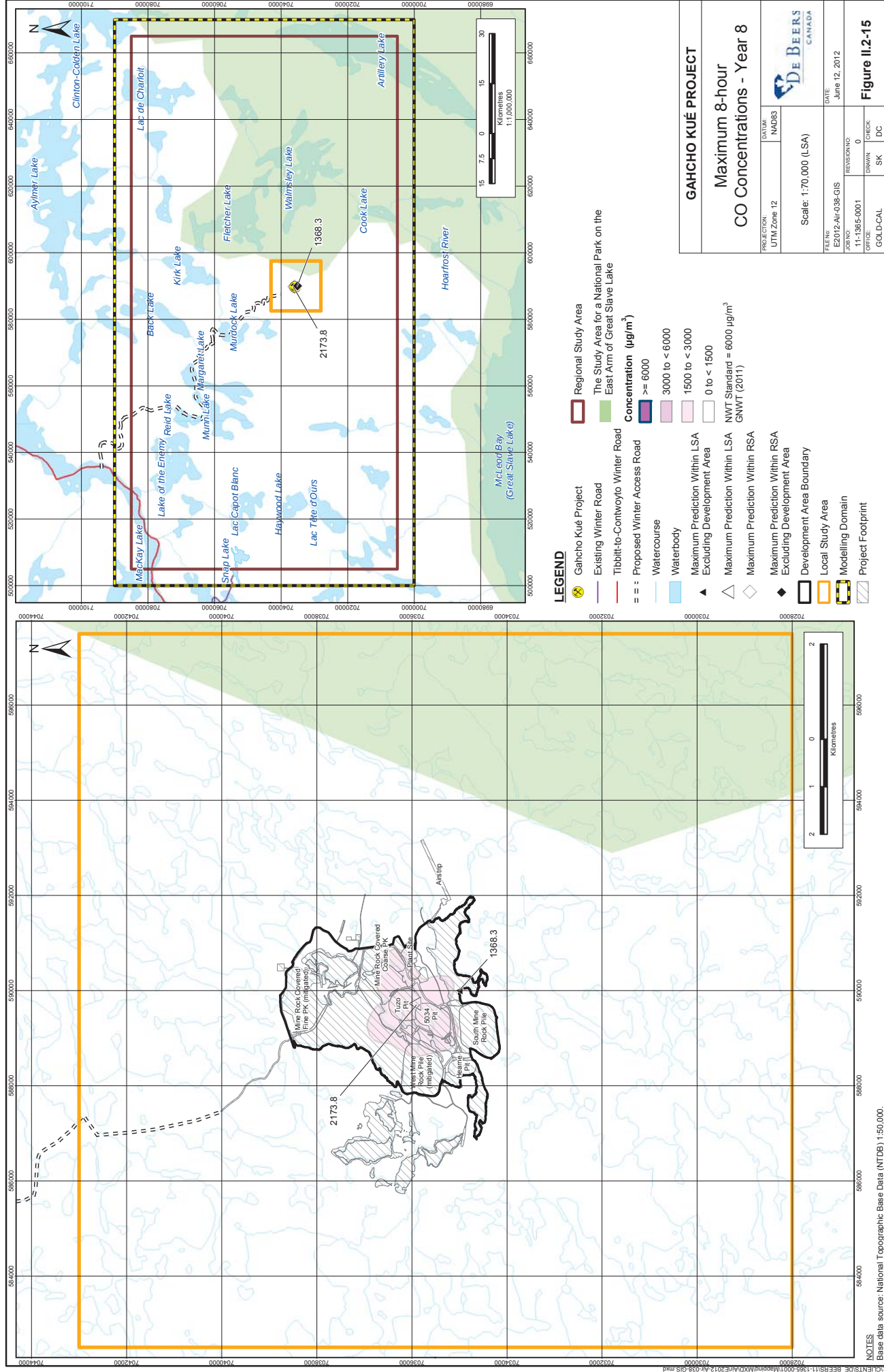
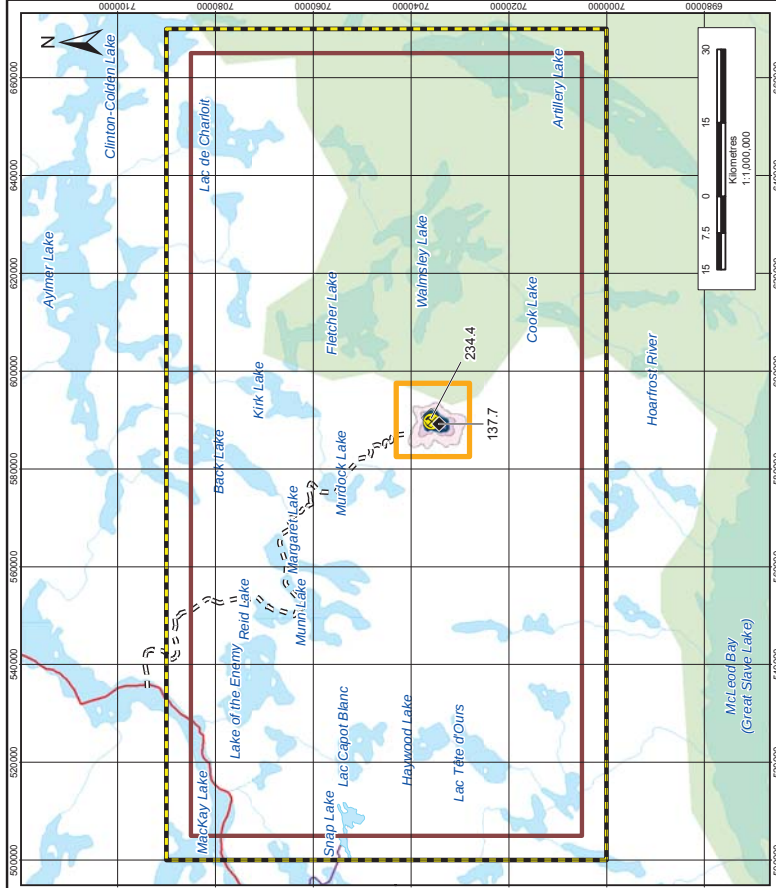
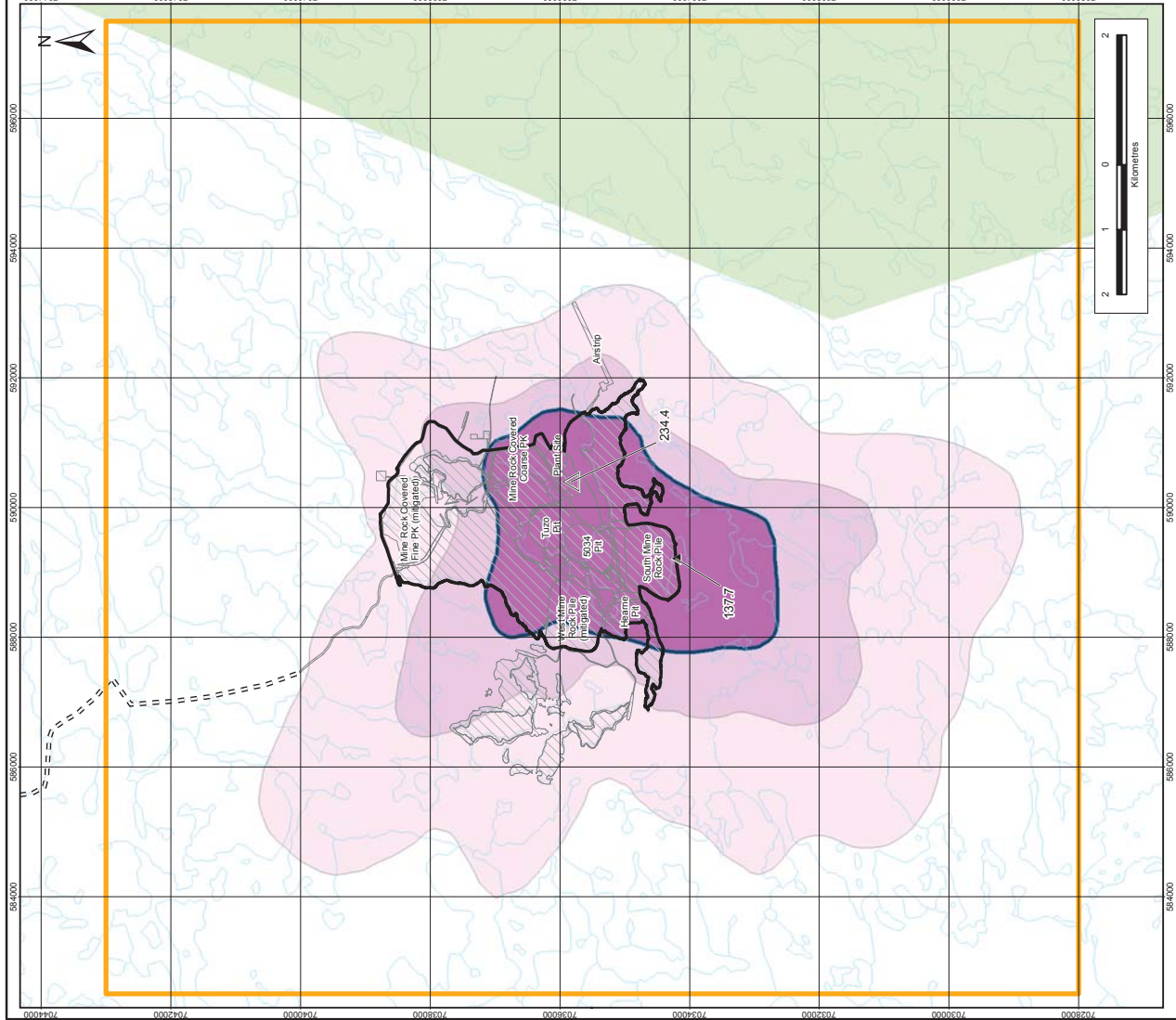


Table II.2-4 Comparison of the Updated Application Case PM_{2.5} Predictions

Study Area	Averaging Period		Maximum Predicted Concentrations [µg/m ³]			
			Year 1	Year 5	Year 8	Application Case
LSA	24-hour ^(a)	Overall	234.4	267.7	265.7	267.7
		Excluding Development Area	137.7	101.2	90.6	137.7
RSA	24-hour ^(a)	Overall	234.4	267.7	265.7	267.7
		Excluding Development Area	137.7	101.2	90.6	137.7

^(a) NWT Air Quality Standard (AQS) for 1-hour PM_{2.5} is 30 µg/m³ (GNWT 2011).

LSA = local study area; RSA = regional study area; PM_{2.5} = airborne particulate matter of mean diameter 2.5 microns (µm) or less; µg/m³ = micrograms per cubic metres.



GAHCHO KUÉ PROJECT

Maximum 24-hour $\text{PM}_{2.5}$ Concentrations - Year 1

Figure II.2-16

Legend

- Regional Study Area
- The Study Area for a National Park on the East Arm of Great Slave Lake
- Garcho Kué Project
- Existing Winter Road
- Tibbitt-to-Contwoyto Winter Road
- Proposed Winter Access Road
- Watercourse
- Waterbody
- Maximum Prediction Within LSA
- Excluding Development Area
- Maximum Prediction Within LSA
- Maximum Prediction Within RSA
- Maximum Prediction Within RSA
- Excluding Development Area
- Development Area Boundary
- Local Study Area
- Modelling Domain
- Project Footprint

Concentration ($\mu\text{g}/\text{m}^3$)

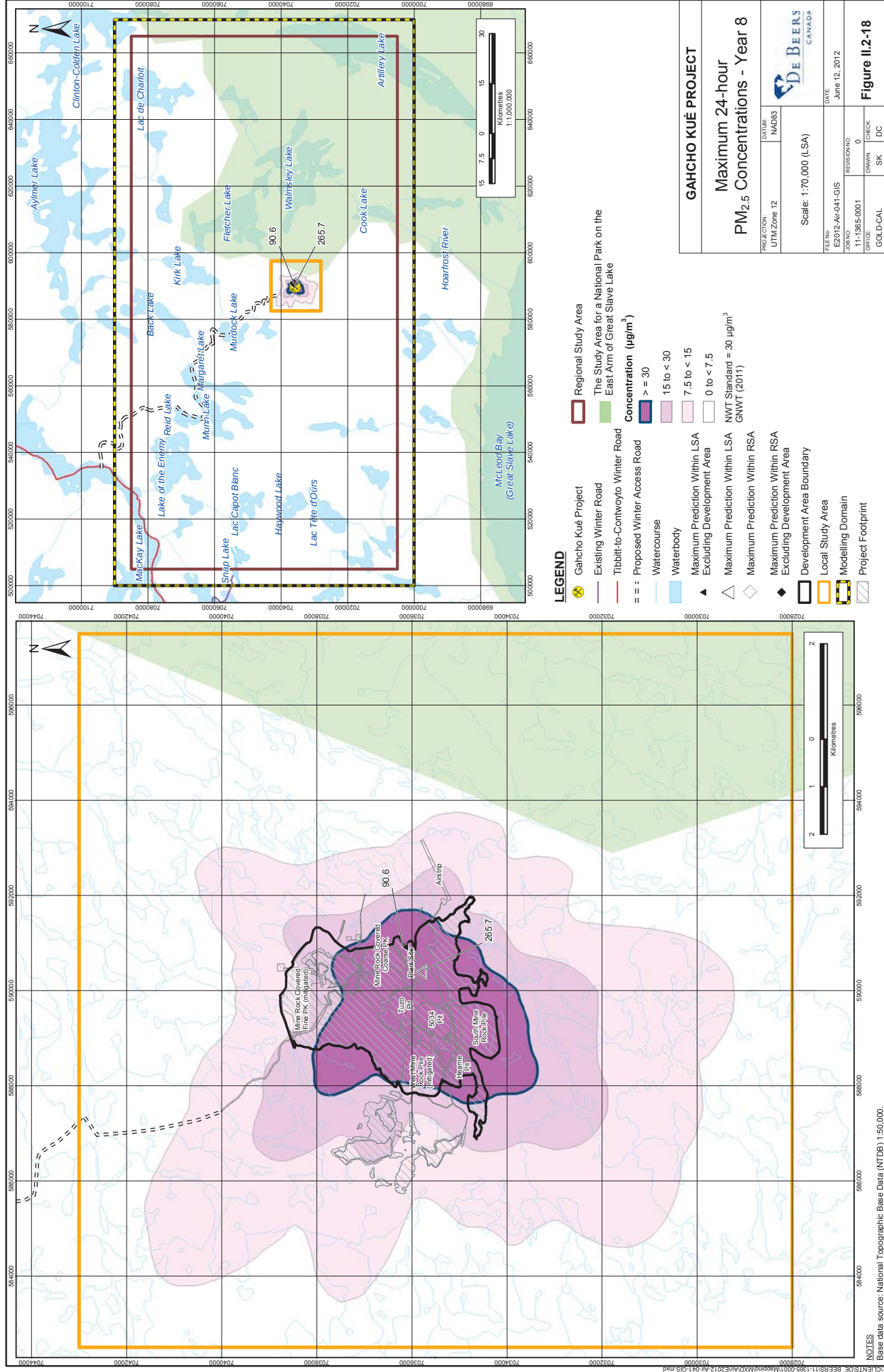
- > 30
- 15 to < 30
- 7.5 to < 15
- 0 to < 7.5

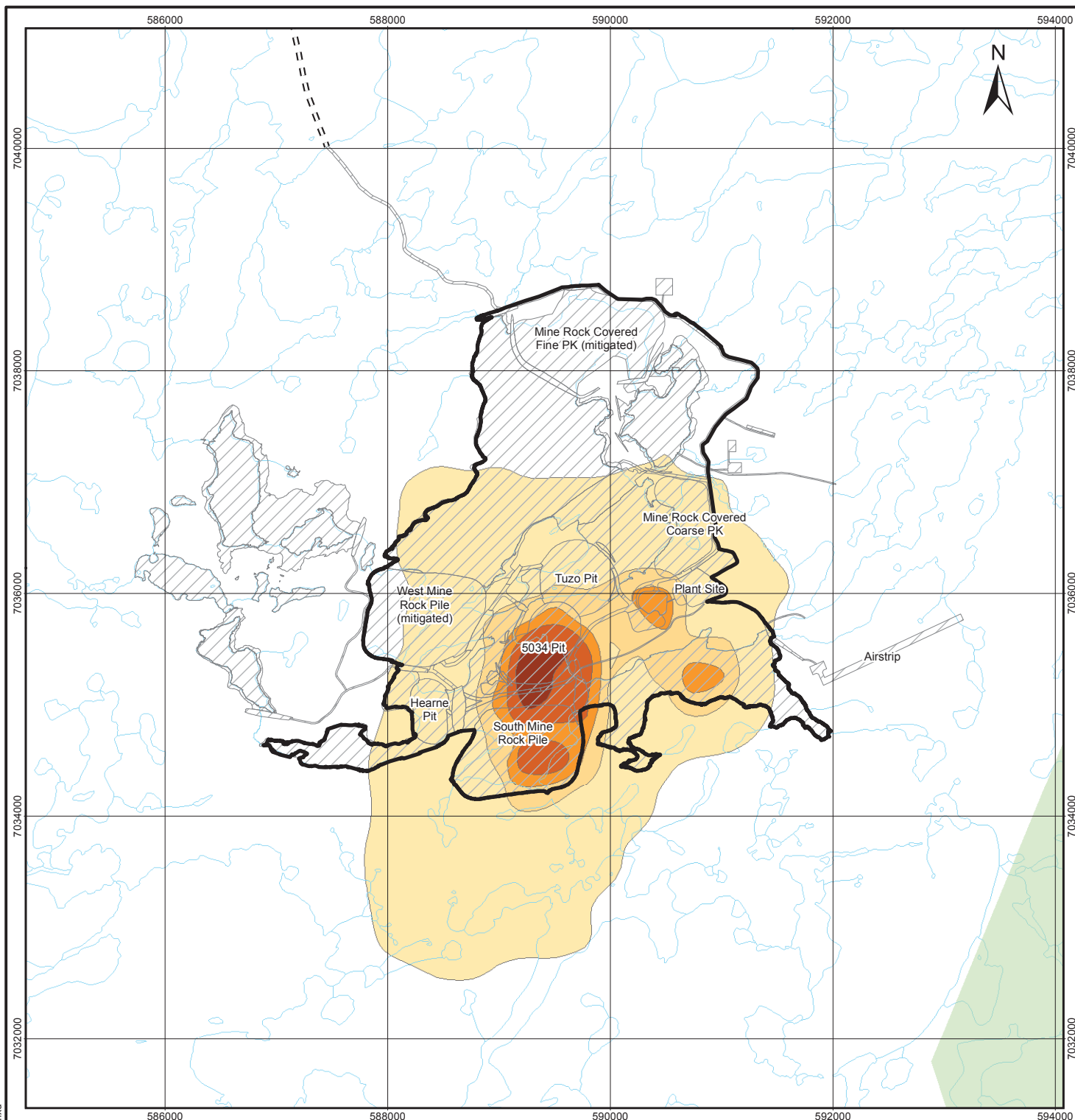
Scale: 1:70,000 (LSA)

Scale: 1:150,000 (RSA)

Scale: 1:1,000,000

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.





LEGEND

== Proposed Winter Access Road

— Watercourse

Waterbody

Development Area Boundary

Project Footprint

The Study Area for a National Park
on the East Arm of Great Slave Lake

Numbers of Days Exceeding Air Quality Standard

> 60

45 to 59

30 to 44

15 to 29

1 to 14

NWT Standard = $30 \mu\text{g}/\text{m}^3$
GNWT (2011)

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Number of Days Exceeding 24-hour $\text{PM}_{2.5}$ Air Quality Standard - Year 1

PROJECTION:
UTM Zone 12

DATUM:
NAD83

Scale: 1:50,000
500 250 0 500
Metres



FILE No:
E2012-Air-042-GIS

DATE:
June 22, 2012

JOB NO:
11-1365-0001

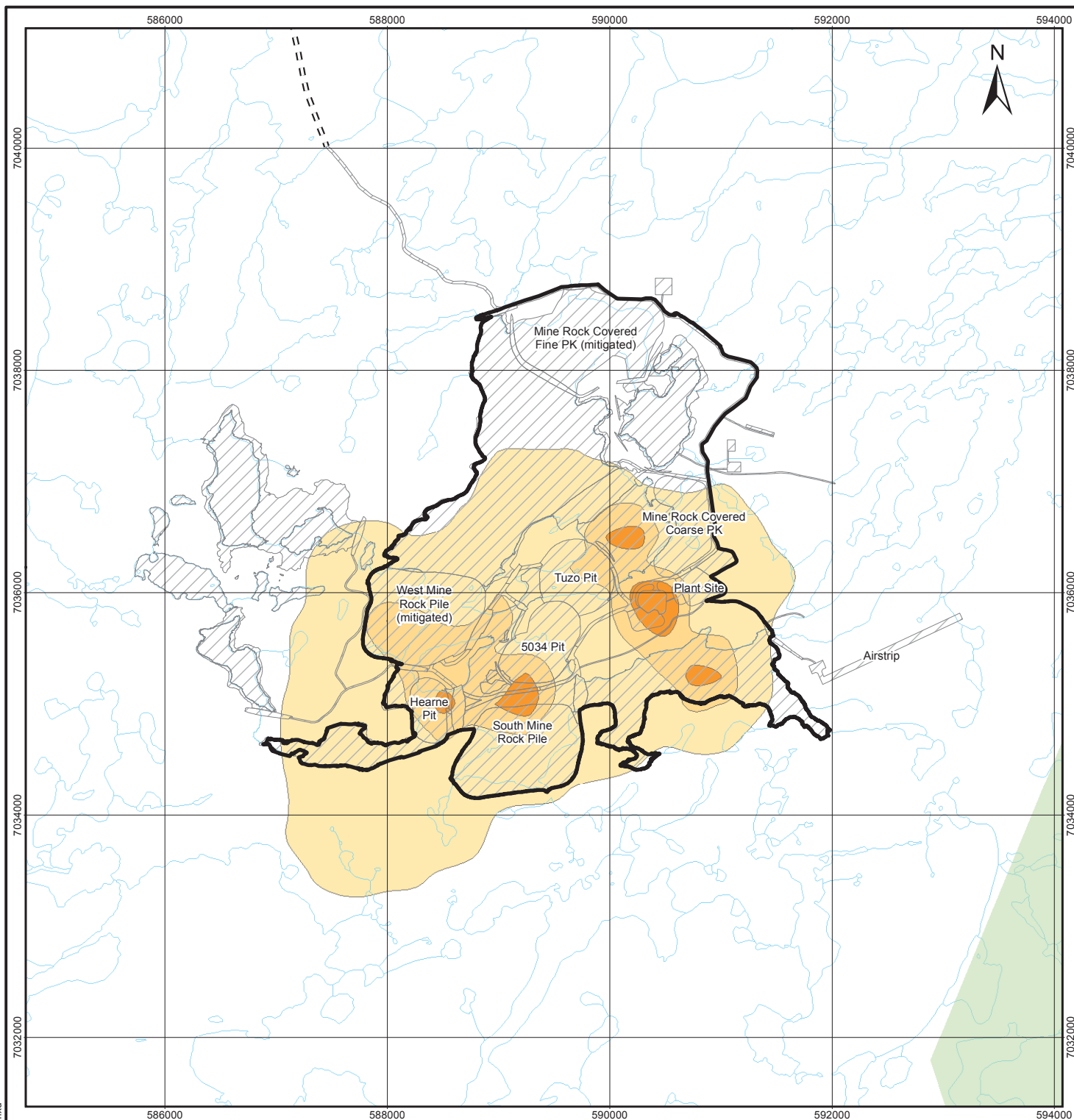
REVISION NO:
1

OFFICE:
GOLD-CAL

DRAWN:
SK

CHECK:
DC

Figure II.2-19



LEGEND

== Proposed Winter Access Road

— Watercourse

— Waterbody

— Development Area Boundary

— Project Footprint

— The Study Area for a National Park on the East Arm of Great Slave Lake

Numbers of Days Exceeding Air Quality Standard

> 60

45 to 59

30 to 44

15 to 29

1 to 14

NWT Standard = $30 \mu\text{g}/\text{m}^3$
GNWT (2011)

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Number of Days Exceeding 24-hour $\text{PM}_{2.5}$ Air Quality Standard - Year 5

PROJECTION:
UTM Zone 12

DATUM:
NAD83

Scale: 1:50,000
500 250 0 500
Metres



FILE No:
E2012-Air-043-GIS

DATE:
June 22, 2012

JOB NO:
11-1365-0001

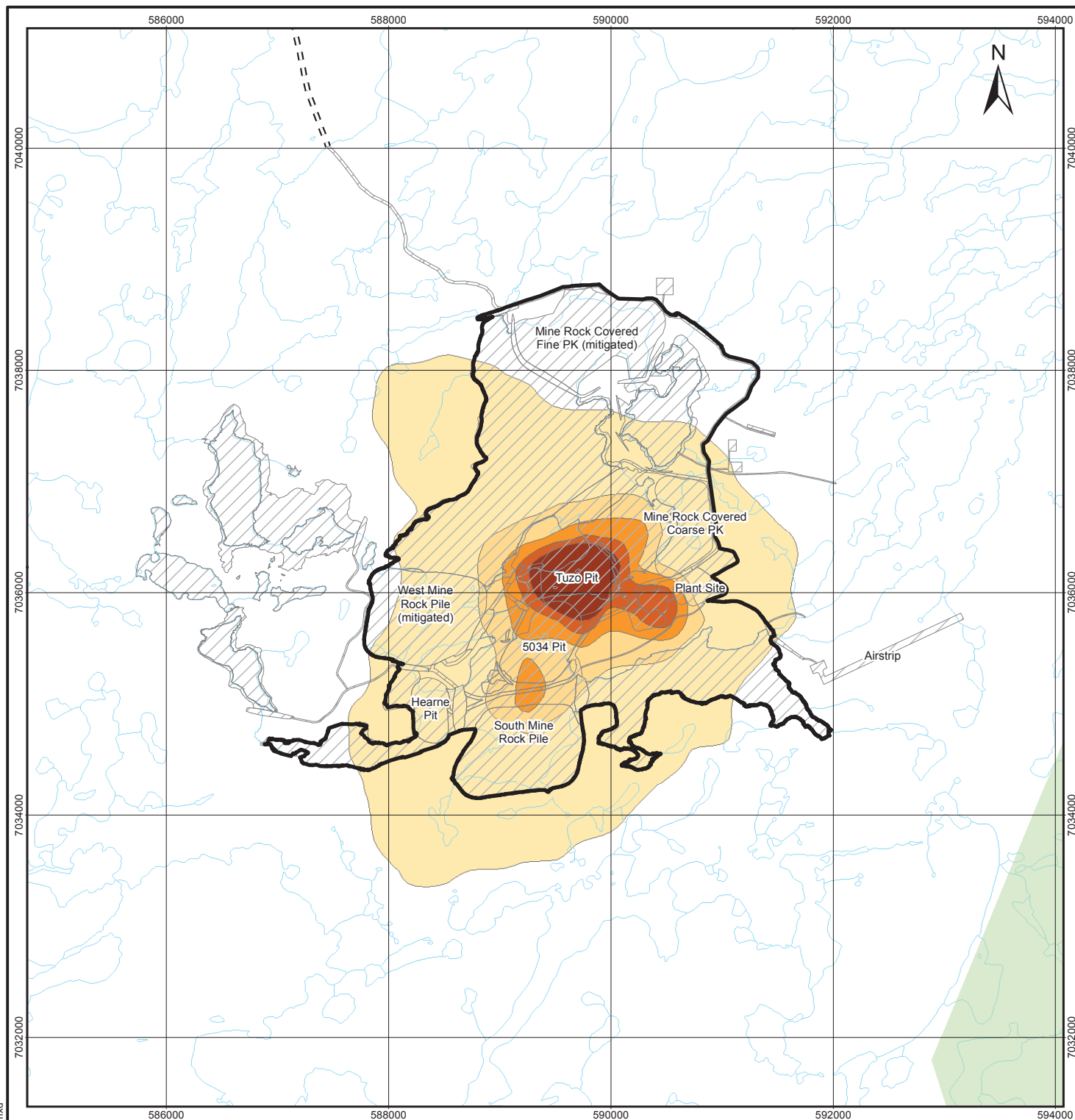
REVISION NO:
1

OFFICE:
GOLD-CAL

DRAWN:
SK

CHECK:
DC

Figure II.2-20



LEGEND

- == Proposed Winter Access Road
- Watercourse
- Waterbody
- Development Area Boundary
- Project Footprint

The Study Area for a National Park
on the East Arm of Great Slave Lake

Numbers of Days Exceeding Air Quality Standard

- > 60
- 45 to 59
- 30 to 44
- 15 to 29
- 1 to 14

NWT Standard = $30 \mu\text{g}/\text{m}^3$
GNWT (2011)

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Number of Days Exceeding 24-hour $\text{PM}_{2.5}$ Air Quality Standard - Year 8

PROJECTION:
UTM Zone 12

DATUM:
NAD83

Scale: 1:50,000
500 250 0 500
Metres



FILE No:
E2012-Air-044-GIS

DATE:
June 22, 2012

JOB NO:
11-1365-0001

REVISION NO:
1

OFFICE:
GOLD-CAL

DRAWN:
DC

CHECK:
DC

Figure II.2-21

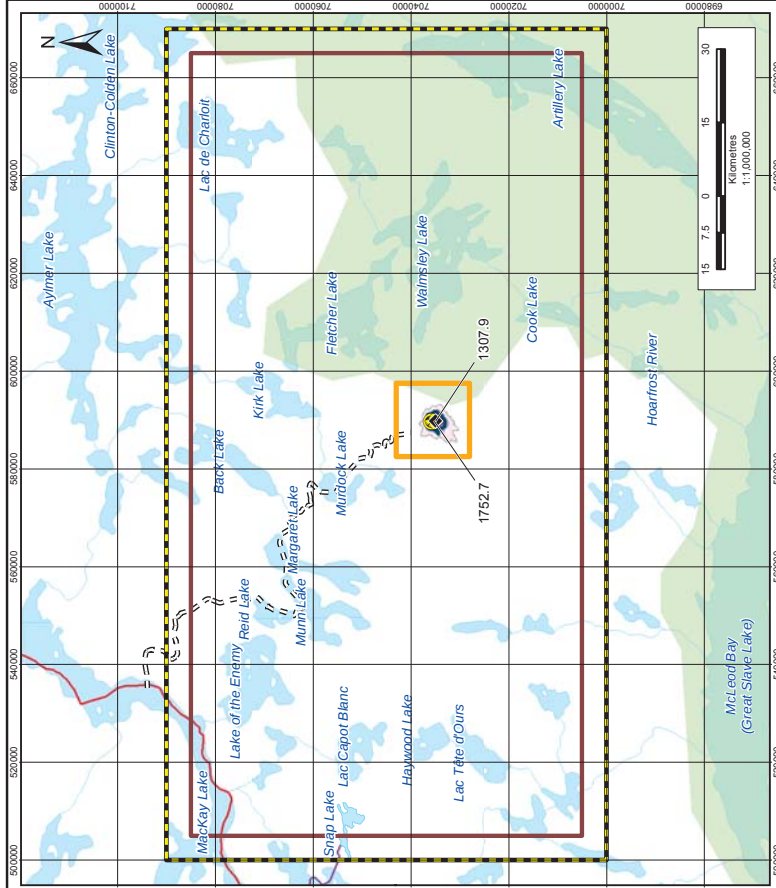
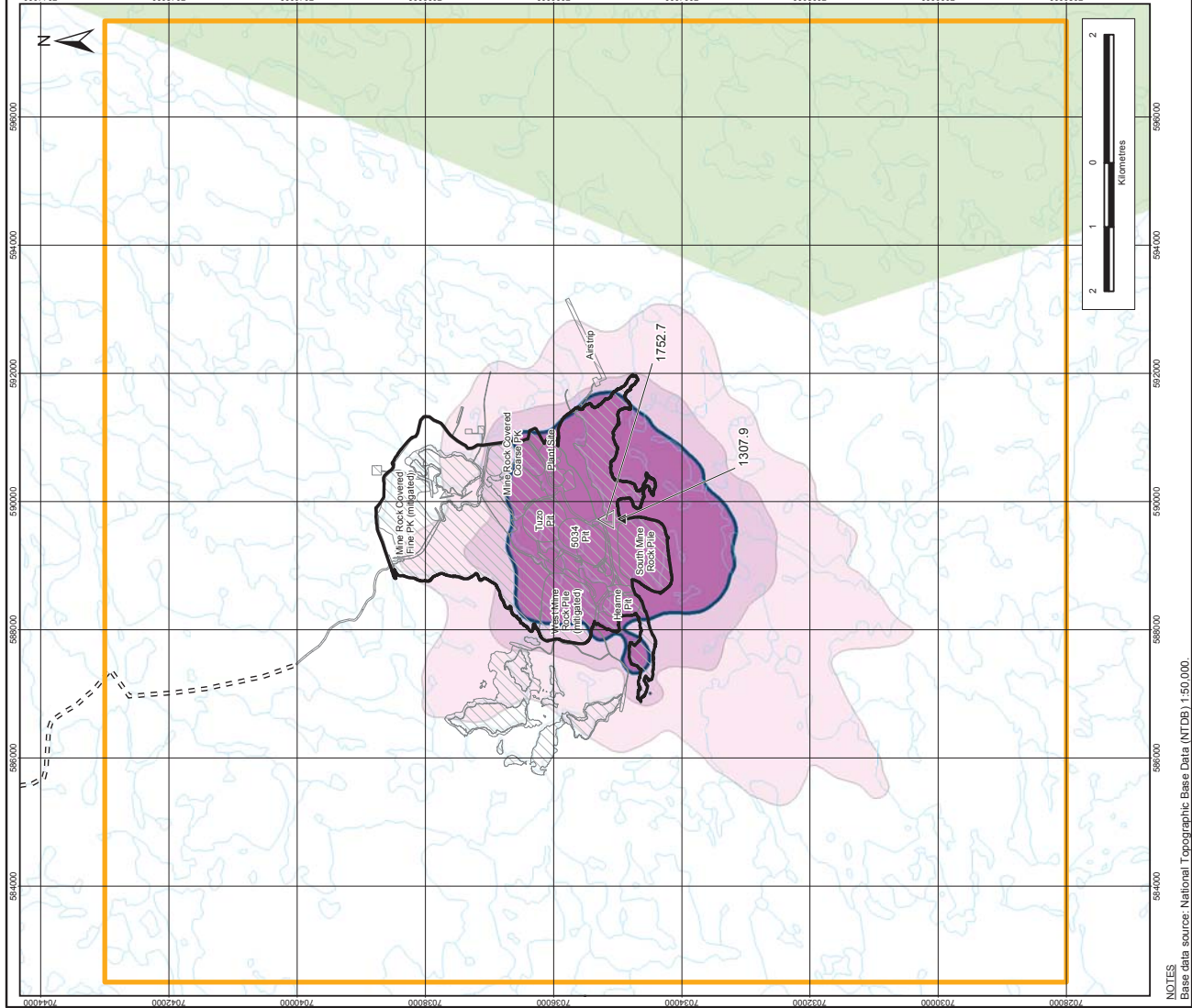
Table II.2-5 TSP Predictions - Comparison of the Updated Application Case

Study Area	Averaging Period		Maximum Predicted Concentrations [$\mu\text{g}/\text{m}^3$]			
			Year 1	Year 5	Year 8	Application Case
LSA	24-hour ^(a)	Overall	1,752.7	1,221.3	1,836.7	1,836.7
		Excluding Development Area	1,307.9	746.8	397.6	1,307.9
	Annual ^(b)	Overall	314.4	195.3	356.7	356.7
		Excluding Development Area	278.1	91.5	56.7	278.1
RSA	24-hour ^(a)	Overall	1,752.7	1,221.3	1,836.7	1,836.7
		Excluding Development Area	1,307.9	746.8	397.6	1,307.9
	Annual ^(b)	Overall	314.4	195.3	356.7	356.7
		Excluding Development Area	278.1	91.5	56.7	278.1

^(a) NWT Air Quality Standard (AQS) for 24-hour TSP is $120 \mu\text{g}/\text{m}^3$ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for annual TSP is $60 \mu\text{g}/\text{m}^3$ (GNWT 2011).

LSA = local study area; RSA = regional study area; TSP = total suspended particulates; $\mu\text{g}/\text{m}^3$ = micrograms per cubic metres.



LEGEND

- Garcho Kué Project
- Regional Study Area
- The Study Area for a National Park on the East Arm of Great Slave Lake
- Existing Winter Road
- Tibbitt-to-Contwoyto Winter Road
- Proposed Winter Access Road
- Watercourse
- Waterbody
- Maximum Prediction Within LSA
- Excluding Development Area
- Maximum Prediction Within LSA
- Maximum Prediction Within RSA
- Maximum Prediction Within RSA
- Excluding Development Area
- Development Area Boundary
- Local Study Area
- Modelling Domain
- Project Footprint

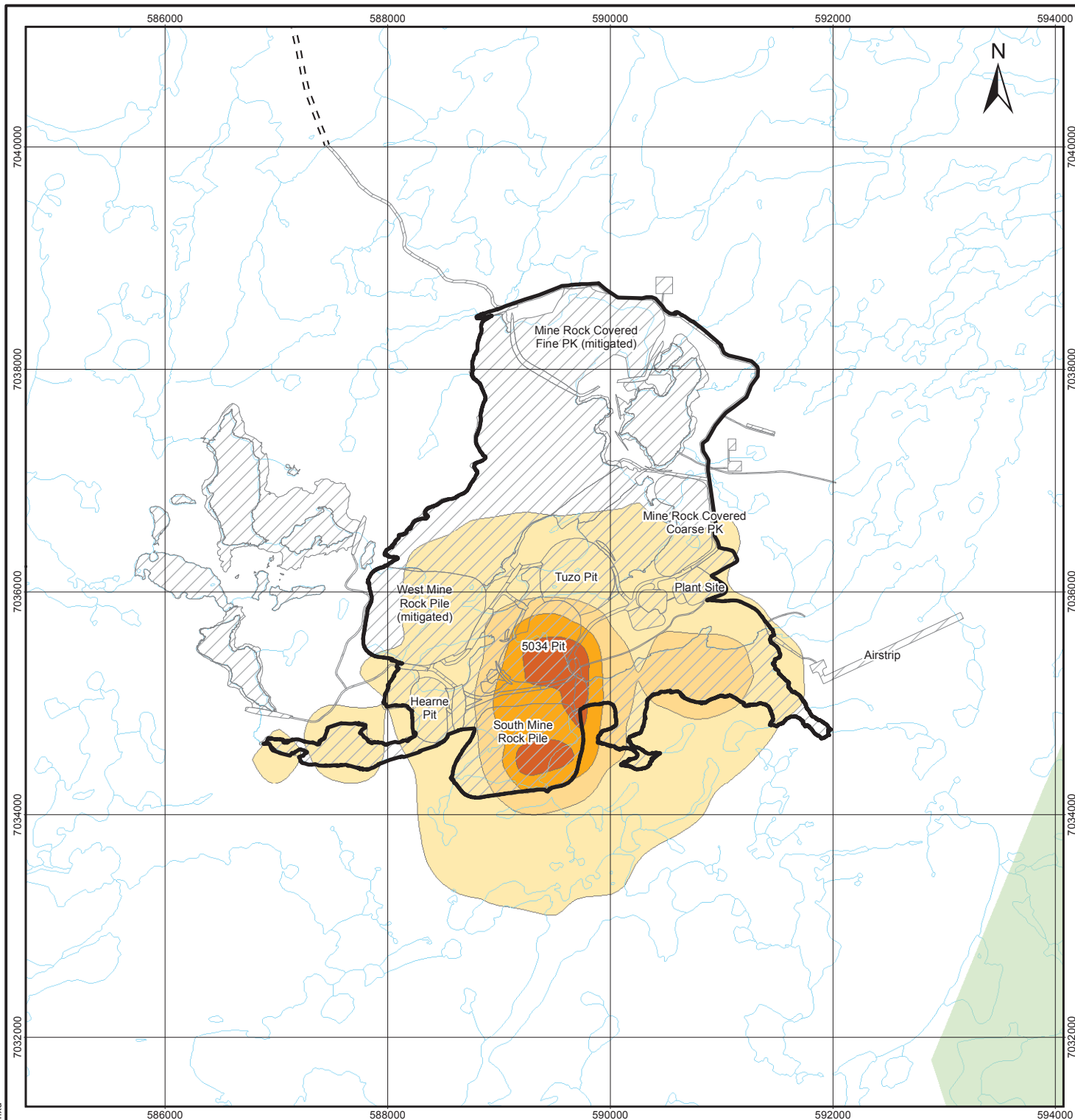
Concentration ($\mu\text{g}/\text{m}^3$)

- ≥ 120
- 60 to < 120
- 30 to < 60
- 0 to < 30

NMT Standard = $120 \mu\text{g}/\text{m}^3$ GNWT (2011)

GAHCHO KUÉ PROJECT	
Maximum 24-hour TSP Concentrations - Year 1	
PROJECTION: UTM Zone 12	DATUM: NAD83
Scale: 1:70,000 (LSA)	
FILE NO: E2012-Air-045-GIS	DATE: June 12, 2012
JOB NO: 11-1365-0001	REVISION: 0
OFFICE: GOLD-CAL	CHECK: DC
Figure II.2-22	

NOTES
Base data source: National Topographic Base Data (NTDB) 1:50,000.



LEGEND

- = = Proposed Winter Access Road
- Watercourse
- Waterbody
- ▬ Development Area Boundary
- ▨ Project Footprint
- The Study Area for a National Park on the East Arm of Great Slave Lake

Numbers of Days Exceeding Air Quality Standard

- > 240
- 180 to 239
- 120 to 179
- 60 to 119
- 1 to 59
- 0 to <1

NWT Standard = $120 \mu\text{g}/\text{m}^3$
GNWT (2011)

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Number of Days Exceeding 24-hour TSP NWT Air Quality Standard - Year 1

PROJECTION:
UTM Zone 12

DATUM:
NAD83

Scale: 1:50,000
500 250 0 500
Metres



FILE No:
E2012-Air-048-GIS

DATE:
June 22, 2012

JOB NO:
11-1365-0001

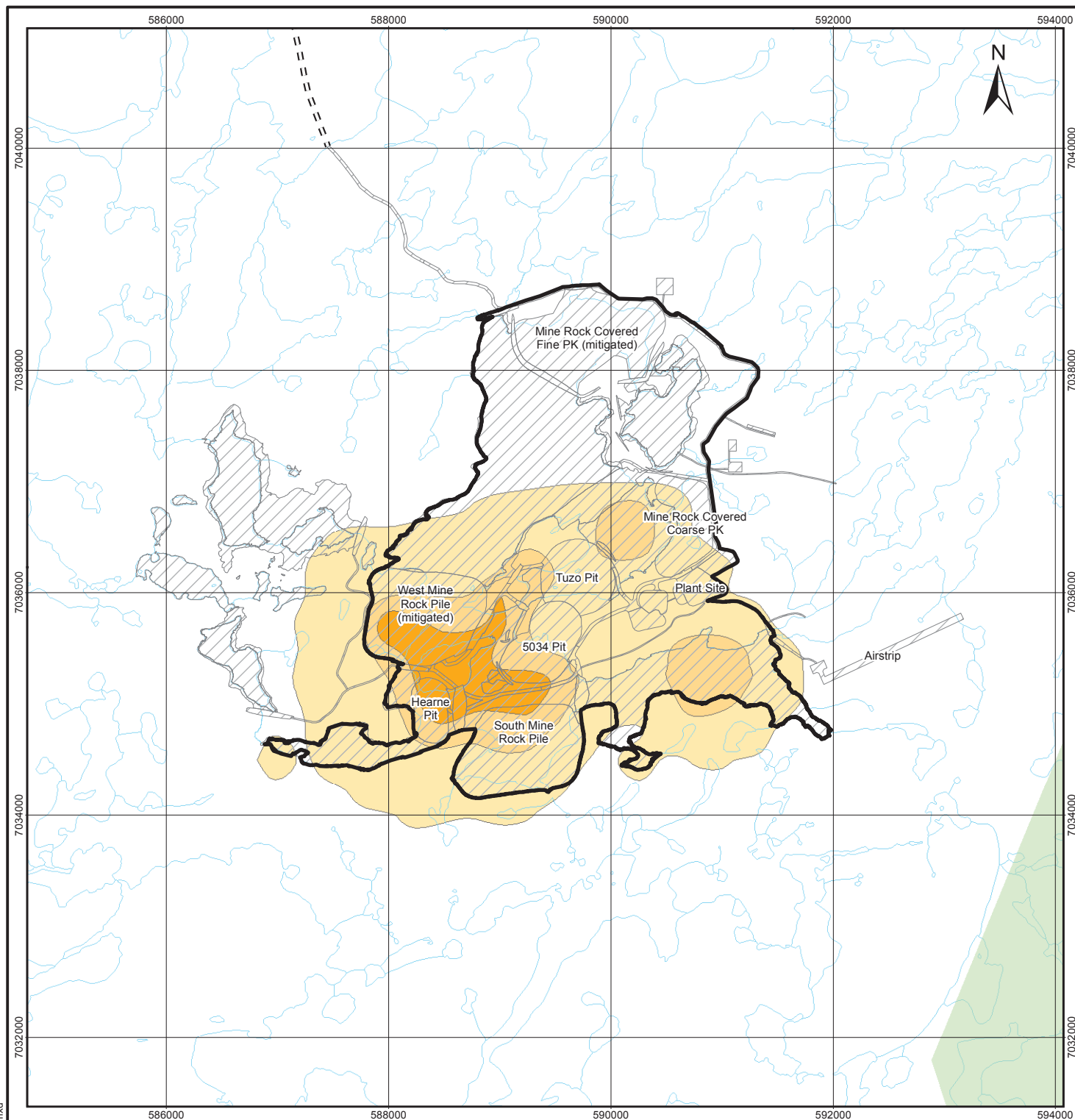
REVISION NO:
1

OFFICE:
GOLD-CAL

DRAWN:
SK

CHECK:
DC

Figure II.2-25



LEGEND

= = Proposed Winter Access Road

— Watercourse

— Waterbody

— Development Area Boundary

— Project Footprint

— The Study Area for a National Park on the East Arm of Great Slave Lake

Numbers of Days Exceeding Air Quality Standard

> 240

180 to 239

120 to 179

60 to 119

1 to 59

0 to <1

NWT Standard = $120 \mu\text{g}/\text{m}^3$
GNWT (2011)

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Number of Days Exceeding 24-hour TSP NWT Air Quality Standard - Year 5

PROJECTION:
UTM Zone 12

DATUM:
NAD83

Scale: 1:50,000
500 250 0 500
Metres



FILE No:
E2012-Air-049-GIS

DATE:
July 19, 2012

JOB NO:
11-1365-0001

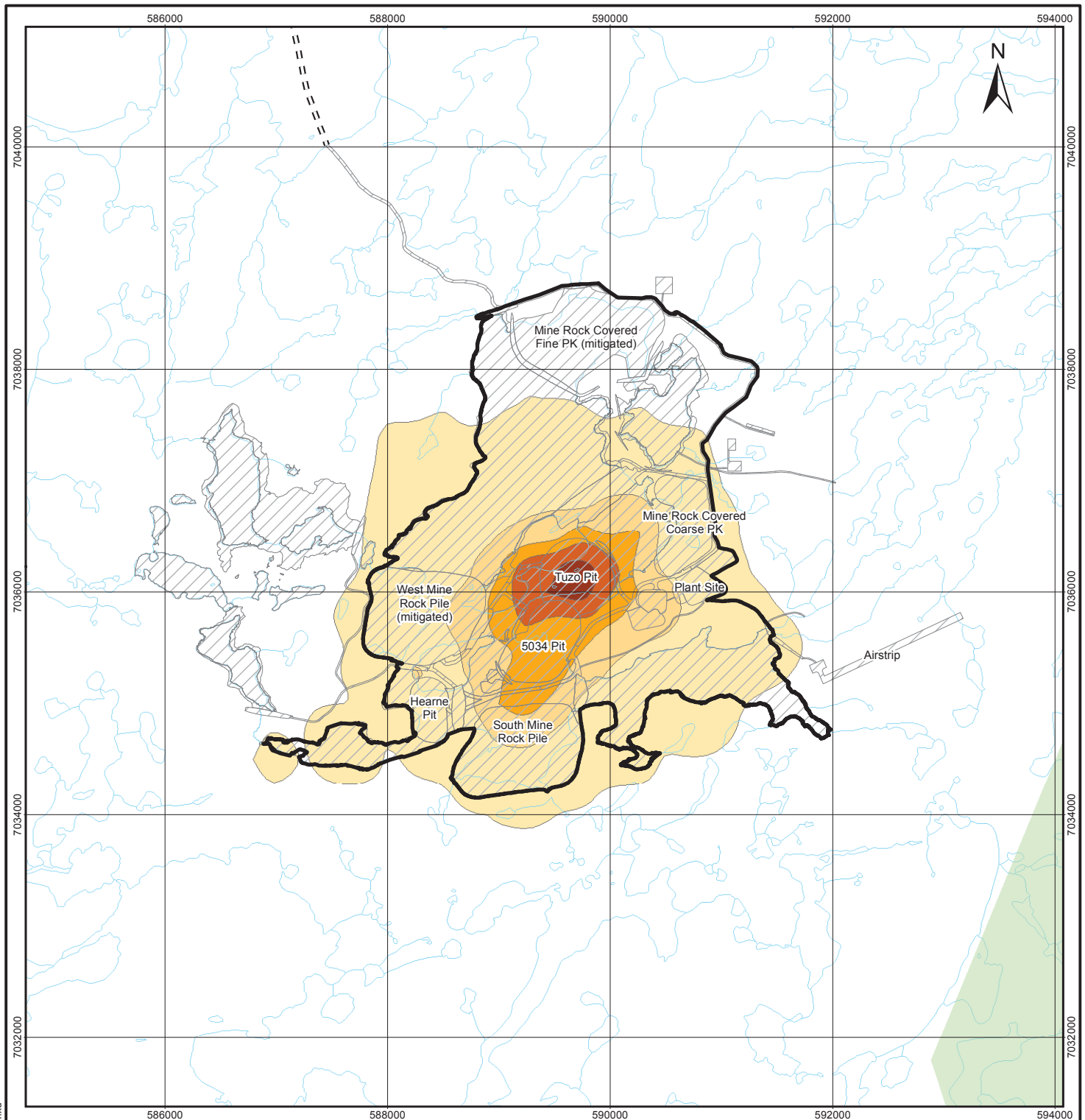
REVISION NO:
1

OFFICE:
GOLD-CAL

DRAWN:
DC

CHECK:
DC

Figure II.2-26



LEGEND

- == Proposed Winter Access Road
- Watercourse
- Waterbody
- Development Area Boundary
- Project Footprint

The Study Area for a National Park
on the East Arm of Great Slave Lake

Numbers of Days Exceeding Air Quality Standard

- > 240
- 180 to 239
- 120 to 179
- 60 to 119
- 1 to 60
- 0 to <1

NWT Standard = $120 \mu\text{g}/\text{m}^3$
GNWT (2011)

NOTES

Base data source: National Topographic Base Data (NTDB) 1:50,000

GAHCHO KUÉ PROJECT

Number of Days Exceeding 24-hour TSP NWT Air Quality Standard - Year 8

PROJECTION:
UTM Zone 12

DATUM:
NAD83

Scale: 1:50,000
500 250 0 500
Metres



FILE No:
E2012-Air-050-GIS

DATE:
July 19, 2012

JOB NO:
11-1365-0001

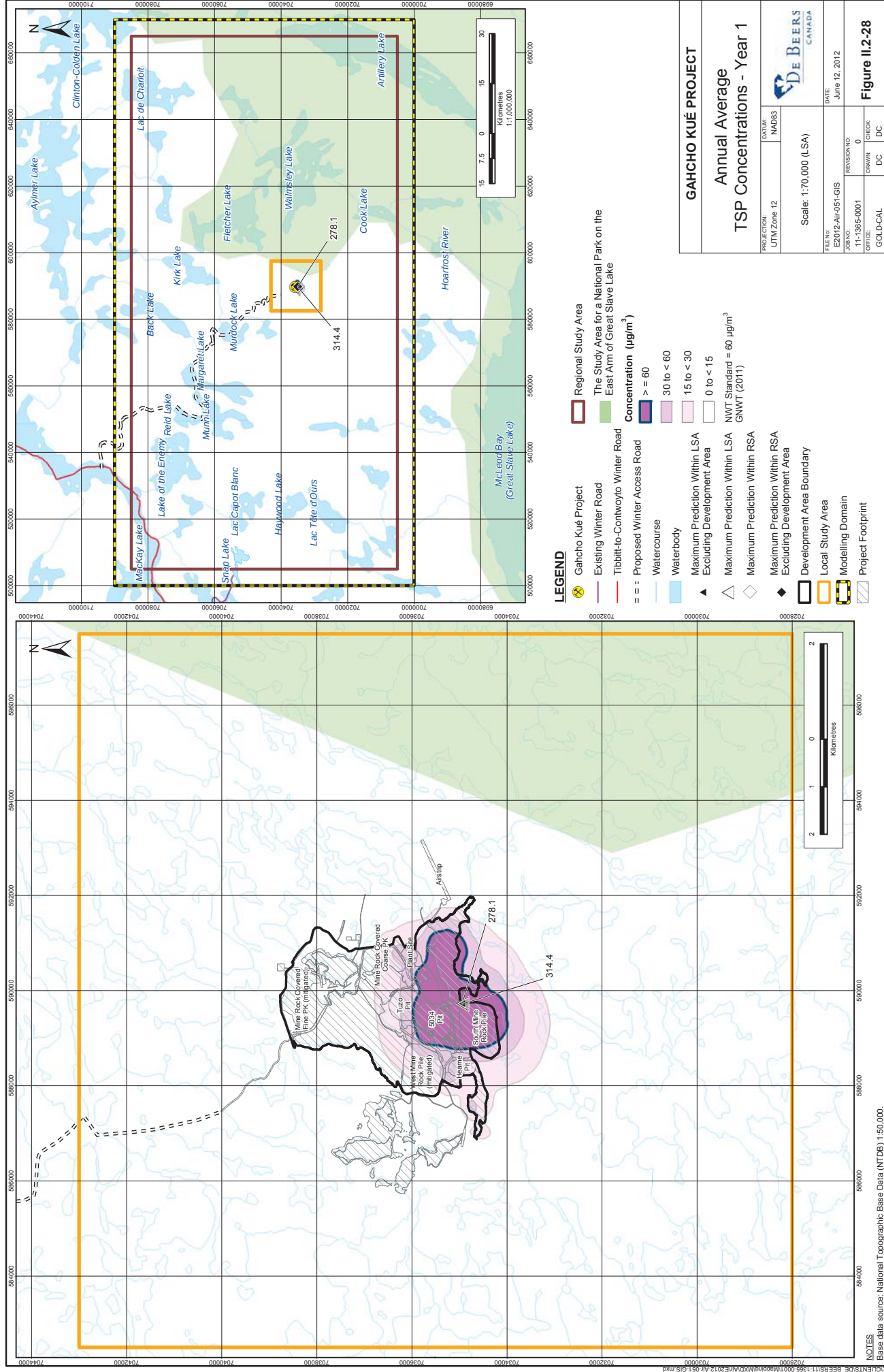
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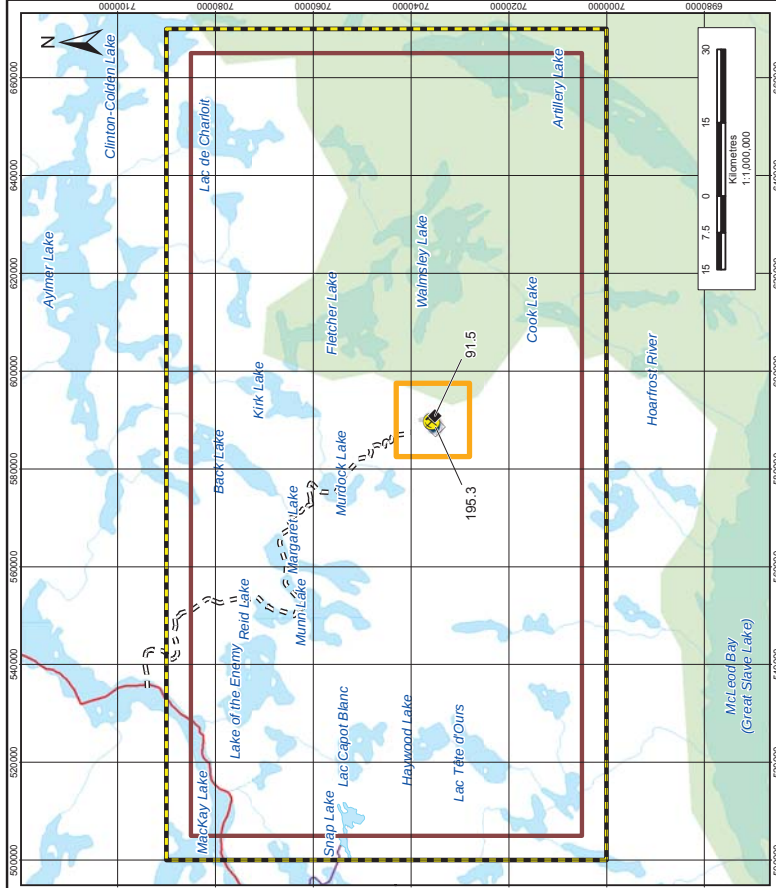
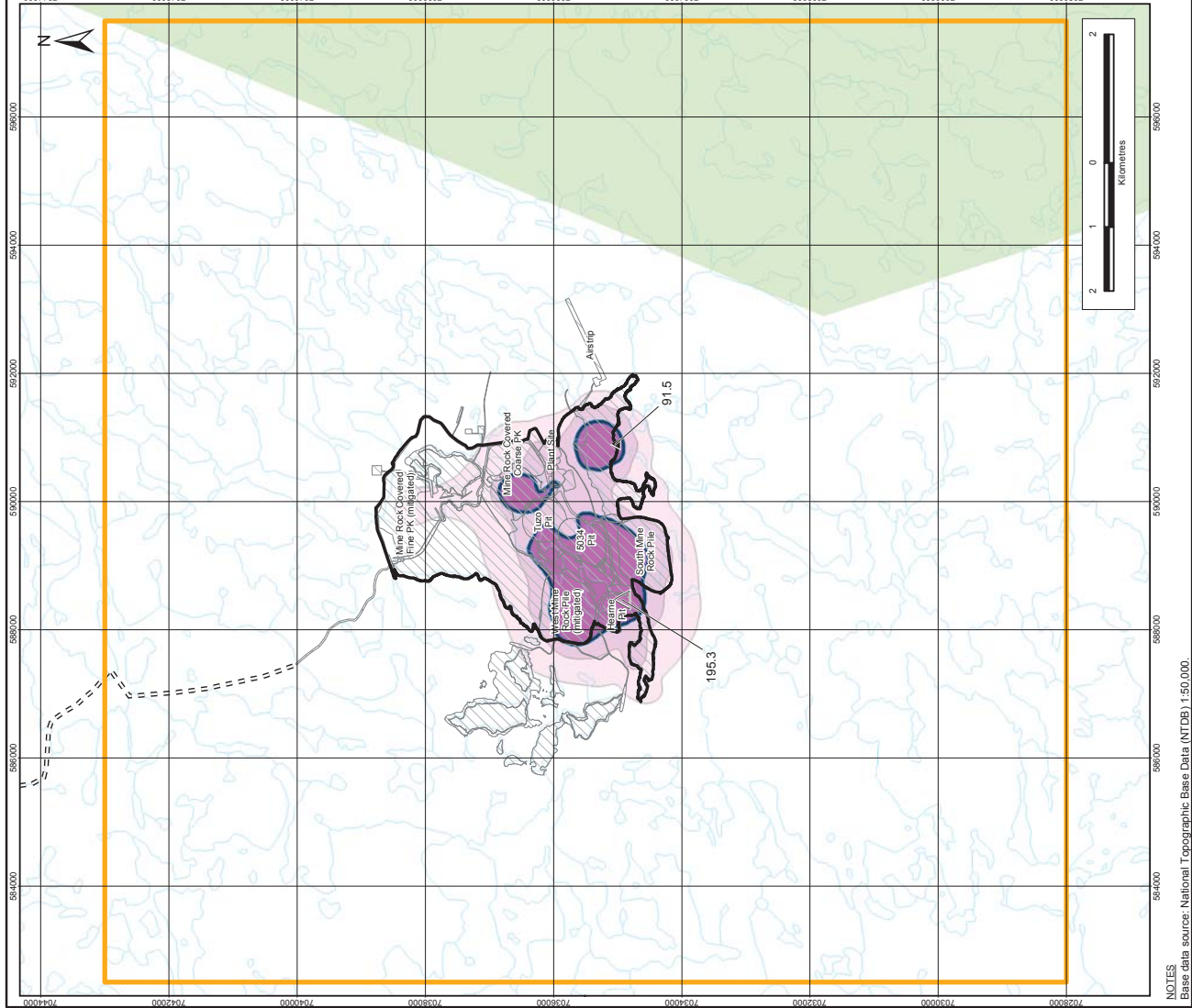
OFFICE:
GOLD-CAL

DRAWN:
DC

CHECK:
DC

Figure II.2-27





LEGEND

- Garcho Kué Project
- Existing Winter Road
- Tibbitt-to-Contwoyto Winter Road
- Proposed Winter Access Road
- Watercourse
- Waterbody
- Maximum Prediction Within LSA
- Excluding Development Area
- Maximum Prediction Within LSA
- Maximum Prediction Within RSA
- Maximum Prediction Within RSA
- Excluding Development Area
- Development Area Boundary
- Local Study Area
- Modelling Domain
- Project Footprint

Concentration ($\mu\text{g}/\text{m}^3$)

- ≥ 60
- 30 to < 60
- 15 to < 30
- 0 to < 15

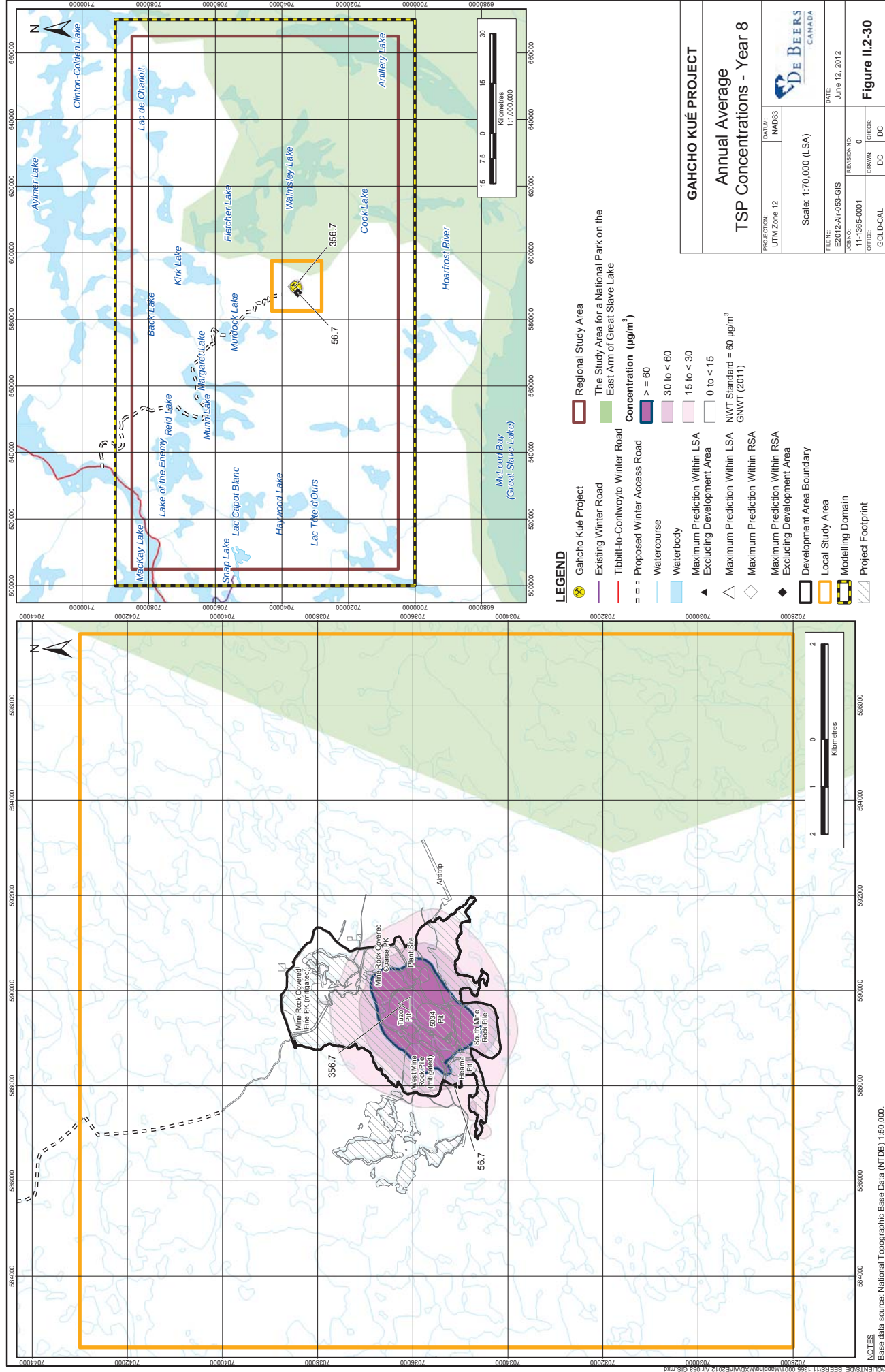
Scale: 1:70,000 (LSA)

Annual Average TSP Concentrations - Year 5

GAHCHO KUÉ PROJECT

De Beers CANADA

Figure II.2-29



II.3 PREDICTED AIR QUALITY AT SELECTED LOCATIONS

Tables II.3-1 to II.3-6 presented the updated Application Case predictions at the selected locations of interest.

Table II.3-1 SO₂ Predictions at Selected Locations

Location	Maximum 1-hour ^(a) (µg/m ³)		Maximum 24-hour ^(b) (µg/m ³)		Annual ^(c) (µg/m ³)	
	Baseline	Application	Baseline	Application	Baseline	Application
Warburton Bay Lodge	3.7	3.7	2.9	2.9	2.6	2.6
Warburton Bay Fishing Lodge	4.1	4.1	2.9	2.9	2.6	2.6
MacKay Lake Lodge	3.5	3.5	2.9	2.9	2.6	2.6
Employee Camp	3.1	35.3	2.7	16.9	2.6	3.1
Proposed National Park Boundary	3.1	7.2	2.7	3.5	2.6	2.7
Development Area Boundary	3.1	43.4	2.7	33.3	2.6	4.8

^(a) NWT Air Quality Standard (AQS) for 1-hour SO₂ is 450 µg/m³ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for 24-hour SO₂ is 150 µg/m³ (GNWT 2011).

^(c) NWT Air Quality Standard (AQS) for annual SO₂ is 30 µg/m³ (GNWT 2011).

SO₂ = sulphur dioxide; µg/m³ = micrograms per cubic metres.

Table II.3-2 NO₂ Predictions at Selected Locations

Location	Maximum 1-hour ^(a) (µg/m ³)		Maximum 24-hour ^(b) (µg/m ³)		Annual ^(c) (µg/m ³)	
	Baseline	Application	Baseline	Application	Baseline	Application
Warburton Bay Lodge	43.1	43.1	9.7	9.7	5.9	5.9
Warburton Bay Fishing Lodge	38.1	38.1	11.2	11.2	5.9	6.0
MacKay Lake Lodge	23.2	23.2	10.2	10.2	5.9	5.9
Employee Camp	11.5	234.5	7.2	170.0	5.8	55.2
Proposed National Park Boundary	12.1	101.4	7.7	54.3	5.8	9.6
Development Area Boundary	13.1	314.8	7.6	224.4	5.8	62.1

^(a) NWT Air Quality Standard (AQS) for 1-hour NO₂ is 400 µg/m³ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for 24-hour NO₂ is 200 µg/m³ (GNWT 2011).

^(c) NWT Air Quality Standard (AQS) for annual NO₂ is 60 µg/m³ (GNWT 2011).

NO₂ = nitrogen dioxide; µg/m³ = micrograms per cubic metres.

Table II.3-3 CO Predictions at Selected Locations

Location	Maximum 1-hour ^(a) (µg/m ³)		Maximum 8-hour ^(b) (µg/m ³)	
	Baseline	Application	Baseline	Application
Warburton Bay Lodge	130.3	130.3	120.5	120.5
Warburton Bay Fishing Lodge	129.2	129.2	121.6	121.6
MacKay Lake Lodge	124.0	124.0	119.2	119.2
Employee Camp	118.9	1,714.6	117.9	1,249.3
Proposed National Park Boundary	118.9	344.2	118.0	215.8
Development Area Boundary	118.9	2,144.0	118.0	1,855.8

^(a) NWT Air Quality Standard (AQS) for 1-hour CO is 15,000 µg/m³ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for 8-hour CO is 6,000 µg/m³ (GNWT 2011).

CO = carbon monoxide; µg/m³ = micrograms per cubic metres.

Table II.3-4 TSP Predictions at Selected Locations

Location	Maximum 24-hour ^(a) (µg/m ³)		Annual Average ^(b) (µg/m ³)	
	Baseline	Application	Baseline	Application
Warburton Bay Lodge	7.2	7.3	7.1	7.1
Warburton Bay Fishing Lodge	7.2	7.4	7.1	7.1
MacKay Lake Lodge	7.2	7.3	7.1	7.1
Employee Camp	7.1	281.3	7.1	29.0
Proposed National Park Boundary	7.1	31.8	7.1	8.4
Development Area Boundary	7.1	1,307.9	7.1	278.1

^(a) NWT Air Quality Standard (AQS) for 24-hour TSP is 120 µg/m³ (GNWT 2011).

^(b) NWT Air Quality Standard (AQS) for annual TSP is 60 µg/m³ (GNWT 2011).

TSP = total suspended particulates; µg/m³ = micrograms per cubic metres.

Table II.3-5 PM_{2.5} Predictions at Selected Locations

Location	Maximum 24-hour ^(a) (µg/m ³)	
	Baseline	Application
Warburton Bay Lodge	2.1	2.1
Warburton Bay Fishing Lodge	2.1	2.1
MacKay Lake Lodge	2.1	2.1
Employee Camp	2.1	89.2
Proposed National Park Boundary	2.1	6.4
Development Area Boundary	2.2	137.7

^(a) NWT Air Quality Standard (AQS) for 1-hour PM_{2.5} is 30 µg/m³ (GNWT 2011).

PM_{2.5} = airborne particulate matter of mean diameter 2.5 µm or less; µg/m³ = micrograms per cubic metres.

Table II.3-6 PM₁₀ Predictions at Selected Locations

Location	Maximum 24-hour (µg/m ³)	
	Baseline	Application
Warburton Bay Lodge	3.1	3.3
Warburton Bay Fishing Lodge	3.1	3.3
Mackay Lake Lodge	3.1	3.2
Employee Camp	3.0	171.7
Proposed National Park Boundary	3.0	22.6
Development Area Boundary	3.0	515.1

PM₁₀ = airborne particulate matter of mean diameter 10 µm or less; µg/m³ = micrograms per cubic metres.

II.4 REFERENCES

GNWT (Government of Northwest Territories). 2011. Guideline for Ambient Air Quality Standards in the Northwest Territories. Department of Environment and Natural Resources. 5 pp.

II.5 ACRONYMS AND ABBREVIATIONS

AQS	Air Quality Standards
CO	carbon monoxide
LSA	local study area
NO₂	nitrogen dioxide gas
PM₁₀	particulate matter of particle diameter less than 10 µm
PM_{2.5}	particulate matter of particle diameter less than 2.5 µm
Project	Gahcho Kué Project
RSA	regional study area
SO₂	sulphur dioxide gas
TSP	total suspended particulates