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& SCIENTISTS

Tel: 519.823.1311
Fax: 519.823.1316

RWDI AIR Inc.
650 Woodlawn Road West
Guelph, Ontario, Canada
N1K 1B8



West Carleton Environmental Centre Ottawa, Ontario

Final Report

Noise Monitoring Program Version 1 RWDI # 1302177 July 30, 2014

SUBMITTED TO

Wayne Jenken
Area Landfill Engineer
wjenken@wm.com

Waste Management of Canada Corporation
2401 Carp Road
Ottawa, Ontario
N0M 2S0

SUBMITTED BY

Brad Bergeron, A.Sc.T., d.E.T
Senior Project Manager / Principal
Brad.Bergeron@rwdi.com

John DeYoe, B.A., d.E.T
Project Director / Associate
John.DeYoe@rwdi.com

Nghi Nguyen, C.Tech.
Intermediate Noise Scientist
Nghi.Nguyen@rwdi.com

Aaron Haniff, B.A.Sc., EIT
Senior Noise Scientist
Aaron.Haniff@rwdi.com

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West Carleton Environmental Centre
FINAL- Noise Monitoring Program
RWDI#1302177
Version 1
July 30, 2014

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1. INTRODUCTION

Waste Management of Canada Corporation (WM) has retained RWDI AIR Inc. (RWDI) to complete a Noise Monitoring Program (NMP) for the proposed landfill operations at the West Carleton Environmental Centre (WCEC).

As included in the approval terms of the Environmental Assessment (EA), WM has been recommended to complete this NMP. This NMP provide procedures for evaluating sound levels and is expected to span the life of the landfill. This NMP includes sound level monitoring of both steady-state and impulsive sources associated with the proposed landfill operations. Procedures for both are illustrated in a flow chart found in **Appendix A**.

The objectives of this NMP are summarized below:

- Outline the approximate monitoring locations and provide procedures for evaluating sound levels;
- On-site performance verification measurements of acoustic emissions generated by significant stationary and mobile equipment;
- Noise monitoring be conducted at representative locations of each of the three worst-case residential receptors; and
- Evaluate measured sound levels with respect to the applicable compliance limits.

A qualified acoustical consultant must be retained for the proper implementation of this NMP.

1.1 Definitions

1.1.1 Sound Pressure Level

Sound pressure level is what humans experience as sound. Sound waves create small fluctuations around the normal atmospheric pressure. These pressure fluctuations come into contact with eardrums and create the sensation of sound.

1.1.2 A-Weighted Sound Level

A-weighted decibel is the sound pressure level measured by applying a frequency weighting, designated the A-scale, to the signal. The frequency weighting (i.e., A-weighting), specified in IEC 61672-1, is intended to approximate the relative sensitivity of the normal human ear to different frequencies. The level is denoted as dBA. All sound levels in the NMP will be expressed in A-weighted sound levels.

1.1.3 Energy Equivalent Sound Level (L_{EQ})

The average energy equivalent sound level for a specified period is the level of constant or steady-state sound that has an amount of acoustical energy equal to the actual sound being measured. This quantity can be readily measured with an integrating sound level meter. The L_{EQ} for this project is the time average of the A-weighted sound pressure level (dBA).



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1.1.4 Logarithmic Mean Impulse Sound Level (L_{LM})

L_{LM} is the logarithmic mean (or average) of each impulsive A-weighted sound pressure peak (dBAI) sound occurring over a short period of time. Impulsive sound is sound characterized by sharp, fast rise times, and quick decay times. Each impulsive A-weighted sound pressure peak can be measured with an impulse sound level meter set to impulse response.

1.1.5 Ninetieth Percentile Sound Level (L_{90})

The ninetieth percentile sound level (L_{90}) is the A-weighted sound pressure level exceeded 90 percent of a specified time period. The L_{90} statistical level reflects sound levels that occur in the absence of frequent short-duration sound events. This quantity is readily computed by an integrating sound level meter.

1.1.6 Qualified Acoustical Consultant

A person trained and currently active in the field of environmental noise and has a combination of formal post-secondary education, training and experience to perform the sound level measurements. Familiarity with the Ministry of the Environment guidelines and procedures is a must.

2. ASSESSMENT CRITERIA

The sound level criteria for the WCEC landfill expansion is outlined in the Ministry of the Environment (MOE) Landfill Guideline.

2.1 Steady-State Sources

The MOE Landfill Guideline sets the following One-Hour Energy Equivalent Sound Level (L_{EQ-1hr}) limit for acoustic emissions from steady-state sources at a landfill site.

- The higher of 55 dBA or background noise, during the daytime hours (07:00 to 19:00h); and
- The higher of 45 dBA or background noise, during the evening and night hours (19:00 to 07:00h).

2.2 Pest Control Devices

Pest control devices at the WCEC landfill site are expected to include impulsive sources (e.g., propane cannons and shotgun blasts), and quasi-steady impulsive sources (e.g., “whistles”). The MOE Landfill Guideline sets sound level limits for pest control devices at off-site points of reception.

Type of Pest Control Device	Applicable Guideline Limit
Impulsive Noise	70 dBAI, $L_{LM}^{[1]}$
Quasi-Steady Impulsive Noise	60 dBA, $L_{EQ(1-hr)}$

Notes: [1] L_{LM} is the logarithmic mean impulse level.



The higher of the MOE Landfill Guideline limit or background sound level was used to establish the criteria of each receptor. Background sound level is either calculated based on road traffic volumes in compliance with NPC-206 requirements, or measured based on monitoring for a minimum 48-hour period in accordance with NPC-233 requirements. The applicable sound level limits vary by point of reception and are summarized in **Table 1** (Point of Reception Summary).

3. INSTRUMENTATION

Measurements will be conducted in accordance with the applicable requirements of MOE Publication NPC-103 and NPC-104 or their successors. As a minimum, measurement equipment will meet the Type 1 specifications of ANSI S1.4 or IEC 61672-1 (or their successors), and be equipped with an appropriate windscreen. Field calibration checks using an acoustic calibrator must be conducted both before and after each of the measurements.

4. PERFORMANCE VERIFICATION

Acoustic performance verification will be conducted annually. Procedures are illustrated in **Flow Chart 1** of **Appendix A**. Sound level measurements will be completed by a qualified acoustical consultant; all in accordance with the requirements of MOE Publications NPC-103 and NPC-104 or their successors. Instrumentation will comply with the requirements as outlined in Section 3.

4.1 Weather Conditions for Measurements

Acceptable environmental conditions for the measurements include:

- wind speed low enough to ensure that wind noise over the windscreen-enclosed microphone is 10 dB less than the measured source sound levels;
- relative humidity below 95% and non-condensing;
- no rain or snowfall; and
- any other limitations specified by the measurement equipment manufacturer to ensure that the complete package of measurement equipment is operated within the specifications provided above.

4.2 Construction Sources

All construction equipment must meet the requirements as set out in MOE Publication NPC-115. The following will be verified and the acoustic emissions must meet the sound pressure level limits as outlined in **Table 2** (Modelled Equipment Sound Level for Performance Verification – Landfill Sources).

- Verify the average acoustic emissions and characteristics, number and type of equipment, and hours of operation of construction equipment in operation at the construction working face.



4.3 Landfilling-Related Sources

The following will be verified and the acoustic emissions must meet the sound pressure level limits as outlined in **Table 2** (Modelled Equipment Sound Level for Performance Verification – Landfill Sources).

- Verify the average acoustic emissions and characteristics, number and type of equipment, and hours of operation of landfilling equipment in operation at the landfilling working face;
- Verify the pass-by sound level and hours of operation of heavy mobile equipment travelling at the posted speed limits; and
- Verify the average acoustic emissions and characteristics, number and type of equipment, hours of operation, location and directivity of pest control devices, specifically propane cannons.

4.4 Ancillary Sources

The acoustic performance of landfill gas flares and gas-to-energy plant will be compared with the predicted worst-case sound levels at representative measurement locations as shown in **Figure 1**. For ancillary sources, a 3 dB tolerance over the predicted levels is feasible based on the source locations relative to surrounding sensitive receptors. The sound level for verification is summarized below.

Measurement Location ID	Source(s)	Description of Location	Description of Sources in Operation	Daytime Sound Pressure Level Limit ^[1] (dBA)
VL1	Gas Flares	25 m northwest from base of candlestick flare	1 candlestick flare, 2 enclosed flares and 1 blower building	62
VL2a	Gas-to-Energy Plant	20 m northeast from east side of building	all 5 engines	71
VL2b		35 m southwest from west side of building	all 5 engines	75

Notes: [1] Includes the 3 dB tolerance over the predicted levels. Sound levels exclude all other non-landfill sources (e.g., road traffic, sounds of nature, aircraft flyovers, farm machinery, and adjacent commercial or industrial facilities).

5. VERIFICATION RESULTS IN EXCESS OF THE LIMITS

5.1 Construction Sources

In cases where measured levels do not comply with equipment sound levels as outlined in Section 4 for construction sources, the following steps are to be taken:

1. Identify source(s) contributing to the exceeding MOE NPC-115 guideline limit.
2. Confirm that sound is from equipment operating normally and did not occur during abnormal conditions.
3. Investigate mitigation measures to address sound levels.
4. Implement sound abatement measures.
5. Conduct confirmatory measurements to determine if the abatement solutions were successful or alternatively if additional abatement may be considered.
6. Identify source(s) contributing to the exceeding the modeled sound level as outlined in **Table 2** (Modelled Equipment Sound Level for Performance Verification – Landfill Sources).
7. Conduct receptor-based audit measurements according to requirements in Sections 6 and 7.

Procedures are illustrated in **Flow Chart 1** of **Appendix A**. Findings will be provided in the annual reports including any applicable control measures in the event of a measured excess that is confirmed to be from activities at the landfill.

5.2 Landfilling-Related and Ancillary Sources

In the event that measured levels do not comply with equipment sound levels as outlined in Section 4 for landfilling-related and ancillary sources, the following steps are to be taken:

1. Identify source(s) contributing to the exceeding sound level as outlined in **Table 2** for landfilling-related sources or **Table 3** for ancillary sources.
2. Conduct receptor-based audit measurements according to requirements in Sections 6 and 7.

Procedures are illustrated in **Flow Chart 1** of **Appendix A**. Findings will be provided in the annual reports including any applicable control measures in the event of a measured excess that is confirmed to be from activities at the landfill.



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6. RECEPTOR-BASED AUDIT

Noise monitoring in the form of audit measurements will be conducted to obtain energy equivalent (L_{EQ}) and/or logarithmic mean impulse (L_{LM}) sound levels for steady-state and impulsive sources, respectively. The audit measurements will be carried out as outlined in the following sections.

6.1 Weather Conditions for Measurements

Acceptable environmental conditions for the measurements include:

- wind speed less than 18 km/h and low enough to ensure that wind noise over the windscreen-enclosed microphone is 5 dB less than the measured source sound levels;
- relative humidity below 95% and non-condensing;
- no precipitation; and
- any other limitations specified by the measurement equipment manufacturer to ensure that the complete package of measurement equipment is operated within the specifications provided above.

6.2 Monitoring Frequencies

Monitoring will be planned at the start of each of the following landfill development phases when the highest acoustic emissions are expected to occur. The landfill development phases are provided in **Appendix B**.

- Phase 1: liner construction in Cell 2A and simultaneous landfilling in Cell 1A;
- Phase 2: liner construction in Cell 3A and simultaneous landfilling in Cells 1A and 2A;
- Phase 4: liner construction in Cell 5A and simultaneous landfilling in Cell 3A;
- Phase 5: liner construction in Cell 6A and simultaneous landfilling in Cell 5A;
- Phase 7: liner construction in Cell 8A and simultaneous landfilling in Cell 6A; and
- Phase 9: landfilling in Cell 8A, Cell 8B and top of mound.

Monitoring will be completed at each phase to capture WCEC sound levels outside of the above phases. No additional monitoring is required unless there is a complaint. A report summarizing the measured sound levels during each phase with respect to the compliance limits will be included in the annual reports, as applicable.



6.3 Receptor-Based Audit Measurement Process

Attended receptor-based audit measurement will be conducted for the receptors anticipated to have the greatest impact from landfill sources. The audit will evaluate sound levels due to the landfill against the applicable sound level limits. The audit will use measurement, auditory and visual observations to identify the source or sources of the sound at the representative measurement locations.

WM may contact the owners of the selected receptor for permission to conduct audit measurements at the point of reception. If contacting the owners is not desired or if owners do not give consent, an alternate location, as acoustically similar as possible, will be selected. All applicable receptors surrounding the WCEC are shown in **Figure 2**. The selected receptors and applicable sound level limits for the audit measurement are summarized in the table below and illustrated in **Figure 3**.

Point of Reception ID	Measurement Location ID	Point of Reception (PoR) Description	Performance Limit		
			Landfill Steady-State Sources ^[1] (dBA)	Landfill Quasi-Steady Impulsive Sources (dBA)	Landfill Impulsive Sources (dBA)
NR1	AL1	1-storey home on Richardson Side Road N	61	61	70
PR4	AL2	2-storey home on Richardson Side Road NNW	55	60	70

Notes: [1] Daytime only (07:00 to 19:00h) as landfill operations are planned only during this time period.

6.4 Audit Measurement Details

Attended noise measurement of minimum 20-minute duration will be conducted by a qualified acoustical consultant. The measurement will be conducted per Sections 6.2 and 6.3 and in accordance the equipment requirements as outlined in Section 3.

6.5 Audit Measurement Observations

During the measurements, aural and visual observations will be noted to assist in the analysis of the data. On-site observations such as the closest construction, landfilling and other site activity will be recorded before and after the audit measurements. The sound levels at the measurement location will be recorded. Personnel attending the measurement will count vehicle pass-by's and note vehicle classification in order to estimate the expected road traffic influence using an MOE accepted road traffic modeling techniques. Wherever possible, other background sources of noise will be excluded from the measurements by pausing during the undesirable event. In all cases, observed noise sources will be documented.



6.6 Background Sound

Where the acoustic environment includes road traffic, sounds of nature, aircraft flyovers, farm machinery, and adjacent commercial or industrial facilities, the effect of these on the measurement will be minimized as much as possible. Where traffic noise is a significant contributor, its contribution will be modelled and subtracted from the measured value.

6.7 Compliance Analysis

The acoustical consultant that conducted the measurements shall analyze the collected data and observations. The receptor-based audit will evaluate sound levels due to the landfill against the applicable sound level limits to establish the compliance status of landfill-attributable sound levels.

7. AUDIT RESULTS IN EXCESS OF THE LIMITS

In the event that landfill-attributable sound level in excess of the limits is identified through the receptor-based audit measurements, the following steps are to be taken:

1. Identify source(s) contributing to the exceeding sound level.
2. Confirm that sound is from construction and/or landfilling activities and did not occur during emergency or upset conditions.
3. Investigate mitigation measures to address sound levels.
4. Implement sound abatement measures.
5. Conduct confirmatory audit measurements to determine if the abatement solutions were successful or alternatively if additional abatement may be considered. This will be completed and reported within the next annual report after abatement installation has been completed.

Procedures are illustrated in **Flow Chart 2** of **Appendix A**. Findings will be provided in the annual reports including these measures in the event of a measured excess that is confirmed to be from activities at the landfill.



8. REPORTING

8.1 Complaint Reports

In the event that a noise complaint is received by either WM or the MOE inspector, the complaint shall be reported in accordance with the complaint procedure requirements of the EA and the noise Best Management Practices Plan (BMPP). The time, inspector, response time, and other details of all complaints shall be logged on the complaint form. An example of a complaint form is provided in **Appendix C**.

8.2 Annual Reports

Annual monitoring reports will be submitted in accordance with the EA and BMPP requirements. The annual reports will include:

- Summarized monitoring results, weather conditions (temperature, wind speed, wind direction, and precipitation), and analysis completed;
- A summary of sound levels;
- Complaints and responses;
- Records of activities at the site during periods of time when sound levels are noted above the criterion; and
- Any recommended improvements to the noise monitoring program.



9. REFERENCES

Ontario Ministry of the Environment, 1998: Noise Guidelines for Landfill Sites (Draft), October 1998.

Ontario Ministry of the Environment, 1978, Model Municipal Noise Control Bylaw, which includes Publication NPC-103 – Procedures, and Publication NPC-104 – Sound Level Adjustments.

Ontario Ministry of the Environment (MOE), 1977b: Model Municipal Noise Control By-law, which includes Publication NPC-115 – Construction Equipment.

Ontario Ministry of the Environment, 1995c, Publication NPC-206, Sound Levels Due to Road Traffic.

Ontario Ministry of the Environment, 1995a, Publication NPC-233, Information to be Submitted for Approval of Stationary Sources of Sound.

TABLES

Table 1: Point of Reception Summary

WCEC - Ottawa, Ontario

Notes:

1. The higher of MOE Landfill Guideline daytime limit for steady-state sources or background sound level.
2. The higher of MOE Landfill Guideline limit for quasi-steady impulsive pest control devices or background sound level.
3. The higher of MOE Landfill Guideline limit for impulsive pest control devices or background sound level.

Point of Reception ID	Point of Reception (PoR) Description	Easting (m)	Northing (m)	Performance Limit		
				Landfill Steady-State Sources ^[1] (dBA)	Landfill Quasi-Steady Impulsive Sources ^[2] (dBA)	Landfill Impulsive Sources ^[3] (dBAI)
SITE VICINITY RECEPTORS						
PR4	2-storey home on Richardson Side Road NNW	422496	5014786	55	60	70
PR9	2-storey home David Manchester Road	422477	5013457	57	60	70
NR1	1-storey home on Richardson Side Road N	423378	5015662	61	61	70
NR2	2-storey home at 2166 Carp Road East	425095	5014365	60	60	70
NR4	2-storey home at 292 Moonstone Road South	424009	5013694	60	60	70
NR8	2-storey Terrace Youth Residential Services	424510	5013860	57	60	70
NR9	2-storey Sensitive Business Operation	423804	5016030	64	64	70
RR12	2-storey home on David Manchester Road Central	421792	5014164	62	62	70
RR14	2-storey home at 607 William Mooney Road	422720	5015088	61	61	70
RR15	2-storey home on Wilbert Cox Drive	422487	5015392	55	60	70
REGIONAL RECEPTORS						
PR7	2-storey home at 2096 Carp Road South	425379	5014175	60	60	70
NR5	St. Stephen Catholic Elementary School	426965	5013887	55	60	70
NR6	Huntleigh United Cemetery	423336	5016477	55	60	70
NR7	Lloydalex Park	426103	5013580	55	60	70
RR10	2-storey Spruce Ridge Road Central	420721	5013259	55	60	70
RR11	2-storey David Manchester Road North	420955	5015076	59	60	70
RR13	2-storey David Manchester Road South	423070	5012577	55	60	70
RR16	2-storey Carp Road North	422885	5017058	55	60	70
RR17	2-storey Oak Creek Road	424808	5016945	61	61	70
RR18	2-storey West Carleton Industrial Park	424788	5013745	55	60	70
RR19	2-storey Timbermere	425265	5013211	55	60	70
RR20	2-storey Stittsville	426301	5013124	55	60	70
RR21	2-storey Jackson Trails	426301	5014124	55	60	70
RR22	2-storey Fairwinds	427201	5014922	55	60	70
RR23	2-storey Arcadia	426664	5016724	55	60	70
RR24	2-storey Kanata West	426926	5017979	55	60	70

Table 2: Modeled Equipment Sound Level for Performance Verification - Landfill Sources

WCEC - Ottawa, Ontario

Notes to Table:

1. Measurement Type, per MOE Publication NPC-103.
2. Sound Characteristic, per MOE Publication NPC-104:
 S = Steady
 Q = Quasi-Steady Impulsive
 I = Impulsive
 B = Buzzing
 T = Tonal
 C = Cyclic
3. Construction equipment sound level in accordance the requirements as set out in MOE Publication NPC-115.

Source ID	Source Description	Measurement Type ^[1]	Sound Pressure Level Limit at 15 m (dBA/dBAI)	Sound Characteristics ^[2] (S,Q,I,B,T,C)
CONSTRUCTION SOURCES ^[3]				
SS1_ob_stu	Overburden - CAT Soil Truck Unloading	Steady	86	S
SS1_lwf_grdr	Construction Working Face - Grader	Steady	83	S
SS1_cwf_exc	Construction Working Face - CAT 330B Excavator	Steady	73	S
SS1_cwf_ldr	Construction Working Face - CAT 988H Loader	Steady	83	S
SS1_cwf_scrpr	Construction Working Face - CAT Scraper	Steady	86	S
LANDFILLING SOURCES				
SS1_cs_ldr	Cover Soil - CAT Loader	Steady	83	S
SS1_lwf_cmpt	Landfill Working Face - CAT 826G Compactor	Steady	77	S
SS1_lwf_dzr	Landfill Working Face - CAT D6R Dozer	Steady	85	S
SS1_lwf_dzr2	Landfill Working Face - CAT D7 Dozer	Steady	83	S
SS1_HR1_rfpv	Refuse Truck on Paved Route #trips/hr; Entry and Exit	Mobile Equipment	85	S
SS1_HR2_cspv	Contaminated Soil Truck on Paved Route #trips/hr; Entry and Exit	Mobile Equipment	82	S
SS1_HR3_lst	Landfill Daily Cover Soil Haul Truck Route #trips/hr; To and From Stockpile	Mobile Equipment	80	S
SS1_HR3_cst	Construction Overburden Haul Truck Route #trips/hr; To and From Stockpile	Mobile Equipment	80	S
SS1_HR4_cht	Construction Haul Truck #trips/hr; Entry and Exit	Mobile Equipment	79	S
Imp1_pc_wh	Pest Control - Whistle	Steady	72	S, T
Imp1_pc_pc	Pest Control - Propane Cannon	Impulsive	109	I
Imp1_pc_shtg	Pest Control - Shotgun	Impulsive	123	I

FIGURES



Aerial Photography from Google Earth Professional © 2010 Google, 2011 DigitalGlobe

Performance Verification Measurement Locations

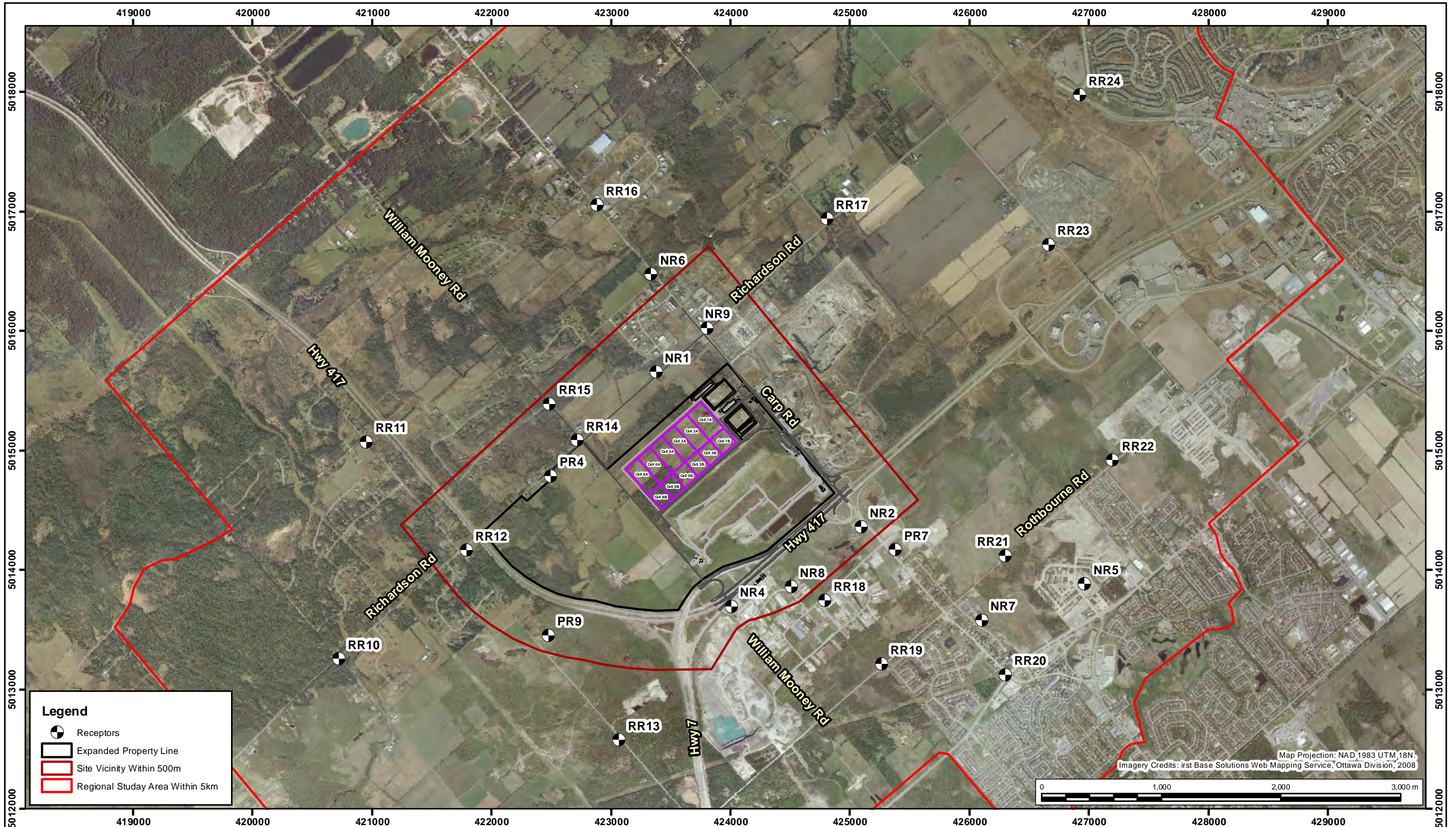
True North



Project #1302177

Drawn by: NTN	Figure: 1
Scale: 1:18000	
Date: Feb. 27, 2014	





Sensitive Receptor Locations

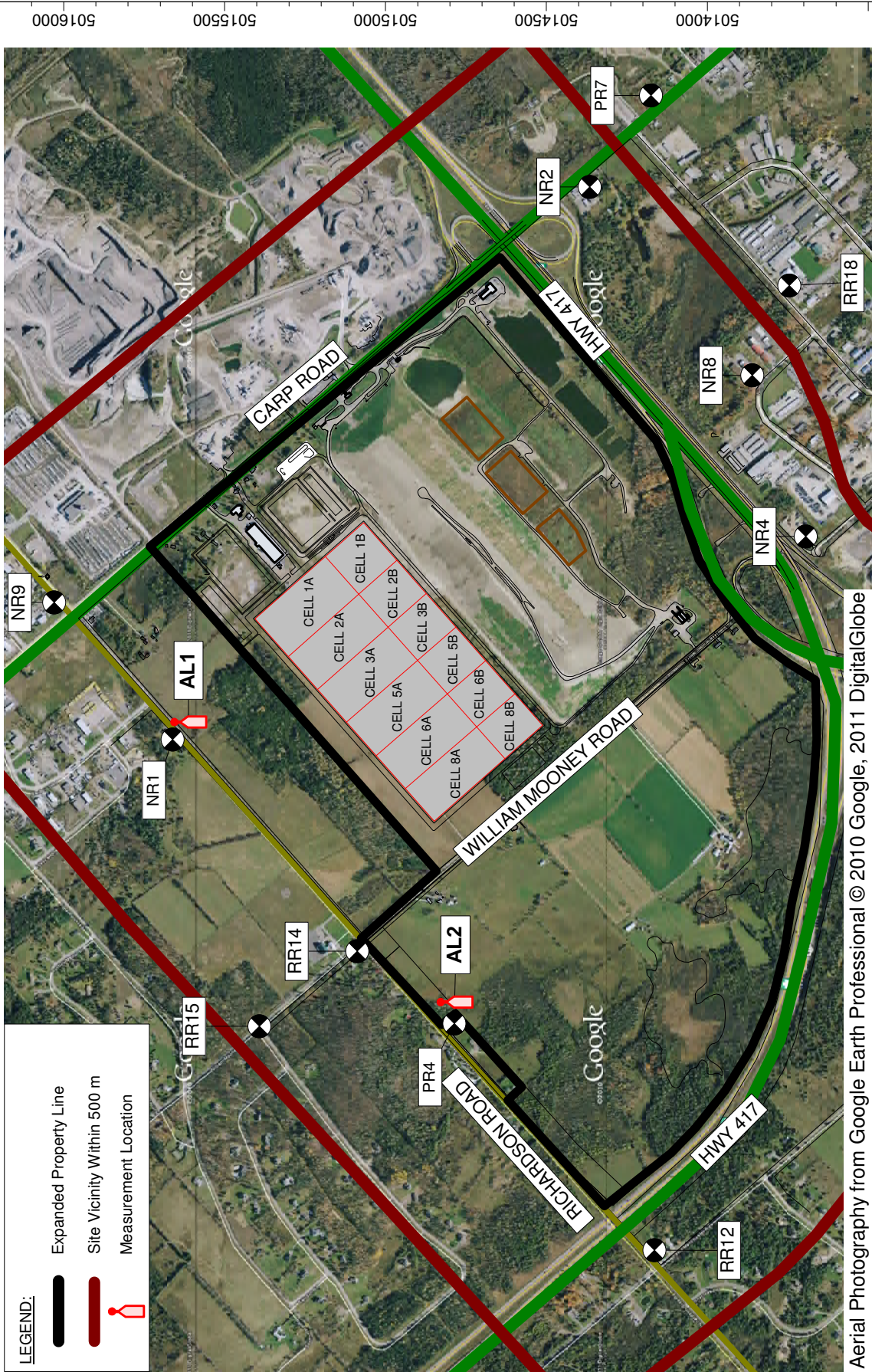
WCEC - Ottawa, Ontario



Drawn by: NBN	Figure: 2
Approx. Scale: 1:30,000	
Date Revised: Mar. 6, 2014	



Project #1302177



LEGEND:

-  Expanded Property Line
-  Site Vicinity Within 500 m
-  Measurement Location

Aerial Photography from Google Earth Professional © 2010 Google, 2011 DigitalGlobe

Receptor and Audit Measurement Locations

True North



Drawn by: NTN	Figure: 3
Scale: 1:18000	
Date: Feb. 27, 2014	

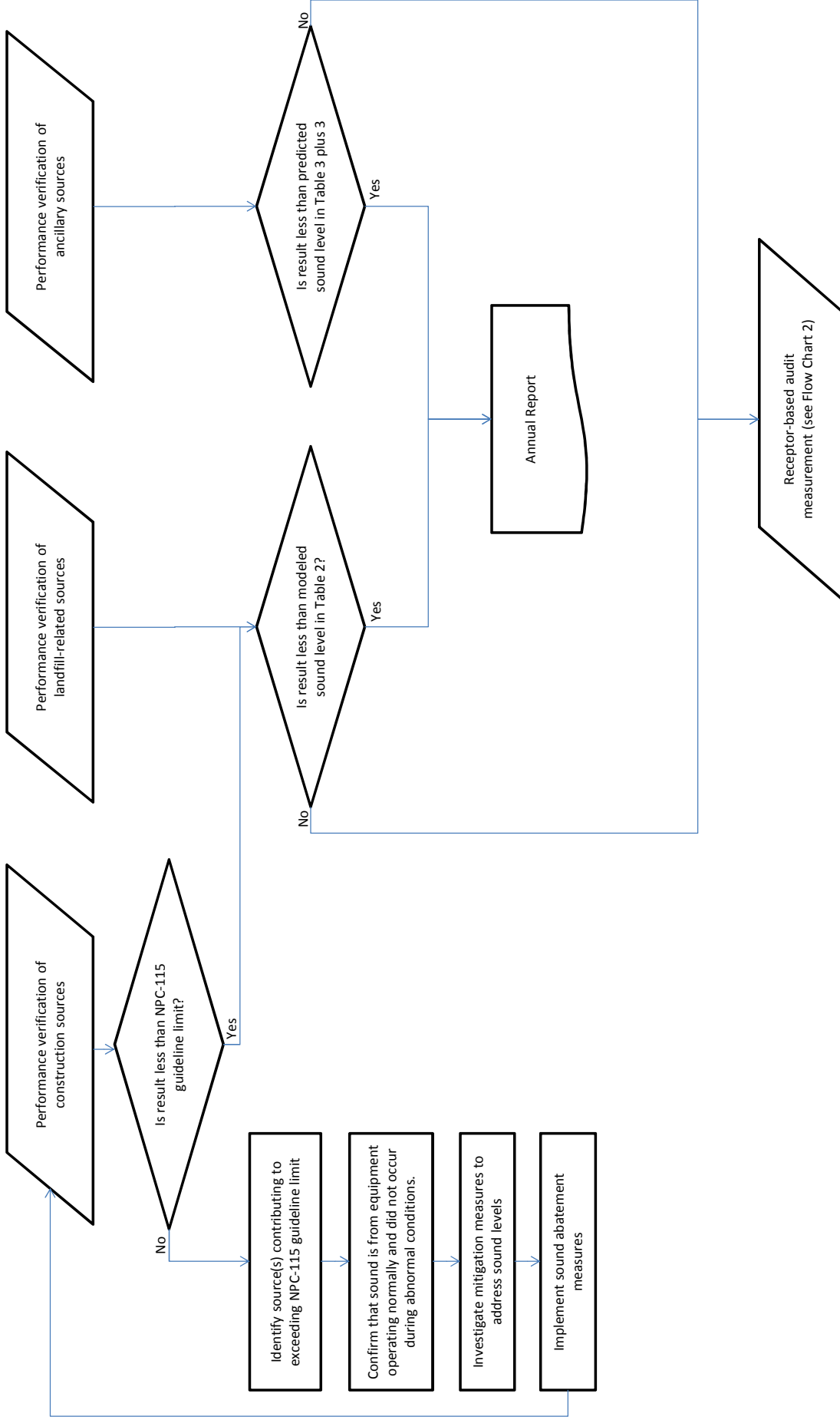


APPENDIX A

Flow Charts

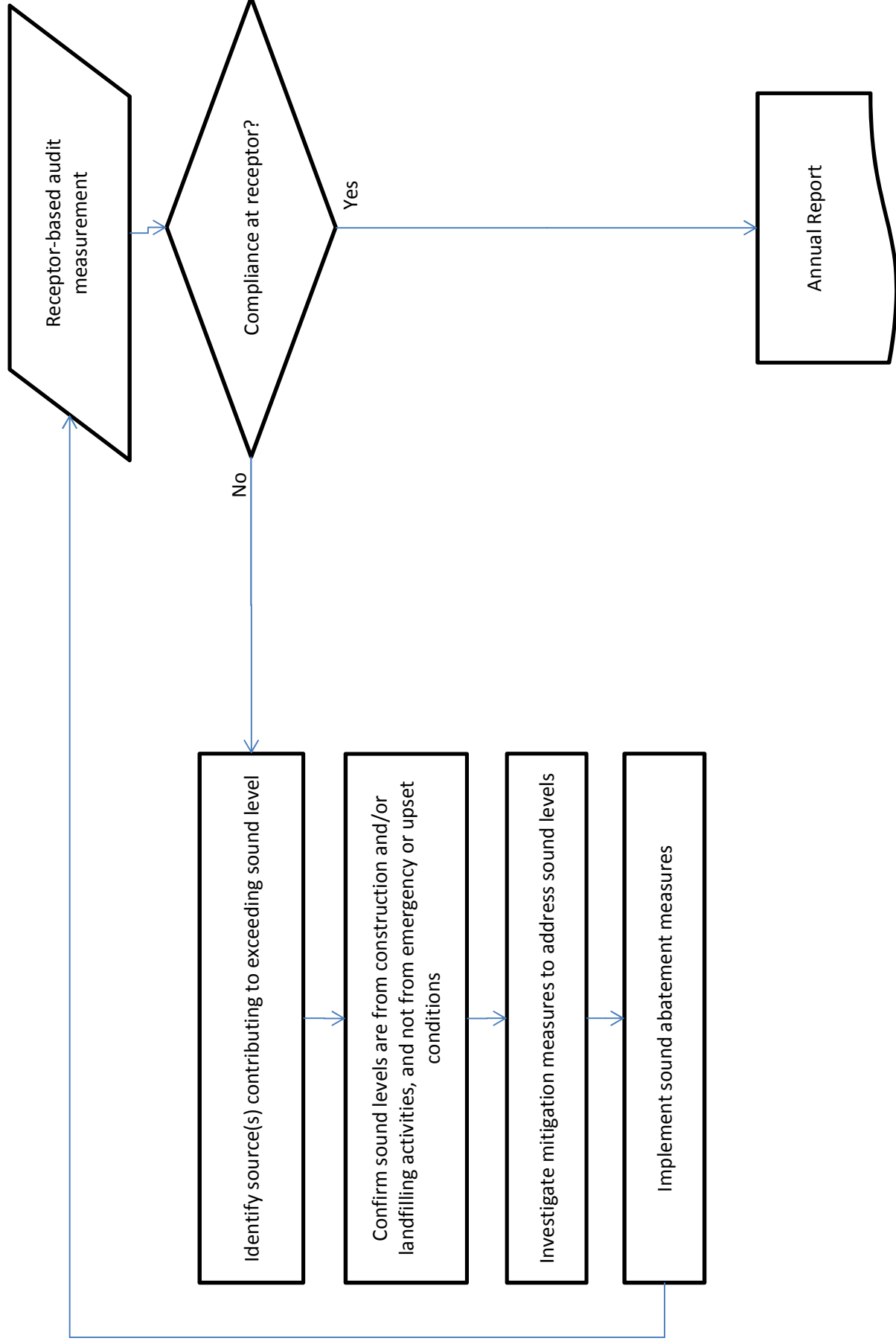
Flow Chart 1: Noise Monitoring Program - Performance Verification

WCEC - Ottawa, Ontario



Flow Chart 2: Noise Monitoring Program - Receptor-Based Audit Measurement

WCEC - Ottawa, Ontario



APPENDIX B

Landfill Development Phases

LEGEND :

	AREA COMPLETED TO FINAL WASTE GRADES (SEE NOTE BELOW)
	PROPOSED LIMIT OF WASTE (EXPANSION AREA)
	PROPOSED BOTTOM OF WASTE CONTOURS
	APPROXIMATE LIMIT OF EXISTING LANDFILL
	HARD SURFACE ACCESS ROAD
	GRAVEL HIGH LEVEL ACCESS ROAD
	TEMPORARY GRAVEL ACCESS ROAD
	WORKING AREA FOR EACH LANDFILLING PHASE
	AREA OF TEMPORARY CLAY SEAL
	WASTE MANAGEMENT OF CANADA CORP. PROPERTY LIMIT
	TREELINE
	LITTER FENCE 10m HIGH
	LITTER FENCE 3m HIGH
	CUT/FILL LIMIT BESIDE EXISTING LANDFILL MOUND
	FILL CONTOURS BESIDE EXISTING LANDFILL MOUND
	PROPOSED DITCH/SWALE
	PROPOSED DITCH/SWALE RIP RAP LINED
	PROPOSED CULVERT
	CONDENSATE DRAIN CHAMBER/PUMPING STATION
	750Ø BUTTERFLY ISOLATION VALVE

ABBREVIATIONS :

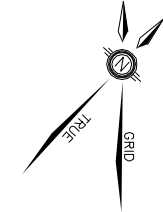
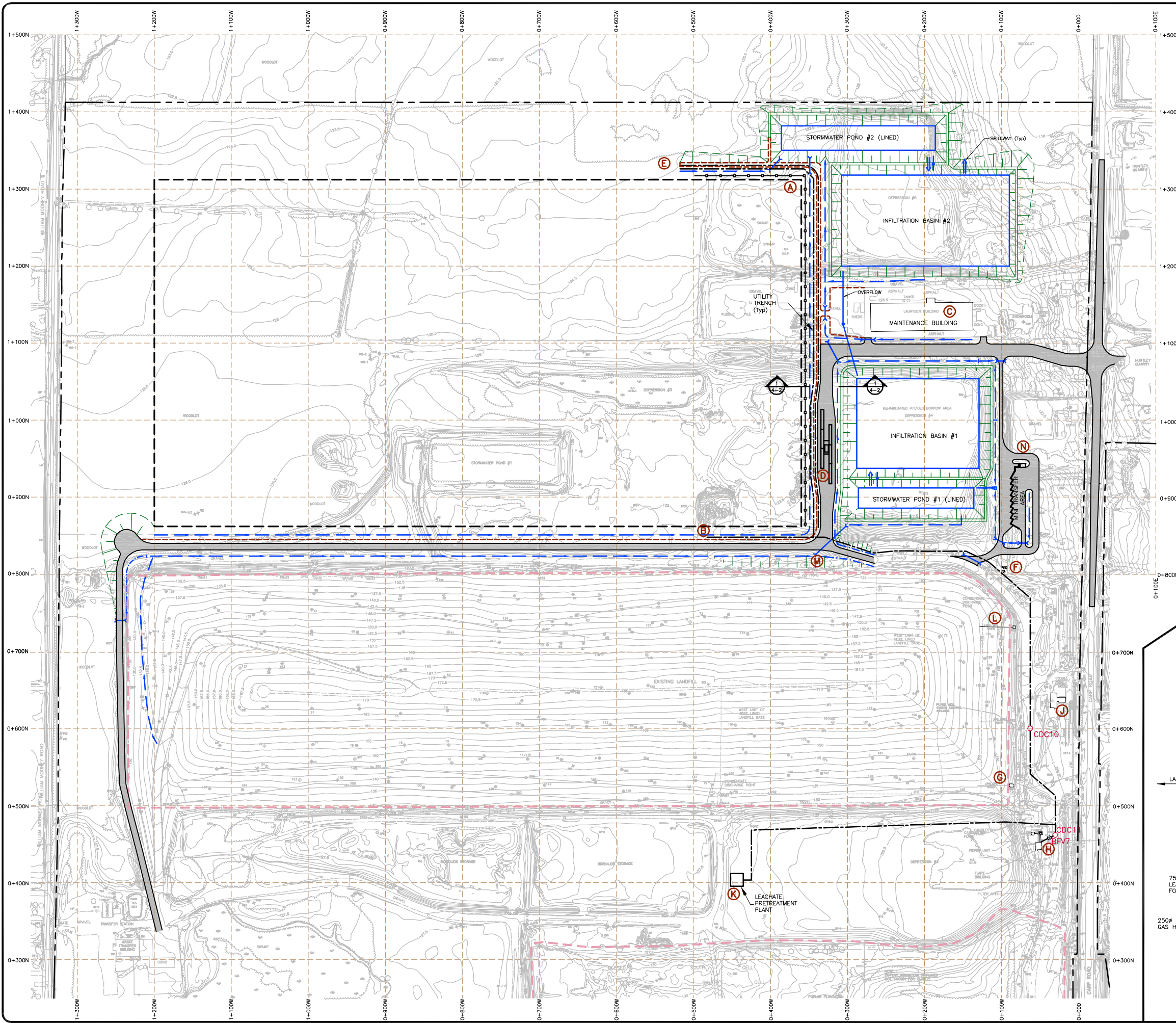
LF	LEACHATE FORCEMAIN
WM	WATERMAIN (NONPOTABLE)
OH	OVERHEAD HYDRO
SAF	SANITARY FORCEMAIN/SEWER
PWF	PURGE WELL FORCEMAIN
GH	GAS HEADER
CA	COMPRESSED AIR LINE
PS	PUMPING STATION (PRIMARY AND SECONDARY LEACHATE COLLECTION SYSTEM)

NOTE :

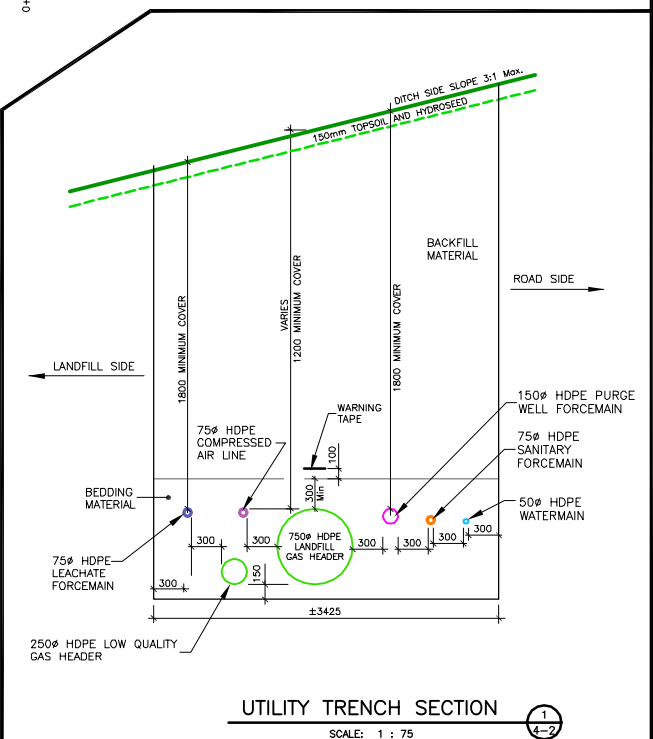
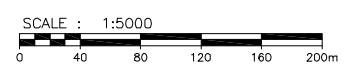
THIS AREA WILL BE PARTIALLY CAPPED AND VEGETATED AS SOON AS PRACTICAL AND FULLY CAPPED AND VEGETATED ONCE STABILIZED AND NO SIGNIFICANT SETTLEMENT IS ANTICIPATED. CONTOUR ELEVATIONS SHOWN REFLECT TOP OF FINAL COVER.

EXISTING/PROPOSED FACILITIES	
LOCATION	DESCRIPTION
(A)	PUMPING STATIONS PS5/PS6
(B)	END OF GAS HEADER AT PHASE 1 - NORTH
(C)	MAINTENANCE BUILDING
(D)	SCALE HOUSE
(E)	END OF GAS HEADER AT PHASE 1 - SOUTH
(F)	END OF EXISTING PURGE WELL FORCEMAIN (PW20)
(G)	PUMPING STATION PS1
(H)	BLOWER BUILDING AND FLARES
(J)	EXISTING OFFICE BUILDING
(K)	LEACHATE PRETREATMENT PLANT
(L)	PUMPING STATION PS3
(M)	GAS HEADER TEE FOR LANDFILL LOOP
(N)	KIOSK MINI TRANSFER AREA
(P)	END OF GAS HEADER AT PHASE 2 - NORTH
(Q)	END OF GAS HEADER AT PHASE 2 - SOUTH
(R)	END OF GAS HEADER AT PHASE 3 - NORTH
(S)	END OF GAS HEADER AT PHASE 3 - SOUTH
(T)	END OF GAS HEADER AT PHASE 5 - NORTH
(U)	END OF GAS HEADER AT PHASE 5 - SOUTH
(V)	END OF GAS HEADER AT PHASE 6 - SOUTH
(W)	END OF GAS HEADER AT PHASE 6 - NORTH
(X)	ACCESS ROAD TURNAROUND

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WORK DESIGNATION	
RUN	PIPING INFO
A - K	LF (75ø)
B - E	GH, GH & CA (750/250/75ø)
C - D	WM (50ø)
D - A	OH
D - C	SAF (75ø)
E - F	PWF (150ø)
H - M	GH, GH & CA (750/250/75ø)
J - D	OH
J - N	OH



NOTE :
CONFIGURATION OF COMMON TRENCH VARIES DEPENDING ON LOCATION.

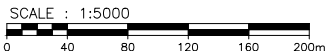
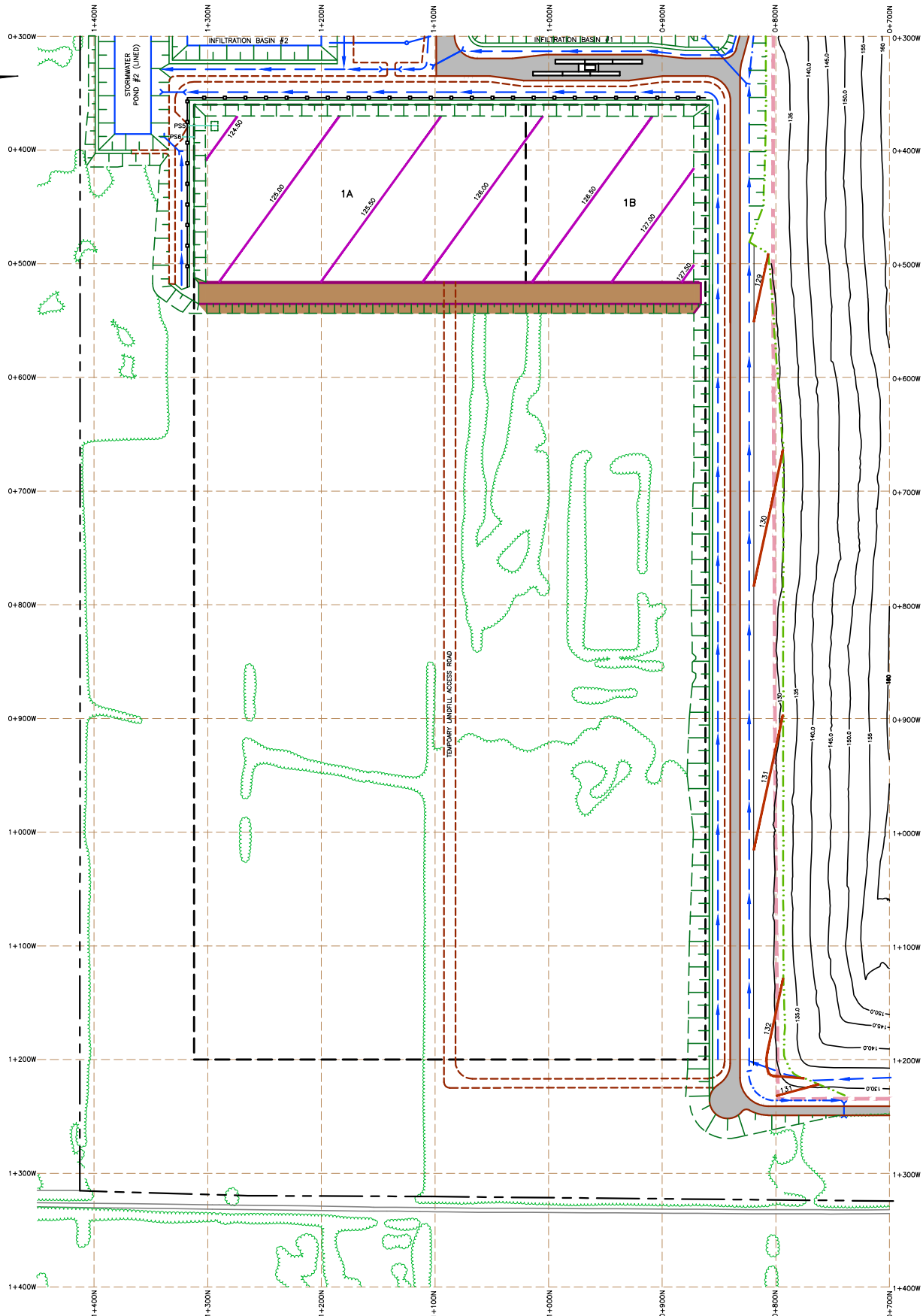
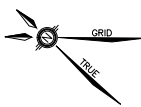
SITE PREPARATION FOR
PHASE 1 - PART 1
WEST CARLETON
ENVIRONMENTAL CENTRE

WASTE MANAGEMENT OF CANADA CORP.
DRAWING NO. 131-19416-00 - 4-2

FIGURE
4-2


 101-467, 1st AVENUE W
 OAKVILLE, ONTARIO, CANADA L6K 6P9
 TEL.: 516-275-7372 FAX: 516-275-9686 WWW.WSPGROUP.COM


 WASTE MANAGEMENT



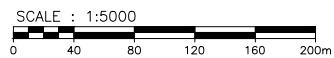
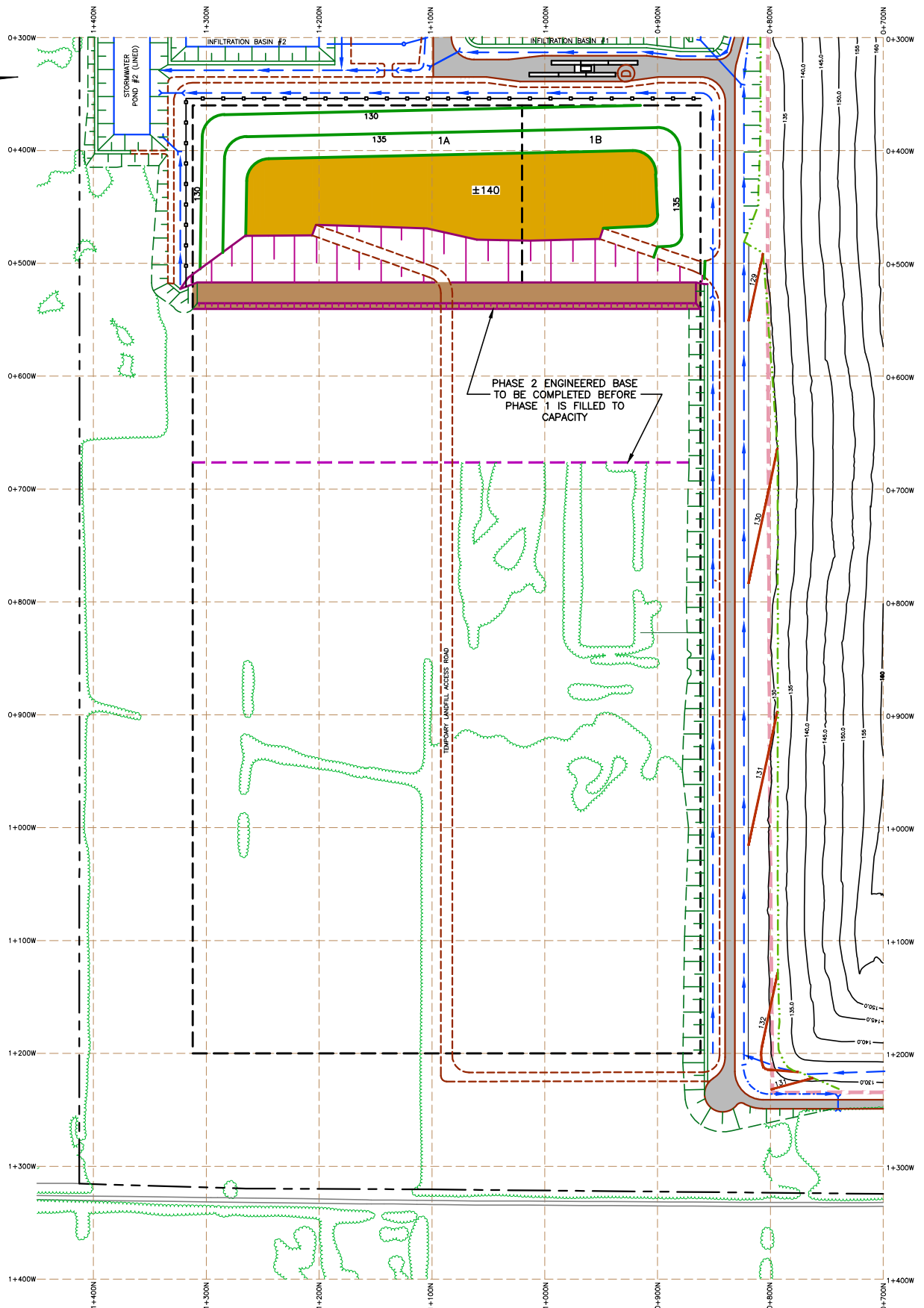
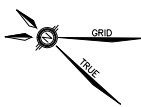
copyright © WSP CANADA INC. 101-450 1st Avenue W, Owen Sound, Ontario Canada N4K 6N2
 TEL: 519-376-7812 FAX: 519-376-9008 WWW.WSPGROUP.COM
 131-19416-00 - Environmental/131-19416-00 - Owen Sound/Expansion/Drawings/131-19416-00-4-3.dwg Mar 14, 2014 - 4:03pm

FIGURE 4-3

DWN BY: T C G
 CHK BY: F C F
 DATE: MAR 17, 2014
 SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-3

**SITE PREPARATION FOR
 PHASE 1 - PART 2**
**WEST CARLETON
 ENVIRONMENTAL CENTRE**





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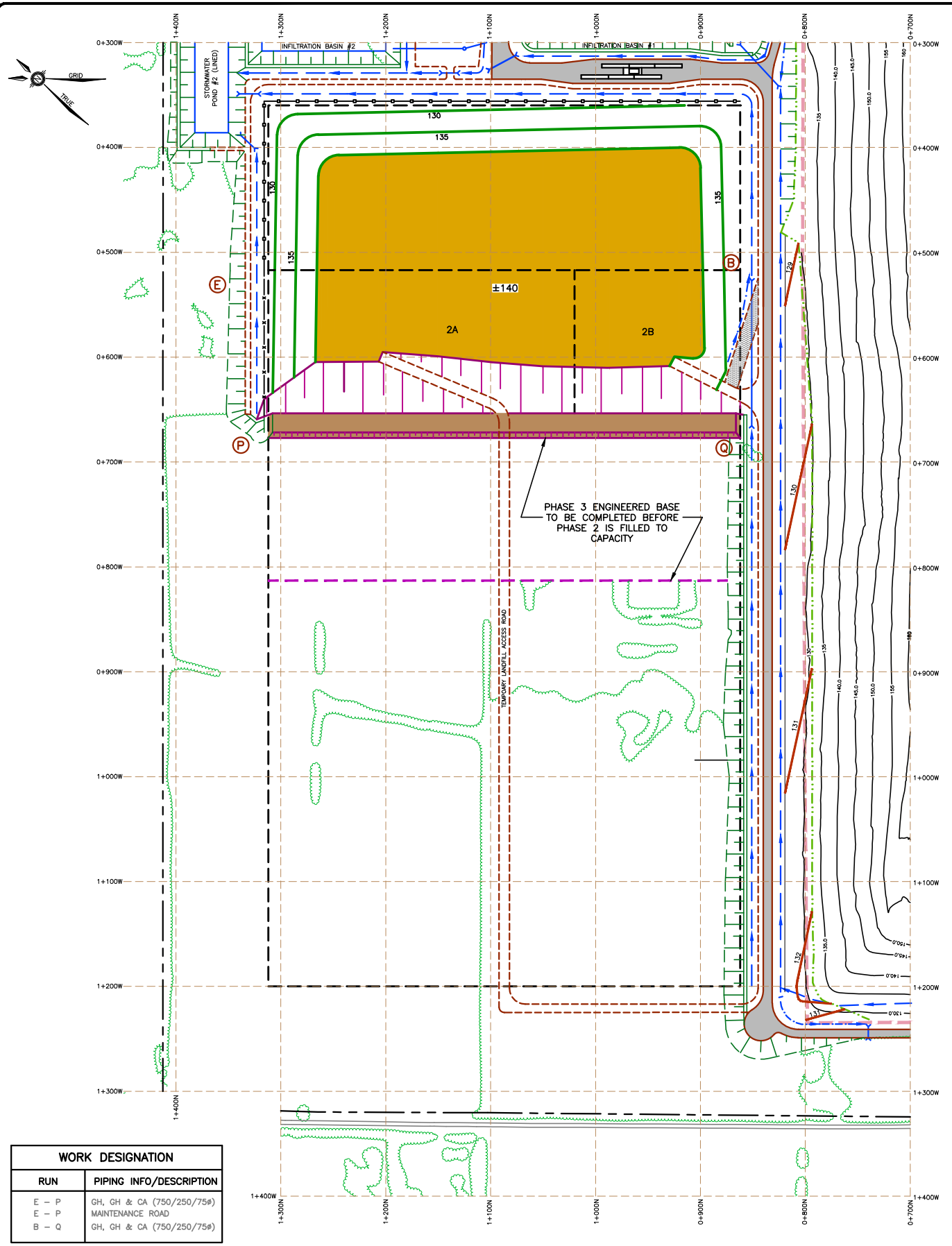
FIGURE
4-4

DWN BY: T C G
 CHK BY: F C F
 DATE: MAR 17, 2014
 SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-4

PHASE 1
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE



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PHASE 3 ENGINEERED BASE
 TO BE COMPLETED BEFORE
 PHASE 2 IS FILLED TO
 CAPACITY

WORK DESIGNATION	
RUN	PIPING INFO/DESCRIPTION
M - P	GH, GH & CA (750/250/75#)
M - P	MAINTENANCE ROAD
B - Q	GH, GH & CA (750/250/75#)

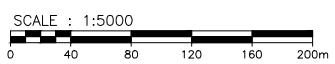


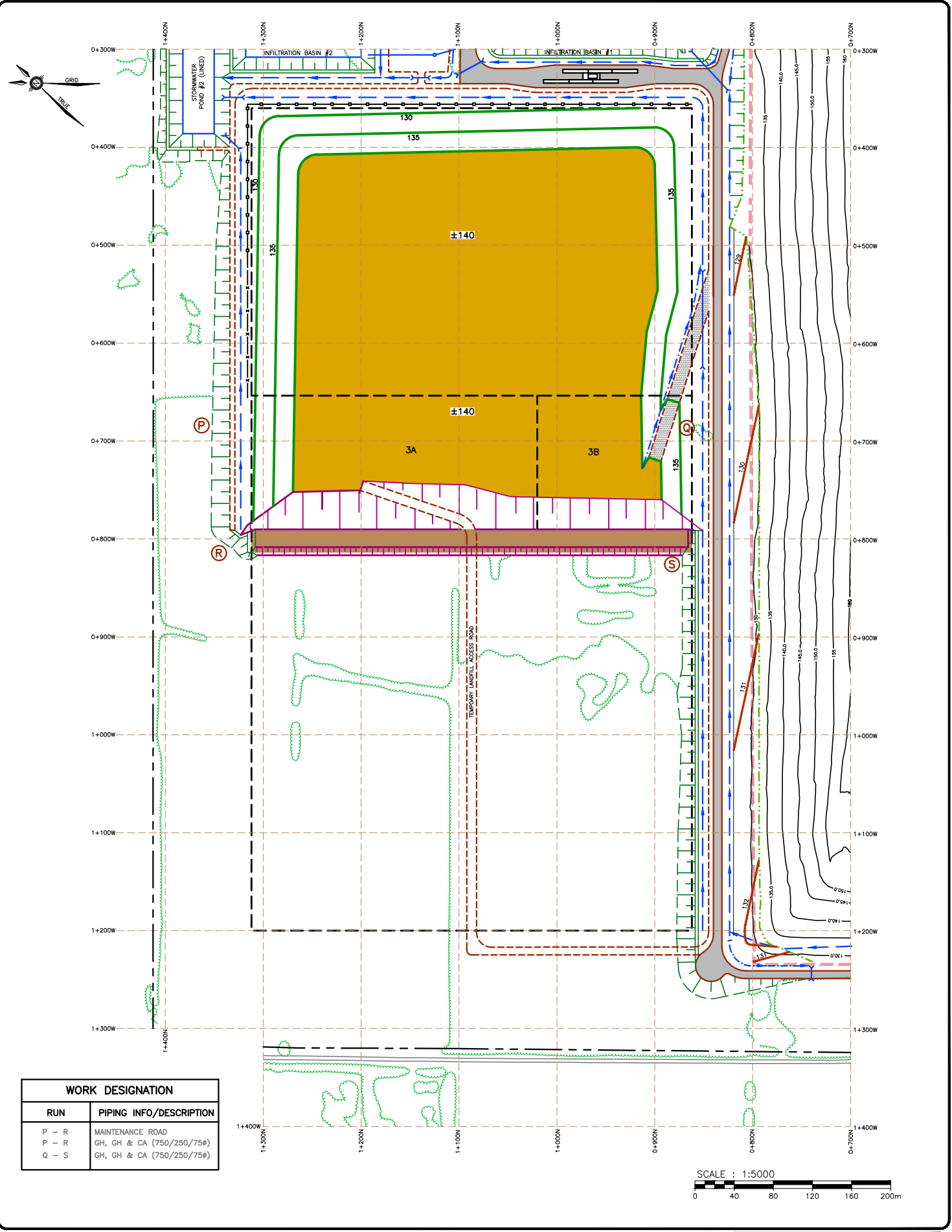
FIGURE
 4-5

DWN BY: T C G DATE: MAR 17, 2014
 CHK BY: F C F SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-5

PHASE 2
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE



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WORK DESIGNATION	
RUN	PIPING INFO/DESCRIPTION
P I R	MAINTENANCE ROAD
P I R	GH, GH & CA (750/250/75#)
Q I S	GH, GH & CA (750/250/75#)

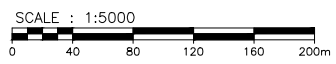


FIGURE 4-6

DWN BY: T C G DATE: MAR 17, 2014
 CHK BY: F C F SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-6

PHASE 3
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE



632013\05\13-401 - Environmental\13-19416-00 - Ottawa Landfill Expansion\03\13-19416-00-4-7.dwg Mar 14, 2014 - 4:09pm
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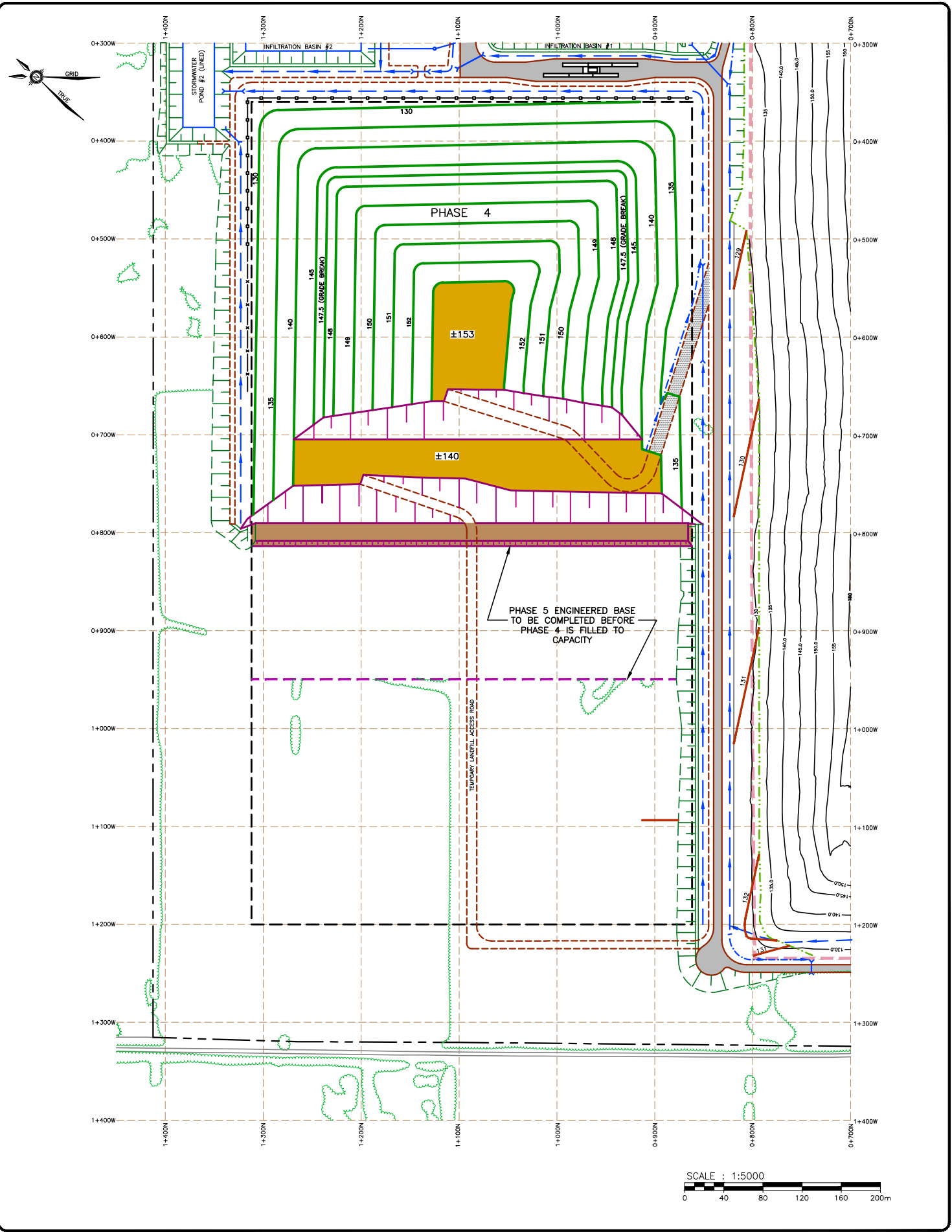
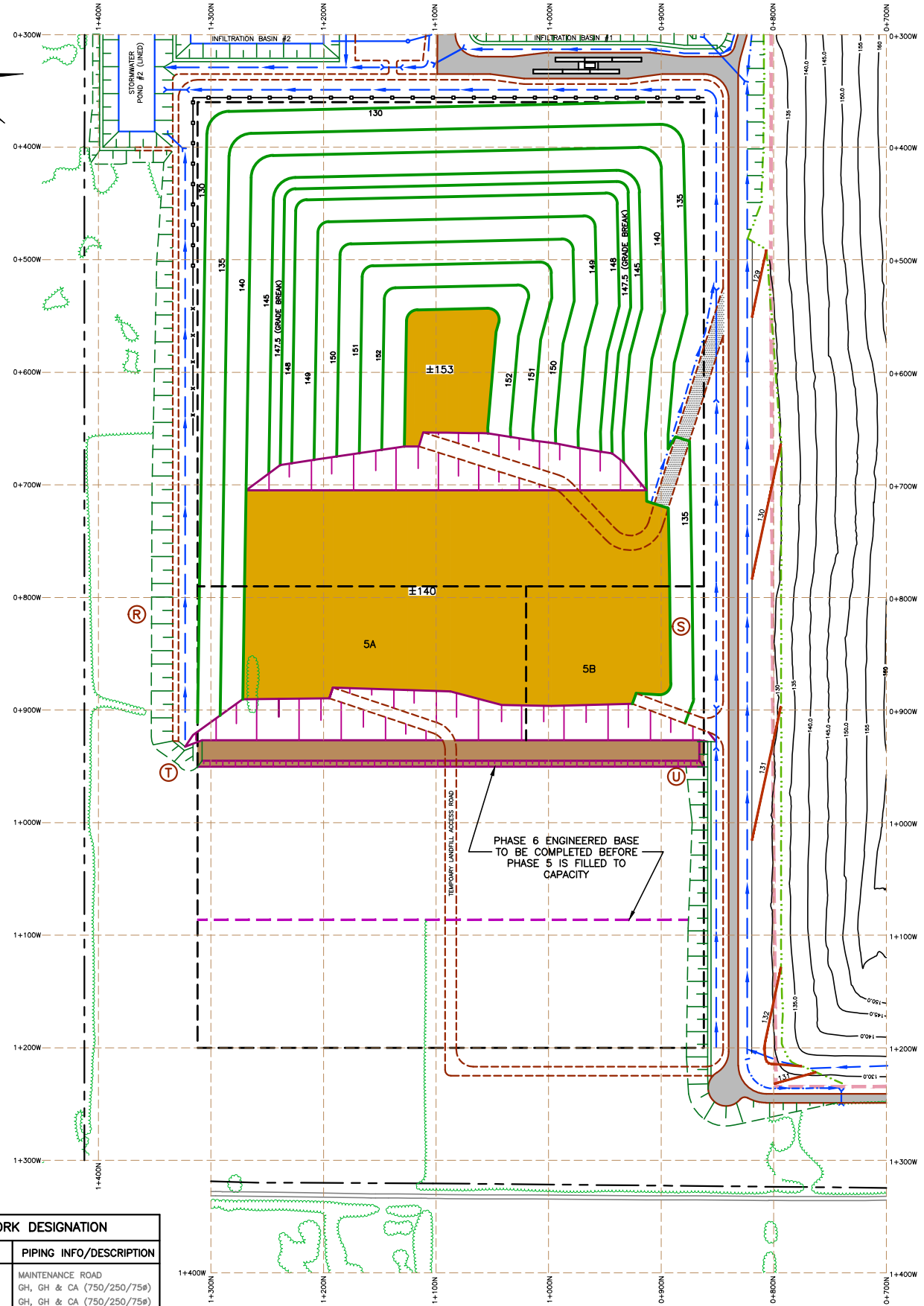
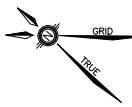


FIGURE 4-7

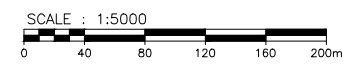
DWN BY: T C G DATE: MAR 17, 2014
 CHK BY: F C F SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-7

PHASE 4
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE





WORK DESIGNATION	
RUN	PIPING INFO/DESCRIPTION
R - T	MAINTENANCE ROAD
R - I - T	GH, GH & CA (750/250/75#)
S - U	GH, GH & CA (750/250/75#)



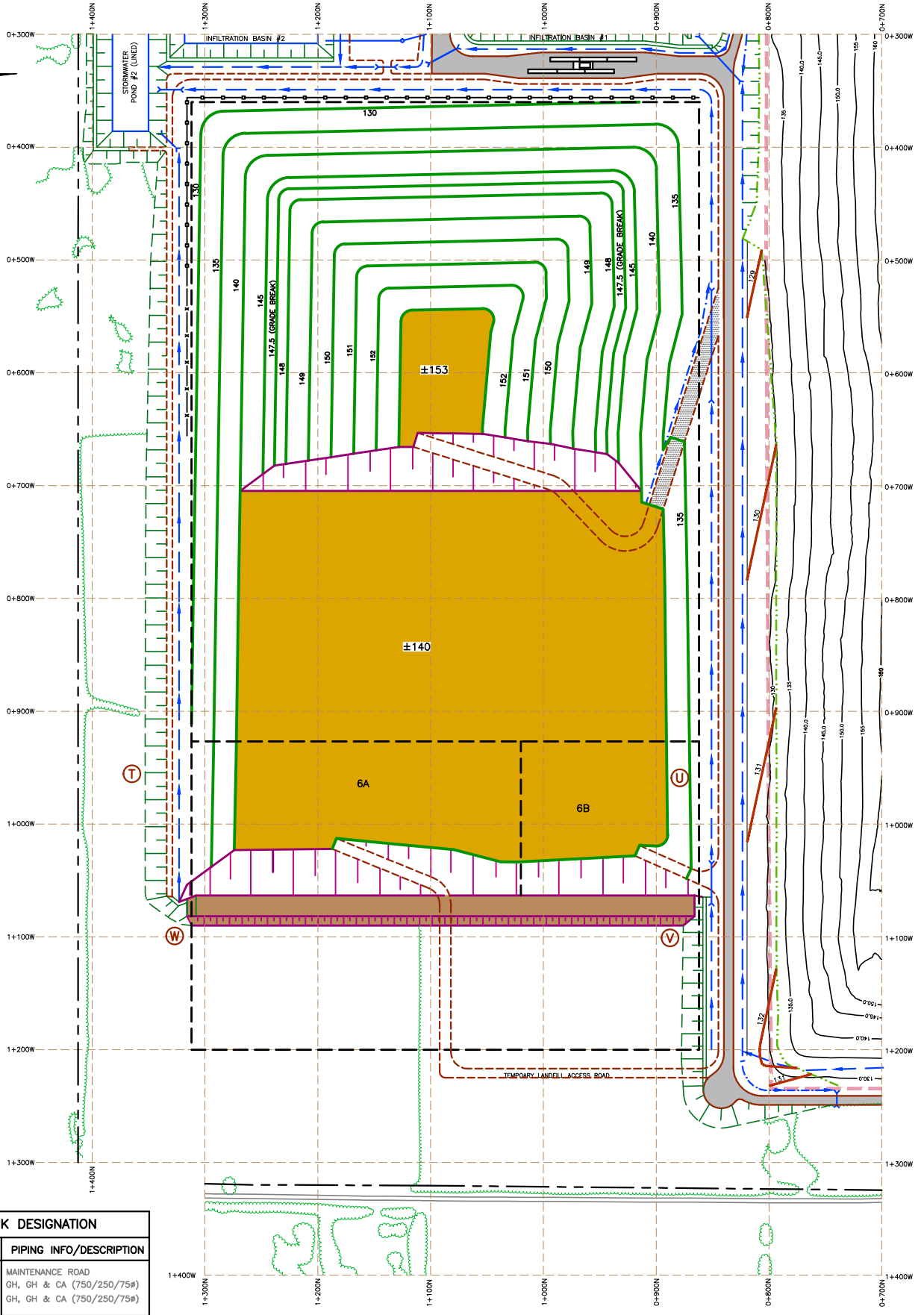
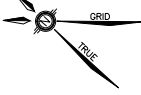
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FIGURE
4-8

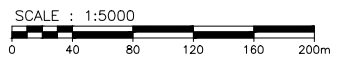
DWN BY: T C C
 CHK BY: F C F
 DATE: MAR 17, 2014
 SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-8

PHASE 5
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE





WORK DESIGNATION	
RUN	PIPING INFO/DESCRIPTION
T - W	MAINTENANCE ROAD
T - W	GH, GH & CA (750/250/75#)
U - V	GH, GH & CA (750/250/75#)



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FIGURE 4-9

DWN BY: T C C DATE: MAR 17, 2014
 CHK BY: F C F SCALE: SEE BAR SCALE

WASTE MANAGEMENT OF CANADA CORP.

DRAWING NO. 131-19416-00 - 4-9

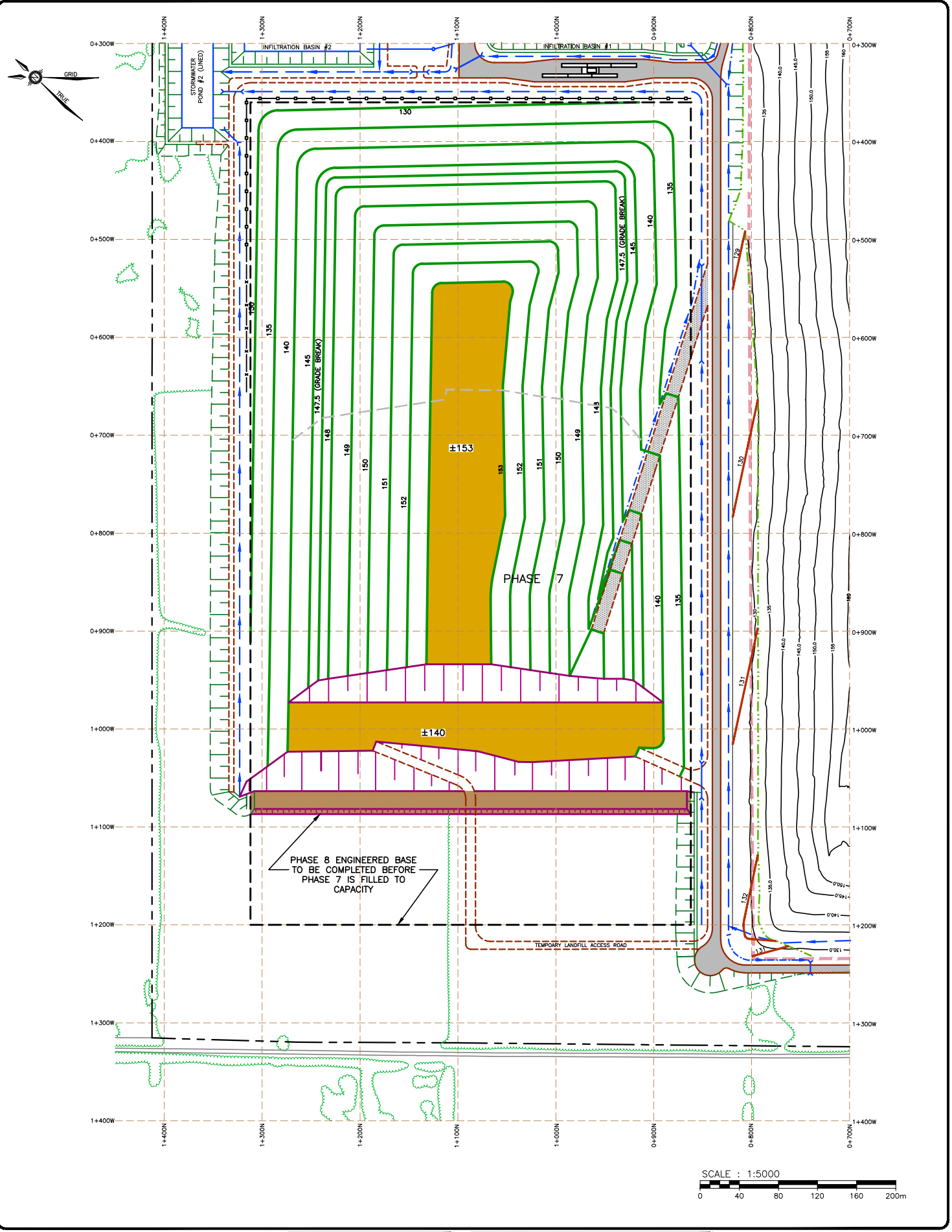
PHASE 6
 LANDFILL DEVELOPMENT

WEST CARLETON
 ENVIRONMENTAL CENTRE

WASTE MANAGEMENT

101-1450 1st AVENUE W
 OWEN SOUND (ONTARIO) CANADA N4K 6W2
 TEL: 519-376-7612 | FAX: 519-376-8008 | WWW.WSPGROUP.COM

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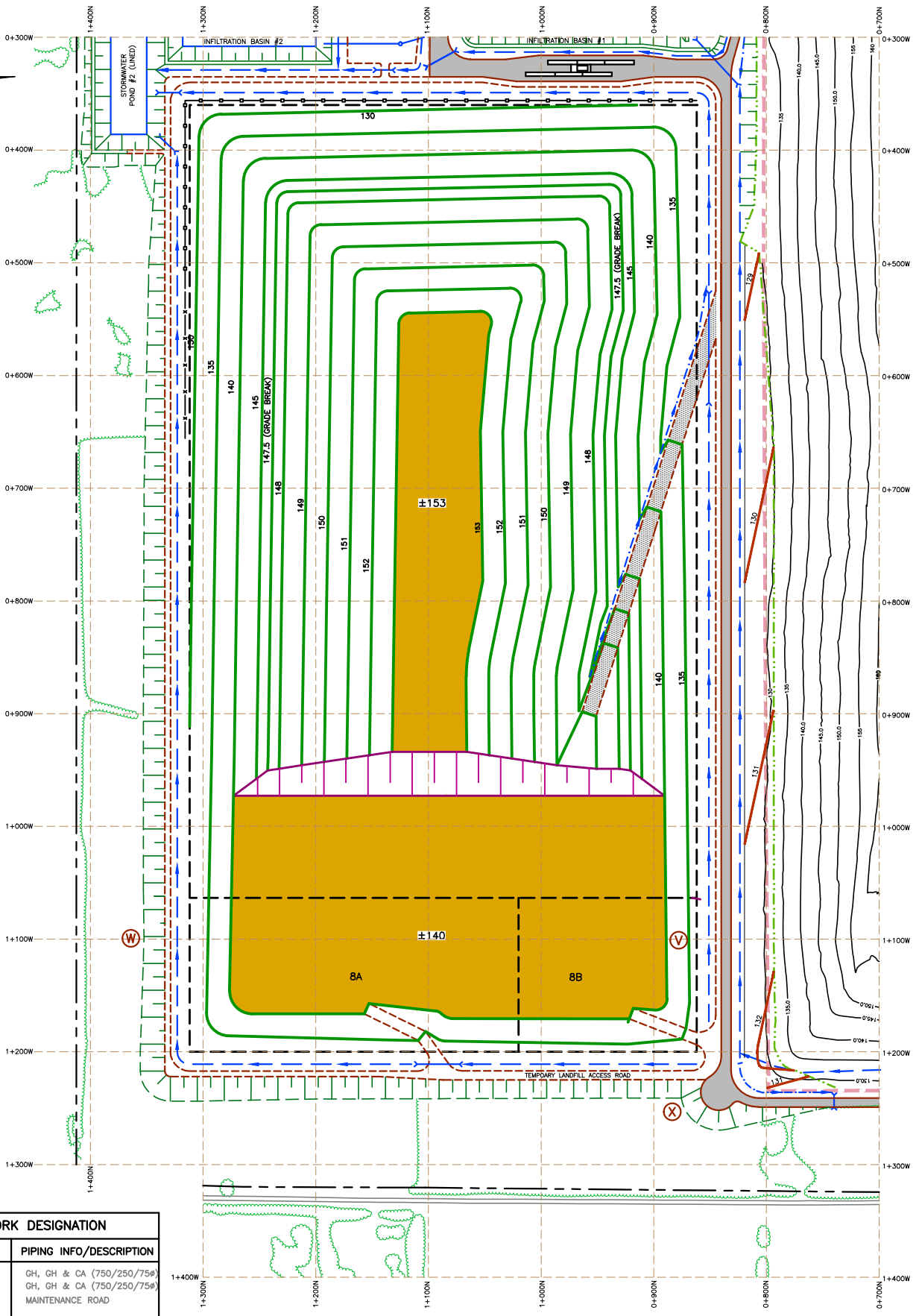
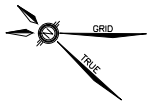
PHASE 8 ENGINEERED BASE
 TO BE COMPLETED BEFORE
 PHASE 7 IS FILLED TO
 CAPACITY

FIGURE
4-10

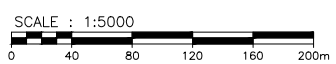
DWN BY: T C G
 CHK BY: F C F
 DATE: MAR 17, 2014
 SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-10

PHASE 7
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE





WORK DESIGNATION	
RUN	PIPING INFO/DESCRIPTION
V - X	GH, GH & CA (750/250/75 ϕ)
W - X	GH, GH & CA (750/250/75 ϕ)
W - X	MAINTENANCE ROAD



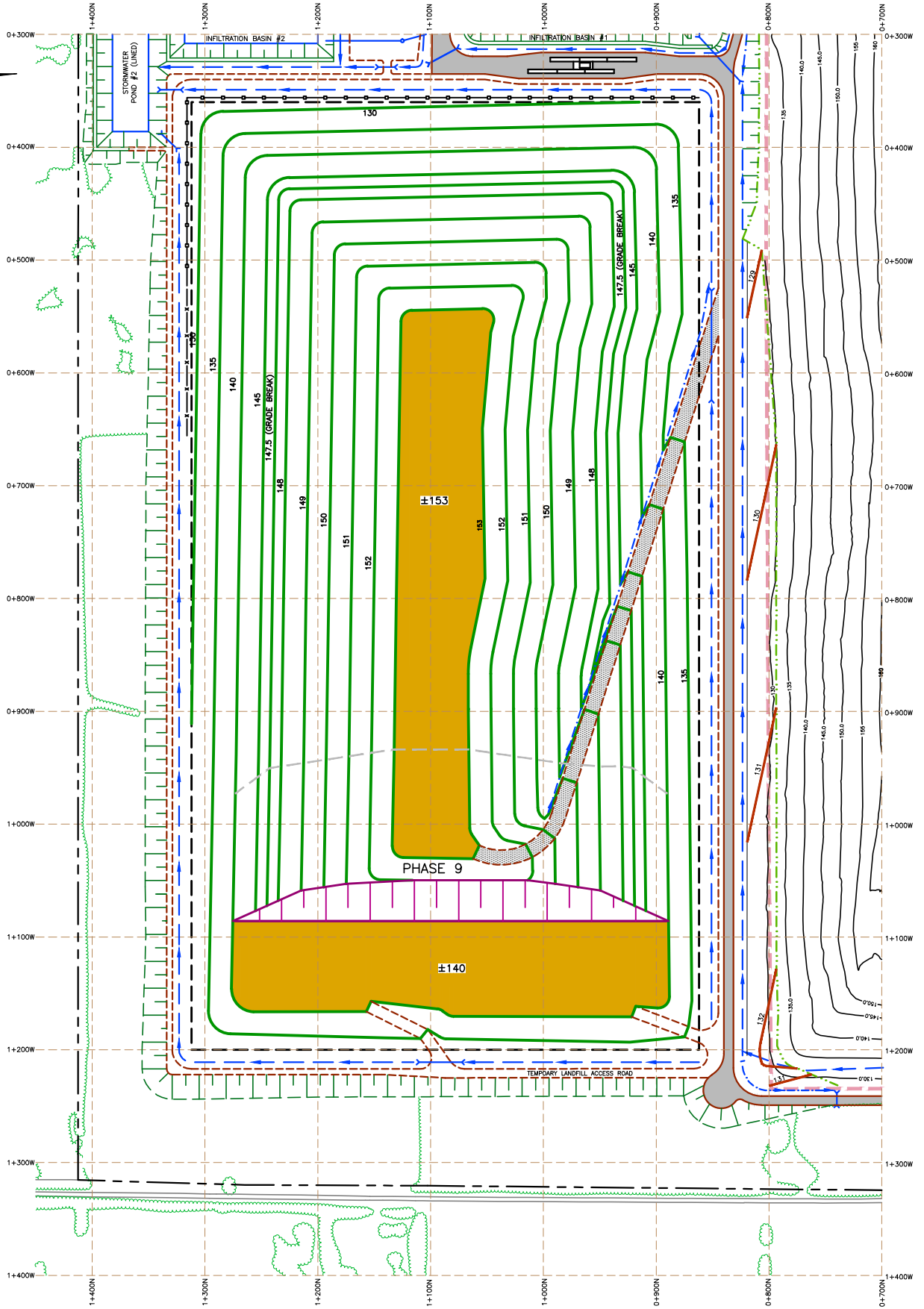
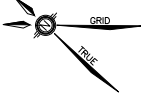
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FIGURE
4-11

DWN BY: T C G DATE: MAR 17, 2014
 CHK BY: F C F SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-11

PHASE 8
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE





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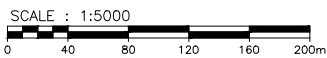
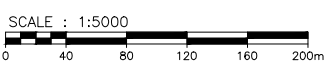
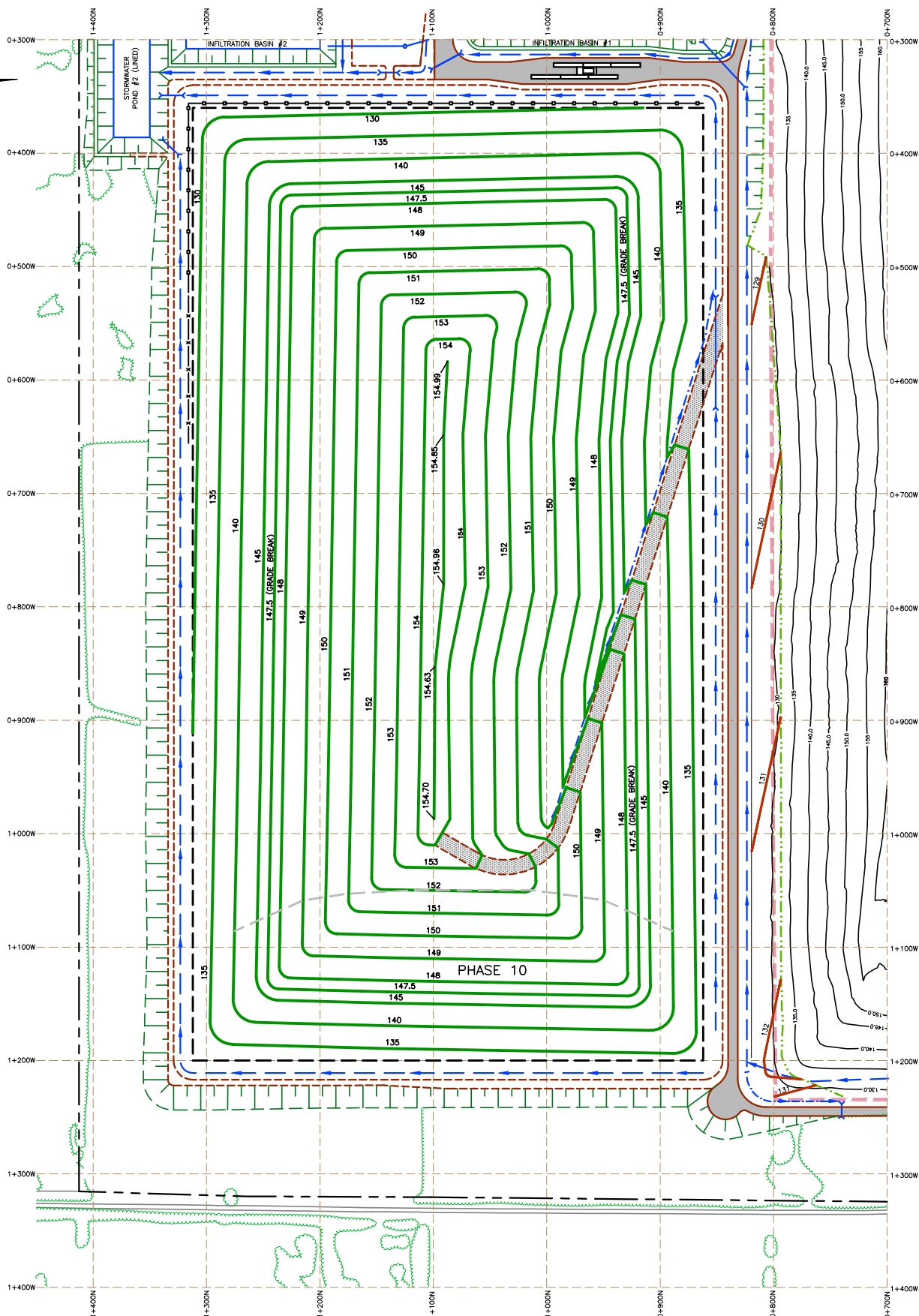
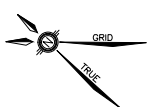


FIGURE
4-12

DWN BY: T C C
CHK BY: F C F
DATE: MAR 17, 2014
SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
DRAWING NO. 131-19416-00 - 4-12

PHASE 9
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE





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FIGURE
4-13

DWN BY: T C G
 CHK BY: F C F
 DATE: MAR 17, 2014
 SCALE: SEE BAR SCALE
WASTE MANAGEMENT OF CANADA CORP.
 DRAWING NO. 131-19416-00 - 4-13

PHASE 10
LANDFILL DEVELOPMENT
WEST CARLETON
ENVIRONMENTAL CENTRE



APPENDIX C

Noise Complaint Form

NOISE COMPLAINT FORM

WCEC - Ottawa, Ontario

Form Last Updated

2014-03-18

1. Complainant Information

Date & Time: _____
Name of Complainant: _____
Telephone of Complainant: _____
Address of Complainant: _____
Address of Complaint: Same as above, or _____
Complaint Method: In-person / Telephone / Email / Other _____

2A. Complaint Description

Noise Activities Visible: Yes No
Nature of Complaint: _____

2B. Inside/Outside Location

Location of Annoyance: Inside Outside
Describe Inside Location: Bedroom / Living Room / Dining Room / Other _____
Describe Outside Location: Front Yard / Back Yard / Side Yard / Other _____
Complainant Activity at Time of
Complaint (optional): _____
Other Comments: _____

3A. Employee Receiving Complaint

Name: _____
Company & Title: _____
Date & Time: _____
Telephone: _____

3B. Form Completion

Same as 3A

Completed By: _____
Company & Title: _____
Date & Time: _____
Telephone: _____

4. Environmental Conditions

Weather Description: _____
Precipitation: Yes No
Wind Speed (km/h): _____
Wind Direction From: _____
Other Comments: _____

5. Complaint Investigation and Corrective Actions

Activities at Time of Incident: Landfilling: _____
 Construction: _____
 Contractors: _____
 Others: _____
Unusual Events/Occurrences? Yes No
If yes, describe: _____
Need to Monitor? Yes No
Corrective Actions: _____

Other Comments:

Note:

-- This form is reviewed and updated every 5 years.