10.0 DETAILED DESCRIPTION OF PROPOSED CRRRC

This section provides a more detailed description of the proposed CRRRC which served as the basis for assessment of the potential CRRRC impacts for each of the environmental components. In this section: 1) the preferred Concept A has been refined to produce the final Site development plan; and 2) the Site construction and operations are further described. More detailed process and facility descriptions are provided in Volume IV of the EASR document package. Supporting geotechnical and hydrogeological information is provided in Volume III. This section incorporates the results of the comparative assessment of leachate management alternatives for the CRRRC, which is summarized below in Section 12.0, further detailed in TSD #10 and also described in Volume IV.

The resulting Site Development Plan is shown on Figure 10-1; cross-sectional views through the landfill component are shown on Figure 10-2;. All diversion and support facilities are in the north part of the property to the north of the Simpson Drain, while the landfill footprint and associated stormwater management components and perimeter buffers occupy the southern portion. The flow of waste material and products at the Site is shown on Figure 10-3. Additional diversion components may be added to the CRRRC over time, as technology and/or the end markets develop.

10.1 Site Access

The refinement of the primary Site access road resulted in a two way main road to the in-bound scale, the provision of a separate single out-bound lane to an out-bound scale and a separate truck queuing lane. Considering a queuing lane length of about 400 metres, as well as an in-bound lane length of another 450 metres, all queuing of waiting Site-related traffic will be on-Site and there will be no back up of incoming traffic onto Boundary Road. The main access road will be paved.

The secondary Site access/exit location remains near the northern end of Frontier Road.

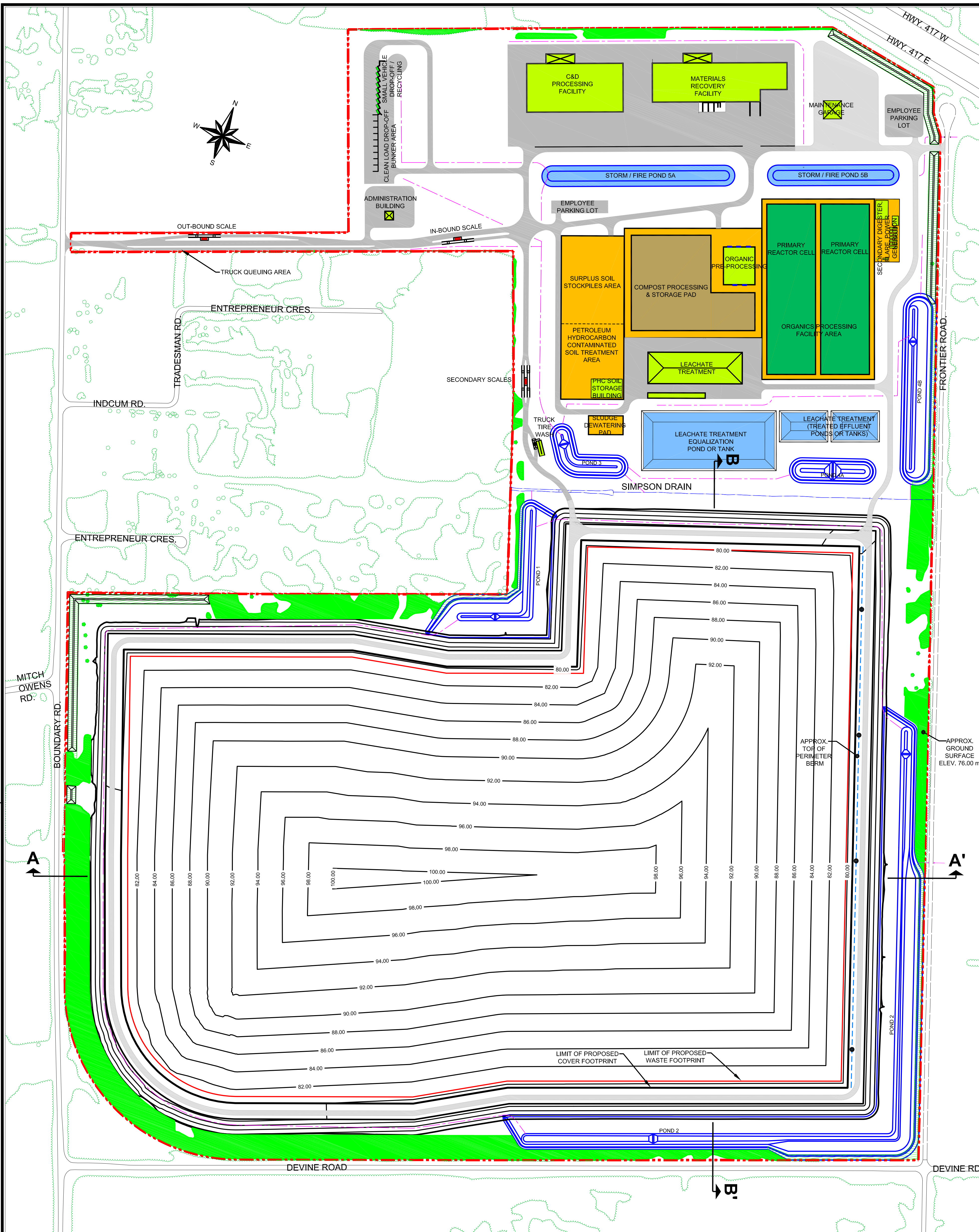
10.2 Administration Building

The administration building remained in the same location, with an assumed footprint of about 200 square metres. This will house office functions for the CRRRC; staff and visitor access will be via a separate lane off the main access road prior to the in-bound scales. A paved parking and apron area will be provided around this building.

10.3 Small Load Drop-Off

The small load drop-off remained in the same location and configuration; the plan shows a maximum number of receiving bunkers. Vehicles will enter the Site over the in-bound scales and proceed to this facility to drop off their material in the appropriate bunker and then exit the Site. A separate road is provided for on-Site trucks to access the containers within the bunkers. The roadways associated with this facility will be paved.

PLOT DATE: November 17, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 1 (Report Figures)\EA report\1211250045-V1-EAr-10-1.dwg



LEGEND

PROPOSED FACILITY BUILDING	EXISTING VEGETATION SCREENING
OUTDOOR DIVERSION AREA	CONSTRUCTED SCREENING FEATURE
PAVED ROAD (ASPHALT)	PERIMETER BERM CONTOURS (interval 1 m)
GRAVEL ROAD	STORMWATER MANAGEMENT PONDS
PROPERTY BOUNDARY	LANDFILL FINAL CONTOURS (interval 2 m)

NOTES:
THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

120 0 120 240
SCALE 1:6,000 METRES

Golder Associates
Ottawa, Ontario, Canada

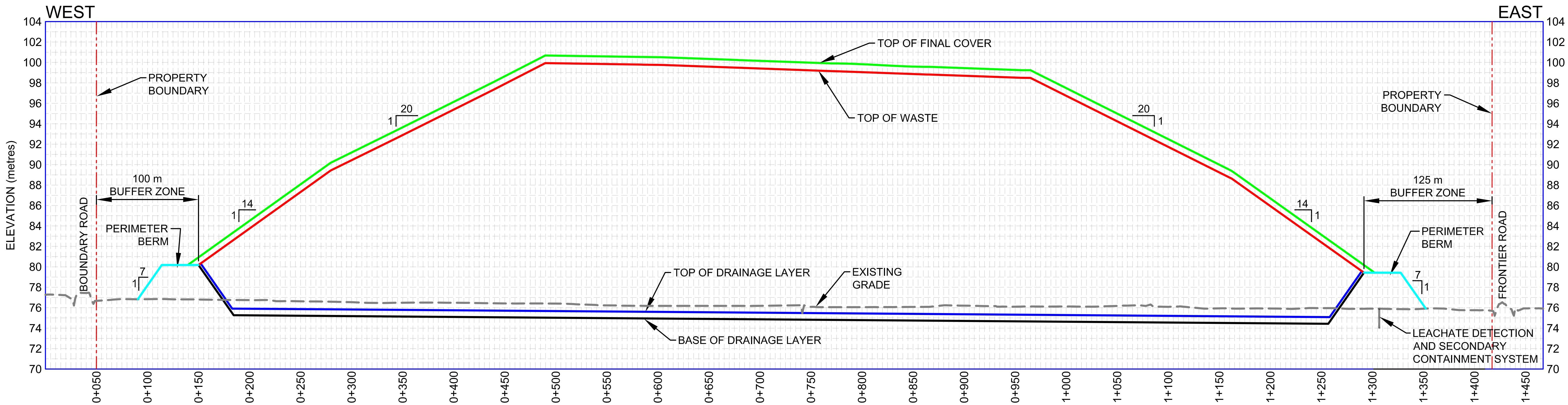
SCALE	AS SHOWN	TITLE	
DATE	7 Nov. 2013		
DESIGN	M.L.F.		
CAD	M.L.F.		
CHECK	P.L.E.		
REVIEW	P.A.S.		

FILE No. 1211250045-V1-EAr-10-1.dwg
PROJECT No. 12-1125-0045 REV.

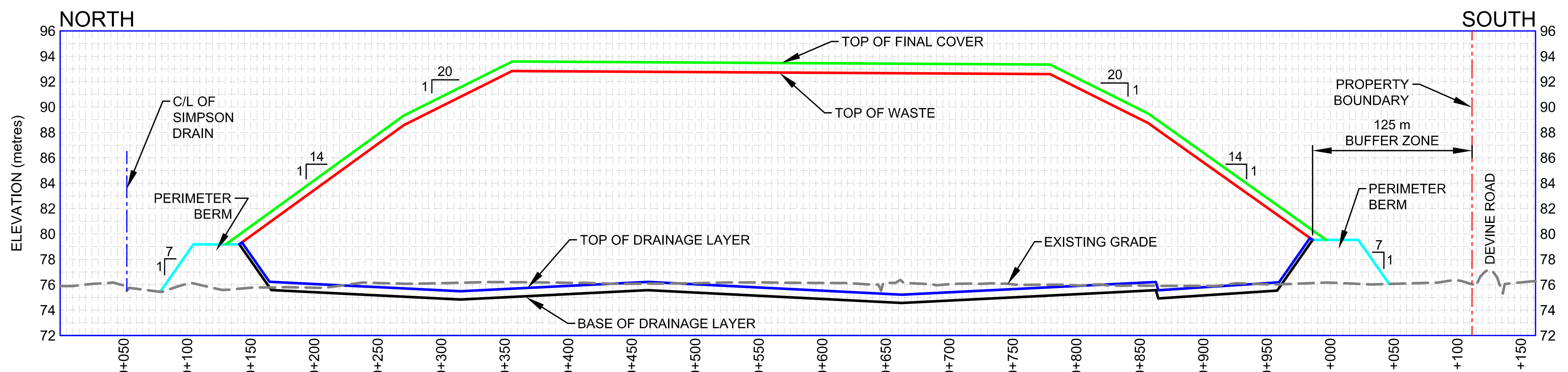
SITE DEVELOPMENT PLAN

ENVIRONMENTAL ASSESSMENT OF THE
CAPITAL REGION RESOURCE RECOVERY CENTRE

FIGURE 10-1



SECTION A-A'



SECTION B-B'

NOTES:

1. VERTICAL SCALE EXAGGERATED 10 TIMES THE HORIZONTAL SCALE FOR PRESENTATION PURPOSES.
2. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

80 0 80 160
SCALE 1:4,000 HORIZONTAL METRES

8 0 8 16
SCALE 1:400 VERTICAL METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT
ENVIRONMENTAL ASSESSMENT OF THE CAPITAL REGION RESOURCE RECOVERY CENTRE

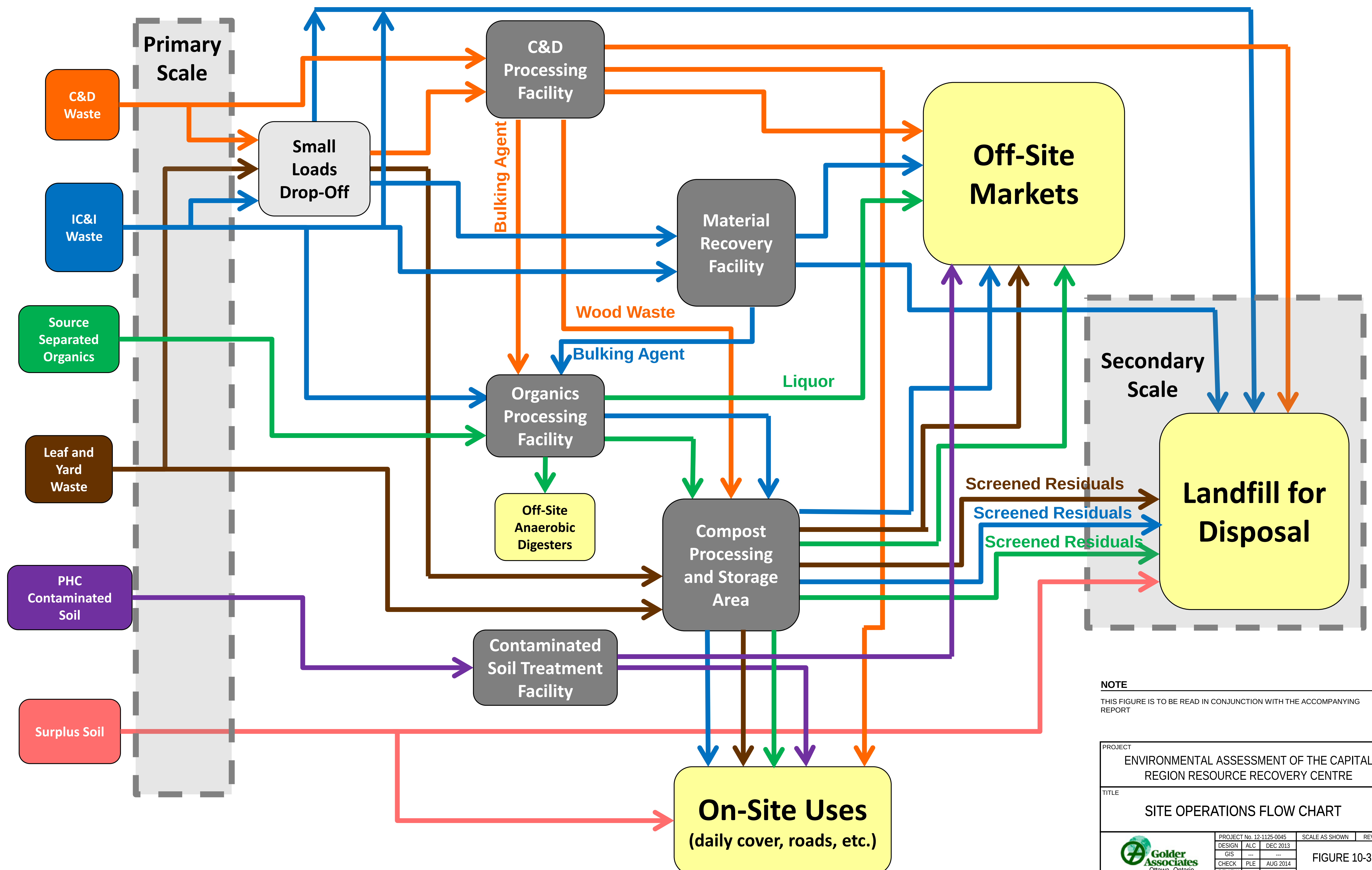
TITLE
SECTIONS A-A' and B-B'

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	M.K.F.	15 Oct. 2013
CAD	M.L.F.	15 Oct. 2013
CHECK	P.L.E.	Aug. 2014
REVIEW	P.A.S.	Aug. 2014

FILE No. 1211250045-V1-EAr-10-2.dwg
SCALE AS SHOWN REV. 0
DRAWING No.
Figure 10-2

PLOT DATE: November 6, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 1 (Report Figures)\EA report\1211250045-V1-EAr-10-2.dwg



NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT

PROJECT

ENVIRONMENTAL ASSESSMENT OF THE CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

SITE OPERATIONS FLOW CHART

Golder Associates
Ottawa, Ontario

PROJECT No. 12-1125-0045			SCALE AS SHOWN	REV.0
DESIGN	ALC	DEC 2013	FIGURE 10-3	
GIS	---	---		
CHECK	PLE	AUG 2014		
REVIEW	PAS	AUG 2014		

10.4 Materials Recovery and Construction & Demolition Processing Facilities

The position of these two main diversion buildings was shifted slightly, into the north central part of the Site, closer to the Site entry point and somewhat further from Highway 417. The area of each building has been assumed to be approximately 13,000 square metres. Most truck traffic will enter and leave the buildings on the south side, such that the north side of the buildings closest to Highway 417 will rarely have truck traffic. The offices and employee facilities, including employee parking, will be on the north side of the main buildings. The area around and between the buildings will be paved.

Incoming vehicles containing materials destined for the MRF will enter the MRF building along the west part of the south side of the building and unload onto the floor. Clean (source separated) loads will be kept separate from mixed loads. These incoming materials will be loaded into a system of processing equipment that includes both mechanical recovery and manual sorting of materials. The recovered materials will generally consist of cardboard, paper, glass, plastics, ferrous and non-ferrous metals, wood and other fibres. The recovered materials will be baled and stored, and then loaded onto trucks along the eastern part of the south side of the building and hauled off-Site to end markets. Rejected and residual materials will be loaded onto trucks within the east end of the building and hauled for disposal in the on-Site landfill.

The C&D building will house mechanical processing equipment (crushing, screening, air and magnetic separation, shredding) and manual sorting in the west and northwest areas of the building, with the main recovered products consisting of shredded wood, ferrous and non-ferrous metals, mixed aggregate, shingles, cardboard and drywall, and process fines. Incoming trucks will enter the building from the south side and unload onto the building floor. The eastern and southern parts of the building will be mostly open space for receiving and other processing operations, such as chipping of recovered wood. The building will also be set up for loading of trucks within the building; this will consist of recovered materials to be sent to off-Site markets, recovered materials to be re-used on-Site, and rejected and residual materials to be hauled to the on-Site landfill.

Both buildings will use a fuel oil fired heating system. Each building will have a dust collection system that will discharge through a bag house and cyclone with the air vented through the roof.

10.5 Organics Processing Facility

The primary reactor cells were oriented north-south rather than west-east in the updated Site Development Plan in order to optimize use of land in the northern part of the Site.

As described in Section 9.0, it is initially proposed to construct and operate a demonstration scale BioPower facility within the overall organics processing facility area. The demonstration will be performed by constructing and operating a facility that incorporates all of the processes and facilities associated with the BioPower technology. These facilities will be expanded as required and incorporated into the full-scale plant following completion of the demonstration phase, depending on the results of the demonstration phase and market demand.

The principal facilities to be used in the course of the demonstration are:

- Organics pre-processing building;
- Biofilter for treatment of air from the organics pre-processing building;
- Primary reactor;
- Secondary reactor;
- Negative pressure extraction system;
- Flare;
- Equipment for blending organic materials, transportation and placement of blended material in primary reactor, installation of cover system, excavation and transportation of digested product, processing of digested product, curing of digested product, refurbishment of primary reactor for re-use; and
- Monitoring and analytical equipment.

It is intended that the demonstration facility be sized to accommodate up to 4,000 tonnes of organic waste per calendar month, not to exceed 23,400 tonnes/year. Operation of the demonstration unit will parallel the planned operation of a full-scale commercial facility. The demonstration will be performed for a minimum of one complete treatment cycle (filling primary reactor, anaerobic treatment of organics in primary reactor and liquor in secondary reactor, aerobic stabilization of material in primary reactor, emptying of primary reactor, screening and curing of digested product, and analysis of end-product quality). For planning purposes, it is anticipated that the demonstration will operate for a period of 24 to 36 months. Key operational parameters within the primary and secondary digesters will be monitored. Data will be analyzed and used to adjust operating conditions as appropriate. The monitoring program may be adjusted in response to ongoing data review and analysis. The character of material produced by the BioPower process will be monitored in accordance with MOECC compost guidelines. As the demonstration progresses, data will be gathered and the performance assessed from three perspectives: environmental, operational and economic. Part V EPA approval will be sought, depending on the results, for conversion of the system to full-scale commercial operation. The precise full-scale system requirements will be specified in the Part V application. Operationally, the transition from demonstration to full-scale is expected to be seamless, since the demonstration system will be fully incorporated into the commercial plant.

In order to ensure organics diversion capability during the demonstration period for the BioPower facility, and to meet market demand, it is proposed to provide capacity for source separated organics from IC&I sources and pre-process them (size reduction and removal of physical contaminants via hydraulic squeezing) within the on-Site organics receiving building and then take the resulting organics slurry by tanker to approved off-Site farm based (or other commercially available) anaerobic digesters for final processing. It is estimated that this initial operation could divert up to 20,000 tonnes/year of organics. Should this operation prove successful and there be continued interest/demand from farm digesters, Taggart Miller may elect to continue it for source separated organics, while operating the BioPower facility for organics streams for which that technology is more appropriate. The receiving and storage building, which is anticipated to serve for both the pre-processing and the full scale receiving and storage, has been assumed to have a footprint area of approximately 3,000 square metres and a height of about 12 metres.

Pre-processing of source separated organics to create an organics slurry for off-Site anaerobic digesters will occur on-Site in the building established for the receipt and storage of organics. Delivery trucks will tip the organics into a receiving pit within the on-Site building; they will then be fed to a pre-processing system that will provide particle size reduction, physical separation of physical contaminants and production of a pumpable organics slurry. The organics slurry will be pumped to an exterior, closed storage tank while the separated physical contaminants will either be sent to landfill or subjected to further processing depending on their organic content. The slurry will be pumped into tankers and sent for off-Site processing in approved anaerobic digesters. The organics receiving and storage building, as well as internal and external storage tanks, will be kept under negative pressure to reduce the potential for fugitive odour emissions and the air will be exhausted and treated through a biofilter. The building will be heated by heat recovered from the flare/generator or a biogas boiler or via a backup fuel oil heating system.

Although subject to modification depending on the results of the demonstration scale project, it is anticipated that the BioPower process will generally consist of the following activities:

- The source separated or mixed organics will be tipped from trucks into the organics building receiving area, where they will be mixed with a bulking agent (such as compost or wood chips from other Site operations) and carbon source (such as fibre from the MRF). This building, which would also contain the pre-processing system for production of the slurry described above, will be kept under negative pressure to reduce the potential for fugitive odour emissions and the air will be exhausted and treated through a biofilter. The building will be heated using fuel oil;
- The blended material will be removed from the building and placed in the primary reactor cells. The primary reactors will be built in stages and consist of an encapsulation design consisting of a shallow excavation with a geomembrane bottom liner, an underdrain system to remove the liquor generated by the digestion process, an upper insulating layer and a geomembrane cover. Piping will be placed within the organic material to allow recirculation of collected liquor and for extraction of biogas and odour control. The primary reactor cells will be built on an ongoing basis based on the quantity of material to be processed and are anticipated to ultimately consist of two main cells that are up to 70 metres wide by 300 metres long, with sloped sides and heights up to about 6.5 to 7 metres. The material will be temporarily covered when placed in the cell until additional material is placed in the adjoining area. The anaerobic digestion period within the cell could be about 12 to 18 months. The extracted biogas will be directed to an enclosed flare and/or power generation area. Once the anaerobic digestion is complete, air will be introduced to the digested product to turn the cell aerobic prior to removal of the cover to control potential odorous emissions; and
- The collected liquor will be sent to a secondary reactor within a building where it will be digested anaerobically and converted to biogas consisting primarily of methane and carbon dioxide. The biogas will be sent to an enclosed flare and or a power generation area where it will be combusted (in combination with collected LFG) and the combustion air treated prior to release. The flare will be sized to accommodate a total gas flow from the secondary digester and landfill of 3,000 cubic feet per minute, and have an approximate stack height of about 12 metres. In the initial period of Site operation, all collected gas will be flared. If there is enough gas generated and the economics are favourable, a power generation area would be utilized to generate electricity for export to the grid. Although the final approvals for a power generation

area would be pursued subsequent to EAA and EPA approval of the CRRRC, based on the estimated gas generation it is anticipated that up to seven generating sets (engines and generators) may be used to potentially generate up to 7 to 8 megawatts of electricity. As much liquor as possible will be recirculated into the primary reactor and the surplus will be considered for possible beneficial alternative off-Site uses such as farm nutrients or combined with landfill leachate for treatment. The flare and generation plant will be located near the northeast corner of the Site adjacent to the primary reactor.

The compost processing and storage pad will occupy an area of up to 3.5 hectares and will have a paved surface. The following activities will be carried out on the pad: 1) leaf and yard materials received will be ground, initially aerobically composted in open windrows/trapezoidal piles, and then transferred and reformed into open windrows/trapezoidal piles for final curing; 2) received clean wood will be ground and processed into chips; 3) the digested product from organics processing will be cured in windrows/trapezoidal piles; 4) these products will be screened and stored for subsequent use on- or off-Site; and 5) residual materials will be transferred for disposal.

It is also possible that an aerated pile composting process may be utilized on the pad, wherein air is introduced to the material to be composted in order to sustain elevated oxygen content within the material and thereby further assist/accelerate the pathogen kill and composting process. This could be desirable to enhance processing of leaf and yard waste or for additional processing of the digested product. If this process is to be utilized, the compost pad would be designed/equipped to supply the air and collect the liquid generated from this process; the liquid would be re-used to moisture-condition the material. The need for any further processing of the digested product and length of the curing period will be determined during the initial, demonstration scale operation of the BioPower organics processing facility.

Although not anticipated, if the demonstration scale BioPower facility described for processing organics in the mixed IC&I waste stream does not meet its design objectives or is otherwise not approvable for full scale use by the MOECC, then an alternative approach will need to be developed in order for the CRRRC to provide processing and diversion of mixed load organics. Because there is not currently to our knowledge another process in commercial use for processing organics in the mixed IC&I waste stream, at this time Taggart Miller proposes that organics diversion at the CRRRC would consist of the continuation of pre-processing source separated organics and sending the organic slurry to off-Site anaerobic digesters for processing. This would continue until such time as a process to digest organics in the mixed IC&I waste stream is proven and commercially viable.

10.6 Petroleum Hydrocarbon Contaminated Soil Treatment

The location of the PHC contaminated soil treatment area was shifted somewhat south in the updated Site Development Plan to the west central portion of the Site area north of the Simpson Drain. The overall area for this process was increased to about 1.2 hectares to allow for the construction and operation of up to 8 biopile cells and for an enlarged PHC soil receiving building.

As described in Section 9.2.2, the approach that will be taken in the initial period of operation is to pre-treat the PHC impacted soil using the biopile technique, as required, prior to use as daily cover in the landfill component of the CRRRC to prevent off-Site odour impacts. The incoming PHC soil would be placed on a concrete pad and temporarily covered with a low permeability tarp and stored until placed in a biopile cell. The concrete pad would be designed so that rainwater runoff and water draining from the PHC soil could be captured for re-use in the biopile or treated if required.

If the MOECC at some point requires treatment of PHC soils prior to using them in the landfill regardless of their odour-generating capability, the objective of the treatment using the biopile technique will then be to meet the required concentrations for PHCs in the soil, while capturing and treating the generated liquid and gas. The incoming soils would be received inside a building where they would be conditioned and stored until placed in a biopile cell; the air emissions from the conditioning process would be treated with a biofilter.

In addition to the process information provided in Section 9.2.2, it was assumed that each aerated static biopile cell could have an area of approximately 600 square metres with sloped sides and a height of about 2.5 metres, to provide a working volume of approximately 1,000 cubic metres. The cell base would be provided with a geomembrane liner to contain the liquid produced from the process. Piping would be provided in the base to both collect liquid and to both add and remove air from the soil; an irrigation piping system would be installed at the top of the soil to supply water, to provide amendments and nutrients, and recirculate the collected liquid. A central treatment unit would be provided to regulate and optimize the conditions within the biopile to achieve the pre-treatment or treatment. The extracted air would be managed through a biofilter before final polishing with an activated carbon filter.

10.7 Surplus Soil Management

The location of the surplus soil management area was shifted from near the north boundary to the west central portion of the Site area north of the Simpson Drain. The ongoing operation in this area, as well as other areas of the Site where surplus uncontaminated soil may be temporarily stored until such time that it is required for re-use, will basically consist of the dumping and dozing of incoming soil into a stockpile(s), and removal of this soil for re-use on-Site. It is anticipated that the temporary stockpiles could be up to about 5 metres in height.

10.8 Landfill Component

As described in Section 9.0, the landfill component of the CRRRC will require between approximately 9.4 and 10.7 million cubic metres of airspace volume for a period of 30 years. This is based on an assumed five year ramp up of waste receipts to a maximum of 450,000 tonnes/year and achieving an overall diversion rate in the range of 43 to 57% (including surplus soil for daily cover) over time. The landfill component presented as part of preferred Concept A satisfied this requirement. The landfill component design was further refined by considering: the buffer width needed around the landfill (as described in Section 10.12); additional geotechnical analysis of static and seismic stability; estimated settlement of the waste caused by consolidation of the underlying clay soil deposit under the weight of the waste; design of the landfill base grades and leachate collection system; leachate containment system requirements to provide groundwater protection as described in O. Reg. 232/98 (MOE, 1998a); and design of the LFG management system. These analyses are described in Volume III of the EASR document package and the designs with additional details are presented in Volume IV. An overview of the proposed landfill design is provided below and is illustrated on accompanying figures.

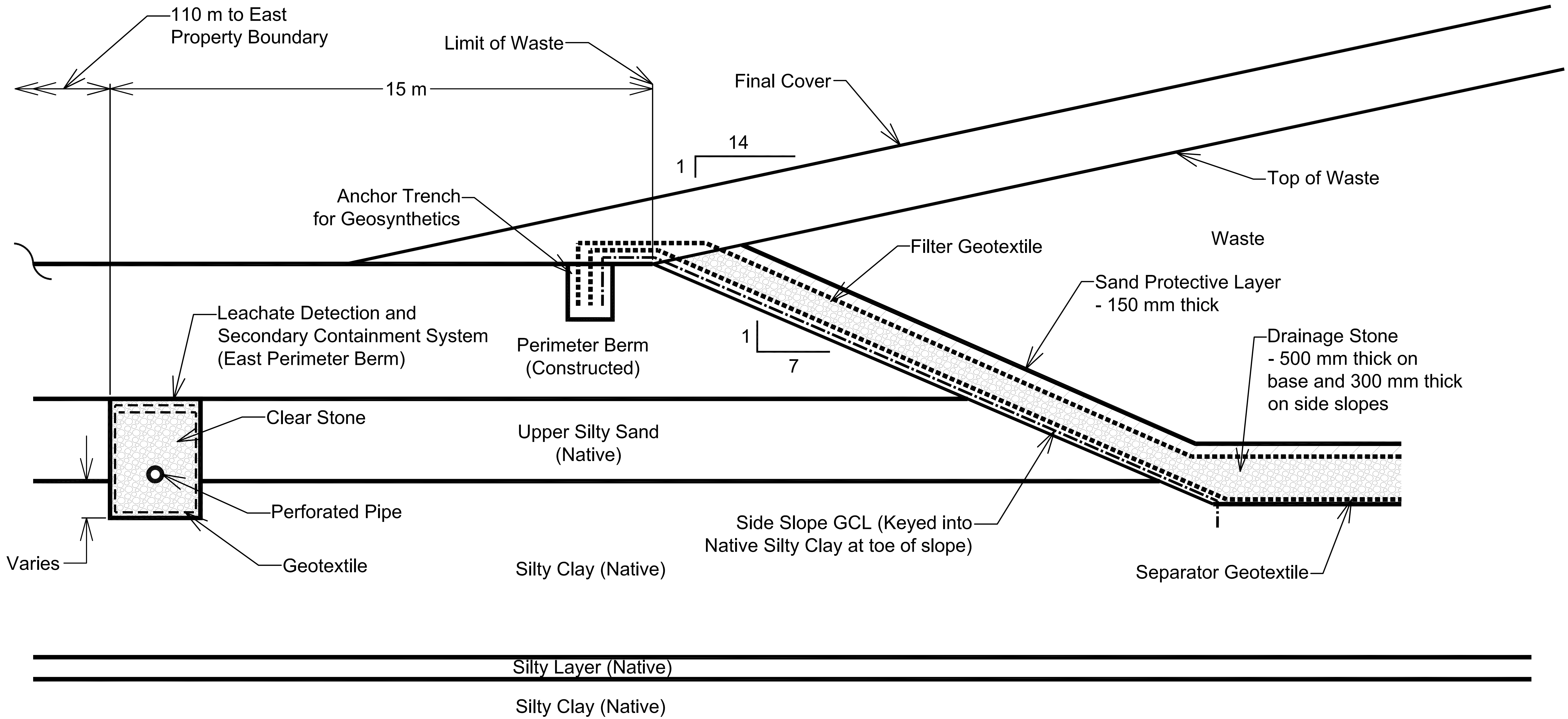
Landfill Base: The total landfill footprint is approximately 84 hectares. The landfill base will be excavated 1.5 to 2.5 metres below existing ground level and will be surrounded with a perimeter containment berm. The perimeter berm will be constructed to about 3.5 metre height using the excavated soils and/or similar types of imported materials. The perimeter berm will have a top platform width of around 35 metres to provide adequate overall landfill stability, with 7 horizontal to 1 vertical sideslopes. The berm will also accommodate a perimeter road, header piping for leachate and LFG and other service lines, and provide conveyance of runoff to the SWM system. An approximately 20 metre wide bench will be provided between the exterior toe of the perimeter berm and adjacent facilities within the buffer, providing both access and working area around the landfill.

The design of the leachate containment and leachate collection system will meet the requirements of O. Reg. 232/98 (MOE, 1998a), within the context of the Site-specific geological and hydrogeological setting, as follows:

- For leachate containment, a Site-specific design approach will be followed. The natural low permeability silty clay deposit will provide the low permeability bottom liner for the landfill. The perimeter berm will incorporate a constructed low permeability hydraulic barrier (a GCL) extending the full height of the berm and down through the surficial silty sand layer or weathered clay zone and keyed into the underlying upper silty clay. This would cut off the potential pathway for off-Site leachate migration via the berm fill and surficial silty sand layer. A typical cross-section showing the perimeter leachate containment is shown on Figure 10.8-1.
- The design of the landfill base recognizes that consolidation settlement of the silty clay deposit will occur and that the largest settlements will be below the central portion of the landfill where the waste thickness is greatest. As such, the landfill base will be shaped to provide drainage of leachate from the perimeter of the landfill towards the centre; the leachate will be conveyed through a system of perforated and non-perforated leachate piping and a granular drainage blanket. Leachate sumps (manholes) will be provided within the landfill; they will be located at the lowest points of the base grading, both when constructed initially and allowing for the longer term consolidation of the clay as the waste is placed. The leachate collection system design will accommodate the expected settlement. As the settlement of the clay occurs, the slope of the base and piping will increase from that originally constructed, thereby

enhancing the transmission of leachate to the interior leachate sumps. Leachate removal from each sump will be by means of submersible pumps and via piping to a forcemain that will convey the collected leachate for treatment (as described in Section 10.9). The layout of the base is shown on Figure 10.8-2. Cleanout access for inspection and flushing/cleaning of the leachate collection piping system will be provided, both from the exterior of the landfill and by cleanouts provided from within the landfill.

A leachate detection and secondary containment system (LDSCS), shown on Figure 10.8-2, will be positioned beneath the perimeter berm on the hydraulically downgradient (eastern) side of the landfill. As shown on Figure 10.8-1, the LDSCS, which will be a granular filled trench completed in the surficial silty sand layer, will allow for the monitoring of the performance of the landfill's leachate containment system (the natural clay deposit, the leachate collection system, and perimeter berm with the GCL) and provide secondary containment in the unlikely event that leachate enters the surficial silty sand layer outside of the landfill footprint.



SCALE: N.T.S.

NOTES:

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

PROJECT

ENVIRONMENTAL ASSESSMENT OF THE CAPITAL REGION RESOURCE RECOVERY CENTRE

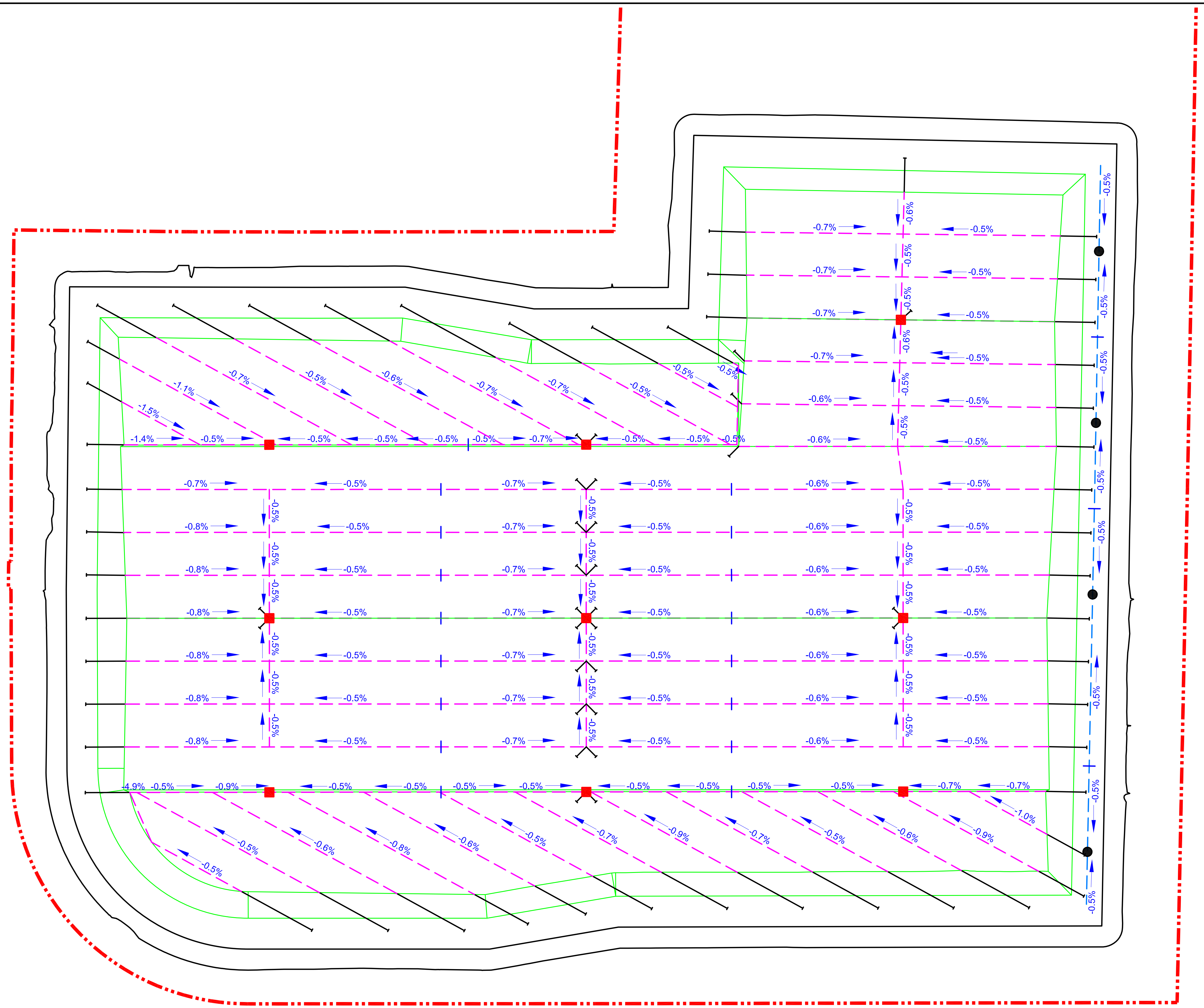
TITLE

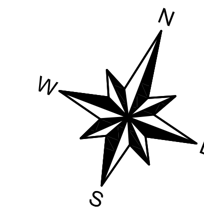
TYPICAL PERIMETER LEACHATE CONTAINMENT CROSS-SECTION

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-V1-EAr-10.8-1.dwg	
DESIGN	M.K.F.	15 Oct. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	M.K.F.	Aug. 2014	**Figure 10.8-1**	
REVIEW	P.A.S.B.	Aug. 2014		

PLOT DATE: November 5, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 1 (Report Figures)\EA report\1211250045-V1-EAr-10.8-1.dwg





LEGEND:

- PROPERTY BOUNDARY
- -0.5% LEACHATE COLLECTION PIPE SLOPE (initial)
- LEACHATE MANHOLE (nts)
- CLEAN OUT LOCATION (nts)
- PIPE GRADE BREAK POINT
- LEACHATE COLLECTION PIPE
- MAIN SUBGRADE SLOPE BREAK POINTS
- PERIMETER BERM SLOPE BREAK POINTS
- LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM MANHOLE (nts)
- LEACHATE DETECTION AND SECONDARY CONTAINMENT SYSTEM COLLECTION PIPE

NOTE:

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCES:

PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 18

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

ENVIRONMENTAL ASSESSMENT OF THE CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LEACHATE COLLECTION AND LDSCS PIPING LAYOUT PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045
DESIGN	M.K.F.	15 Oct. 2013
CAD	M.L.F.	15 Oct. 2013
CHECK	M.K.F.	Aug. 2014
REVIEW	P.A.S.B.	Aug. 2014

FILE No. 1211250045-V1-EAr-10.8-2&3.dwg
SCALE AS SHOWN REV. 0
DRAWING No.

Figure 10.8-2

PLOT DATE: November 10, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 1 (Report Figures)\EA report\1211250045-V1-EAr-10.8-2&3.dwg

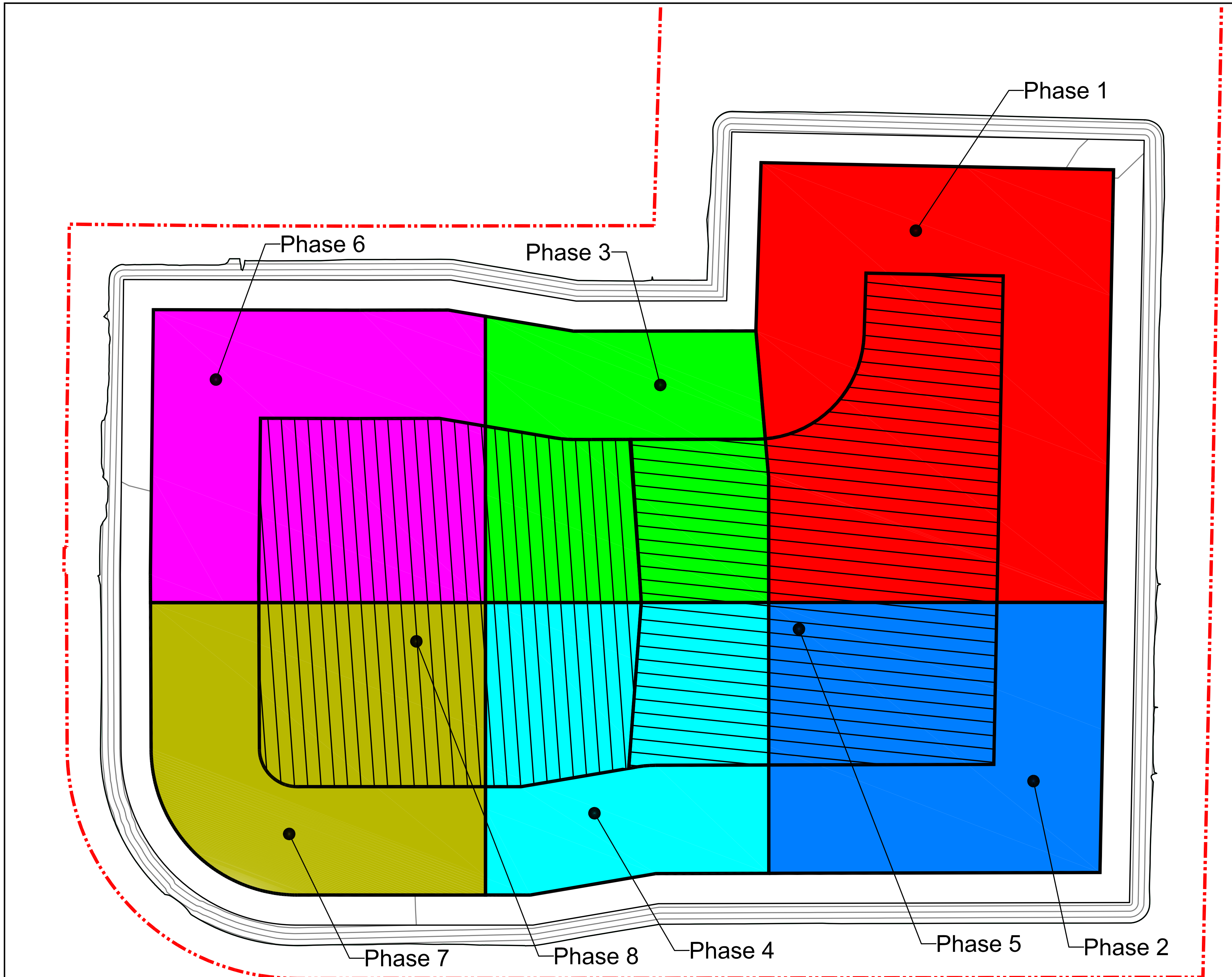
- Landfill Development: The landfill component has been planned to be developed in eight phases. The phase divisions recognize the layout of the base grades and the leachate collection system, and will allow for sequential construction of the overall landfill footprint. The proposed phasing is shown on Figure 10.8-3 and filling will generally progress from northeast to southwest within the landfill footprint. Sequential filling in Phases 1 through 4 will progress up to a height of about 12 to 13 metres above ground level (approximate elevation 89 masl). Phase 5 waste will be placed on part of the top of Phases 1 through 4 up to its final elevation. Phases 6 and 7 will then be filled similar to Phases 1 through 4 and Phase 8 filling will take place on top of Phases 6 and 7 (and Phases 3 and 4) to complete the landfill. The area of each stage varies from about 11 to 21 hectares and it is estimated will provide airspace for operating periods ranging from about 2 to 6 years. The operating period for each Phase is variable because certain Phases have to be initially built with relatively flat temporary interior waste sideslopes on two sides (thereby reducing the available airspace above the footprint of that Phase), while filling in others involves the placement of waste above the temporary sideslopes within the previous adjacent Phase(s) footprints. The phasing is described in Table 10.8-1.

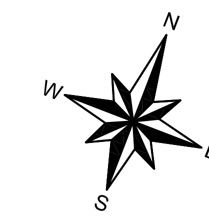
Table 10.8-1: Landfill Phasing

Phase	Footprint Area (hectares)	Estimated Years of Operation
1	21.6	4.5
2	12.9	3.6
3	11.0	2.3
4	11.3	4.8
5	On top of Phases 1 to 4	1.7
6	13.9	3.2
7	13.3	6.6
8	On top of Phases 3 to 7	3.3
Totals	84.1	30

As part of the EA approval, Taggart Miller has assessed the potential impacts from the total proposed landfill airspace. Recognizing that the rate of landfill airspace consumption will depend on the annual tonnage received and the diversion performance of the CRRRC over time (including the development of end markets), it is proposed that the landfill airspace be approved under the EPA in stages. Considering the proposed phasing shown on Figure 10.8-3, the practical approach is to split the landfill into two stages so that, as described above, the first stage of the landfill can be built to a completed configuration prior to starting to fill the second phase. The two stages are:

- Stage 1 consisting of Phases 1 through 5, which corresponds to approximately 5.7 million cubic metres of airspace and an estimated operating life of about 17 years; and
- Stage 2 consisting of Phases 6 through 8, which corresponds to approximately 4.4 million cubic metres of airspace and an estimated operating life of about 13 years based on the assumptions used in this EASR.





LEGEND:

PROPERTY BOUNDARY

PERIMETER BERM CONTOURS (interval 1.0 m)

NOTE:

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCES:

PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 18

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

ENVIRONMENTAL ASSESSMENT OF THE
CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LANDFILL PHASING PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No.	1211250045-V1-EAr-10.8-2&3.dwg
DESIGN	M.K.F.	15 Oct. 2013	SCALE	AS SHOWN REV. 0
CAD	M.L.F.	15 Oct. 2013	DRAWING No.	
CHECK	M.K.F.	Aug. 2014		**Figure 10.8-3**
REVIEW	P.A.S.B.	Aug. 2014		

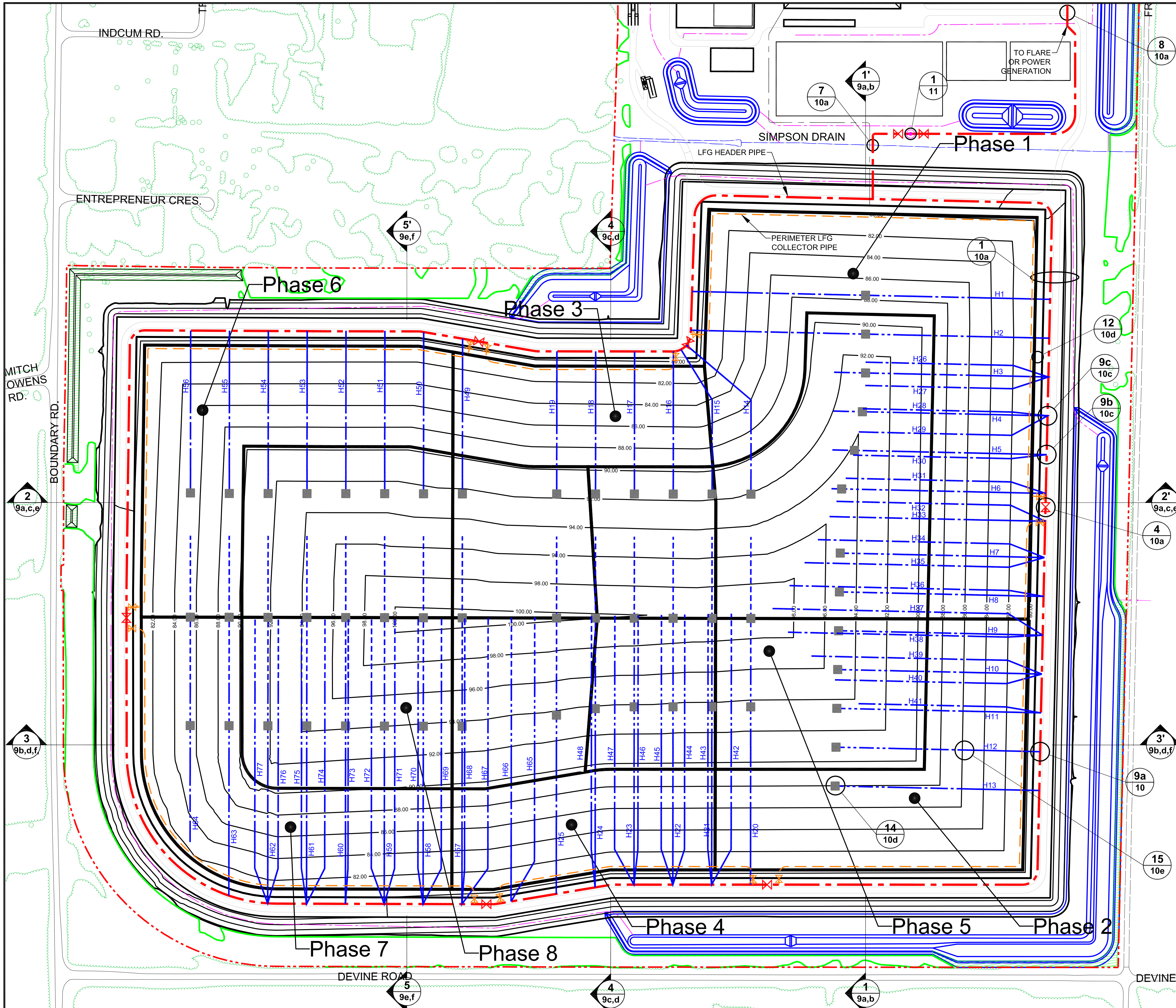
PLOT DATE: September 4, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 1 (Report Figures)\EA report\1211250045-V1-EAr-10.8-2&3.dwg

Landfill Gas Management: The proposed LFG management system will be designed in accordance with the requirements of O. Reg. 232/98 (MOE, 1998a). Given the contemplated diversion of IC&I organics from disposal to the extent practical, landfill gas and odour associated with decomposition of organics within the landfill will be reduced. The proposed LFG management system is an active collection system consisting of horizontal collector piping installed in two layers within the waste as the waste is placed, and header piping around the perimeter of the landfill and extending to the on-Site condensate management facilities, vacuum extraction plant and enclosed flare. This collection system will also be able to supply a possible power generation facility. The layout of the proposed LFG management system is shown on Figure 10.8-4.

The proposed LFG collection system will conform to the most recent version of B149.6-11 Code for Digester Gas and Landfill Gas Installations (CSA, 2011), which has been adopted by the Technical Safety and Standards Authority (TSSA) for use in Ontario as of December 2012. The LFG collection system has also been designed for the predicted clay foundation settlement.

Due to the presence of clay soils beneath and in a large area beyond the Site, the presence of a high groundwater table in the area and the proposed low permeability barrier through the surficial sand layer around the landfill perimeter, the potential for off-Site migration of LFG through the subsurface is negligible. In addition, there is a minimum 100 metre wide buffer between the landfill footprint and the Site property boundaries; and there are ditches and drains that would interrupt the movement of any LFG in the unlikely event that it had migrated away from the landfill through the thin unsaturated zone.

Based on the analysis of landfill performance in terms of compliance with the groundwater protection requirements of O. Reg. 232/98 (MOE, 1998a), it is currently proposed that a permeable soil final cover be used on the landfill. An allowance for up to a 1 metre thick final soil cover has been provided, although the final soil cover is likely to have a total thickness of approximately 0.75 metres. Final cover construction will take place after filling in a part of the landfill is complete.



LEGEND:

- HDPE LFG HEADER PIPE
- HDPE LFG PERIMETER COLLECTOR PIPE
- HDPE NON-PERFORATED LFG HORIZONTAL CONVEYANCE PIPE
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 500 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 250 mm)
- HDPE PERFORATED LFG HORIZONTAL COLLECTOR (PERFORATION SPACING - 125 mm)
- HORIZONTAL COLLECTOR DRAIN
- VALVE
- CONDENSATE TRAP
- 0 / 10 — SECTION LINES
- X / X — REFERENCE DETAIL OR SECTION / REFERENCE DRAWING SHEET

NOTES:

1. DETAILS AND DIMENSIONS SUBJECT TO MODIFICATION DURING DETAILED DESIGN.
2. WELLHEAD / VALVE AT DOWNSTREAM END OF HORIZONTAL COLLECTOR IS NOT SHOWN.
3. SECTIONS AND DETAILS ARE PROVIDED IN THE D&O REPORT.
4. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

100 0 100 200

SCALE 1:5,000 METRES

REV	DATE	DES	REVISION DESCRIPTION	CAD	CHK	RVW

PROJECT

ENVIRONMENTAL ASSESSMENT OF THE CAPITAL REGION RESOURCE RECOVERY CENTRE

TITLE

LANDFILL GAS COLLECTION SYSTEM PLAN

Golder Associates
Ottawa, Ontario, Canada

PROJECT No.		12-1125-0045	FILE No. 1211250045-V1-EAr-10.8-4.dwg	
DESIGN	A.M.H.	29 Nov. 2013	SCALE AS SHOWN	REV. 0
CAD	M.L.F.	03 Dec. 2013	DRAWING No.	
CHECK	M.K.F.	Aug. 2014	**Figure 10.8-4**	
REVIEW	P.A.S.B.	Aug. 2014		

PLOT DATE: October 9, 2014
FILENAME: N:\Active\Spatial_IM\Miller_Paving_Ltd\CRRRC\ACAD\Vol 1 (Report Figures)\EA report\1211250045-V1-EAr-10.8-4.dwg

Landfill Capacity: As described in Section 9.2.2, the presence of the clay deposit beneath this Site requires relatively flat sideslopes in order that the landfill has adequate stability. The landfill design has 14 horizontal to 1 vertical sideslopes above the perimeter berm up to about elevation 89 masl or 12 to 13 metres above ground level and then a 20 horizontal to 1 vertical slope up to a central peak or ridge area. The maximum height of the designed final landfill contours, as illustrated by the contours and cross-section on Figures 10-1 and 10-2, respectively, is about 25 metres above ground level. This corresponds to an airspace volume of about 10,170,000 cubic metres for waste and daily cover, without accounting for settlement.

As described in Volumes III and IV of this EASR submission, the clay beneath the landfill will consolidate under the weight of the waste. As a result, the elevation to which waste is placed will decline as the clay below it consolidates, some of which will occur during the period that filling is ongoing. Because the stability of the landfill is dependent on the thickness of waste, the thickness will be monitored and will be used to determine the remaining thickness of waste that can be placed. Although the overall final shape of the landfill will be similar to the design, it is expected that the landfill will not actually reach the maximum ridge/peak elevation presented in the design. In this regard, it is expected that the final contours for Phases 5 and 8 (the two periods of filling the upper part of the landfill above previously filled areas) may be somewhat lower than, but within the approved landfill landform contours. As the clay consolidates over time its shear strength will increase; this increase in shear strength will be considered in consultation with the MOECC in determining the total achievable waste thickness and the final contours for Phases 5 and 8. The final shape will also provide positive drainage runoff.

Landfill Operations: As required by O. Reg. 232/98 (MOE, 1998a), landfill operations are described in Volume IV of this EASR document package. This includes procedures for receiving, placing, compacting and covering waste as well as for controlling potential nuisance effects associated with landfill operations.

10.9 Leachate Treatment

In the Site Development Plan, the location of leachate treatment was shifted somewhat southward to the land area north of the Simpson Drain. This was mainly a result of preparing a preliminary design of the Site drainage system including room for the required SWM system components.

An assessment of leachate management alternatives is presented in TSD #10. The preferred leachate management system was identified as off-Site treatment and discharge at the City of Ottawa wastewater treatment plant Robert O Pickard Environmental Centre (ROPEC). On-Site pre-treatment will be required for this option. The leachate will be pre-treated as required to comply with the City of Ottawa Sewer Use By-law requirements as set out in the required discharge agreement between the City of Ottawa and Taggart Miller.

The proposed leachate pre-treatment facility consists of an equalization tank, leachate storage pond, liquor storage tank, boilers and heat exchangers, chemical precipitation contingency to reduce elevated metals toxic to the biological treatment if they occur, Sequencing Batch Reactor (SBR) system, effluent storage pond, truck filling station and sludge management system. It will pre-treat both leachate from the landfill and liquor from the on-Site organics processing facility.

10.10 Ancillary Facilities/Components

In the Site Development Plan, the location of the maintenance garage was shifted to the northeast corner of the property; an employee parking lot has been located adjacent to it, primarily for the use by staff working at facilities other than the MRF and C&D processing buildings.

Secondary scales are proposed along the internal access/exit road to/from the landfill. The truck tire wash is located along the exit road from the landfill.

Some minor adjustments were made to the internal road network to accommodate shifting of components and facilitate Site operations. As shown on Figure 10-1, all on-Site roads north of the Simpson Drain will be paved, except for the internal road along the east side of the Site leading from the landfill to the maintenance garage; this road has to remain gravel surfaced for use by equipment associated with landfill operations such as compactors, dozers, etc.

10.11 Surface Water Management

Design of drainage requirements for the CRRRC is shown on Figure 10-1. The approach to system design was to closely match post-development flows to pre-development flows by providing the required retention time in on-Site ponds and by doing so also provide an Enhanced Level of total suspended solids (TSS) removal (MOE, 2003b). The approach also aimed at dividing up the Site into three drainage areas that are similar in size to the three pre-development drainage areas leading to the three surface water discharge locations from the Site. The three discharge locations, which all flow eastward and enter Shaw's Creek, are to the Regimbald Municipal Drain to the northeast, to the Simpson Municipal Drain in the central portion and to an existing ditch in the southern portion leading to the Wilson-Johnston Municipal Drain. The system consists of Site grading, ditching and culverts leading to five linear stormwater ponds or pairs of ponds; one of the ponds will receive stormwater drainage from a portion of the diversion areas to provide a large fire pond (as per the building code) to provide water for firefighting purposes, if required. Oil-water separators will be used in the vehicle maintenance garage and reversed slope outlet pipes will be used for stormwater management ponds that receive drainage from vehicle parking areas. Also, it is envisioned that the tire wash station will be a recirculating system with a solids interceptor.

10.12 Buffers

To refine the preferred Site development concept, additional geotechnical analysis of landfill stability was completed to further assess the geometrical requirements of this landform, including its interaction with the required stormwater ponds, Simpson Drain, leachate management and other Site features. The requirements for perimeter screening were also further considered, to determine where constructed screening features (earth berms 2 to 3 metres high with trees transplanted on them) were required and their geometry, and where the screening could be provided by leaving an adequate width (15 to 20 metres) of existing tree cover around the perimeter of the property. Constructed screening will be required at the northeast and southeast corner areas and along a portion of the west central Site boundary. It is noted that a portion of the constructed screening proposed at the northeast corner could be replaced by transplanting trees in the gap in the existing tree line at the north end of the Frontier Road cul-de-sac. This would also effectively screen the view of the Site for persons travelling along Highway 417.

The result of this design and analysis was to increase the width of the buffer area adjacent to the east side, the east half of the south side and the northwest corner of the landfill from 100 metres to 125 metres. Around the remainder of the landfill the perimeter buffer would be 100 metres, as per the O. Reg. 232/98 (MOE, 1998a).

10.13 Operating Hours

It is proposed that the Site will be open for material and waste receipts between 6:00 a.m. and 6:00 p.m. Monday through Saturday. Operating hours for the MRF and C&D processing facilities will be between 7:00 a.m. and 11:00 p.m. Monday through Saturday, although it is expected they will generally operate between 7:00 a.m. and 5:00 p.m. The evening hours provide the flexibility to run two shifts during high demand periods. Landfill operations, organics processing in the building, composting and PHC soils treatment are proposed to be 6:00 a.m. to 7:00 p.m. Monday through Saturday. Organics processing at the primary reactor cells will occur between 7:00 a.m. and 7:00 p.m. Monday through Saturday. The Site is expected to operate between 300 and 312 days per year.