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May 7, 2025 Project No. 0231-01

Alberta Environment and Protected Areas
Attn: Mr. Alper Basar, Municipal Approvals Engineer
10320 – 99th Street
Grande Prairie, AB
T8V 6J4

Via Email: Alper.Basar@gov.ab.ca

cc: Jamie Hallett, MD Greenview
Zac Sarling, MD Greenview

RE: Summary of Proposed Hybrid and Alternate Landfill Closure Designs

Dear Mr. Basar,

This letter has been developed following a meeting between Alberta Environment and Protected Areas (AEPA), Omni-McCann Inc. (Omni-McCann), and the Municipal District (MD) of Greenview No. 16 (the 'MD') held on April 9, 2025.

Omni-McCann was retained by the MD in 2024 to develop Closure/Post-Closure reports for 15 historically retired landfills/ waste disposal areas within the MD, with the scope of work later expanded to include a 16th site following it's identification. As part of this process, historical records review and a field program were carried out. Upon review of the information gathered through these activities, it has been proposed that several of the former landfills have not been operational in the intervening time between 1996 (the date at which the *Code of Practice for Landfills*[1] (the 'Code') was brought into effect and present day. It was further noted, that of the landfill sites which were operational after 1996, in most cases, these operations were limited, and as a result it is proposed that historical closure practices followed before the Code was brough in be applied to one or more of the retired landfills in their entirety and select areas of other landfills as discussed herein.

As part of this letter, we have provided background information on each of the 16 retired landfills (herein referred to as 'sites'), along with a proposed approach for each site.

[1] Alberta (1996). *Code of Practice for Landfills*, Government of Alberta. Edmonton, AB

BACKGROUND

IDENTIFICATION AND ASSESSMENT OF SITES

The MD determined the location of 16 historically closed landfills through internal documents and communication with landowners and the public at large. As part of these communications and through a cursory review of the sites, it was suspected that some degree of closure was likely to have occurred at each of the sites, however, no records were available confirming the closure activity. A summary of the sites is provided in **Table 1** below, with their relative locations presented in **Figure 1** (**Appendix A**).

Table 1. Summary of Sites

Site Name	Land Location	Current Usage
Sandy Bay	NW-9-71-23-W5	Transfer Station (DML)
Old Little Smoky	NE-19-66-21-W5M (229LZ & 7520294A)	Vacant
Old Sturgeon	SE-29-70-24-W5M	Vacant
DeBolt	SE-2-72-1-W6M	Transfer Station/Class III Landfill
Puskwaskau	NE-36-74-26-W5M	Transfer Station (DML)
Sweathouse	SW-4-70-19-W5M	Transfer Station (DML)
Old Sunset house	NE-35-70-20-W5M	Vacant
Sunset House	NE-23-70-21-W5M	Class III Landfill/Transfer Station
New Fish Creek	NW-16-72-21-W5M	Class III Landfill/Transfer Station
Little Smoky	NW-13-66-22-W5M	Transfer Station
Sturgeon Heights	NW-13-70-25-W5M	Transfer Station
Grovedale	SW-22-69-6-W6M	Transfer Station
South Wapiti	SW-34-69-8-W6M	Transfer Station (DML)
RR260 (Crooked Creek)	NW-30-71-26-W5M	Vacant
Muskeg	NW&NE-18-57-5-W6M	Vacant (DML)
Debolt East	SE-12-72-1-W6M	Vacant

The MD retained Omni-McCann to assess and develop Closure/Post-Closure reports for each of these sites. Prior to the development of Closure/ Post-Closure Reports, Omni-McCann completed a review of historical aerial photos, a field investigation involving the installation of boreholes across each site, and a topographic survey (LiDAR). Additionally, Omni-McCann, who has been working with the MD for approximately 30 years reviewed in-house files within which, historical closure designs from 2005 were identified for three landfills. As part of these designs it was noted that a modified closure was incorporated into the design work wherein historical areas of waste disposal were to be closed following the practices typical of landfill closures under the Public Health Act (e.g., 0.6 m of clay cover with positive drainage off cover), while areas of recent disposal (post-1996) were to be closed in accordance with the Code. On this basis, it has been proposed that a similar method of a hybrid closure be considered as part of the current Closure/ Post-Closure reports where sites allow for such design.

Notably, as part of this review it was determined that no historical MSW waste disposal activities (i.e., prior to the current Class III Landfill activities) occurred at the New Fish Creek site, and that several of the landfills (Old Little Smoky, Old Sturgeon, Old Sunset House, Debolt East, and RR260) did not appear to have accepted any waste after 1996.

AEPA MEETING

Prior to proceeding with the finalization of Closure/ Post-Closure Plans, Omni-McCann and the MD met with representatives from AEPA on April 9, 2025, to review available historical information related to the subject landfills and to initiate discussions regarding a hybrid closure approach. The objective of the meeting was to confirm whether AEPA would accept a hybrid closure approach to the sites similar to what was design in 2005 by Omni-McCann, and to confirm whether alternate closure designs could be used in instances where a transfer station had been constructed over a historical landfill area.

As part of the meeting, AEPA was able to provide a series of hard-copy documents for review, including former inspection reports and notification letters issued to the MD (or previously the ID [Improvement District]) alerting them to the incoming Code. For many of the sites, records were limited to the notification letters issued in or around 1996 indicating that there was a record of a landfill at the site under the Public Health Act, and that regulatory control of the site would be automatically converted to the Environmental Protection and Enhancement Act with the incoming Code. Through these records, it wasn't clear whether the sites had been registered as a landfill or accepted waste after the Code was implemented.

Outcomes from the meeting included:

- Confirmation that the sites where no notification letter was issued and/ or no known waste disposal occurred after the Code was brought into effect would fall under the Contaminated Sites stream (i.e., Phased Environmental Site Assessments or 'ESAs') rather than the landfill closure stream. This included the following sites:
    - Old Little Smoky
    - Old Sturgeon
    - Old Sunset House
    - RR260 (Crooked Creek)
    - Debolt East
- Confirmation that the New Fish Creek site had never accepted MSW or operated as a landfill prior to construction of the current Class III facility (*not included in this scope of work*) and as such would not require further work related to closure of historical landfill/ waste management facilities.
- Confirmation that the Sturgeon Heights site had previously had a reclamation report (equivalent to a 'Closure Report') completed on the site by EXH Engineering, and was considered closed by AEPA.

During the meeting, AEPA expressed openness to considering a hybrid closure design which would account for the landfill's age, legacy construction methods, and current site conditions; however, acceptance of such a design would require input from a senior Approvals Engineer, and would likely need to proceed on a site-by-site basis with the exception of both Sandy Bay and Puskwaskau which the MD intends to fully close to the design requirements in the Code. This collaborative effort lays the foundation for developing a practical and technically sound closure plan aligned with both regulatory expectations and the constraints of historical landfill infrastructure.

REVIEW OF SUPPLEMENTAL INFORMATION

Following the AEPA meeting, Omni-McCann reviewed additional records, including a review registrations and approvals issued under the Environmental Protection and Enhancement Act (EPEA) which could apply to each of the sites, as available through AEPA's online Authorization Viewer.

In general, the documents listed on the Authorization Viewer were consistent across the sites, with most sites making reference to one or more Approval issued to the MD that was "expired and renewable" and listed a Modified Landfill or a WMF (waste management facility)/ Municipal Landfill. While listings of documents and Approvals were provided through the Authorization Viewer, no copies of the Approvals were available online with the exception of Debolt, Grovedale, and Muskeg. Documents identified as the "Approval" for all three of these sites were limited to permits issued under the Public Health Act. The following additional notable observations were made of the listings available online:

- An active Approval (00046992-00-00) issued September 1, 1996 for a WMF and Transfer Station at the Debolt site which does not expire;
- The Approval for the "new" Little Smoky site was listed as being held by the Regional Health Authority No. 7
- The Approval for the South Wapiti site was listed as "renewed", though no date was listed for the renewal and the listing was greyed, indicating it was considered inactive.

It is considered notable that no *Registrations* were issued for any of the site, as would be typical under the Code, and that while *Approvals* (typical under the *Standards for Landfills in Alberta*[2]) were issued to the nine sites, they do not appear to have been renewed at any point, and may have been generic approvals issued as a result of a clerical record rather than knowledge of on-going landfilling practices.

PROPOSED APPROACH TO CLOSURE

Based on our assessment, nine sites are considered well-suited for a hybrid- or alternate-closure design approach, as summarized in **Table 2** below and on **Figures 2** through **10** (**Appendix A**). Further details on these design parameters are outlined in subsections below.

The following sites having been excluded from further closure planning under the landfill closure stream based on reviewed records confirming reclamation (presumed equivalent to Closure) had occurred and been documented with AEPA, or that the landfills had either not accepted any historical MSW, or had not accepted MSW after 1996:

- Old Little Smoky
- Old Sturgeon
- Old Sunset House
- New Fish Creek
- RR260 (Crooked Creek)
- Debolt East
- Sturgeon Heights

[2] Alberta (2010). *Standards for Landfills in Alberta*, Government of Alberta. Edmonton, AB

DESCRIPTION OF CLOSURE METHODS & MANAGEMENT OF IMPACTS

The following sections describe Omni-McCann proposed approach for both a hybrid-closure design, and an alternate closure design where a transfer station has been constructed overlying the former landfill areas.

HYBRID LANDFILL CLOSURE DESIGN

Omni-McCann proposes to complete site-specific modified closure designs for seven of the landfills using a hybrid closure design by applying the respective standards based on the date of the landfilling; as previously noted, closure designs for Sandy Bay and Puskwaskau will be fully developed following the Code. As part of this design, areas where landfilling is confirmed to have occurred after 1996 will be closed following the design parameters from the Code (Design A) and areas where landfilling occurred solely before the Code will be closed following best management practices typically followed under the Public Health Act (Design B). A description of the cover system to be employed under each of these designs is summarized below:

- Design A (Code-based)
  - 0.6 meters of clayey barrier with $1x10^{-7}$ m/sec (or equivalent)
  - 0.35 meters of subsoil
  - 0.2 meters of topsoil
  - 5% - 30% grade
- Design B (Public Health Act-based)
  - 0.6 meters of clayey barrier with $1x10^{-7}$ m/sec (or equivalent)
  - 0.2 meters of topsoil
  - Minimum 2% grade

Figures 2 through **10** (**Appendix A**) identifying the landfill boundary, existing topographic contours, and anticipated extent of waste for each of the nine landfill sites to be closed under the landfill closure stream. The blue hatched areas shown on the figures is the anticipated extent of waste disposal placed after the Code and would follow Design A. The red hatched area is the anticipated extent of waste disposal before the Code and would follow Design B.

In addition to the above design commentary, Omni-McCann has addressed several questions raised during the April 9, 2025 meeting below for clarity.

Overlapping Waste Disposal Periods

In instances where waste may have been disposed of both before and after the Code came into effect, Design A will be followed as part of the closure process.

Transition Areas

In areas where waste disposal occurring before the Code is located directly adjacent to, but distinct from areas where waste disposal occurred after the Code, Design A is to be followed across the entire footprint of the applied waste, with any tapering of cover thickness or reductions in grading occurring solely over the wastes disposed of before the Code was implemented.

ALTERNATE DESIGN FOR CLOSURE ON SITE WITH TRANSFER STATION

Several of the landfills under review currently operate with existing transfer stations situated on top of the historical waste footprint, as outlined in green in **Figures 2** through **10** (**Appendix A**). In these cases, removal of the infrastructure to install a conventional engineered final cover system is not feasible without significant operational disruptions and costs.

As a more practical and equally protective approach, we propose an alternate closure design that utilizes the Rational Method (or equivalent methods) to demonstrate equivalency in surface runoff characteristics between a compacted gravel surface and a topsoil cover, along with proposing a slope of approximately 2%. Due to the high compaction and limited infiltration capacity of the gravel, the runoff coefficients are anticipated to be comparable to those of topsoil under typical precipitation events. This approach provides a technically sound justification for retaining the current surface material while still meeting the closure objectives related to runoff management and minimizing environmental impact.

As part of this design, a reduced subsoil layer may be present relative to that typical of a Code-compliant cover design (Design A above). The subsoil layer (0.35 m) is primarily included to serve as a protective buffer for the underlying low-permeability clayey barrier, specifically guarding against root intrusion from vegetative cover or activities that may disturb surficial soils (e.g., cultivating of agricultural fields). As the proposed alternate design for transfer stations will consist of compacted gravel rather than topsoil and vegetation, effectively eliminating the potential for root growth, a reduction in subsoil thickness would not be expected to increase the potential for damages to the clayey barrier provided gravel of an adequate thickness (minimum 0.3 m proposed granular base course) is maintained at the site as part of the Post-Closure Plan.

CLOSING

This letter report has been prepared to provide a summary of the proposed modified closure approach for AEPA's consideration in relation to legacy landfill sites. Omni-McCann appreciates AEPA's continued engagement on this matter and welcomes the opportunity to further discuss these proposed options in detail as part of the ongoing closure planning process.

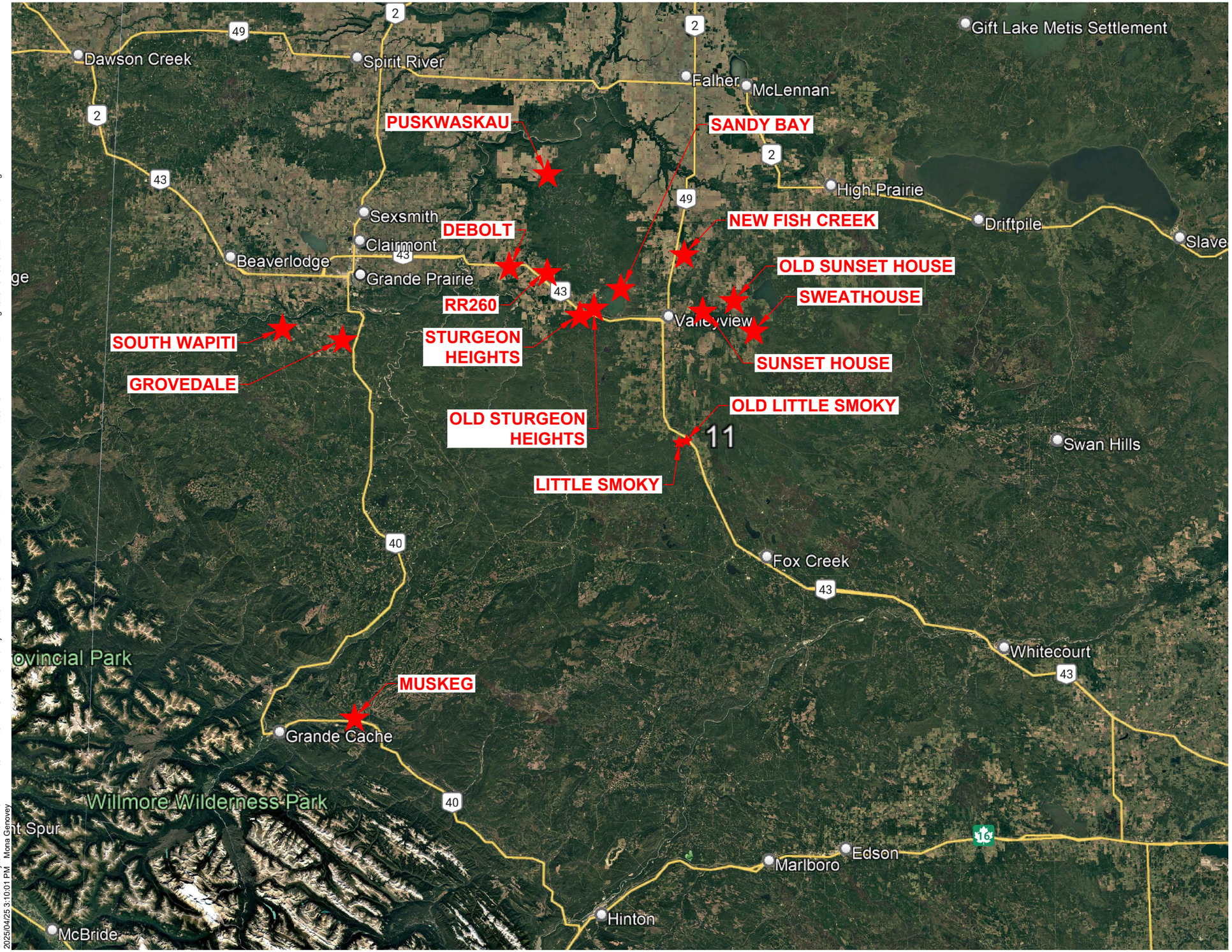
Yours Truly,
Omni-McCann Inc.

Grant Barker, P. Geo.

Jaclyn Lesko, P.Tech, P.Eng.

APPENDIX A

Figures



IMAGERY SOURCE AND DATE: GOOGLE EARTH 12/31/2020

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M.D. OF GREENVIEW No. 16

PROJECT NO. 0231-0100

M.D. OF GREENVIEW, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

APRIL, 2025

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★ SITE LOCATIONS

FIGURE 1
SITE LOCATIONS

Omni-McCann

SW 16-71-23 W5

GOVERNMENT ROAD ALLOWANCE

NW 9-71-23 W5

ROAD PLAN 842 2075
TOWNSHIP ROAD 711A

NW 9-71-23 W5

STURGEON LAKE I.R. 154A

M.D. OF GREENVIEW No. 16
SANDY BAY CLASS II LANDFILL

0231-0100

N.W. 9-71-23-W5M, SANDY BAY, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

APRIL, 2025

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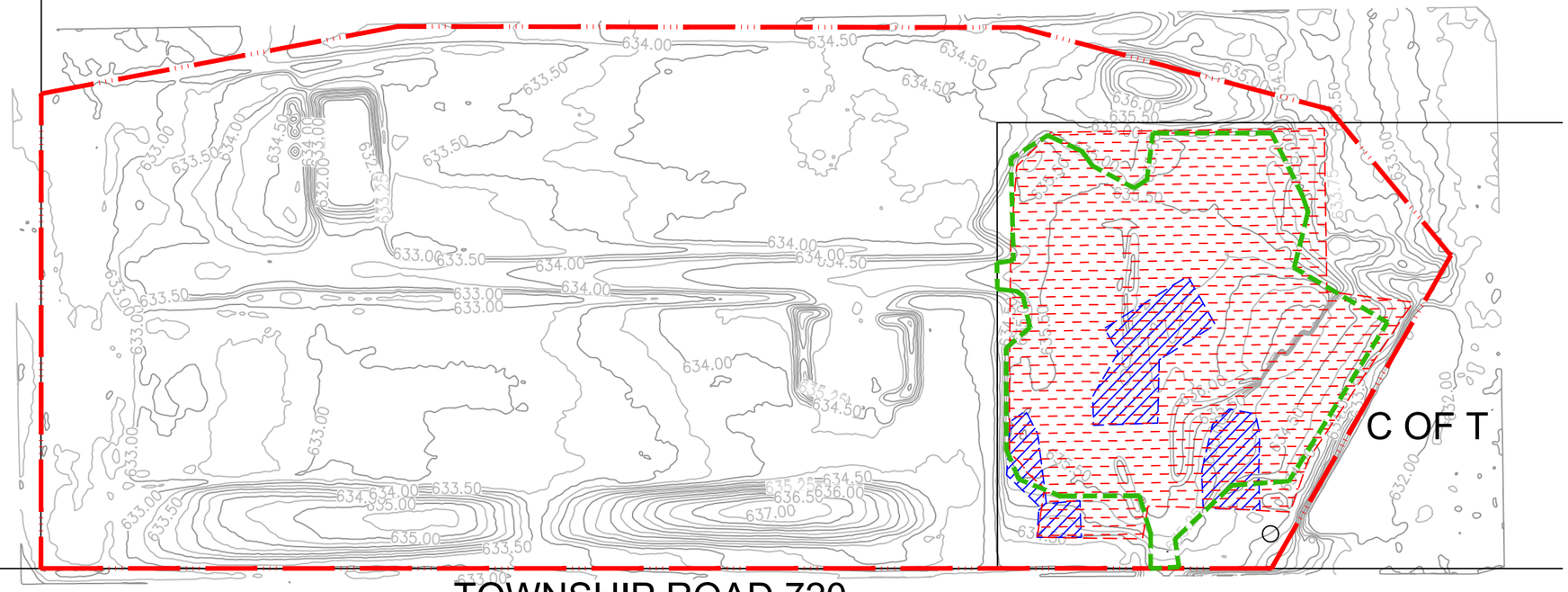
- 705.00 EXISTING GROUND LIDAR CONTOURS BY VENTUS SEPT., 2024
- ANTICIPATED EXTENT OF WASTE DISPOSAL PRIOR TO CODE OF PRACTICE
- ANTICIPATED EXTENT OF WASTE DISPOSAL POST CODE OF PRACTICE

FIGURE 2
CLASS II LANDFILL

Omni-McCann

SW 2-72-1-W6

SE 2-72-1-W6



TOWNSHIP ROAD 720

NW 35-71-1-W6

NE 35-71-1-W6

M.D. OF GREENVIEW No. 16
DeBOLT CLASS II LANDFILL

0231-0100

SE 2-72-1-W6M, DeBOLT, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

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- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 3

APPOX. LOCATION OF EXISTING TRANSFER STATION / CLASS II LANDFILL

Omni-McCann

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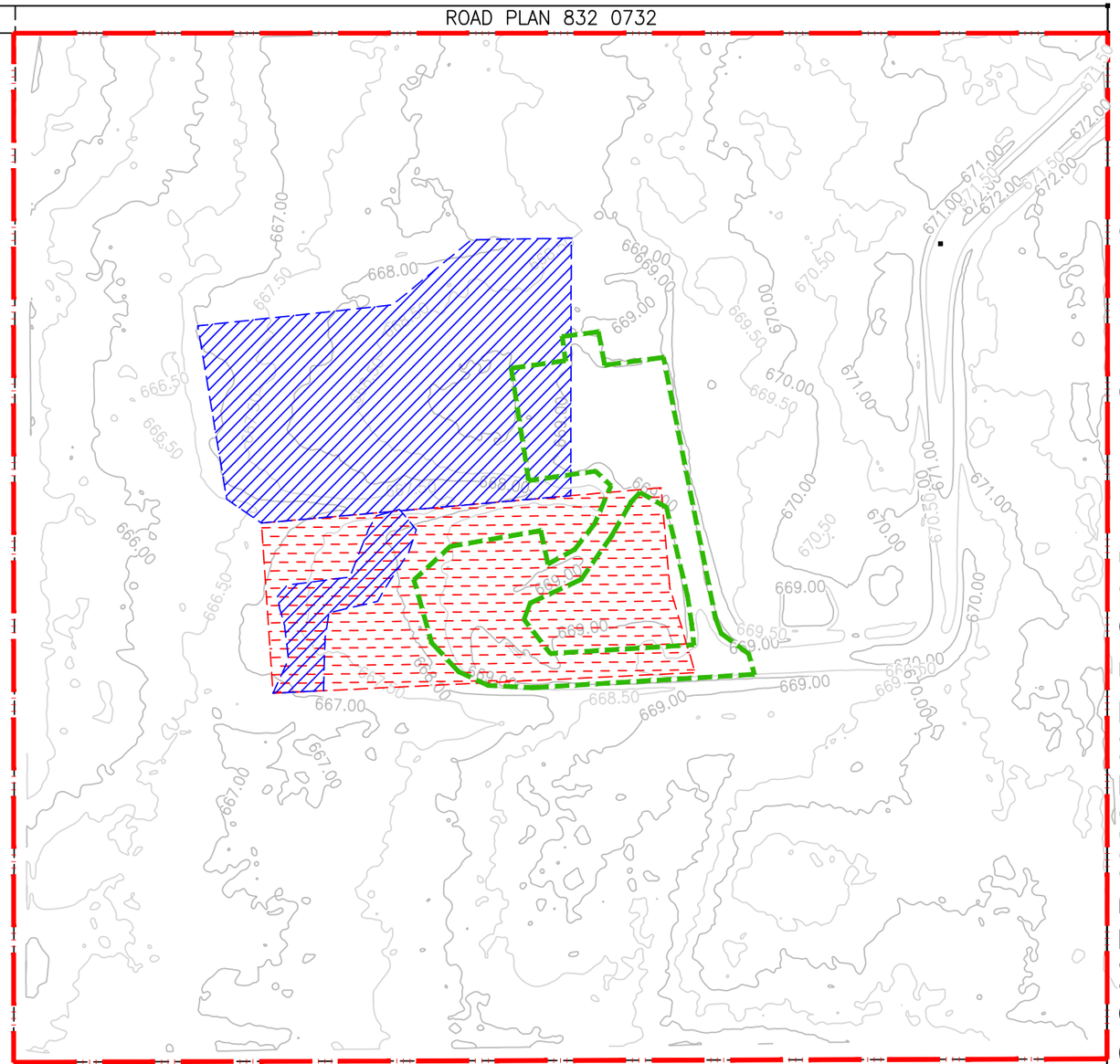
HIGHWAY 676

ROAD PLAN 832 0732



GOVERNMENT ROAD ALLOWANCE

NW 31-74-25

NE 36-74-26 W5

CROWN LAND

M.D. OF GREENVIEW No. 16
PUSKWASKAU CLASS II LANDFILL

0231-0100

N.E. 36-74-26-W5M, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

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- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 4

APPROX. LOCATION OF EXISTING TRANSFER STATION

Omni-McCann

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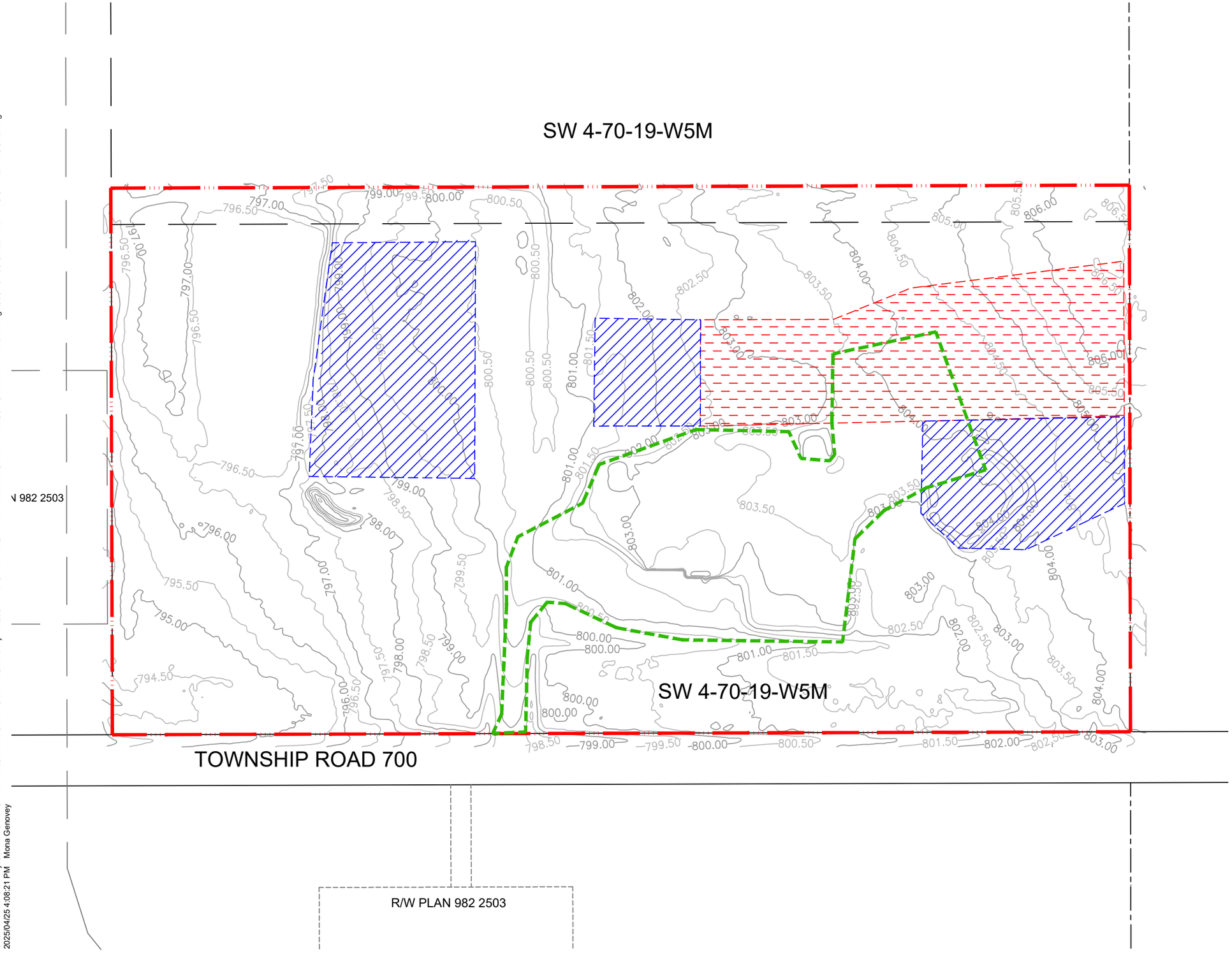
SW 4-70-19-W5M



M.D. OF GREENVIEW No. 16
SWEATHOUSE CLASS II LANDFILL

0231-0100

S.W. 4-70-19-W5M, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

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- ANTICIPATED EXTENT OF WASTE DISPOSAL POST CODE OF PRACTICE
- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 5

APPOX. LOCATION OF EXISTING TRANSFER STATION

Omni-McCann

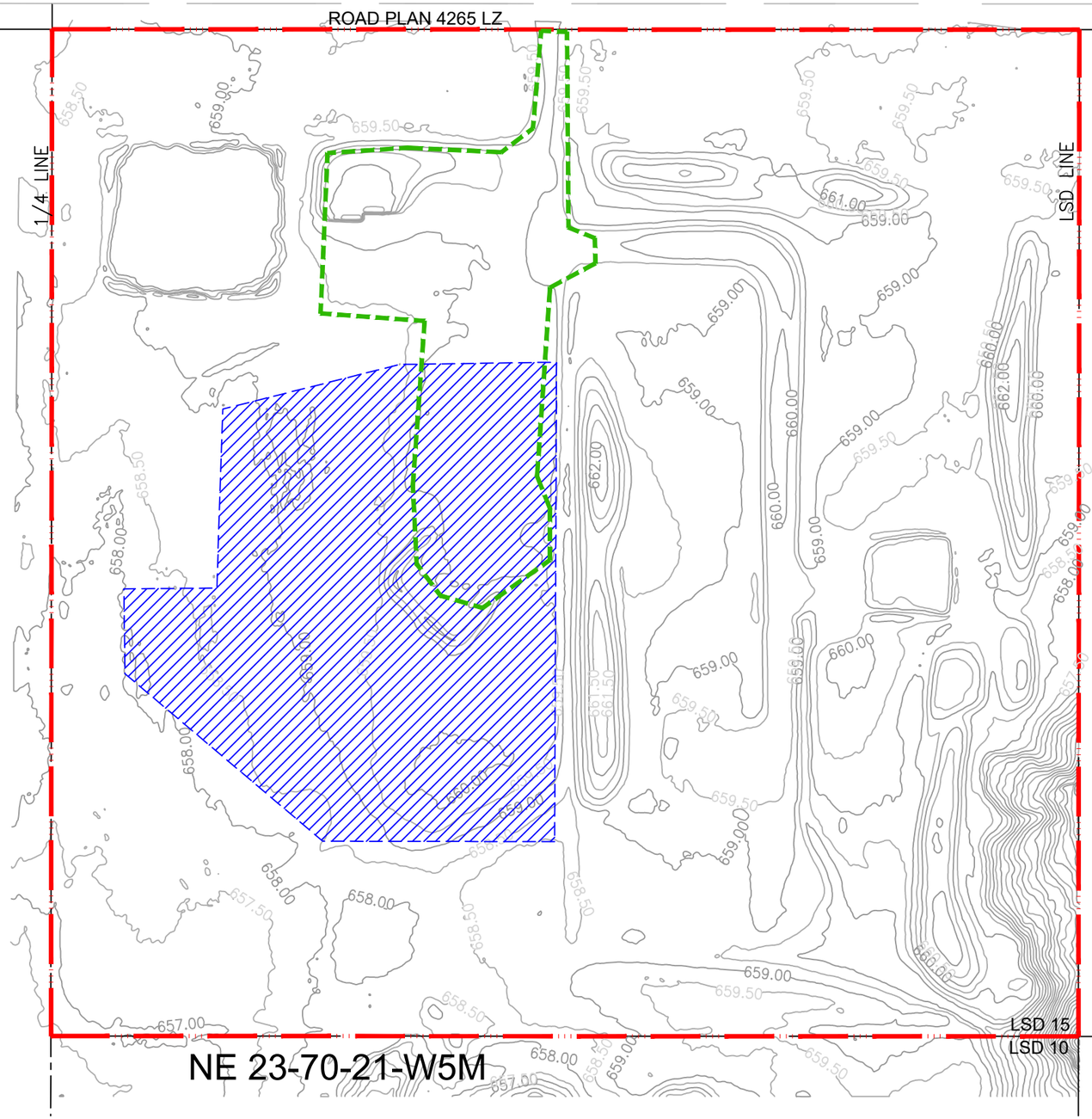
SE 26-70-21-W5M

HWY. 669

ROAD PLAN 4265 LZ

1/4 LINE

LSD LINE



LSD 15 LSD 16
LSD 10 LSD 9

NE 23-70-21-W5M

M.D. OF GREENVIEW No. 16
SUNSET HOUSE CLASS II LANDFILL

0231-0100

N.E. 23-70-21-W5M, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

APRIL, 2025

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- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 6

APPOX. LOCATION OF EXISTING TRANSFER STATION / CLASS II LANDFILL

Omni-McCann

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SW 24-66-22-W5M

PIPELINE RW PLAN 232 1363

ROAD PLAN 232 2748

TOWNSHIP ROAD 664A

LOT 1
BLOCK 1
PLAN 142 2071

PIPELINE RW 982 0987

NW 13-66-22-W5M

NW 13-66-22-W5M

PIPELINE RW PLAN 232 1363

M.D. OF GREENVIEW No. 16
LITTLE SMOKY CLASS II LANDFILL

0231-0100

N.W. 13-66-22-W5M, LITTLE SMOKY, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

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- ANTICIPATED EXTENT OF WASTE DISPOSAL POST CODE OF PRACTICE
- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 7
APPOX. LOCATION OF
EXISTING TRANSFER STATION

Omni-McCann

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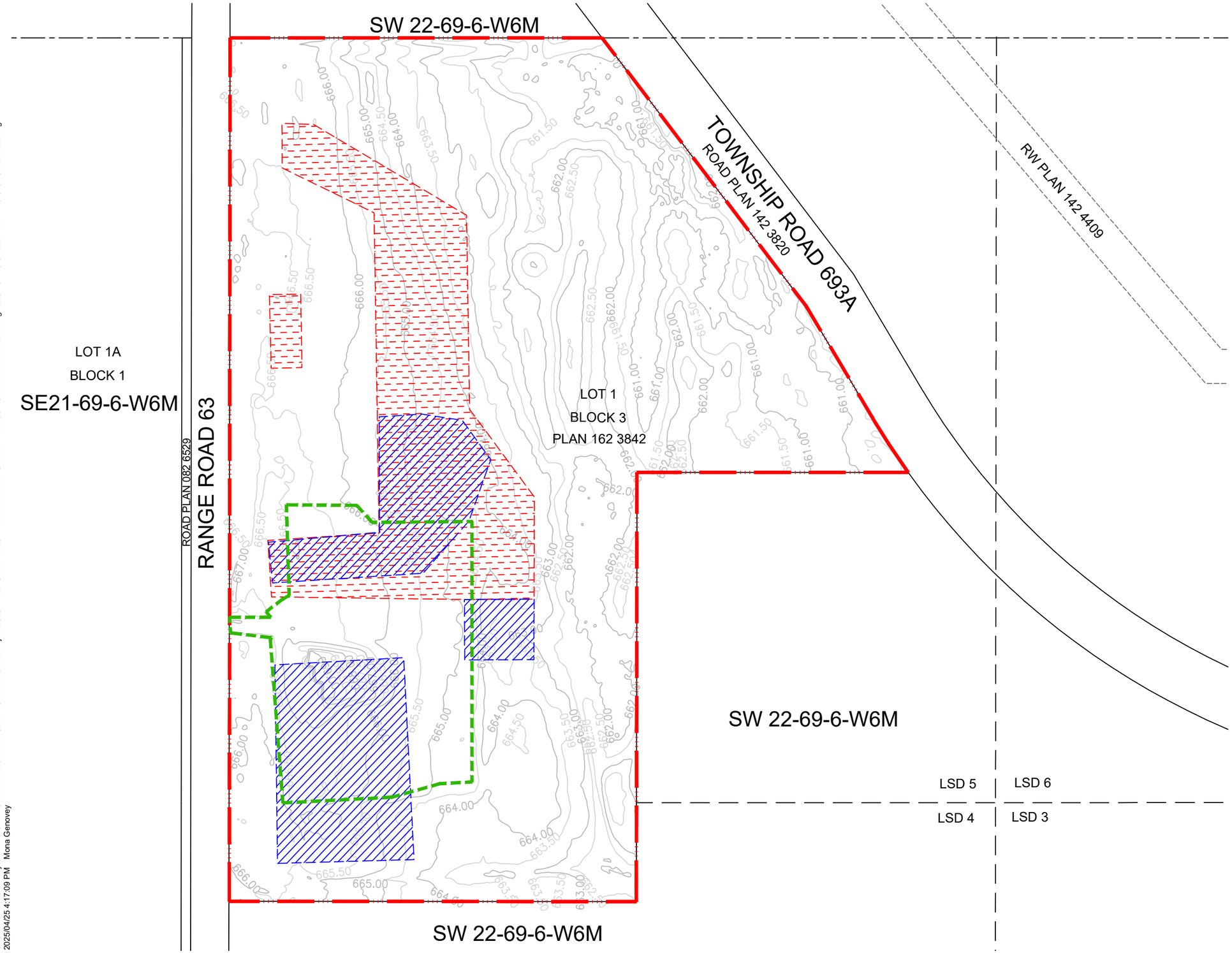
M.D. OF GREENVIEW No. 16
GROVEDALE CLASS II LANDFILL

0231-0113

S.W. 22-69-6-W6M, GROVEDALE, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

APRIL, 2025



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- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 8

APPROX. LOCATION OF EXISTING TRANSFER STATION

Omni-McCann

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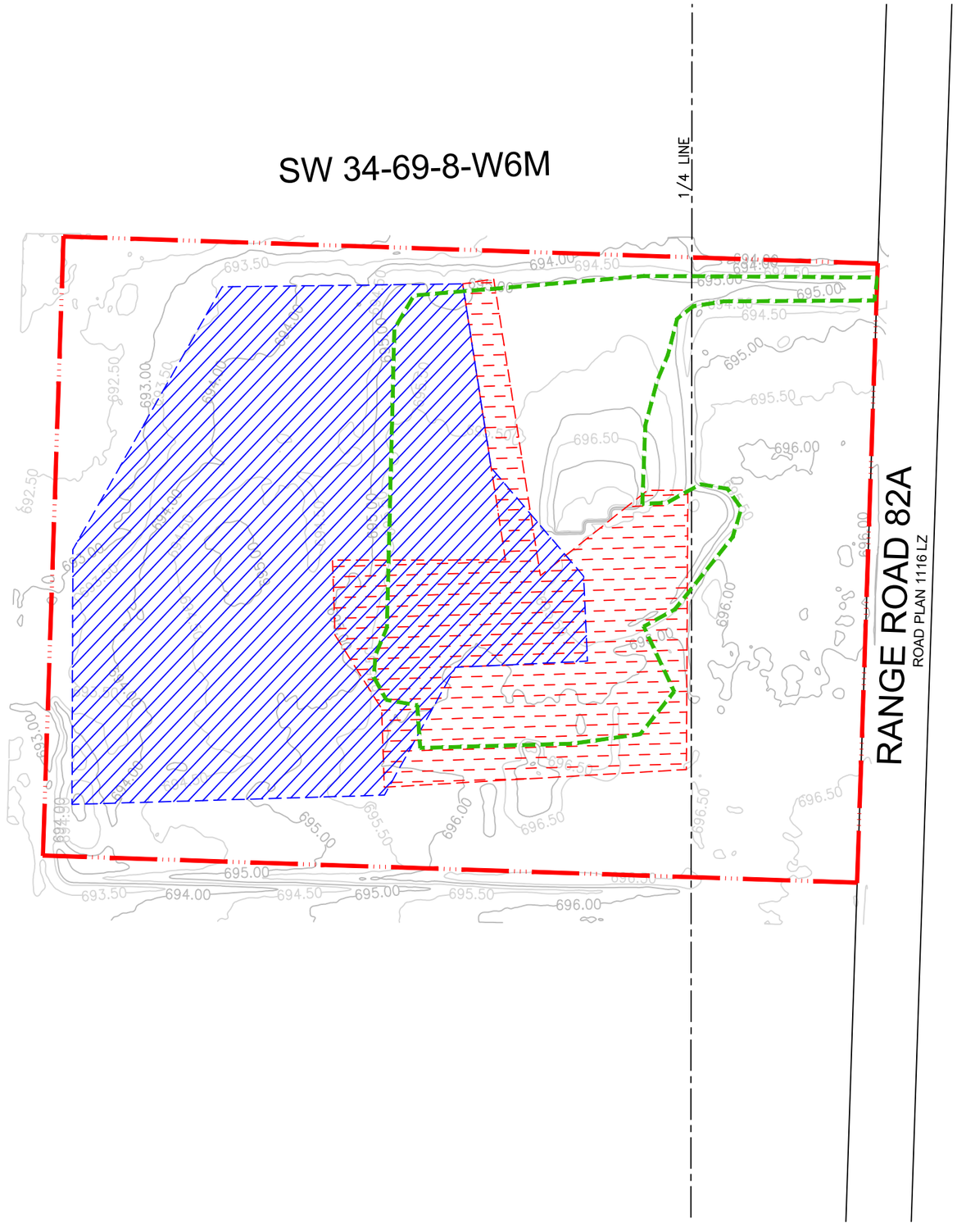

M.D. OF GREENVIEW No. 16
SOUTH WAPITI CLASS II LANDFILL

0231-0114

S.W. 34-69-8-W6M, WAPITI, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

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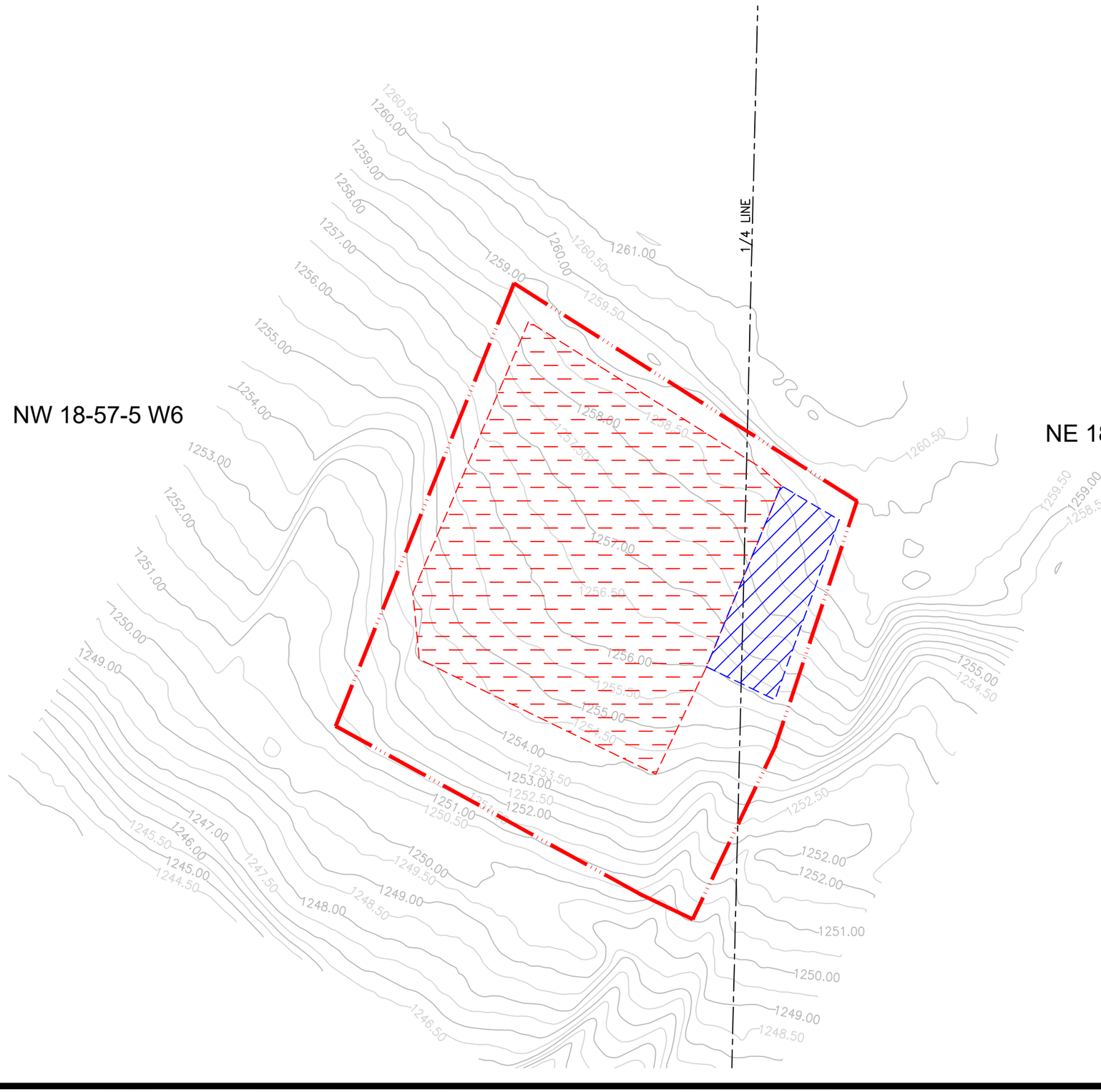
- APPROXIMATE LOCATION OF EXISTING TRANSFER STATION/ CLASS II LANDFILL

FIGURE 9

APPROX. LOCATION OF EXISTING TRANSFER STATION

Omni-McCann



M.D. OF GREENVIEW No. 16
MUSKEG RIVER CLASS II LANDFILL

0231-0116

N.W. AND N.E. 18-57-5-W6M, AB.

RETIRED LANDFILL CLOSURE ENGINEERING SERVICES

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- ANTICIPATED EXTENT OF WASTE DISPOSAL POST CODE OF PRACTICE

FIGURE 10
CLASS II LANDFILL

Omni-McCann