Notice of Alteration Form

Manitoba Sustainable Development

Client File No. : 4522.10	Environment Act Licence No. : 2473 RR

Legal name of the Licencee: Rural Municipality of Gimli

Name of the development: Gimli Lagoon Decommissioning Biosolids Land Application

Category and Type of development per Classes of Development Regulation:

Waste Treatment and Storage — Biosolids application

Licencee Contact Person: Darcy Hjelmeland

Mailing address of the Licencee: 62 2nd Avenue, P.O. Box 1246

City: Gimli Province: Manitoba Postal Code: R0C 1B0

Phone Number: (204) 642-6658 Fax: Email: Dhjelmeland@rmgimli.com

Name of proponent contact person for purposes of the environmental assessment (e.g. consultant):

Dana Bredin

Phone: (204) 479-0014 Fax:	Mailing address: 1600 Buffalo Pl, Winnipeg, MB R3T 6B8

Email address: dana.bredin@wsp.com

Short Description of Alteration *(max 90 characters)*:

Land application of biosolids stockpiled at the former Gimli Lagoon site.

Alteration fee attached: Yes: ☐ No: ☑

If No, please explain:

Date: 2024-08-02	Signature: [redacted] Printed name: Dana Bredin

A complete Notice of Alteration **(NoA)** consists of the following components:

- ☑ **Cover letter**
- ☑ **Notice of Alteration Form**
- ☑ **2 hard copies and 1 electronic copy of the NoA detailed report** (see "Information Bulletin - Alteration to Developments with Environment Act Licences")
- ☐ **$500 Application fee, if applicable** (Cheque, payable to the Minister of Finance)

Submit the complete NoA to:

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

For more information:

Phone: (204) 945-8321
Fax: (204) 945-5229
http://www.gov.mb.ca/sd/eal

Note: Per Section 14(3) of the Environment Act, Major Notices of Alteration must be filed through submission of an Environment Act Proposal Form (see "Information Bulletin – Environment Act Proposal Report Guidelines")

NOTICE OF ALTERATION

TO: Agnes Wittman, Director, Environmental Approvals Branch, Manitoba Environment and Climate Change

FROM: Dana Bredin, P.Eng., WSP Canada Inc.

SUBJECT: **File No. 4522.10 – RM of Gimli, Biosolids Land Application**

DATE: **August 2, 2024**

WSP Canada Inc. (WSP) is presently engaged with the RM of Gimli to provide professional engineering services for the decommissioning of the former Gimli Lagoon and subsequent biosolids land application program. On behalf of the RM of Gimli, we are submitting a Notice of Alteration for review and approval by the Environmental Approvals Branch of Manitoba Environment and Climate Change.

We are requesting an alteration to the current Environment Act Licence (EAL) 2473RR to allow a one-time application of biosolids currently stockpiled at the former Gimli Lagoon site (SW 9-19-4-EPM). In 2021, the biosolids were removed from the former lagoon cells as part of the decommissioning works and stockpiled in the northwest cell. The biosolids have remained in place since decommissioning works were completed in fall 2021. There is approximately 8,000 to 10,000 m^3 of stockpiled biosolids.

The biosolids are to be directed to agricultural land owned by the RM of Gimli, as described in Clause 39. WSP has identified six sites (Sites A-F) within NW-13-19-3-EPM, NE-13-19-3-EPM, SW-13-19-3-EPM, SE-12-19-3-EPM, NW-7-19-4-EPM, and SW-7-19-4-EPM. Refer to the attached *Drawing CL100 – Biosolids Hauling Plan*. On Drawing CL100, WSP has identified setbacks, as described in Clause 42, where biosolids cannot be applied. Furthermore, part of Site B is within the 1 km setback from a residential area (Aspen Park) and no biosolids will be applied on this site.

As part of the land application process, WSP has previously completed the following:

- A composite sample of the stockpiled biosolids (sample date of September 21, 2023).
- Eight soil samples within the six sites (sample date of September 20, 2023).
- Notification to the Director the intention to apply the biosolids in 2024 (email on February 28, 2024).
- Notification of the public of the intention to apply the biosolids in 2024 (advertisement on February 28, 2024).

The RM of Gimli has engaged Assiniboine Injections (contractor) to haul, spread, and incorporate the biosolids as described in the EAL. Assiniboine Injections is seeking to apply the biosolids to Sites C and D as soon as possible, which are currently uncultivated. The remaining biosolids will be applied to the remaining sites, as applicable, once the crop has been harvested.

Prior to the application, WSP will complete and submit the following to MB Environment and Climate Change:

- A composite sample of the stockpiled biosolids.
- Soil sampling of the sites where the biosolids will be applied.
- Field prescription rates.

The RM of Gimli and WSP intend to complete the required monitoring and reporting requirements as outlined in Clauses 49-53.

Finally, it is important to note that the funding to complete this work will expire at the end of 2024. WSP looks forward to your timely response on this matter. If you have any questions or require further information, please contact the undersigned.

[redacted]

Dana Bredin, P.Eng.
Project Manager

Attachments:

- EAL 2473RR
- DWG CL100 – Biosolids Hauling Plan
- Biosolids test results (sample date of September 21, 2023).
- Soil test results (sample date of September 20, 2023).
- Soil sampling location map.

APPENDIX

A ENVIRONMENT ACT LICENCE

Manitoba
Environment, Climate and Parks
Environmental Approvals Branch
1007 Century Street, Winnipeg MB R3H 0W4
T 204 945-8321 F 204 945-5229
www.gov.mb.ca/sd

File No.: 4522.10

July 27, 2022

Kelly Cosgrove
Chief Administrative Officer
Rural Municipality of Gimli
Box 1246 – 62 2nd Avenue, Gimli MB R0C 1B0
kcosgrove@rmgimli.com

Dear Kelly Cosgrove:

Re: Environment Act Licence No. 2473 RR

Enclosed, Environment Act Licence No. 2473 RR is issued to the Rural Municipality of Gimli. The licence is to build and operate a three-cell biosolids storage pond and apply biosolids on agricultural lands in the Rural Municipality of Gimli.

The Rural Municipality of Gimli must operate the development according to all licence requirements and applicable federal, provincial, and municipal regulations and by-laws.

The Director of Environmental Approvals must approve any alterations to the development as licensed before any work occurs.

Anyone affected by the issuance of this licence may appeal the decision to the Minister of Environment, Climate and Parks. If you wish to appeal, please send your reasons, in writing, to the Minister's attention by August 25, 2022 [30 days from the letter date].

If you have any questions regarding this approval, please contact Tyler Kneeshaw, Regional Supervisor, Environmental Compliance and Enforcement Branch at EnvCEInterlake@gov.mb.ca or 204-239-3608.

Sincerely,

Original signed by,

James Capotosto
Director

Enclosure

c. Dana Bredin, P.Eng. - WSP Canada Inc.
Jason Bunn, P.Eng. - WSP Canada Inc.
Darren Keam, P.Ag. - WSP Canada Inc.
Dick Menon, P.Eng. - RM. of Gimli
Kristal Harman, Yvonne Hawryliuk, Tyler Kneeshaw - Environmental Compliance and Enforcement
Siobhan Burland Ross, Bereket Assefa - Environmental Approvals
Public Registry

THE ENVIRONMENT ACT
LOI SUR L'ENVIRONNEMENT

Manitoba

LICENCE

File No. 4522.10

Licence No. / Licence n°: 2473 RR
Issue Date / Date de délivrance: September 7, 2000
Revised: January 20, 2003
Revised: July 27, 2022

In accordance with The Environment Act (C.C.S.M. c. E125)
Conformément à la Loi sur l'environnement (C.P.L.M. c. E125)

Pursuant to Section 11(1) / Conformément au Paragraphe 11(1)

THIS LICENCE IS ISSUED TO: / CETTE LICENCE EST DONNÉÉ À:

RURAL MUNICIPALITY OF GIMLI; "the Licensee"

for the construction and operation of the development being a three-cell biosolids storage pond on portions of SW 10-21-03 EPM, as shown in Figure 1 attached to this Licence, providing a total storage capacity for 13,740 cubic metres of biosolids generated from the Gimli wastewater treatment plant, and application of the biosolids onto lands within sections 12-19-03 EPM, 13-19-03 EPM, 07-19-04 EPM and 18- 19-04 EPM in the Rural Municipality of Gimli in accordance with the Proposal filed under The Environment Act on April 11, 2000 as amended on April 18, 2000, subsequent notice of alteration filed June 13, 2018, and additional information submitted October 23, 2019, June 19, 2020 and March 25, 2021, and subject to the following specifications, limits, terms and conditions:

DEFINITIONS

In this Licence,

"accredited laboratory" means a laboratory accredited by the Standards Council of Canada (SCC), another accrediting agency recognized by Manitoba Environment, Climate and Parks to be equivalent to the SCC, or at a laboratory which can demonstrate to Manitoba Environment, Climate and Parks that it has the quality assurance/quality control (QA/QC) procedures in place equivalent to accreditation based on the international standard ISO/IEC 17025, or otherwise approved by the director;

"affected area" means a geographical area, excluding the property of the development;

"anaerobic digestion" means the degradation of organic matter brought about through the action of microorganisms in the absence of elemental oxygen;

"approved" means approved by the director, or an assigned environment officer, in writing;

"aquifer" means a water saturated geologic unit that will yield water to wells or springs at a sufficient rate so that the wells or springs can serve as practical sources of water supply;

"biosolids" means accumulated organic solids, resulting from wastewater treatment processes, that have received adequate treatment to permit the material to be recycled;

"director" means an employee so designated pursuant to The Environment Act;

"environment officer" means an employee so designated pursuant to The Environment Act;

"first order waterway" means a drain or watercourse serving a watershed with a drainage area of up to one square mile;

"flooding" means the flowing of water onto lands, other than waterways, due to the overtopping of a waterway or waterways;

"fourth order waterway" means a drain or watercourse formed at the point of confluence of at least two third order waterways and may have tributaries of the third order and lower;

"leachate" means liquid that has percolated through biosolids/sludge, and that contains dissolved and suspended materials from the biosolids/sludge;

"NIST" means the National Institute of Standards and Technology;

"noise nuisance" means an unwanted sound, in an affected area, which is annoying, troublesome, or disagreeable to a person:

a) residing in an affected area;
b) working in an affected area; or
c) present at a location in an affected area which is normally open to members of the public;
d) if the unwanted sound:
    i) is the subject of at least 5 written complaints, received by the director in a form satisfactory to the director and within a 90-day period, from 5 different persons falling within clauses a), b) or c), who do not live in the same household; or
    ii) is the subject of at least one written complaint, received by the director in a form satisfactory to the director, from a person falling within clauses a), b) or c) and the director is of the opinion that if the unwanted sound had occurred in a more densely populated area there would have been at least 5 written complaints received within a 90-day period, from 5 different persons who do not live in the same household;

"odour nuisance" means a continuous or repeated odour, smell or aroma, in an affected area, which is offensive, obnoxious, troublesome, annoying, unpleasant or disagreeable to a person:

a) residing in an affected area;
b) working in an affected area; or
c) present at a location in an affected area which is normally open to members of the public;
d) if the odour, smell or aroma:

i) is the subject of at least 5 written complaints, received by the director in a form satisfactory to the director and within a 90-day period, from 5 different persons falling within clauses a), b) or c), who do not live in the same household; or
ii) is the subject of at least one written complaint, received by the director in a form satisfactory to the director, from a person falling within clauses a), b) or c) and the director is of the opinion that if the odour, smell or aroma had occurred in a more densely populated area there would have been at least 5 written complaints received within a 90-day period, from 5 different persons who do not live in the same household;

"plant-available nitrogen" means nitrogen which is readily available to plants by uptake through the roots and is determined by adding 20 percent of the organic nitrogen (as nitrogen), 100 percent of the ammonia (as nitrogen) and 100 percent of the nitrate (as nitrogen);

"reference material" means soil or biosolids material which is used as a reference;

"reference value" means the value established by the agency that supplied the reference material;

"second order waterway" means a drain or watercourse servicing a watershed with a drainage area greater than one square mile or having a tributary or tributaries which are first order waterways;

"sludge" means accumulated solid material containing large amounts of entrained water, which has separated from wastewater during processing;

"sludge solids" means solids in sludge;

"Standard Methods for the Examination of Water and Wastewater" means the most recent edition of Standard Methods for the Examination of Water and Wastewater published jointly by the American Public Health Association, the American Waterworks Association and the Water Environment Federation;

"third order waterway" means a drain or watercourse formed at the point of confluence of a least two second order waterways and may have tributaries of the second order and lower;

"waste disposal ground" means an area of land designated by a person, municipality, provincial government agency, or crown corporation for the disposal of waste and approved for use in accordance with the Waste Management Facilities Regulation, or any future amendments thereto, or a licence pursuant to The Environment Act;

"wastewater" means the spent or used water of a community or industry which contains dissolved and suspended matter; and

"water table" means the upper surface of the zone of saturation of a water bearing geologic unit.

GENERAL TERMS AND CONDITIONS

This section of the Licence contains requirements intended to provide guidance to the Licensee in implementing practices to ensure that the environment is maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for present and future Manitobans.

Copy of Licence

1. The Licensee shall at all times maintain a copy of this Licence at the development or at the premises from which the development's operations are managed.

Future Sampling

2. In addition to any of the limits, terms and conditions specified in this Licence, the Licensee shall, upon the request of the director:
   a) sample, monitor, analyze and/or investigate specific areas of concern regarding any segment, component or aspect of pollutant storage, containment, treatment handling, disposal or emission systems, for such pollutants or ambient quality, aquatic toxicity, leachate characteristics and discharge or emission rates, for such duration and at such frequencies as may be specified;
   b) determine the environmental impact associated with the release of any pollutant(s) from the development;
   c) conduct specific investigations in response to the data gathered during environmental monitoring programs; or
   d) provide the director, within such time as may be specified, with such reports, drawings, specifications, analytical data, descriptions of sampling and analytical procedures being used, bioassay data, flow rate measurements and such other information as may from time to time be requested.

3. The Licensee shall, unless otherwise specified in this Licence:
   a) carry out all preservations and analyses of liquid samples in accordance with the methods prescribed in the Standard Methods for the Examination of Water and Wastewater or in accordance with equivalent preservation and analytical methodologies approved by the director;
   b) carry out all sampling of, and preservation and analyses on biosolids, soil, compost, and air samples in accordance with methodologies approved by the director;
   c) have all analytical determinations undertaken by an accredited laboratory; and
   d) report the results to the director, in writing and in an electronic format acceptable to the director, within 60 days of the samples being taken.

Reporting Format

4. The Licensee shall submit all information required to be provided to the director or environment officer under this Licence, in writing, in such form (including number of copies), and of such content as may be required by the director or environment officer, and each submission shall be clearly labelled with the Licence Number and File Number associated with this Licence.

Equipment Breakdown or Process Upset

5. The Licensee shall, in the case of physical or mechanical equipment breakdown or process upset where such breakdown or process upset results or may result in the release of a pollutant in an amount or concentration, or at a level or rate of release, that causes or may cause a significant adverse effect, immediately report the event by calling 204-944-4888 (toll-free 1-855-944-4888). The report shall indicate the nature of the event, the time and estimated duration of the event and the reason for the event.

6. The Licensee shall, following the reporting of an event pursuant to Clause 5,
   a) identify the repairs required to the mechanical equipment;
   b) undertake all repairs to minimize unauthorized discharges of a pollutant;
   c) complete the repairs in accordance with any written instructions of the director; and
   d) submit a report to the director about the causes of breakdown and measures taken, within one week of the repairs being done.

SPECIFICATIONS, LIMITS, TERMS AND CONDITIONS

7. The Licensee shall, during construction and operation of the development, report spills of fuels or other contaminants to an environment officer in accordance with the requirements of the Environmental Accident Reporting Regulation or any future amendment thereof.

8. The Licensee shall not cause or permit a noise nuisance to be created as a result of the construction, operation, or alteration of the development, and shall take such steps as the director may require to eliminate or mitigate a noise nuisance.

9. The Licensee shall not cause or permit an odour nuisance to be created as a result of the construction, operation, or alteration of the development, and shall take such steps as the director may require to eliminate or mitigate an odour nuisance.

10. The Licensee shall actively participate in any future watershed-based management study, plan or nutrient reduction program, approved by the director, for the Icelandic/Willow Creek Watershed and associated waterways and watersheds.

Construction – Biosolids Storage Pond – General

11. The Licensee shall notify the assigned environment officer not less than two weeks prior to beginning construction of the cells of the biosolids storage pond as identified in Figure 1 of this Licence. The notification shall include the intended starting date(s) of construction and the name(s) of the contractor(s) responsible for the construction.

12. The Licensee shall locate all fuel storage and equipment servicing areas established for the construction and operation of the development a minimum distance of 100 metres from any waterbody, and shall comply with the requirements of the Storage and Handling of Petroleum Products and Allied Products Regulation or any future amendment thereof.

13. The Licensee shall dispose of non-reusable construction debris from the development at a waste disposal ground operating under the authority of a permit issued pursuant to the Waste Management Facilities Regulation, or any future amendment thereof, or a Licence issued pursuant to The Environment Act.

14. The Licensee shall, during construction and maintenance of the development, prevent the introduction and spread of foreign aquatic and terrestrial biota by cleaning equipment prior to its delivery to the site of the development in accordance with the requirements of the Aquatic Invasive Species Regulation, or any future amendment thereof.

15. The Licensee shall:
    a) conduct all ditch related work activities during no flow or dry conditions and not during the April 1 to June 15 fish spawning and incubation period;
    b) not construct the development during periods of heavy rain;
    c) place and/or isolate all dredged and construction material where it will not erode into any watercourse;
    d) implement effective long-term sediment and erosion control measures to prevent soil-laden runoff, and/or silt from entering any watercourse during construction and until vegetation is established;
    e) routinely inspect all erosion and sediment control structures and immediately complete any necessary maintenance or repair;
    f) revegetate soil exposed during the construction of the development with native or introduced grasses or legumes. Native species shall be used to revegetate areas where native species existed prior to construction; and
    g) use rock that is free of silt and clay for riprap.

16. The Licensee shall, during construction of the development, operate, maintain and store all materials and equipment in a manner that prevents any deleterious substances (fuel, oil, grease, hydraulic fluids, coolant, paint, uncured concrete and concrete wash water, etc.) from entering the biosolids storage pond and any nearby watercourses, and have an emergency spill kit for in water use available on site during construction.

17. The Licensee shall not alter local drainage patterns by the construction of the development.

18. The Licensee shall, prior to the construction of the dykes of the biosolids storage pond as identified in Figure 1 of this Licence:
    a) remove all organic topsoil from the area where the dykes will be constructed; and
    b) remove all organic material for a depth of 0.3 metres and a width of 3.0 metres from the area where the cut-off liner will be constructed.

19. The Licensee shall install and maintain a fence around all cells of the development to limit access. The fence shall be a minimum of 1.2 meters high and have a locking gate, which shall be locked at all times except to allow access to the cells of the biosolids pond.

20. The Licensee shall construct and maintain an all-weather access road to access the cells of the biosolids storage pond as identified in Figure 1 of this Licence.

Construction – Biosolids Storage Pond – Liner

21. The Licensee shall construct and maintain the cells of the biosolids storage pond as identified in Figure 1 of this Licence with a continuous liner under all interior surfaces of each cell in accordance with the following specifications:
    a) the liner shall be made of clay or in-situ till material;
    b) the liner shall be at least one metre in thickness;
    c) the liner shall have a hydraulic conductivity of 1×10^{-7} centimetres per second or less at all locations; and
    d) the liner of the cells of the biosolids storage pond, as identified in Figure 1 of this Licence, shall be constructed to an elevation of 0.69 metres above the base of any cells of the biosolids storage pond.

22. The Licensee shall arrange with the designated environment officer a mutually acceptable time and date for any required soil sampling between the 15th day of May and the 15th day of October of any year, unless otherwise approved by the environment officer.

23. The Licensee shall, upon the request of the director, take and test undisturbed soil samples, in accordance with the Standard Practice for Obtaining Block Samples (ASTM D70 15) from the soil liners of the cells of the biosolids storage pond; the number and location of samples and test methods to be specified by the designated environment officer up to a maximum of 10 samples per cell.

24. The Licensee shall, not less than 2 weeks before any new or upgraded clay or in-situ material-lined cells of the biosolids storage pond is placed in operation, submit for the approval of the environment officer the results of the tests carried out, in accordance with the Standard Test Method for One-Dimensional Consolidation Properties of Cohesive Soil (ASTM D4186), pursuant to Clause 23 of this Licence.

Record Drawings – Biosolids Storage Pond

25. The Licensee shall:
    a) prepare updated "record drawings" for the biosolids storage pond and shall label the drawings "record drawings"; and
    b) provide to the director, within four months of commissioning the biosolids storage, two electronic copies of the "record drawings" of the biosolids storage.

Operation – General

26. The Licensee shall obtain and maintain classification of the development pursuant to the Water and Wastewater Facility Operators Regulation or any future amendment thereof and maintain compliance with all requirements of the regulation including, but not limited to, the preparation and maintenance of a Table of Organization, Emergency Response Plan and Standard Operating Procedures.

27. The Licensee shall carry out the operation of the development with individuals properly certified to do so pursuant to the Water and Wastewater Facility Operators Regulation or any future amendment thereof.

28. The Licensee shall transport biosolids in containers in such a manner to prevent loss of biosolids and associated liquids to the satisfaction of an environment officer.

29. The Licensee shall operate and maintain the cells of the biosolids storage pond of the development as identified in Figure 1 of this Licence in such a manner that:
    a) the depth of biosolids in the cells of the biosolids storage pond of the development does not exceed 0.69 metre; and
    b) a minimum of 1.31 metre freeboard is maintained in the cells of the biosolids storage pond at all times.

30. The Licensee shall, at least thirty days prior to the commencement of removal of biosolids from the storage pond, transportation to any Licenced site, and land application of biosolids at any location(s) in any year other than 2022, provide public notice that presents information of each intended land application of biosolids that is to occur at any and all locations in that year to the satisfaction of the environment officer. For the year 2022 the Licensee shall provide the said public notice as soon as possible.

31. The Licensee shall notify the assigned environment officer not less than ten days prior to the commencement of removal, transportation and land incorporation of biosolids. The notification shall include the intended starting date of the activities and the name of the contractor responsible for the activities.

32. The Licensee shall, during removal, transportation, application, and incorporation of biosolids to land, operate, maintain and store all materials and equipment in a manner that prevents any deleterious substances (fuel, oil, grease, hydraulic fluids, coolant, paint, uncured concrete and concrete wash water, etc.) from entering the storage pond and nearby watercourses.

Operation – Records Maintenance and Reporting

33. The Licensee shall during each year maintain the following records and retain them for a minimum period of five calendar years:
    a) reports of visual inspections of the biosolids storage pond conducted at a minimum of once per month;
    b) estimated volume of biosolids hauled into the biosolids storage facility;
    c) estimated quantity of biosolids taken out of the biosolids storage facility for land application purposes;
    d) dates when the leachate collected in the holding tanks is hauled to the Gimli wastewater treatment plant;
    e) estimated volume of leachate hauled to the Gimli wastewater treatment plant;
    f) maintenance and repairs; and
    g) updated organization charts identifying all certified operators, including backup operators.

Operation – Operating Depth and Freeboard Non-Compliance Events

34. The Licensee shall immediately notify the director each time the operating depth of any cell of the biosolids storage pond does not comply with the maximum operating depth and minimum freeboard requirements for that cell as specified in Clause 29 of this approval.

35. The Licensee shall, if reporting is required pursuant to Clause 34 of this Licence in two consecutive years:
    a) engage the services of a qualified consultant, acceptable to the director, to undertake an investigation of the biosolids storage pond and related infrastructure, to determine the ability or inability of the existing system to meet the biosolids generation capacity of the Gimli wastewater treatment plant. The investigation shall include but not be necessarily limited to the following:
        i) diagnosis of the cause(s) of the recent exceedances of maximum operating depth;
        ii) current biosolids storage capacity of the system; and
        iii) operating procedures;
    b) provide to the director, within four months of the notification given pursuant to Clause 34 of this Licence, an engineering report describing in detail the results and observations concluded by virtue of the investigation; and
    c) provide to the director, within four months of the report provided pursuant to Clause b) of this section, a remedial action plan in the form of a detailed engineering report describing recommended modifications, repairs or upgrading works in order to be compliant with Clause 29 of this approval.

Operation – Land Application

36. The Licensee shall, during all biosolids land application activities, comply with the requirements of the Nutrient Management Regulation or any future amendment thereof.

37. The Licensee shall dispose of biosolids:
    a) by application to agricultural land in accordance with the requirements of this Licence; or
    b) in the event of an emergency situation and with the approval of the director, at a waste disposal ground in accordance with its permit or Licence.

38. The Licensee shall, prior to removal for application on agricultural land, subject the biosolids to aerobic digestion for a period of 25 days at a minimum temperature of 10° C and store in the biosolids storage pond for a period of 12 months, or an equivalent digestion process acceptable to the director.

39. The Licensee shall apply the biosolids only to agricultural lands owned by the Rural Municipality of Gimli located within sections 12-19-03 EPM, 13-19-03 EPM, 07-19-04 EPM, and 18-19-04 EPM in the Rural Municipality of Gimli or other adjacent or nearby areas approved by the director;

40. The Licensee shall:
    a) apply biosolids to the identified agricultural land by incorporating it into the soil a minimum of 15 centimetres below the soil surface within 48 hours of application; and
    b) complete the incorporation of the biosolids such that it is acceptable to an environment officer.

41. The Licensee shall apply biosolids such that the amounts of residual nitrate-nitrogen in the 0 - 60 centimetres soil depth and Olsen-P phosphorus in the 0 - 15 centimetres soil depth do not exceed the limits of the most limiting Nutrient Management Zone, regardless of size, set forth in the Nutrient Management Regulation under The Water Protection Act or any future amendment thereof.

42. The Licensee shall not apply biosolids:
    a) between November 10th of any year and April 10th of the following year, unless otherwise authorized in writing by the director;
    b) to frozen soil;
    c) less than 300 metres from any occupied residence (other than the residence occupied by the owner of the land on which the biosolids are to be applied);
    d) less than 1 kilometre from a residential area;
    e) less than 8 metres from a major wetland, bog, marsh or swamp;
    f) less than 15 metres from a first order waterway;
    g) less than 30 metres from a second, third or fourth order waterway and less than 90 metres from any other waterway;
    h) less than 50 metres from any groundwater well; or
    i) on land that is subject to flooding.

43. The Licensee shall not apply biosolids on land:
    a) with a depth of clay or clay till of less than 1.5 metres between the soil surface and the water table;
    b) within 100 metres of an identifiable boundary of an aquifer which is exposed to the ground surface;
    c) where, prior to the application of biosolids, the soil pH is less than 6.0;
    d) where the surface slope of the land is greater than five per cent;
    e) where, prior to the application of biosolids, the concentration of sodium bicarbonate extractable phosphorous, as P, exceeds 60 micrograms per gram in the upper 15 centimetres of the soil.

44. The Licensee shall not allow cattle to pasture on land on which biosolids have been applied, for a period of three years from the date of application of the biosolids. For application on land not owned by the Licensee, this requirement shall be included in any agreement between the Licensee and the landowner.

45. The Licensee shall, on all agricultural land onto which biosolids have been applied, plant one of the following crops at the commencement of the next growing season following such application and for a period of three years from the date of application of biosolids:
    a) a cereal crop;
    b) a forage crop;
    c) an oil seed crop;
    d) field peas; or
    e) lentils.

    For application on land not owned by the Licensee, this requirement shall be included in any agreement between the Licensee and the landowner.

46. The Licensee shall apply biosolids onto agricultural land such that the cumulative weight per hectare of each heavy metal in the soil, as calculated by adding the amount of each heavy metal in the biosolids applied to the background level of the same metal, does not exceed the following levels: *

Metal	**Kilogram per Hectare**
Arsenic	21.6
Cadmium	2.5
Chromium (total)	115.2
Copper	113.4
Lead	126
Mercury	11.9
Nickel	90
Zinc	360

***** Calculated values shall be based on a soil bulk density of 1200 kilograms per cubic metre and a soil depth of 15 centimetres. Analysis for heavy metals shall be carried out in accordance with Schedule "B" of this Licence.

MONITORING AND REPORTING SPECIFICATIONS

47. The Licensee shall submit to the director and the respective municipal authority, at least two months prior to each intended application of biosolids to land events, the legal descriptions for all land on which biosolids are to be applied in the current calendar year.

48. The Licensee shall at least two months prior to each intended application of biosolids to land events, provide a public notice to advise local residents of the location and approximate size of the land areas intended to be used as biosolids land application sites in the prevailing calendar year, to the satisfaction of the assigned environment officer.

49. The Licensee shall develop and carry out a biosolids sampling and analysis program, acceptable to the director, to determine the volume of the biosolids removed on a daily basis and the volume of biosolids applied to each field. The Licensee shall make this information available to an environment officer on request.

50. The Licensee shall conduct a monitoring and analysis program that is acceptable to the director, and in accordance with Schedules "A" and "B" of this Licence to determine:
    a) the composition of the biosolids;
    b) the background levels of selected soil parameters for each parcel of land;
    c) the surface slope of each parcel of land;
    d) the presence of clay or clay till to a depth of 1.5 metres for each parcel of land;
    e) whether metals-based, phosphorus-based, or nitrogen-based application limits are most appropriate for field-specific application rates for the lands on which the biosolids are to be applied; and
    f) the crops grown on land on which biosolids have been applied during the previous 3-year period.

51. The Licensee shall during each year maintain the following records and retain them for a minimum period of five calendar years:
    a) details of the biosolids land application programs carried out during the calendar year including:
        i) a description of each parcel of land on which biosolids were applied;
        ii) the background levels of soil parameters as listed in Schedule "A" of this Licence, for each parcel of land;
        iii) the dry weight of biosolids applied per hectare;
        iv) the weight of each heavy metal, in milligrams per kilogram of soil, added to each parcel of land for the metals listed in Schedule "A" of this Licence; and
        v) the cumulative weight, in kilograms per hectare, of each heavy metal for each parcel of land as calculated by adding the amount of each heavy metal applied to the background level of the same metal;
    b) the amount of nitrogen, phosphorus, and potassium which was added per hectare for each parcel of land;
    c) the results of analysis of the biosolids and soil required by this Licence; and
    d) a copy of the analytical procedures used and the results of analysis of reference materials in accordance with Schedule “B” of this Licence.

52. The Licensee shall undertake annual post-harvest soil testing of each field for Nitrate-N (0 – 60 centimetres) and phosphorus using the Olsen-P test (0 – 15 centimetres) for 3 years following biosolids application and maintain the records of the test results. Additionally, the Licensee shall maintain information from the producer regarding cropping and the amounts of nutrients from other sources (fertilizer, manure, etc) being added to the field and an estimate of the crop yield in kilograms per hectare.

53. The Licensee shall submit an annual report to the environment officer by March 15th of the following year including all records required by Clause 33, 51, and 52 of this Licence.

REVIEW AND REVOCATION

A. Environment Act Licence No. 2473 R is hereby rescinded.

B. If, in the opinion of the director, the Licensee has exceeded or is exceeding or has or is failing to meet the specifications, limits, terms, or conditions set out in this Licence, the director may, temporarily or permanently, revoke this Licence.

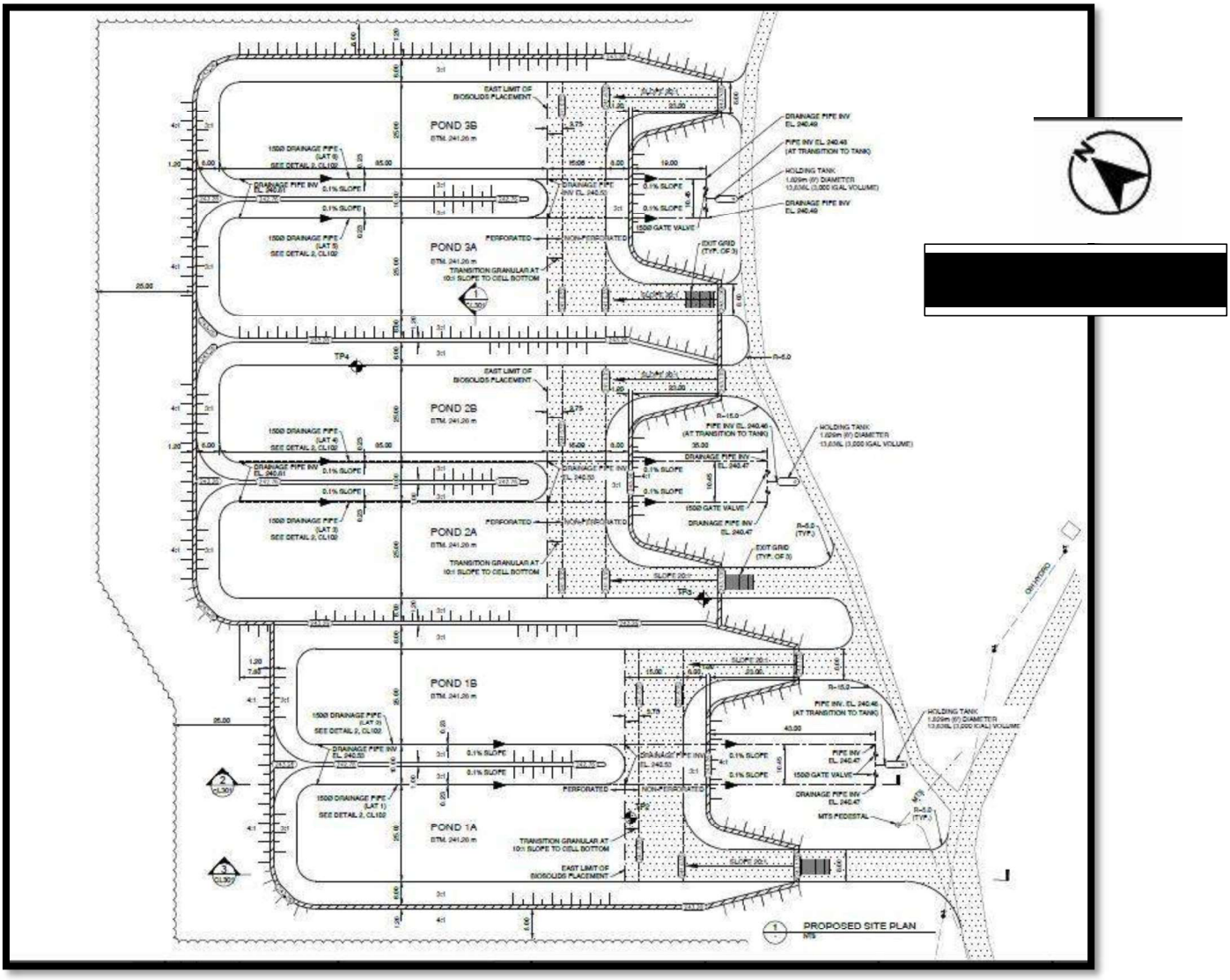
C. If, in the opinion of the director, new evidence warrants a change in the specifications, limits, terms or conditions of this Licence, the director may require the filing of a new proposal pursuant to section 11 of The Environment Act.

Original signed by,

James Capotosto
Director

Figure 1 to Environment Act Licence No. 2473 RR

Cells of the Biosolids Storage Facility (Not to Scale)



Schedule "A" to Environment Act Licence No. 2473 RR

Biosolids and Soil Sampling Requirements Pursuant to Clauses 50 and 51

Biosolids

A representative sample of biosolids shall be collected from each cell from which biosolids will be removed for land application. A representative sample of biosolids from each cell shall be a composite of biosolids samples taken from a minimum of 5 locations distributed over the area of that cell.

1. The sample of biosolids shall be analyzed for the following parameters:*

a.	conductivity	j.	lead
b.	pH	k.	mercury
c.	total solids	l.	nickel
d.	volatile solids	m.	potassium
e.	nitrate nitrogen	n.	cadmium
f.	total Kjeldahl nitrogen	o.	copper
g.	ammonia nitrogen	p.	zinc
h.	organic nitrogen	q.	chromium
i.	total phosphorus	r.	arsenic

* Analysis for heavy metals must be carried out in accordance with Schedule "B" of this Licence.

Soil

1. Composite samples from each field onto which biosolids will be applied shall be taken prior to application of biosolids. Each field of twenty-four hectares or less shall be sampled from a minimum of twelve representative sites or a minimum of one sample site per two hectares for larger fields. Each sample site shall be sampled from 0 to 15 centimetres and from 0 to 60 centimetres. The entire core extracted for each sample shall be collected. All samples from similar depths within a field shall be bulked in one container for thorough mixing prior to analysis yielding two samples per field.

2. Soil samples from 0 to 15 centimetres shall be analyzed for the following: *

a.	pH	g.	cadmium
b.	potassium	h.	chromium
c.	nickel	i.	copper
d.	mercury	j.	lead
e.	zinc	k.	arsenic
f.	sodium bicarbonate extractable phosphorus, as P		

* Analysis for heavy metals must be carried out in accordance with Schedule "B" of this Licence.

3. Soil samples from 0 to 60 centimetres shall be analyzed for the following:

a.	nitrate nitrogen	b.	total nitrogen

Crops

1. The type of crop grown on lands on which biosolids have been applied during the previous 3-year period shall be listed along with the legal description of the land and the date of application of biosolids.

Schedule "B" to Environment Act Licence No. 2473 RR

Metals Analysis Requirements Pursuant to Clauses 46, 50 and 51

The analysis for all metals shall be carried out in accordance with the following requirements:

1. The laboratory performing these analyses shall:
   a) possess and maintain accreditation with the Canadian Association for Laboratories Accreditation Inc. (CALA) and/or the Standards Council of Canada (SCC);
   b) operate a quality assurance program acceptable to the assigned environment officer;
   c) monitor the accuracy of the sludge and soil analyses for each set of ten or less samples of sludge or soil through the use of a suitable reference material acceptable to the assigned environment officer; and
   d) analyze field duplicates of samples based on a frequency of one in each set of ten or less field samples and that the acceptance criteria for duplicate analysis should be within ± 10 percent.

2. A copy of the analytical procedures and the analytical results for associated reference materials used in the laboratory, and any other controls used in the analysis, shall be submitted with the field sample results.

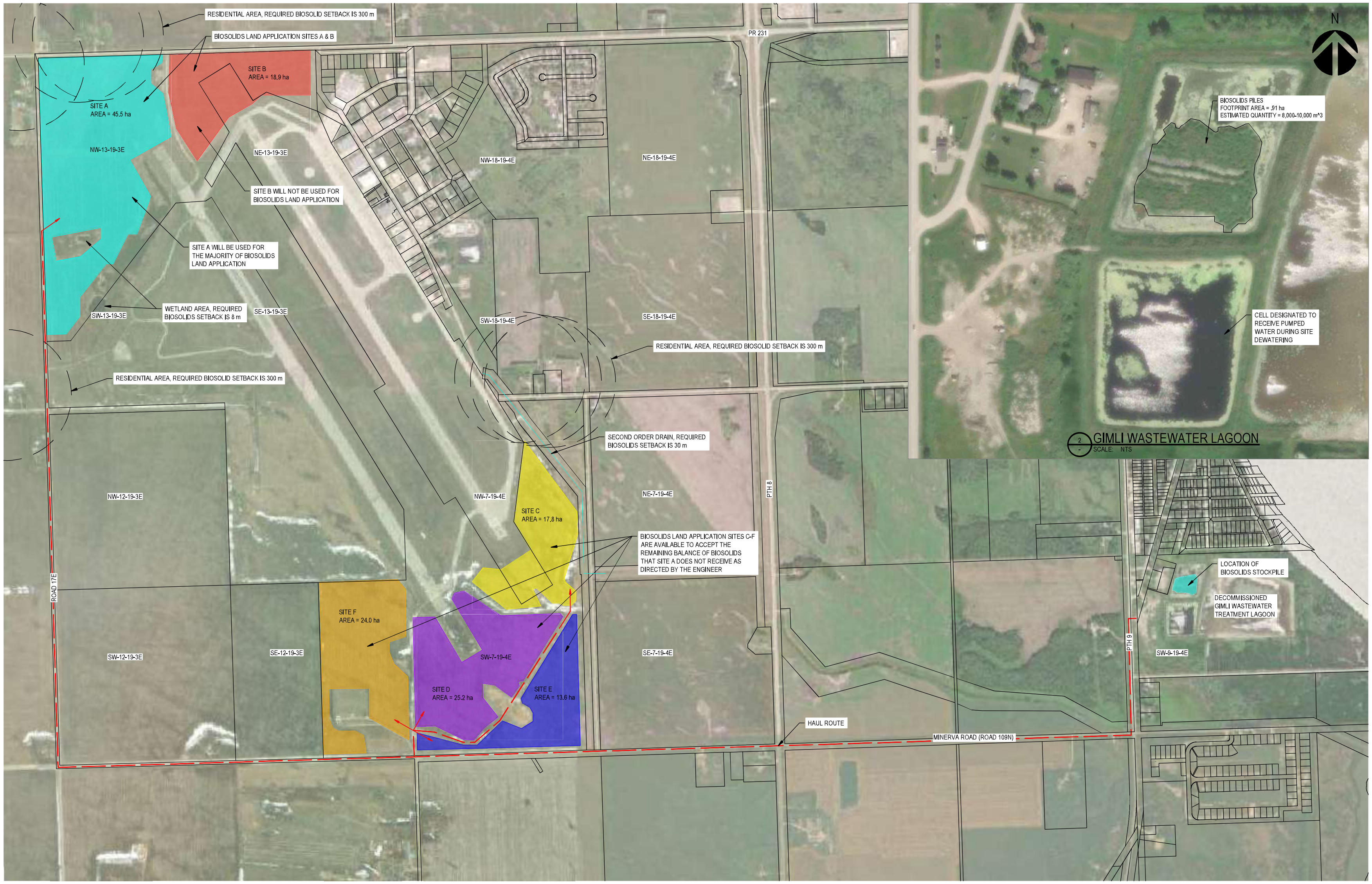
3. If the analytical results of any associated reference materials do not meet the following criteria, the soil and/or sludge samples must be re-analyzed:

- Arsenic	± 35 percent from the reference value
- Cadmium	± 25 percent from the reference value (for values above 1 µg/g)
- Cadmium	± 35 percent from the reference value (for values below 1 µg/g)
- Chromium	± 25 percent from the reference value
- Copper	± 25 percent from the reference value
- Lead	± 25 percent from the reference value
- Mercury	± 35 percent from the reference value
- Nickel	± 25 percent from the reference value
- Zinc	± 25 percent from the reference value

APPENDIX

B

BIOSOLIDS HAULING PLAN



1 BIOSOLIDS HAULING PLAN
SCALE: 1:9000

KEY NOTES:

1. LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE. NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.
2. DESCRIPTION OF PROPERTY LIMITS, AND EXISTING AND/OR PROPOSED FEATURES RELATIVE TO THESE LIMITS AS SHOWN ON THIS DRAWING DO NOT REPRESENT A LEGAL SURVEY. WSP MAKES NO REPRESENTATION OR GUARANTEE THAT THE PROPERTY LIMIT INFORMATION IS ACCURATE. WSP ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY ANY THIRD PARTY AS A RESULT OF DECISIONS OR ACTIONS BASED ON THIS DRAWING.
3. DRAWING IS IN METRIC, WHOLE NUMBERS INDICATE MILLIMETRES, AND DECIMALIZED NUMBERS INDICATE METRES.
4. BIOSOLIDS ARE CURRENTLY STOCKPILED AT THE DECOMMISSIONED GIMLI WASTEWATER TREATMENT LAGOON IN SW 9-19-4-EPM IN THE EXISTING NORTH CELL.
5. CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ALL WATER FROM THE CELL CONTAINING THE BIOSOLIDS PRIOR TO CONSTRUCTION START-UP AND DURING BIOSOLIDS REMOVAL ACTIVITIES.
6. THE HAULING AND SPREADING OF BIOSOLIDS SHALL COMPLY WITH THE REQUIREMENTS OF ENVIRONMENT ACT LICENCE #2473RR AND MAINTAIN SEPARATION FROM APPLICABLE WATERWAYS AND OTHER NOTED SETBACK DISTANCES.
7. INCORPORATION OF BIOSOLIDS MATERIAL SHALL BE COMPLETED WITHIN 48 HOURS OF SPREADING ON THE RECEIVING SITES.
8. ALL BIOSOLIDS TRANSPORTED WITHIN A WORKING SHIFT MUST BE LAND SPREAD WITHIN THE SAME SHIFT. NO STOCKPILING ON BIOSOLIDS ON AGRICULTURAL SOIL IS PERMITTED.

REV	DATE	DESCRIPTION	BY
A	2024/03/07	ISSUED FOR TENDER	DTGB

REVISION:

REV	DATE	DESCRIPTION	BY

SEAL:

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
WSP Canada Inc.
No. 5750

ORIGINAL SCALE: AS SHOWN
DATE: 2024/03/07
DESIGNED BY: D.T.G.B.
ASSISTED BY: D.T.G.B.
DRAWN BY: B.E.L.
MODIFIED BY: B.E.L.
APPROVED BY: D.T.G.B.
DISCIPLINE: INFRASTRUCTURE

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm

WSP Canada Inc.
1600 Buffalo Place, Winnipeg, Manitoba R3T 6B8
T 204-477-6650 | www.wsp.com

PROJECT NUMBER: 181-03988-00

CLIENT: RM OF GIMLI
CLIENT REF. #

TITLE: BIOSOLIDS HAULING PLAN

PROJECT: GIMLI SLUDGE STORAGE PONDS

DRAWING NUMBER: CL100
REV. A

FILE: y:\projects\2018\181-03988-00 rm of gimli sludge storage ponds & wdg (cb)\03 dwgs\02 working dwgs\01 surv - map\2023-09-19\biosolids hauling plan.dwg
CTB: wsp-c3d-black-full.ctb
PLOTTED: 2024-03-07 - 8:31 AM

APPENDIX

C

BIOSOLIDS TESTING RESULTS

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WP2324008**	Page	: 1 of 6
Amendment	: **1**		
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Winnipeg
Contact	: Darren Keam	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 21-Sep-2023 13:00
PO	: ----	Date Analysis Commenced	: 23-Sep-2023
C-O-C number	: ----	Issue Date	: 17-Oct-2023 11:44
Sampler	: ----		
Site	:		
Quote number	: 2023 Standing offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Sask Soils, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Honey Patel	Team Leader - Organics	Organics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Sask Soils, Saskatoon, Saskatchewan

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
°C	degrees celsius
dS/m	decisiemens per metre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units
t/ha	tonnes per hectare

>: greater than.
<: less than.
Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Workorder Comments

Sample(s) F1: Samples Received with temperature >10 °C in Saskatoon.

Analytical Results Evaluation

Matrix: Soil/Solid

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: GIMLI BIOSOLIDS	----	----	----	----	----	----
				Sampling date/time: 21-Sep-2023 09:50	----	----	----	----	----	----
				Sub-Matrix: Soil/Solid	----	----	----	----	----	----
				WP2324008-001	--------	--------	--------	--------	--------	--------
Sample Preparation										
Temperature, oven	----	EPP441/SK	°C	<38	----	----	----	----	----	----
Physical Tests										
Moisture	----	E144/SK	%	13.0	----	----	----	----	----	----
pH, saturated paste	----	E114/SK	pH units	7.57	----	----	----	----	----	----
TGR (brine)	----	EC106/SK	t/ha	<0.10	----	----	----	----	----	----
TGR (sodic)	----	EC106/SK	t/ha	<0.10	----	----	----	----	----	----
% Saturation	----	E141/SK	%	63.8	----	----	----	----	----	----
Particle Size										
Sand (>0.075mm)	----	E178/SK	%	3.4	----	----	----	----	----	----
Fines (<0.075mm)	----	E178/SK	%	96.6	----	----	----	----	----	----
Texture class	----	E178/SK	-	Fine	----	----	----	----	----	----
Anions and Nutrients										
Nitrogen, total	7727-37-9	E366/SK	%	0.192	----	----	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	%	6.96	----	----	----	----	----	----
Carbon, inorganic [IC]	----	E354/SK	%	2.66	----	----	----	----	----	----
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	E354/SK	%	22.2	----	----	----	----	----	----
Carbon, total organic [TOC]	----	EC356/SK	%	4.30	----	----	----	----	----	----
Organic matter	----	EC356/SK	%	7.41	----	----	----	----	----	----
Plant Available Nutrients										
Ammonium, available (as N)	14798-03-9	E312A/SK	mg/kg	12.2	----	----	----	----	----	----
Nitrate + Nitrite, available (as N)	----	E269.N+N/SK	mg/kg	15.1	----	----	----	----	----	----
Nitrite, available (as N)	14797-65-0	E269.NO2/SK	mg/kg	<0.40	----	----	----	----	----	----
Phosphate, available (as P)	14265-44-2	E385/SK	mg/kg	59.9	----	----	----	----	----	----
Potassium, available	7440-09-7	E390/SK	mg/kg	218	----	----	----	----	----	----
Sulfate, available (as S)	14808-79-8	E497.SO4/SK	mg/kg	151	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Soil/Solid**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID: GIMLI BIOSOLIDS	----	----	----	----	----	----
				Sampling date/time: 21-Sep-2023 09:50	----	----	----	----	----	----
				Sub-Matrix: Soil/Solid	----	----	----	----	----	----
				WP2324008-001	--------	--------	--------	--------	--------	--------
Plant Available Nutrients										
Nitrate, available (as N)	14797-55-8	EC269.NO3/SK	mg/kg	15.1	----	----	----	----	----	----
Saturated Paste Extractables										
Chloride, soluble ion content	16887-00-6	E266.Cl/SK	mg/L	41	----	----	----	----	----	----
Conductivity, saturated paste	----	E102/SK	dS/m	1.86	----	----	----	----	----	----
Chloride, soluble ion content	16887-00-6	EC266A.Cl/SK	mg/kg	26	----	----	----	----	----	----
Sulfur (as SO4), soluble ion content	14808-79-8	EC485/SK	mg/kg	545	----	----	----	----	----	----
Sodium, soluble ion content	17341-25-2	EC485/SK	mg/kg	67.6	----	----	----	----	----	----
Potassium, soluble ion content	7440-09-7	EC485/SK	mg/kg	12.1	----	----	----	----	----	----
Magnesium, soluble ion content	7439-95-4	EC485/SK	mg/kg	81.7	----	----	----	----	----	----
Calcium, soluble ion content	7440-70-2	EC485/SK	mg/kg	112	----	----	----	----	----	----
Boron, soluble ion content	7440-42-8	EC485/SK	mg/kg	0.39	----	----	----	----	----	----
Boron, soluble ion content	7440-42-8	E485/SK	mg/L	0.61	----	----	----	----	----	----
Calcium, soluble ion content	7440-70-2	E485/SK	mg/L	175	----	----	----	----	----	----
Magnesium, soluble ion content	7439-95-4	E485/SK	mg/L	128	----	----	----	----	----	----
Potassium, soluble ion content	7440-09-7	E485/SK	mg/L	19.0	----	----	----	----	----	----
Sodium, soluble ion content	17341-25-2	E485/SK	mg/L	106	----	----	----	----	----	----
Sulfur (as SO4), soluble ion content	14808-79-8	E485/SK	mg/L	854	----	----	----	----	----	----
Metals										
Arsenic	7440-38-2	E440/SK	mg/kg	3.52	----	----	----	----	----	----
Cadmium	7440-43-9	E440/SK	mg/kg	0.296	----	----	----	----	----	----
Chromium	7440-47-3	E440/SK	mg/kg	32.9	----	----	----	----	----	----
Copper	7440-50-8	E440/SK	mg/kg	46.2	----	----	----	----	----	----
Lead	7439-92-1	E440/SK	mg/kg	14.7	----	----	----	----	----	----
Mercury	7439-97-6	E510/SK	mg/kg	0.120	----	----	----	----	----	----
Nickel	7440-02-0	E440/SK	mg/kg	24.0	----	----	----	----	----	----
Phosphorus	7723-14-0	E440/SK	mg/kg	854	----	----	----	----	----	----
Zinc	7440-66-6	E440/SK	mg/kg	76.0	----	----	----	----	----	----
Leachable Anions & Nutrients										

Analytical Results Evaluation

Matrix: **Soil/Solid**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	GIMLI BIOSOLIDS	----	----	----	----	----	----
				Sampling date/time	21-Sep-2023 09:50	----	----	----	----	----	----
				Sub-Matrix	Soil/Solid	----	----	----	----	----	----
				WP2324008-001	--------	--------	--------	--------	--------	--------	--------
Leachable Anions & Nutrients											
Kjeldahl nitrogen, total [TKN]	----	E319/SK	%		0.252	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Key:

ALS Canada Ltd.

CERTIFICATE OF ANALYSIS

Work Order	: **WP2324008**	Page	: 1 of 5
Amendment	: **1**		
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Winnipeg
Contact	: Darren Keam	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 21-Sep-2023 13:00
PO	: ----	Date Analysis Commenced	: 23-Sep-2023
C-O-C number	: ----	Issue Date	: 17-Oct-2023 11:44
Sampler	: ----		
Site	:		
Quote number	: 2023 Standing offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Colby Bingham	Laboratory Supervisor	Sask Soils, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Inorganics, Saskatoon, Saskatchewan
Hedy Lai	Team Leader - Inorganics	Sask Soils, Saskatoon, Saskatchewan
Honey Patel	Team Leader - Organics	Organics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Inorganics, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Metals, Saskatoon, Saskatchewan
Milad Khani	Laboratory Analyst	Sask Soils, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Inorganics, Saskatoon, Saskatchewan
Nancy Cruse	Laboratory Assistant	Sask Soils, Saskatoon, Saskatchewan

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
°C	degrees celsius
dS/m	decisiemens per metre
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units
t/ha	tonnes per hectare

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

Sample(s) F1: Samples Received with temperature >10 °C in Saskatoon.

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	GIMLI BIOSOLIDS	----	----	----	----
					Client sampling date / time	21-Sep-2023 09:50	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WP2324008-001	--------	--------	--------	--------
						Result	----	----	----	----
Sample Preparation										
Temperature, oven	----	EPP441/SK	1	°C		<38	----	----	----	----
Physical Tests										
Moisture	----	E144/SK	0.25	%		13.0	----	----	----	----
pH, saturated paste	----	E114/SK	0.10	pH units		7.57	----	----	----	----
TGR (brine)	----	EC106/SK	0.10	t/ha		<0.10	----	----	----	----
TGR (sodic)	----	EC106/SK	0.10	t/ha		<0.10	----	----	----	----
% Saturation	----	E141/SK	1.0	%		63.8	----	----	----	----
Particle Size										
Sand (>0.075mm)	----	E178/SK	1.0	%		3.4	----	----	----	----
Fines (<0.075mm)	----	E178/SK	1.0	%		96.6	----	----	----	----
Texture class	----	E178/SK	-	-		Fine	----	----	----	----
Anions and Nutrients										
Nitrogen, total	7727-37-9	E366/SK	0.020	%		0.192	----	----	----	----
Organic / Inorganic Carbon										
Carbon, total [TC]	----	E351/SK	0.050	%		6.96	----	----	----	----
Carbon, inorganic [IC]	----	E354/SK	0.050	%		2.66	----	----	----	----
Carbon, inorganic [IC], (as CaCO3 equivalent)	----	E354/SK	0.40	%		22.2	----	----	----	----
Carbon, total organic [TOC]	----	EC356/SK	0.050	%		4.30	----	----	----	----
Organic matter	----	EC356/SK	0.10	%		7.41	----	----	----	----
Plant Available Nutrients										
Ammonium, available (as N)	14798-03-9	E312A/SK	1.0	mg/kg		12.2	----	----	----	----
Nitrate + Nitrite, available (as N)	----	E269.N+N/SK	1.0	mg/kg		15.1	----	----	----	----
Nitrite, available (as N)	14797-65-0	E269.NO2/SK	0.40	mg/kg		<0.40	----	----	----	----
Phosphate, available (as P)	14265-44-2	E385/SK	1.0	mg/kg		59.9	----	----	----	----
Potassium, available	7440-09-7	E390/SK	20	mg/kg		218	----	----	----	----
Sulfate, available (as S)	14808-79-8	E497.SO4/SK	3.0	mg/kg		151	----	----	----	----
Nitrate, available (as N)	14797-55-8	EC269.NO3/SK	2.0	mg/kg		15.1	----	----	----	----
Saturated Paste Extractables										

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	GIMLI BIOSOLIDS	----	----	----	----
					Client sampling date / time	21-Sep-2023 09:50	----	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WP2324008-001	--------	--------	--------	--------
						Result	----	----	----	----
Saturated Paste Extractables										
Chloride, soluble ion content	16887-00-6	E266.Cl/SK	20	mg/L		41	----	----	----	----
Conductivity, saturated paste	----	E102/SK	0.020	dS/m		1.86	----	----	----	----
Chloride, soluble ion content	16887-00-6	EC266A.Cl/SK	10	mg/kg		26	----	----	----	----
Sulfur (as SO4), soluble ion content	14808-79-8	EC485/SK	8.0	mg/kg		545	----	----	----	----
Sodium, soluble ion content	17341-25-2	EC485/SK	5.0	mg/kg		67.6	----	----	----	----
Potassium, soluble ion content	7440-09-7	EC485/SK	5.0	mg/kg		12.1	----	----	----	----
Magnesium, soluble ion content	7439-95-4	EC485/SK	5.0	mg/kg		81.7	----	----	----	----
Calcium, soluble ion content	7440-70-2	EC485/SK	5.0	mg/kg		112	----	----	----	----
Boron, soluble ion content	7440-42-8	EC485/SK	0.25	mg/kg		0.39	----	----	----	----
Boron, soluble ion content	7440-42-8	E485/SK	0.25	mg/L		0.61	----	----	----	----
Calcium, soluble ion content	7440-70-2	E485/SK	5.0	mg/L		175	----	----	----	----
Magnesium, soluble ion content	7439-95-4	E485/SK	5.0	mg/L		128	----	----	----	----
Potassium, soluble ion content	7440-09-7	E485/SK	5.0	mg/L		19.0	----	----	----	----
Sodium, soluble ion content	17341-25-2	E485/SK	5.0	mg/L		106	----	----	----	----
Sulfur (as SO4), soluble ion content	14808-79-8	E485/SK	6.0	mg/L		854	----	----	----	----
Metals										
Arsenic	7440-38-2	E440/SK	0.10	mg/kg		3.52	----	----	----	----
Cadmium	7440-43-9	E440/SK	0.020	mg/kg		0.296	----	----	----	----
Chromium	7440-47-3	E440/SK	0.50	mg/kg		32.9	----	----	----	----
Copper	7440-50-8	E440/SK	0.50	mg/kg		46.2	----	----	----	----
Lead	7439-92-1	E440/SK	0.50	mg/kg		14.7	----	----	----	----
Mercury	7439-97-6	E510/SK	0.0050	mg/kg		0.120	----	----	----	----
Nickel	7440-02-0	E440/SK	0.50	mg/kg		24.0	----	----	----	----
Phosphorus	7723-14-0	E440/SK	50	mg/kg		854	----	----	----	----
Zinc	7440-66-6	E440/SK	2.0	mg/kg		76.0	----	----	----	----
Leachable Anions & Nutrients										
Kjeldahl nitrogen, total [TKN]	----	E319/SK	0.020	%		0.252	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2324008**	Page	: 1 of 11
Amendment	: **1**		
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Winnipeg
Contact	: Darren Keam	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: ----	Date Samples Received	: 21-Sep-2023 13:00
PO	: ----	Issue Date	: 17-Oct-2023 11:44
C-O-C number	: ----		
Sampler	: ----		
Site	:		
Quote number	: 2023 Standing offer		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Anions and Nutrients : Total Nitrogen by Combustion										
LDPE bag GIMLI BIOSOLIDS	E366	21-Sep-2023	27-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	6 days	✓
Leachable Anions & Nutrients : Total Kjeldahl Nitrogen by Colourimetry										
LDPE bag GIMLI BIOSOLIDS	E319	21-Sep-2023	12-Oct-2023	365 days	21 days	✓	13-Oct-2023	365 days	22 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag GIMLI BIOSOLIDS	E510	21-Sep-2023	28-Sep-2023	28 days	7 days	✓	28-Sep-2023	28 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag GIMLI BIOSOLIDS	E440	21-Sep-2023	28-Sep-2023	180 days	7 days	✓	28-Sep-2023	180 days	7 days	✓
Organic / Inorganic Carbon : Total Carbon by Combustion										
LDPE bag GIMLI BIOSOLIDS	E351	21-Sep-2023	27-Sep-2023	----	----		27-Sep-2023	0 days	0 days	✓
Organic / Inorganic Carbon : Total Inorganic Carbon by Acetic Acid pH Standard Curve										
LDPE bag GIMLI BIOSOLIDS	E354	21-Sep-2023	----	----	----		26-Sep-2023	----	5 days	
Particle Size : CCME fine/coarse Particle Size Analysis by wet sieve										
LDPE bag GIMLI BIOSOLIDS	E178	21-Sep-2023	----	----	----		26-Sep-2023	180 days	5 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag GIMLI BIOSOLIDS	E144	21-Sep-2023	----	----	----		25-Sep-2023	----	4 days	
Plant Available Nutrients : Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)										
LDPE bag GIMLI BIOSOLIDS	E312A	21-Sep-2023	11-Oct-2023	----	----		12-Oct-2023	1 days	1 days	✓
Plant Available Nutrients : Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)										
LDPE bag GIMLI BIOSOLIDS	E269.N+N	21-Sep-2023	26-Sep-2023	180 days	5 days	✓	27-Sep-2023	3 days	1 days	✓
Plant Available Nutrients : Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)										
LDPE bag GIMLI BIOSOLIDS	E269.NO2	21-Sep-2023	26-Sep-2023	180 days	5 days	✓	27-Sep-2023	3 days	1 days	✓
Plant Available Nutrients : Available Phosphorus by Colourimetry (Olsen)										
LDPE bag GIMLI BIOSOLIDS	E385	21-Sep-2023	28-Sep-2023	----	----		28-Sep-2023	0 days	0 days	✓
Plant Available Nutrients : Available Potassium by flame photometry (Modified Kelowna)										
LDPE bag GIMLI BIOSOLIDS	E390	21-Sep-2023	27-Sep-2023	----	----		27-Sep-2023	0 days	0 days	✓
Plant Available Nutrients : Available Sulfate by ICPMS (0.01M Calcium Chloride Ext.)										
LDPE bag GIMLI BIOSOLIDS	E497.SO4	21-Sep-2023	26-Sep-2023	180 days	5 days	✓	26-Sep-2023	28 days	0 days	✓
Sample Preparation : Dry and Grind in Soil/Solid <38°C										
LDPE bag GIMLI BIOSOLIDS	EPP441	21-Sep-2023	23-Sep-2023	----	----		----	3 days	2 days	✓
Saturated Paste Extractables : Ca, K, Mg, Na, B and S by ICPOES (Saturated Paste)										
LDPE bag GIMLI BIOSOLIDS	E485	21-Sep-2023	26-Sep-2023	180 days	5 days	✓	27-Sep-2023	180 days	1 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Saturated Paste Extractables : Chloride by Colourimetry (Saturated Paste)										
LDPE bag GIMLI BIOSOLIDS	E266.Cl	21-Sep-2023	26-Sep-2023	365 days	5 days	✓	27-Sep-2023	28 days	1 days	✓
Saturated Paste Extractables : Conductivity in Soil (Saturated Paste)										
LDPE bag GIMLI BIOSOLIDS	E102	21-Sep-2023	26-Sep-2023	365 days	5 days	✓	26-Sep-2023	28 days	0 days	✓
Saturated Paste Extractables : pH by Meter (Saturated Paste)										
LDPE bag GIMLI BIOSOLIDS	E114	21-Sep-2023	26-Sep-2023	365 days	5 days	✓	26-Sep-2023	365 days	5 days	✓
Saturated Paste Extractables : Saturation Percentage										
LDPE bag GIMLI BIOSOLIDS	E141	21-Sep-2023	26-Sep-2023	----	----		26-Sep-2023	0 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	1177373	1	7	14.2	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	1154100	1	19	5.2	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	1154099	1	7	14.2	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	1155874	1	3	33.3	5.0	✓
Available Potassium by flame photometry (Modified Kelowna)	E390	1155825	1	13	7.6	5.0	✓
Available Sulfate by ICPMS (0.01M Calcium Chloride Ext.)	E497.SO4	1154101	1	14	7.1	5.0	✓
Ca, K, Mg, Na, B and S by ICPOES (Saturated Paste)	E485	1153811	1	20	5.0	5.0	✓
CCME fine/coarse Particle Size Analysis by wet sieve	E178	1155137	1	8	12.5	5.0	✓
Chloride by Colourimetry (Saturated Paste)	E266.Cl	1153812	1	20	5.0	5.0	✓
Conductivity in Soil (Saturated Paste)	E102	1153814	1	20	5.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1156868	1	9	11.1	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1156867	1	14	7.1	5.0	✓
Moisture Content by Gravimetry	E144	1152643	1	20	5.0	5.0	✓
pH by Meter (Saturated Paste)	E114	1153813	1	20	5.0	5.0	✓
Saturation Percentage	E141	1153815	1	20	5.0	5.0	✓
Total Carbon by Combustion	E351	1155967	1	4	25.0	5.0	✓
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1154866	1	12	8.3	5.0	✓
Total Kjeldahl Nitrogen by Colourimetry	E319	1181656	1	15	6.6	5.0	✓
Total Nitrogen by Combustion	E366	1155966	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	1177373	2	7	28.5	10.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	1154100	2	19	10.5	10.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	1154099	2	7	28.5	10.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	1155874	2	3	66.6	10.0	✓
Available Potassium by flame photometry (Modified Kelowna)	E390	1155825	2	13	15.3	10.0	✓
Available Sulfate by ICPMS (0.01M Calcium Chloride Ext.)	E497.SO4	1154101	2	14	14.2	10.0	✓
Ca, K, Mg, Na, B and S by ICPOES (Saturated Paste)	E485	1153811	2	20	10.0	10.0	✓
CCME fine/coarse Particle Size Analysis by wet sieve	E178	1155137	1	8	12.5	5.0	✓
Chloride by Colourimetry (Saturated Paste)	E266.Cl	1153812	2	20	10.0	10.0	✓
Conductivity in Soil (Saturated Paste)	E102	1153814	2	20	10.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	1156868	2	9	22.2	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1156867	2	14	14.2	10.0	✓
Moisture Content by Gravimetry	E144	1152643	1	20	5.0	5.0	✓
pH by Meter (Saturated Paste)	E114	1153813	2	20	10.0	10.0	✓
Saturation Percentage	E141	1153815	2	20	10.0	10.0	✓
Total Carbon by Combustion	E351	1155967	2	4	50.0	10.0	✓

Matrix: **Soil/Solid**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1154866	2	12	16.6	10.0	✓
Total Kjeldahl Nitrogen by Colourimetry	E319	1181656	2	15	13.3	10.0	✓
Total Nitrogen by Combustion	E366	1155966	2	20	10.0	10.0	✓
Method Blanks (MB)							
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A	1177373	1	7	14.2	5.0	✓
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N	1154100	1	19	5.2	5.0	✓
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2	1154099	1	7	14.2	5.0	✓
Available Phosphorus by Colourimetry (Olsen)	E385	1155874	1	3	33.3	5.0	✓
Available Potassium by flame photometry (Modified Kelowna)	E390	1155825	1	13	7.6	5.0	✓
Available Sulfate by ICPMS (0.01M Calcium Chloride Ext.)	E497.SO4	1154101	1	14	7.1	5.0	✓
Ca, K, Mg, Na, B and S by ICPOES (Saturated Paste)	E485	1153811	1	20	5.0	5.0	✓
Chloride by Colourimetry (Saturated Paste)	E266.Cl	1153812	1	20	5.0	5.0	✓
Conductivity in Soil (Saturated Paste)	E102	1153814	1	20	5.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1156868	1	9	11.1	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1156867	1	14	7.1	5.0	✓
Moisture Content by Gravimetry	E144	1152643	1	20	5.0	5.0	✓
Total Carbon by Combustion	E351	1155967	1	4	25.0	5.0	✓
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354	1154866	1	12	8.3	5.0	✓
Total Kjeldahl Nitrogen by Colourimetry	E319	1181656	1	15	6.6	5.0	✓
Total Nitrogen by Combustion	E366	1155966	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Soil (Saturated Paste)	E102 ALS Environmental - Saskatoon	Soil/Solid	CSSS Ch. 15 (mod)/APHA 2510 (mod)/AER D50	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a filtered extract from a soil sample prepared using the saturated paste procedure. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter (Saturated Paste)	E114 ALS Environmental - Saskatoon	Soil/Solid	Carter-CSSS / APHA 4500 H	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C) on a soil produced by the saturated paste extraction procedure.
Saturation Percentage	E141 ALS Environmental - Saskatoon	Soil/Solid	CSSS Ch. 15 (mod)/AER D50	Saturation Percentage (SP) is determined as the total volume of water present in a saturated paste (in mL) divided by the dry weight of the sample (in grams), expressed as a percentage.
Moisture Content by Gravimetry	E144 ALS Environmental - Saskatoon	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
CCME fine/coarse Particle Size Analysis by wet sieve	E178 ALS Environmental - Saskatoon	Soil/Solid	CCME Vol 4 Analytical Methods	An air-dried sample is reduced to < 2 mm size and mixed with a dispersing agent (sodium hexametaphosphate). The sample is washed through a 200 mesh (0.075 mm) sieve. The retained mass of sample is used to determine % sand fraction. If the percentage of sand is >50%, the soil is considered to be coarse textured soil. If the percentage of sand is <50%, the soil is considered to be fine textured.
Chloride by Colourimetry (Saturated Paste)	E266.Cl ALS Environmental - Saskatoon	Soil/Solid	CSSS Ch. 15/APHA 4500-CL E (mod)/AER D50	Inorganic anions are analyzed by obtaining a soil extract produced by the saturated paste extraction procedure which is then analyzed by colourimetry using a discrete analyzer.
Available Nitrate and Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.N+N ALS Environmental - Saskatoon	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Plant available nitrate and nitrite are analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Nitrite by Colourimetry (0.01M Calcium Chloride Ext.)	E269.NO2 ALS Environmental - Saskatoon	Soil/Solid	Alberta Agriculture/APHA 4500-NO2 B (mod)	Plant available nitrite is analyzed by colourimetry using a flow injection analyzer on a soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Available Ammonium by Colourimetry (2N Potassium Chloride Ext.)	E312A ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 6.2/Comm Soil Sci 19(6) (mod)	Plant available ammonium is analyzed by colourimetry on a soil sample extract that has been extracted using 2N Potassium Chloride, then shaken well and filtered prior to analysis.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Kjeldahl Nitrogen by Colourimetry	E319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colourimetrically at 660 nm.
Total Carbon by Combustion	E351 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2 (mod)	Total Carbon is determined by the high temperature combustion method with measurement by an infrared detector.
Total Inorganic Carbon by Acetic Acid pH Standard Curve	E354 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 20.2	Total Inorganic Carbon is determined by acetic acid pH standard curve, where a known quantity of acetic acid is consumed by reaction with carbonates in the soil. The pH of the resulting solution is measured and compared against a standard curve relating pH to weight of carbonate.
Total Nitrogen by Combustion	E366 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.4	The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.
Available Phosphorus by Colourimetry (Olsen)	E385 ALS Environmental - Saskatoon	Soil/Solid	Carter CSSS (2008) 8.3	Plant available phosphorus is extracted from air dried soil using a fixed ratio bicarbonate extraction. Phosphorus is determined by colorimetry.
Available Potassium by flame photometry (Modified Kelowna)	E390 ALS Environmental - Saskatoon	Soil/Solid	Comm. Soil Sci. Plant Anal, 25 (5&6)	Plant available potassium is extracted from soil using modified Kelowna solution. Potassium is determined by flame emission at 770 nm.
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Saskatoon	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Ca, K, Mg, Na, B and S by ICPOES (Saturated Paste)	E485 ALS Environmental - Saskatoon	Soil/Solid	CSSS CH15/EPA 6010B/AER D50	A soil extract produced by the saturated paste extraction procedure is analyzed for Calcium, Magnesium, Potassium, Sodium, Boron, and Sulfur (as SO4) by ICPOES.
Available Sulfate by ICPMS (0.01M Calcium Chloride Ext.)	E497.SO4 ALS Environmental - Saskatoon	Soil/Solid	Alberta Agriculture	Plant available sulfate is determined by ICPMS. Soil is extracted using a 0.01M calcium chloride solution. This extraction may also produce organic sulfur in the extracts when organic soils are analyzed.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Saskatoon	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Theoretical Gypsum Requirements (TGR) Saturated Paste	EC106 ALS Environmental - Saskatoon	Soil/Solid	J. Ashworth et al (1999)	Theoretical Gypsum Requirement is an estimate of the gypsum amendment required to remediate brine contaminated or sodic soils, and is provided in units of tonnes per hectare (t/ha) for a treatment depth of 15cm. TGR(brine), intended for brine-contaminated soils, is calculated using Method A from "A Comparison of Methods for Gypsum Requirement of Brine-Contaminated Soils", by J. Ashworth (Cdn J. of Soil Science, 1999), available at www.alsglobal.com. TGR(sodic), intended for naturally sodic soils, uses the Oster and Frenkel method (Method B) from the same paper. Reported TGR values are capped at 50 t/ha, considered the maximum practical gypsum amendment. To convert TGR from t/ha to tons/acre, multiply by 0.446. To determine a TGR value for an alternate treatment depth, multiply by [desired treatment depth (cm) / 15 cm].
Chloride by Colourimetry (Saturated Paste) (mg/kg)	EC266A.Cl ALS Environmental - Saskatoon	Soil/Solid	CSSS Ch. 15/APHA 4500-CL E (mod)	Inorganic anions are analyzed by obtaining a soil extract produced by the saturated paste extraction procedure which is then analyzed by colourimetry using a discrete analyzer.
Available Nitrate by Difference (0.01M Calcium Chloride Ext.)	EC269.NO3 ALS Environmental - Saskatoon	Soil/Solid	Alberta Agriculture/APHA 4500-NO3 I (mod)	Available Nitrate is determined by difference between Nitrate+Nitrite-N and Nitrite-N. A soil sample extract that has been extracted using 0.01M Calcium Chloride, then shaken well and filtered prior to analysis.
Total Organic Carbon (Calculated) in soil	EC356 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 21.2	Total Organic Carbon (TOC) is calculated by the difference between total carbon (TC) and total inorganic carbon (TIC).
Ca, K, Mg, Na, B and S by ICPOES (Saturated Paste) (mg/kg)	EC485 ALS Environmental - Saskatoon	Soil/Solid	CSSS CH15/EPA 6010B	A soil extract produced by the saturated paste extraction procedure is analyzed for Calcium, Magnesium, Potassium, Sodium, Boron, and Sulfur (as SO4) by ICPOES. Results are calculated in mg/kg using Saturation Percentage.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Fixed ratio 0.01M Calcium Chloride extraction for plant available nutrients	EP269 ALS Environmental - Saskatoon	Soil/Solid	Alberta Agriculture	Plant available nutrients (N&S) extracted using 0.01M calcium chloride, then shaken well and filtered prior to analysis.
2N Potassium Chloride extraction for available nutrients	EP269A ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 6.2	A soil sample extract is generated by fixed ratio extraction using 2N Potassium Chloride, then shaken well and filtered prior to analysis.
Kjeldahl Digestion for soils	EP319 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 22.2.3	The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Modified Kelowna Extraction for soil	EP384 ALS Environmental - Saskatoon	Soil/Solid	Comm. Soil Sci. Plant Anal, 25 (5&6)	Plant available phosphorus and potassium are extracted from the soil using fixed ratio Modified Kelowna solution.
Bicarbonate extraction for soil	EP385 ALS Environmental - Saskatoon	Soil/Solid	CSSS (2008) 8.2	Plant available phosphorus is extracted using fixed ratio sodium bicarbonate solution (Olsen method).
Digestion for Metals and Mercury	EP440 ALS Environmental - Saskatoon	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl. This method is intended to liberate metals that may be environmentally available.
Dry and Grind in Soil/Solid <38°C	EPP441 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of coarse fragments a portion of homogenized sample is set in a tray and dried at less than 38°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.
Dry and Grind in Soil/Solid <60°C	EPP442 ALS Environmental - Saskatoon	Soil/Solid	Soil Sampling and Methods of Analysis, Carter 2008	After removal of any coarse fragments and reservation of wet subsamples a portion of homogenized sample is set in a tray and dried at less than 60°C until dry. The sample is then particle size reduced with an automated crusher or mortar and pestle, typically to <2 mm. Further size reduction may be needed for particular tests.

ALS Canada Ltd.

QUALITY CONTROL REPORT

Work Order	:**WP2324008**	Page	: 1 of 10
Amendment	:**1**		
Client	:WSP Canada Inc.	Laboratory	:ALS Environmental - Winnipeg
Contact	:Darren Keam	Account Manager	:Judy Dalmaijer
Address	:1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	:1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	:	Telephone	:+1 204 255 9720
Project	:----	Date Samples Received	:21-Sep-2023 13:00
PO	:----	Date Analysis Commenced	:23-Sep-2023
C-O-C number	:----	Issue Date	:17-Oct-2023 11:45
Sampler	:---- 204 477 6650		
Site	:		
Quote number	:2023 Standing offer		
No. of samples received	:1		
No. of samples analysed	:1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1152643)											
SK2305010-001	Anonymous	Moisture	----	E144	0.25	%	11.2	11.2	0.219%	20%	----
Particle Size (QC Lot: 1155137)											
WT2330241-010	Anonymous	Sand (>0.075mm)	----	E178	1.0	%	2.1	2.1	0.04	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 1155966)											
FC2302682-005	Anonymous	Nitrogen, total	7727-37-9	E366	0.020	%	0.101	0.105	0.004	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 1154866)											
FC2302705-007	Anonymous	Carbon, inorganic [IC]	----	E354	0.050	%	5.35	5.30	0.964%	20%	----
Organic / Inorganic Carbon (QC Lot: 1155967)											
FC2302682-005	Anonymous	Carbon, total [TC]	----	E351	0.050	%	3.48	3.62	4.09%	20%	----
Plant Available Nutrients (QC Lot: 1154099)											
WP2323395-007	Anonymous	Nitrite, available (as N)	14797-65-0	E269.NO2	5.02	mg/kg	<5.00	<5.02	5.00	Diff <2x LOR	----
Plant Available Nutrients (QC Lot: 1154100)											
WP2323395-007	Anonymous	Nitrate + Nitrite, available (as N)	----	E269.N+N	12.5	mg/kg	<12.5	<12.5	0.04	Diff <2x LOR	----
Plant Available Nutrients (QC Lot: 1154101)											
WP2323395-007	Anonymous	Sulfate, available (as S)	14808-79-8	E497.SO4	75.2	mg/kg	3280	3440	4.70%	30%	----
Plant Available Nutrients (QC Lot: 1155825)											
RG2301567-001	Anonymous	Potassium, available	7440-09-7	E390	100	mg/kg	1160	1370	16.4%	30%	----
Plant Available Nutrients (QC Lot: 1155874)											
WP2324008-001	GIMLI BIOSOLIDS	Phosphate, available (as P)	14265-44-2	E385	9.7	mg/kg	59.9	55.0	4.9	Diff <2x LOR	----
Plant Available Nutrients (QC Lot: 1177373)											
EO2309073-045	Anonymous	Ammonium, available (as N)	14798-03-9	E312A	11.4	mg/kg	17.6	17.8	0.1	Diff <2x LOR	----
Saturated Paste Extractables (QC Lot: 1153811)											
SK2305010-004	Anonymous	Boron, soluble ion content	7440-42-8	E485	0.50	mg/L	0.54	0.56	0.03	Diff <2x LOR	----
		Calcium, soluble ion content	7440-70-2	E485	10.0	mg/L	183	198	7.64%	30%	----
		Magnesium, soluble ion content	7439-95-4	E485	10.0	mg/L	243	262	7.21%	30%	----
		Potassium, soluble ion content	7440-09-7	E485	10.0	mg/L	13.7	13.9	0.3	Diff <2x LOR	----
		Sodium, soluble ion content	17341-25-2	E485	10.0	mg/L	166	171	3.05%	30%	----
		Sulfur (as SO4), soluble ion content	14808-79-8	E485	12.0	mg/L	1330	1460	9.46%	30%	----
Saturated Paste Extractables (QC Lot: 1153812)											
SK2305010-004	Anonymous	Chloride, soluble ion content	16887-00-6	E266.Cl	40	mg/L	289	295	1.97%	30%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Saturated Paste Extractables (QC Lot: 1153813)											
SK2305010-004	Anonymous	pH, saturated paste	----	E114	0.10	pH units	7.88	7.97	1.14%	10%	----
Saturated Paste Extractables (QC Lot: 1153814)											
SK2305010-004	Anonymous	Conductivity, saturated paste	----	E102	20	µS/cm	2.84 dS/m	2970	4.48%	20%	----
Saturated Paste Extractables (QC Lot: 1153815)											
SK2305010-004	Anonymous	% Saturation	----	E141	1.0	%	51.5	52.8	2.46%	20%	----
Metals (QC Lot: 1156867)											
FC2302736-007	Anonymous	Arsenic	7440-38-2	E440	0.10	mg/kg	1.30	1.35	3.46%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		Chromium	7440-47-3	E440	0.50	mg/kg	1.40	1.50	0.10	Diff <2x LOR	----
		Copper	7440-50-8	E440	0.50	mg/kg	0.52	0.63	0.10	Diff <2x LOR	----
		Lead	7439-92-1	E440	0.50	mg/kg	1.10	1.16	0.06	Diff <2x LOR	----
		Nickel	7440-02-0	E440	0.50	mg/kg	1.06	1.22	0.16	Diff <2x LOR	----
		Phosphorus	7723-14-0	E440	50	mg/kg	118	215	96	Diff <2x LOR	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4.7	5.8	1.2	Diff <2x LOR	----
Metals (QC Lot: 1156868)											
FC2302736-007	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	<0.0050	<0.0050	0	Diff <2x LOR	----
Leachable Anions & Nutrients (QC Lot: 1181656)											
TY2310114-041	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	0.154 %	1460	80	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1152643)						
Moisture	----	E144	0.25	%	<0.25	----
Anions and Nutrients (QCLot: 1155966)						
Nitrogen, total	7727-37-9	E366	0.02	%	<0.020	----
Organic / Inorganic Carbon (QCLot: 1154866)						
Carbon, inorganic [IC]	----	E354	0.05	%	<0.050	----
Organic / Inorganic Carbon (QCLot: 1155967)						
Carbon, total [TC]	----	E351	0.05	%	<0.050	----
Plant Available Nutrients (QCLot: 1154099)						
Nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	<0.40	----
Plant Available Nutrients (QCLot: 1154100)						
Nitrate + Nitrite, available (as N)	----	E269.N+N	1	mg/kg	<1.0	----
Plant Available Nutrients (QCLot: 1154101)						
Sulfate, available (as S)	14808-79-8	E497.SO4	3	mg/kg	<3.0	----
Plant Available Nutrients (QCLot: 1155825)						
Potassium, available	7440-09-7	E390	20	mg/kg	<20	----
Plant Available Nutrients (QCLot: 1155874)						
Phosphate, available (as P)	14265-44-2	E385	1	mg/kg	<1.0	----
Plant Available Nutrients (QCLot: 1177373)						
Ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	<1.0	----
Saturated Paste Extractables (QCLot: 1153811)						
Boron, soluble ion content	7440-42-8	E485	0.25	mg/L	<0.25	----
Calcium, soluble ion content	7440-70-2	E485	5	mg/L	<5.0	----
Magnesium, soluble ion content	7439-95-4	E485	5	mg/L	<5.0	----
Potassium, soluble ion content	7440-09-7	E485	5	mg/L	<5.0	----
Sodium, soluble ion content	17341-25-2	E485	5	mg/L	<5.0	----
Sulfur (as SO4), soluble ion content	14808-79-8	E485	6	mg/L	<6.0	----
Saturated Paste Extractables (QCLot: 1153812)						
Chloride, soluble ion content	16887-00-6	E266.Cl	20	mg/L	<20	----
Saturated Paste Extractables (QCLot: 1153814)						
Conductivity, saturated paste	----	E102	20	µS/cm	<20	----
Metals (QCLot: 1156867)						
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1156867) - continued						
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 1156868)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Leachable Anions & Nutrients (QCLot: 1181656)						
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	<200	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1152643)									
Moisture	----	E144	0.25	%	50 %	99.8	90.0	110	----
Anions and Nutrients (QCLot: 1155966)									
Nitrogen, total	7727-37-9	E366	0.02	%	22.37 %	101	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1154866)									
Carbon, inorganic [IC]	----	E354	0.05	%	0.5 %	97.8	90.0	110	----
Organic / Inorganic Carbon (QCLot: 1155967)									
Carbon, total [TC]	----	E351	0.05	%	48 %	102	90.0	110	----
Plant Available Nutrients (QCLot: 1154099)									
Nitrite, available (as N)	14797-65-0	E269.NO2	0.4	mg/kg	20 mg/kg	100	70.0	130	----
Plant Available Nutrients (QCLot: 1154100)									
Nitrate + Nitrite, available (as N)	----	E269.N+N	1	mg/kg	40 mg/kg	107	70.0	130	----
Plant Available Nutrients (QCLot: 1154101)									
Sulfate, available (as S)	14808-79-8	E497.SO4	3	mg/kg	200 mg/kg	105	70.0	130	----
Plant Available Nutrients (QCLot: 1155825)									
Potassium, available	7440-09-7	E390	20	mg/kg	125 mg/kg	96.4	70.0	130	----
Plant Available Nutrients (QCLot: 1155874)									
Phosphate, available (as P)	14265-44-2	E385	1	mg/kg	20 mg/kg	102	80.0	120	----
Plant Available Nutrients (QCLot: 1177373)									
Ammonium, available (as N)	14798-03-9	E312A	1	mg/kg	10 mg/kg	89.2	80.0	120	----
Saturated Paste Extractables (QCLot: 1153811)									
Boron, soluble ion content	7440-42-8	E485	0.25	mg/L	2 mg/L	99.1	80.0	120	----
Calcium, soluble ion content	7440-70-2	E485	5	mg/L	100 mg/L	103	80.0	120	----
Magnesium, soluble ion content	7439-95-4	E485	5	mg/L	100 mg/L	102	80.0	120	----
Potassium, soluble ion content	7440-09-7	E485	5	mg/L	100 mg/L	102	80.0	120	----
Sodium, soluble ion content	17341-25-2	E485	5	mg/L	100 mg/L	101	80.0	120	----
Sulfur (as SO4), soluble ion content	14808-79-8	E485	6	mg/L	300 mg/L	102	80.0	120	----
Saturated Paste Extractables (QCLot: 1153812)									
Chloride, soluble ion content	16887-00-6	E266.Cl	20	mg/L	50 mg/L	92.1	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Saturated Paste Extractables (QCLot: 1153813)									
pH, saturated paste	----	E114	----	pH units	7 pH units	100	97.0	103	----
Saturated Paste Extractables (QCLot: 1153814)									
Conductivity, saturated paste	----	E102	20	µS/cm	1000 µS/cm	98.0	80.0	120	----
Saturated Paste Extractables (QCLot: 1153815)									
% Saturation	----	E141	----	%	100 %	98.7	80.0	120	----
Metals (QCLot: 1156867)									
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
Metals (QCLot: 1156868)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.7	80.0	120	----
Leachable Anions & Nutrients (QCLot: 1181656)									
Kjeldahl nitrogen, total [TKN]	----	E319	200	mg/kg	1000 mg/kg	110	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					Qualifier
Particle Size (QCLot: 1155137)									
	RM	Sand (>0.075mm)	----	E178	40.1 %	97.9	88.0	112	----
Anions and Nutrients (QCLot: 1155966)									
	RM	Nitrogen, total	7727-37-9	E366	0.11 %	94.8	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1154866)									
	RM	Carbon, inorganic [IC]	----	E354	0.383 %	104	80.0	120	----
Organic / Inorganic Carbon (QCLot: 1155967)									
	RM	Carbon, total [TC]	----	E351	1.4 %	101	80.0	120	----
Plant Available Nutrients (QCLot: 1154099)									
	RM	Nitrite, available (as N)	14797-65-0	E269.NO2	0.1 mg/kg	50.5	0	570	----
Plant Available Nutrients (QCLot: 1154100)									
	RM	Nitrate + Nitrite, available (as N)	----	E269.N+N	11.3 mg/kg	111	70.0	130	----
Plant Available Nutrients (QCLot: 1154101)									
	RM	Sulfate, available (as S)	14808-79-8	E497.SO4	459 mg/kg	111	70.0	130	----
Plant Available Nutrients (QCLot: 1155825)									
	RM	Potassium, available	7440-09-7	E390	397 mg/kg	87.0	70.0	130	----
Plant Available Nutrients (QCLot: 1155874)									
	RM	Phosphate, available (as P)	14265-44-2	E385	15.3 mg/kg	105	80.0	120	----
Plant Available Nutrients (QCLot: 1177373)									
	RM	Ammonium, available (as N)	14798-03-9	E312A	70.1 mg/kg	94.5	80.0	120	----
Saturated Paste Extractables (QCLot: 1153811)									
	RM	Boron, soluble ion content	7440-42-8	E485	11.1 mg/L	92.7	70.0	130	----
	RM	Calcium, soluble ion content	7440-70-2	E485	776 mg/L	106	70.0	130	----
	RM	Magnesium, soluble ion content	7439-95-4	E485	261 mg/L	98.8	70.0	130	----
	RM	Potassium, soluble ion content	7440-09-7	E485	111 mg/L	94.1	70.0	130	----
	RM	Sodium, soluble ion content	17341-25-2	E485	330 mg/L	102	70.0	130	----
	RM	Sulfur (as SO4), soluble ion content	14808-79-8	E485	1841 mg/L	112	70.0	130	----
Saturated Paste Extractables (QCLot: 1153812)									
	RM	Chloride, soluble ion content	16887-00-6	E266.Cl	1237 mg/L	91.2	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Saturated Paste Extractables (QCLot: 1153813)									
	RM	pH, saturated paste	----	E114	7.59 pH units	99.3	96.0	104	----
Saturated Paste Extractables (QCLot: 1153814)									
	RM	Conductivity, saturated paste	----	E102	5970 µS/cm	101	70.0	130	----
Saturated Paste Extractables (QCLot: 1153815)									
	RM	% Saturation	----	E141	48.3 %	101	70.0	130	----
Metals (QCLot: 1156867)									
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	97.5	70.0	130	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	95.7	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	95.2	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	107	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	99.6	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	93.5	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
Metals (QCLot: 1156868)									
	RM	Mercury	7439-97-6	E510	0.059 mg/kg	95.2	70.0	130	----
Leachable Anions & Nutrients (QCLot: 1181656)									
	RM	Kjeldahl nitrogen, total [TKN]	----	E319	1040 mg/kg	108	80.0	120	----

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here
(lab use only)

COC Number: 17 - 776111

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	WSP	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Darren Keam	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☐ / 2 day [P2-50%] ☐
Phone:	204-259-1488	☐ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E - 100%] ☐ / Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	1600 Buffalo pl. WPG	Email 1 or Fax: darren.keam@wsp.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	WPG	Email 2: dana.bredin@wsp.com	
Postal Code:		Email 3	
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**	
	Copy of Invoice with Report ☑ YES ☐ NO	Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	
Company:		Email 1 or Fax: CAPayables@wsp.com	
Contact:		Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#
Job #:	CA-WSP-181-03988-01/05.01	Major/Minor Code:	Routing Code:
PO / AFE:	CA-WSP-181-03988-01 tbk 0.5.01	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):		ALS Contact:	Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	CCME	Mercury	Total Nitrite metals	available K&S (Soil Leachate)	Nitrate - Nitrogen	available potassium	organic Matter (TOC)	total Nitrogen	moisture	EC, SAR, PH	particle size	Plant available Phosphorus	total Nitrite	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	Gimli biosolids	21/09/23	9:50	Grab Soil	1	R	R	R	P	R	R	R	R	R	P	R	R	P		

Environmental Division
Winnipeg
Work Order Reference
WP2324008

Telephone : +1 204 255 9720

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE C
Frozen ☐ Sl
Ice Packs ☐ Ice Cubes ☐ C
Cooling Initiated ☐
INITIAL COOLER TEMPERATURE
TURES °C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Annie McNally	Date: Sept 21/23	Time: 12:15	Received by: [redacted]	Date: SEP 21 2023	T[redacted]	eived by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY [redacted] ELLOW -

JUNE 2018 FRONT

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

APPENDIX

D SOIL TESTING RESULTS

RM of Gimli

Biosolids Land Application Program
Agricultural Land and Sample Locations

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WP2324006**	Page	: 1 of 6
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Winnipeg
Contact	: Darren Keam	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: CA-WSP-181-03988-01 TSK05.01	Date Samples Received	: 21-Sep-2023 13:00
PO	: CA-WSP-181-03988-01 TSK05.01	Date Analysis Commenced	: 26-Sep-2023
C-O-C number	: ----	Issue Date	: 27-Sep-2023 15:33
Sampler	: ----		
Site	:		
Quote number	: 2023 Standing offer		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Baxter	Team Leader - Inorganics	Metals, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Metals, Calgary, Alberta

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/kg	milligrams per kilogram

>: greater than.
<: less than.
Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Analytical Results Evaluation

Matrix: **Soil**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	NE13-GL001	NE13-GL002	NE13-GL003	NW07-GL004	SW07-GL005	SW07-GL006	SW07-GL007
				Sampling date/time	20-Sep-2023 16:45	20-Sep-2023 17:00	20-Sep-2023 15:45	20-Sep-2023 13:30	20-Sep-2023 12:20	20-Sep-2023 10:00	20-Sep-2023 11:00
				Sub-Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
					WP2324006-001	WP2324006-002	WP2324006-003	WP2324006-004	WP2324006-005	WP2324006-006	WP2324006-007
Metals											
Aluminum	7429-90-5	E440/CG	mg/kg		15000	19800	10300	18800	27200	21700	25100
Antimony	7440-36-0	E440/CG	mg/kg		<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.12
Arsenic	7440-38-2	E440/CG	mg/kg		2.21	2.64	2.18	2.66	4.11	2.44	2.58
Barium	7440-39-3	E440/CG	mg/kg		94.5	121	70.3	112	134	119	130
Beryllium	7440-41-7	E440/CG	mg/kg		0.53	0.66	0.36	0.65	0.92	0.72	0.82
Bismuth	7440-69-9	E440/CG	mg/kg		<0.20	<0.20	0.25	<0.20	<0.20	<0.20	<0.20
Boron	7440-42-8	E440/CG	mg/kg		16.9	16.9	15.6	17.3	17.8	17.8	19.8
Cadmium	7440-43-9	E440/CG	mg/kg		0.201	0.187	0.167	0.194	0.126	0.155	0.184
Calcium	7440-70-2	E440/CG	mg/kg		55400	56900	89800	60200	28800	52900	31100
Chromium	7440-47-3	E440/CG	mg/kg		29.5	36.5	20.7	34.6	47.1	38.7	44.6
Cobalt	7440-48-4	E440/CG	mg/kg		6.64	8.09	4.47	7.80	11.1	8.93	9.41
Copper	7440-50-8	E440/CG	mg/kg		11.7	15.5	24.3	17.2	23.8	17.6	23.5
Iron	7439-89-6	E440/CG	mg/kg		14600	18300	10700	18000	25000	20100	22900
Lead	7439-92-1	E440/CG	mg/kg		7.32	8.62	5.45	9.24	10.8	9.20	10.7
Lithium	7439-93-2	E440/CG	mg/kg		14.7	18.3	12.2	18.6	24.4	20.2	22.2
Magnesium	7439-95-4	E440/CG	mg/kg		33600	34200	49100	36500	22700	32900	23000
Manganese	7439-96-5	E440/CG	mg/kg		421	449	233	375	311	471	294
Mercury	7439-97-6	E510/CG	mg/kg		0.0256	0.0215	0.0272	0.0244	0.0304	0.0233	0.0328
Molybdenum	7439-98-7	E440/CG	mg/kg		0.46	0.29	0.30	0.26	0.30	0.36	0.32
Nickel	7440-02-0	E440/CG	mg/kg		18.2	22.4	13.2	22.5	33.3	25.4	28.6
Phosphorus	7723-14-0	E440/CG	mg/kg		721	729	847	673	628	711	893
Potassium	7440-09-7	E440/CG	mg/kg		2510	3940	1680	3540	5140	4390	5270
Selenium	7782-49-2	E440/CG	mg/kg		0.34	0.30	0.20	0.29	0.29	0.28	0.43
Silver	7440-22-4	E440/CG	mg/kg		<0.10	0.10	<0.10	<0.10	0.12	0.11	0.14
Sodium	7440-23-5	E440/CG	mg/kg		132	158	168	169	142	248	152
Strontium	7440-24-6	E440/CG	mg/kg		35.1	41.8	56.9	46.6	41.3	40.3	38.5
Sulfur	7704-34-9	E440/CG	mg/kg		<1000	<1000	<1000	<1000	<1000	<1000	<1000
Thallium	7440-28-0	E440/CG	mg/kg		0.145	0.194	0.109	0.184	0.286	0.211	0.254

Analytical Results Evaluation

Matrix: **Soil**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	NE13-GL001	NE13-GL002	NE13-GL003	NW07-GL004	SW07-GL005	SW07-GL006	SW07-GL007
				Sampling date/time	20-Sep-2023 16:45	20-Sep-2023 17:00	20-Sep-2023 15:45	20-Sep-2023 13:30	20-Sep-2023 12:20	20-Sep-2023 10:00	20-Sep-2023 11:00
				Sub-Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
					WP2324006-001	WP2324006-002	WP2324006-003	WP2324006-004	WP2324006-005	WP2324006-006	WP2324006-007
Metals											
Tin	7440-31-5	E440/CG	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	7440-32-6	E440/CG	mg/kg		268	350	263	411	391	414	456
Tungsten	7440-33-7	E440/CG	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	7440-61-1	E440/CG	mg/kg		0.616	0.849	1.20	1.59	1.83	1.43	1.31
Vanadium	7440-62-2	E440/CG	mg/kg		28.1	35.5	24.9	37.4	53.0	37.7	46.6
Zinc	7440-66-6	E440/CG	mg/kg		41.6	55.6	35.5	52.2	65.6	57.7	67.3
Zirconium	7440-67-7	E440/CG	mg/kg		2.1	3.0	1.1	3.6	10.1	3.6	9.0

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results Evaluation

Matrix: **Soil**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	SE12-GL008	----	----	----	----	----	----
				Sampling date/time	20-Sep-2023 14:30	----	----	----	----	----	----
				Sub-Matrix	Soil	----	----	----	----	----	----
				WP2324006-008	--------	--------	--------	--------	--------	--------	--------
Metals											
Aluminum	7429-90-5	E440/CG	mg/kg	29600	----	----	----	----	----	----	----
Antimony	7440-36-0	E440/CG	mg/kg	0.11	----	----	----	----	----	----	----
Arsenic	7440-38-2	E440/CG	mg/kg	3.53	----	----	----	----	----	----	----
Barium	7440-39-3	E440/CG	mg/kg	156	----	----	----	----	----	----	----
Beryllium	7440-41-7	E440/CG	mg/kg	0.99	----	----	----	----	----	----	----
Bismuth	7440-69-9	E440/CG	mg/kg	0.20	----	----	----	----	----	----	----
Boron	7440-42-8	E440/CG	mg/kg	21.7	----	----	----	----	----	----	----
Cadmium	7440-43-9	E440/CG	mg/kg	0.253	----	----	----	----	----	----	----
Calcium	7440-70-2	E440/CG	mg/kg	30100	----	----	----	----	----	----	----
Chromium	7440-47-3	E440/CG	mg/kg	52.9	----	----	----	----	----	----	----
Cobalt	7440-48-4	E440/CG	mg/kg	11.7	----	----	----	----	----	----	----
Copper	7440-50-8	E440/CG	mg/kg	26.2	----	----	----	----	----	----	----
Iron	7439-89-6	E440/CG	mg/kg	26500	----	----	----	----	----	----	----
Lead	7439-92-1	E440/CG	mg/kg	11.7	----	----	----	----	----	----	----
Lithium	7439-93-2	E440/CG	mg/kg	26.4	----	----	----	----	----	----	----
Magnesium	7439-95-4	E440/CG	mg/kg	21700	----	----	----	----	----	----	----
Manganese	7439-96-5	E440/CG	mg/kg	442	----	----	----	----	----	----	----
Mercury	7439-97-6	E510/CG	mg/kg	0.0297	----	----	----	----	----	----	----
Molybdenum	7439-98-7	E440/CG	mg/kg	0.44	----	----	----	----	----	----	----
Nickel	7440-02-0	E440/CG	mg/kg	35.3	----	----	----	----	----	----	----
Phosphorus	7723-14-0	E440/CG	mg/kg	727	----	----	----	----	----	----	----
Potassium	7440-09-7	E440/CG	mg/kg	5420	----	----	----	----	----	----	----
Selenium	7782-49-2	E440/CG	mg/kg	0.51	----	----	----	----	----	----	----
Silver	7440-22-4	E440/CG	mg/kg	0.12	----	----	----	----	----	----	----
Sodium	7440-23-5	E440/CG	mg/kg	166	----	----	----	----	----	----	----
Strontium	7440-24-6	E440/CG	mg/kg	48.7	----	----	----	----	----	----	----
Sulfur	7704-34-9	E440/CG	mg/kg	<1000	----	----	----	----	----	----	----
Thallium	7440-28-0	E440/CG	mg/kg	0.283	----	----	----	----	----	----	----
Tin	7440-31-5	E440/CG	mg/kg	<2.0	----	----	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Soil**

Analyte	CAS Number	Method/Lab	Unit	Client sample ID	SE12-GL008	----	----	----	----	----	----
				Sampling date/time	20-Sep-2023 14:30	----	----	----	----	----	----
				Sub-Matrix	Soil	----	----	----	----	----	----
				WP2324006-008	--------	--------	--------	--------	--------	--------	--------
Metals											
Titanium	7440-32-6	E440/CG	mg/kg	456	----	----	----	----	----	----	----
Tungsten	7440-33-7	E440/CG	mg/kg	<0.50	----	----	----	----	----	----	----
Uranium	7440-61-1	E440/CG	mg/kg	3.02	----	----	----	----	----	----	----
Vanadium	7440-62-2	E440/CG	mg/kg	54.1	----	----	----	----	----	----	----
Zinc	7440-66-6	E440/CG	mg/kg	81.9	----	----	----	----	----	----	----
Zirconium	7440-67-7	E440/CG	mg/kg	7.1	----	----	----	----	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Key:

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS

Work Order	: **WP2324006**	Page	: 1 of 6
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Winnipeg
Contact	: Darren Keam	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg MB Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: CA-WSP-181-03988-01 TSK05.01	Date Samples Received	: 21-Sep-2023 13:00
PO	: CA-WSP-181-03988-01 TSK05.01	Date Analysis Commenced	: 26-Sep-2023
C-O-C number	: ----	Issue Date	: 27-Sep-2023 15:49
Sampler	: ----		
Site	:		
Quote number	: 2023 Standing offer		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Baxter	Team Leader - Inorganics	Metals, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Metals, Calgary, Alberta

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	*Description*
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	NE13-GL001	NE13-GL002	NE13-GL003	NW07-GL004	SW07-GL005
					Client sampling date / time	20-Sep-2023 16:45	20-Sep-2023 17:00	20-Sep-2023 15:45	20-Sep-2023 13:30	20-Sep-2023 12:20
						WP2324006-001	WP2324006-002	WP2324006-003	WP2324006-004	WP2324006-005
						Result	Result	Result	Result	Result
Metals										
Aluminum	7429-90-5	E440/CG	50	mg/kg		15000	19800	10300	18800	27200
Antimony	7440-36-0	E440/CG	0.10	mg/kg		<0.10	<0.10	<0.10	0.10	<0.10
Arsenic	7440-38-2	E440/CG	0.10	mg/kg		2.21	2.64	2.18	2.66	4.11
Barium	7440-39-3	E440/CG	0.50	mg/kg		94.5	121	70.3	112	134
Beryllium	7440-41-7	E440/CG	0.10	mg/kg		0.53	0.66	0.36	0.65	0.92
Bismuth	7440-69-9	E440/CG	0.20	mg/kg		<0.20	<0.20	0.25	<0.20	<0.20
Boron	7440-42-8	E440/CG	5.0	mg/kg		16.9	16.9	15.6	17.3	17.8
Cadmium	7440-43-9	E440/CG	0.020	mg/kg		0.201	0.187	0.167	0.194	0.126
Calcium	7440-70-2	E440/CG	50	mg/kg		55400	56900	89800	60200	28800
Chromium	7440-47-3	E440/CG	0.50	mg/kg		29.5	36.5	20.7	34.6	47.1
Cobalt	7440-48-4	E440/CG	0.10	mg/kg		6.64	8.09	4.47	7.80	11.1
Copper	7440-50-8	E440/CG	0.50	mg/kg		11.7	15.5	24.3	17.2	23.8
Iron	7439-89-6	E440/CG	50	mg/kg		14600	18300	10700	18000	25000
Lead	7439-92-1	E440/CG	0.50	mg/kg		7.32	8.62	5.45	9.24	10.8
Lithium	7439-93-2	E440/CG	2.0	mg/kg		14.7	18.3	12.2	18.6	24.4
Magnesium	7439-95-4	E440/CG	20	mg/kg		33600	34200	49100	36500	22700
Manganese	7439-96-5	E440/CG	1.0	mg/kg		421	449	233	375	311
Mercury	7439-97-6	E510/CG	0.0050	mg/kg		0.0256	0.0215	0.0272	0.0244	0.0304
Molybdenum	7439-98-7	E440/CG	0.10	mg/kg		0.46	0.29	0.30	0.26	0.30
Nickel	7440-02-0	E440/CG	0.50	mg/kg		18.2	22.4	13.2	22.5	33.3
Phosphorus	7723-14-0	E440/CG	50	mg/kg		721	729	847	673	628
Potassium	7440-09-7	E440/CG	100	mg/kg		2510	3940	1680	3540	5140
Selenium	7782-49-2	E440/CG	0.20	mg/kg		0.34	0.30	0.20	0.29	0.29
Silver	7440-22-4	E440/CG	0.10	mg/kg		<0.10	0.10	<0.10	<0.10	0.12
Sodium	7440-23-5	E440/CG	50	mg/kg		132	158	168	169	142
Strontium	7440-24-6	E440/CG	0.50	mg/kg		35.1	41.8	56.9	46.6	41.3
Sulfur	7704-34-9	E440/CG	1000	mg/kg		<1000	<1000	<1000	<1000	<1000
Thallium	7440-28-0	E440/CG	0.050	mg/kg		0.145	0.194	0.109	0.184	0.286
Tin	7440-31-5	E440/CG	2.0	mg/kg		<2.0	<2.0	<2.0	<2.0	<2.0

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	NE13-GL001	NE13-GL002	NE13-GL003	NW07-GL004	SW07-GL005
					Client sampling date / time	20-Sep-2023 16:45	20-Sep-2023 17:00	20-Sep-2023 15:45	20-Sep-2023 13:30	20-Sep-2023 12:20
						WP2324006-001	WP2324006-002	WP2324006-003	WP2324006-004	WP2324006-005
						Result	Result	Result	Result	Result
Metals										
Titanium	7440-32-6	E440/CG	1.0	mg/kg		268	350	263	411	391
Tungsten	7440-33-7	E440/CG	0.50	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	7440-61-1	E440/CG	0.050	mg/kg		0.616	0.849	1.20	1.59	1.83
Vanadium	7440-62-2	E440/CG	0.20	mg/kg		28.1	35.5	24.9	37.4	53.0
Zinc	7440-66-6	E440/CG	2.0	mg/kg		41.6	55.6	35.5	52.2	65.6
Zirconium	7440-67-7	E440/CG	1.0	mg/kg		2.1	3.0	1.1	3.6	10.1

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	SW07-GL006	SW07-GL007	SE12-GL008	----	----
					Client sampling date / time	20-Sep-2023 10:00	20-Sep-2023 11:00	20-Sep-2023 14:30	----	----
						WP2324006-006	WP2324006-007	WP2324006-008	--------	--------
						Result	Result	Result	----	----
Metals										
Aluminum	7429-90-5	E440/CG	50	mg/kg		21700	25100	29600	----	----
Antimony	7440-36-0	E440/CG	0.10	mg/kg		<0.10	0.12	0.11	----	----
Arsenic	7440-38-2	E440/CG	0.10	mg/kg		2.44	2.58	3.53	----	----
Barium	7440-39-3	E440/CG	0.50	mg/kg		119	130	156	----	----
Beryllium	7440-41-7	E440/CG	0.10	mg/kg		0.72	0.82	0.99	----	----
Bismuth	7440-69-9	E440/CG	0.20	mg/kg		<0.20	<0.20	0.20	----	----
Boron	7440-42-8	E440/CG	5.0	mg/kg		17.8	19.8	21.7	----	----
Cadmium	7440-43-9	E440/CG	0.020	mg/kg		0.155	0.184	0.253	----	----
Calcium	7440-70-2	E440/CG	50	mg/kg		52900	31100	30100	----	----
Chromium	7440-47-3	E440/CG	0.50	mg/kg		38.7	44.6	52.9	----	----
Cobalt	7440-48-4	E440/CG	0.10	mg/kg		8.93	9.41	11.7	----	----
Copper	7440-50-8	E440/CG	0.50	mg/kg		17.6	23.5	26.2	----	----
Iron	7439-89-6	E440/CG	50	mg/kg		20100	22900	26500	----	----
Lead	7439-92-1	E440/CG	0.50	mg/kg		9.20	10.7	11.7	----	----
Lithium	7439-93-2	E440/CG	2.0	mg/kg		20.2	22.2	26.4	----	----
Magnesium	7439-95-4	E440/CG	20	mg/kg		32900	23000	21700	----	----
Manganese	7439-96-5	E440/CG	1.0	mg/kg		471	294	442	----	----
Mercury	7439-97-6	E510/CG	0.0050	mg/kg		0.0233	0.0328	0.0297	----	----
Molybdenum	7439-98-7	E440/CG	0.10	mg/kg		0.36	0.32	0.44	----	----
Nickel	7440-02-0	E440/CG	0.50	mg/kg		25.4	28.6	35.3	----	----
Phosphorus	7723-14-0	E440/CG	50	mg/kg		711	893	727	----	----
Potassium	7440-09-7	E440/CG	100	mg/kg		4390	5270	5420	----	----
Selenium	7782-49-2	E440/CG	0.20	mg/kg		0.28	0.43	0.51	----	----
Silver	7440-22-4	E440/CG	0.10	mg/kg		0.11	0.14	0.12	----	----
Sodium	7440-23-5	E440/CG	50	mg/kg		248	152	166	----	----
Strontium	7440-24-6	E440/CG	0.50	mg/kg		40.3	38.5	48.7	----	----
Sulfur	7704-34-9	E440/CG	1000	mg/kg		<1000	<1000	<1000	----	----
Thallium	7440-28-0	E440/CG	0.050	mg/kg		0.211	0.254	0.283	----	----
Tin	7440-31-5	E440/CG	2.0	mg/kg		<2.0	<2.0	<2.0	----	----
Titanium	7440-32-6	E440/CG	1.0	mg/kg		414	456	456	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	SW07-GL006	SW07-GL007	SE12-GL008	----	----
					Client sampling date / time	20-Sep-2023 10:00	20-Sep-2023 11:00	20-Sep-2023 14:30	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		WP2324006-006	WP2324006-007	WP2324006-008	--------	--------
						Result	Result	Result	----	----
Metals										
Tungsten	7440-33-7	E440/CG	0.50	mg/kg		<0.50	<0.50	<0.50	----	----
Uranium	7440-61-1	E440/CG	0.050	mg/kg		1.43	1.31	3.02	----	----
Vanadium	7440-62-2	E440/CG	0.20	mg/kg		37.7	46.6	54.1	----	----
Zinc	7440-66-6	E440/CG	2.0	mg/kg		57.7	67.3	81.9	----	----
Zirconium	7440-67-7	E440/CG	1.0	mg/kg		3.6	9.0	7.1	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WP2324006**	Page	: 1 of 7
Client	: **WSP Canada Inc.**	Laboratory	: ALS Environmental - Winnipeg
Contact	: Darren Keam	Account Manager	: Judy Dalmaijer
Address	: 1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	: 1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	: 204 477 6650	Telephone	: +1 204 255 9720
Project	: CA-WSP-181-03988-01 TSK05.01	Date Samples Received	: 21-Sep-2023 13:00
PO	: CA-WSP-181-03988-01 TSK05.01	Issue Date	: 27-Sep-2023 15:49
C-O-C number	: ----		
Sampler	: ----		
Site	:		
Quote number	: 2023 Standing offer		
No. of samples received	: 8		
No. of samples analysed	: 8		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag NE13-GL001	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag NE13-GL002	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag NE13-GL003	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag NW07-GL004	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag SE12-GL008	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag SW07-GL005	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag SW07-GL006	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag SW07-GL007	E510	20-Sep-2023	26-Sep-2023	28 days	6 days	✓	27-Sep-2023	28 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag NE13-GL001	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag NE13-GL002	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag NE13-GL003	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag NW07-GL004	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag SE12-GL008	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag SW07-GL005	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag SW07-GL006	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag SW07-GL007	E440	20-Sep-2023	26-Sep-2023	180 days	6 days	✓	27-Sep-2023	180 days	7 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	1154611	1	20	5.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1154612	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1154611	2	20	10.0	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1154612	2	20	10.0	10.0	✓
Method Blanks (MB)							
Mercury in Soil/Solid by CVAAS	E510	1154611	1	20	5.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1154612	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Calgary	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Calgary	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for Metals and Mercury	EP440 ALS Environmental - Calgary	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.

QUALITY CONTROL REPORT

Work Order	:**WP2324006**	Page	: 1 of 10
Client	:WSP Canada Inc.	Laboratory	:ALS Environmental - Winnipeg
Contact	:Darren Keam	Account Manager	:Judy Dalmaijer
Address	:1600 Buffalo Place Winnipeg MB Canada R3T 6B8	Address	:1329 Niakwa Road East, Unit 12 Winnipeg, Manitoba Canada R2J 3T4
Telephone	:	Telephone	:+1 204 255 9720
Project	:CA-WSP-181-03988-01 TSK05.01	Date Samples Received	:21-Sep-2023 13:00
PO	:CA-WSP-181-03988-01 TSK05.01	Date Analysis Commenced	:26-Sep-2023
C-O-C number	:----	Issue Date	:27-Sep-2023 15:29
Sampler	:---- 204 477 6650		
Site	:		
Quote number	:2023 Standing offer		
No. of samples received	:8		
No. of samples analysed	:8		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Kevin Baxter	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta
Shirley Li	Team Leader - Inorganics	Calgary Metals, Calgary, Alberta

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1154611)											
CG2313159-001	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0119	0.0111	0.0008	Diff <2x LOR	----
Metals (QC Lot: 1154612)											
CG2313159-001	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	2500	2520	0.761%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.62	0.64	0.02	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	3.32	3.41	2.62%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	73.0	73.8	1.08%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.14	0.14	0.002	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.129	0.130	0.0008	Diff <2x LOR	----
		Calcium	7440-70-2	E440	50	mg/kg	21100	21500	1.64%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	14.6	15.1	3.20%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	3.58	3.59	0.242%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	14.6	14.7	0.804%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	7890	8000	1.27%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	7.60	7.74	1.87%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	3.1	3.1	0.008	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	5190	5360	3.18%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	260	261	0.271%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.25	1.29	3.14%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	10.8	10.9	1.20%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	411	417	1.46%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	490	490	1	Diff <2x LOR	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	576	580	0.660%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	39.1	40.6	3.64%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.052	0.002	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1154612) - continued											
CG2313159-001	Anonymous	Titanium	7440-32-6	E440	1.0	mg/kg	50.1	50.0	0.280%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	7.12	7.44	4.42%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.286	0.295	0.009	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	9.18	9.20	0.268%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	66.2	66.7	0.794%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1154611)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1154612)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1154612) - continued						
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	---
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	---
Zinc	7440-66-6	E440	2	mg/kg	<2.0	---
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	---

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1154611)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
Metals (QCLot: 1154612)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.3	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.6	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	92.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	96.8	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	100.0	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.5	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.8	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	104	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.5	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	98.9	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.2	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.3	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	106	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	98.1	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	100	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	97.5	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	97.1	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	93.7	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.9	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1154612) - continued									
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.5	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1154611)									
	RM	Mercury	7439-97-6	E510	0.062 mg/kg	96.7	70.0	130	----
Metals (QCLot: 1154612)									
	RM	Aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	RM	Antimony	7440-36-0	E440	3.99 mg/kg	98.6	70.0	130	----
	RM	Arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	RM	Barium	7440-39-3	E440	105 mg/kg	103	70.0	130	----
	RM	Beryllium	7440-41-7	E440	0.349 mg/kg	106	70.0	130	----
	RM	Boron	7440-42-8	E440	8.5 mg/kg	120	40.0	160	----
	RM	Cadmium	7440-43-9	E440	0.91 mg/kg	100	70.0	130	----
	RM	Calcium	7440-70-2	E440	31082 mg/kg	94.5	70.0	130	----
	RM	Chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
	RM	Cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	RM	Copper	7440-50-8	E440	123 mg/kg	96.7	70.0	130	----
	RM	Iron	7439-89-6	E440	23558 mg/kg	99.0	70.0	130	----
	RM	Lead	7439-92-1	E440	267 mg/kg	98.8	70.0	130	----
	RM	Lithium	7439-93-2	E440	9.5 mg/kg	106	70.0	130	----
	RM	Magnesium	7439-95-4	E440	5509 mg/kg	103	70.0	130	----
	RM	Manganese	7439-96-5	E440	269 mg/kg	102	70.0	130	----
	RM	Molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
	RM	Nickel	7440-02-0	E440	26.7 mg/kg	100	70.0	130	----
	RM	Phosphorus	7723-14-0	E440	752 mg/kg	106	70.0	130	----
	RM	Potassium	7440-09-7	E440	1587 mg/kg	102	70.0	130	----
	RM	Silver	7440-22-4	E440	4.06 mg/kg	94.9	70.0	130	----
	RM	Sodium	7440-23-5	E440	797 mg/kg	98.0	70.0	130	----
	RM	Strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
	RM	Thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
	RM	Tin	7440-31-5	E440	10.6 mg/kg	99.8	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1154612) - continued									
	RM	Titanium	7440-32-6	E440	839 mg/kg	105	70.0	130	----
	RM	Uranium	7440-61-1	E440	0.52 mg/kg	97.0	70.0	130	----
	RM	Vanadium	7440-62-2	E440	32.7 mg/kg	101	70.0	130	----
	RM	Zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
	RM	Zirconium	7440-67-7	E440	5.73 mg/kg	103	70.0	130	----

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 17 - 776112

Page 1 of 1

Report To	Contact and company name below will appear on the final report
Company:	WSP Canada
Contact:	darren keam
Phone:	204-259-1488
	Company address below will appear on the final report
Street:	1600 Buffalo Pl
City/Province:	WPG/MB
Postal Code:	

Report Format / Distribution	
Select Report Format:	PDF ☐ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	darren.keam@wsp.com
Email 2	dana.bredin@wsp.com
Email 3	

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)			
Regular [R]	☑ Standard TAT if received by 3 pm - business days - no surcharges apply		
PRIORITY (Business Days)	4 day [P4-20%] ☐	EMERGENCY	1 Business day [E - 100%] ☐
	3 day [P3-25%] ☐		Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	2 day [P2-50%] ☐		
Date and Time Required for all E&P TATs:		dd-mmm-yy hh:mm	
For tests that can not be performed according to the service level selected, you will be contacted.			

Invoice To		
	Same as Report To	☑ YES ☐ NO
	Copy of Invoice with Report	☑ YES ☐ NO
Company:	C	
Contact:		

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	CAPayables@wsp.com
Email 2	

Project Information	
ALS Account # / Quote #:	
Job #:	CA-WSP-181-03988-01 tsk05.01
PO / AFE:	CA-WSP-181-03988-01 tsk 0.501
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	CCME	MECTURY	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	NE13-GL001	20/sep/23	16:45	Soil					
	NE13-GL002		17:00						
	NE13-GL003		15:45						
	NW07-GL004		13:30						
	SW07-GL005		12:20						
	SW07-GL006		10:00						
	SW07-GL007		11:00						
	SE12-GL008		14:30						

Environmental Division
Winnipeg
Work Order Reference
WP2324006

Telephone : +1 204 255 9720

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
Are samples taken from a Regulated DW System? ☐ YES ☐ NO	
Are samples for human consumption/ use? ☐ YES ☐ NO	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐	SIF Observations	Yes ☐	No ☐		
Ice Packs ☑	Ice Cubes ☐	Custody seal intact	Yes ☐	No ☐	
Cooling Initiated ☐					
INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
		9.8			

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Received by:	Date:	Time:
Annie McIntyre	Sept 21/23	12:15	[redacted]	SEP 21 2023	[redacted]		

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

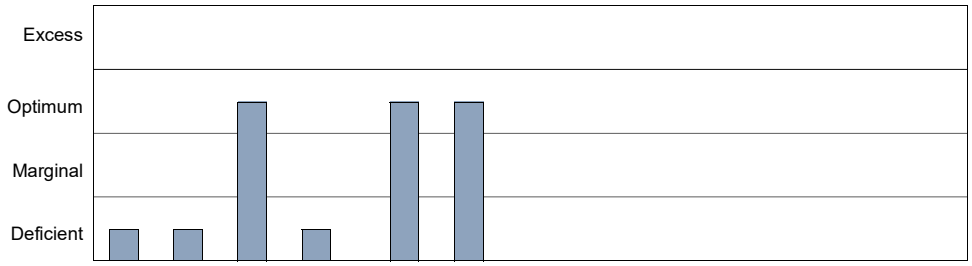
JUNE 2018 F

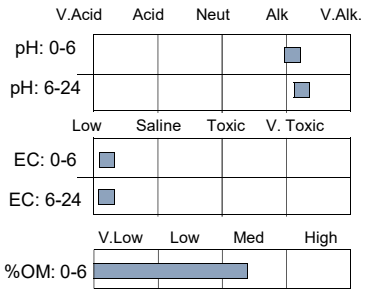
1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Farmers Edge Laboratories
1357 Dugald Road
Winnipeg, Manitoba Canada
R2J 0H3
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_157
		Grower Field Name:	NW13_GL001	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	NE 13-19-3 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_157-01	0-6	9	4.6	120	3	4800	950	15							8.2	0.39	5.6
230922_157-02	6-24	7			3										8.5	0.38	





	N	P	K	S
0-6 lb/Ac:	17	9	240	5
6-24 lb/Ac:	42			19
Total lb/Ac measured:	59	9	240	24
Estimated lb/Ac to 24 inch:	59			25

CEC (meq/100g):	32.1	Ca Base Sat. (%):	74.0	Mg Base Sat. (%):	24.0
Base Saturation (%):	100.0	K Base Sat. (%):	0.9	Na Base Sat (%):	0.2

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

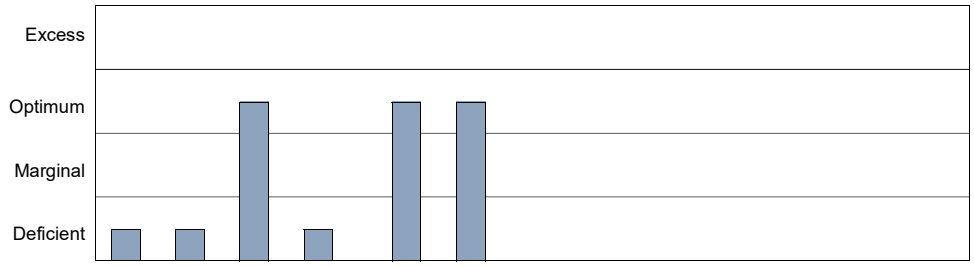
Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
Canola, Hybrid													
*Customer Yield	9.2 (Wet)	45 bu	0	75	40	0	15						
Calculated Yield	10.1 (Wet)	50 bu	0	90	40	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	75	35	0	10						
Calculated Yield	4.8 (Dry)	25 bu	0	20	20	0	10						

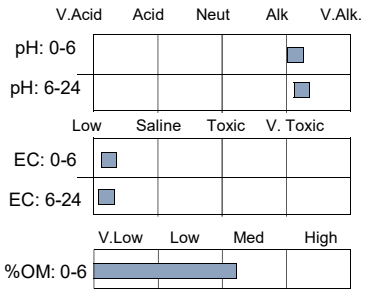
Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
The rate of P2O5 application is higher than the maximum recommended seed-placed P2O5 rate for the first crop (> 20 lbs/acre). The remaining may be banded.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.

Farmers Edge Laboratories
1357 Dugald Road
Winnipeg, Manitoba Canada
R2J 0H3
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_158
		Grower Field Name:	NW13_GL002	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	SW 13-19-3 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_158-01	0-6	9	6.4	230	3	5200	1200	24							8.3	0.45	4.9
230922_158-02	6-24	3			3										8.5	0.38	





	N	P	K	S
0-6 lb/Ac:	17	13	460	6
6-24 lb/Ac:	20			17
Total lb/Ac measured:	37	13	460	23
Estimated lb/Ac to 24 inch:	38			23

CEC (meq/100g):	36.2	Ca Base Sat. (%):	71.0	Mg Base Sat. (%):	27.0
Base Saturation (%):	100.0	K Base Sat. (%):	1.6	Na Base Sat (%):	0.3

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

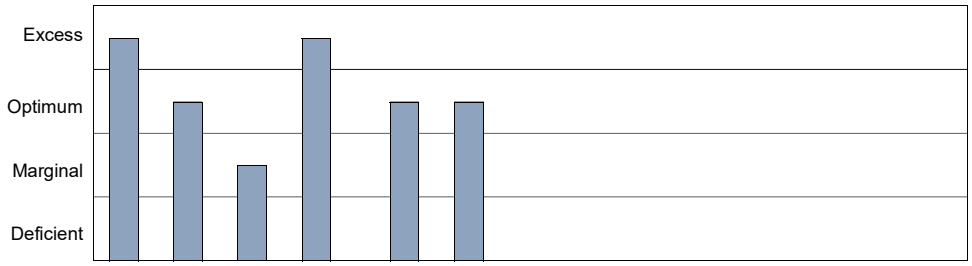
Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
Canola, Hybrid													
Calculated Yield	10.1 (Wet)	50 bu	0	110	30	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	100	25	0	15						
Calculated Yield	4.8 (Dry)	25 bu	0	40	15	0	10						

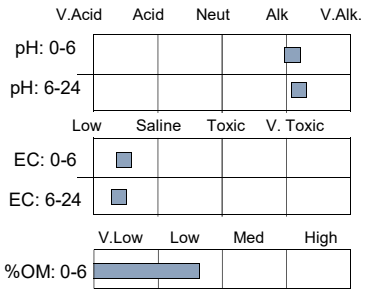
Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
High nitrogen rates may be more effective as split application.
The rate of P2O5 application is higher than the maximum recommended seed-placed P2O5 rate for the first crop (> 20 lbs/acre). The remaining may be banded.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.

Farmers Edge Laboratories
1357 Dugald Road
Winnipeg, Manitoba Canada
R2J 0H3
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_159
		Grower Field Name:	NW13_GL003	**Date Sampled:**	2023/09/22
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	NE 13-19-3 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_159-01	0-6	40	50.0	100	50	4200	920	41							8.2	0.89	3.3
230922_159-02	6-24	35			30										8.4	0.76	





	N	P	K	S
0-6 lb/Ac:	80	100	200	100
6-24 lb/Ac:	210			180
Total lb/Ac measured:	290	100	200	280
Estimated lb/Ac to 24 inch:	289			281

CEC (meq/100g):	29.0	Ca Base Sat. (%):	72.0	Mg Base Sat. (%):	26.0
Base Saturation (%):	100.0	K Base Sat. (%):	0.9	Na Base Sat (%):	0.6

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
Canola, Hybrid													
Calculated Yield	10.1 (Wet)	50 bu	0	0	15	20	10						
Calculated Yield	7.8 (Average)	38 bu	0	0	15	20	10						
Calculated Yield	4.8 (Dry)	25 bu	0	0	15	15	10						

Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.
Rates of Potassium less than 30 lbs/acre are for seed-placement. Broadcast and incorporate 60-80 lbs/acre of K2O as a substitute for 15-20 lbs/acre of K2O seed-placed potassium.

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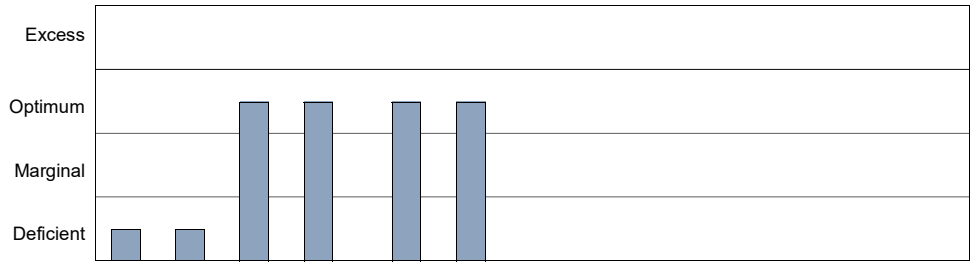
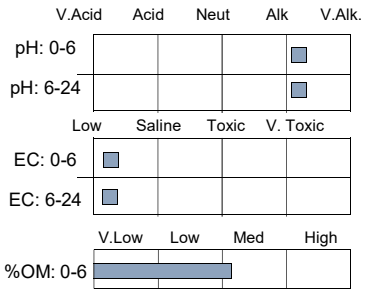
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_155
		Grower Field Name:	NW07_GL004	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	NW 7-19-4 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_155-01	0-6	10	6.0	180	5	5000	1200	27							8.4	0.52	4.6
230922_155-02	6-24	4			9										8.4	0.49	





	N	P	K	S
0-6 lb/Ac:	19	12	360	11
6-24 lb/Ac:	26			52
Total lb/Ac measured:	45	12	360	63
Estimated lb/Ac to 24 inch:	46			63

CEC (meq/100g):	35.2	Ca Base Sat. (%):	70.0	Mg Base Sat. (%):	28.0
Base Saturation (%):	100.0	K Base Sat. (%):	1.3	Na Base Sat (%):	0.3

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
Canola, Hybrid													
*Customer Yield	9.2 (Wet)	45 bu	0	90	30	0	15						
Calculated Yield	10.1 (Wet)	50 bu	0	105	30	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	95	25	0	15						
Calculated Yield	4.8 (Dry)	25 bu	0	35	15	0	10						

Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
High nitrogen rates may be more effective as split application.
The rate of P2O5 application is higher than the maximum recommended seed-placed P2O5 rate for the first crop (> 20 lbs/acre). The remaining may be banded.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.

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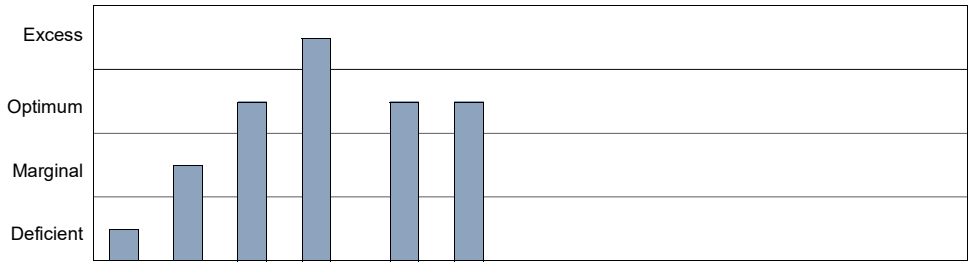
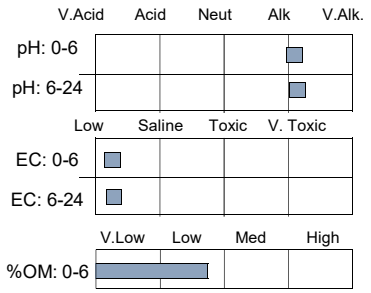
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_154
		Grower Field Name:	SW07_GL005	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	SW 7-19-4 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_154-01	0-6	12	12.0	280	14	5200	2000	31							8.2	0.50	3.5
230922_154-02	6-24	5			12										8.3	0.55	





	N	P	K	S
0-6 lb/Ac:	24	24	560	28
6-24 lb/Ac:	31			72
Total lb/Ac measured:	55	24	560	100
Estimated lb/Ac to 24 inch:	55			101

CEC (meq/100g):	43.7	Ca Base Sat. (%):	60.0	Mg Base Sat. (%):	38.0
Base Saturation (%):	100.0	K Base Sat. (%):	1.7	Na Base Sat (%):	0.3

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

Canola, Hybrid

Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
*Customer Yield	9.2 (Wet)	45 bu	0	100	25	0	15						
Calculated Yield	10.1 (Wet)	50 bu	0	120	25	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	105	20	0	15						
Calculated Yield	4.8 (Dry)	25 bu	0	35	15	0	10						

Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
High nitrogen rates may be more effective as split application.
The rate of P2O5 application is higher than the maximum recommended seed-placed P2O5 rate for the first crop (> 20 lbs/acre). The remaining may be banded.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.

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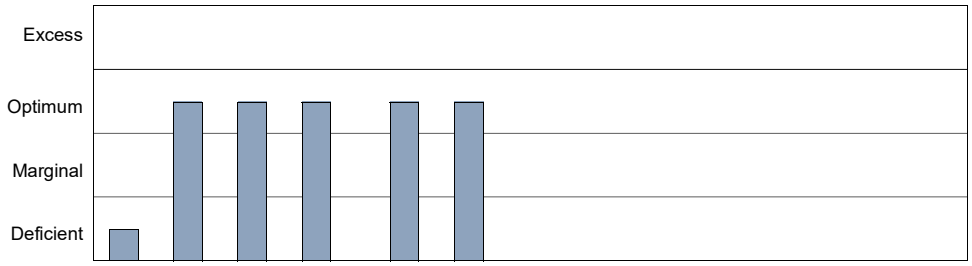
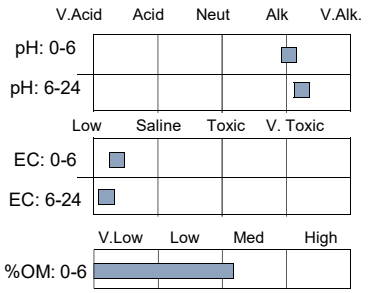
Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_160
		Grower Field Name:	SW07_GL006	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	SW 7-19-4 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_160-01	0-6	9	42.0	280	15	5500	1100	120							8.1	0.70	4.7
230922_160-02	6-24	5			4										8.5	0.38	





	N	P	K	S
0-6 lb/Ac:	18	84	560	30
6-24 lb/Ac:	28			25
Total lb/Ac measured:	46	84	560	55
Estimated lb/Ac to 24 inch:	46			55

CEC (meq/100g):	38.2	Ca Base Sat. (%):	72.0	Mg Base Sat. (%):	25.0
Base Saturation (%):	100.0	K Base Sat. (%):	1.9	Na Base Sat (%):	1.3

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

Canola, Hybrid

Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
*Customer Yield	9.2 (Wet)	45 bu	0	90	15	0	15						
Calculated Yield	10.1 (Wet)	50 bu	0	105	15	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	95	15	0	15						
Calculated Yield	4.8 (Dry)	25 bu	0	35	15	0	10						

Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
High nitrogen rates may be more effective as split application.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.

Farmers Edge Laboratories
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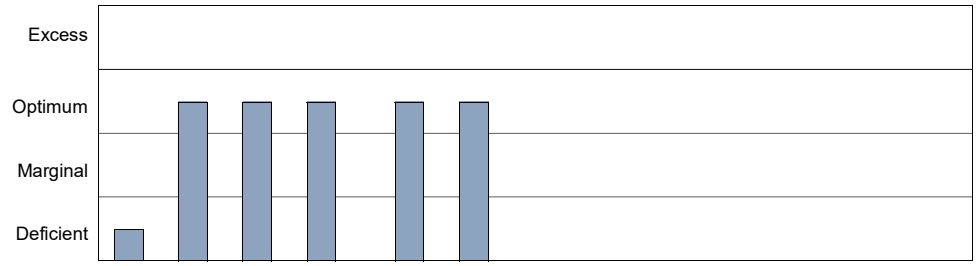
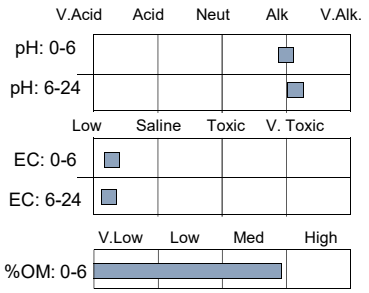
Winnipeg, Manitoba Canada
R2J 0H3
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_153
		Grower Field Name:	SW07_GL007	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	SE 7-19-4 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_153-01	0-6	11	10.0	290	9	5400	1400	26							8.0	0.55	7.7
230922_153-02	6-24	4			12										8.3	0.46	





	N	P	K	S
0-6 lb/Ac:	22	20	580	18
6-24 lb/Ac:	26			72
Total lb/Ac measured:	48	20	580	90
Estimated lb/Ac to 24 inch:	48			90

CEC (meq/100g):	39.3	Ca Base Sat. (%):	69.0	Mg Base Sat. (%):	29.0
Base Saturation (%):	100.0	K Base Sat. (%):	1.9	Na Base Sat (%):	0.3

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
Canola, Hybrid													
*Customer Yield	9.2 (Wet)	45 bu	0	75	25	0	15						
Calculated Yield	10.1 (Wet)	50 bu	0	95	25	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	80	20	0	10						
Calculated Yield	4.8 (Dry)	25 bu	0	25	15	0	10						

Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
The rate of P2O5 application is higher than the maximum recommended seed-placed P2O5 rate for the first crop (> 20 lbs/acre). The remaining may be banded.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.

Farmers Edge Laboratories
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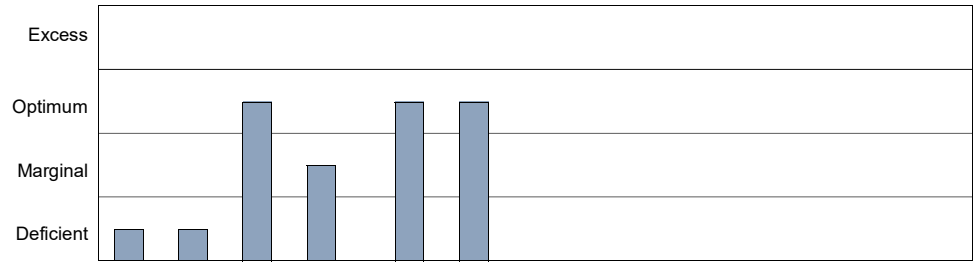
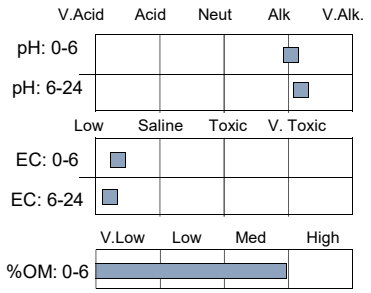
Phone: 1 204 233 4099

Report To:	WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB R3T 6B8	**Grower:**	RM of Gimli	**Lot Number:**	230922_156
		Grower Field Name:	SE12_GL008	**Date Sampled:**	2023/09/20
		Reference Field Name:		**Received Date:**	2023/09/22
		Legal Location:	SE 12-19-3 E1	**Date Reported:**	2023/09/25
Attention:	Darren Keam	**Total Acres:**	30		
Client ID:	18-0013	**Sampler:**	Annie McIntyre		

Sample ID	Depth	N ppm	P* ppm	K ppm	S ppm	Ca ppm	Mg ppm	Na ppm	B ppm	Cu ppm	Fe ppm	Mn ppm	Zn ppm	Cl ppm	pH	EC dS/m	OM %
230922_156-01	0-6	11	4.8	280	5	6600	1700	30							8.1	0.65	7.9
230922_156-02	6-24	4			6										8.4	0.42	





	N	P	K	S
0-6 lb/Ac:	22	10	560	9
6-24 lb/Ac:	23			34
Total lb/Ac measured:	45	10	560	43
Estimated lb/Ac to 24 inch:	45			43

CEC (meq/100g):	47.9	Ca Base Sat. (%):	69.0	Mg Base Sat. (%):	29.0
Base Saturation (%):	100.0	K Base Sat. (%):	1.5	Na Base Sat (%):	0.3

Sand (%): Silt (%): Clay (%): Texture:

Lab Comments:

' Bicarbonate-Extractable (Olsen) Phosphate

Fertility Recommendation

Previous Crop: Beans, Field (row) ☐ **Straw Removed** ☑ **Continuous Cropping** ☐ **Irrigated**

Yield Type	Rain Required (Inch)	Yield	% Yield Reduction	N	P2O5	K2O	S	B	Cu	Fe	Mn	Zn	Cl
Canola, Hybrid													
*Customer Yield	9.2 (Wet)	45 bu	0	75	40	0	15						
Calculated Yield	10.1 (Wet)	50 bu	0	95	40	0	15						
Calculated Yield	7.8 (Average)	38 bu	0	80	35	0	10						
Calculated Yield	4.8 (Dry)	25 bu	0	30	20	0	10						

Fertility recommendations are based on spring banding of N, S and seed placement of P, K. Consider total seed row fertilizer with regard to seedling damage.
The rate of P2O5 application is higher than the maximum recommended seed-placed P2O5 rate for the first crop (> 20 lbs/acre). The remaining may be banded.
The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.