

APPENDIX

B

SUPPORTING
DOCUMENTS

APPENDIX

B.1 LIST OF SPECIES OF CONSERVATION CONCERN WITHIN THE LAKE MANITOBA ECOREGION



Table A. Species of Conservation Concern within the Lake Manitoba Ecoregion

Category	Scientific Name	Common Name	Rank
Amphibian	<i>Ambystoma mavortium</i>	Western Tiger Salamander	S4S5
Amphibian	<i>Lithobates pipiens</i>	Northern Leopard Frog	S4
Amphibian	<i>Spea bombifrons</i>	Plains Spadefoot Toad	S2S3
Animal Assemblage	Gull Colony		SNR
Animal Assemblage	Snake Hibernaculum	Snake Hibernaculum	SNR
Animal Assemblage	Tern Colony		SNR
Bird	<i>Accipiter cooperii</i>	Cooper's Hawk	S4B
Bird	<i>Aechmophorus occidentalis</i>	Western Grebe	S4B
Bird	<i>Ammodramus bairdii</i>	Baird's Sparrow	S1B
Bird	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	S3B
Bird	<i>Anthus spragueii</i>	Sprague's Pipit	S2B
Bird	<i>Antrostomus vociferus</i>	Whip-poor-will	S3B
Bird	<i>Ardea herodias</i>	Great Blue Heron	S5B
Bird	<i>Asio flammeus</i>	Short-eared Owl	S2S3B
Bird	<i>Athene cunicularia</i>	Burrowing Owl	S1B
Bird	<i>Butorides virescens</i>	Green Heron	S1B
Bird	<i>Calcarius ornatus</i>	Chestnut-collared Longspur	S2B
Bird	<i>Cardellina canadensis</i>	Canada Warbler	S3B
Bird	<i>Cardinalis cardinalis</i>	Northern Cardinal	S1B,SUN
Bird	<i>Chaetura pelagica</i>	Chimney Swift	S2B
Bird	<i>Charadrius melodus</i>	Piping Plover	S1B
Bird	<i>Chlidonias niger</i>	Black Tern	S4B
Bird	<i>Chordeiles minor</i>	Common Nighthawk	S3B
Bird	<i>Contopus cooperi</i>	Olive-sided Flycatcher	S3B
Bird	<i>Contopus virens</i>	Eastern Wood-pewee	S4B
Bird	<i>Coturnicops noveboracensis</i>	Yellow Rail	S3B
Bird	<i>Dolichonyx oryzivorus</i>	Bobolink	S4B
Bird	<i>Falco peregrinus anatum</i>	Peregrine Falcon	S1B
Bird	<i>Hirundo rustica</i>	Barn Swallow	S4B
Bird	<i>Hydroprogne caspia</i>	Caspian Tern	S3B

Category	Scientific Name	Common Name	Rank
Bird	<i>Ixobrychus exilis</i>	Least Bittern	S2B
Bird	<i>Lanius ludovicianus excubitorides</i>	Loggerhead Shrike	S1B
Bird	<i>Lanius ludovicianus migrans</i>	Loggerhead Shrike	S1B
Bird	<i>Larus argentatus</i>	Herring Gull	S4B
Bird	<i>Larus delawarensis</i>	Ring-billed Gull	S5B
Bird	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	S3B
Bird	<i>Numenius borealis</i>	Eskimo Curlew	SNA
Bird	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron	S4B
Bird	<i>Pelecanus erythrorhynchos</i>	American White Pelican	S4B
Bird	<i>Phalacrocorax auritus</i>	Double-crested Cormorant	S5B
Bird	<i>Podiceps auritus</i>	Horned Grebe	S4B
Bird	<i>Podiceps nigricollis</i>	Eared Grebe	S4B
Bird	<i>Riparia riparia</i>	Bank Swallow	S5B
Bird	<i>Sterna forsteri</i>	Forster's Tern	S4B
Bird	<i>Strix varia</i>	Barred Owl	S4
Bird	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	S3B
Fish	<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	SU
Fish	<i>Ichthyomyzon unicuspis</i>	Silver Lamprey	SU
Fish	<i>Macrhybopsis storeriana</i>	Silver Chub	S5
Fish	<i>Margariscus nachtriebi</i>	Northern Pearl Dace	S5
Invertebrate	<i>Amblema plicata</i>	Threeridge	S3
Invertebrate	<i>Danaus plexippus</i>	Monarch	S3S4B
Invertebrate	<i>Fusconaia flava</i>	Wabash Pigtoe	S3
Invertebrate	<i>Hesperia dacotae</i>	Dakota Skipper	S2
Invertebrate	<i>Lasmigona complanata</i>	White Heelsplitter	S3
Invertebrate	<i>Ligumia recta</i>	Black Sandshell	S3
Invertebrate	<i>Orconectes immunis</i>	Calico Crayfish	S3
Invertebrate	<i>Quadrula quadrula</i>	Mapleleaf Mussel	S1
Invertebrate	<i>Strophitus undulatus</i>	Creeper	S5
Invertebrate	<i>Stylurus amnicola</i>	Riverine Clubtail	S3
Mammal	<i>Geomys bursarius</i>	Plains Pocket Gopher	S3
Plant	<i>Acmispon americanus</i>	Prairie Trefoil	S2S3

Category	Scientific Name	Common Name	Rank
Plant	<i>Agalinis aspera</i>	Rough Agalinis	S2
Plant	<i>Agalinis gattingeri</i>	Gattinger's Agalinis	S1
Plant	<i>Agalinis tenuifolia</i>	Narrow-leaved Agalinis	S2S3
Plant	<i>Agrimonia gryposepala</i>	Common Agrimony	S1S2
Plant	<i>Alisma gramineum</i>	Narrow-leaved Water-plantain	S1
Plant	<i>Ambrosia acanthicarpa</i>	Sandbur	S1
Plant	<i>Amorpha fruticosa</i>	False Indigo	S1S2
Plant	<i>Antennaria plantaginifolia</i>	Plantain-leaved Everlasting	S1S2
Plant	<i>Arisaema triphyllum</i> ssp. <i>triphyllum</i>	Jack-in-the-pulpit	S1S2
Plant	<i>Asarum canadense</i>	Wild Ginger	S3S4
Plant	<i>Asclepias verticillata</i>	Whorled Milkweed	S3
Plant	<i>Astragalus neglectus</i>	Neglected Milkvetch	S1
Plant	<i>Atriplex argentea</i>	Silver Saltbush	S2
Plant	<i>Blysmopsis rufa</i>	Red Bulrush	S2?
Plant	<i>Boltonia asteroides</i> var. <i>recognita</i>	White Boltonia	S2S3
Plant	<i>Botrychium pallidum</i>	Pale Moonwort	SH
Plant	<i>Bouteloua curtipendula</i>	Side-oats Grama	S2
Plant	<i>Bromus kalmii</i>	Wild Chess	S2S3
Plant	<i>Bromus porteri</i>	Porter's Chess	S2S3
Plant	<i>Calamagrostis montanensis</i>	Plains Reed Grass	S3
Plant	<i>Calamagrostis rubescens</i>	Pine Reed Grass	S1
Plant	<i>Cardamine bulbosa</i>	Spring Cress	SH
Plant	<i>Carex brevior</i>	Fescue Sedge	S3S4
Plant	<i>Carex crawei</i>	Crawe's Sedge	S3?
Plant	<i>Carex cristatella</i>	Crested Sedge	S1?
Plant	<i>Carex douglasii</i>	Douglas Sedge	S2
Plant	<i>Carex echinodes</i>	Quill Sedge	SNR
Plant	<i>Carex emoryi</i>	Emory's Sedge	S2?
Plant	<i>Carex hallii</i>	Hall's Sedge	S1S2
Plant	<i>Carex hystericina</i>	Porcupine Sedge	S3
Plant	<i>Carex livida</i>	Livid Sedge	S3
Plant	<i>Carex parryana</i>	Parry's Sedge	S3

Category	Scientific Name	Common Name	Rank
Plant	<i>Carex prairea</i>	Prairie Sedge	S3S4
Plant	<i>Carex projecta</i>	Necklace Sedge	S3?
Plant	<i>Carex sterilis</i>	Dioecious Sedge	S2
Plant	<i>Carex supina</i> ssp. <i>spaniocarpa</i>	Weak Sedge	S2S3
Plant	<i>Carex tetanica</i>	Rigid Sedge	S3
Plant	<i>Carex vulpinoidea</i>	Fox Sedge	S3
Plant	<i>Celtis occidentalis</i>	Hackberry	S1?
Plant	<i>Circaea canadensis</i> ssp. <i>canadensis</i>	Large Enchanter's-nightshade	S2
Plant	<i>Cirsium discolor</i>	Field Thistle	S1
Plant	<i>Clematis ligusticifolia</i>	Western Virgin's-bower	S1
Plant	<i>Clematis virginiana</i>	Virgin's-bower	S2?
Plant	<i>Corispermum americanum</i> var. <i>americanum</i>	American Bugseed	S3
Plant	<i>Corispermum villosum</i>	Hairy Bugseed	S1S2
Plant	<i>Cornus alternifolia</i>	Alternate-leaved Dogwood	S3
Plant	<i>Cryptotaenia canadensis</i>	Canadian Honewort	S1
Plant	<i>Cuscuta pentagona</i>	Field Dodder	SU
Plant	<i>Cyperus erythrorhizos</i>	Red-root Flatsedge	S1
Plant	<i>Cyperus houghtonii</i>	Houghton's Umbrella-sedge	S2S3
Plant	<i>Cyperus schweinitzii</i>	Schweinitz's Flatsedge	S2
Plant	<i>Cypripedium candidum</i>	Small White Lady's-slipper	S1
Plant	<i>Dalea villosa</i> var. <i>villosa</i>	Hairy Prairie-clover	S2S3
Plant	<i>Desmodium canadense</i>	Beggar's-lice	S2
Plant	<i>Dichanthelium linearifolium</i>	White-haired Panic-grass	S2?
Plant	<i>Draba reptans</i>	Creeping Whitlow-grass	S2
Plant	<i>Elatine americana</i>	American Waterwort	S1
Plant	<i>Elodea nuttallii</i>	Nuttall's Waterweed	S1?
Plant	<i>Elymus diversiglumis</i>	Various-glumed Wild Rye	S1S2
Plant	<i>Elymus hystrix</i>	Bottle-brush Grass	S2
Plant	<i>Epilobium brachycarpum</i>	Annual Willowherb	SU
Plant	<i>Eragrostis hypnoides</i>	Creeping Teal Love Grass	S3
Plant	<i>Euphorbia geyeri</i>	Prostrate Spurge	S2
Plant	<i>Festuca hallii</i>	Plains Rough Fescue	S3

Category	Scientific Name	Common Name	Rank
Plant	<i>Festuca subverticillata</i>	Nodding Fescue	S1
Plant	<i>Fraxinus nigra</i>	Black Ash	S2S3
Plant	<i>Galium aparine</i>	Cleavers	S3
Plant	<i>Gentiana puberulenta</i>	Downy Gentian	S2
Plant	<i>Halerpestes cymbalaria</i>	Seaside Crowfoot	S5
Plant	<i>Helianthus nuttallii</i> ssp. <i>rydbergii</i>	Tuberous-rooted Sunflower	S2
Plant	<i>Helianthus pauciflorus</i> ssp. <i>pauciflorus</i>	Stiff Sunflower	SU
Plant	<i>Heteranthera dubia</i>	Water Star-grass	S2S3
Plant	<i>Hudsonia tomentosa</i>	False Heather	S3
Plant	<i>Hypoxis hirsuta</i>	Yellow Stargrass	S3S4
Plant	<i>Krigia biflora</i>	Two-flowered Dwarf-dandelion	S2S3
Plant	<i>Lactuca floridana</i>	Woodland Lettuce	SH
Plant	<i>Lechea intermedia</i>	Pinweed	S1?
Plant	<i>Leersia oryzoides</i>	Rice Cutgrass	S3
Plant	<i>Leucophysalis grandiflora</i>	Large White-flowered Ground-cherry	S3S4
Plant	<i>Linum sulcatum</i>	Grooved Yellow Flax	S3
Plant	<i>Lysimachia quadriflora</i>	Whorled Loosestrife	S2
Plant	<i>Menispermum canadense</i>	Canada Moonseed	S3
Plant	<i>Muhlenbergia andina</i>	Foxtail Muhly	S1
Plant	<i>Musineon divaricatum</i>	Leafy Musineon	S1S2
Plant	<i>Nassella viridula</i>	Green Needle Grass	S3S4
Plant	<i>Oenothera perennis</i>	Sundrops	S1
Plant	<i>Orobanche ludoviciana</i>	Louisiana Broom-rape	S2
Plant	<i>Orobanche uniflora</i>	One-flowered Broom-rape	S1
Plant	<i>Osmorhiza claytonii</i>	Hairy Sweet Cicely	S2?
Plant	<i>Osmorhiza depauperata</i>	Blunt-fruited Sweet Cicely	S2
Plant	<i>Ostrya virginiana</i>	Hop-hornbeam	S2
Plant	<i>Parietaria pensylvanica</i>	American Pellitory	S3S4
Plant	<i>Pellaea glabella</i> ssp. <i>occidentalis</i>	Western Dwarf Cliffbrake	S2
Plant	<i>Penthorum sedoides</i>	Ditch-stonecrop	S1S2
Plant	<i>Phryma leptostachya</i>	Lopseed	S3
Plant	<i>Platanthera orbiculata</i>	Round-leaved Bog Orchid	S3S4

Category	Scientific Name	Common Name	Rank
Plant	<i>Polygala verticillata</i>	Whorled Milkwort	S2
Plant	<i>Polygala verticillata</i> var. <i>isocycla</i>	Whorled Milkwort	S2
Plant	<i>Potamogeton illinoensis</i>	Illinois Pondweed	S1?
Plant	<i>Sanguinaria canadensis</i>	Blood-root	S2
Plant	<i>Sceptridium multifidum</i>	Leathery Grape-fern	S3
Plant	<i>Shinnersoseris rostrata</i>	Annual Skeletonweed	S1S2
Plant	<i>Sisyrinchium campestre</i>	White-eyed Grass	S3
Plant	<i>Solidago riddellii</i>	Riddell's Goldenrod	S2S3
Plant	<i>Sporobolus compositus</i>	Tall Dropseed	S1
Plant	<i>Sporobolus neglectus</i>	Annual Dropseed	S2S3
Plant	<i>Symphotrichum sericeum</i>	Western Silvery Aster	S2S3
Plant	<i>Townsendia exscapa</i>	Silky Townsend-daisy	S2
Plant	<i>Verbena bracteata</i>	Bracted Vervain	S3
Plant	<i>Verbena urticifolia</i>	White Vervain	S1
Plant	<i>Vernonia fasciculata</i>	Western Ironweed	S1
Plant	<i>Veronicastrum virginicum</i>	Culver's-root	S1S2
Plant	<i>Viola labradorica</i>	Early Blue Violet	S3
Reptile	<i>Chelydra serpentina</i>	Snapping Turtle	S3
Reptile	<i>Plestiodon septentrionalis</i>	Northern Prairie Skink	S1
Reptile	<i>Thamnophis radix</i>	Western Plains Garter Snake	S4
Reptile	<i>Thamnophis sirtalis</i>	Red-sided Garter Snake	S4
Reptile	<i>Thamnophis sirtalis parietalis</i>	Red-sided Garter Snake	S4

APPENDIX

B.2 FIELD STORAGE MEMO





MEMO

TO: Manitoba Sustainable Development, Environmental Approvals Branch
FROM: Darren Keam, Manager, Environmental Management, WSP
SUBJECT: City of Winnipeg Biosolids Field Storage
DATE: April 18, 2017

1.0 INTRODUCTION

The objective of this memo is to provide supporting documentation to Manitoba Sustainable Development, Environmental Approvals Branch for consideration of the temporary field storage of Class B biosolids materials generated by the City of Winnipeg's North End Sewage Treatment Plant (NEWPCC) prior to land application. Approval of temporary field storage of this material is requested to support an Environment Act Proposal that is currently being developed by MMM Group Limited on behalf of the City of Winnipeg for a future biosolids land application program. Supporting documentation presented in this memo includes existing regulatory frameworks, best management practices, and environmental aspects and associated mitigation measures utilized across Canada and in the U.S.

Problem statement: In the full City of Winnipeg Biosolids Land Application Program it is anticipated that approximately 20,000 wet tonnes of Class B biosolids will be land applied annually. NEWPCC produces nearly 4,000 wet tonnes monthly and can only house a minimum volume on-site. This requires the biosolids produced between May and September (start of land application program) to be hauled daily (between 6 and 12 trucks daily) from the NEWPCC to a temporary storage facility(s) until land application can proceed after crop harvest.

Objective statement: To provide environmentally safe field storage for biosolids from the NEWPCC on an annual basis during the growing season, at or near targeted application fields in the given year. It is anticipated that the application fields will be established on a rotation basis (1 in 3 or 4 years) and therefore field storage requirements would follow the same rotation.

2.0 CANADIAN FEDERAL AND PROVINCIAL REGULATORY FRAMEWORK

A summary of Federal and Provincial regulations, guidelines and best management practices utilized across Canada are presented in this Section in support of the temporary storage of biosolids materials from the City of Winnipeg NEWPCC.

2.1 Federal Guidance Document

The Canadian Council of Ministers of the Environment (CCME), 2012, Guidance Document for the Beneficial Use of Municipal Biosolids, Municipal Sludge and Treated Septage. PN 1473 provides guidance on requirements for stockpiling and storage of wastewater residuals prior to land application



Section 2.5.3 Stockpiling and Storage, states that:

In some land application programs stockpiling is done to develop an inventory of wastewater residuals for land application. Stockpiling is a short-term, interim activity prior to land application and should not be used as a long-term management method. Considerations for wastewater residuals storage are:

- wastewater residuals form and quantity which relates to the potential for runoff, leaching, and fugitive or point source emissions,
- wastewater residuals quality including odour and vector attraction potential,
- proposed length of time for storage of the wastewater residuals and the effects of seasonal climate variations,
- spontaneous combustibility,
- public access to the site,
- Site specific factors such as topography, soil characteristics, presence of flora and fauna, current and neighbouring land use.

Stockpiling must be completed in a manner that prevents the movement of wastewater residuals outside of the stockpile area. The characteristics of wastewater residuals local climate and legislation influence containment requirements. A contained vessel such as a lined lagoon or sealed, leak-proof tank may be required for liquid wastewater residuals while berms and an impermeable surface may serve to contain dewatered wastewater residuals. Covering the stockpile may be required in areas with significant precipitation (rain or snow) to prevent the ingress of water and the egress of wastewater residuals. In addition, materials may be combustible under certain conditions, undergo self-heating and spontaneous combustion (e.g., from heat generated during microbial decomposition). Management plans should be developed to prevent this occurrence and contingency plans should be put in place to respond appropriately. Refer to provincial/territorial/federal standards, requirements or guidelines for stockpiling and storage restrictions.

When selecting a location for stockpiling wastewater residuals, site characteristics and sensitive features such as surface water and wells (groundwater) must be considered for environmental protection. A contingency plan must also be developed to identify actions to be taken in the event of a spill to avoid adverse effects.

Applicability to Temporary Storage of City of Winnipeg's Biosolids

The City will include best management practices for field storage of biosolids materials based on the CCME guidance document and will take into consideration local environmental characteristics and sensitive features when selecting temporary storage sites. Key features of a BMP would be outlined in the EAP submission to MSD.

2.2 Provincial Regulations

2.2.1 Manitoba - Environment Act, Livestock Manure and Mortalities Management Regulation (42/98)

The current regulatory framework in Manitoba designates the management of biosolids to the *Environmental Act* and the *Classes of Development Regulation*; no specific requirements for the field storage of biosolids are defined.



However, the *Environment Act, Livestock Manure and Mortalities Management Regulation* (LMMMMR) (42/98) does address storage and composting of livestock manure. Provided below is a brief summary of this applicable regulation.

Definitions under the LMMMMR:

- (1) Field storage means solid livestock manure that is stored in the open air other than in a manure storage facility.
- (2) Solid manure means manure that contains more than 25% solid matter and does not flow when piled.

Pertinent Sections within the LMMMMR:

Storage methods 3(1): No person shall store solid manure in an agricultural operation except (a) in a manure storage facility; or b) as field storage.

Field Storage (applicable clauses cited only):

7(1) No person shall store livestock manure as field storage other than solid manure.

- 7(2) A person who stores solid manure as field storage shall;
- a) locate the livestock manure at least 100m from any surface watercourse, sinkhole, spring or well; and
 - b) store the livestock manure in a manner that does not cause pollution of surface water, groundwater or soil.

7(3) An operator shall construct dikes or other works around a field storage area that are effective to prevent the escape of livestock manure that may cause pollution of surface water, groundwater or soil, if generally accepted agricultural practices indicate their necessity. The operator shall maintain the effectiveness of the dikes or other works for so long as the field storage area is used to store livestock manure.

7(6) An operator shall remove and dispose of all livestock manure in a field storage area no later than November 10 of the year following any year when the operator stores livestock manure in the area.

7(7) After the manure is removed, the field storage area must remain empty of manure for at least 12 months. Before storing livestock manure in the area again, the operator must grow a crop on the emptied manure storage area that will deplete the area of any leached nutrients.

Applicability to Temporary Storage of City of Winnipeg's Biosolids

The City of Winnipeg biosolids on average are greater than 25% solids (between 25% and 28%). Based on the criteria established under the LMMMMR biosolids meet the criteria for field storage based on percent solids, slumping needs to be confirmed. Mitigation measures as outlined in 7 (3, 6, and 7) can all be effectively applied.

In order to minimize risk to humans, environmental health and safety and control odour from the land application of biosolids materials, buffer zones will be established as outlined in the *Nutrient Management Regulation* (62/2008) under *The Water Protection Act* (C.C.S.M. c. W65) and the Farm Practices Guidelines for Pig Producers in Manitoba (April 2007). Buffer zones

around residential areas, residences, groundwater wells and surface water drainage systems will be established. An example of buffer zones are outlined in Table 1.

Table 1. Example of Buffer Zones

Description	Recommended Buffer Zone Distance
Identified groundwater well	50 m
Presence of clay and clay till to a depth of 1.5 metres.	n/a
Residential areas	400 m ¹ (1312 ft)
Occupied Residence (other than the residence occupied by the owner of the land on which the biosolids are to be applied)	75 m ¹ (246 ft)
Property line with residence	10 m ¹ (33 ft)
Property line without residence	1.0 m ¹ (3.3 ft)

Notes:

¹ *Farm Practices Guidelines for Pig Producers in Manitoba (April 2007)* if surface applied and incorporated within 48 hours.

2.2.2 Ontario - Nutrient Management Act (200) Regulation (267/03) – Nutrient Management Protocol, Temporary Field Storage of Non-Agricultural Source Material, Publication date: January 2016, Last reviewed November 1, 2016. Accessed March 1, 2017

As Stated in the *Nutrient Management Act*: “As of January 1, 2011, the land application and some on-farm storage of Non-Agricultural Source Material (NASM) is regulated under Ontario *Regulation 267/03*, as amended (the "Regulation"), which is made under the *Nutrient Management Act, 2002* (NMA). If a material is to be stored at an agricultural operation under a NASM plan for more than 24 hr, it must be kept in either a permanent nutrient storage facility or a temporary field nutrient storage site.”

“Some types of NASM can be temporarily stored at a field prior to application if a number of regulatory requirements are met. These regulatory requirements take into account the characteristics of the material and the characteristics of the temporary field storage site. This information is used to determine if, and for how long, the NASM can be stored in a specific temporary field storage site.”

Only material meeting the definition of "solid" in section 1 of the Regulation can be stored in a temporary field storage site. Solid, in relation to prescribed materials or nutrients, is defined as: "... having a dry matter content of 18 per cent, or more, or a slump of 150 mm, or less, using the (slump test) set out in Schedule 9 to Regulation 347 made under the Ontario *Environmental Protection Act*..."

Odour

NASMs have been divided into three categories based on odour detection thresholds. Table 2 is a summary of the odour categories and examples of materials that fit into each category. Solid NASM that is OC3 cannot be put into temporary field storage.

Table 2. Odour Categories for NASM

Category	Definition	Example Materials*
Odour Category 1 (OC1)	Odour detection threshold of <500 odour units/m ³	<ul style="list-style-type: none"> leaf and yard waste composted leaf and yard waste
Odour Category 2 (OC2)	Odour detection threshold of >=500 to <1,500 odour units/m ³	<ul style="list-style-type: none"> culled fruit and vegetables solid pulp and paper biosolids
Odour Category 3 (OC3)	Odour detection threshold >=1,500 to <4,500 odour units/m ³	<ul style="list-style-type: none"> grease trap waste sewage biosolids dewatered by high speed centrifuge

Note: Materials for >4,500 odour units/m³ cannot be land-applied to agricultural land.

*A complete list of NASMs and their odour category can be found in the Nutrient Management Tables.

Location of Temporary Field Storage Sites

If solid NASM is stored in a temporary field storage site for longer than 24 hr, the site must meet ALL the minimum site requirements for NASM temporary field storage sites. OC3 NASM material (Odour detection material 1,500 to 4,500 odour units/m³) cannot be stored in temporary field storage sites.

Applicability to Temporary Storage of City of Winnipeg's Biosolids:

Based on this regulation, without further assessment or mitigation, City of Winnipeg biosolids would not be permitted to be stored in temporary field storage sites. However, it is our interpretation that these regulations are developed in context to conflicting land uses in close proximity to each other, a perspective that is less applicable in rural Manitoba.

2.2.3 New Brunswick – The Department of Environment and Local Government, Guidelines for the Beneficial Use of Industrial By-Products as Soil Amendments (March 2014)

Under the New Brunswick guidelines, specific requirements may be included in the Approval to Operate (Permit), both at the Generator's site and the End User's site (farm field). General terms and conditions that are applied to materials that possess an Agronomic Value (MAV) are based on CCME material categories Class A, B and C. These terms and conditions that apply to Class B MAV include:

- a) Storage requirements will be part of the Approval to Operate.



- b) Care must be taken that the environment is protected from any runoff, which may contaminate water.
- c) If odours are an issue with the MAV, storage must be in a location such that odours will not negatively impact the neighbors.
- d) The maximum volume of MAV allowed at the End Users site is what will be used in one growing season.
- e) If the MAV is stored on End User's site for more than 30 days, it must be covered to prevent runoff or blowing. The maximum time a MAV may be stored at the End User's site is 8 months.
- f) The Generator is responsible for the integrity of the temporary storage at the End Users site, unless otherwise stated in the Approval to Operate.
- g) Storage site must be on sites with a slope of 3% or less.

Minimum set back requirements for storage of all MAV products:

- a) 1 meter above seasonal high water table and above bedrock;
- b) 30 meters from floodplain or nearest buried drain tile;
- c) 30 meters from adjacent properties;
- d) 300 meters from nearest well, or residence; and
- e) 100 meters from wetlands/ water courses.

Applicability to Temporary Storage of City of Winnipeg's Biosolids:

City of Winnipeg Biosolids material is considered a Class B material, therefore the applied terms and conditions of New Brunswick guidelines could be applied to the City of Winnipeg Environment Act Proposal.

2.2.4 Nova Scotia - Guidelines for Land Application and Storage of Municipal Biosolids in Nova Scotia, March 2010, Nova Scotia Environment

Pertinent sections of the Nova Scotia guideline include:

Class B Municipal Biosolids: Storage

The storage of Class B municipal biosolids may be required at times when land application is not possible due to inclement weather, unsuitable soil conditions or other adverse conditions. The following would apply:

- Class B municipal biosolids with a minimum solids content of 20% or greater may be stockpiled, or stored temporarily (< 1 week), at the application site prior to land application, provided that the municipal biosolids are intended for use at that location. Sufficient storage should be available to retain municipal biosolids during these circumstances.
- Class B municipal biosolids must be stored in a manner that minimizes the risk of odour or bioaerosol release. An application for Approval of land application and/or storage of Class B municipal biosolids must identify existing and proposed municipal biosolids temporary storage areas as outlined in Schedule 3.



- Class B municipal biosolids may be stored under Approval for more than one week only if they are fully covered with an impermeable material, such as a tarp. Stockpiles must be located to minimize contact with surface water run-off and to prevent infiltration of precipitation and the generation of leachate.
- Class B municipal biosolids with a solids content of 20% or greater, may be stored for more than one week on top of an impermeable surface such as a concrete pad or clay liner at the application site prior to land application. The impermeable surface shall have curbed sidewalls or berms on all sides constructed of the same material. Clay liners shall have a minimum thickness of 0.5 meters and an in-situ coefficient of permeability of 1.3×10^{-6} cm/sec.
- In addition, such storage areas must be located to minimize contact with surface water run-off and to prevent infiltration of precipitation and the generation of leachate.

Applicability to Temporary Storage of City of Winnipeg's Biosolids:

The City of Winnipeg biosolids would be suitable to accomplish field storage options under the Nova Scotia guidelines. Additional cover and/or an impermeable liner maybe required. Both a form of a cover and clay barrier (1.5m clay) are likely along with setback distances would be implemented.

Personal Communication with Lise LaBlanc with LP Consulting Ltd. (March 6, 2017) who manages the land application requirements for the City of Halifax and has nearly 10 years of experience in management and brokering of biosolids, advised that a beneficial alternative means to biosolids management is based on "at time of use delivery". It has been experienced in Nova Scotia that field stockpiling is a means to receiving public complaints about biosolids land application. The identified alternative is to have a direct delivery to farm producers at the time they are prepared to complete the application. While this approach is not regulated in Nova Scotia, Ms. LaBlanc identified this approach works well for them. In Manitoba, this approach in Manitoba is the limiting factor for the current proposed biosoldis program.

2.2.5 Quebec - Guidelines for the Beneficial Use of Fertilising Residuals, Reference Criteria and Regulatory Standards, 2008, Quebec Ministry of the Environment

Under the Quebec guidelines, fertilizer residuals (FRs) are "residual materials that can be used to maintain or improve, separately or simultaneously, plant nutrition, as well as the physical and chemical properties and biological activity of soils." This definition combines the expression "residual materials," as defined in section 1 of the Environment Quality Act (EQA), and the concept of "fertilizers and soil conditioners," as defined by the International Organization for Standardization (ISO, 1984).

Hence FRs are a subgroup of "fertilizing materials" which, according to international terminology, include both fertilizers and soil amendments. For example, a FR that is high in organic matter and low in nitrogen and phosphorus would be considered a "fertilizing material" in the soil amendment subcategory, even though it does not have any significant fertilizing properties. By convention, livestock waste (manure) and other "farm residuals" are not considered to be FRs, even though they are residual materials and have both fertilizing and soil



amendment properties as they are managed through a specific regulatory framework to these residuals. To clarify however, biosolds are considered a FR.

For regulatory purposes in Quebec, temporary storage at the application site is considered an integral part of the spreading activity. If the spreading activity is exempt from a Certificate of Authorization (CA) pursuant to the regulation, storage of the FR is likewise exempted. FRs may be stored for up to six months in the case of heaps on the ground, and up to 12 months in leak-proof storage facilities.

Exceptionally, an activity that does not meet all the storage criteria may still be authorized. The CA application must, however, contain compensatory measures to ensure compliance with section 20 of the EQA and, where applicable, a specific research protocol for validating these measures.

Table 3 provides a list of separation (setback) distances from sensitive features for the storage of FRs in order to protect air and water quality under the guideline and Table 4 provides additional requirements that must be met in order to minimize the production and transport of leachate water, which can contain high levels of nitrogen and phosphorus.

Table 3. Separation Distances for the Ground Storage of FRs to Protect Air and Water Quality
 (Table taken directly from Guidelines for the Beneficial Use of Fertilising Residuals, Reference Criteria and Regulatory Standards, 2008, Quebec Ministry of the Environment)

Environment to protect	Location	Basic requirements (protection vs nitrogen and phosphorus)	Additional requirements	
			P2	O2/O3
Groundwater	Groundwater catchment works intended for human consumption	300 m ^(1,2)		
	Rock outcrop	100 m		
Surface water	Agricultural ⁽³⁾ or non-agricultural ditch	15 m		
	Drainage furrow (dead furrow or plough furrow or grassed waterway) ⁽⁴⁾	1m	5 m	
	Watercourses ^(3, 5)	50 m	150 m	
	Lake, swamp, pond or natural marsh ^(3, 5)	50 m	150 m	
	2-year flood zone.	outside		
Air (bioaerosols)	Dwelling ⁽⁴⁾		100 m	
Air (odours)	Dwelling ⁽⁴⁾			O2 : 75 m ⁽⁶⁾ O3 : 500 m ⁽⁶⁾
Air (dust)	Dwelling ⁽⁴⁾	Dust must not be carried further than 2 m within the line of a neighbouring property. ⁽⁷⁾		

- (1) This is a regulatory standard pursuant to section 30 of the Groundwater catchment regulation (GCR). This distance is also designed to protect water from microbial contamination.
- (2) For certain collective catchment works, the GCR stipulates that storage must be done outside the virological protection area of a groundwater catchment site if the FR has been contaminated by human fecal matter, with the exception of BNQ-certified products.
- (3) The AOR does not contain any standards pertaining to field storage of FRs. It only prescribes standards for solid manures. See the notes in Table 10.2.
- (4) See Glossary.
- (5) Terms defined by the AOR. Under the AOR, the total flow area of a watercourse is > 2 m². In the context of FR storage, however, irrigation ponds for crops must be treated in the same manner as other ponds in order to ensure the safety of crops.
- (6) The risk of odour release is higher during handling (heap formation or handling). The distance may be reduced where written consent has been obtained from the owner or tenant of the neighbouring dwelling.
- (7) In the case of certain industrial residuals from dry dedusting, this is a mandatory standard under the Regulation respecting the quality of the atmosphere.

Note: A municipal biosolids from biological treatment with less than 2,000,000 E.coli/g, aged over 20 days is P2.

Table 8.4 Odour categories

Odour categories	Residuals
O1 (low odour) ^(1, 2)	<ul style="list-style-type: none"> • Cement kiln dust • Wood ashes • Lime mud from paper mills • Magnesium residuals • Other non-putrescible liming amendments • Composts (mature) • Dead leaves • Bark • Paper mill biosolids and deinking residuals with C:N \geq 70
O2 (malodorous) ^(1, 3)	<ul style="list-style-type: none"> • Municipal biosolids — lagoons not emptied since \geq 4 years • Municipal biosolids – dried ⁽⁶⁾ • Municipal biosolids – limed • Septic tank biosolids • Limed abattoir biosolids – see table 8.5 • Paper mill biosolids with C:N \geq 50 and $<$ 70, not from a kraft process • Paper mill biosolids from lagoons not emptied since \geq 4 years • Paper mill biosolids – acid treated
O3 (strongly malodorous) ^(1, 4)	<ul style="list-style-type: none"> • Municipal biosolids – biological treatment in a plant • Limed abattoir biosolids – see table 8.5 • Paper mill biosolids with C:N ratio $<$ 50, not acid treated, not originating from lagoons with prolonged accumulation and not resulting from a kraft process. • Paper mill biosolids from a kraft process, with C:N \geq 50 and $<$ 70 • Whey • Declassified milk • Potato residuals • Grass clippings
OC (out of category) ^(1, 5)	<ul style="list-style-type: none"> • Municipal biosolids from anaerobic digesters that are dehydrated using high-speed centrifuges, except if they have been deodorized by composting, liming or heat drying. • Paper mill biosolids from a kraft process, with a C:N ratio $<$ 50 that have not been treated for odours.

(1) The categories may be revised in some cases according to olfactometry test results (section 8.4.2). This may apply particularly when there is a specific little known deodorization process. For FRs not in the table, the category will be determined by olfactometry or by analogy, on a case-by-case basis by the regional office. When two categories are possible, choose the category with less restriction. As an example, for a papermill biosolid with a low C:N ratio, coming from a kraft process, but stabilized in a lagoon with accumulation $>$ 4 years, this biosolid is considered O2 rather than out of category;

(2) O1: odour $<$ solid dairy cattle manure;

(3) O2: similar to that of solid dairy cattle manure;

(4) O3: odour $>$ solid dairy cattle manure, but $<$ hog slurry;

(5) OC: odour $>$ hog slurry;

(6) Dried or granulated municipal biosolids must be protected from moisture to prevent microbial regrowth and to maintain their O2 status.

“Out-of-category” FRs cannot be used for agricultural purposes or in populated areas unless they have been properly deodorized or reclassified according to the applied guidelines.

Table 4. Preventative Measures to Reduce Nitrogen and Phosphorus Losses During Temporary Ground Storage of FRs and their Runoff into Surface or Groundwater

(Table taken directly from Guidelines for the Beneficial Use of Fertilising Residuals, Reference Criteria and Regulatory Standards, 2008, Quebec Ministry of the Environment)

FR dryness (alone or mixed)	Maximum volume per establishment ⁽¹⁾	Winter storage restrictions according to CHU zone ⁽²⁾	Waterproof covering (sheeting, tarpaulin, roof, capping, etc.) ⁽³⁾	Other restrictions
Liquid or < 15% dryness	Heaps on ground not permitted	Not applicable (N/A)	N/A	N/A
Non liquid and > 15% but < 20% dryness	< 250 m ³ ⁽⁴⁾	CHU 1: Dec. 1 to Feb. 28 CHU 2 and 3: Nov. 15 to Mar. 15 CHU 4 to 7: Nov. 1 to Mar. 31 Exception: These restrictions do not apply to paper mill biosolids.	For winter storage of paper mill biosolids	a) Location has not been used to store FRs or manure in the past 2 years. b) Heap must not be built on ground that is snow covered or has not been de-snowed. c) Protection from surface runoff and snow melt. d) Location slope ≤ 5%. e) Sowing should be done as soon as possible after the removal of heaps: soil must be decompacted where necessary.
Non liquid and > 20% but ≤ 25% dryness	According to the AERP	Ibid (above)	For storage from September to May • except if < 350 m ³ /establishment • or if < 21 days.	
Non liquid and > 25% but ≤ 30% dryness	According to the AERP	Ibid (above)	Ibid (above). Not required for paper mill biosolids with C:N ≥ 30	
Non liquid and > 30% dryness	According to the AERP	No restrictions	Ibid (above) Not required if: • paper mill biosolids ≥ 30% dryness (at the mill), • or ashes ≥ 50% dryness ⁽⁵⁾ , • or if total N + total P ₂ O ₅ < 1% (d.w.). Mandatory for granulated municipal biosolids ⁽⁶⁾	

- (1) The establishment is an agricultural operation, nursery, community garden, etc.
- (2) CHU = corn heat unit. For the location of CHU zones, visit: <http://nlwis-snite1.agr.gc.ca/chu-utm/index.phtml?lang=en-CA>.
- (3) The "capping" of a FR with a primary paper mill biosolid (deinking or from another process) is acceptable if carried out by a specialized promoter using a snowblower. The capping layer must be at least 30 cm thick and the residual used must have a minimum dryness of 40%. Heaps should be large to reduce the total surface to be capped.
- (4) This is not an annual volume, but the volume at any given point in time. For example, two successive heaps of 250 m³ on the same site, one in May and the other in June, count as 250 m³ at a given time.
- (5) Ashes and other pulverulent materials must be moistened or otherwise treated to prevent their dissemination by the wind.
- (6) Dry organic matter, such as granulated municipal biosolids, must be protected from precipitations. This prevents further fermentation, which would increase the release of odours and the risk of spontaneous combustion.

Note: AERP – Agro-environmental reclamation Plans



Applicability to Temporary Storage of City of Winnipeg's Biosolids:

Based on Quebec's regulation, without further assessment or mitigation, City of Winnipeg biosolids would not be permitted to be stored in temporary field storage sites. However, it is our interpretation, similar to Ontario's, that these regulations are developed in context to conflicting land uses in close proximity to each other, a perspective that is less applicable in rural Manitoba.

2.2.6 Alberta - Environmental Protection and Enhancement Act (R.S.A 2000, c.E-12)

Alberta Environment and Parks administers the *Environmental Protection and Enhancement Act* (R.S.A 2000, c.E-12). The Act provides the regulatory framework of biosolids management in Alberta. The Guidelines for the Application of Municipal Wastewater Sludge to Agricultural Land (2001) outlines the application of biosolids and municipal sludge to maximize the benefits and reduce potential hazards.

Personal Communication (March 2, 2017) with Mr. Gordon Dinwoodie with Alberta Parks indicated that these guidelines are currently under review and modification by the Province of Alberta. The 2001 guidelines do not address field storage of biosolids, however, Mr. Dinwoodie did indicate that the City of Edmonton and City of Calgary Biosolids Management Plans have permitted field storage of biosolids. Mr. Dinwoodie also expressed that it would be likely that the updated guidelines would address (permit) field storage with risk exposure control measures, primarily addressing best management practices that limit exposure.

Applicability to Temporary Storage of City of Winnipeg's Biosolids:

The current Alberta Guidelines for the Application of Municipal Wastewater Sludge to Agricultural Land (2001) are not dissimilar to the Manitoba approach to biosolids management. Based on the personal communications with Mr. Dinwoodie, Alberta is considering a standardized approach to permitting field storage of biosolids based on BMPs. This approach is similar to the mechanism that the City of Winnipeg Biosolids EAP would approach field storage.

2.2.7 British Columbia - Environmental Management Act and the Public Health Act, Organic Matter Recycling Regulation

The British Columbia Regulatory Framework for Biosolids is regulated by the *Environmental Management Act and the Public Health Act* with specific regulations administered in the *Organic Matter Recycling Regulation* (OMRR). This establishes five biosolids categories and outlines the requirements related to the production, distribution, storage, sale and use or land application of all categories of biosolids and biosolids-compost. It provides clear guidance for local governments, as well as compost and biosolids producers, on how to use organic material while protecting soil quality and drinking water sources.

Part 4 of the Organic Matter Recycling Regulation (B.C. Reg. 18/2002) outlines Storage and Land Application Requirements, Division 1 – Storage at a Land Application Site and includes:

Clause 16, Definitions establishes a "storage facility" means a structure for containing managed organic matter before its use under a land application plan, and includes a reservoir, lagoon,



cistern, gutter, tank or bermed area but does not include a vehicle or any mobile equipment used for the transportation of managed organic matter; and "storage site" means a site for storing a temporary stock of managed organic matter which is ready to be drawn upon for use as a fertilizer or soil conditioner under a land application plan.

Storage Methods

- Clause 17 (1) If managed organic matter, which is to be applied to land under a land application plan, is stored on a farm or at some other site, it must be stored
- (a) in a storage facility in accordance with the requirements of section 18, or
 - (b) at a storage site in accordance with the requirements of section 19.
- (2) Managed organic matter must only be stored on a farm if all of the managed organic matter is used on that farm.

Storage Facility

- Clause 18 A storage facility must
- (a) be of sufficient capacity to store all the managed organic matter to be used on the land application site for the period of time needed for its application as a fertilizer or soil conditioner,
 - (b) be located at least 15 metres from any watercourse and 30 metres from any source of water for domestic purposes, and
 - (c) be maintained in such a manner as to prevent the escape of managed organic matter.

Storage Site

- Clause 19 (1) Managed organic matter may only be stored at a storage site as follows:
- (a) for not more than 2 weeks if it is
 - (i) used within 2 weeks, and
 - (ii) stored in a manner that prevents the escape of managed organic matter;
 - (b) for more than 2 weeks if it is
 - (i) stored for no longer than 9 months,
 - (ii) located at least 30 metres from any watercourse or any source of water used for domestic purposes, and
 - (iii) stored in a manner that prevents the escape of managed organic matter.
- (2) Berms or other works must be constructed around the storage site if necessary to prevent the escape of managed organic matter.

The regulation also references requirements specific to rainy season storage, however this is not applicable to the Manitoba climatic conditions.

Applicability to Temporary Storage of City of Winnipeg's Biosolids:

The BC regulation establish parameters that permit the storage of biosolids based on: 1) volume required for site specific needs, 2) duration of storage period and site requirements and 3) Containment (if necessary). This approach is similar to the mechanism that the City of Winnipeg Biosolids EAP would approach field storage.

3.0 INTERNATIONAL GUIDELINES

3.1 United States Environmental Protection Agency (USEPA), Guide to Field Storage of Biosolids and Other Organic By-Products Used in Agricultural and for Soil Resource Management (July 2000)

The focus of the USEPA document is on management practices for field storage of biosolids prior to land application, as distinguished from land application and spreading. The document stresses recommended management practices for three critical control points: 1) the WWTP, 2) the transportation system, and 3) the field storage site. The term “*critical control point*”, as used in the USEPA document, means a location, event or process point at which specific monitoring and responsive management practices should be applied. If these points are controlled, the objectives and goals of a responsible and community-friendly practice can be achieved.

The term “*field storage*” as used in the USEPA document refers to temporary or seasonal storage. Storage operations involve an area of land or facilities constructed to hold biosolids until material is land applied on designated and approved sites. More permanently constructed storage facilities can involve state or locally permitted areas of land or facilities used to store biosolids. The permissible time limits for field storage vary by state and local jurisdiction. They are usually located at or near the land application site, and are managed so that biosolids come and go on a relatively short cycle, based on weather conditions, crop rotations, and land or equipment availability. Alternatively, storage sites are used to accumulate enough material to conduct an efficient spreading operation.

The operative concept for these recommendations is that site design and management requirements increase as the length of storage or volume of stored biosolids increases. These recommendations are based on practical field experience and are designed to protect water quality, minimize pathogen exposure risks, and reduce the potential for unacceptable off-site odors.

Site selection considerations applicable to all storage types include: climate, topography, soil/geology, buffer zones, odour prevention/aesthetics, accessibility and hauling distance and property issues. Other specific considerations to stockpiles include; design considerations, site selection and water management, operational practices, housekeeping, security and site restoration. An example of a field storage (stockpile) check list is provided below.

<u>Critical Control Point 3: Field Storage (Stockpile) Checklist</u>		
<i>(Involving dewatered cake, dried, or composted Class A or Class B Biosolids)</i>		
	Management	✓
1	Prepare and maintain a Field Management Plan	
2	Train employees to properly operate the site according to plan; conduct spill drills	
3	Critical Control Point 1: Work with WWTP to maximize biosolids stability, consistency, and quality; direct batches to appropriate sites.	
4	Critical Control Point 2: Transportation; Clearly mark site access routes and stockpile areas; conduct spill drills	
5	Maintain accurate and well organized records	
6	Designate a competent public relations person; maintain communication with stakeholders; notify agencies of reportable incidents; explain actions taken to respond to citizens concerns or complaints	
	Operations	✓
1	Use biosolids that stay consolidated and non-flowing; shape stockpiles whenever possible to shed water	
2	Minimize ponding and storage time to the extent feasible during hot, humid weather; manage accumulated water appropriately	
3	Inspect and maintain up-slope water diversions	
4	Inspect buffer zones to ensure run-off is not moving out of bounds	
5	Restrict public access and use temporary fencing to exclude livestock, where applicable; install signs; secure site appropriately	
6	Clean all vehicles and equipment before they exit onto public roads	
7	Train employees to use of appropriate sanitation practices; inspect for use	
8	Inspect for odors and conditions conducive to odors; apply chemicals or surface covering material to suppress odors if needed; consider the meteorological conditions and the potential for off-site odors when scheduling opening the storage pile and spreading of biosolids	

Source: United States Environmental Protection Agency (July 2000), Guide to Field Storage of Biosolids and Other Organic By-Products Used in Agricultural and for Soil Resource Management

Applicability to Temporary Storage of City of Winnipeg’s Biosolids:

The USEPA document is a practical approach to providing a mechanism to accomplish environmentally safe methods and measures for field biosolids storage for Class A and B material. This USEPA guide would be a cornerstone to the development of the City of Winnipeg EAP for the field storage component to develop environmental protection approach, good neighbour practices and meet regulatory compliance.



4.0 CITY OF WINNIPEG FIELD STORAGE APPROACH

Based on the review of Federal, Provincial and International jurisdictional approaches, the means of permitting some form of field storage of biosolids are either based on mitigation of potential environmental impact (New Brunswick, Nova Scotia, British Columbia, and Alberta (pers.com.)) or mitigation of offensive odour (Ontario and Qubec). Based on the document review and personal communications with a regulator and practitioner, there is recognition of the logistical limitation to provide delivery of biosolids in sufficient quantity to accomplish efficient and timely land application. Therefore, with sufficient qualifications to field storage site selection and implementation of beneficial management practices it is being permitted in various Canadian Provinces and the United States.

The proposed City of Winnipeg biosolids land application program is planned to land apply nearly 20,000 wet tonnes of biosolids annually. This amount of biosolids will require field delivery of material from May through to August inclusive, on a daily basis. To permit logistical management and economic viability to the program some form of seasonal field storage of biosolids material prior to application is required.

The City's proposed approach to field storage will be consistent with CCME Guidance Document (2012) best management practices, the LMMMR (42/98) and the USEPA Guidance document. In addition, the Environmental Act Proposal for the City of Winnipeg land application program intends to address environmental aspects and propose mitigations with the following approach to field storage:

Table 5. Measures Proposed by the City of Winnipeg to Mitigate Environmental Aspects Associated with Field Storage of Biosolids Materials

Proposed EAP Approach	Environmental Aspect to Mitigate	Supporting References for Proposed EAP Approach
Locate biosolids storage location at least 100m from any surface water course, sinkhole, and spring or well and in a manner that does not cause pollution of surface water, groundwater or soil.	Access to surface water, sinkhole, spring or well.	<ul style="list-style-type: none"> Manitoba Environment Act, LMMMR.
Only biosolids that contain more than 25% solids matter and/or meet a slump test requirement can be stored in field.	Access to surface water, sinkhole, spring or well.	<ul style="list-style-type: none"> Manitoba Environment Act, LMMMR.
Locate biosolids storage location at a site with the presence of clay and clay till to a depth of 1.5metres.	Access to groundwater impacts through leachate	<ul style="list-style-type: none"> Manitoba Environment Act Licence Schedule A as applied to biosolids land application programs.
Locate biosolids storage site at least 1600m from designated residential area, 300m from a residence, at least 30m from property line with residence and at least 15m from property line without residence.	Odour buffer zone and good neighbour practices.	<ul style="list-style-type: none"> Farm Practices Guidelines for Pig Producers in Manitoba (2007). Table 11 Recommended Distances from Residential Areas and Property Lines for Apply Manure. Application method: Irrigation – assumed to be most odour generating practice hence most separation distances applied. USEPA Guide to Field Storage of Biosolids National Manual of Good Practices for Biosolids, National Biosolids Partnership, June 2011.
Biosolids field storage shall be removed and land applied in a field storage area no earlier than May 1 and later than November 10 of the year stored.	Odour, exposure management	<ul style="list-style-type: none"> Manitoba Environment Act, LMMMR.
After the biosolids are removed, the field storage area must remain empty of biosolids for at least 12 months. Before storing biosolids in the area again, the site must grow a crop on the emptied biosolids storage area that will deplete the area of any leached nutrients.	Odour, exposure and nutrient management	<ul style="list-style-type: none"> Manitoba Environment Act, LMMMR.

Proposed EAP Approach	Environmental Aspect to Mitigate	Supporting References for Proposed EAP Approach
The field storage location would be established to be of sufficient capacity to store all the managed biosolids to be used on the land application site for the period of time needed for its application as a fertilizer.	Odour, exposure and nutrient management	<ul style="list-style-type: none"> • BC Environment Management Act Clause 18. • USEPA Guide to Field Storage of Biosolids • National Manual of Good Practices for Biosolids, National Biosolids Partnership, June 2011.
Develop a Best Management Practice, site selection requirement and operations checklist prior to implementing a field storage location.	Beneficial Management Practices and good neighbour practices	<ul style="list-style-type: none"> • USEPA Guide to Field Storage of Biosolids • National Manual of Good Practices for Biosolids, National Biosolids Partnership, June 2011.

Glossary of Terms (USEPA, 2000)

FIELD STORAGE

Temporary or seasonal storage area, usually located at the application site, which holds biosolids destined for use on designated fields. Note: the time limits for the same material to be stored continuously on-site before it must be land applied range from 24 hours to two years.

OFF-SITE STORAGE

Storage of biosolids at locations away from the wastewater treatment plant (WWTP) or from the point of generation. Several terms encompass various types of storage: Staging, Stockpiling, Field Storage, and Storage facility.

STAGING

The concurrent delivery and application of biosolids, allowing for the transfer of biosolids from transport vehicles to land application equipment. Dewatered materials may be off-loaded from delivery vehicles to temporary stockpiles to facilitate the loading of spreading equipment.

STOCKPILING

Holding of biosolids at an active field site long enough to accumulate sufficient material to complete the field application.

STORAGE

Placement of Class A or B biosolids in designated locations (other than the WWTP) until material is land applied; referred to as field storage. See also *Off-Site Storage*.

STORAGE FACILITY

An area of land or constructed facilities committed to hold biosolids until the material may be land applied at on- or off-site locations; may be used to store biosolids for up to two years. However, most are managed so that biosolids come and go on a shorter cycle based on weather conditions, crop rotations and land availability, equipment availability, or to accumulate sufficient material for efficient spreading operations.

APPENDIX

B.3 EXAMPLE OF SPILL RESPONSE PLAN





SPILL RESPONSE PLAN FOR FUEL, FLUIDS AND BIOSOLIDS

EMERGENCY CONTACT NUMBERS

- **Emergency: 911**
- **Manitoba Environmental Emergency Response – 24 hour reporting line 1-(204) 944-4888**

An environmental emergency is any release, or imminent release, of a contaminant that may pose a risk to public health or the environment.

Note that liquid spills (**flammable liquids, oils and other liquids**) must be reported to this number when quantities exceed 100 liters as per the Manitoba Environmental Accident Reporting Regulation (439/87).

- **The following information is required:**
 - Your name and phone number.
 - Exact location of the emergency.
 - Type of emergency (spill, leak, fire, overturn, etc.).
 - Name and spelling of products, if known.
 - Estimate of amount of product released.

All spills, regardless of size, are to be reported to:

PROJECT TEAM CONTACT NUMBERS

- **Assiniboine Injections Limited**
Jeff Jamault – (204) 723-0240
Noel Boisvert - (204) 745-7817
- **WSP | MMM Group Limited**
Darren Keam, Senior Project Manager – (204) 250-4010
- **City of Winnipeg**
Jong Hwang, Senior Project Engineer – (204) 619-2185
Richard Vendramelli, Wastewater Contracts Officer – (204) 451-2754



EMERGENCY SPILL RESPONSE PLAN: FUEL AND FLUIDS

The emergency spill response plan for fuel and fluids includes spills at the biosolids storage site(s), transport between the storage site(s) and the application fields or at the application fields.

1. Check for hazards such as traffic, ignition sources, flammable materials or fumes.
2. If serious hazards are present:
 - a. Leave the area and call: **911**.
 - b. If the spill poses a risk to public health or the environment, contact the Manitoba Environmental Emergency Response – 24 hour reporting line **1- (204) 944-4888**.
 - c. Call City of Winnipeg, WSP | MMM Group and Assiniboine Injections contacts to inform them of the spill.
3. If no serious hazards are present:
 - a. Ensure the area is safe for cleanup, including putting out traffic cones to identify the area of hazard and delineate the impacted area with pin flags or paint. Ensure that appropriate personal protective equipment is worn during the cleanup.
 - b. Stop the source of the spill if possible by shutting down equipment, closing valves and pumps, plugging hoses, etc.
 - c. Prevent the spill from entering drains or ditches using absorbent booms and absorbent material.
 - d. If the spill poses a risk to public health or the environment, contact the Manitoba Environmental Emergency Response – 24 hour reporting line **1-(204) 944-4888**.
 - e. Call City of Winnipeg, WSP | MMM Group and Assiniboine Injections contacts to inform them of the spill.
 - f. Clean up the spill material and absorbent material and dispose in a secure container for appropriate hazardous waste handling. The removal and disposal of all spill material should follow appropriate provincial guidelines and regulations.



EMERGENCY SPILL RESPONSE PLAN: BIOSOLIDS MATERIAL

The emergency spill response plan for biosolids material is for transport between the biosolids storage site(s) and the application fields.

1. Check for hazards such as traffic, ignition sources, and flammable materials.
2. If serious hazards are present:
 - a. Leave the area and call: **911**.
 - b. If the spill poses a risk to public health or the environment, contact the Manitoba Environmental Emergency Response – 24 hour reporting line **1-(204) 944-4888**.
 - c. Call City of Winnipeg, WSP | MMM Group and Assiniboine Injections contacts to inform them of the spill.
3. If no serious hazards are present:
 - a. Ensure the area is safe for cleanup, including putting out traffic cones to identify the area of hazard and delineate the impacted area with pin flags or paint. Ensure that appropriate personal protective equipment is worn during the cleanup.
 - b. Stop the source of the spill if possible.
 - c. If the spill is small, shovel it back into the hauling equipment.
 - d. If the spill is large, coordinate equipment to clean up the spill such as excavators or vacuum truck if required.
 - e. Spilled biosolids material can be transported to the application field or to the storage area after it is cleaned up from the spill location.

EMERGENCY SPILL RESPONSE EQUIPMENT

- Spill response plan including contact numbers
- Cell phone
- Personal Protective Equipment (e.g. rubber gloves , boots, Tyvek coveralls)
- Traffic cones
- Pin flags and/or delineation paint
- A spill kit should be available at each in-field storage site (during active operation) and include:
 - 25 kg of “Loose” Absorbent
 - 2 Absorbent Booms
 - 20 Absorbent Pads
 - Shovel and broom
 - Containment barrel

SPILL PREVENTION MEASURES

- Have equipment and haul vehicles regularly inspected.
- Plan the safest and most appropriate haul route from the storage site(s) to the field(s) being land applied.
- Drivers to obey road rules and drive to conditions.
- Follow all provincial regulations regarding fuel handling.
- Biosolids loads should be fully covered during transport.



SPILL REPORT FORM

Fill out the following information and forward to the City of Winnipeg, WSP | MMM Group and Assiniboine Injections contacts within 3 business days of spill.

Date of Incident:	Time of Incident:
Type of Incident:	_____ Fuel & Fluids _____ Biosolids
Location:	Estimated Quantity:
Description of Incident:	
Corrective Actions Taken:	
Name:	Phone #:
Signature:	Date of Report:

