SUMMARY OF COMMENTS/RECOMMENDATIONS

PROPONENT: Southland Church Inc.
PROPOSAL NAME: Bird River Bible Camp Onsite Wastewater System Design and Construction

CLASS OF DEVELOPMENT: 2
TYPE OF DEVELOPMENT: Onsite wastewater systems > 10,000L/day
CLIENT FILE NO.: 5866.00

OVERVIEW:

Manitoba Sustainable Development received a Proposal for the Bird River Bible Camp Onsite Wastewater System Design and Construction filed by MMM Group Limited on behalf of Southland Church Inc., Steinbach to upgrade the wastewater management system from existing ejector system to a septic field system that would serve the Bird River Bible Camp, which operates on a seasonal basis at NE 01-17-13EPM in the Rural Municipality of Alexander. The Department, on 9th February 2017, placed copies of the Proposal in the Public Registries located at Legislative Library (200 Vaughan Street, Winnipeg), the Winnipeg Millennium Public Library (4th Floor, 251 Donald St., Winnipeg) and online at http://www.gov.mb.ca/sd/eal/registries/5866birdriver/eap.pdf. Copies of the Proposal were also provided to the Technical Advisory Committee (TAC) members. A notice of the Environment Act proposal was also placed in the Lac du Bonnet Clipper on February 9th, 2017. The newspaper and TAC notifications invited responses until March 9, 2017.

COMMENTS FROM THE PUBLIC:

No Comments.

SUMMARY OF COMMENTS FROM THE TECHNICAL ADVISORY COMMITTEE:

No	Technical Advisory Committee Member	Response Provided
1	Manitoba Agriculture – Land Use Branch	No response
2.	Manitoba Sustainable Development –	
	• Hazardous Waste, Petroleum, & Contaminated Sites Section	See comments below
	• Compliance and Enforcement Branch	See comment below
	• Climate Change and Air Quality Branch	No response
	• Wildlife and Fisheries Branch	No wildlife related concerns
	• Parks and Protected Spaces Branch	No concerns
	• Forestry Branch	No response
	• Indigenous and Municipal Relations	No response
	• Lands Branch	No concerns
	• Water Science and Management Branch	See the comments below
	• Groundwater Management Section	No concerns
	• Office of Drinking Water Branch	No concerns
	• Water Use Licensing Section	No concerns.
	• Drainage and Water Control Licensing Branch	No concerns.
	• Parks and Regional Services Branch	No response
3	Manitoba Sport, Culture, and Heritage – Historic Resources Branch	See comment below
	Office Of The Fire Commissioner	No response
4	Manitoba Growth, Enterprise and Trade	No response
5	Manitoba Infrastructure	No concerns
6	Manitoba Indigenous and Municipal Relations	No response
7	Manitoba Health, Seniors and Active Living – Environmental Health Unit	No response

A copy of the responses and the additional information provided can be viewed at the following link:
http://www.gov.mb.ca/sd/eal/registries/5866birdriver/index.html

COMMENTS FROM THE TECHNICAL ADVISORY COMMITTEE:

Manitoba Sustainable Development–Compliance and Enforcement Branch

The Bird River Bible Camp is proposing the installation of a septic field system that is designed for a daily flow capacity of 15,000 litres. Wastewater discharge volumes tracked by the Camp in 2015 indicate that discharge flows exceeded 15,000 litres/day during the weeks of July 8, 2015 and August 23, 2015. The Camp occupancies during these weeks were 155 and 164, respectively. The proposed septic field design is intended to accommodate up to a 35% increase in Camp occupancy.

- *The data displayed in Table 3. In-flow and Pump Discharge Volumes demonstrates a potential for wastewater flows to exceed 15,000 litres/day at current occupancy rates. What measures will be implemented to ensure that:*
    - *flows are maintained at 15,000 litres/day, or*
    - *the system will not be overloaded if the wastewater flows exceed 15,000 litres on an individual day?*
- *The proposal indicates that efficient water-use fixtures will be installed to reduce water usage and wastewater flows. When does the camp propose to install these fixtures i.e. prior to the completion and commissioning of the proposed septic field, or at a later time?*

Proponent's Response:

The proposed design is over developed to permit for peak flow situations that are reported in the 2015 discharge records. As outlined in Section 4.5.4 Above Ground, Pressurized Treatment Mounds of the EAP, the on-site wastewater management system will allow for a 40% growth in Camp and the buffering capacity of the sand filter system offers about four weeks of holding capacity in the voids of the sand alone for easy accommodation of occasional days of extraordinary flows. Also as outlined in section 4.5.5 Base Area Preparation, the formula as outlined in Clause 2(6) of Schedule A of the Regulation (Environment Act, On-Site Wastewater Management System Regulation, 83/2003) calls for a safety factor of 2.0 in applying the application of rate for an area field. Since the use of an aboveground, pressurized sand treatment filter provides for wastewater treatment that is essentially equal to that of other aerated methods of secondary treatment, a 25% reduction in the field area can be applied when the wastewater effluent is received from an aerobic treatment unit (Clause 2(7) of Schedule A). Essentially a 1.75 times safety factor is built into the system providing a 26,250 l/day capacity in the engineered system as required by regulation. Therefore, there is not a need to govern the on-site wastewater system to 15,000 l/day of peak flow as the system is built to manage a greater capacity inherently.

The Bird River Bible Camp installed efficient water use fixtures in all lavatories on camp after the 2015 water use monitoring but before the 2016 camp season. The EAP did not identify this as a modification completed by the Camp.

Disposition: The proponent's response was provided to the Environmental Compliance and Enforcement Branch. A meeting was arranged on 5th June 2017 among the proponent, the consultant and Manitoba Sustainable Development to discuss the comments and concerns and Environmental Compliance and Enforcement Branch had no further concerns.

Manitoba Sustainable Development– Water Quality Management Section

- *The Water Quality Management Section recommends the license include a requirement for annual monitoring of total phosphorous concentrations in the shallow groundwater wells to characterize water that may be flowing into the Bird River from the disposal field.*
- *The Water Quality Management Section is concerned with any discharges that have the potential to impact the aquatic environment and/or restrict present and future uses of the water. Therefore it is recommended that the license require the proponent to actively participate in any future watershed based management study, plan/or nutrient reduction program, approved by the Director.*

Proponent's Response:

As outlined in Section 10.1 Groundwater Monitoring, groundwater analytical parameters will include: total-Kjeldahl nitrogen, nitrate/nitrite, ammonia, total phosphorus, chloride, electrical conductivity and chemical/biological oxygen demand. Groundwater quality will be monitored prior to the commissioning of the field to evaluate baseline data, once in the year of commissioning and then once annually for three years. Monitoring events will be completed during peak operation performance of the on-site wastewater management system (August). The Bird River Bible Camp on-site wastewater system will be located approximately 50m away from the Bird River shoreline, greater than the minimum distance required by regulation and is surrounded by a mature forest. In-field observations of the soil profile during the geotechnical investigation, demonstrated that the soil profile was sufficiently dry after the Camp season near the soon to be abandoned ejector system.

It is reported in Forests, Climate and Hydrology, Regional Impacts by Evan R., Reynolds C., and Thompson F.B. (1988) that the estimated evapotranspiration of mature spruce, pine and deciduous forests are 490mm, 450mm and 585mm per year, respectfully in the southern taiga subzone of European USSR, an eco-climate zone similar to the boreal forest of Manitoba. It was also determined that during the growing season, deciduous forests evaporate and transpire 95% of the total annual evapotranspiration, and for conifers the proportion is 85 to 90%, meaning that the majority of evapotranspiration of water occurs during the growing season with a minimal amount outside of the growing season. This reported water use in a spruce, pine and deciduous forest demonstrates that the water uptake and removal from the soil system likely is sufficient to demonstrate a water deficiency to mitigate against excess water seepage from the on-site wastewater system.

The on-site wastewater management system is not a direct discharge to the Bird River and thus will not be identifiable as a point source provider to the surface water system. The on-site

wastewater management system will likely not be contributing a measureable water volume to the hydrology of the Bird River due to the separation distance between the field and the surface water body as the established mature forest will uptake and removal a considerable volume of water and nutrients from the soil system. Therefore the proponent should not be subject to a requirement to be a participant to a management study, plan/or nutrient reduction program (as approved by the Director) when there will likely be no measureable means of defining the contribution to the system.

Manitoba Sustainable Development– Environmental Approvals Branch - Hazardous Waste, Petroleum, & Contaminated Sites Section

Sand Treatment Mound

EAB is concerned that a sand treatment mound may not be an effective onsite wastewater treatment system design for this development. Sand treatment mounds were developed to service single family homes and/or small commercial/recreational developments with daily design flows considerably less than 10,000 litres/day. It is important to recognize that the design and installation standards associated with the Onsite Wastewater Management Systems Regulation (regulation) are for small flow systems (< 10,000 litres/day) and are not intended to be used for larger flows due to limitations in their treatment and hydraulic performance capabilities. Important modifications are often necessary when designing onsite wastewater treatment systems for larger flows. As well, Manitoba standards for sand mound systems are included in the Supplementary Information Manual (2010), not the regulation.

The heavy clay soils present another serious concern in terms of the ability of a sand treatment mound to perform effectively and be protective of the environment and public health. The soil particle size analysis reports (May 9, 2016) indicate the presence of heavy clay soils (64 - 68% clay) at depths of 6 – 18 inches. These soils are defined as impermeable in the regulation and present severe hydraulic restrictions for onsite wastewater systems. EAB is unaware of any studies or reports demonstrating that sand treatment mounds receiving daily wastewater flows >10,000 litres/day can perform effectively in heavy clay soils. In fact, studies and experience have shown that sand treatment mounds servicing single family homes have experienced performance failures when used in heavy clay soils.

In addition to the above, there are some specific concerns about the sand mound design and installation specifications submitted (or missing) in the report. These include:

- *The sand mound does not meet the vertical separation distance requirement of 1.0 metre in Section 2(2)(b) in the regulation.*
- *The methodology used to design and size the sand treatment mound appears to be incorrect and does not conform to industry standards. For example, the mound area was sized using the formula for total area fields, not sand mounds and there are no calculations showing how the top and bottom areas of the individual mounds were determined. In addition, the proposed sand depth of 400 mm is insufficient to provide aerobic treatment system effluent quality. A sand depth of 450 to 600 mm is needed to achieve this type of effluent quality. This has a considerable impact on the required size of the mound.*

- *The minimum standard for the mound sidewall slopes is 3:1, not 2:1 as indicated in the report. Slopes of 3:1 or 4:1 are used to ensure adequate stability and facilitate easy access to the mound for lawn mowing. This will also affect the required size of the mound.*
- *There is insufficient information pertaining to the pressure distribution system design methodology and specifications. Important design parameters are not included, such as the dose volume, dosing frequency, and residual pressure head (squirt height). Based on the limited information provided, it cannot be determined if the pressure system meets industry standards or if it maintains maximum orifice discharge rate differences of 10% within any one laterals and 15% throughout the entire pressure distribution system.*
- *There is no indication as to how far apart the 6 individual mounds (zones) will be spaced. This is very important because the mounds can hydraulically impact each other, especially in heavy clay soils where a considerable proportion of the effluent can move laterally in the upper soil horizons.*
- *The pressure distribution system needs to incorporate a digital control panel to provide time dosing of the effluent. This is an industry standard for sand mounds in low permeability soils.*

The information provided by MMM Group in the letter dated April 7, 2017 contains some incorrect information. Specifically, sand mound systems do provide any appreciable holding capacity in the sand voids. In order for a sand mound system to perform effectively, an unsaturated and aerobic environment must be maintained in the sand media. In heavy clay soils, the hydraulic gradient created in the mound will cause the effluent to move laterally along the sand/soil interface until it can be absorbed by the soil. If the volume of effluent applied to the mound exceeds the hydraulic capacity of the soil, it will move laterally and begin seeping out of the toes (i.e., it will not build up vertically). This is considered to be a performance failure that can negatively impact the environment and public health.

<u>Daily Design Flow</u>

The methodology used to determine the daily design flow rate of 15,000 litres/day does not account for peak flows and is therefore viewed as being inaccurate. It is standard engineering practice to use flow rate peaking factors (i.e., the ratio of peak flow rate to average flow rate) to determine appropriate daily design flows. As indicated in Table 3 of the EAP, peak daily wastewater flows measured in 2015 exceeded 19,000 litres/day during two monitoring periods. Another concern is the limited amount of monitoring data submitted (i.e., only 2015).

The occupancy and water use data provided in the EAP are confusing and unclear. For example, Section 1.1 (Background) states that the current occupancy is 150 people per week but Table 2 shows the occupancy at 180 people per day. Similarly, Section 1.1 states the usage will be increased to 230 people per week but Table 4 shows the user number to be as high as 270 people per day.

It is critically important that the daily design flow is determined accurately because it is used to size the septic tanks, pump tank and sand mound system.

<u>Septic Tanks and Pump Tank</u>

The septic tank sizing requirements in the regulation are not intended to be used for systems with flows >10,000 litres/day. The current industry standard is to size septic tanks so they provide 2-3 days retention time. The tank sizes in the EAP do not provide adequate retention time.

The EAP states the pump tank will provide 3,000 litres capacity. Although sizing calculations were not provided in the report, this tank appears to be severely undersized. The pump tank volume needs to take into consideration the dose volume, dosing frequency, drain back volume, alarm operation, flow equalization, and at least 12 to 24 hours reserve capacity for repairs and/or emergencies.

Installation Instructions

The EAP does not provide installation/construction instructions for this system. Clear and concise instructions are critical to ensure the system is installed correctly. This is especially true for sand mound systems.

Operation & Maintenance

The operation and maintenance requirements for this system are considerable and include routine inspections and maintenance of the floats, alarm, pump, effluent filters, and hydrotec valve. As well, the pressure distribution laterals need to be cleaned and flushed every few years. The EAP does not adequately address these ongoing requirements.

Proponent's Response:

Soil Sample results

WSP completed an in-field soil pit profile and soil sampling on June 14, 2017 within the anticipated foot print of the on-site wastewater field. As described in the EAP the project study area is developed on lacustrine material, with a north facing aspect and mid slope in the landscape. The site is currently forested with white spruce, balsam fir and balsam poplar and a thick understory and ground cover of multiple shrubs and herbaceous species. Four test pits were excavated, one within Zone 2, 3, 4 and 6 (Figure 7, attached). Pit excavation was completed to a maximum depth of 1.5 metres below grade (mbg). In general the soil profiles were consistent between the four pits and are consistent with the Middlebro Series (MDB). In general the soil profile consisted of an herbaceous leafmat (10 cm to 0cm); over an Ah to Ahe horizon, that was black in colour, silty, and fine to medium granular structure (0 to 15cm); over Bt horizon with prismatic vertical columns, strong medium granular structure in a column (10 cm to 25cm); over a transition horizon from the Bt to C parent material (Clay, small to medium blocky structure and no visual mottles), 25cm to 50cm; over parent material (Clay Loam , prominent mottles, strong, medium blocky structure, grey in colour, 50cm to 150cm). Throughout the profile plant roots and rootlets were observed.

Based on the in-field observations the development of a Bt horizon and the development of soil structure the internal soil drainage may be considered to be well to imperfectly drain. By working through the Ontario Institutes of Pedology (1988) soil drainage flow chart these site soil may be defined as well to imperfect drainage and influenced by landscape form and aspect. From each of

the four soil pits, grab samples were collected from the pit wall for soil grain size analysis by hydrometer, pH and EC (1:2 soil:water extraction).
The soil grain size analysis demonstrates that the Ah/Ahe horizon has eluviation of clay and the horizon below is an illuvial horizon with the increased concentration of clay material. This demonstrates internal drainage with the movement of clay particles downwards to at least 0.25 mbg.
The pH concentrations (pH=6) in the surface sample (WP07 4-8") demonstrates that the calcium has moved down through the profile and developed a more acidic forest soil, while the parent material still maintains at very basic pH level (pH=8.61).

Response to TAC Comments

The USEPA Onsite Wastewater Treatment Systems Manual (Section 4.7.2, 2002) states that "Sand media filters may be used for a broad range of applications, including single-family residences, large commercial establishments, and small communities." Where it is used for larger systems the effluent application areas are divided into individual zones for uniform operational control. WSP has designed and observed multiple disposal fields in Manitoba and Western Ontario that have been operating successfully for many years under various water use models and soil conditions.

The soil test pits revealed a layer of heavily rooted Ah / Ahe horizon in the upper 100mm over a 150mm layer of silty clay with an increasing clay content of 50 to 60%, followed by a progression into heavy clay. Roots penetrated into the heavy clay at depth which was granular to blocky in structure, demonstrating water movement down the soil profile. No water table was encountered in any of the test pits. Given that the water that will trickle through the sand filter will be well treated for suspended solids and BOD removal, WSP is confident that the system will be effective hydraulically through a combination of infiltration and evapotranspiration. As indicated in the EAP, the design incorporates a safety factor and the average flow from the camp is significantly below the peak flow for which the system is designed. WSP believes that the requirement for a minimum one metres depth of soil over bedrock or high water table as per Article 2(2)(b) in Schedule A of the Regulation is achieved through the design and native soil profile at this Site.

The Manitoba Onsite Wastewater Management System Program Supplementary Information for Onsite
Wastewater Management System Installations (2005) indicates that for sand filters the minimum thickness of the sand filter is 300 mm below the gravel bed. The USEPA Onsite Wastewater Treatment Systems Manual (2002) states in Section 4.7.1 that "Most of the biochemical treatment occurs within approximately 6 inches (15 centimeters) of the filter surface. As the wastewater percolates through this active layer, carbonaceous BOD and ammonium-nitrogen are removed. Most of the suspended solids are strained out at the filter surface. The BOD is nearly completely removed if the wastewater retention time in the sand media is sufficiently long for the microorganisms to absorb and react with waste constituents. With depleting carbonaceous BOD in the percolating wastewater, nitrifying microorganisms are able to thrive deeper in this active surface layer, where nitrification will readily occur." The USEPA manual also goes on to state that single pass filters can typically produce an effluent quality of less than 10 mg/L for both BOD and suspended solids.

With regard to retention time, it is noted that the at the above mentioned application rate of 33L/m2/day (33 mm of depth) on the sand filter surface, the retention time would be extended by a considerable percentage over the standard application rate of 50L/m2/day of the MSD Supplementary Information (2005). It is expected that the full 400 mm of sand filter depth will be an active aerobic treatment zone as will the fixed film biological surface treatment in the graded rock material overlying the sand filter.

The pore space of an aggregate mineral material (sand) is that portion of the soil volume occupied by air and water. The amount of pore space is determined largely by the arrangement of solid particles. Water holding capacity is directly related to the texture (sand) and grain size. An approximate water storage capacity of a course sand is estimated to be approximately 0.8 to 1.3 mm/cm depth (A&L Canada). When wastewater infiltrates into the sand mound, the pore spaces will be filled providing between 32mm (most conservative) to 52mm (least conservative) of water storage in the full 400mm of sand filter. Given a median capacity of 42mm an individual zone which is approximately 450 square metres (1 zone) provides an estimated 19 m3 of water storage capacity.

While this is a theoretical storage holding capacity of one zone within the on-site wastewater system should the system be held within a box, this certainly demonstrates that the volume of a sand mound storage capacity is greater than the maximum daily design flow that is about 5 mm of wastewater application over the total area of the field (2,708 m2) with an average daily flow amount approximately 3 mm of application, sufficiently demonstrating the available capacity of the six zone on-site wastewater management system.

Monitoring by WSP of sand filter wastewater management systems at other sites has shown that on underlying clay soils a layer of saturation exists at the bottom of the sand mounds. It has been our observation that the systems are not necessarily anaerobic. While capillary action in the sand mounds may be minor, capillary action will keep a layer in the sand at near saturation. WSP does agree that the water will move laterally due to the underlying silty clay mineral horizon from the sand filter into the sandy loam cover (where capillary action will also draw it upwards and laterally) and into the underlying forest soil matt, and topsoil, then into the upper layer of silty clay and into the underlying clay. The latter is blocky and shows clear signs of water migration. The forest soils are observed to be relatively dry, being in the root zone of the existing trees. Native grass vegetation that is to be seeded to the surface of the field will contribute to evapotranspiration.

The standards that were applied in the design are those published by MSD. Infiltration rates determined by soil characterization do not change on the basis of the configuration of the field. The infiltration rate into the surface of the sand mound that WSP has used is about 33 L/m 2/day. In the Province of Manitoba, Onsite Wastewater Management Systems Installers Education Program (2011), in the section on Sand Treatment Mound Design and Sizing, the application rate is specified as being not more than 50L/m2/day.

The upper horizon (under the 100 mm thick topsoil and leaf mulch) with a thickness of 100 mm to 250 mm ranges from a clay content of 45 % to marginally over 60%. From the soil texture triangle in the Supplementary Information to Manitoba Regulation 83/2003 the wastewater application rate is listed as 8.31 L/m2/day. Though the Regulation itself does not apply to this case,

the actual infiltration rate of soil is a physical matter. This infiltration rate was used in the EAP for the design of the wastewater treatment system. WSP is confident that this rate of infiltration along with the considerable degree of evapotranspiration from the native vegetation planted over the above-ground sand filter system will be able to accommodate the flow from the camp facility.

Additionally, the camp only operates in the summer months during the forest growing period (July and August) and with no campers on site on Saturdays and Sundays, the average daily flow from camping activities (as measured in 2015) did not exceed 9,000 litres per day in any week. The extraordinary high flows that were recorded for a few days in the summer of 2015 at opening and closing down of the camp are reported to be from sources other than domestic wastewater and will not be directed to the new wastewater treatment system once it is in place.

The slopes of the sand filter are not the exterior of the overall sand mound. The depth of the various layers of the sand filter (sand, stone, loam cover, topsoil) together with the outside dimensions of the zones, dictates that the exterior slopes will be about 5:1. This number does not appear to be indicated in the drawings or the text of the EAP which is an oversight, however in section 4.5.6 of the EAP it is correctly reported that the side slopes may be at the normal angle of repose for the material but are recommended to be not less than 2:1. The exterior slopes will be indicated in construction documents. As to the slope of the sand filter, the Province of Manitoba, Onsite Wastewater Management Systems Installers Education Program (2011) manual does states that the sides and the end of the sand layer may be left at a slope that equals the angle of repose. Some berm material may be banked around the sand layer to contain the sand and maintain the top surface while the stone and effluent distribution materials are installed. Photos in the manual show an installation in progress that displays such a slope. A slope of 2:1 is more stable and will be securely confined by the berm material.

WSP believes that sufficient design information is provided in the EAP. The pump size, the pipe sizes, the lengths, the orifice size and spacing are all given. These values have been determined to conventional engineering methods and to conform to the standard values that are given in the Province of Manitoba, Onsite Wastewater Management Systems Installers Education Program (2011) manual.

WSP does concur that short discharge pump cycles will provide the opportunity for controlled treatment and infiltration time between the applications of effluent within each individual zone as discussed in the May 12 meeting and that short application events will help to maintain an active biosystem in an aerobic state.

Parameters like dose volume will be determined by the settings of the pump start and stop controls (which have a wide range of choices by the operator). Pumping frequency will be variable based on the rate of wastewater flow from the camp facilities at any one time. The size of the laterals in the sand filter ensure that a uniform pressure exists for the full length. Both orifice size and spacing are as suggested in the above Manual. The EAP is issued under professional seal and the system will be installed by a Provincially Registered and qualified contractor to meet or exceed all the Provincial regulatory requirements.
As per discussions at the meeting on May 12, WSP believes that a spacing of 3 metres is appropriate.

There is sufficient space at the site to accommodate such spacing. It was also suggested by MSD staff that to promote evapotranspiration each filter zone should slope down toward the interface with other zones. WSP does agree with that suggestion but recommend that the interval space be covered with a shallow layer (150mm to 200mm) of sand or sandy loam and with topsoil cover. In similar fashion we will also add such a layer for a minimum of 3 metres length on the downslope gradient of the overall field, being the N-NW leading edge of Zones 1, 4, 5 and 6.

The water usage and wastewater flow of a children' camp like this are relatively predictable and uniform on the basis of a daily average over the period of a week. Daily readings will vary on the basis of the time of day when the readings are taken. Based on the presented arguments outlined above, the fluctuations will not have a detrimental effect on the operation of the sand filter treatment system. The daily variation will represent a difference of only a few millimetres of application of effluent over the total area of the field.

On the matter of the high daily flows recorded in the 2015 data, these were two single days, one during camp preparation and one during closing days. It is reported that some of the water that was discharged into the sewer system likely was discharged from elsewhere in the system and was not black water sewage loading.

The three septic tanks and pump out tank are sized in accordance with MSD standards as indicated in
MR 83/2003. WSP believes that the use of a series of interconnected tanks (3) as proposed actually provides better treatment than a single tank with a settling capacity of 140% of the daily flow. The proposed arrangement assures plug flow (preventing short circuiting) and provides progressive mitigation of the peak flows and the corresponding progression of increasingly quiescent conditions. The multi tank arrangement also provides that the bulk of the settleable solids will remain in the first tank which may be the only tank that normally needs to have the septage (solids) removed on a periodic basis.
The pumpout tank capacity is 20% of the design peak flow, as per the MSD standard. This is more than adequate for the system. As outlined in above arguments, short cycle discharges are preferred. The design capacity of the pump is such that at peak flow it will only need to operate for a total of about 1 hour and 40 minutes in a 24 hour day.

<u>Additional comments from Manitoba Sustainable Development– Environmental Approvals Branch - Hazardous Waste, Petroleum, & Contaminated Sites Section</u>

The additional soil test pits confirm that the sand mound treatment system will meet the vertical separation distance requirements to (1) groundwater table and (2) bedrock - Section 2(2)(b) in Schedule A of the OWMS regulation. However, the letter from WSP does not address the vertical separation distance requirement to the restrictive layer, which in this case is the heavy clay soil layer present at depths of 50 cm (Zone 2), 10 cm (Zone 3), 50 cm (Zone 4), and 50 cm (Zone 6). As indicated in the text and diagram in Figure 1(a) in the 2010 Supplementary Information Manual, a vertical separation distance of 90 cm is to be maintained between the bottom of the infiltrative surface (i.e., gravel bed) and the restrictive layer. This vertical distance appears to be met in the test pits excavated in Zones 2, 4 and 6 but not in zone 3 where the restrictive layer is present at 10

cm. With the 40 cm sand layer and the 10 cm depth of suitable natural soil, the vertical separation distance in this location will be 50 cm, not 90 cm. However, based on the soil conditions observed in the other test pits and the proposed system design, it is possible the sand mound system will afford effective treatment and dispersal provided an appropriate dose volume and dosing frequency are used.

This comment is in response to the statement made on page 5 in the WSP response letter– "the pump tank capacity is 20% of the design peak flow, as per the MSD standard. This is more than adequate for the system". I agree the pump tank is sized in accordance with Section 1(2)(c)(ii) in the OWMS regulation. However, as discussed during the May 12th meeting, the standards in the OWMS regulation are intended primarily for small residential onsite wastewater systems, not large recreational developments where daily flows can vary dramatically and where system problems can have much larger impacts than they would for a single family residence. It should be noted that the regulation provides minimum standards, which in some cases are not adequate or scalable to larger flow systems, especially systems installed in very difficult soil conditions.

I do not believe the proposed 3,000 litre pump tank is adequate. In addition to regulatory requirements, system components such as pump tanks should be sized based on the design and performance needs. Pump tanks should be sized to provide adequate volume for (1) operation of the pump (dose volume), (2) high level alarm, and (3) a reserve volume equal to at least 25 - 50% of the daily design flow. This is to accommodate maintenance and repairs if a problem arises (e.g., pump stops working and needs to be replaced). For instance, if the pump, floats or some other component malfunctions at Bird River Bible Camp, what is the camp going to do once the pump tank fills to capacity? The 3,000 litre tank will hold less than 1/5 of the daily design flow. I would like to point out that many pressurized sand mounds servicing single family homes in MB are now using 200 to 300 gallon (900 - 1,360 litres) pump chambers to ensure adequate performance and operation. Recommendations for this project:

- *Utilize a digital control panel to provide timed-dosing of effluent to the sand mound system (see Dosing Methods and Dose Tank Sizing on pages 4-31 and 4-33 in the 2002 USEPA Onsite Wastewater Treatment System Manual).*

- *A duplex pump system should also be considered.*

The Onsite Wastewater Management Program has no further comments or concerns with this EA Proposal.

Disposition:
Information was forwarded to the proponent. Clause 20 of the licence addresses the requirement of uniform flow through the disposal fields over a 24 hour period.

Manitoba Sport, Culture, and Heritage - Historic Resources Branch

If significant heritage resources or human remains are encountered during any phase of development by Bird River Bible Camp, their employees or contractors, the Manitoba Historic

Resources Branch is to be contacted immediately. In the case of human remains, notification must also be made to the RCMP.

Disposition:
Information was forwarded to the proponent.

PUBLIC HEARING:

As no public comments were received, a public hearing is not recommended.

CROWN-INDIGENOUS CONSULTATION:

The Government of Manitoba recognizes that it has a duty to consult in a meaningful way with Indigenous communities when any proposed provincial law, regulation, decision or action may infringe upon or adversely affect the exercise of the Indigenous rights of that community.

This proposed facility will be located on land owned by the proponent. There would be no infringement of Indigenous rights under Section 35 of the Constitution Act, 1982. Therefore, it is concluded that Crown-Indigenous consultation is not required for the project.

RECOMMENDATION:

All comments received have been addressed through additional information or through licence conditions. It is recommended that the Development be licensed under The Environment Act subject to the limits, terms and conditions as described on the attached Draft Environment Act Licence.

Administration of the Licence should be assigned to the Eastern Region of the Environmental Compliance and Enforcement Branch.

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