MACKENZIE GREEN ENERGY CENTRE PROJECT ASSESSMENT REPORT

APPENDIX D

First Nations Comments and Proponent's Responses

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APPENDIX D1

Application for an Environmental Assessment Certificate for the Mackenzie Green Energy Centre (MGEC)

Proponent's Responses to Comments on the Application from First Nations compiled by Rescan (July 4, 2007)

	Issue or Question of Concern and MGELP Response
	Project Management
1	Clarify whether (and which) pesticides or herbicides will be used, and for what intended purpose. **MGELP Response:** It is planned that pesticides and herbicides will not be applied at the MGEC site and, as noted in the Summary of Commitments (Section 10 of the Application), will not be applied to TLU Sites 3 and 17, which where identified in the Traditional Land Use Study within 15 m of the site border around the proposed ash landfill area. If pests or vegetation are encountered during operations that could create unsafe working conditions or operating inefficiencies and these problems can not be resolved without the use of pesticides or herbicides, then limited use may be made of pesticides or herbicides applied in accordance manufacturer's instructions and in compliance with government regulations and guidelines. Storage and disposal of waste pest control products and containers will be done as outlined in Appendix K in accordance with a Hazardous Waste Management Plan that will be prepared by Mackenzie Green Energy Limited Partnership. Mackenzie Green Energy Limited Partnership will include in its final Landscape Design and Restoration (LDR) Plan (Appendix M of Application) guidelines for the use of pesticides and herbicides on the MGEC site. A draft of the LDR Plan will be circulated for comment to the First Nations that participated in the Environmental Assessment Working Group prior to the plan being finalized.
2	When will the offsite disposal location for the landfill ash be identified and when will the transportation plan details become known? **MGELP Response:** The wood ash produced by the power boiler will be disposed of in a permitted ash landfill located on the MGEC site, as explained in Section 3.4.2 of the Application. Consequently, no offsite disposal or associated transportation of wood ash is proposed for the MGEC project.
3	There is concern that wood residue brought on site for combustion may occasionally contain other non-wood substances such as chemicals, that when combusted would result in deleterious emissions. How will any contamination of wood residue be monitored? **MGELP Response:** The characteristics of the wood residue proposed to be received from sawmills and chipping of logging residues that would otherwise be burned in place are described in Section 3.4.1.2 and in Table 3.4-2 in this section. The process to handle and prepare the incoming wood residues for use as fuel in the plant are described in Section 3.4.1.4.1. Wood fuel will be procured from suppliers under contract agreements that will stipulate

that the MGEC will not accept residue produced from preservative-treated or painted wood, or construction debris. Prior to allowing fuel to be delivered, Mackenzie Green Energy Limited Partnership. will meet with potential suppliers and discuss the need for fuels to be clean of chemicals and other foreign materials prior to delivery to the MGEC, and any other terms of the supply contract. Most of the MGEC's fuel will be wood residue that is currently disposed of by sawmills in the fuel supply areas by incineration in beehive burners.

Monitoring of the incoming fuel for foreign materials will be done by plant personnel in the course of normal operating duties through observation of materials unloaded by delivery trucks into receiving hoppers, on exposed working areas of the wood pile, and on conveyors carrying material to the boiler. Deliveries from a supplier may be scrutinized more thoroughly if there have been quality deficiencies with previous deliveries, it is a new fuel supplier, or a new source of wood residue is being used that may be at higher risk of containing foreign materials.

4 Provide any mineral analysis of wood residue ash.

MGELP Response:
The expected composition of the wood ash that will be produced by the boiler is described in Section 3.4.1.4.7 of the Application (page 3-29).

Table 1 presents the average composition of the ash from six wood residue samples collected by Mackenzie Green Energy Limited Partnership from sawmills in the potential fuel supply areas. These were combusted in a laboratory reactor and the ash was analyzed chemically. The listed elements constitute 43.1% of the weight of ash. The elements are present in the ash as complex and relatively stable oxides, which are formed at the high temperatures used for the test and typical of a boiler furnace. The balance of the sample weight is predominantly oxygen. The elements in the ash at levels over 1 percent by weight are calcium, silicon, potassium, magnesium, aluminum, iron, and manganese. This is consistent with the list of the main constituents of wood ash obtained from the published literature.

Table 1 Elemental Analysis of Ash from Six Wood Residue Samples Taken in 2006 from Sawmills in the Fuel Supply Area.

Element	Note 1	Average Weight in dry Ash (%)
Aluminum, Al		2.422
Arsenic, As	<	0.002
Barium, Ba		0.259
Boron, B		0.023
Cadmium, Cd		0.001
Calcium, Ca		18.833
Chromium, Cr		0.005
Cobalt, Co		0.001
Copper, Cu		0.008
Iron, Fe		1.855
Lead, Pb	<	0.001
Lithium, Li		0.001

	Manganese, Mn		1.078	
	Mercury, Hg		0.000	
	Molybdenum, Mo	<	0.002	
	Nickel, Ni	<	0.008	
	Phosphorus, P		0.833	
	Potassium, K		4.090	
	Silicon, Si		10.618	
	Sodium, Na		0.228	
	Strontium, Sr		0.061	
	Titanium, Ti		0.038	
	Vanadium, V		0.003	
	Zinc, Zn		0.200	
	Total		43.1%	

Note 1: "<" symbol indicates some of the measured values were below the method detection limit and that the actual average value will be less than the amount indicated. If the measured value was below the method detection limit for a sample, the detection limit was used to calculate the average.

5	Is the company willing to fence any areas that are an attractant for wildlife that are a result of industrial activity? **MGELP Response:** A security fence will be installed along the perimeter of the MGEC plant site, including the ash landfill area (Section 3.4.1.6). This will prevent larger wildlife from entering into areas of the MGEC site where their presence could be a concern.
6	There are no First Nations or socio-economic VECs. Provide information on how First Nations were asked to provide VECs. **MGELP Response:** First Nations participated in the review and finalization of the Approved Application Terms of Reference (ATOR) for the environmental and socio-economic studies. Through their participation in this process it was understood that First Nations would identify environmental and socio-economic issues considered important to the assessment of the MGEC. The environmental issues identified in the development of the ATOR were utilized to help identify the Valued Ecosystem Components (VEC), as noted in Section 5.1.1. Input from First Nations during the development of the ATOR also identified the issues considered in the First Nations specific socio-economic impact assessment, namely traditional use, treaty rights, employment, business opportunities and the impact of truck traffic on wildlife. The consultation program included providing information to First Nations about the proposed project and asking for First Nations to identify concerns about the project's potential effects. Details of these consultation activities are provided in Section 2.2 of the Application. For example, at a meeting on July 13 2007 between Mackenzie Green Energy Limited Partnership representatives and the West Moberly First Nations, the Saulteau First Nations, the Fort Nelson First Nation and The Treaty 8 Tribal Association, First Nations representatives were asked by Mackenzie Green Energy Limited Partnership to identify issues of concern and, in regard to the potential impacts of truck traffic, to identify specific wildlife species of concern. First Nations conducted a Traditional Land Use Study with support from Mackenzie Green Energy Limited Partnership. Issues and potential project effects identified in the TLUS

	were considered in the selection of VECs and in the planning of methods to mitigate project effects. The results of the discussions with First Nations noted above and other dialogue described in Section 2.2 of the Application were considered together with potential issues identified by the proponent, government agencies and the public, to identify the VECs used the environmental assessment and the items addressed in the socio-economic impact assessment.
7	Provide a more detailed map of hog fuel transportation routes in relation to First Nations' traditional territories. **MGELP Response:** At this time in project development and contracting of fuel supplies it is not possible to provide a more detailed map of the wood residue transportation routes. The text of Section 3.5.3.2.1 (page 3-50) and the text and map in Section 5.11 (pages 5-208 to 5-216) explains that the sawmill and logging wood residue will be trucked to the MGEC site from the following four main supply areas using the roads indicated (see map in Figure 5.11-1 of Application): • Bear Lake – Mackenzie: Trucks will travel on Highway 97 and Highway 39. • Chetwynd – Mackenzie: Trucks will travel on Highway 97 and Highway 39. • Fort St. James – Mackenzie: Trucks will travel on forestry roads, including Germansen North Road and Ministry of Forest road 2a. • Mackenzie (50-100 km radius): Trucks will travel on forestry roads Sawmills in these fuel supply areas will be the dominant source of fuel for the MGEC meaning that truck traffic will travel from these facilities to the MGEC along the highways and forestry roads noted above. These routes are shown in Figure 5.11-1 of the Application. Forest residues may be transported by independent trucking firms from landing areas within 50-100 km of Mackenzie where the material has been piled by logging companies for open-burning. Trucks will use then existing forestry roads to transport this wood residue to the MGEC. The location of these potential fuel supply areas, the routes that would be available in future for transportation of the wood residue, and the preferences of the truck drivers for routing can not be determined by Mackenzie Green Energy Limited Partnership in advance.
8	Provide more detail for each project phase: preconstruction, construction, operations and closure of the enhancement, mitigation and monitoring opportunities. **MGELP Response:** The information provided by Mackenzie Green Energy Limited Partnership. in the Application on each project phase (Section 3) is typical of the information developed by a proponent prior to regulatory approval of a project and is believed by the study team to be satisfactory for assessment of the potential environmental and socio-economic effects of the MGEC. More detail on each project phase than is described in the Application, as requested by First Nations, can not be provided at this time.
9	With reference to dismantling and abandonment, provide additional details on the handling of the various components and materials and whether the intent is to salvage, re-use or recycle.

	MGELP Response: As stated in Section 3.5.4, Mackenzie Green Energy Limited Partnership commits that equipment will be salvaged (recover for use) where practical and the balance of surface equipment and structures will be demolished and removed from the site. It is intended that equipment and materials will be removed and sold for reuse or, if there is no market for such items, demolished and sold as scrap metal and other materials to be recycled by others. Residual materials that cannot be salvaged or recycled will be disposed of by landfilling. Dismantling and demolishing of the MGEC at the end of its useful life will most likely be done by an experienced company selected by Mackenzie Green Energy Limited Partnership through a competitive tendering process.
10	What would be the implications of the Canfor mill closing? What impact would this have on the MGEC? **MGELP Response:** Mackenzie Green Energy Limited Partnership expects to obtain adequate quantities of fuel from the fuel supply areas identified in the Application. MGEC also expects that the fibre supply in the Mackenzie Forest District will continue to be a strong contributor to the BC forest industry and that the sawmill in Mackenzie will continue to operate to utilize this resource within the lifetime of the MGEC power plant.
	Air Quality
11	Will wood (bottom) ash and fly ash be separated? If fly ash is intended for use as a soil amendment, provide metal analysis. **MGELP Response:** Separation of bottom ash and fly ash is not planned at this time. It will not be possible to test the composition of the fly ash, which varies from facility to facility, until after the MGEC is in operation.
12	How far away from the project site does the dispersion model suggest the PM10 and $PM_{2.5}$ particulates to disperse? **MGELP Response:** The particulate matter from the MGEC was conservatively assumed to be all $PM_{2.5}$ in size and, hence, the predicted concentrations of $PM_{2.5}$ and PM_{10} are the same for MGEC emissions. MGEC will lead to an overall reduction in particulate emissions and thus lower ambient $PM_{2.5}$ and PM_{10} concentrations compared to current levels. The composition of the ambient particulate matter with MGEC in operation will be similar to that under current conditions. The greatest effects on PM concentrations will occur within 1 km of the MGEC site fence line, but small reductions will also occur in Mackenzie and elsewhere in the region. The direction and distance of dispersion of particulate matter that will be emitted by MGEC alone and in combination with the Pope & Talbot pulp mill was modelled using methods agreed to with the BC MOE. The predicted effect of MGEC alone on ambient $PM_{2.5}$ concentrations at the average annual $PM_{2.5}$ emission rate is presented in Appendix E on page E-49. The results for $PM_{2.5}$ show that the predicted maximum short-term concentration (Table E-1) will occur within less than 1 km on the northwest side of the MGEC site boundary (see page E-53). The maximum annual average particulate matter concentrations are very low and will occur within less than 1 km on the north side of the

	MGEC site. The particulate matter emissions from MGEC will be well dispersed further from the plant site and the reduction in ambient concentration in the region will be small compared to current levels. The modelling results show that the maximum $PM_{2.5}$ concentration from MGEC emissions alone will decrease to less than 0.5-1 $\mu g/m^3$ at a distance of 10 km from the MGEC site in all directions and continue to decline at greater distances. These are approaching the typical lower limits of measurement. The shutdown of beehive burners in fuel supply areas that will be enabled by operation of the MGEC will significantly reduce $PM_{2.5}$ and PM_{10} concentrations in the vicinity of these emission sources.
	Soil and/or Reclamation
13	Will a soil monitoring program be established to monitor the potential for soil chemistry changes resulting from precipitation of the emissions? **MGELP Response:** There is no reason to expect that changes in soil chemistry will occur after MGEC begins operation based on the substances that will be emitted and the predicted dispersion of these emissions. MGEC's emissions of sulphur oxides, the main component of acid rain, will be very low. Effects on air quality and land areas will be mitigated by using advanced combustion equipment to reduce pollutant emissions, by installation of a continuous stack emission monitoring system, and by compliance with permit limits.
14	What is the status of soils in and around the site, and will a detailed soil assessment be done? **MGELP Response:** The type and quality of soils on the MGEC site are described in Section 5.3.1.3 based on field sampling and a review of available information from government studies. Section 5.3.1.7 describes that soils in the area of south of the train tracks (See Figure 5.3-3) that will be used to construct the power plant has been altered extensively by past development and imported fill materials. The assessment of the MGEC project on soils presented in Section 5.3.2 and the plans for mitigation and monitoring in Section 5.3.3 are believed to be adequate and meet the requirements of the ATOR.
15	Provide a detailed soils map. **MGELP Response:** Figure 5.3-1 (page 5-15) maps the surficial geology of the study area and shows that the uppermost inorganic soil unit for the entire site is of glaciolacustrine origin. The majority of the area of the MGEC site south of the railway tracks is highly disturbed from construction of roads, buildings, decommissioned and current utility services, a small wood residue landfill, and the domestic sewage treatment plant (Section 5.3.1.7). Mapping of soils in this area would not be useful for assessing impacts to soils as it would simply reflect the known presence of imported fill materials and disturbance from construction work. Test holes excavated for the baseline study indicate the area north of the railway tracks where the proposed ash landfill is to be located is covered by a shallow organic soil layer 2-3.5 cm deep in the central and northern part of the site and 2.5-8.5 cm deep in the eastern part of the site. The soil is composed of spodosol soils formed from decomposition of coniferous trees, the dominant plants in the area. Except for variations in

	depth as noted, the thin organic soil is uniform over the site. The soils on the site were considered in the environmental assessment and it is believed that mapping of the uniform surficial native soils at the site would simply restate and not add to the description already contained in the text of the Application (page 5-13).
16	Specify which plant species will be used for reclamation, and whether this will contribute to the long-term goal of revegetation with native species? **MGELP Response:** The site will be revegetated in accordance with a final version of the preliminary Landscape Design and Restoration Plan contained in Appendix M. The vegetation used for replanting will be indigenous to the Sub Boreal Spruce Subzone (SBSmk2). This approach will meet the long-term goal of revegetation of the site using native species.
	Water Quality
17	There is an interest in understanding the water quality of the eventual discharge into Williston Lake reservoir, which Pope and Talbot now routinely monitor on an unnamed creek. Will MGEC make this monitoring data available or continue the monitoring should Pope and Talbot no longer carry this out? **MGELP Response:** Monitoring of the quality of the discharge from the wetland to the unnamed creek will continue as a condition of Pope & Talbots' effluent permit (Sections 5.7.1.3 and 9.4). Pope & Talbot has monitored the quality of this discharge for many years and reported the data to the BC MOE. The reported water quality monitoring data for 2004-2006 is summarized in Table 5.7-15 on page 5-131 of the Application. Pope & Talbot will continue to monitor the quality of the discharge from the wetland and report the results to the BC MOE. Mackenzie Green Energy Limited Partnership understands that arrangements can be made with the BC MOE to obtain a copy of effluent monitoring data.
	Wetlands
18	Will toxicity testing of the wetland water quality be undertaken and reported on a regular basis for waterfowl and muskrat in addition to the fish toxicity testing? **MGELP Response:** Fish toxicity testing is concluded to be an effective means of monitoring for any effects that could potentially result from the small change in the characteristics of treated effluents discharging to the wetland when MGEC begins operation. Test results for the wetland show the water quality has been good with zero percent toxicity to rainbow trout. The addition of monitoring of the toxicity of water in the wetland to waterfowl or muskrat is concluded to be less effective than fish toxicity monitoring.
	Vegetation
19	First Nations are interested in having the vegetation monitoring plan expanded to include an invasive species management plan, and monitoring of wetland vegetation in view of future changes to conditions. **MGELP Response:** MGEC is not expected to alter vegetation in the wetland as the effluent quality with MGEC in operation will be similar to current conditions and the rate of effluent flow will be approximately 41% lower. There is concluded to be no project disturbances that would necessitate monitoring for invasive species or for long-term changes in wetland vegetation.

	Wildlife
20	What amount of area can wildlife use in actuality given the project area activity? And can this be depicted on a map? **MGELP Response:** Most of the MGEC site will be fenced to keep mammals away from the proposed ash landfill area and the plant facilities. This will limit the use of most of the MGEC site by wildlife with the exception of birds and some small mammals. The ecosystems on the MGEC site are mapped in Figure F-6 of Appendix F. All of the ecosystems are considered to be of low value to wildlife. A part of the Pine Ecosystem extending along the eastern border will remain unaffected by the MGEC project as it is within the proposed 15 m setback required around the perimeter of the ash landfill. Approximately 1.4 ha of the Pine Ecosystem shown in this figure will remain accessible to all wildlife. This ecosystem currently occupies 3.7 ha. Approximately 0.9 ha of the mixed pine/hybrid spruce and balsam poplar ecosystem shown in Figure F-6 will remain within the fenced MGEC site. This ecosystem currently occupies 4.5 ha. The MGEC has committed to install up to five nesting platforms in area of the MGEC site left undisturbed after construction to accommodate birds displaced as a result of the project (Section 5.10.3).
21	What is the attractant potential of the various site development features to mule deer? (It is noted that the Pope and Talbot wood waste pile attracts mule deer). **MGELP Response:** The MGEC site will be fenced to prevent mule deer or other large mammals from entering the site. The Pope & Talbot wood residue pile is not fenced.
	Socio-economics
22	The socio-cultural information for each Treaty 8 First Nation community in relation to business opportunities arising from the proposal is of insufficient detail for the different phases of the project: planning, construction, operations and decommissioning, to plan community business strategies for taking advantage of potential business opportunities. Treaty 8 First Nations are interested in knowing if more detailed information can be provided? **MGELP Response:** The information provided in the Application and subsequent presentations at the public open house and working group meeting is the extent of the information that is currently available regarding potential business opportunities. The commitments by Mackenzie Green Energy Limited Partnership in Section 10 of the Application (item D under First Nations) will provide information to help First Nations plan to take advantage of upcoming business opportunities. These initiatives include provision to First Nations of an Information Sheet that describes the goods and services that will be required during construction and operations, hosting of a contractor's open house in Mackenzie, advertising the contractor's open house, and provision of contractor's open house information directly to First Nations. Development of additional information for First Nations on upcoming business opportunities for the MGEC will get underway following

	receipt of an Environmental Assessment Certificate for the project. MGEC has also committed to providing the EPC contractor with a listing of local businesses with an interest in serving the project. If the First Nations have information about businesses that could serve the project or potential opportunities that they are considering, Mackenzie Green Energy Limited Partnership would be pleased to discuss these with them.
	Land use
23	If the District of Mackenzie and/or the Regional District have Official Community Plans, how do these plan(s) link to the MGEC proposal with regard to wildlife, wildlife habitat and safety? **MGELP Response:** The District of Mackenzie's Official Community Plan (OCP) was reviewed for information relevant to the environmental assessment. The OCP includes reference to the land use zoning, which is shown in Section 5.13.2 of the Application. The OCP does not include information on habitat, wildlife or safety issues for the proposed MGEC site. The field surveys conducted to establish baseline information for aquatic life, vegetation and wildlife are current and best suited to the assessment of potential project effects. The MGEC will prepare an emergency response plan in consultation with regulatory agencies. This will serve to protect personnel and plant property, the general public and the environment in the case of potential emergency situations. The scope of the emergency response plan is described in Section 3.4.1.5.9 of the Application.
	Traditional Use and Knowledge
24	What is the traditional use of plants and vegetation in the area? Treaty 8 First Nations believe that ethnographic sources of information and Traditional Land Use Interviews and/or site visits should be undertaken to acquire this information. **MGELP Response:** The fieldwork portion of the Traditional Land Use (TLU) Sites Assessment for the proposed Mackenzie Green Energy Centre (MGEC) was conducted by Kenneth Solonas of the McLeod Lake Indian Band, Ron Letendre and Amy Gauthier of the Saulteau First Nations and Max Desjarlais of the West Moberly First Nations accompanied by Landsong Heritage Consulting Ltd. The First Nations study team used their knowledge of traditional land use sites and resources in the field survey of the Traditional Land Use Study Area. The scope of the sites found are discussed in Section 4 of the TLU Sites Assessment basic report in Appendix G of the Application and include plants for medicinal use and food, among other resources. A total of sixty-one TLU Sites were recorded. Detailed information on the TLU resources at the TLU Sites was retained by the participating aboriginal communities to be used at their discretion. The proposed development area was not currently being used for traditional purposes by the First Nations representatives who participated in the field assessment, nor had it been used by them in the past. Furthermore, the First Nations representatives were not aware of any community members that were currently using the proposed development area for traditional purposes, or who had used the area in the past. Owing to the extent of previous development and the location of the proposed

	development within an industrial park, it was the opinion of the First Nations study team that traditional use of the area would be limited. It is not possible to provide the requested information on traditional use of plants and vegetation in the TLU Study Area because this information has been kept confidential by the First Nations communities that participated in the TLU Sites Assessment. This information would be documented in the detailed information retained by the First Nations study team.

APPENDIX D2

Application for an Environmental Assessment Certificate for the Mackenzie Green Energy Centre (MGEC)

Proponent's Responses to Comments on the Application from McLeod Lake Indian Band (July 6, 2007)

	Issue or Question of Concern and MGELP Response
1	*Power Plant Emissions:* The proposed MGEC facility will emit Greenhouse Gases, particulates and other contaminants. While it would be best if there were no emissions from the MGEC Project, Verne understands that these emissions will be below the current levels. Please provide a summary of current emissions (from the pulp mill) and future emissions (from the power plant on its own and from the power plant and pulp mill together) to clarify the air quality improvements that can be expected. **MGELP Response:** Table 5.4-15 below (from page 5-57 of the Application) summarizes the annual emissions for the following sources: • Pope & Talbot before and after the MGEC is operational, • MGEC's wood-fired and natural gas fired boilers, and • Pope & Talbot and MGEC combined. Two cases are shown for the MGEC power boiler - one is the maximum annual emissions assuming continuous operation of the wood-fired power boiler 100% of the time at its rated capacity; the other assumes the wood-fired boiler operates 93% of the time and the auxiliary boilers operate 7% of the time. The percent change in emissions from the baseline level, after shutdown of the power boiler at Pope & Talbot, is indicated in the column at the right-hand side of the Table. This is based on MGEC emissions at the proposed permit concentrations. The MGEC will result in a decrease in annual emissions of particulate matter and an increase in annual emissions of SO_x, NO_X, CO and VOCs. The estimated increases in SO_x, NO_X, CO and VOCs are exaggerated by the use of permit limits rather than estimates of actual emissions.

Table 5.4-15 Summary of Annual Baseline and MGEC Emissions

Pollutant	Pope & Talbot Baseline Average Annual Emissions (tonnes/yr)	Pope & Talbot After MGEC Average Annual Emissions (tonnes/yr)	MGEC Annual Emissions** (tonnes/yr)				Total Pope & Talbot and MGEC** (tonnes/yr)	Change from Baseline
			Maximum	Typical				
			Wood-Fired Boiler	Wood-Fired Boiler	Backup Boiler	Total		
Availability*			100%	93%	7%	100%		
Pollutant:								
PM	956	547	222	206	0	206	753	-21%
PM_{10}	801	428	222	206	0	206	634	-21%
$PM_{2.5}$	600	377	222	206	0	206	583	-3%
NOx	449	255	1,332	1,239	10	1,249	1,494	+233%
CO	1,100	640	1,776	1,652	15	1,667	2,292	+108%
SOx	242	222	121	112	3	115	334	+38%
VOC	107	93	75	70	0	70	163	+53%

* Percent of annual hours in operation at maximum continuous rating, based on 8760 hours per year.
** Based on proposed permit emission limits. Average annual emissions will be lower than these values.

MGEC will consume wood residue that is now being used to fuel the power boiler at the Pope & Talbot pulp mill as well as wood residue being incinerated in the fuel supply areas. The net amount of wood residue that will be redirected to the MGEC and no longer be incinerated is approximately 786,200 wet tonnes/yr (see Table 8.3-1 below, from page 8-6 of the Application). Table 8.3-1 summarizes the estimated reduction in pollutant emissions in the fuel supply areas that will result by reduction of wood residue incineration. The reduction in PM emissions from avoided wood residue incineration will be about 10 times the PM emissions from the MGEC. Large reductions in emissions will also be achieved for other criteria pollutants.

Table 8.3-1 Estimate of Avoided Wood Residue Incineration and Emissions for Regional Beehive Burners

Estimate of Avoided Wood Residue Incineration:			
MGEC Power Boiler	Annual wood residue use @ 93% availability	943,371	tonnes/yr, wet
Pope & Talbot Power boiler	Current annual average wood residue use (2004-2006)	-157,206	tonnes/yr, wet
Net reduction in wood incinerated		786,166	tonnes/yr, wet
Estimate of Avoided Emissions from Beehive Burners:			
	Particulate Matter	2,559	tonnes/yr
	NOx	366	tonnes/yr
	CO	47,524	tonnes/yr
	SOx	37	tonnes/yr
	VOC	4,021	tonnes/yr

Table 2 compares for various regional locations the predicted future fine particulate ($PM_{2.5}$) concentrations with the MGEC in operation to the predicted baseline concentrations. The predicted baseline concentrations reflect the effects of current emissions from the Pope & Talbot pulp mill. These results show that the MGEC project will typically reduce the maximum 24-h average $PM_{2.5}$ concentrations in the air by 13% to 28%.

Table 2 Effect of MGEC on Regional Maximum Fine Particulate ($PM_{2.5}$) Concentrations

	Predicted Maximum 24-h average $PM_{2.5}$ Concentration (micrograms/cubic meter)		
Location	Current Values for Pope and Talbot Mill Emissions	Future values for Pope and Talbot mill & MGEC Emissions	Reduction due to MGEC
Town of Mackenzie	2.7	2.0	24%
11 km due South of the MGEC site	3.0	2.5	17%
11 due East of the MGEC site	3.1	2.7	13%
15 km Southeast of the MGEC site	1.8	1.3	28%

Figure 1 shows the predicted reduction in the maximum 24-h average $PM_{2.5}$ concentrations that will result with operation of the MGEC and also compares the predicted concentrations to the stringent Canada Wide $PM_{2.5}$ standard applied in BC. The maximum predicted $PM_{2.5}$ concentrations before and after the MGEC is operational are small (approximately 10%, or less) compared to the Canada Wide Standard.

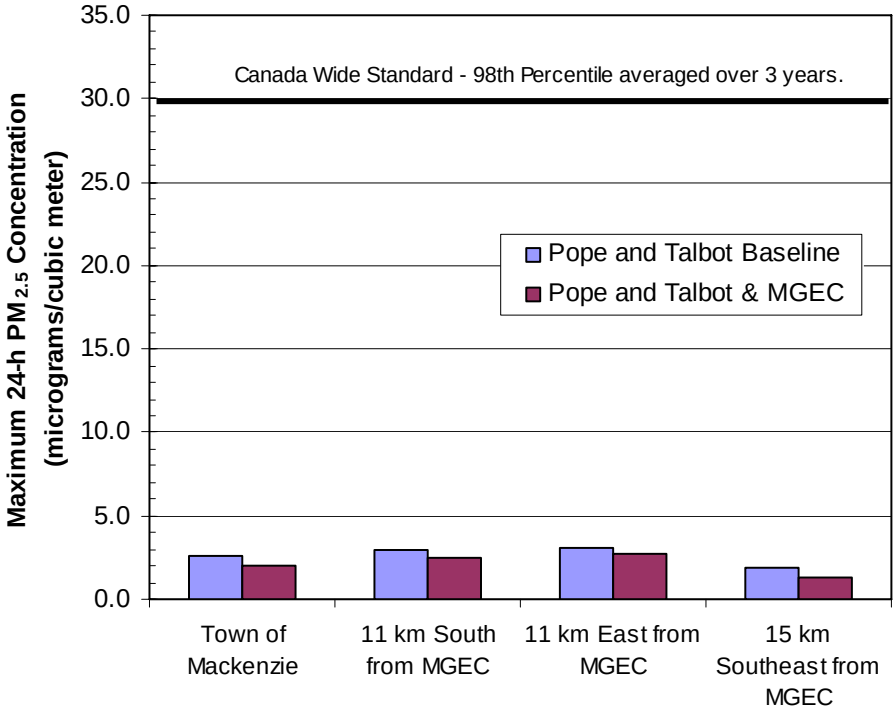

Figure 1 Comparison of Regional Maximum 24-h $PM_{2.5}$ Concentrations with MGEC in Operation to the Baseline with Pope & Talbot Mill Emissions Only

Table 5.5-4, repeated below from page 5-83 of the Application, compares greenhouse gas emissions before and after startup of the MGEC and illustrates that the project will achieve a 77% reduction in CO_2 and a 52% reduction in CO_2-equivalent emissions.

Table 5.5-4 Greenhouse Gas Emissions after MGEC and Compared to Baseline

GHG	Baseline (tonne/year)	After MGEC In Operation (tonne/year)			Change
	Pope & Talbot Power Boiler	Wood-fired Boiler	Natural Gas-fired Standby Boilers	Total	
	CO_2 Equivalent*	CO_2 Equivalent*	CO_2 Equivalent*	CO_2 Equivalent*	
CO_2	50,694	-	11,635	11,635	-77%
CH_4	383	2,219	4.9	2,224	
N_2O	2,219	11,910	65.7	11,976	
Total	53,295	14,129	11,705	25,834	-52%

Basis: Wood-fired boiler operates 93% of the year and the natural gas boiler operates 7% of the year.
* Total GHG emissions from the MGEC, including CO_2 from wood residue, will be 895,996 tonnes CO_2 equivalent/year. Calculated using GWP factors in Table 5.5-2 of the Application.

2 *Truck Emissions*: The proposed MGEC Project will require wood to be transported to the facility from mills in Chetwynd, Fort St. James, Bear Lake, etc. How will emissions related

to the transport of wood to the power plant affect the overall level of emissions from the facility?

MGELP Response:
A preliminary estimate has been developed of emissions from heavy duty diesel trucks that will be used to transport wood residue to the MGEC. This estimate is conservative as it is based on the number of truck deliveries to the MGEC (see Section 3.5.3.2.1 on page 3-50 of the Application) assuming these are new truck movements even though some trucking would be currently required to dispose of the wood residue. The following table summarizes the number of truck deliveries and the estimated one-way and total annual distances travelled by these trucks:

Route	Number of Trucks	One-Way Distance (km)	Annual Distance Travelled (km)
Local Mackenzie area	30 trucks/day	50	780,000
Chetwynd to Mackenzie junction	14 trucks/day	140	1,109,200
Bear Lake to Mackenzie junction	15 trucks/day	80	624,000
Mackenzie junction to Mackenzie	29 trucks/day	30	452,400
Fort St. James to Mackenzie	30 trucks/day	180	3,369,600

Emission factors for the diesel fuel delivery trucks were estimated using the US Environmental Protection Agency (US EPA) MOBILE6.2C model assuming the trucks have a gross vehicle weight rating of in excess of 27,216 kg (60,000 lb). These vehicles are classified by the US EPA as HDDV8b vehicles for modelling purposes. This model was developed primarily for analysis of emissions from operation of onroad vehicles on urban or rural roads and, hence, incorporates assumptions that reflect typical vehicle driving cycles in these situations. There is uncertainty in the application of emission factors estimated by the MOBILE6.2C model to large diesel tractor trailer vehicles that will be used on highway and forestry roads to haul wood residue to the MGEC, however, no better emission estimating tools are available. The model is capable of forecasting emission factors and this capability was used to estimate emission factors for vehicles in 2010 assuming the engines and emission control technology used are 10 years old at that time. The MOBILE6.2C emission factors for PM_{10} and NOx used to estimate truck emissions are listed below:

- PM_{10} from engine exhaust, tire wear and brake wear: 0.16 grams/km travelled.
- NOx: 10.17 grams/km travelled.

Based on the information given above on the annual return distances that would be travelled by trucks and the PM_{10} and NOx emission factors for these types of vehicles, annual emissions from trucks delivering wood residue to the MGEC would be approximately:

PM_{10} 1 tonne/year
NOx 64 tonne/year.

The PM_{10} emissions from fuel delivery trucks will be less than 1% of the PM_{10} emissions from the MGEC. The NOx emissions from fuel delivery trucks will be approximately 5% of the emissions from the MGEC.

3	*Beetle-Killed Wood:* The proposed MGEC Project will utilize wood residue from sawmills processing harvested timber, including trees killed by the Mountain Pine Beetle. Not all beetle-killed wood is being harvested for sawmilling purposes however; much of it remains in the forest. How many years can beetle-killed wood be left in the forest (standing or fallen) before it would not be of any value as fuel for the MGEC Project? **MGELP Response:** Forest residue that Mackenzie Green Energy Limited Partnership anticipates utilizing will be tree trimmings or whole trees separated during logging of merchantable timber and piled for recovery. Consequently, Mackenzie Green Energy Limited Partnership does not plan to utilize beetle-killed wood chosen to be left in the forest by companies because it is unsuitable for use as merchantable timber. All residues from beetle-killed trees processed at sawmills will make good fuel for the MGEC. A discussion paper by Lewis and Harley[1] on the deterioration of pine trees in BC impacted by the mountain pine beetle concluded the following in regard to the wood's "shelf-life" and utilization for manufacturing: • Published information indicates that there is a rapid degrade of beetle-killed wood in the first 1-2 years following death of the tree due to reduced moisture content, checking and blue-staining; • Trees will generally fall before they reach the point where decay losses in standing trees are substantial; • Standing dead trees located in dry ecosystems will not experience significant decay for many years (15-20 years), however basal decay develops in 4-7 years and causes the tree to fall; and • Checking, moisture content and blue-staining will affect the utilization of the affected trees. Reduction in moisture content and associated checking of the wood occurs within a few years of tree death.

[1] Lewis, K.J. and I.D. Harley, 2006, Rate of deterioration , degrade, and fall of trees killed by mountain pine beetle, BC Journal of Ecosystems and Management 7(2): 11-19.

APPENDIX D3

Application for an Environmental Assessment Certificate for the Mackenzie Green Energy Centre (MGEC)

Proponent's Responses to Comments on the Application from McLeod Lake Indian Band (August 23, 2007)

1. Please describe the nature and volume of effluent that is currently discharged - directly or indirectly - to the Williston Reservoir and describe how this will change with the development and operation of the MGEC. Please include maps and air photos to show the location of existing and proposed facilities (e.g., settling pond, wetland, creek, etc.).

One of the things that Verne would like to figure out is whether the Project might affect First Nations treaty right to fish. Since the development of the Reservoir in 1967, it is no longer possible for First Nations to fish "as before". The development of Mackenzie and discharges from pulp mills has caused further deterioration of Water Quality.

Can you provide a qualitative assessment of any changes (positive or negative) in Reservoir Water Quality that might come about with MGEC, please?

MGELP Response:

1. Baseline Conditions

The direct and indirect discharges to Williston Reservoir from the Pope & Talbot pulp mill are as follows:

- Direct discharge: mill effluent treatment plant via deep outfalls.
- Indirect discharges via the ash impoundment pond, the wetland and an unnamed creek:
  - Sanitary effluent from sewage treatment plant;
  - Fly ash sluicing line.

1.1 Direct Discharge

Sewers from different sources within the pulp mill are mixed in an effluent mix tank. The effluent from this tank flows to the primary effluent clarifier and then to aeration lagoons for biological treatment before discharge to Williston Reservoir.

The primary effluent clarifier removes settleable solids such as fibre, grit and lime mud from the effluent.

The combined effluent flows from the mix tank to the first aeration lagoon (Cell #1) in which air is injected through subsurface distributors and surface aerators. Air injection and vigorous mixing of the effluent in the lagoon sustain bacterial activity that removes many contaminants from the water. The effluent flows onward from the first to the second aeration lagoon (Cell #2) where there are 19 surface aerators to provide for final treatment to meet permit effluent criteria. Bacterial biomass settles to the bottom of the lagoon and is consumed. The treated effluent is discharged to Williston Reservoir through two diffusers located on the bottom of

Williston Reservoir.

The discharge of process effluent from the pulp mill is subject to federal and provincial regulations. These requirements have been incorporated into the mill's provincial effluent permit. In addition, there are some federal requirements that are administered separately.

Figure 1 is an aerial photograph showing the Pope & Talbot mill and the effluent treatment ponds discussed above. This aerial photograph was prepared for Pope & Talbot's annual groundwater survey and therefore shows groundwater elevations and well locations. The high reflectance of the water spray and foam created by the aerators in Cells #1 and #2 causes parts of the lagoons to be coloured white in the photograph.

Treated effluent is discharged to Williston Reservoir through two diffusers, which are located on the bottom of the reservoir in the old Parsnip River channel. These diffusers are located as follows:

- The original diffuser extends approximately 500 m out from the foreshore, and
- A newer diffuser (installed in 1994) extends approximately 1,370 m beyond the original diffuser.

The location of the diffusers relative to the mill and shoreline is illustrated in Figure 2.

Detailed field studies in 2002 indicated that 99% dilution of the effluent occurs between 50 and 100 m down-lake of both the original and newer diffusers. This suggests that the region of any effluent-related discharge effects is localized generally within these distances. This finding is supported by water, bottom sediment and benthic invertebrate (organisms which reside in bottom substrates) data collected from the region (Section 5.7.1.1.1 of the Application).

The annual average discharge of pulp mill effluent was between 56,500 m^3/d and 59,500 m^3/d (8,630-9,090 Imperial gallons per minute) during the period between 2004 and 2006. This is 71% to 74% of the permitted maximum discharge rate. During this period the daily effluent discharge, temperature, pH range, BOD_5 (5-day biochemical oxygen demand), AOX (adsorbable organic halogens) and toxicity to rainbow trout were all in compliance with the permit requirements. As a result of turbulence in the lagoon caused by high winds, there were a few exceedances of the monthly average and maximum daily total suspended solids (TSS) permit limits in 2004. The mill repositioned the surface aerators to address this issue, which reduced the number of TSS exceedances to one in the following year. Additional steps to reduce TSS were taken in 2006 and, in future, no TSS discharges are expected occur.

Federal regulations prohibit the discharge of measurable concentrations of dioxins and furans in the effluent. From 2004 to (October) 2006, 31 samples of effluent were tested for dioxins and furans. Except for one result (November 2004), all results have met the federal requirements. The presence of furans in the November 2004 sample was attributed to resuspension of solids that had settled in the treatment plant before the mill implemented production changes to meet the federal regulations.

1.2 Indirect Discharge

The provincial effluent permit authorizes the discharges of sluiced power boiler fly ash (maximum 1,400 m^3/d) and treated sanitary sewage (maximum 200 m^3/d) to a diked pond, commonly referred to as the "ash" pond. The effluent from the pond is routed for final polishing into an adjacent wetland, from which it flows in channels to Williston Reservoir.

Both discharges into the ash pond as well as the overflow from the wetland are subject to permit requirements.

Mainly as a result of low water input and evaporation there is usually no outflow from the wet land and therefore only six sets of monitoring data are available for the period from January 1, 2004 to October 31, 2006. None of the monitoring results exceeded the permit limits for TSS and BOD_5. The average TSS and BOD_5 values were 4.7 mg/L and 2.8 mg/L respectively, which are significantly below the permit limits (60 mg/L and 45 mg/L, respectively). Although not required by the permit, the mill also tests the discharge for toxicity to rainbow trout. Testing of the wetland outflow shows it is nontoxic to rainbow trout.

2. Potential Effects of the MGEC on Effluent and Williston Reservoir

Wastewater from the MGEC will be discharged from three separate collection and treatment systems (Figure 3), as follows:

- Combined process wastewater from the MGEC will be treated in Pope & Talbot's effluent treatment plant and discharged through the existing outfalls into Williston Reservoir.
- Wastewater from the MGEC's sanitary facilities (sinks and toilets) will be discharged to Pope & Talbot's domestic sewage treatment plant where it will be treated to meet permit conditions and discharged to the ash pond and then to the wetland;
- Surface water runoff from the MGEC's wood residue storage area and ash landfill will be combined as illustrated in Figure 3 and treated in the ash pond and then discharged for final polishing to the wetland.

2.1 Process Wastewater

MGEC process wastewater will be largely uncontaminated, except for low concentrations of suspended and dissolved solids brought in by the feedwater and by residual levels of chlorine added to prevent bacterial and algal growth in process water systems.

The wastewater quality is expected to be within the permit requirements prior to treatment at Pope & Talbot mill effluent and, with few exceptions, it is likely to meet the Drinking Water Quality Guidelines for most parameters. The normal temperature of the process effluent leaving the MGEC plant site will be between 5°C and 20°C. This is below the temperature of the wastewater at the Pope & Talbot mill.

The annual average MGEC process wastewater flow rate will be approximately 466 m^3/d. This is approximately 0.8% of the 2006 annual average effluent flow discharged from the mill (56,500 m^3/d) and 0.6% of the allowable effluent discharge under the permit.

Overall, the process wastewater from the MGEC facility will have low concentrations of contaminants and generally be similar to the current sources of cleaner effluent at the pulp mill such as the reject from the mill's boiler feed water treatment system, boiler blowdown, or cooling water. The MGEC will result in no significant change from the existing rate of discharge from the mill and will have no measurable effects on the wastewater quality discharged from the pulp mill's effluent treatment plant. Some of the assumed effluent flow from the MGEC will be off-set by the elimination of blowdown from the mill's wood-fired power boiler, which will be shutdown as a result of the project.

2.2 Discharge from the Ash Pond to the Wetland

The combined sewage flow from the Pope & Talbot mill (14 m^3/day) and the MGEC (5.5 m^3/day) will be approximately 19.5 m^3/day. The mill's domestic sewage treatment plant has a capacity of 200 m^3/day and therefore will easily handle the additional domestic sewage from the MGEC. The sewage treatment plant will continue to meet its current permit limits.

The handling of runoff from the wood residue storage area and the ash landfill has been designed to maximize the flow of water to the wetland. This minimizes the reduction in water flow to the wetland that would otherwise occur when the mill's power boiler water and the associated flow of ash sluice water are shutdown.

Periodically, runoff and leachate collected in the wood residue detention pond and the active ash landfill will be transferred to the Pope & Talbot ash pond for further treatment and discharge to the wetland. The combination of the effluent in the ash pond will improve biological treatment prior to discharge. The runoff from the ash landfill will be similar to the ash sluicing water presently discharged to the wetland from the mill.

Detailed simulations of the treatment of the effluent streams in the holding ponds and the wetland were completed for the environmental assessment (see Section 5.7.3.2.6). These results show that the quality of the wetland outflow with the MGEC in operation will continue to be better than the existing permit conditions for this discharge.

The toxicity to rainbow trout and the concentrations of total suspended solids and fecal coliform in the wetland outflow with the MGEC in operation are expected to be in the same range as measured in recent years.

2. Please describe the potential effects of diesel emissions and dust from truck traffic on berries.

MGELP Response:

a) Approximately 89 trucks per day will deliver wood fuel to the MGEC, predominantly from sawmills located in surrounding fuel supply areas. The distribution of the daily truck traffic from fuel supply areas (Section 3.5.3.2.1, page 3-50) and the predominant type of surface on the roads that will be used are as follows:

Fuel Supply Area	Percent of Total Number of Trucks per day	Predominant Road Surface
Mackenzie	34%	Paved
Chetwynd	16%	Paved
Bear Lake	17%	Paved
Fort St. James	34%	Gravel

All trucks except those from Fort St. James will travel predominantly on paved roads (Highways 97 and 39) and, hence, be a minor contributor to dust near the roadside from all the vehicles using these well-travelled public roads. Approximately 34% of the fuel delivery trucks will travel to/from Fort St. James on the Germansen North Road and Ministry of Forest resource roads, which are gravel surfaced. These vehicles will add to the road dust currently generated during warm, dry periods of the year by existing local

industrial traffic.

A study by Thompson et al. (1984) cited in the federal Science Assessment Document[2] for particulate matter estimated that the effect on the photosynthesis of trees of typical roadway depositions of PM_{10} from automobile exhaust is likely small. This particulate matter is similar in behaviour to that emitted by the MGEC fuel delivery trucks.

A recent paper by Talley[3], et. al. (2006) reported the results of a field study that examined the effects of road dust from recreational trails and access roads on elderberry plants and the elderberry longhorn beetle. The study found that:

- Elderberry density did not differ with distance from dirt surfaces; and
- Dust from low traffic dirt and paved access roads and trails had a minor affect on the condition of elderberry plants.

Walker and Everett[4] (1987) studied the effects of road dust along the Dalton Highway and the Prudhoe Bay Spine Road in North Alaska. They found that road dust resulted in an earlier snowmelt and a snow-free band of vegetation within 30-100 m of the road in spring. Few effects were observed on vascular plant abundance except in areas of very high dust load. Increased depth of thaw was found to occur within 10 m of the road (possibly due to increased plant cover and earlier snowmelt).

Based on the information in the literature:

- Road dust and tailpipe emissions from the MGEC fuel delivery trucks are expected to have no effect on the quality and volume of berries harvested for food.
- Approximately 66% of the MGEC truck traffic will be on paved roads and therefore have a low impact on road dust and the deposition of road dust on berries if they exist along the roadside.
- Approximately 34% of the truck traffic will be on gravel roads and therefore have a potential to increase existing road dust emissions that may have some effects on vegetation within about 30 m of the road during the warm, dry periods of the year. The multiple effects of road development combined with road dust emissions can have low positive and negative effects on berries and other vegetation along the roadside.

[2] National Ambient Air Quality Objectives for Particulate Matter - Science Assessment Document – Section 8: Effects on Vegetation Minister, Public Works and Government Services, 1999, ISBN 0-662-26715-X.
[3] T.S. Talley, M. Holyoak, and D.A. Piechnik, J., 2006, The Effects on the Federally Threatened Valley Elderberry Longhorn Beetle, Environmental Management, Vol 37 No. 5 (May) pp 647-658.
[4] D. A. Walker, K. R. Everett, 1987, Road Dust and Its Environmental Impact on Alaskan Taiga and Tundra *Arctic and Alpine Research*, Vol. 19, No. 4, Restoration and Vegetation Succession in Circumpolar Lands: Seventh Conference of the Comite Arctique International (Nov), pp. 479-489.

Figure 2 Aerial Photograph of the Pope & Talbot Pulp Mill and Effluent Treatment Lagoons (Contour lines show groundwater elevations as reported by AMEC in 2006)

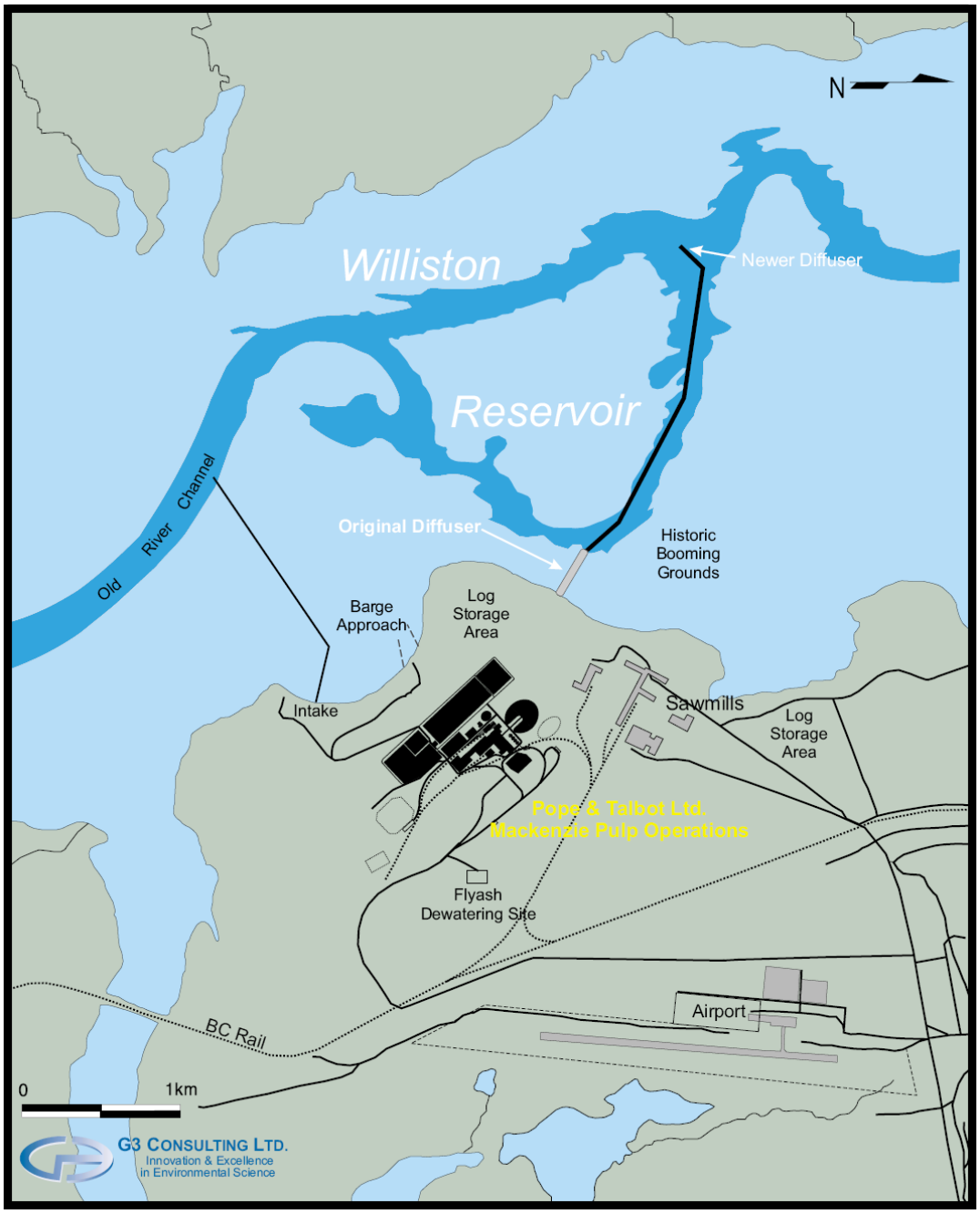

Figure 3 Location of Pope & Talbot Pulp Mill Effluent Outfalls

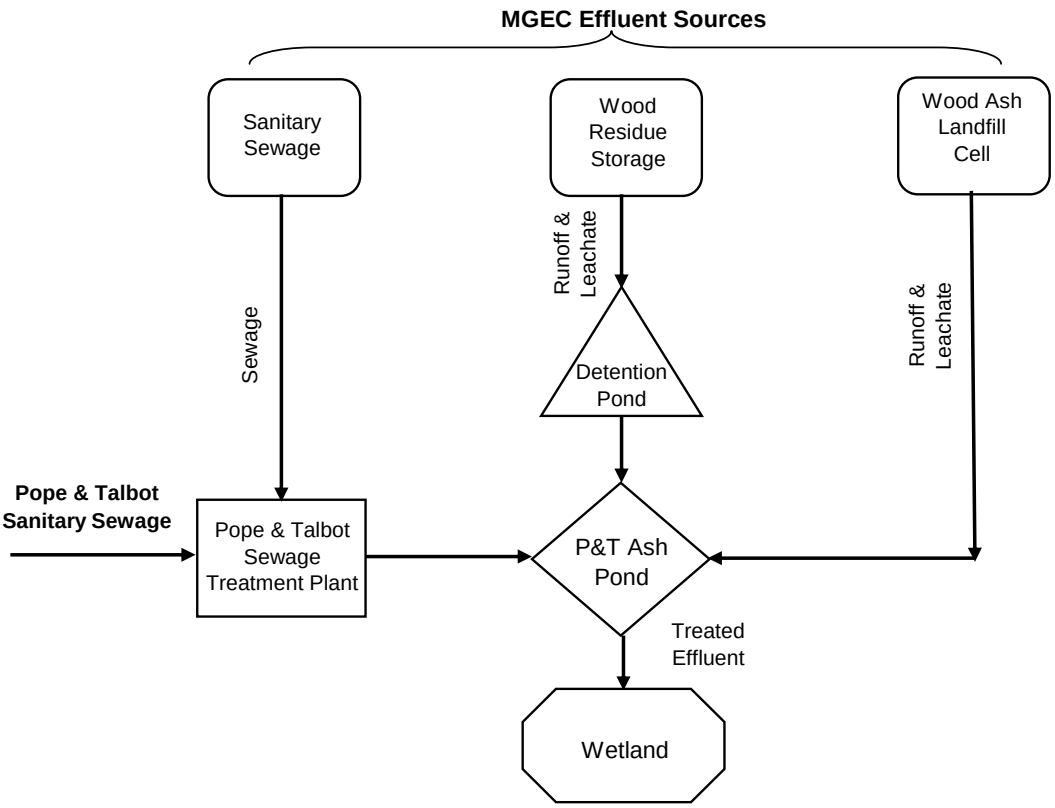

Figure 4 Proposed Discharges and Controls for the MGEC Effluents