Genesee Generating Station

Units 4 & 5

Rule 007 Application for a Power Plant

Alberta Utilities Commission

December 2013

Capital Power

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1.0 Introduction

Capital Power Generation Services Inc. (Capital Power) respectfully submits this application for the Genesee Generating Station Units 4 and 5 Project (the Project) with the Alberta Utilities Commission (AUC) as per *Rule 007: Application for Power Plants, Substations, Transmission Lines, and Industrial System Designations* (Rule 007) (Figure 1). Another application to the AUC for the interconnection of the Project to the Alberta Interconnected Electric System (AIES) will be filed separately. In December 2012, Capital Power announced plans to develop, construct, and operate the Project (formerly the Capital Power Energy Centre). The earliest in-service date is currently expected to be in 2017. The approximate gross capacity of the Project will be up to 1050 MW, and construction could be in two phases with the capacity of each phase being approximately equal. The expected life for the facility is approximately 35 years.

The Project is being developed to meet expected increases in Alberta's power requirements in the 2017-2020 timeframe, arising from continued economic growth and from the expected retirements of existing coal generating units.

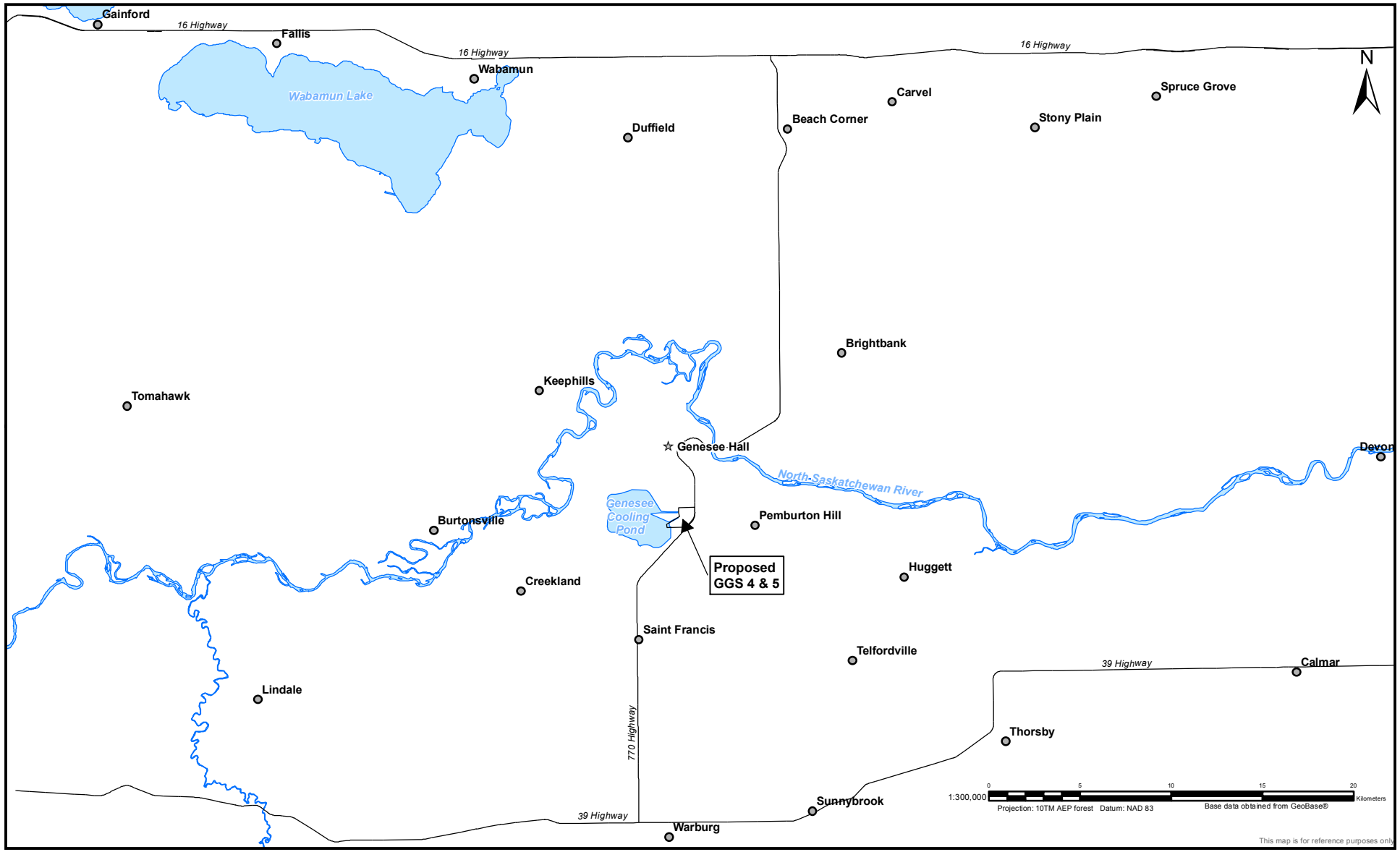
The Project will use natural gas combined-cycle (NGCC) technology. Specifically, the Project consists of two "1-on-1" units, each consisting of a single natural gas turbine paired with a heat recovery steam generator (HRSG), and a single steam turbine. The Plant will be located on a brownfield site adjacent to the existing Genesee Generating Station (GGS), which currently includes Units 1 to 3. The Project will make effective use of the existing GGS infrastructure, specifically, utilization of the existing river water intake, pumphouse, Genesee cooling pond, point of discharge to the North Saskatchewan River, settling pond, sewage lagoon, access roads, and transmission interconnection.

Gross output of the existing GGS Unit 1, 2, and 3 is 430 MW, 430 MW, and 516 MW respectively for a combined total of 1376 MW. The Project would increase the electrical output of the existing GGS by approximately 76% (up to an additional 1050 MW gross) for a combined total gross nameplate capacity of up to 2426 MW at the GGS site.

Electricity generated by the Project will be transmitted to the Genesee switchyard owned by EPCOR via an approximately 200 m-long overhead 500 kV power line. The Project is anticipated to supply approximately1020 MW net of electricity to the Alberta power grid. The application does not include interconnection to the Alberta Interconnected Electric System. Capital Power will submit a Facilities Application for the interconnection facilities application separately.

Capital Power was incorporated in July 2009, and effective July 9, 2009, acquired all power generation assets and related operations from EPCOR Utilities Inc. (EPCOR), including approximately 1,000 EPCOR staff. Prior to the transfer, EPCOR had more than a century of experience operating power generation facilities. Capital Power is headquartered in Edmonton, Alberta. Capital Power has a track record of successfully developing generation projects and operating a diverse portfolio of power generation technologies, including coal, natural gas, biomass and wind.

Capital Power is filing this application for the Project to the AUC under Section 3 (Power Plant Applications 1 Megawatt (MW) or Greater) of Rule 007.



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11/4/2013 By: alundell

November 2013
1102-19025

Stantec

Client/Project
CAPITAL POWER CORPORATION
GENESEE GENERATING
STATION EXPANSION

Figure No.
1

Title
GENERAL LOCATION OF THE PROJECT

2.0 Power Plant (PP) Application

PP1. Identify the sections of the *HEE Act* under which the application is made.

This application for approval to construct and operate a power plant is made pursuant to Section 11 of the *Hydro and Electric Energy Act* (RSA 2000 cH-16 s11).

PP2. Identify any other acts, for example, *Environmental Protection and Enhancement Act* (EPE Act) that may affect the project.

Other Acts considered for the Project include:

1. *Environmental Protection and Enhancement Act* (RSA 2000 c. E-12). Capital Power holds the *EPEA* approval for the existing GGS. Capital Power has prepared an application for submission to Alberta Environment and Sustainable Resource Development (ESRD) to amend the existing *EPEA* approval to include the Project.

2. *Water Act* (RSA 2000, c. W-3). Capital Power holds the *Water Act* license for the existing GGS. Capital Power has prepared an application for submission to ESRD to amend its current Alberta *Water Act* Approvals and Licence to Divert Water for the Project to reflect the integration of the Project with the existing GGS operations.

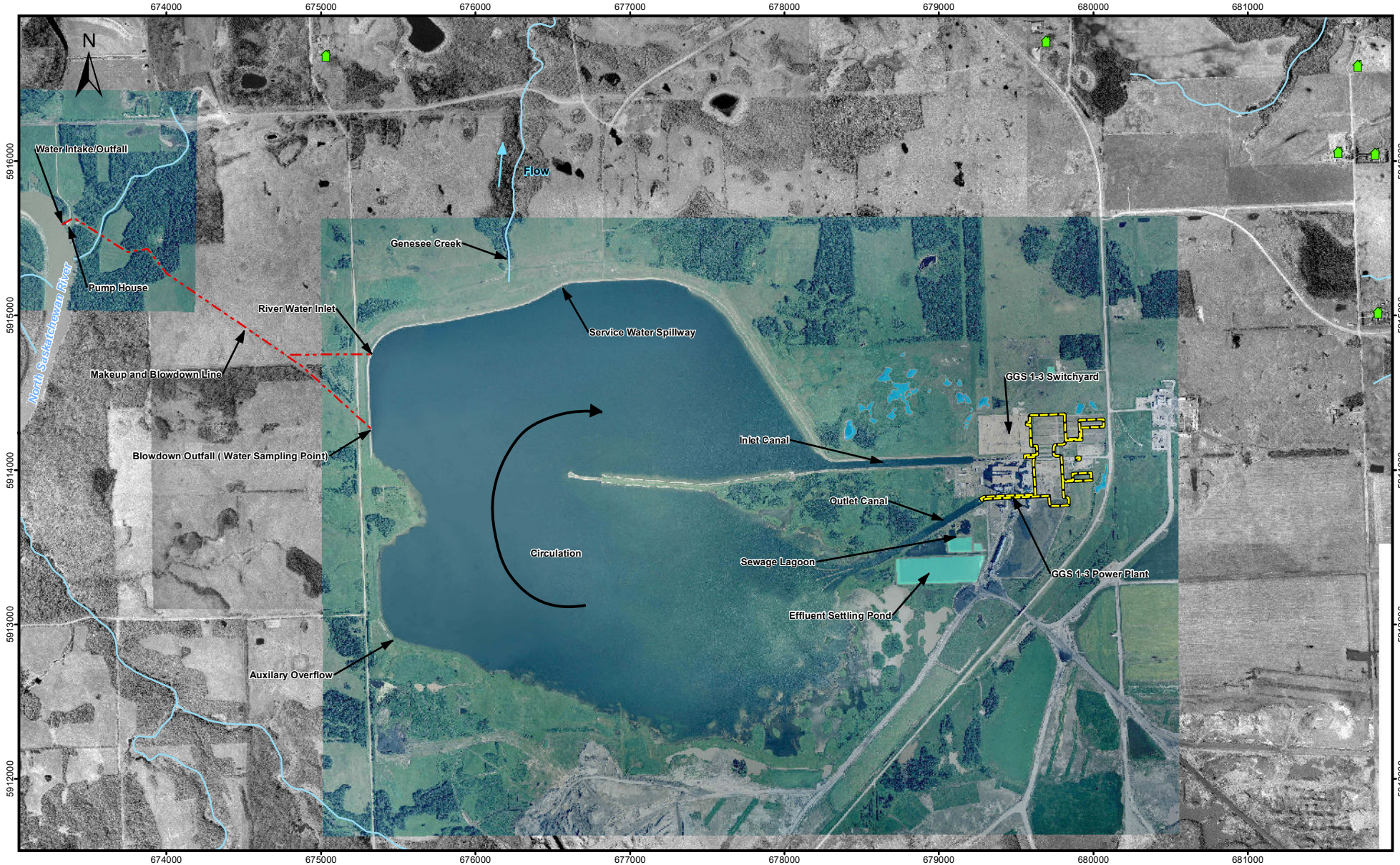
3. *Municipal Government Act* (RSA 2000, c. M-26). Capital Power holds a development permit for the existing GGS. Capital Power will prepare an application for submission to Leduc County to amend the existing development permit to include the Project.

4. *Historical Resources Act.* In 2001, Capital Power received *Historical Resource Act* clearance from Alberta Culture for the existing GGS. The Project is being constructed on a previously disturbed (i.e., a brownfield) site adjacent to the existing GGS and well within the existing GGS plant fence line. Consequently, no further application under the *Historic Resources Act* will be necessary for the Project.

5. *Canadian Environmental Assessment Act 2012.* The expansion of an existing fossil fuel-fired electrical generating facility that results in an increase in production capacity of 50% or more and a total production capacity of 200 MW or more may be subject to a federal environmental assessment process based upon determination of the Canadian Environmental Assessment Agency (CEAA). On November 25, 2013, Capital Power submitted a Project Description to the Canadian Environmental Assessment Agency.

PP3. State the approvals that are being applied for from the Commission, and provide a draft of the approval being requested.

Capital Power is applying to the AUC under Rule 007 (Section 3), pursuant to Section 11 of the *Hydro and Electric Energy Act*, RSA 2000 cH-16, for approval to construct and operate a combined cycle natural gas-fired power plant of up to 1050 MW gross. The Project is comprised of two power units, Unit 4 and Unit 5. Each unit involves construction and operation of a combined cycle natural gas-fired power plant of up to 525 MW gross capacity. The Project will be located within a brownfield site (i.e., previously disturbed lands) adjacent to the existing GGS and will occupy approximately 5 hectares (Figure 2 and Figure 3).



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12/10/2013 By: alundell

December 2013
1102-19025

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Projection: UTM Zone 11 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 2011 and CPC, 2011.

- Limit of Construction
- Makeup and Blowdown Line
- Residence
- Constructed Waterbody
- Wetland
- Watercourse

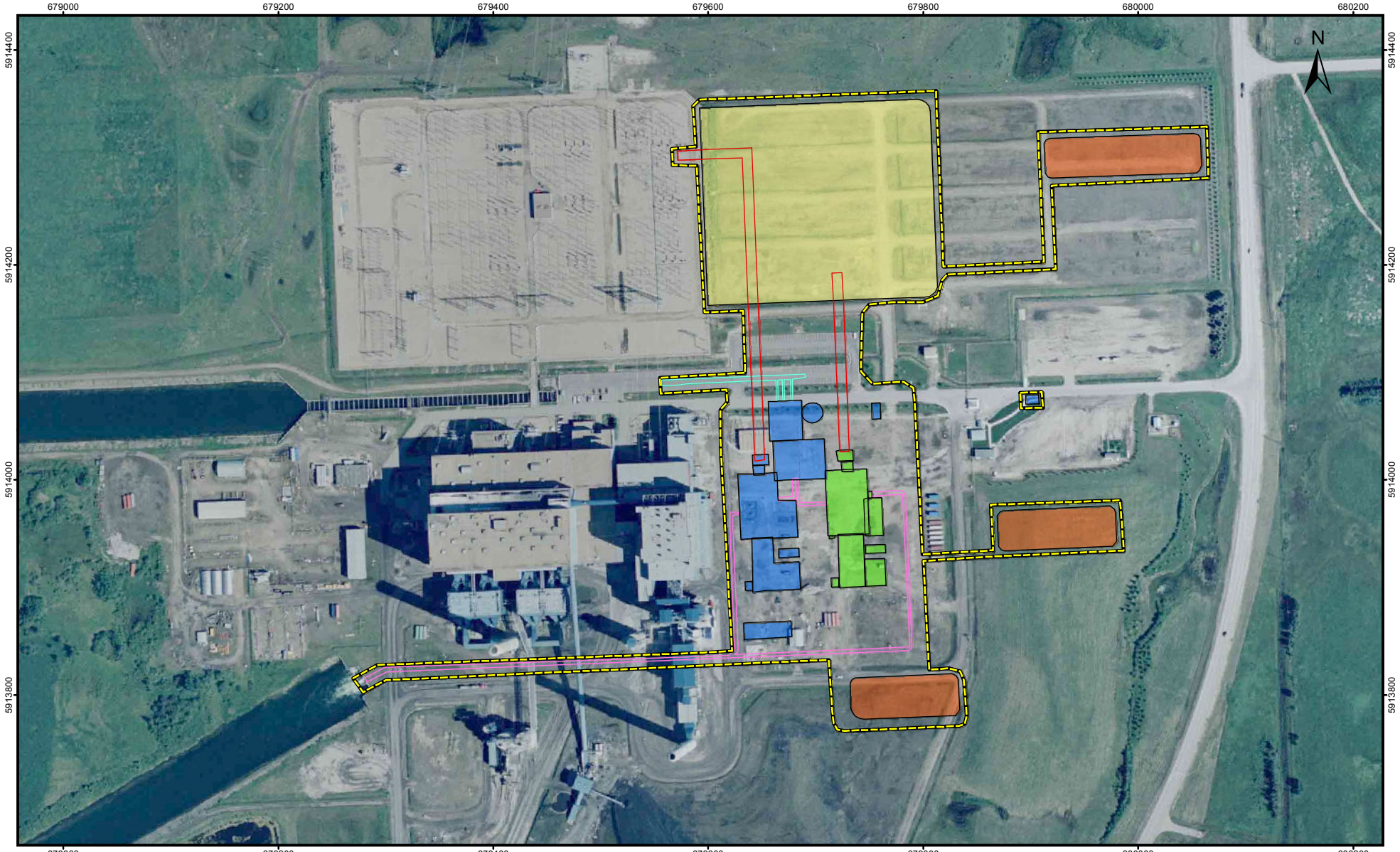
1:35,000 0 500 1,000 1,500 2,000 Meters

This map is for reference purposes only

Client/Project
CAPITAL POWER CORPORATION
GENESEE GENERATING
STATION EXPANSION

Figure No.
2

Title
SITE PLAN OF GENESEE GENERATING STATION UNIT 4 & 5



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10/23/2013 By: alundell

October 2013
1102-19025

Stantec

Projection: 3TM CM:114° Datum: NAD 83
Imagery obtained from CPC, 2011.

- Limit of Construction
- GGS4
- GGS5
- GGS5 Switchyard
- Construction Laydown
- Inlet
- Outlet
- Overhead Powerline

0 50 100 150 200 250
1:5,000 Metres
This map is for reference purposes only

Client/Project
CAPITAL POWER CORPORATION
GENESEE GENERATING
STATION EXPANSION

Figure No.
3

Title
SITE PLAN OF GENESEE GENERATING STATION UNIT 4 & 5

PP4. Provide a list of existing approvals for facilities directly affected by this project, if any.

The *EPEA* Approval (773-02-00 Genesee Thermal Electric Power Plant), *Water Act* Licenses (3449-00-00; 34491-00-01; 268020-00-00), and Development Permit for the existing GGS will be amended accordingly to include changes to evaporative losses due to the proposed Project. No new diversion volume is required.

PP5. Provide details and outcome of consultation with local jurisdictions (e.g., municipal districts, counties).

Capital Power regularly consults with Leduc County and the Village of Warburg through informal breakfast meetings on a quarterly basis. Capital Power will need a new or amended Development Permit to include the Project on the existing Genesee site from Leduc County. Preliminary discussions between Capital Power and local Leduc and Village of Warburg Council members have taken place throughout 2013. Capital Power intends to meet with Leduc County representatives in early 2014 to confirm requirements, processes and expectations for submitting a Development Permit application for the Project, which Capital Power will subsequently prepare and file.

PP6. Provide a list of parties that may be affected by the project, confirm that these parties have no concerns regarding the application, and indicate which other agreements are necessary to carry out the project.

Information on Capital Power's efforts to notify and engage parties potentially affected is described in detail in Section 3.0 of the Participant Involvement Program Report (PIP Report), which is appended (Appendix A). This includes details on concerns raised by parties and how those concerns were addressed by Capital Power.

Since the Project will be constructed within the fence line of the existing GGS, only two external agreements are required to carry out the Project. The first agreement is an Interconnection Agreement with EPCOR for the management of the required switchyard expansion and connection to the existing transmission infrastructure. The second agreement is for a natural gas pipeline connecting the Project to the gas transmission/distribution system. Discussions are on-going with both TransCanada Pipelines and ATCO Pipelines. Once the natural gas interconnection option is finalized, an application for the natural gas pipeline and associated infrastructure, including the metering station, will be submitted to various regulators by the transporter.

PP7. Provide a copy of approval from Transport Canada for any structures 20 metres (m) or taller.

The Project comprises two generating units, GGS Unit 4 & 5. Each unit will have a stack of approximately 80 m in height. The generation building that houses the gas and steam turbine generators and HRSG for each unit will be approximately 40 m in height. An Application for Aeronautical Obstruction Clearance will be prepared and submitted to Transport Canada in relation to the Project. A copy of Aeronautical Obstruction

Clearance obtained from Transport Canada will be provided to the AUC in support of this application.

PP8. Provide a copy of the approval from Alberta Transportation if a wind power plant that is within 300 m of a numbered highway is being applied for.

This sub-section is not applicable.

PP9. Confirm that an application to AESRD has been made, if applicable, and list all other government departments and agencies from which approval is required.

For wind power applications, AESRD – Fish and Wildlife Division must be included on the referral list. The Commission requires a sign off from AESRD prior to processing any new wind power applications.

In December, 2013, Capital Power applied to ESRD for approval to amend the existing GGS *EPEA* Approval to include the Project.

Capital Power has also applied to ESRD to amend its water licences for the existing GGS. No additional diversion of water from the North Saskatchewan River is required for the Project beyond the volumes already permitted under the current Licences to Divert Water issued by ESRD for the existing GGS. Capital Power does anticipate the need to amend the current Licence to Divert Water to extend the expiration date and for some adjustments to operational blowdown conditions due to marginal changes in the cooling pond water temperature (slightly higher). This may result in a reduction of discharge back to the North Saskatchewan River due to increased evaporative losses from the cooling pond.

The expansion of an existing fossil fuel-fired electrical generating facility that results in an increase in production capacity of 50% or more and a total production capacity of 200 MW or more may be subject to a federal environmental assessment process based upon determination of the Canadian Environmental Assessment Agency (CEAA). On November 25, 2013, Capital Power submitted a Project Description to the CEAA. On December 2, CEAA posted the Project Description on its Registry for public comment. The public comment period concludes on December 23, 2013. CEAA indicated that it will notify Capital Power on January 16, 2014 as to whether a federal environmental assessment is required for the Project. A letter from CEAA detailing its review of the Project Description in appended (Appendix B).

Additional government agencies from whom approvals are required includes

- Alberta Electric System Operator (System Access Service Request for interconnection to the Alberta Interconnected Electric System – see PP39)
- Transport Canada (Aeronautical Obstruction Clearance – see PP7),
- NAV CANADA (non-objection following Land Use Proposal submission), and

- Leduc County (Development Permit amendment – see PP5).

Should additional agency approval requirements arise, Capital Power is committed to proceeding with applications to obtain such approvals as necessary.

PP10. Confirm that a *Historic Resources Act* clearance is being applied for. If a historical and/or archaeological impact assessment is required, submit a summary describing any historical or archaeological sites and parks affected by the proposal.

In 2001, Capital Power received *Historical Resource Act* clearance from Alberta Culture for the existing GGS. The Project is being constructed on a previously disturbed (i.e., a brownfield) site adjacent to the existing GGS and well within the existing GGS plant fence line. Consequently, no further application under the *Historic Resources Act* will be necessary for the Project (Appendix C).

PP11. Provide the ISO assigned asset identification code, if available.

This sub-section is not applicable.

PP12. Provide the legal description of the proposed power plant site (Legal Subdivision [LSD], Section, Township, Range, Meridian) and connection point, if applicable.

The Project will encompass the SE quarter of Section 25, Township 50, Range 3, W5M.

PP13. For wind power plant applications, provide the longitude and latitude coordinates for the centre of each structure supporting a wind-powered generator. If after approval is granted, the location of any supporting structure has to be relocated more than 50 m from the coordinates stated in the application, the power plant proponent must re-apply to the Commission for approval to relocate the structure prior to construction.

This sub-section is not applicable.

PP14. Describe the number of generating units and the total capacity (kilovolt-ampere (kVA), or megavolt-ampere (MVA) for the project.

Table 1 provides electrical details for the proposed generating units.

Table 1 Electrical Detail of the Proposed Generating Units

Generating Unit	Nominal Ratings Gross (MW, MVA)	
	Summer	Winter
Unit 4	460, 540	525, 620
Unit 5	460, 540	525, 620

PP15. Describe the existing environmental and land-use conditions on the project site, and discuss potential siting and land-use issues. Also, describe the regional setting of the development, such as regional land-use plans (i.e., Lower Athabasca Regional Plan). If applicable, include maps showing important environmental features and sensitive areas on or near the project site.

The Project will be situated adjacent to the existing GGS. The location for the Project is a brownfield site that was disturbed as part of construction (2001-2005) of the Genesee Phase 3 Project. The location is well within the plant fence line of the existing GGS. The site remains disturbed and is currently being used as a location for siting portable office trailers as well as a laydown area for equipment as part of the ongoing operation of the existing GGS. The site is a level area built up with gravel fill. There is a limited amount of vegetated cover on the site (see Photos 1 to 4). Given the high level of existing disturbance in the Project area, the land in the immediate vicinity of the Project, an active industrial facility, is considered to have low habitat value for wildlife.

Leduc County's Land Use Bylaw (Bylaw 07-08) provides planning guidance for industrial development at the project site. The proposed Project will be located within the Genesee Power Project Overlay zone. Power plants are a permitted use within this zone, with road and property setbacks, landscape plan, as well as height restrictions in some portions of the zone, the sole constraints to power plant development. General conditions related to such things as signage also apply.

The cooling pond hosts waterfowl and fish species. The North Saskatchewan River, near the intake/outfall, hosts various fish species, wildlife, and amphibians. There are a number of wetlands to the north and south of the Project and white-tailed and mule deer concentration areas and movement corridors occur in the area of the Project.

Photo 1: Looking southeast across the southwest portion of the Project site

Photo 2: Looking northwest across the northern portion of the Project site

	
Photo 3: Looking west across the centre of the Project site	**Photo 4:** Looking southeast across the southeastern portion of the Project site

An Environmental Overview Report has been prepared for the Project and is attached as Appendix D. The following is a summary of the results from the Environmental Overview Report.

Soils and Terrain: The project area is located in a transitional region between Black Chernozems and Gray Luvisols. The dominant native soils at the project site are Dark Gray Luvisols, Humic Gleysols, and Mesisols. However, the Project site is currently underlain by fill and replaced topsoil, since native soils had been salvaged when the site was prepared during construction of the Genesee Phase 3 Project (2001-2005).

Vegetation: The Project location is a brownfield site with a high level of bare ground cover. Plant species that do occur at the site include agronomic forbs and grasses.

Hydrology: The only watercourses or waterbodies in the immediate vicinity of the Project are the cooling pond, sewage lagoon, and effluent settling pond associated with the existing GGS, as well as some open water wetlands to the north and south of the Project. All surface runoff from the GGS, including the land on which the Project is to be situated, is contained and enters the effluent settling pond prior to flowing into the cooling pond.

Wildlife: Given the high level of existing disturbance in the proposed project area and agronomic species cover, the land in the immediate vicinity of the Project is considered to have low habitat value for wildlife. Wildlife studies conducted to support regulatory applications in 1989, 2001, and 2011, and ongoing wildlife monitoring that was initiated in 2005, support this assertion.

Land Status: Capital Power owns the lands in and around the GGS facility site. The Project will be located on land owned by Capital Power. Overall control with respect to private land and utility development is provided by Leduc County through its Land Use Bylaw (Bylaw No. 07-08). Power production is a permitted use for the Project lands, as per the land use zoning: Genesee Power Project Overlay Area.

Visual: As the Project is situated within an existing large industrial facility, in an agriculturally developed area, visual impacts are not anticipated.

Air Quality: The Project is located within the West Central Airshed. The nearest monitoring station is the Genesee Station. The health risk in the area is primarily low, with instances ranging into the moderate ranges, according to the Air Quality Health Index data collected by ESRD from that station. The occurrence of moderate ranges is infrequent and the duration of occurrences is limited to only 0.3% hours between 2008 and 2012 (CASA, 2013).

PP16. At a level of detail commensurate with the size and type of potential impact(s) of the project, describe how the project is predicted to adversely affect the environment (such as soils, terrain, vegetation, wetlands, wildlife and wildlife habitat, fish and fish habitat, groundwater, surface water, air quality, land use, and visual aesthetics). Describe how the environmental effects of the project will be mitigated and any monitoring proposed to evaluate the efficacy of the mitigation.

Air

An assessment of the effects of NO_2, SO_2, $PM_{2.5}$, CO, Hg, and NH_3 emissions from the Project was conducted (Appendix E). This air quality assessment also assessed cumulative emissions from the Project in combination with other existing regional sources. Potential effects on ambient air quality were evaluated using the CALPUFF dispersion model. Dispersion modeling was performed in accordance with the ESRD Air Quality Model Guideline (ESRD 2013a).

The maximum predicted concentrations for NO_2, SO_2, $PM_{2.5}$, CO and NH_3 associated with emissions from the Project (G4 and G5 alone) for all relevant averaging periods are predicted to be much lower than the Alberta Ambient Air Quality Objectives (AAAQO).

In combination with the existing and approved facilities in the region, modelling indicates that NO_2, $PM_{2.5,}$ and CO concentrations are influenced by the nearby Genesee Mine and haul roads and SO_2 is influenced primarily by the existing GGS (G1-3) and Genesee sour gas plant. Highest concentrations are predicted to occur near the Mine, haul road, and GGS plant areas and decrease with distance from the respective emission sources. Maximum predicted NO_2, SO_2, $PM_{2.5}$, CO, Hg, and NH_3 at all sensitive receptors are predicted to be less than the AAAQO. Maximum predicted NO_2, SO_2, $PM_{2.5}$, CO, Hg, and NH_3 at all areas outside of the Genesee Mine Permit Boundary are also predicted to be less than the AAAQO, except for the 24-hour, 30-day, and annual SO_2 concentrations in a small area surrounding the Genesee sour gas plant.

Model predictions indicate little difference between Base Case and Application Case results, with maximum predicted concentrations of key substances of interest increasing less than 3% indicating that the Project is not expected to materially increase maximum concentrations of these substances within the study area.

Hydrology and Surface Water Quality

No additional diversion of water from the North Saskatchewan River (NSR) is required for the Project beyond the volumes already permitted under the current Licenses to Divert Water issued by ESRD for the existing GGS. The current approved annual withdrawal volume of 34.1 Mm^3 represents 0.5% of the NSR mean annual flow (Golder Associates 2010). Long-term simulations were completed to predict Total Dissolved Solids (TDS) and major ion concentrations, makeup water, as well as blowdown rates to the NSR, under Base and Application Case conditions (Appendix F). Two Application Case scenarios were modelled to represent the upper (Scenario 1 - 370 ppm) and lower (Scenario 2 - 250 ppm) operational targets for TDS monitored by GGS operations.

Application Case – Scenario 1

TDS levels in the pond are predicted to remain below 370 mg/L if the water diversion rate for makeup water increases from 18.5 Mm^3/y to 22.0 Mm^3/y. The estimated rate of blowdown water for this scenario is about 10 Mm^3/y. Concentrations of all modelled constituents are predicted to increase relative to the Base Case, but the calculated in-stream concentration will remain close to Base Case levels because of the relatively small blowdown flow rate compared to NSR flow rate. In-stream concentrations of all modelled constituents are predicted to remain below corresponding chronic guidelines and Water Quality Objectives (WQOs), except for fluoride. Predicted fluoride levels are slightly higher than guidelines (0.15 vs. 0.12 mg/L); however, fluoride concentrations in rivers and lakes of Alberta are typically at, or above, the chronic water quality guideline for the protection of aquatic life. Available data indicate a mean fluoride concentration of 0.12 mg/L, with levels ranging from 0.05 to 0.95 mg/L (at 242 sites, number of samples = 10,429) (Government of Canada 1993).

Application Case – Scenario 2

Diverting water from NSR at the maximum permitted rate (34.1 Mm^3/y) is predicted to keep TDS levels below 281 mg/L. Concentrations of all constituents are predicted to decrease relative to the Base Case, except for calcium and barium. The estimated rate of blowdown water for this scenario is about 22 Mm^3/y. Since the expected net loss of water being released back into the NSR is anticipated to be small in comparison to mean annual flow, measurable changes in flow volume in the NSR are not expected.

Under both scenarios, barium and calcium concentrations are predicted to increase under Application Case conditions relative to the Base Case, because of higher concentrations of these ions in NSR water relative to the cooling pond. But in reality, the concentrations of barium and calcium in the cooling pond are likely to be lower due to shifting equilibrium as the NSR water is pumped into the cooling pond. Barium is presumed to precipitate in the pond in response to elevated sulphate concentrations from process chemical addition (i.e., sulphuric acid); whereas, calcium is presumed to precipitate due to the reduced solubility of calcite in warmer water (i.e., calcium solids precipitate as calcium-rich makeup water enters the warmer cooling pond).

Although the simulations were extended for 20 years, predicted concentrations of chemical constituents within the Genesee cooling pond, including TDS, reach steady-state conditions around 2020. The water quality modelling results show that within the current water license approved makeup water rate, the cooling pond water quality can be improved relative to the current level and will not affect NSR water quality with the addition of the G4 and G5 units in the future.

Overall, the additional consumptive water use at the NSR is expected to have no additional effects on water levels beyond those predicted under the existing water licence. The total consumptive water use is expected to increase from 0.18% to 0.24% of the mean annual flow of the NSR, but no adverse effects on downstream users are expected.

Storm Water Management Plan (SWMP)

The objectives of a SWMP are to:

- Develop storm water management strategies and identify infrastructure requirements to handle surface runoff for worse case conditions.
- Minimize effects on the adjacent environment with respect to water quantity and quality.
- Comply with regulatory requirements for industrial runoff management.

Capital Power's current storm water collection system for the power block area, as depicted on Drawing #180144-DS-00001 in Appendix A of the Storm Water Management Plan (Black and Veatch 2013) (Appendix G), includes a series of catch basins and ditches around the perimeter of the laydown yard. The surface drainage pattern allows the storm water to flow from the center of the site to the southwest and southeast where it ties into the perimeter storm water ditch. The perimeter ditch drains south at the southwest corner of the site, which then flows to the existing settling pond through a series of storm water ditches. The settling pond allows sediments to settle out prior to discharging to the Genesee cooling pond.

Groundwater

No changes are anticipated to the current groundwater regime in the vicinity of the proposed Project. Potential groundwater impacts from the existing GSS are monitored according to the requirements outlined in Section 4.6 of the current *EPEA* approval for the existing GGS. With the incorporation of the proposed Project, the changes to groundwater quantity are expected to be imperceptible, since dewatering during construction is not expected and groundwater will not be used for operations.

Overall, effects of the Project on groundwater are predicted to be not significant. The continuation of the existing groundwater monitoring program already in place for the

existing GGS will detect any variances from the expected effects on the groundwater resource.

Industrial Waste Water

Industrial process waste water from the Project will be directed to the existing Genesee cooling pond. Process industrial waste water is generated from blowdown from the heat recovery steam generators (HRSGs), from the water treatment plant and equipment drains. Process industrial water will also be directed to the existing Genesee cooling pond through the settling pond. To minimize contamination of industrial waste water entering the Genesee cooling pond, the Project's design includes an oil/water separator where all drains identified as having the possibility of oil contamination will be directed through before discharging to the settling pond. Furthermore, all above ground storage tanks required for the Project will be designed to comply with the *Guidelines for Secondary Containment for Above Ground Storage Tanks* (Alberta Environmental Protection, 1997).

The waste water and effluent management plan for the Project is provided in Appendix H Blowdown from the Genesee cooling pond will be periodically released into the NSR to meet operational water quality requirements of GSS units as described in Hydrology and Surface Water Quality section above.

Vegetation and Wetlands

The majority of the lands around the Project area and existing GGS have been cleared for agriculture (mostly cultivation with some pasturelands) with the remaining native vegetation comprised of aspen-dominated woodlots, scattered in isolated pockets throughout the Project area. Additional information on vegetation and wetlands is provided in the Environmental Overview Report (Appendix D).

Since the Project will be located on a previously disturbed site within the existing GGS plant fence line, site preparation activities will be limited. Bare ground cover dominates the Project site with some agronomic species cover found on the eastern half of the site. A number of wetlands occur to the north, south, and east of the project site. No vegetation clearing of previously undisturbed areas will be required, as well as minimal topsoil salvage, site grading, and site preparation activities will be necessary. Consequently, the project effects on vegetation and wetlands are assessed as not significant.

Wildlife

The Project Site is located on a brownfield site adjacent to the existing GGS. Residual environmental effects associated with any site preparation work during construction of the Project does not result in any disturbance or loss of wetland habitat or natural wildlife habitat. Consequently, the effects of the Project on wildlife diversity and wildlife habitat are predicted to be not significant.

Fish, Fish Habitat, and Aquatics

Construction and operation of the Project are also not expected to lead to any changes to aquatic species, including fish and fish habitat, since no physical changes are expected to the existing NSR intake and outfall.

The Genesee cooling pond and NSR at the blowdown mixing zone boundary were evaluated for effects on fish with regard to water quality, thermal habitat, and gas bubble trauma (Appendix F). Impacts due to changes to water quality and thermal habitat are expected to be minimal in the Genesee cooling pond and negligible in the NSR. With regard to gas bubble trauma, it is expected that the predicted changes in the cooling pond are unlikely to affect the suitability of the pond for maintaining the existing resident fish species and communities, with no impacts anticipated in the NSR.

Conservation and Reclamation

The primary objective of reclamation is to return disturbed lands to a level of quality or productivity equal to or greater than that which existed prior to disturbance. Reclamation of the Project will align with the previous commitment made by Capital Power to reclaim the existing GGS plant site to primarily agricultural land use. This intended land use objective for the existing GGS plant site remains unchanged from those described in previous approval applications for the site.

Specifically, all land shall be reclaimed through appropriate conservation and reclamation methods to have characteristics (soils, topography, and drainage) that result in a return of land capability equivalent to that which existed prior to disturbance. Slopes in agricultural areas will be approximately 1:20.

Topsoil and upper subsoil was previously salvaged from the Project site during construction of the G3 Phase 3 Project and is being stored on the north and east sides of the Project area. Approximately 90,000 m^3 of topsoil will be needed to ultimately reclaim the entire GGS plant site, which includes the Project; approximately 94,000 m^3 of topsoil is stockpiled. Methods to achieve chemical and physical soil quality, and appropriate replacement depths for each given agricultural land capability will be determined at the time of reclamation planning near the end of the Project life. Soil amendment methods will depend upon sampling results of the stored topsoil and materials and technology available at the time of reclamation. Replacement depths will be based upon analogues Capital Power will compile to guide reclamation efforts.

Capital Power anticipates the need to file an amendment to any *EPEA* approval to reclaim the Plant by submitting a Decommissioning and Land Reclamation Plan to the Director of ESRD within six months of the plant ceasing operations. This requirement is consistent with the current EPEA approval issued by ESRD for the existing GGS.

Proposed Environmental Monitoring

Monitoring requirements in the current *EPEA* approval for the GGS, as well as those that constitute the requirements of the current Wabamun-Genesee Area Environmental Monitoring Program (i.e., Biomonitoring Program) will continue to be used to monitor and address any predicted effects of the Project in conjunction with the existing GGS. The Biomonitoring Program already established for the existing GGS is comprehensive and sufficient to monitoring any additional predicted effects of the Project. Table 2 details the components of the environment already monitored as part of the Biomonitoring Program, as well as the frequency in which these environmental components are assessed.

Given the extensive monitoring programs already in place, no changes to performance monitoring elements, nor locations, or methods of monitoring, are anticipated due to the expected effects of the Project.

Table 2 Sampling Frequency for Ecological Receptors of the Environmental Monitoring Programs for the Existing GGS

Actual and Proposed program plan	**Sampling Year (Reported the following year)**								
Receptor	**2004 (pre GGS Unit 3)**	**2005**	**2006 (post GGS Unit 3)**	**2007**	**2008 only annuals**	**2009 only annuals**	**2010 (pre Keephills 3)**	**2015 (post Keephills 3)**	**2020**
WILDLIFE									
TransAlta wildlife (every 5 years)		√	√				● moved from 2011	√	√
GGS wildlife (every 5 years)		√	√				√	●	√
Peregrine falcon monitoring (Keephills and GGS)	√	√	√	√	√	√	√	√	√
Over-wintering waterfowl (GGS)	√	√	√	√	√	√	√	√	√
AQUATICS									
Area lakes - Surface water quality, sediment quality, fish tissue quality	√		√	● additional sampling			● moved from 2011	√	√
Area lakes - Benthic community and Benthic tissue quality (baseline)	√								
Area groundwater wells	√		√				● moved from 2011	√	√
Cooling ponds - water quality	√	√	√	√	√	√	√	√	√
Cooling ponds – sediment quality	√								

Actual and Proposed program plan	Sampling Year (Reported the following year)								
Receptor	**2004 (pre GGS Unit 3)**	**2005**	**2006 (post GGS Unit 3)**	**2007**	**2008 only annuals**	**2009 only annuals**	**2010 (pre Keephills 3)**	**2015 (post Keephills 3)**	**2020**
(baseline)									
Cooling ponds – fish tissue and muskrat tissue quality	√		√				● moved from 2011	√	√
Cooling ponds – benthic community (baseline)	√								
Cooling ponds - Blowdown surface water quality, toxicity testing and temperature	√	√	√	√	√	√	√	√	√
North Saskatchewan River - surface water quality	√		√				√	√	√
North Saskatchewan River - sediment quality, benthic tissue quality (baseline)	√								
North Saskatchewan River – benthic community	√		√				√	√	√
North Saskatchewan River – fish quality	√		√				● moved from 2011	√	√
North Saskatchewan River – temperature (one time only)			√						
TERRESTRIAL									
Soil quality	√	● re-site	√				● moved from 2011	√	√
Vegetation – tissue quality and plant community	√		● re-sample				● moved from 2009	√	√
Red–backed Vole - population and tissue quality	√		√		√		√	√	√
White-tailed deer (baseline)	√								
AIR									
Acid deposition monitoring	√	√	√	√	√	√	√	√	√
Ambient air monitoring and meteorological parameters	√	√	√	√	√	√	√	√	√

Actual and Proposed program plan	Sampling Year (Reported the following year)								
Receptor	**2004 (pre GGS Unit 3)**	**2005**	**2006 (post GGS Unit 3)**	**2007**	**2008 only annuals**	**2009 only annuals**	**2010 (pre Keephills 3)**	**2015 (post Keephills 3)**	**2020**
Passive monitoring (SO_2, NO_2, O_3)	√	√	√	√	√	√	√	√	√
Mercury wet deposition	√	√	√	√	√	√	√	√	√
Mercury dry deposition			√						

PP17. If the project site occurs within the plan boundaries of the Lower Athabasca Regional Plan (LARP):

i. Confirm that the proposed project is compliant with the LARP.

ii. Confirm if the proposed project is in a conservation area or provincial recreation area established in the LARP.

iii. Provide submissions describing how the activity may be considered incidental to a previously approved activity.

iv. If the project will release air or waste water emissions into the environment, use groundwater or surface water, or cause new surface or subsurface disturbance, summarize discussions held with AESRD regarding the project and its potential to exceed the triggers and limits of the air quality management framework, the surface water quality management framework, and the groundwater management framework of the LARP. Discuss any actions or mitigation recommended by AESRD as a result of these discussions and describe how these actions or mitigation measures will be incorporated into the project.

v. If the project will clear vegetation, summarize discussions held with AESRD regarding the project and its potential to exceed the biodiversity targets detailed in the biophysical management framework for the Lower Athabasca Region (once this framework is adopted). Discuss any actions or mitigation measures recommended by AESRD and describe how these actions or mitigation measures will be incorporated into the project.

This sub-section is not applicable.

PP18. For projects in other regional land-use plan areas, created under the *Alberta Land Stewardship Act,* applicants should describe the land-use regional plan applicable to the project area and how the proposed project is compliant with the land-use

planning detailed in the plan, following the steps described in PP17 i to v, as applicable.

The proposed Project lies within the North Saskatchewan Planning Region of the provincial Land Use Framework. To date, a regional land-use plan has not been prepared for this planning region.

PP19. Describe the participant involvement information. (See Appendix A – Participant Involvement Program Requirements).

Consultation for the Project has occurred in a manner that meets or exceeds the scope of the Participant Involvement Program described in AUC Rule 007, including notification and personal consultation activities. This is described in the PIP Report appended (Appendix A).

PP20. List all occupants, residents, and landowners on lands within 2,000 m of the project area, as well as other interested persons that were consulted as part of the participant involvement program. If there are populated areas just outside the 2,000 m limit, applicants should consider including those areas in the participant involvement program.

As described in Section 3.2.1 of the PIP Report (Appendix A), Capital Power undertook direct consultations with occupants, residents and landowners within a 1.5 mile radius (~2410 metres) around the Project Area.

PP21. Supply a list of mailing addresses, with corresponding land locations and two sets of printed mailing labels of those parties mentioned in PP20 above.

Capital Power will provide this information electronically as part of filing its application to the AUC and will provide printed mailing labels to the AUC under a separate submission

PP22. Identify any persons who expressed concerns about the project and the specifics of their concerns.

The PIP Report describes the nature of concerns stakeholders' have expressed to Capital Power with the Project at the time of filing this submission.

PP23. Summarize discussions held with potentially directly and adversely affected persons.

Section 4.0 of the PIP Overview (Appendix A) identifies persons who may potentially be directly and adversely affected by the Project, discussed their expressed concerns, as well as Capital Power's efforts to engage and address their concerns.

PP24. If potentially directly and adversely affected persons raised any concerns, describe how they were dealt with or are being dealt with.

Section 5.0 of the PIP Overview (Appendix A) identifies how Capital Power addressed, or plans to address, concerns about the Project.

PP25. For those potentially directly and adversely affected persons identified above, include a confirmation of resolution of the concerns, if applicable.

Stakeholders have sought information and asked questions about the Project. Furthermore, many stakeholders have expressed support for the Project. At this time, Capital Power has not identified any stakeholder who could be deemed potentially directly and adversely affected by the Project based on the various studies conducted to evaluate environmental effects. As the regulatory review process progresses with the submission of the AUC Rule 007 application and EPEA amendment application and the formal public notifications associated with such filing are advertised, further public consultation efforts may identify directly and adversely affect persons. Capital Power is committed to addressing the concerns of such stakeholders.

PP26. If the power plant is to be located within an oil and gas facility, confirm the power plant will comply with the standards outlined in sections 8.090 and 8.170 of the *Oil and Gas Conservation Regulations.*

This sub-section is not applicable.

PP27. Provide a noise impact assessment, in accordance with the current Rule 012 Noise Control.

The Noise Impact Assessment is provided in Appendix I.

PP28. Provide details of the power generating equipment and associated facilities, such as make, model, and nominal capacity.

Based on previous discussions with and feedback from the AUC, Capital Power has filed the application for the Project and prepared the accompanying air emissions, noise impact assessment, and other environmental studies to develop the Project based on advanced combustion turbine technology currently available in the market. The equipment selected will meet or exceed the environmental performance measures predicted in these studies in support of the application. At this time, the specific model and design of the gas turbine(s), steam turbines and other major power generation equipment have not been selected.

This approach was outlined by Capital Power in a letter provided to the AUC dated August 13, 2013 (the August Letter). The August Letter noted that equipment vendors continue to make significant advances in efficiency, output, emissions performance, operating characteristics, and the operating flexibility relating to fast startup times and ramping rates. These parameters continue to improve with the maturity of the technology. A copy of the August Letter is appended (Appendix J)

The August Letter also noted that Capital Power intends to take advantage of these on-going improvements to utilize the best available technology for this project. The final determination of the specific equipment will be driven by the equipment characteristics, environmental performance attributes, cost, and operating parameters that best suit the

Alberta market. On this basis, Capital Power noted its intention to file the application for the Project and prepare the accompanying emissions and environmental studies, on the basis of 'generic' equipment, which represents a worst-case scenario. The worst-case scenario was developed based on the largest size combustion turbine, which could be a feasible option for the Project. The equipment selected will meet or exceed the environmental performance associated with the 'generic' equipment.

On August 27, 2013, the AUC responded to the August Letter (AUC Letter). In its response, the AUC acknowledges the merit of this approach. A copy of the AUC Letter is appended (Appendix K).

The Facility Application has been prepared and filed consistent with the approach first articulated by Capital Power in its August Letter, and acknowledged by the AUC in the AUC Letter, both as described above.

The block flow diagram of the proposed facility details the configuration of power generation equipment and associated auxiliaries (Figure 4). The Project will use advanced natural gas combined-cycle (NGCC) technology. The major systems of the Project are described below:

Main Power Generation System

The Project consists of two "1-on-1" units, each consisting of a single natural gas turbine paired with a heat recovery steam generator (HRSG), and a single steam turbine. Nominal summer ratings of each unit are expected to be up to 460 MW (540 MVA) gross capacity with supplementary firing. Nominal winter ratings of each unit are expected to be up to 525 MW (620 MVA) gross capacity with supplementary firing. The make and model of the gas turbine steam turbine, and HRSG has not been selected.

The gas turbine generator is provided with auxiliary systems; inlet air heating and filtration system, lubrication systems, unit control systems, DC power supply system, fuel gas supply systems, evaporative cooling system, and generator excitation system. The HRSG will be triple pressure reheat type generating high pressure steam, reheat steam, and low pressure steam. The HRSG will be equipped with low NOx duct burners for supplementary firing. Steam generated in the HRSG will be expanded in a condensing steam turbine generator. The steam turbine will be provided with auxiliary systems such gland sealing system, lubrication system and turbine control system. The HRSG will be provided with a steam by-pass system for by-passing steam to the condenser during start-up and upset conditions. Each unit will be equipped with advanced Selective Catalytic Reactor (SCR) for NOx control and a minimum stack height of 80 m to facilitate flue gas dispersion. The SCR will utilize aqueous ammonia as a reagent with an ammonia storage and handling facility being built for ammonia injection into the SCR.

Circulating Water System (CWS)

The primary function of the CWS is to provide cooling water to the steam surface condensers for condensing steam turbine exhaust steam. The system also provides

cooling water to the condenser vacuum pump seal water heat exchangers to cool the seal water for the liquid ring vacuum pumps. The CWS draws water from the Genesee cooling pond intake canal and rejects the water and heat to the existing Genesee cooling pond discharge canal.

The CWS includes one concrete circulating water pump intake structure with traveling screens to filter debris before entering the pumps, vertical cooling water pumps, wet pit, single-stage, mixed flow type circulating water pumps with motors, and all piping, valves, and instrumentation necessary to transport circulating water within the CWS.

Boiler Feedwater System (BFS)

The BFS provides feedwater to the high-pressure (HP) and intermediate- pressure (IP) economizer sections of the HRSG. The BFS supplies desuperheating spray water to the HP steam bypass desuperheater, HRSG HP superheater attemperator, and HRSG reheater attemperator. Additionally, the BFS is the cooling water source for the gas turbine air cooler and the heating water source for the fuel gas heater.

The BFS also includes boiler feedwater pumps and the necessary piping, valves, and instrumentation to transport feedwater within the BFS.

Condensate System (CS)

The CS receives, condenses, and deaerates cycle exhaust steam from the steam turbine and other reclaimable steam sources and pumps the condensate from the condenser hot well to the low-pressure (LP) drum via the LP economizer. The system serves as a collection point for reclaimable cycle drains and provides short-term condensate storage in the hot well. The condensate also serves as cooling water for the gland steam condenser.

The CS consists of a single shell, single-pressure deaerating surface condenser; four 100% unit capacity condensate pumps (with the second unit condensate pump being required to start on a trip from a fired bypass condition), and all the piping, valves, and instrumentation necessary to transport condensate within the CS.

Cycle Make-Up and Storage System (CMSS)

The CMSS supplies and stores demineralized water to the cycle chemical feed, condenser vacuum pump seal water makeup, condensate pump seal water (during startup), HRSG low-pressure (LP) fill, steam cycle makeup, gas turbine inlet air evaporative cooler, and gas turbine water wash skid.

The CMSS includes one demineralized storage tank, demineralized water transfer pumps with motors, and associated distribution piping and valves. The demineralized water transfer pumps are located in the water treatment building. The system receives demineralized water from the CMSS.

Cycle Make-Up Water Treatment System (CMWTS)

The CMWTS produces demineralized water of sufficient quantity and quality to the steam cycle and other uses for the Project. The CMWTS also supports various uses during startup including hydrostatic testing, chemical cleaning, displacement flushes after cleaning, steam blow and wet storage.

The CMWTS consists of two 50% Project capacity trains each consisting of a double pass reverse osmosis (RO) system and an ion exchange polisher.

Fuel Supply System

Natural gas will be supplied for the Project at the Plant boundary by a third-party gas supplier. Gas metering and a gas compression facility will be needed to process the gas before supplying it to the gas turbine and HRSG duct burners.

Plant Drainage and Effluent Disposal System

The function of the Waste Water Effluent System (WES) is to provide for the collection and disposal of the Project waste water. The WES includes a waste water sump with waste water sump pumps, two heat recovery steam generator (HRSG) blowdown tanks, two power block area oil/water separators with level switches, manways, and associated piping, valves, in-line devices, and instrumentation. All waste water lines are routed to the WES which drains to the existing Genesee site settling pond that discharges to the existing Genesee cooling pond.

Generator Step-Up Transformer (GSU)

The function of the Generator Step-up (GSU) transformers is to step-up power from the generator voltages to a voltage level suitable for long distance power delivery.

The power produced from each unit's GT/ST generator and carried by the isolated phase bus duct is transformed from the unit's 21 kV to 525 kV three-phase GSU transformer for utilization by the Genesee 525 kV switchyard.

Auxillary Power Supply (APE**)**

The function of the AC Power Supply System (APE) for each unit is to receive power from GSU transformer secondary at 21 kV, or from the Station Service (SS) transformer secondary and step it down through the Unit Auxiliary (UA) transformer to 6900 volts. The medium voltage (MV) Main 6900V switchgear and motor starters will distribute power throughout the Project for consumption by direct electrical motor or other loads requiring 6900 volts, and to supply the low voltage (LV) power distribution system through Secondary Unit Substation (SUS) transformers. The SUS transformers feed 600V load centers and/or motor control centers (MCC) and other LV (120/208V) power distribution transformers and panels. The Fire Water Pump transformer will be supplied directly from the 6900V terminals of one of the UA transformers.

Buildings and Enclosures

Buildings and enclosures will be provided for various Project mechanical and electrical equipment, as necessary, for weather protection or noise abatement. The buildings will be environmentally controlled, as required. The Generation Building, Administration/Control Building, pump enclosures, HRSG enclosure and Boiler Feedwater enclosure will be engineered structures with appropriate siding and roofing. All other buildings will be pre-engineered metal. Buildings and enclosures included in the Project are as follows:

- Generation Building
- Admin/Control and Water Treatment Building
- Pumps (circulation cooling water, auxiliary cooling water, and fire water pumps)
- Sampling Building
- HRSG Enclosure
- Boiler Feedwater Enclosure
- CEMS Enclosure
- Fuel Gas Compressors Enclosure
- Switchyard Control Building

Plant Control System

The Project will use state-of-the-art distributed control system (DCS) for control of the main power generation equipment and all other plant auxiliaries. The gas turbine and steam turbine will have its own control system that will be integrated with the DCS for centralized control of all equipment from the main central control room.

19% AQUEOUS AMMONIA STORAGE

AMMONIA TRANSFER PUMPS

NATURAL GAS SUPPLY

FUEL GAS COMPRESSORS

LOW PRESSURE STEAM

COLD REHEAT STEAM

HOT REHEAT STEAM

MAIN STEAM

DEMINERALIZED WATER SUPPLY

INLET AIR

UNIT 4 INLET FILTER

UNIT 4 INLET EVAPAPORATIVE COOLER

UNIT 4 COMBUSTER

STEAM FROM UNIT 3

TO 500KV SWITCHYARD

UNIT 4 GENERATOR

UNIT 4 STEAM TURBINE

UNIT 4 COMPRESSOR

UNIT 4 TURBINE

UNIT 4 GAS TURBINE

UNIT 4 HEAT RECOVERY STEAM GENERATOR

UNIT 5 INLET FILTER

UNIT 5 INLET EVAPORATIVE COOLER

DEMINERALIZED WATER SUPPLY

UNIT 5 COMBUSTER

STEAM FROM UNIT 3

TO 500KV SWITCHYARD

UNIT 5 GENERATOR

UNIT 5 STEAM TURBINE

UNIT 5 COMPRESSOR

UNIT 5 TURBINE

UNIT 5 GAS TURBINE

UNIT 5 HEAT RECOVERY STEAM GENERATOR

UNIT 4 EQUIPMENT HEAT EXCHANGERS

UNIT 4 CLOSED CYCLE COOLING WATER HEAT EXCHANGER

UNIT 4 CLOSED COOLING WATER PUMPS

TO COOLING POND RETURN

UNIT 4 SURFACE CONDENSER

UNIT 4 VACUUM SYSTEM

UNIT 4 CONDENSATE PUMPS

UNIT 4 GSC

UNIT 4 BOILER FEEDWATER PUMPS

TO COOLING POND RETURN

UNIT 5 SURFACE CONDENSER

UNIT 5 VACUUM SYSTEM

UNIT 5 CONDENSATE PUMPS

UNIT 5 GSC

UNIT 5 BOILER FEEDWATER PUMPS

UNIT 5 CLOSED CYCLE COOLING WATER HEAT EXCHANGER

UNIT 5 EQUIPMENT HEAT EXCHANGERS

UNIT 5 CLOSED COOLING WATER PUMPS

SERVICE WATER TREATMENT SYSTEM

DEMINERALIZED WATER TREATMENT SYSTEM

DEMINERALIZED WATER TANK

TO UNIT 4 INLET EVAPORATIVE COOLER

TO UNIT 5 INLET EVAPORATIVE COOLER

DEMINERALIZED WATER TRANSFER PUMPS

TO FIRE PROTECTION SYSTEM

OILY WATER SEPARATORS

PLANT DRAINS

SERVICE WATER USERS

EXISTING SETTLING POND

FROM UNIT 4 SURFACE CONDENSER

FROM UNIT 4 CLOSED CYCLE COOLING HEAT EXCHANGER

COOLING POND SUPPLY

COOLING POND RETURN

TRAVELING WATER SCREENS

FIRE PROTECTION PUMPS MOTOR DRIVEN & DIESEL DRIVEN

CIRCULATING WATER PUMPS

AUXILIARY COOLING WATER PUMPS

NOTES:

1. SUBJECT TO REVISIONS AS A RESULT FROM DETAILED DESIGN.

NOT TO BE USED FOR CONSTRUCTION

THE DISTRIBUTION AND USE OF THE NATIVE FORMAT CAD FILE OF THIS DRAWING IS UNCONTROLLED. THE USER SHALL VERIFY TRACEABILITY OF THIS DRAWING TO THE LATEST CONTROLLED VERSION.

NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
0	19/SEP/13	ISSUED FOR PERMIT APPLICATION	SAB	SAB		JD	GDK

BLACK & VEATCH CORPORATION

DESIGNER SAB | DRAWN SAB | CHECKED | DATE

CAPITAL POWER
GENESEE GENERATING STATION UNITS 4 AND 5

FLOW DIAGRAM
POWER BLOCK

PROJECT 180144 | DRAWING NUMBER DM-0001 | REV 0 | CODE | AREA

Figure 4

SAB51028 A1ASL028 11/15/11 08:52:49 D1 ACAD 18.0s (LMS Tech) 1=1

PP29. Present the estimated power plant heat rates, efficiency, and details of cooling system.

GGS Unit 4 and Unit 5 power plant heat rates are estimated at 6112 kJ/KWh (Lower Heating Value) each, with an efficiency of 58.8% based on LHV at an ambient temperature of 15°C.

The Project will utilize a once-through cooling process for the steam turbine condenser taking water from the GGS cooling pond through the extended intake canal. Water for equipment cooling and other process needs will also utilize cooling water from the GGS cooling pond. All of the cooling water discharge from the steam turbine condenser and other equipment will be returned back to the Genesee cooling pond through the existing discharge canal.

The thermal and chemical performance of the GGS cooling pond with the addition of the load for the Project has been evaluated by Golder. A copy of the Golder study is appended (Appendix F).

PP30. State the fuel requirements of the power plant, including type, source, method of handling, transportation, and environmental effects.

The Project will require approximately 170,000 GJ/day of natural gas for Unit 4 and Unit 5 operating at full load during winter months. Natural gas for the Project will come from TransCanada's mainline located east of Drayton Valley. An underground pipeline of approximately 78 kilometres will be developed for the Project. The exact route of the pipeline has not yet been determined. The pipeline will connect to an existing high pressure line in the area. A separate application will be submitted to ESRD by the natural gas service provider, ATCO Gas, for the Project which will detail any potential environmental effects associated with the pipeline. The pipeline is not expected to have any environmental effects on the brownfield GGS site.

No secondary fuel is expected for the Project.

PP31. State the projected annual electric energy production.

Capital Power estimates that annual energy production of the Project will be up to 7,750 GWh/yr at average ambient temperature without duct firing at 100% capacity.

PP32. Provide a legible plant site drawing showing all major equipment components.

A plant site drawing is provided in Appendix L.

PP33. Provide a legible map showing the power plant site boundaries and land ownership, including any residences and dwellings within 2,000 m of the boundaries, as well as any additional energy-related facilities within the project area.

A land ownership map is provided in Appendix M.

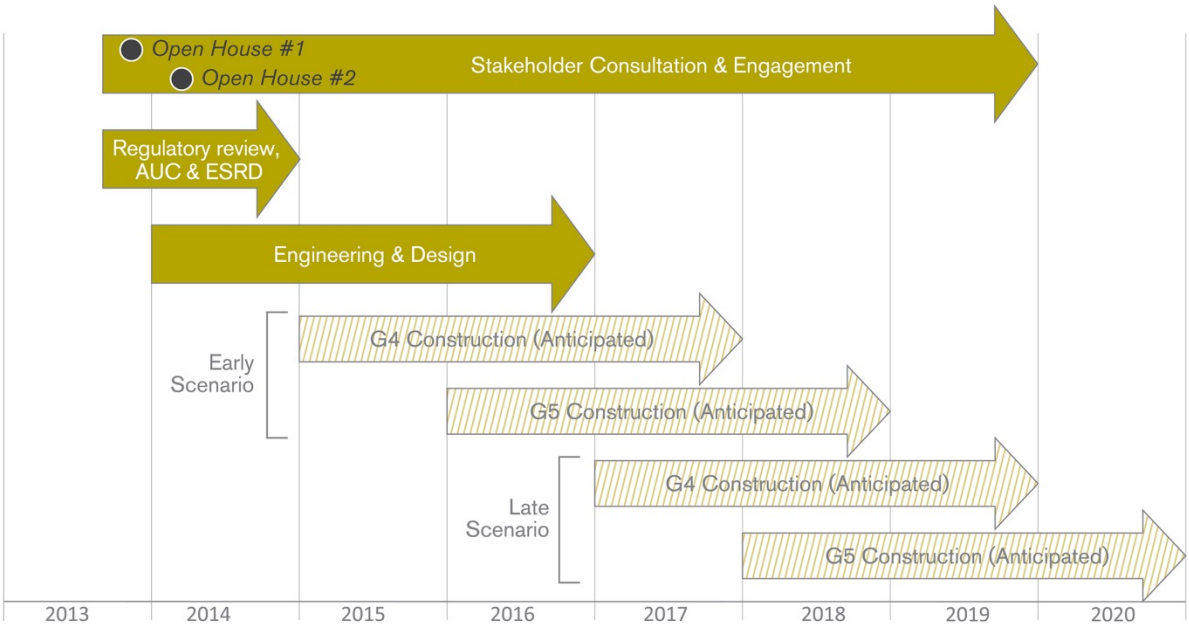
PP34. Provide a legible map of the project area suitable for use in a public notice.

A figure that can be used in a public notice for the Project is provided in Appendix N.

PP35. Supply the expected in-service dates, and describe ramifications if the approval date cannot be met.

The earliest in service date for the interconnection is Q3, 2017 for Unit 4. Commissioning of Unit 4 is expected to be complete by Q4, 2017 at the earliest. Capital Power expects to enter into contracts for procurement and construction of the Project, as well as power sales agreements during 2014 and 2015. Consequently, should any delays in receiving approval based on the current regulatory review schedule occur, Capital Power may need to adjust current Project timelines and thereby be exposed to loss of power sales revenue and equipment supplier contractual penalties.

The earliest interconnection and commissioning dates of Unit 5 are Q3, 2018 and Q4, 2018, respectively. Unit 5 in-service dates have lower risk exposure to approval delays.



PP36. Indicate the plant's emission rates, in kilograms per megawatt-hour (kg/MWh) of nitrogen oxides (NOx), sulphur dioxide (SO2), and primary particulate matter, and state whether the emissions will comply with the current Alberta Source Emission Standards.

Estimates of SO_2, NO_x, $PM_{2.5}$, NH_3, and CO emissions were obtained from gas turbine manufacturers at ambient and operating conditions for the Project. Maximum emission rates were estimated at a minimum ambient temperature of -48.3°C allowing for maximum gas turbine power output with maximum duct firing. Emissions of NO_x were modeled at 0.09 kg/MWh (net). Table 3 provides details on emission sources, rates, and quantities. The current *Alberta Source Emission Standard* for natural gas-fired power plants with electricity generating capacity greater than 60 MW is 0.30 kg NO_x/MWh output) (AENV 2005). The intensity used by the Project for NO_x emission is much lower than the standard.

Table 3 Emission Rates for G4 and G5

Parameter		G4[a,b]	G5 [a,b]	Alberta Standard
NOx	kg/MWh	0.09	0.09	0.30
SO_2	kg/MWh	0.04	0.04	
$PM_{2.5}$	kg/MWh	0.06	0.06	
CO	kg/MWh	0.07	0.07	
NH_3 (SCR slip)[c]	kg/MWh	0.01	0.01	

Notes:
a. Stack exhaust parameters and emission rates based on extreme minimum conditions (-48.3°C, 68%RH)
b. Inside tip diameter assumed as 6.4 metres
c. NH_3 emissions based upon 5 ppm NH_3 slip

PP37. State whether the proposed plant will comply with the *Alberta Ambient Air Quality Guidelines* for ground-level concentrations of pollutants.

Maximum predicted NO_2, SO_2, $PM_{2.5}$, CO, and NH_3 concentrations for the Project Case (G4 and G5 Alone), Baseline Case (Existing and Approved Sources) and Application Case (Existing and Approved Sources plus the Proposed G4 and G5) are presented in Table 4.

Table 4 Maximum Predicted Ground-level Concentrations for the Baseline and Application Cases

Substance	Location	Averaging Period	Project Case (G4/G5 Alone)	Baseline Case	Application Case	AAAQO [a]	Percent Change from Baseline to Application Case	Application Case Percent of AAAQO
				(µg/m³)	(µg/m³)	(µg/m³)	%	%
Nitrogen Dioxide (NO_2)	Power Plant Fence line	1-hour (9th-high)	41.8	153	153	—		
		Annual [b]	8.77	38.3	38.4	—		
	Outside of Power Plant Site and within Mine Permit Development Boundary	1-hour (9th-high)	57.1	272	272	—		
		Annual [b]	9.61	54.6	54.8	—		
	Along and Outside of Mine Permit Development Boundary	1-hour (9th-high)	51.0	194	194	300	0.0000%	65%
		Annual [b]	8.79	23.0	23.0	45	0.0840%	51%
	Maximum at Sensitive Receptors	1-hour (9th-high)	44.6	187	187	300	0.0000%	62%
		Annual [b]	8.67	30.1	30.3	45	0.638%	67%
Sulphur Dioxide (SO_2)	Power Plant Fence line	1-hour (9th-high)	20.9	439	439	—		
		24-hour (1st-high)	11.3	304	304	—		
		Monthly	3.80	38.4	38.4	—		
		Annual [b]	2.36	10.6	10.7	—		
	Outside of Power Plant Site and within Mine Permit Development Boundary	1-hour (9th-high)	28.6	586	586	—		
		24-hour (1st-high)	15.5	306	306	—		
		Monthly	4.40	42.5	42.7	—		
		Annual [b]	2.78	12.6	12.9	—		
	Along and Outside of Mine Permit Development Boundary	1-hour (9th-high)	25.5	427	427	450.0	0.000%	95%
		24-hour (1st-high)	10.8	203	203	125.0	0.000%	162%
		Monthly	3.66	41.0	41.0	30.0	0.024%	137%
		Annual [b]	2.37	28.7	28.7	20.0	0.037%	143%
	Maximum at Sensitive Receptors	1-hour (9th-high)	22.4	378	384	450.0	1.521%	85%
		24-hour (1st-high)	9.68	109	110	125.0	0.324%	88%

		Monthly	3.53	14.7	14.9	30.0	1.508%	50%
		Annual [b]	2.32	6.65	6.66	20.0	0.121%	33%
Respirable Particulate Matter ($PM_{2.5}$)	Power Plant Fence line	1-hour (9th-high) [c]	21.9	216	216	—		
		24-hour (1st-high)	13.1	102	102	—		
	Outside of Power Plant Site and within Mine Permit Development Boundary	1-hour (9th-high) [c]	31.5	149	149	—		
		24-hour (1st-high)	18.5	74.8	74.8	—		
	Along and Outside of Mine Permit Development Boundary	1-hour (9th-high) [c]	27.7	59.5	59.5	80.0	0.000%	74.3%
		24-hour (1st-high)	12.5	25.1	25.3	30.0	0.840%	84.4%
	Maximum at Sensitive Receptors	1-hour (9th-high) [c]	23.6	68.0	68.0	80.0	0.000%	85.0%
		24-hour (1st-high)	11.1	28.2	28.2	30.0	0.000%	94.0%
Carbon Monoxide (CO)	Power Plant Fence line	1-hour (9th-high)	252	428	430	—		
		8-hour (1st-high)	256	425	435	—		
	Outside of Power Plant Site and within Mine Permit Development Boundary	1-hour (9th-high)	263	635	635	—		
		8-hour (1st-high)	262	570	570	—		
	Along and Outside of Mine Permit Development Boundary	1-hour (9th-high)	258	499	499	15000.0	0.000%	3.33%
		8-hour (1st-high)	249	507	507	6000.0	0.000%	8.45%
	Maximum at Sensitive Receptors	1-hour (9th-high)	254	464	464	15000.0	0.000%	3.09%
		8-hour (1st-high)	247	413	419	6000.0	1.453%	6.98%
Ammonia (NH_3)	Power Plant Fence line	1-hour (9th-high)	6.96	-	6.96	—		
	Outside of Power Plant Site and within Mine Permit Development Boundary	1-hour (9th-high)	9.05	-	9.05	—		
	Along and Outside of Mine Permit Development Boundary	1-hour (9th-high)	8.22	-	8.22	1400.0	100.000%	0.587%
	Maximum at Sensitive Receptors	1-hour (9th-high)	7.34	-	7.34	1400.0	100.000%	0.525%
Mercury	Power Plant Fence line	24-hour (1st-high) [d]	-	0.00135	0.00135	—		

(Hg)	Outside of Power Plant Site and within Mine Permit Development Boundary	24-hour (1st-high)[d]	-	0.00178	0.00178	—		
	Along and Outside of Mine Permit Development Boundary	24-hour (1st-high)[d]	-	0.00143	0.00143	2.0	0.000%	0.072%
	Maximum at Sensitive Receptors	24-hour (1st-high)[d]	-	0.00138	0.00138	2.0	0.000%	0.069%

Notes:

a: (AAAQO) Alberta Ambient Air Quality Objective

b: Annual averages are derived from Average Baseline and Application scenarios.

c: (AAAQG) Alberta Ambient Air Quality Guideline

d: (OAAQC) Ontario Ambient Air Quality Criteria

Baseline Case – Existing and Approved Emission Sources (Genesee Units 1 to 3, Prairie Mines, Nearby Oil and Gas Facilities)

Application Case - Existing and Approved Emission Sources (Genesee Units 1 to 3, Prairie Mines, Nearby Oil and Gas Facilities) and Proposed G4/5 Project (Alone)

The maximum predicted concentrations for NO_2, SO_2, $PM_{2.5}$, CO and NH_3 associated with emissions from the Project (G4 and G5 alone) for all relevant averaging periods are predicted to be much lower than the Alberta Ambient Air Quality Objectives (AAAQO).

In combination with the existing and approved facilities in the region, modelling indicates that NO_2, $PM_{2.5,}$ and CO concentrations are influenced by the nearby Genesee Mine and haul roads and SO_2 is influenced primarily by the existing GGS (G1-3) and Genesee sour gas plant. Highest concentrations are predicted to occur near the Mine, haul road, and GGS plant areas and decrease with distance from the respective emission sources. Maximum predicted NO_2, SO_2, $PM_{2.5}$, CO, Hg, and NH_3 at all sensitive receptors are predicted to be less than the AAAQO. Maximum predicted NO_2, SO_2, $PM_{2.5}$, CO, Hg, and NH_3 at all areas outside of the Genesee Mine Permit Boundary are also predicted to be less than the AAAQO, except for the 24-hour, 30-day, and annual SO_2 concentrations in a small area surrounding the Genesee sour gas plant.

Model predictions indicate little difference between Base Case and Application Case results, with maximum predicted concentrations of key substances of interest increasing less than 3% indicating that the Project is not expected to materially increase maximum concentrations of these substances within the study area.

PP38. Provide the EIA as an appendix to the application, if one has been conducted.

The applicant must obtain approval from AESRD for thermal power plant facilities greater than 1 MW in total capacity at one site. An EIA is mandatory for thermal power plant facilities that use nongaseous fuel and are greater than 100 MW in total capacity; an EIA may be required for other power plant facilities regardless of total capacity. When an EIA is not mandatory, AESRD will determine if it is necessary, based on the specific nature of the project. The applicant should consult with the Commission and AESRD in the initial stages of preparing its application to determine the level of detail required.

On September 19, 2013, ESRD confirmed that a provincial Environmental Impact Assessment (EIA) report is not required for the proposed Project (Appendix O). Notwithstanding, Capital Power has conducted several studies to assess the environmental effects of the Project. These include a(n):

- Environmental Overview Report (Appendix D),
- Air Quality Impact Assessment (Appendix E),
- Genesee Cooling Pond Thermal and Water Quality Modelling Study (Appendix F), and
- Noise Impact Assessment (Appendix I).

PP39. If the power plant is to be connected to the Alberta Interconnected Electric System (AIES), irrespective of voltage level, provide the following information:

- **an electrical single-line diagram obtained from the ISO or sanctioned by the ISO showing the transmission development plan for the interconnection, and**
- **a map with one or more conceptual layouts showing possible routes and general land locations for facilities that would be used to interconnect the power plant to the AIES.**

In April 30, 2013, Capital Power filed a System Access Service Request (SASR) with the Alberta Electric System Operator (AESO) for connecting the Project to the Alberta Interconnected Electric System (AIES). EPCOR as the Genesee switchyard owner (TFO) will be involved at the early stages of the Project. A Connection Study Scope was finalized by AESO on June 27, 2013.

The Project is currently in Stage 2 of the process. The AESO is completing the first draft of the Engineering Study Report (ESR). Capital Power has submitted all necessary data to AESO for the ESR and Stage 2 Project Data Update Package (PDUP). AESO plans to complete the Stage 2 PDUP by mid-March, 2014. A Connection Proposal has been developed between AESO, EPCOR, and Capital Power. AESO has also issued a preliminary Single Line Diagram (SLD) for this transmission connection between the Project and the Genesee 500kV switchyard expansion. The single line diagram is provided in Appendix P. There are no proposed alternatives to the Genesee switchyard for interconnection.

PP40. If the power plant is to be connected at distribution voltage level (generally less than 69 kV), the applicant must provide a statement from the Distribution Facility Owner (DFO) indicating that it is willing to connect the generating facilities.

This sub-section is not applicable.

PP41 For a municipality or a subsidiary of a municipality to hold an interest in a generating unit, documentation confirming compliance with section 95 of the EU Act is required.

This sub-section is not applicable.

PP41. For a wind power application, provide legible maps and/or air photo mosaics upon which the proposed collector power line route or routes have been imposed and showing the residences, landowner names, and major land-use and resource features (e.g., vegetation, topography, soil type, existing land use, existing rights-of-way, existing or potential archaeological sites, and superficial and mineable resources).

This sub-section is not applicable.