



**Whitesand First Nation  
Cogeneration and Pellet Mill Project**

**Construction Plan Report**

**Sagatay Cogeneration LP**

**October 2014**







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Cogeneration and Pellet Mill Project**

**Construction Plan Report**

*Prepared By:*

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Sagatay Cogeneration LP, with its General Partner, Sagatay  
Cogeneration Ltd., and Whitesand First Nation as agent

October 2014

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## Record of Revisions

<b>Revision</b>	<b>Date</b>	<b>Description</b>
0	December 18, 2013	Draft Submission for Public Consultation
1	October 17, 2014	Application to the Ministry of the Environment and Climate Change for Renewable Energy Approval

## Executive Summary

Sagatay Cogeneration LP, with its General Partner, Sagatay Cogeneration Ltd., and Whitesand First Nation as agent is proposing to develop, construct and operate a biomass fueled electric power and heat cogeneration plant, and wood pellet facility. The Project is located on Crown Land in an unorganized territory of the Thunder Bay District near Whitesand First Nation and Armstrong, Ontario. The unorganized territory is administered by the Armstrong Local Service Board and the Project will be located solely on the traditional territory of Whitesand First Nation.

This Construction Plan Report describes Project construction activities, timing, materials, traffic, and potential negative environmental effects with associated mitigation, monitoring and contingency measures.

Construction of the Project is estimated to take 14 months, from April 2015 to June 2016. Within this timeframe, specific construction activities will be scheduled to protect potentially affected wildlife.

Construction-related activities of the Project generally involve:

- survey for Project layout (pre-construction);
- installation of erosion and sediment control measures;
- site preparation, clearing and grubbing;
- general earthworks (site grading);
- excavation for water storage pond, installation of liner, and pond filling;
- excavation for site building foundations;
- construction of site foundations/footings;
- installation of the water supply distribution system;
- construction of the wastewater management system;
- installation of remaining underground utilities;
- installation of the transformer substation;
- installation of equipment in the woodyard;
- construction of site buildings;
- fine-grading and drainage features;
- finishing of granular access roads and paving;
- installation of security systems;
- installation of equipment in site buildings;
- equipment commissioning; and,
- site restoration.

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The majority of construction activities will be completed using standard equipment, materials, and methods utilized in Ontario for electricity generation and land development projects.

Each potential negative environmental effect during construction has been analyzed with the following key considerations:

- the magnitude of the effect both in intensity and spatial scale;
- the proximity of the effect in relation to the Project;
- the likelihood of occurrence and reoccurrence of the effect;
- the timing and duration of the effect; and,
- the permanence or irreversibility of the effect.

For each potential negative effect, appropriate mitigation, monitoring, and contingency measures were developed. These typically involve setbacks from environmental features, timing restrictions, inspections, reporting, and rehabilitation measures.

During detailed design, the proposed mitigation, monitoring, and contingency measures described in this report will be translated into construction contract specifications as appropriate to fulfill the obligations of Renewable Energy Approval (REA).

The Whitesand Cogeneration and Pellet Mill Project can be constructed without causing significant adverse environmental effects. This will be achieved through proper implementation of the mitigation, monitoring, and contingency measures outlined in this report.

This Construction Plan Report has been prepared in accordance with O.Reg. 359/09 in support of an Application for Renewable Energy Approval of the Project.

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## 1.0 Introduction

### 1.1 Project Overview

Sagatay Cogeneration LP, with its General Partner, Sagatay Cogeneration Ltd., and Whitesand First Nation (“Whitesand”) as agent, is proposing to develop, construct and operate a biomass fueled electric power and heat cogeneration plant, and wood pellet facility (the “Project”). The Project is located on Crown Land in an unorganized territory of the Thunder Bay District near Whitesand First Nation and Armstrong, Ontario. The unorganized territory is administered by the Armstrong Local Service Board and the Project will be located solely on the traditional territory of Whitesand First Nation.

The general Project components include a biomass fueled electric power and heat cogeneration plant, wood pellet plant, maintenance garage, material storage and handling areas, wastewater management system, water storage pond, wells, pump building, and transformer substation. The only biomass used to fuel the cogeneration plant will be woodwaste, making it a Class 1 Thermal Facility under Ontario Regulation 359/09 (O.Reg. 359/09) of the *Environmental Protection Act*. The proposed Class 1 Thermal Facility would have a nameplate capacity of up to 3.6 MW, and would displace the energy supply from existing diesel generators servicing the community via a local grid, operated by Hydro One Remote Communities Inc., as well as supply electricity for the Project. The local grid is not connected to the Provincial grid, and there are no such future plans for a transmission connection.

As the cogeneration facility and ancillary equipment is classified as a Class 1 Thermal Facility under O.Reg. 359/09, an Application for Renewable Energy Approval (“REA”) is being prepared under O.Reg. 359/09.

The remaining Project components that are not considered to be part of the renewable energy generation facility are subject to Environmental Compliance Approval administered by the Ministry of the Environment and Climate Change (“MOECC”) and the Class Environmental Assessment for Ministry of Natural Resources (“MNR”) Resource Stewardship and Facility Development Projects (“MNR Class EA”).

### 1.2 Report Requirements

Activities related to the construction of the Project as well as associated potential negative environmental effects and corresponding mitigation measures are described within the Construction Plan Report.

This Construction Plan Report has been prepared in accordance with Table 1 of O.Reg. 359/09, which sets out specific content requirements as provided in **Table 1.1**.

**Table 1.1 Construction Plan Report Requirements**

<b>Requirements</b>	<b>Completed</b>	<b>Section Reference</b>
Details of any construction or installation activities.	Yes	Section 2.0
The location and timing of any construction or installation activities for the duration of the construction or installation.	Yes	Section 2.0
Any negative environmental effects that may result from construction or installation activities.	Yes	Section 3.0
Mitigation measures in respect of any negative environmental effects, as identified above.	Yes	Section 3.0

## 2.0 Construction and Installation Activities

The construction methods, equipment, material types and quantities described in this report are provided as an estimate of Project scope for the purpose of identifying and mitigating potential negative environmental effects. Approvals from authorities having jurisdiction will be required in addition to Renewable Energy Approval administered by the Ministry of the Environment. As such, the details described in the following sections are subject to change during the course of detailed design and permitting. However, a conservative approach was used to identify the greatest potential impacts, such that appropriate mitigation measures would be developed to accommodate detailed design changes that would result in a lesser impact.

For context, an outline of the construction timing and methodology for each Project component is summarized below. Further detail on construction materials, equipment, traffic, and other considerations are then outlined in the remaining portions of this Section.

### 2.1 Timing and Operational Plan

Subject to approval from all applicable regulatory agencies, construction of the Project is planned to commence in Spring 2015. Construction is estimated to take place over approximately a 14 month period according to the schedule outlined in **Table 2.1**.

The schedule provided in **Table 2.1** is primarily intended to illustrate construction duration and phasing such that potential negative environmental effects can be identified. The schedule may be modified to accommodate the requirements of Whitesand and the applicable approval agencies.

**Table 2.1 Construction Schedule**

Activity	Duration	Start Date	End Date
Survey for Project layout (pre-construction)	2 weeks	Apr-2015	Apr-2015
Install erosion and sediment control measures	1 week	Apr-2015	May-2015
Site preparation, clearing and grubbing	2 weeks	May-2015	May-2015
General earthworks (site grading)	1 month	May-2015	Jun-2015
Excavation for water storage pond, installation of liner, and pond filling	1 month	May-2015	Jun-2015
Excavation for site building foundations	3 weeks	May-2015	Jun-2015
Construction of site foundations/footings	6 weeks	May-2015	Jul-2015
Installation of water supply distribution system	6 weeks	Jun-2015	Jul-2015
Construction of wastewater management system	6 weeks	Jun-2015	Jul-2015
Installation of remaining underground utilities	3 weeks	Jun-2015	Jul-2015
Installation of transformer substation	6 months	Jun-2015	Dec-2015

<b>Activity</b>	<b>Duration</b>	<b>Start Date</b>	<b>End Date</b>
Installation of equipment in the woodyard	1 month	Jun-2015	Jul-2015
Construction of site buildings	3 months	Jul-2015	Oct-2015
Fine-grading and drainage features	3 weeks	Jul-2015	Aug-2015
Finishing of granular access roads and paving	3 weeks	Aug-2015	Sep-2015
Installation of security systems	3 weeks	Sep-2015	Sep-2015
Installation of equipment in site buildings	5 months	Oct-2015	Mar-2016
Equipment commissioning	2 months	Mar-2016	May-2016
Site restoration	3 weeks	May-2016	Jun-2016

### **2.1.1 Natural Heritage Timing Restrictions**

As recommended in Part IV (Environmental Impact Study) of the Natural Heritage Assessment (Neegan, 2014), construction activities may have an impact on migratory breeding birds. The recommended mitigation involves avoidance of vegetation clearing during the breeding bird season (May 16 to August 8). As noted in **Table 2.1**, clearing and grubbing is scheduled from May 1 to May 15, which is in compliance with the recommended mitigation strategy. If clearing and grubbing must occur during the breeding bird season, additional mitigation measures must be implemented as outlined in Part IV (Environmental Impact Study) of the Natural Heritage Assessment (Neegan, 2014).

### **2.1.2 Winter Construction**

The construction schedule outlined in **Table 2.1** assumes critical grading, access road, and concrete foundation works will avoid the need for modified winter construction methods. Should unexpected winter climate conditions arise, the Project schedule may be impacted, or additional crews may be required to satisfy Project requirements.

## **2.2 Pre-Construction Activities**

Pre-construction activities for the Project generally involve design and layout work that will be required prior to construction of Project infrastructure. These activities are described in further detail below.

### **2.2.1 Survey for Layout and Delineation**

The Project Location will be surveyed and staked prior to any ground breaking works. Once staked, all construction and installation activities will be conducted within the defined area. For further detail on the location of Project components within the Project Location, refer to the Site Plan in **Appendix A**.

### 2.2.2 Erosion and Sediment Control Design

An erosion and sediment control plan will be designed to minimize displacement of soil and impacts on receiving water bodies during construction. The plan will be in accordance with the “Measures to Avoid Causing Harm to Fish and Fish Habitat” published by Fisheries and Oceans Canada, and shall ensure that no deleterious substance enters a water body. A combination of Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD), and industry best management practices will be utilized. The erosion and sediment control plan may include:

- silt fence around the downstream area of the Project Location;
- a mud mat at the exit of the construction Site to mitigate sediment transport off-site;
- straw bale barriers;
- dewatering filter bags; and,
- temporary vegetation/seeding/hydroseeding/terrace seeding.

The erosion and sediment control plan will include inspection and reporting requirements to ensure the installed measures are properly maintained and functioning as designed. It will also outline a process whereby installed mitigation measures will be modified as required in the event that they are not functioning according to the design objectives.

### 2.2.3 Safety Measures

Construction site and traffic safety measures will be detailed in the construction contract documents. The construction contract documents will outline all details necessary to construct the Project in accordance with the Ontario Occupational Health and Safety Act, including safety training of workers on site. A communications plan and emergency response plan will also be prepared and implemented in accordance with Section 6.0 of the Design and Operations Report.

## 2.3 Construction Activities

Construction activities for the Project generally involve:

- installation, monitoring and maintenance of erosion and sediment control measures;
- site clearing, grubbing, and grading;
- construction/installation of Project components; and,
- restoration of disturbed areas.

A more detailed description of these activities as they relate to **Table 2.1** is outlined for each Project component below.

### **2.3.1 Erosion and Sediment Control**

The erosion and sediment control plan identified in Section 2.2.2 above will be implemented and functioning prior to all other construction activities.

### **2.3.2 Site Preparation, Clearing and Grubbing**

Temporary construction site trailers will be set up within the Project Location to serve the following functions:

- maintain the communications plan and emergency response plan identified in Section 6.0 of the Design and Operations Report;
- maintain all applicable health and safety information;
- conduct safety training;
- provide offices for contractors and space for drawing/plan review; and,
- hold on-site meetings.

Any power required by the site trailers for lighting, heating, or air conditioning, will be supplied by the existing electrical service connection at the site. Any drinking water at the trailers will be bottled water from a commercial supplier.

Lands designated for Project infrastructure will need to be prepared and cleared of obstructions and debris. Site clearing will include the removal of trees, shrubs, foreign objects, and other debris that would interfere with the construction of the Project. The contractor will only undertake clearing and grubbing activities within the Project Location, and vegetation within the Project Location will be left in place if it does not interfere with the construction or operation of the project.

If any contaminated soils, water, groundwater, or other pollution is encountered at any point during construction, the MOECC Spills Action Centre, Hazardous Waste Information Network, and/or Pollution Hotline will be contacted as appropriate. Subject to further instruction by MOECC, contaminated materials will be collected and disposed of off-site at an approved facility by a qualified person, in accordance with all applicable legislation.

### **2.3.3 General Earthworks (Site Grading)**

General site grading will be required to achieve the required building, wastewater management system, and access road design elevations, as well as evenly distribute stormwater runoff towards the bio-swale. The grading plan will be designed to minimize land disturbance and movement of material as much as possible.

General earthworks will involve standard construction practices for site grading. Any topsoil and organic material will be stripped and stockpiled on site for re-use during site restoration. Stockpiles will be located according to the design in the erosion and sediment control plan, and silt fence will be installed around the stockpiles to reduce sediment transport. The remaining earthworks activities will involve excavation and movement of soil from areas of cut to areas of fill, including proper compaction in place according to geotechnical requirements.

#### **2.3.4 Water Storage Pond**

Excavation of the water storage pond will take place in accordance with standard construction practices. Excavated materials will be placed and compacted on-site as fill in accordance with the grading plan design. In the event that climate conditions are not suitable for placement and compaction of fill, the excavated materials will be stockpiled for future grading in a location specified on the erosion and sediment control plan, with appropriate mitigation measures for erosion and sediment control.

Upon completion of excavation, the water storage pond liner will be installed to limit infiltration of water required to be stored in the pond for fire protection purposes. Upon complete installation of the liner, the pond will be filled from the on-site well at a rate no greater than 5.7 L/s in accordance with Appendix D of the Design and Operations Report, or as otherwise specified by MOECC.

When filled, fencing and signage will be installed around the pond for safety.

#### **2.3.5 Excavation for Site Buildings**

Similarly to the excavation described above, excavation for site building foundations will take place in accordance with standard construction practices. Site buildings will be constructed on reinforced concrete slab-on-grade foundations. It is estimated that the pre-grade elevation for foundations will be approximately 0.6 m below finished floor elevations. Excavated materials will be placed and compacted on-site as fill in accordance with the grading plan design. In the event that climate conditions are not suitable for placement and compaction of fill, the excavated materials will be stockpiled for future grading in a location specified on the erosion and sediment control plan, with appropriate mitigation measures for erosion and sediment control.

#### **2.3.6 Foundations/Footings**

Reinforced concrete slab-on-grade foundations and footings will be constructed to support site buildings and equipment as required. The detailed foundation designs will be based on the results of the geotechnical investigation of the site. For the purposes of

this report, it is assumed that the general foundation design will include approximately 0.3 m of reinforced concrete underlain by approximately 0.3 m of granular material.

Upon completion of excavation outlined in Section 2.3.5, granular material will be delivered by a commercial supplier and placed and compacted according to geotechnical requirements. Formwork and rebar will then be installed in preparation of the concrete foundation. Upon completion of the formwork and rebar, concrete will be delivered and poured by a commercial supplier. After setting of the concrete, the formwork will be removed, and the foundation will cure for 28 days to achieve its design strength.

### **2.3.7 Water Supply Distribution System**

Water for the Project during operation will be supplied by existing wells at the Project Location. As such, suitably designed pumps will be installed in the existing wells. Appendix D of the Design and Operations Report provides a detailed assessment of the groundwater and its ability to provide water at the required demand by the Project during operations. Subject to Renewable Energy Approval, the existing wells may also be used during construction at or below the rate of 5.7 L/s specified in the Design and Operations Report. Water could be used for a variety of purposes during construction, including dust control, and filling of the water storage pond described in Section 2.3.4. The water would not be used during construction for drinking unless an appropriate monitoring and water treatment system is in place.

The remaining construction activities required for the water supply distribution system at this stage of the Project will include:

- excavation and installation of underground pipes and appurtenances to connect the site wells to the future site buildings and equipment, and connect the future fire pump building to all fire protection equipment throughout the site;
- temporary termination and capping of the underground pipes at the future building and equipment connection locations, including markers for pipe locations; and,
- installation of site fire protection equipment throughout the woodyard, including hydrants and hose stations.

The water supply distribution system will be installed and backfilled using standard construction procedures in accordance with the applicable OPSS and OPSDs for the water supply pipes and fire protection equipment. Bedding and backfill will be placed and compacted according to geotechnical requirements.

### 2.3.8 Wastewater Management System

The wastewater management system will be installed and backfilled in accordance with the approved design drawings and all applicable OPSS, OPSDs, and Ontario Building Code requirements, including:

- excavation and installation of underground gravity pipes or forcemain to connect site buildings to the wastewater management system;
- installation of pump stations to service process wastewater and domestic sewage;
- excavation and installation of underground tankage for the septic and process wastewater management system;
- installation of an effluent disposal bed dosing tank;
- excavation and placement of specified materials for the leaching bed;
- installation of underground perforated pipes for the leaching bed; and,
- installation of monitoring and communications equipment.

Bedding and backfill for the wastewater management system infrastructure will be placed and compacted according to geotechnical requirements.

### 2.3.9 Underground Utilities

All remaining underground utilities besides the water and wastewater infrastructure will be installed and backfilled in accordance with all applicable OPSS, OPSDs, Ontario Electrical Safety Code, and the requirements of the authorities having jurisdiction. Remaining underground utilities are expected to include the excavation and installation of:

- electrical wires, cables, and conduit for power, grounding, and communication systems;
- heat distribution system pipes; and,
- steam, condensate, and instrument air lines.

Bedding and backfill for the underground utilities will be placed and compacted according to geotechnical requirements and the authorities having jurisdiction.

### 2.3.10 Transformer Substation

The transformer substation will be constructed to convert the voltage from the cogeneration plant at 5 kV to the voltage of the local grid at 25 kV. Refer to **Figure A1** of **Appendix A** for the location of the transformer substation, and the conceptual drawing of the substation layout in **Appendix B**.

To prepare the site, topsoil and subsoil will be stripped and stockpiled separately, followed by construction of the electrical connections and grounding, granular foundation, electrical equipment, and safety features. Access to the transformer substation will be secured by a properly grounded perimeter fence, a locked gate, and appropriate warning signage.

### **2.3.11 Woodyard Equipment**

Remaining equipment in the woodyard such as the biomass belt dryer, truck scale, truck dumpers, mechanical conveyor system and ancillary equipment will be installed and connected to underground utilities and site building locations as appropriate. The majority of this equipment will be transported as partially assembled components for installation on site.

### **2.3.12 Site Building Construction**

Site buildings will be pre-engineered steel structures supported on the foundations/footings described above. The steel buildings will be designed and constructed in accordance with the requirements of CAN/CSA-S16-01, National Building Code of Canada and/or Ontario Building Code as appropriate. This will be accomplished through standard building construction activities including framing, siding, roofing, and connection to underground utilities. Internal partition walls, stairs, and floors will also be constructed within the site buildings to create the necessary rooms (i.e., offices, lunch rooms, washrooms, etc.).

### **2.3.13 Fine-Grading and Drainage**

The site will be fine-graded to:

- distribute and compact surplus spoils from excavations;
- shape the access road and paved area pre-grades;
- direct site drainage around the biomass piles;
- provide adequate slope on the biomass piles to promote drainage and reduce leachate production of biomass; and,
- evenly distribute site drainage (i.e., not channelized) to the bio-swale.

A permeable infiltration bio-swale will be constructed as shown on **Figure A1** of **Appendix A**. Further details regarding the bio-swale are described in the Surface Water Assessment Report under a separate cover.

### 2.3.14 Granular Access Roads and Paving

Granular access roads will be constructed in accordance with the design as determined by the geotechnical investigation. For the purposes of this report, it is assumed that a granular thickness of approximately 0.5 m will be required to withstand vehicle loading. Granular material will be delivered by a commercial supplier and will be placed and compacted according to geotechnical requirements.

The pre-processed biomass storage pads and wood pellet shipping area will be hard-surfaced (i.e., concrete or asphalt). These areas will also be constructed in accordance with the geotechnical design for the site. For the purposes of this report, it is assumed that these areas will be asphalt, and will have an asphalt thickness of approximately 0.15 m, overlain by approximately 0.5 m of compacted granular material.

### 2.3.15 Security Systems

As noted in Sections 2.3.4 and 2.3.10, fencing and signage will be installed around the transformer substation and water storage pond for safety. Additional site security features will be installed, including:

- a slide gate at the access road entrances to deter unauthorized entry; and,
- closed circuit television cameras to monitor key areas, including the fuel handling area, and various processes inside the site buildings.

### 2.3.16 Site Building Equipment Installation

All equipment within and immediately adjacent to site buildings will be installed and connected to the site's underground utilities. Detailed preliminary drawings of the required equipment are provided in **Appendix B**. The equipment generally includes the following:

#### **Biomass Cogeneration Plant**

- a biomass dryer;
- water treatment systems and storage tanks for process and domestic water supply;
- a biomass dryer, furnace and boiler to generate steam;
- a steam turbine;
- an oil tank and lubrication system;
- an electrical generator;
- a condenser and cooling tower;
- water, wastewater, and steam distribution piping;
- wastewater pipes and floor drains;

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- a steam/glycol heating system (to heat site buildings);
- a fire suppression system;
- a heating and ventilation system, including exhaust stacks;
- pumps and fans;
- a baghouse and exhaust stack;
- an emission monitoring system;
- an ash collection and storage system;
- fire protection equipment;
- a mechanical material handling system; and,
- fuel tanks and a backup / emergency generator.

### **Pellet Plant**

- a mechanical material handling system, including feed bucket elevators;
- dry biomass and pellet storage bins/silos;
- hammer mills;
- a pellet ripening bin;
- moisture metering equipment;
- pellet mills;
- a pellet cooler;
- dust control bag houses;
- a pellet packaging and bag stacking system;
- fire protection equipment;
- covered and secured propane bottle storage racking;
- heat, steam and air distribution pipes;
- water distribution pipes; and,
- domestic sewage pipes.

### **Maintenance Garage**

- work benches;
- repair equipment/tools;
- fire protection equipment;
- heat distribution piping;
- water distribution pipes;
- domestic sewage pipes; and,
- a floor drain system connected to an oil/grit separator.

### **Waste Oil Building**

- containment sump

### **Fire Pump Building**

- electric and diesel fire pump system; and,
- water distribution pipes and appurtenances.

While not within a building, the diesel fuel storage and filling station will also be installed, on a concrete pad in accordance with O.Reg. 217/01 and the Ontario Liquid Fuels Handling Code.

#### **2.3.17 Commissioning**

Project equipment will be commissioned in accordance with contractual requirements and the authorities having jurisdiction. This will ensure all equipment is functioning properly prior to commencement of Project operation. In addition, a pre-start safety review will be conducted in accordance with regulatory requirements.

#### **2.3.18 Site Restoration**

Upon completion of construction and installation activities, any disturbed areas susceptible to erosion will be stabilized with native plant species as appropriate. Erosion and sediment control measures for construction will be maintained until the site has been stabilized, at which time they will be removed.

### **2.4 Materials Brought On-Site**

Standard building materials will be utilized for the construction of the Project. These generally include metal, aggregate, concrete, wiring, plastic, and ceramic. The majority of Project components will be pre-assembled prior to delivery to the site, while other components will require the raw materials to be delivered for construction on-site. The type and quantity of equipment used to deliver these materials to the site is described in Section 2.6.

#### **2.4.1 Pre-Assembled Materials**

With the exception of underground cables, the majority of electrical equipment will be delivered to the site in pre-assembled components by equipment manufacturers/suppliers. These components will generally include transformers, switches, capacitors, insulators, and meters. These pre-assembled components are predominantly comprised of composite metals and ceramics for their conductive, insulating, and structural properties.

The majority of mechanical equipment will also be delivered to the site in pre-assembled components. These components generally include material handling equipment, pumps, motors, fans, boiler, furnace, turbine, gearbox, generators, hammer mills, pellet mills, heating, cooling, and drying equipment. These pre-assembled components are predominantly comprised of composite metals for their structural properties.

Pre-assembled materials will be delivered to the site via standard transport trucks suitable for carrying the equipment loading.

#### **2.4.2 Raw Materials**

Raw materials will be delivered to the Project as they are required throughout construction. If not immediately used for construction, materials will be stored in staging areas within the Project Location. Hazardous materials such as fuels, oils, and lubricants required for construction equipment will be kept in proper storage containers with associated labels and MSDS documentation, and secured in a proper location identified by the Contractor. Predominant raw material requirements for the Project are described in detail below.

##### **Concrete**

Concrete will be required for the Project building and equipment foundations. The strength of the concrete will be determined based on the geotechnical design, but it is anticipated that 25 to 35 MPa concrete will be required. It is estimated that approximately 1,350 m<sup>3</sup> of concrete will be required. Concrete will be prepared off-site at a commercial facility, and delivered in mixing trucks.

##### **Aggregate**

Aggregate will be required for the site access roads, and as a base/bedding material under foundations, paved surfaces, and underground utilities. Subject to geotechnical requirements, it is anticipated that Granular 'A' and 'B' would be used for the above noted applications as required. It is estimated that approximately 15,220 m<sup>3</sup> of granular material will be required. Aggregate will be sourced from a commercial supplier and delivered via tri-axle dump trucks.

##### **Asphalt**

Asphalt is anticipated to be required for the biomass storage pads, and the wood pellet shipping area adjacent the pellet plant. It is estimated that approximately 2,880 m<sup>3</sup> of asphalt will be required. Asphalt will be sourced from a commercial supplier and delivered via tri-axle dump trucks.

**Steel**

Structural steel members will be required to construct the site buildings, and reinforcing steel (rebar) in concrete foundations will also be required. It is estimated that approximately 285,000 kg of structural steel building members and rebar will be required. Steel will be sourced from a commercial supplier and delivered via transport trucks.

**Plastic**

Plastic material such as PVC is expected to be required to construct the water storage pond liner. The strength and thickness of the liner will be determined during detailed design, but it is anticipated that a 20-30 mil liner will be required, weighing approximately 7,000 kg. Plastic will be delivered to the site via transport truck.

**Geotextile**

Geotextile fabric is expected to be required for silt fence as part of the erosion and sediment control measures during construction. It is estimated that approximately 1,700 kg of woven geotextile fabric silt fence will be required during construction. Geotextile will be delivered to the site via transport truck.

**Wiring**

Power and communications cables will be required throughout the site to achieve equipment power and monitoring requirements. It is anticipated that approximately 20,000 kg of cables/wiring will be required for the Project. Cable/wiring will be delivered via cable reel trucks.

**Pipes**

A variety of pipes will be required for underground utilities throughout the site, including:

- wastewater gravity pipes or forcemain;
- water distribution pipes;
- heat distribution pipes; and,
- steam, condensate, and instrument air lines.

Subject to detailed design, it is estimated that approximately 32,500 kg of pipes will be required for the utilities noted above. Pipes will be delivered to the site via transport truck.

## Fill

A grading design will be developed that minimizes the amount of cut and fill required as much as possible, while achieving required design objectives for buildings, wastewater management, and site drainage. It is anticipated that volumes of cut will be designed to equal volumes of fill, such that no imported fill will be required to achieve grading requirements.

## Water

Water is expected to be required during construction to fill the water storage pond, and be used for dust suppression and concrete mixing as required. It is estimated that approximately 270 m<sup>3</sup> of water will be required for the concrete to be poured on site, which is assumed to predominantly be provided at the commercial supplier's facility, and topped-up as required on site to achieve proper moisture content requirements. The water storage pond is estimated to require approximately 1136 m<sup>3</sup> of water. Water suppression for dust control will depend on climate conditions and the extent of dust emissions experienced during construction. Apart from the initial water supplied by the concrete supplier, water needs for the Project are proposed to be provided via on-site wells as further described in Section 2.3.7. For dust suppression, water from the wells would be pumped into water trucks as required to properly distribute water over the required areas.

## 2.5 Construction Equipment

### 2.5.1 Typical Construction Equipment

The heavy construction equipment required will generally consist of earth moving and compacting equipment, cranes, and a variety of service and delivery trucks. The equipment will vary depending on the preferred techniques of the selected Contractor, but will typically include the equipment outlined in **Table 2.2**. Further specifications on each machine can be provided upon request, or found on the manufacturer's website.

**Table 2.2 Typical Construction Equipment**

Description	Example
Harvester	CAT 511
Backhoe	CAT 450E
Scraper	CAT 621H
Excavator	CAT 320D L
Loader	CAT 950H
Bulldozer	CAT D6N

Description	Example
Vibratory Soil Compactor	CAT CP54B
Grader	CAT 12M2
Asphalt Paver	CAT AP1055E
Pneumatic Tire Compactor	CAT PS150C
Vibratory Asphalt Compactor	CAT CB54
Water Truck	International 7400
Cable Reel Truck	Ground Force Cable Reel Truck
Concrete Truck (7 m <sup>3</sup> capacity)	Mack Granite Mixer
Tri-axle Dump Truck (15 m <sup>3</sup> capacity)	Mack Granite Dump
Standard Transport Truck	Volvo VN670
Truck Mounted Crane	Terex Roadmaster 5300
Boom Lift	JLG 600S

### 2.5.2 Construction Equipment by Activity

Each construction operation will require a variety of equipment as outlined in **Table 2.3**. The selected Contractor may elect to use a different combination or quantity of equipment depending on their preferred techniques.

**Table 2.3 Construction Equipment by Activity**

Activity	Equipment Required	Quantity
Site preparation, clearing and grubbing	Harvester	1
	Bulldozer	1
	Excavator	1
	Loader	1
	Tri-axle Dump Truck	4
General earthworks (site grading)	Scraper	1
	Bulldozer	1
	Excavator	1
	Grader	1
	Vibratory Soil Compactor	1
	Tri-axle Dump Truck	1
Excavation for water storage pond, installation of liner, and pond filling	Water Truck	1
	Excavator	1
	Bulldozer	1
	Grader	1
	Vibratory Soil Compactor	1
	Tri-axle Dump Truck	1

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<b>Activity</b>	<b>Equipment Required</b>	<b>Quantity</b>
Excavation for site building foundations	Excavator	1
	Bulldozer	1
	Grader	1
	Vibratory Soil Compactor	1
	Tri-axle Dump Truck	1
Construction of site foundations/footings	Concrete Truck	9
	Standard Transport Truck	1
Installation of water supply distribution system	Excavator	1
	Loader	1
	Vibratory Soil Compactor	1
	Standard Transport Truck	1
	Tri-axle Dump Truck	2
Construction of wastewater management system	Excavator	1
	Loader	1
	Truck Mounted Crane	1
	Vibratory Soil Compactor	1
	Standard Transport Truck	1
	Tri-axle Dump Truck	2
Installation of remaining underground utilities	Excavator	1
	Loader	1
	Vibratory Soil Compactor	1
	Cable Reel Truck	1
	Standard Transport Truck	1
	Tri-axle Dump Truck	2
Installation of transformer substation	Excavator	1
	Loader	1
	Vibratory Soil Compactor	1
	Grader	1
	Standard Transport Truck	1
	Tri-axle Dump Truck	2
Installation of equipment in the woodyard	Truck Mounted Crane	2
	Standard Transport Truck	1
Construction of site buildings	Truck Mounted Crane	2
	Boom Lift	6
	Standard Transport Truck	1
Fine-grading and drainage features	Bulldozer	1
	Excavator	1
	Vibratory Soil Compactor	1
	Grader	1

Activity	Equipment Required	Quantity
Finishing of granular access roads and paving	Grader	1
	Asphalt Paver	1
	Pneumatic Tire Compactor	1
	Vibratory Asphalt Compactor	1
	Tri-axle Dump Truck	21
Installation of equipment in site buildings	Truck Mounted Crane	2
	Boom Lift	6
	Standard Transport Truck	1
Site Restoration	Backhoe	1
	Tri-axle Dump Truck	1
	Loader	1
	Vibratory Soil Compactor	1
	Grader	1
	Asphalt Paver	1
	Pneumatic Tire Compactor	1
Vibratory Asphalt Compactor	1	

## 2.6 Transportation and Traffic

Construction of the Project will require the delivery of construction equipment, pre-assembled materials, and raw materials to the site. The Contractor will comply with Book 7 (Temporary Conditions) of the Ontario Traffic Manual to ensure all equipment deliveries and construction-related traffic is controlled in a safe manner that minimizes traffic disruptions.

For overweight/oversize loads, the Contractor will be required to employ the safety measures required by each applicable road authority via trip permits, such as flags, signs, lighting, and escort vehicles as required.

A summary of the estimated construction traffic generated by construction activities is provided in **Table 2.4**.

**Table 2.4 Construction Traffic Summary**

Material Delivered	Trucks Required	Frequency of Total Trips to Site	Duration of Trips to Site
Construction Equipment (Mobilization)	2 Transport Trucks	4 trips/day	1 week
Pre-assembled equipment	1 Transport Truck	2 trips/day	1 month
Concrete	7 Concrete Trucks	14 trips/day	2 weeks
Aggregate	15 Tri-axle Dump Trucks	29 trips/day	5 weeks

<b>Material Delivered</b>	<b>Trucks Required</b>	<b>Frequency of Total Trips to Site</b>	<b>Duration of Trips to Site</b>
Asphalt	7 Tri-axle Dump Trucks	14 trips/day	2 weeks
Steel	1 Transport Truck	1 trip/day	1 week
Plastic	1 Transport Truck	1 trips/day	1 day
Geotextile	1 Transport Truck	1 trips/day	1 day
Wiring	1 Cable Reel Truck	2 trips/day	1 week
Pipes	1 Transport Truck	2 trips/day	1 week

## 2.7 Temporary Uses of Land

Temporary uses of land during construction will include the site trailers described in Section 2.3.2, and equipment staging areas throughout construction. Both of these features will be located in a suitable area within the Project Location that will not interfere with construction activities. It is likely that an area near the center or east end of the site will be selected, as there are pre-existing roads leading to these areas to facilitate access and suitable soils (i.e., gravel) to support the temporary features. Short-term staging areas may also be prepared adjacent to site buildings to facilitate building erection.

It is anticipated that the existing entrance leading to the Project Location from Highway 527 is suitable for the delivery of construction equipment. If temporary entrance modifications are required, approval will be obtained from the Ministry of Transportation (MTO), and rehabilitation measures will take place after construction to restore the entrance to its pre-development condition, if deemed necessary by MTO.

Upon completion of construction, these temporary uses of land will be stabilized in accordance with the site restoration measures outlined in Section 2.3.18.

## 2.8 Temporary Water Takings

Due to the deep groundwater table at the Project Location as described in Appendix D of the Design and Operations Report, dewatering activities are not anticipated to be required during construction for excavations. However, the water storage pond will be required to be filled upon installation of the liner. Furthermore, water may be required during construction for dust suppression and concrete mix water. As such, it is proposed that the existing well will be used during construction at a rate no greater than 5.7 L/s as identified in Appendix D of the Design and Operations Report.

For a detailed assessment of the groundwater characteristics and suitability to supply water at the required demand, refer to Appendix D of the Design and Operations Report under a separate cover.

## **2.9 Materials/Waste Generated and Transported**

Since the Project would include the construction of several buildings with a total footprint of at least 2,000 m<sup>2</sup>, O.Reg. 102/94 would apply. Under O.Reg. 102/94, the builder would be required to perform the following:

- prior to construction work, conduct a waste audit, covering the waste that would be generated during construction of the Project;
- prepare a written report of the audit;
- prepare a written waste reduction work plan based on the waste audit to reduce, reuse and recycle waste generated during construction;
- implement the waste reduction work plan; and,
- implement measures to communicate the plan to workers at the construction site.

In addition to the strategies developed in the waste reduction work plan, the general strategy for materials and waste generated at and transported from the Project during construction will include the following:

- supply construction materials without packaging;
- reuse materials and temporary structures where possible; and,
- dispose of excess materials at approved recycling and disposal facilities as appropriate.

The majority of materials brought on site will be pre-assembled or raw materials having little or no packaging. Formwork can be reused, and a limited number of temporary structures are anticipated. It is therefore anticipated that a minor amount of construction debris will be stored in bins and disposed of at an approved facility by one dump truck on a bi-weekly basis, or as required.

Portable washrooms will be provided and maintained during construction by a commercial supplier. The supplier will be responsible for regular servicing of the washrooms, including removal and disposal of sewage at an approved facility. It is estimated that one sewage truck will be required to remove approximately 530 L of sewage from the Project location each week during construction.

No waste materials will be disposed of on-site during construction.

### 3.0 Potential Negative Environmental Effects, Mitigation and Monitoring

All potential negative environmental effects anticipated during construction, including associated mitigation and monitoring strategies, are detailed in **Table 3.1**. The guiding principles that were used to identify and analyze each effect are summarized below.

#### 3.1 Description of Potential Negative Environmental Effects

Any potential negative environmental effect that may result from Project construction has been identified in **Table 3.1**.

A number of considerations for each potential negative environmental effect were considered to understand the extent of the effect and to develop appropriate mitigation and monitoring strategies. Key considerations included:

- the magnitude of the effect both in intensity and spatial scale;
- the proximity of the effect in relation to the Project;
- the likelihood of occurrence and reoccurrence of the effect;
- the timing and duration of the effect; and,
- the permanence or irreversibility of the effect.

#### 3.2 Mitigation Strategies

Wherever possible, construction scheduling and procedures were developed to avoid occurrence of a potential effect. In cases where avoidance was not possible, an appropriate mitigation strategy was developed to minimize the magnitude, likelihood, duration and permanence of the potential effect. Mitigation strategies were typically developed according to the following approach:

- design Project siting to avoid occurrence of the effect;
- develop construction scheduling and procedures to mitigate the effect; and,
- develop rehabilitation measures to restore affected features.

Mitigation will be implemented through a variety of mechanisms, including:

- Contract Documents: Whitesand is committed to constructing the Project in an environmentally responsible manner and in compliance with all applicable environmental laws, regulations, and guidelines. All of Whitesand's contractors and subcontractors will be accountable for actions that have an adverse effect on the environment. As such, any contract documents executed by Whitesand will incorporate appropriate provisions from the REA documents. Additionally, all

contractors, subcontractors, and other associates of the Project will follow the guiding principles of the monitoring program. These organizations will also comply with all relevant local, provincial, and federal legislation.

- Management Structures: Whitesand, the construction Contractor, or staff, will take steps to ensure that they have appropriately skilled personnel to carry out the environmental responsibilities as defined in this Report. All organizations associated with Project construction activities will develop responsive reporting systems that clearly assign responsibility and accountability for actions. As appropriate, Whitesand will review these reporting documents.
- Change Management: During construction, change may be required to address unforeseen or unexpected conditions or situations. Whitesand, the construction Contractor, or staff, will be responsible for ensuring environmental and safety issues are addressed. Whitesand will incorporate any significant changes to Project programs, procedures, and plans throughout the life of the Project.
- Environmental Procedures: Whitesand, the construction Contractor, or staff, will be responsible for implementing all approved environmental procedures during construction. Individual personnel responsibilities will be assigned as necessary to support the full and effective implementation of the environmental procedures. Environmental procedures will address the following issues to prevent environmental contamination:
  - Spills and releases: to identify the specific procedures for the prevention, response, and notification of spills. In addition it should establish the general procedures for spill clean-up, personnel training, and material handling and storage to prevent spills.
  - Hazardous waste management: to outline the procedures for the proper identification of hazardous waste and its proper storage, handling, transport, and disposal. In addition, the procedures should outline specific requirements for personnel training, emergency response, product testing, review and approval, and record keeping.
  - Solid waste management: to establish alternative procedures for the management and disposal of used lubricants, used drums, and general office waste.

The procedures above will ensure internal and external risks are fully evaluated and the information communicated to personnel in advance of any accident or malfunction.

- Construction Training Program: As appropriate Whitesand and/or the Contractor and/or staff should develop a contractor training program to ensure personnel

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receive appropriate training in relation to construction procedures, environmental procedures, and the emergency preparedness and response plan. With respect to the environment and natural features, training may cover the following issues:

Environmental Protection, including:

- any inspection, monitoring, maintenance and reporting required by Project permits and/or applicable environmental legislation;
- important/sensitive environmental features and areas;
- incidence reporting (spills, wildlife incidents); and,
- materials disposal.

Facility Safety, including:

- security and safety protocols and responsibilities;
- accident reporting; and,
- chemical and hazardous materials handling.

Emergency Preparedness, including:

- fire preparedness and response;
- natural disasters (i.e., extreme weather events); and,
- hazardous materials and spill response.

Training should begin as the initial staff complement is hired, before they are permitted to contribute to construction works. There should also be on-going training for personnel as well as specific training sessions for new hires.

### **Emergency Response and Communications Plans**

Whitesand will finalize a detailed Emergency Response Plan in collaboration with the applicable government and local emergency service departments. A Communications Plan will also be implemented that clearly outlines a process for two-way communication with all stakeholders during construction. For further details of the Emergency Response and Communications Plans, including the complaint response protocol to be followed during construction, refer to the Design and Operations Report under a separate cover.

### 3.3 Environmental Monitoring

Some mitigation strategies will require environmental monitoring to ensure proper implementation and confirmation that the effect is adequately mitigated. In some cases where the likelihood of a significant negative environmental effect is low, a monitoring approach has been proposed in lieu of a mitigation strategy. To prepare for an event where environmental monitoring may reveal a negative environmental effect, contingency measures have been developed to achieve the following:

- rehabilitate or correct a negative environmental effect;
- notify the applicable agencies if required; and,
- develop alternative mitigation strategies that could prevent the same negative environmental effect from occurring again.

An environmental inspector will be employed during construction, who will be responsible for continual inspection/monitoring for environmental compliance and adherence to proper procedures.

### 3.4 Potential Negative Environmental Effects, Mitigation and Monitoring

All potential negative environmental effects during construction are detailed in **Tables 3.1** and **3.2**. Each potential negative environmental effect is identified and assessed for performance objectives, mitigation strategies, monitoring, and contingency measures.

**Table 3.1 Potential Negative Environmental Effects, Mitigation, and Monitoring**

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
Archaeological and Cultural Heritage	<ul style="list-style-type: none"> <li>Disturbance to archaeological and cultural heritage resources during construction</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to archaeological and cultural heritage features.</li> </ul>	<ul style="list-style-type: none"> <li>A Stage 1 Archaeological Assessment Report has been completed, and concluded that extensive modification of the ground surface has severely degraded any cultural heritage potential, leading to the recommendation that the Study Area does not require further archaeological assessment.</li> <li>The Ministry of Tourism, Culture and Sport has reviewed the above referenced report and is satisfied that the fieldwork and reporting are consistent with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists and the terms and conditions for archaeological licenses.</li> <li>A Cultural Heritage Self-Assessment was undertaken to evaluate the potential for cultural heritage resources at or abutting the Project Location. The assessment concluded there is low potential for cultural heritage resources.</li> </ul>	<ul style="list-style-type: none"> <li>Should any unknown/unexpected artifacts or human remains be encountered during construction, the construction contractor will stop work and the Ministry of Tourism, Culture and Sport will be notified for direction prior to proceeding.</li> </ul>
Woodlands and Natural Vegetation	<ul style="list-style-type: none"> <li>Fragmentation;</li> <li>Introduction of invasive species;</li> <li>Vegetation loss/change during construction; and,</li> <li>Removal of biomass from surrounding forests for use in the various facility processes</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to forest communities to the extent possible.</li> </ul>	<ul style="list-style-type: none"> <li>Field studies took place in the summer of 2013 to confirm the presence, significance, sensitivity and abundance of woodlands and natural vegetation, including: <ul style="list-style-type: none"> <li>Vegetation Inventories;</li> <li>Ecological Land Classification; and,</li> <li>Species at Risk surveys as required.</li> </ul> </li> <li>No Significant Woodlands, rare vegetation communities or at risk flora were identified.</li> <li>Forests regenerating from previous harvesting activities are present. The following mitigation will be used to minimize disturbance to surrounding forests: <ul style="list-style-type: none"> <li>The Project Location site boundaries will be surveyed and marked to limit vegetation clearing and encroachment beyond the Project Location;</li> <li>No clearing, grading, stockpiling of materials, temporary work areas, etc., will be permitted beyond the Project Location;</li> <li>Silt fencing will be installed to limit soil movement beyond the boundaries of the Project Location;</li> <li>Erosion and sediment control measures will be regularly inspected to ensure they are functioning and are maintained as required;</li> <li>If erosion and sediment control measures are not functioning properly, alternative measures will be implemented and prioritized above other construction activities; and,</li> <li>Only approved and permitted biomass will be stored on site and used in the cogeneration plant and pellet plant.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>During construction, an Environmental Inspector will regularly monitor operations to ensure that activities do not extend beyond the Project Location;</li> <li>If accidental encroachment occurs, the offending material or equipment will be immediately removed and restoration of the area conducted as needed; and,</li> <li>Deliveries of biomass will be regularly inspected and will not be accepted without the proper documentation to ensure it is approved biomass from a permitted source. Non-permitted biomass will not be accepted for storage or use at the facility.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
Wetlands	<ul style="list-style-type: none"> <li>• Fragmentation;</li> <li>• Introduction of invasive species;</li> <li>• Vegetation loss/change;</li> <li>• Possible loss of, or disturbance to, Provincially Significant Wetlands, non-Provincially Significant Wetlands and unevaluated wetlands; and,</li> <li>• Impacts to the hydrological regime due to changes in surface water runoff and groundwater drawdown.</li> </ul>	<ul style="list-style-type: none"> <li>• None Required.</li> </ul>	<ul style="list-style-type: none"> <li>• Field studies took place in the summer of 2013. No wetlands were identified within 120 m of the Project Location.</li> </ul>	<ul style="list-style-type: none"> <li>• None Required.</li> </ul>
Life Science and Earth Science Areas of Natural and Scientific Interest (“ANSIs”)	<ul style="list-style-type: none"> <li>• These features are not present within 120 m of the Project Location. No effects are anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>• None Required.</li> </ul>	<ul style="list-style-type: none"> <li>• The Project has been sited in an area with no ANSIs at or within 120 m of the Project Location.</li> </ul>	<ul style="list-style-type: none"> <li>• None Required.</li> </ul>
Terrestrial Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> <li>• Disruption to terrestrial species and their breeding, feeding and migration habitats, including:               <ul style="list-style-type: none"> <li>– birds;</li> <li>– bats;</li> <li>– mammals;</li> <li>– amphibians;</li> <li>– reptiles;</li> <li>– insects; and,</li> <li>– species at risk.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Minimize habitat loss to the extent possible and limit direct loss to the confines of the Project Location.</li> </ul>	<ul style="list-style-type: none"> <li>• Field studies took place in 2013 and 2014 to confirm the presence, significance, sensitivity and abundance of wildlife and wildlife habitat, in accordance with the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012). The only significant feature identified at or within 120 m of the Project Location was Category 3 woodland caribou habitat.</li> <li>• Limit disturbance to Category 3 woodland caribou habitat as follows:               <ul style="list-style-type: none"> <li>– Minimize the footprint of the facility and land clearing requirements to the extent possible;</li> <li>– Minimize construction impacts as noted above under “Woodlands and Natural Vegetation” and below under “Surface Water”, “Air, Odour, Dust”, and “Noise”; and,</li> <li>– Review potential impacts with the MNR to confirm permitting requirements and additional mitigation, if required under the ESA, 2007.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• None, unless required by MNR for Category 3 woodland caribou habitat under the ESA, 2007.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
			<ul style="list-style-type: none"> <li>• Mitigate impacts to migratory bird species by implementing the following:               <ul style="list-style-type: none"> <li>– Tree and vegetation clearing will not occur during the breeding season (May 16 to August 8);</li> <li>– Noise levels will be maintained at or below the approved limits set out by MOECC in the REA and ECA approvals; and,</li> <li>– Measures to limit accidental encroachment into habitats beyond the Project Location and to minimize sedimentation and erosion effects on habitats are described under “Woodlands and Natural Vegetation”, above.</li> </ul> </li> </ul>	
Provincial Parks, Conservation Reserves or Valleylands	<ul style="list-style-type: none"> <li>• These features are not present within 120 m of the Project Location. No effects are anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>• None Required.</li> </ul>	<ul style="list-style-type: none"> <li>• The Project has been sited in an area with no provincial parks, conservation reserves, or valleylands at or within 120 m of the Project Location.</li> </ul>	<ul style="list-style-type: none"> <li>• None Required.</li> </ul>
Surface Water	<ul style="list-style-type: none"> <li>• Erosion and sedimentation during all Project phases could affect water quality at the water bodies in the vicinity of the Project Location;</li> <li>• Water quality impacts due to potential fuel and oil spills;</li> <li>• Water quality impacts due to leachate or movement of biomass into nearby water bodies; and,</li> <li>• Water quality impacts associated with the subsurface disposal wastewater management system.</li> </ul>	<ul style="list-style-type: none"> <li>• Prevent erosion and sedimentation impacts on water bodies;</li> <li>• Prevent occurrence of spills;</li> <li>• Minimize biomass leachate production and prevent migration into water bodies; and,</li> <li>• Minimize potential impacts on water bodies associated with wastewater management system subsurface disposal.</li> </ul>	<ul style="list-style-type: none"> <li>• Field studies took place in the summer of 2013 to evaluate water bodies in the vicinity of the Project. The Project Location was sited such that there are no water bodies at or within 120 m of the Project Location, and no Lake Trout Lakes within 300 m of the Project Location.</li> <li>• Mitigation measures will be implemented to minimize potential impacts associated with erosion and sedimentation as follows:               <ul style="list-style-type: none"> <li>– An erosion and sediment control plan will be designed and implemented prior to any other construction activities;</li> <li>– Erosion and sediment control measures would be inspected regularly and repaired/maintained as required;</li> <li>– Materials removed or stockpiled would be contained in a manner to ensure sediment does not enter any water body;</li> <li>– The porous soils and deep water table at the Project Location are conducive to infiltration. The Project has been designed with more than 90% of the site area having gravel or vegetated surfaces, promoting infiltration at source, thereby reducing runoff and associated erosion and sediment impacts; and,</li> <li>– A vegetated filter strip and/or bio-swale will be constructed at the downstream side of the Project for additional infiltration, reduced runoff, and reduced erosion and sediment transport.</li> </ul> </li> <li>• Mitigation measures will be implemented to prevent the occurrence of spills as follows:               <ul style="list-style-type: none"> <li>– A secondary containment system will be constructed in the transformer substation around the main site transformer and will be inspected regularly;</li> <li>– All other oil filled transformers will be installed above a containment catch basin;</li> <li>– The diesel fuel storage and filling station will include above ground tanks on a</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• A three year post-construction monitoring program is proposed at ponds 1, 4, and 5, as shown on Figure A4 of the Site Plan in Appendix A of the Design and Operations Report. The monitoring program would include:               <ul style="list-style-type: none"> <li>– Taking water samples at ponds 1, 4, and 5, for chemical analysis to determine pollutant levels in each pond;</li> <li>– The first round of testing would occur prior to construction to establish background conditions. These background conditions will be evaluated to set performance objectives in consultation with MOECC;</li> <li>– Subsequent samples will be taken twice a year (during Spring after snow melt, and Summer), for three years; and</li> <li>– If testing remains within the performance objectives for three years of Project operation, testing will discontinue. Otherwise, MOECC will be consulted to implement further mitigation, contingency, and testing procedures.</li> </ul> </li> <li>• Wastewater flow monitoring and reporting in accordance with MOECC requirements.</li> <li>• Minor site re-grading and dense vegetation planting as required to disperse channelized flows.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
			<p>hard surface, and will comply with the requirements of O.Reg. 217/01 and the Ontario Liquid Fuels Handling Code;</p> <ul style="list-style-type: none"> <li>– A waste oil building will be constructed with a containment sump for storage of waste oil in metal barrels;</li> <li>– Site personnel will be trained in the proper handling, use, and storage of hazardous materials;</li> </ul> <ul style="list-style-type: none"> <li>• Biomass will be stored on paved storage areas with drainage directed away from the piles, consistent with environmental best practices listed in the “Biomass Storage Environmental Practices Guide” (OFIA, 2008);</li> <li>• The paved biomass storage areas are located over 290 m from the nearest water body; and,</li> <li>• The wastewater management system has been designed in accordance with the effluent limits established in consultation with MOECC.</li> </ul>	<ul style="list-style-type: none"> <li>• Covered storage of biomass if monitoring discovers non-conformance due to biomass leachate impacts.</li> <li>• The Ontario Ministry of the Environment document “Spills Reporting – A Guide to Reporting Spills and Discharges”, dated May 2007 and as amended from time to time, will be followed for spill reporting protocols, including calling the MOECC Spills Action Centre.</li> </ul>
Groundwater	<ul style="list-style-type: none"> <li>• Groundwater taking for use by the Project (expected to require more than 50,000 L/d);</li> <li>• Potential to encounter non-documented shallow dug wells;</li> <li>• Water quality impacts due to leachate from biomass to groundwater;</li> <li>• Impacts to groundwater quality from on-site subsurface wastewater treatment;</li> <li>• Water quality impacts due to potential fuel and oil spills; and,</li> <li>• Water quality impacts from damaged underground utilities (i.e., glycol heat</li> </ul>	<ul style="list-style-type: none"> <li>• No adverse impact on existing wells in the vicinity of the Project;</li> <li>• Minimize biomass leachate production and potential impact on groundwater;</li> <li>• Minimize potential impacts on groundwater associated with wastewater management system subsurface disposal;</li> <li>• Prevent occurrence of spills; and</li> <li>• Minimize potential for underground utility damage and associated</li> </ul>	<ul style="list-style-type: none"> <li>• A hydrogeological assessment has been completed, and concluded that the groundwater can supply 5.7 L/s from the well identified as TW2-13, and the water taking would not adversely impact the existing wells in the surrounding area, including those in Armstrong, Ontario. The hydrogeological assessment is included in Appendix D of the Design and Operations Report.</li> <li>• Due to the porous nature of the surficial soils and deep water table at the Project Location, no shallow dug wells are anticipated. Furthermore, none were encountered during natural heritage field studies or during the on-site hydrogeological assessment.</li> <li>• Biomass will be stored on paved storage areas with drainage directed away from the piles, consistent with environmental best practices listed in the “Biomass Storage Environmental Practices Guide” (OFIA, 2008).</li> <li>• The paved biomass storage areas are located over 290 m from the nearest water body.</li> <li>• The wastewater management system has been designed in accordance with the effluent limits established in consultation with MOECC.</li> <li>• Mitigation measures will be implemented to prevent spills as noted above under “Surface Water”.</li> <li>• All underground electrical cables, backfill, and grounding will be installed according to the Electrical Safety Code and the authorities having jurisdiction.</li> <li>• Gravity pipes or forcemains for the wastewater conveyance system will be installed in accordance with all relevant Ontario Provincial Standard Specifications (OPSS), including OPSS 410 and OPSS 412 as appropriate.</li> <li>• If technically feasible, propylene glycol (a low toxicity, organic compound) will be used for the glycol heating system.</li> </ul>	<ul style="list-style-type: none"> <li>• As part of the three year post-construction monitoring program outlined above under “Surface Water”, water samples will also be taken from the Project’s production well and analyzed for compliance with performance objectives set in consultation with MOECC.</li> <li>• Ponds 1, 4, and 5 are believed to be groundwater fed. As such, the post-construction surface water monitoring program outlined above is expected to provide insight on groundwater quality conditions. Furthermore, the cogeneration plant will be equipped with a water treatment system that will be able to detect water quality coming from the production well on site. Any abnormal incoming water quality characteristics will prompt notice to potentially affected groundwater users, and further investigations, such that the cause of the unexpected results is determined and corrective actions are taken.</li> <li>• Wastewater flow monitoring and reporting in accordance with MOECC requirements.</li> <li>• Covered storage of biomass if monitoring discovers non-conformance due to biomass leachate impacts.</li> <li>• Monitoring of glycol heating system fluid levels to confirm no leaks have occurred.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
	transfer system or wastewater conveyance system).	impacts on the environment.		<ul style="list-style-type: none"> <li>The Ontario Ministry of the Environment document “Spills Reporting – A Guide to Reporting Spills and Discharges”, dated May 2007 and as amended from time to time, will be followed for spill reporting protocols, including calling the MOECC Spills Action Centre.</li> </ul>
Aquatic Species and Aquatic Habitat	<ul style="list-style-type: none"> <li>Potential impacts to aquatic habitat due to erosion and sedimentation, spills, and leachate migration to water bodies; and,</li> <li>Water bodies may also be affected by groundwater taking.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize impacts on potential aquatic species at water bodies in the vicinity of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>Field studies took place in the summer of 2013 to evaluate water bodies in the vicinity of the Project. The Project Location was sited such that there are no water bodies at or within 120 m of the Project Location, and no Lake Trout Lakes within 300 m of the Project Location;</li> <li>No fish were observed from shoreline observations at the five closest water bodies to the Project Location; and,</li> <li>Refer to mitigation measures above under “Surface Water” and “Groundwater” for measures to protect potential aquatic species and aquatic habitat in the vicinity of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to the monitoring and contingency measures above under “Surface Water” and “Groundwater”, which will be implemented in part to protect potential aquatic species and aquatic habitat in the vicinity of the Project.</li> </ul>
Air, Odour, Dust	<ul style="list-style-type: none"> <li>Dust and air emissions from Project equipment;</li> <li>Increases in air-borne dust and particulate matter;</li> <li>Increased emissions from equipment during construction and decommissioning;</li> <li>Positive effects of reducing air emissions by replacing the need for the existing diesel generating station; and,</li> <li>Odour impacts from biomass storage piles.</li> </ul>	<ul style="list-style-type: none"> <li>Comply with the applicable air emissions regulations during Project operation;</li> <li>Minimize dust and air emissions during construction and decommissioning; and,</li> <li>Minimize odour from biomass storage piles.</li> </ul>	<ul style="list-style-type: none"> <li>An Emission Summary and Dispersion Modelling (ESDM) report has been prepared under a separate cover in accordance with O.Reg. 419/05. The report indicates air emissions compliance with the applicable regulatory requirements during Project operation.</li> <li>The construction and decommissioning contractors would implement good site practices with regard to air/odour/dust, which may include: <ul style="list-style-type: none"> <li>Multi-passenger vehicles would be utilized to the extent practical;</li> <li>Company and contractor personnel would avoid idling of vehicles when not necessary for construction activities;</li> <li>Equipment and vehicles would be maintained in good working order with functioning mufflers and emission control systems as appropriate; and,</li> <li>Dust suppression (e.g., water) of source areas.</li> </ul> </li> <li>A Best Management Plan will be in place during operation to control dust/particulate emissions from unpaved roads and biomass storage piles.</li> <li>Low emissions and low temperature wood drying technology will be used for drying of biomass during Project operation.</li> <li>Ash waste will be collected and stored inside the cogeneration plant building.</li> <li>Biomass and waste ash delivery trucks carrying friable material will be loaded and/or covered such that emissions are minimized during transport.</li> <li>Biomass will be stored on paved storage areas with drainage directed away from the piles, consistent with environmental best practices listed in the “Biomass Storage Environmental Practices Guide” (OFIA, 2008). Proper drainage at the biomass storage piles will promote drying of material and reduced odour effects.</li> </ul>	<ul style="list-style-type: none"> <li>The cogeneration plant will be equipped with a Continuous Emission Monitoring system to ensure the cogeneration plant is operating within existing Ministry established air emissions limits for biomass combustion facilities; and,</li> <li>A Communications Plan will be developed and implemented during all phases of the Project, including a complaint response protocol as outlined in Section 6.3 of the Design and Operations Report. Corrective actions will be taken to address the complaint as appropriate.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
Noise	<ul style="list-style-type: none"> <li>Noise emissions from the operation of construction machinery and transport of materials to and from the facility;</li> <li>Noise emissions from the operation of equipment at the facility; and,</li> <li>Noise effects associated with decommissioning and dismantling activities.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize noise emissions during construction and decommissioning</li> <li>Comply with REA and ECA noise emission requirements during Project operation.</li> </ul>	<ul style="list-style-type: none"> <li>Industry best practices will be implemented to minimize noise impacts during construction and decommissioning. For example, construction equipment will be repaired and maintained in good working order, and all engines associated with construction equipment would be equipped with mufflers. To the greatest extent possible, activities that could create excessive noise would be restricted to daytime construction hours, and construction/decommissioning activities would adhere to local noise regulations that may be in effect.</li> <li>The facility has been designed to mitigate noise impacts by locating equipment with significant noise emissions in buildings as required. Building doors will be kept closed during operation as required to achieve predicted noise levels.</li> <li>A Noise Study Report has been prepared to assess noise impacts during Project operation, and indicates compliance with regulatory requirements at the nearest points of reception.</li> <li>Regular facility maintenance will take place throughout the operational phase of the Project to ensure that all equipment is functioning properly, reducing noise associated with malfunctioning equipment.</li> </ul>	<ul style="list-style-type: none"> <li>A Communications Plan will be developed and implemented during all phases of the Project, including a complaint response protocol as outlined in Section 6.3 of the Design and Operations Report. Corrective actions will be taken to address the complaint as appropriate.</li> </ul>
Petroleum, Oil and Gas Resources	<ul style="list-style-type: none"> <li>Possible impacts on existing or historic petroleum, oil and gas wells.</li> </ul>	<ul style="list-style-type: none"> <li>None required.</li> </ul>	<ul style="list-style-type: none"> <li>A review of the MNR's oil, gas and petroleum library indicated there are no current or historical petroleum wells or facilities within 75 m of the Project Location.</li> </ul>	<ul style="list-style-type: none"> <li>None required.</li> </ul>
Provincial and Local Infrastructure	<ul style="list-style-type: none"> <li>Temporary pressure on local services and inconvenience to local residents during construction and decommissioning;</li> <li>Traffic delays on local and provincial roads as a result of construction-related traffic (i.e., movement of heavy equipment and facility components);</li> <li>Damage to roads as a result of the movement of heavy equipment and facility components;</li> </ul>	<ul style="list-style-type: none"> <li>Minimize traffic; and,</li> <li>Restore any damage to roads/ infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>The construction and decommissioning contractors will comply with Book 7 (Temporary Conditions) of the Ontario Traffic Manual to ensure all equipment deliveries and construction-related traffic is controlled in a safe manner that minimizes traffic disruptions.</li> <li>The Project Location is situated over 300 m from Highway 527, minimizing traffic impacts associated with construction activities or work areas on or near public roads.</li> <li>During Project operation, transport trucks will frequent the site on a daily basis for the delivery of biomass and shipment of wood pellets. The woodyard will have adequate space for multiple trucks on site at the same time, ensuring no backups will occur onto Highway 527. Based on existing traffic volume and the population of Armstrong, Ontario, no significant traffic delays are expected during the operational phase of the Project.</li> <li>Oversize/overweight trip permits will be obtained from MTO as required.</li> <li>A Road Condition Survey will be conducted if required by MTO or the local services and roads boards. Any damage to local or provincial infrastructure as a result of construction or decommissioning activities will be repaired promptly as required.</li> <li>Consultation will take place with the MTO and local service board if there is a need</li> </ul>	<ul style="list-style-type: none"> <li>Any upgrades and/or subsequent rehabilitation and maintenance/repair will be negotiated with the appropriate authorities.</li> <li>A Communications Plan will be developed and implemented during all phases of the Project, including a complaint response protocol as outlined in Section 6.3 of the Design and Operations Report. Corrective actions will be taken to address the complaint as appropriate.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
	and, <ul style="list-style-type: none"> <li>• Potential traffic delays during Project operation as a result of deliveries of biomass.</li> </ul>		to upgrade or widen any roads in order to allow for the delivery of equipment or biomass.	
Waste	<ul style="list-style-type: none"> <li>• Construction and decommissioning waste will be generated and will require disposal; and,</li> <li>• The cogeneration plant will generate wood ash waste, which will require disposal.</li> </ul>	<ul style="list-style-type: none"> <li>• Meet MOECC and operator requirements for disposal of waste at an approved landfill/disposal facility.</li> </ul>	<ul style="list-style-type: none"> <li>• During construction and decommissioning, the Contractor would implement a site-specific waste collection and disposal management plan.</li> <li>• Non-hazardous wood ash waste generated by the cogeneration plant will be regularly disposed of off-site at an approved landfill/disposal facility. No landfilling will occur on-site.</li> </ul>	<ul style="list-style-type: none"> <li>• Testing of waste material as required to confirm acceptability for disposal.</li> </ul>
Public Health and Safety	<ul style="list-style-type: none"> <li>• Safety concerns related to the operation of heavy equipment during construction;</li> <li>• Accidents, spills or malfunctions associated with Project components, including heavy equipment, furnace, boiler system, pressurizing equipment, and electrical systems;</li> <li>• Fire and/or explosion at the facility or within material stockpiles, with the potential to spread to surrounding forests; and,</li> <li>• Water quality impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Protect site personnel and the public;</li> <li>• Prevent occurrence of spills;</li> <li>• Prevent occurrence of fires and explosions; and,</li> <li>• No adverse impacts to wells in the vicinity of the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• All Project work during construction, operation, maintenance, and decommissioning will comply with the Ontario Occupational Health and Safety Act.</li> <li>• A Health and Safety Plan will be developed and implemented during each phase of the Project, including the minimum emergency response elements described in Section 6.1 of the Design and Operations Report, and a staff training program including the minimum elements described in Section 5.2 of the Design and Operations Report.</li> <li>• The site will be equipped with security equipment, signage, and entrance slide gates. Fencing and signage will be installed around the transformer substation and fire water supply pond.</li> <li>• There will be a pre-start safety review of the Project prior to operation in accordance with regulatory requirements. This review will ensure that all equipment has been installed as designed, commissioned appropriately, and that safety procedures and a training program are in place as noted above.</li> <li>• Mitigation measures will be implemented to prevent spills as noted above under "Surface Water".</li> <li>• The entire facility, including biomass storage areas, will be fully equipped for fire detection and protection as described in Section 4.1.6.4 of the Design and Operations Report.</li> <li>• Biomass will be stored on paved storage areas with drainage directed away from the piles, consistent with environmental best practices listed in the "Biomass Storage Environmental Practices Guide" (OFIA, 2008).</li> <li>• The wastewater management system has been designed in accordance with the</li> </ul>	<ul style="list-style-type: none"> <li>• The facility will be monitored by staff on site 24 hours / day, throughout the year. Any event encountered that could impact public health and safety will trigger the emergency response protocols outlined in the Health and Safety Plan.</li> <li>• Refer to the monitoring and contingency measures above under "Surface Water" and "Groundwater", which will be implemented in part to protect public health.</li> </ul>

Environmental Component	Potential Effects	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
	on wells in the vicinity of the Project.		effluent limits established in consultation with MOECC.	
Provincial Land Use Plans	<ul style="list-style-type: none"> <li>The Project is not protected under the Greenbelt Plan, Lake Simcoe Protection Plan, Niagara Escarpment Plan or Oak Ridges Moraine Conservation Plan. No impacts under provincial land use plans or policies are anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>None Required.</li> </ul>	<ul style="list-style-type: none"> <li>No mitigation measures are required.</li> </ul>	<ul style="list-style-type: none"> <li>None Required.</li> </ul>

**Table 3.2 Environmental Effects Monitoring Plan – Natural Heritage Assessment Environmental Impact Study**

Potential Impacts and Mitigation					Environmental Effects Monitoring Plan					
Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	Monitoring Plan and Contingency Measures
Habitat of Threatened and Endangered Species: Category 3 Woodland Caribou Habitat										
All Construction Activities	<ul style="list-style-type: none"> <li>Loss of approximately 35 ha of Category 3 habitat (D)</li> </ul>	<ul style="list-style-type: none"> <li>Minimize the footprint of the facility and land clearing requirements to the extent possible.</li> <li>Minimize construction effects (noise, dust, erosion/ sedimentation).</li> <li>Review potential impacts with the MNR to confirm permitting requirements and additional mitigation, if required under the ESA, 2007.</li> </ul>	<ul style="list-style-type: none"> <li>Limited geographic extent based on entire range of Category 3 habitat.</li> <li>Low magnitude based on relatively low importance of Category 3 habitat.</li> <li>Duration of effect will last for the entire life of the facility.</li> <li>No residual effect to the species anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize loss of Category 3 habitat to the extent possible.</li> </ul>	<ul style="list-style-type: none"> <li>No Environmental Effect Monitoring needed unless specified as part of ESA, 2007 requirements.</li> </ul>					
Habitat for Migratory Breeding Birds										
Tree and vegetation clearing for construction	<ul style="list-style-type: none"> <li>Loss of approximately 35 ha of breeding habitat (D).</li> <li>Potential for greater loss if clearing, encroachment of equipment or stockpiles inadvertently extends beyond the Project</li> </ul>	<ul style="list-style-type: none"> <li>Tree and vegetation clearing will not occur during the breeding bird season (May 16 to August 8).</li> <li>The site boundaries will be surveyed and marked to limit encroachment within Project Location.</li> <li>No clearing, grading, stockpiling of materials, temporary work areas, etc. will</li> </ul>	<ul style="list-style-type: none"> <li>Loss will be experienced for the life of the project; however, magnitude considered to be low based on large extent of Suitable habitat present in the surrounding area.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize habitat loss to the extent possible and limit direct loss to the confines of the Project Location.</li> </ul>	• N/A	• N/A	• N/A	• N/A	• N/A	• N/A

Potential Impacts and Mitigation					Environmental Effects Monitoring Plan					
Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	Monitoring Plan and Contingency Measures
	Location boundary (D).	<p>be permitted beyond the Project Location.</p> <ul style="list-style-type: none"> <li>During construction, an Environmental Inspector will regularly monitor operations to ensure that activities do not extend beyond the Project Location.</li> <li>If accidental encroachment occurs the offending material or equipment will be immediately removed and restoration of the area conducted as needed.</li> </ul>								
Land clearing and construction activities	<ul style="list-style-type: none"> <li>Movement of exposed sediment into the features (I).</li> <li>Sedimentation could have a minor effect on the size of woodland and on its function (I).</li> </ul>	<ul style="list-style-type: none"> <li>Silt fencing will be installed to limit soil movement beyond the boundaries of the Project Location.</li> <li>Erosion and sediment control measures will be regularly inspected to Ensure they are functioning and are maintained as required.</li> <li>If erosion and sediment control measures are not</li> </ul>	<ul style="list-style-type: none"> <li>Limited duration, frequency, geographic extent.</li> <li>No residual effect anticipated.</li> </ul>	<ul style="list-style-type: none"> <li>No vegetation loss or disturbance associated with sediment and erosion beyond the Project Location.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>					

Potential Impacts and Mitigation					Environmental Effects Monitoring Plan					
Project Activity	Potential Effects (D=Direct) (I=Indirect) Potential effect on the size, diversity, health, connectivity, functionality and resilience of the natural feature.	Mitigation Strategy	Residual Effect (magnitude/frequency/duration)	Performance Objective	Methodology	Monitoring Locations	Frequency and Duration of Sample Collection	Technical and Statistical Value of Data	Reporting Requirements	Monitoring Plan and Contingency Measures
		functioning properly, alternative measures will be implemented and prioritized above other construction activities.								
Construction activities	<ul style="list-style-type: none"> <li>Noise disturbance during construction and operations could cause bird species to avoid suitable nesting areas adjacent to the project (I).</li> <li>No effect anticipated at the species level.</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels will be maintained at or below the approved limits set out by MOECC in the REA and ECA approvals.</li> </ul>	<ul style="list-style-type: none"> <li>Loss will be experienced for the life of the project; however, magnitude considered to be low based on large extent of suitable habitat present in the surrounding area.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance effects to maintain breeding habitat in the area.</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>					

#### 4.0 Conclusion

The Whitesand Cogeneration and Pellet Mill Project can be constructed without causing significant adverse environmental effects. This will be achieved through proper implementation of the mitigation, monitoring, and contingency measures outlined in this report.

Burnside has prepared this Construction Plan Report for Whitesand in accordance with O.Reg. 359/09. This report has been prepared by Burnside for the sole benefit of Whitesand, and may not be re-produced by any third party without the express written consent of Whitesand.

Respectfully submitted,

**Neegan Burnside Ltd.**

Signature  October, 2014  
Chris Shilton, P.Eng., LEED®AP  
Project Manager  
Neegan Burnside Ltd.

**Reviewed by:**

Signature  October, 2014  
Lyle Parsons, BES  
Senior Advisor  
Neegan Burnside Ltd.

**Approved By:**

Signature  October, 2014  
Craig Toset  
Project Manager  
Whitesand First Nation

## 5.0 References

Neegan Burnside Ltd., October 2014. *Design and Operations Report*

Neegan Burnside Ltd., August 2014. *Natural Heritage Assessment*

Neegan Burnside Ltd., October 2014. *Project Description Report*

Neegan Burnside Ltd., October 2014. *Surface Water Assessment Report*

Neegan Burnside Ltd., October 2014. *Water Assessment Report*

Ontario Legislative Assembly, 2012. *Renewable Energy Approvals Under Part V.0.1 of the Environmental Protection Act*. Ontario Regulation 359/09.

Ontario Ministry of the Environment, 2013. *Technical Guide to Renewable Energy Approvals*

WSP Canada Inc., June 18, 2014. *Design Basis Memorandum Great North Bio Energy Inc. Whitesand First Nation Biomass Energy Project, Revision 4.*

# Site Plan



# FIGURE A1

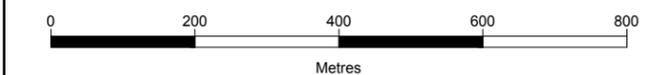
## WHITESAND FIRST NATION COGENERATION & PELLET MILL PROJECT CONSTRUCTION PLAN REPORT

### SITE PLAN

#### LEGEND

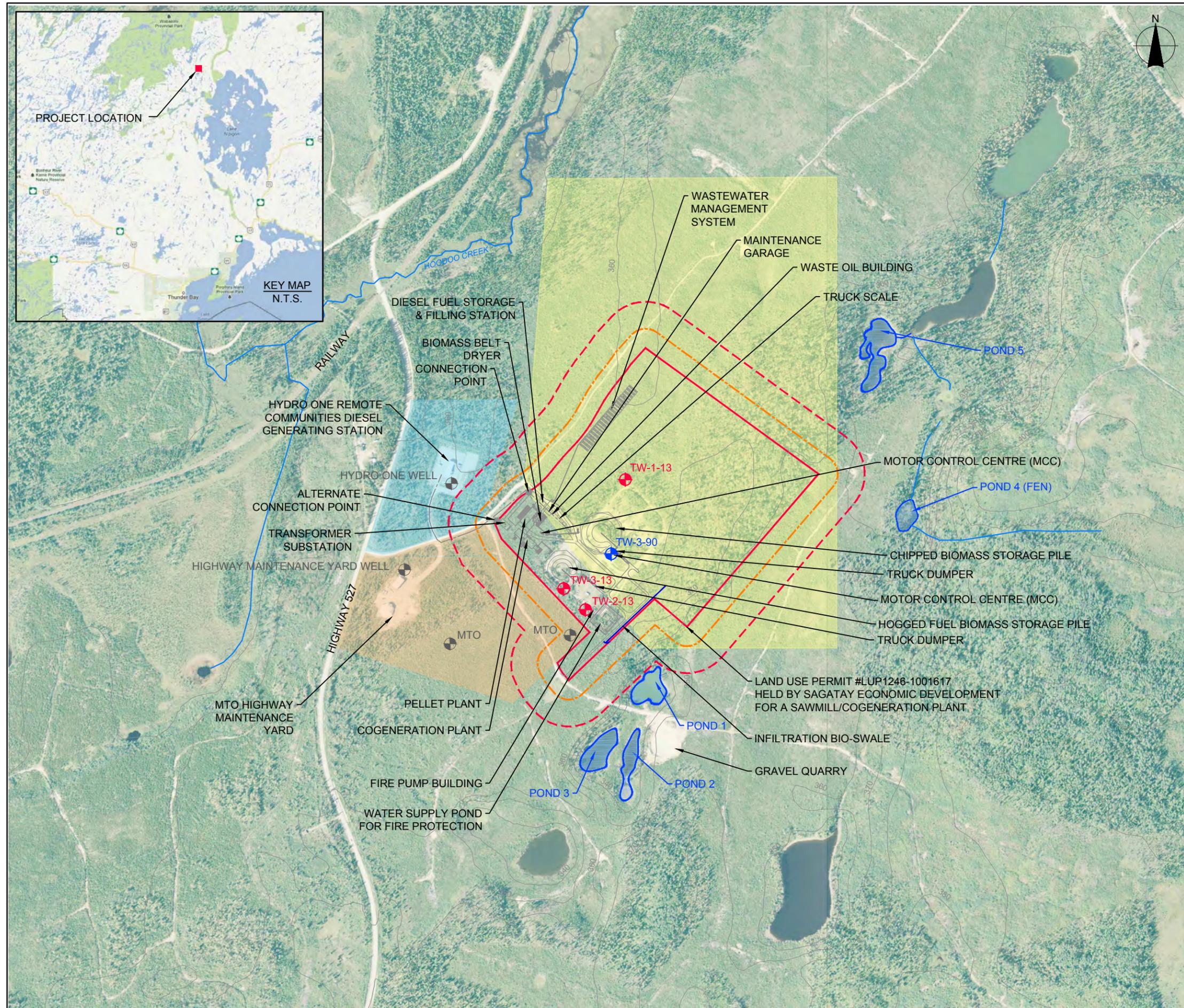
- PROJECT LOCATION
- - - STUDY AREA 50m SETBACK
- - - STUDY AREA 120m SETBACK
- MONITORING WELL LOCATION  
*By Others, 1990*
- MONITORING WELL LOCATION  
*By Neegan Burnside, 2013*
- PRIVATE WELL LOCATION  
*By Others*
- AREA WITHDRAWN PER SECTION 35 OF  
THE MINING ACT (ORDER No. W-TB-122/11)
- CROWN LAND DISPOSITION  
CL10395
- PART 1, REFERENCE PLAN  
No. P-8060-55 ON HIGHWAY  
No. 527
- EXISTING ELECTRICITY DISTRIBUTION LINE
- 350 EXISTING 10m CONTOURS INTERVAL (m asl)

Air Photo Source:  
Background 2008 forest resource inventory air photo reproduced  
with the permission of Ministry of Natural Resources, © Queen's  
Printer for Ontario



1:10,000  
August 2014  
Project Number: 300030895  
Prepared by: C. Sheppard

Projection: UTM Zone 16  
Datum: NAD83  
Verified by: C. Shilton



PROJECT LOCATION

KEY MAP  
N.T.S.



PRINTED: August 26, 2014, 9:24 AM

# Conceptual Facility Plans and Details



NEEGAN BURNSIDE

**Process Flow Diagrams and Equipment**

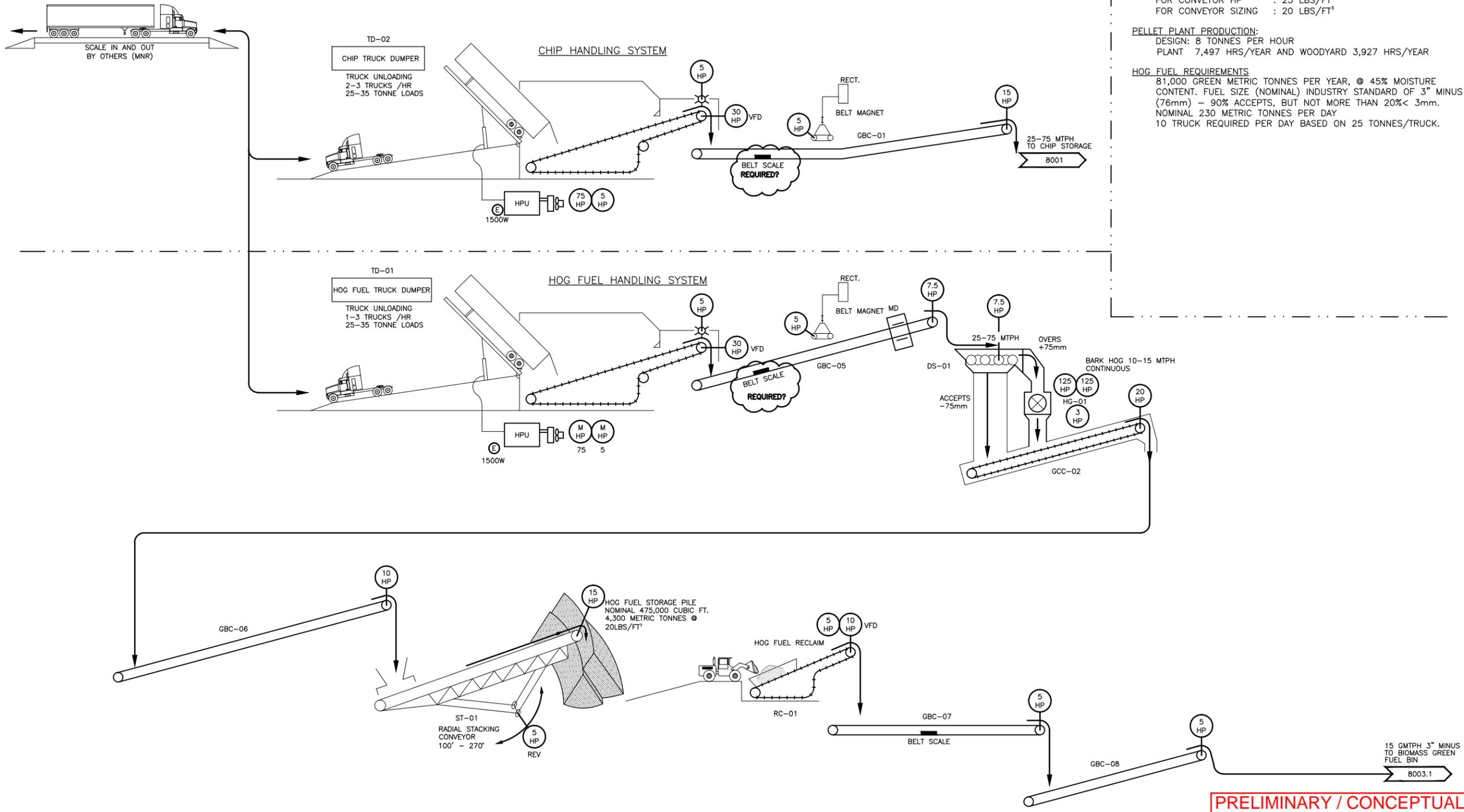
**OPERATING PARAMETERS**

**FEED STOCK:**  
 ASPEN 74%  
 WHITE BIRCH 26%  
 TOTAL 113,000 m<sup>3</sup> PER YEAR  
 CHIPS ARE TO BE SUPPLIED TO PULP MILL SPEC.

**BIOMASS BULK DENSITY ASSUMPTIONS**  
 FOR STORAGE : 20 LBS/FT<sup>3</sup>  
 FOR CONVEYOR HP : 25 LBS/FT<sup>3</sup>  
 FOR CONVEYOR SIZING : 20 LBS/FT<sup>3</sup>

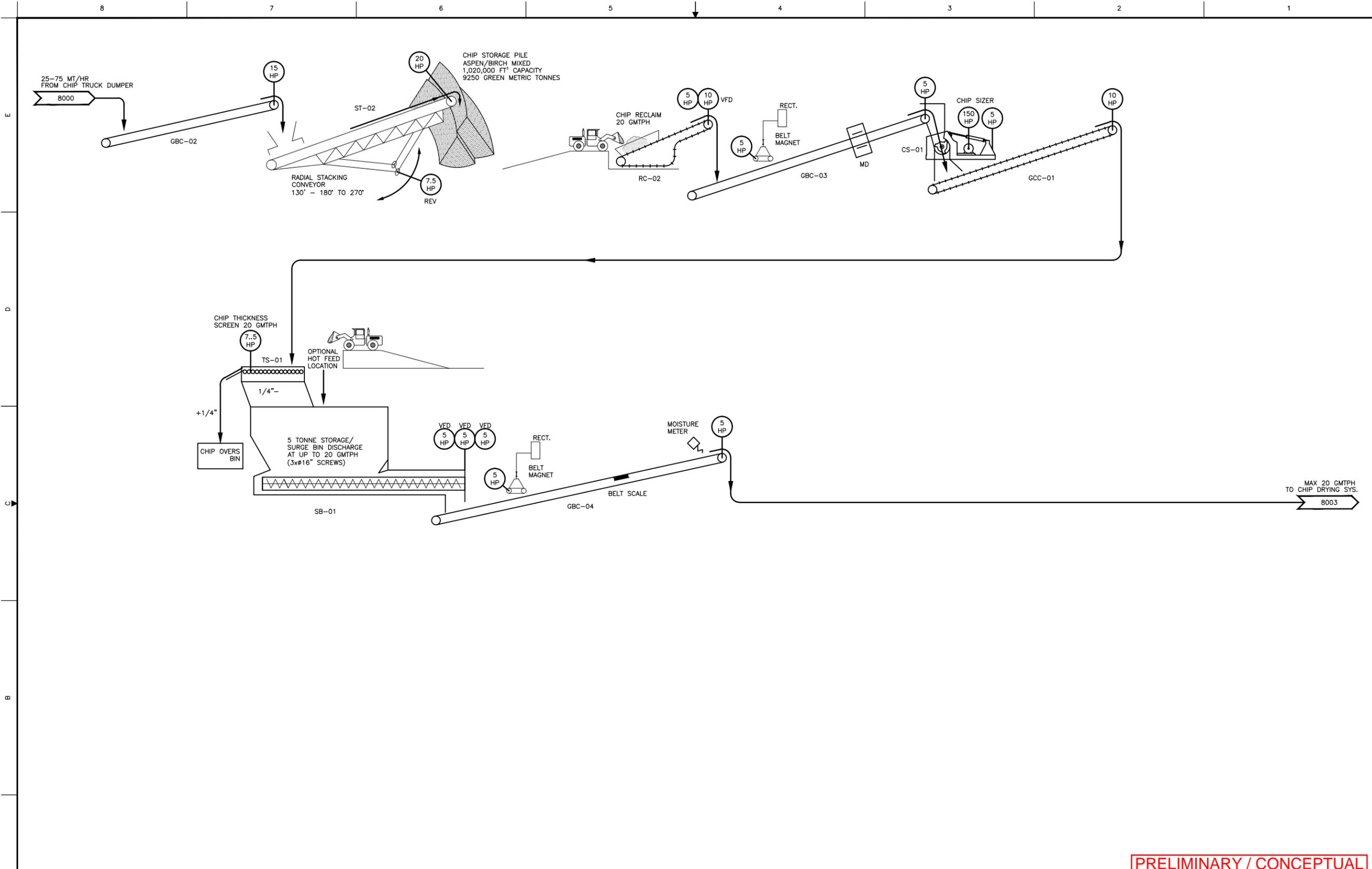
**PELLET PLANT PRODUCTION:**  
 DESIGN: 8 TONNES PER HOUR  
 PLANT 7,497 HRS/YEAR AND WOODYARD 3,927 HRS/YEAR

**HOG FUEL REQUIREMENTS**  
 81,000 GREEN METRIC TONNES PER YEAR, @ 45% MOISTURE CONTENT. FUEL SIZE (NOMINAL) INDUSTRY STANDARD OF 3" MINUS (76mm) - 90% ACCEPTS, BUT NOT MORE THAN 20% < 3mm. NOMINAL 230 METRIC TONNES PER DAY  
 10 TRUCK REQUIRED PER DAY BASED ON 25 TONNES/TRUCK.



**PRELIMINARY / CONCEPTUAL**

<table border="1"> <tr> <th>DWG. NO.</th> <th>DESCRIPTION</th> <th>REV.</th> <th>DATE</th> <th>BY</th> <th>CHK'D.</th> <th>APP'D.</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>				DWG. NO.	DESCRIPTION	REV.	DATE	BY	CHK'D.	APP'D.								<table border="1"> <tr> <th>REV.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>DRAFTER</th> <th>DESIGNER</th> <th>PROJ.MGR</th> </tr> <tr> <td>J</td> <td>2014/03/11</td> <td>SYSTEM REVISED TO PURCHASED CHIPS AND BARK ONLY.</td> <td>RMP</td> <td></td> <td></td> </tr> <tr> <td>H</td> <td>2013/11/05</td> <td>REVISED TRUCK DUMPER NOTES, ADDED BELT SPEED &amp; CHIPPER RPM</td> <td>TJH</td> <td></td> <td></td> </tr> <tr> <td>G</td> <td>2013/09/18</td> <td>REVISED TO INDICATE GTPH</td> <td>TJH</td> <td></td> <td></td> </tr> <tr> <td>F</td> <td>2013/08/19</td> <td>REVISED TO MATCH SITE LAYOUT PLAN</td> <td>TJH</td> <td>TKK</td> <td>DRW</td> </tr> <tr> <td>E</td> <td>2013/06/24</td> <td>GENERAL REVISION</td> <td>DTP</td> <td>CPB</td> <td>DRW</td> </tr> <tr> <td>D</td> <td>2013/06/05</td> <td>WAS 2-3 TRUCKS/HR</td> <td>DTP</td> <td>CPB</td> <td>DRW</td> </tr> <tr> <td>C</td> <td>2013/05/30</td> <td>FOR REVIEW</td> <td>JJR</td> <td>DRW</td> <td>DRW</td> </tr> <tr> <td>B</td> <td>2012/04/12</td> <td>REVISED CHIP FLOW RATE</td> <td>DCH</td> <td>DRW</td> <td>DRW</td> </tr> <tr> <td>A</td> <td>2012/03/26</td> <td>FOR REVIEW</td> <td>DCH</td> <td>DRW</td> <td>DRW</td> </tr> </table>				REV.	DATE	DESCRIPTION	DRAFTER	DESIGNER	PROJ.MGR	J	2014/03/11	SYSTEM REVISED TO PURCHASED CHIPS AND BARK ONLY.	RMP			H	2013/11/05	REVISED TRUCK DUMPER NOTES, ADDED BELT SPEED & CHIPPER RPM	TJH			G	2013/09/18	REVISED TO INDICATE GTPH	TJH			F	2013/08/19	REVISED TO MATCH SITE LAYOUT PLAN	TJH	TKK	DRW	E	2013/06/24	GENERAL REVISION	DTP	CPB	DRW	D	2013/06/05	WAS 2-3 TRUCKS/HR	DTP	CPB	DRW	C	2013/05/30	FOR REVIEW	JJR	DRW	DRW	B	2012/04/12	REVISED CHIP FLOW RATE	DCH	DRW	DRW	A	2012/03/26	FOR REVIEW	DCH	DRW	DRW	<p>ISSUE STATUS</p> <p><b>FOR REVIEW</b></p>		<p>SCALE</p> <p>N.T.S.</p>		<p>Great North Bio Energy</p>		<p>PROJECT</p> <p>GREAT NORTH BIO ENERGY - WHITESAND F.N.</p>	
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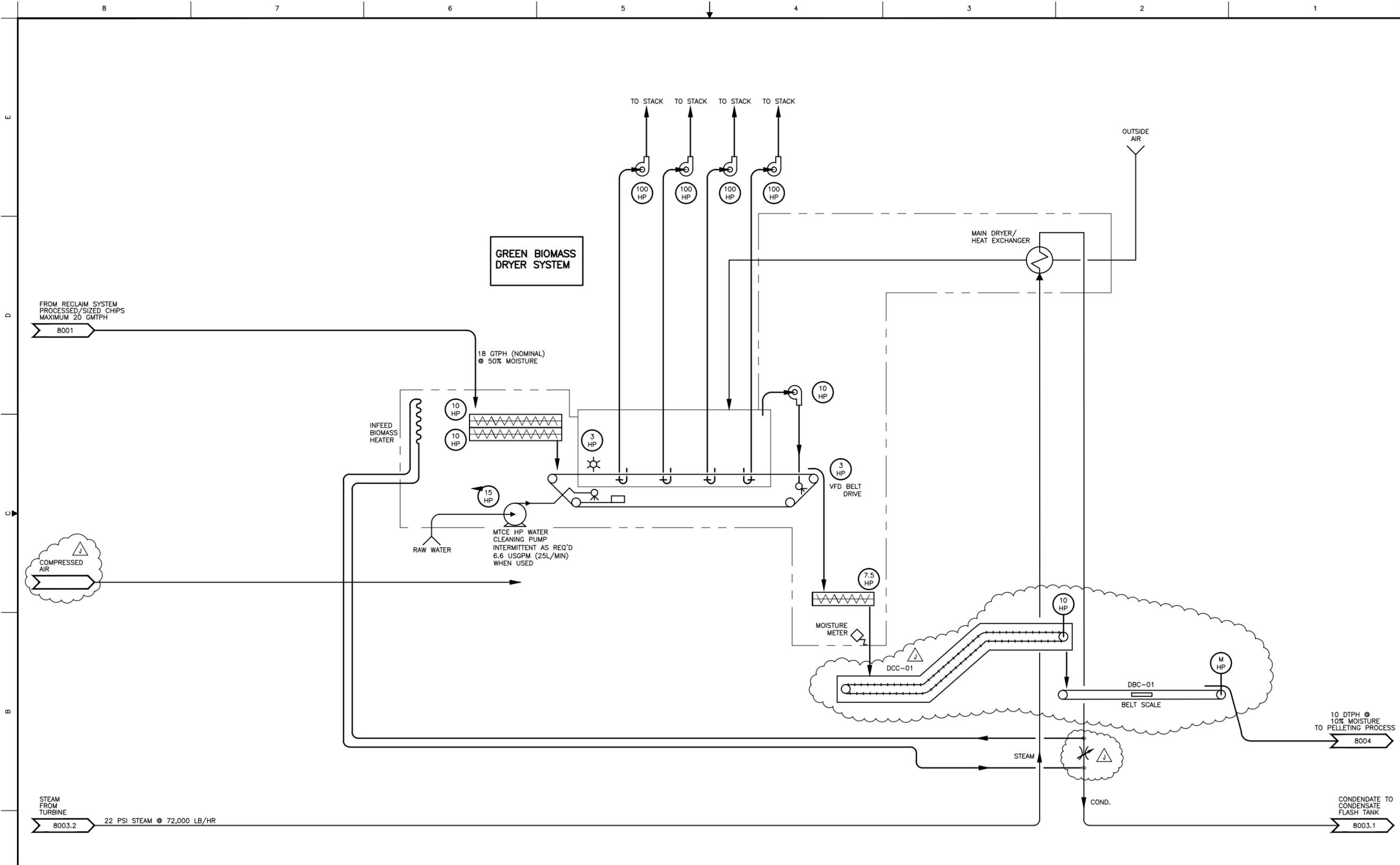
**PRELIMINARY / CONCEPTUAL**

DWG. NO.	DESCRIPTION	REV.	DATE	DESCRIPTION	DRAFTER	DESIGNER	PROJ.MGR	ISSUE STATUS	SCALE	INITIALS	DATE	PROJECT	TITLE	CLIENT DWG. NO.	
		J	2014/03/11	SYSTEM REVISED TO PURCHASED CHIPS ONLY	RMP			<b>FOR REVIEW</b>	N.T.S.			GREAT NORTH BIO ENERGY - WHITESAND F.N.	FLOW DIAGRAM PROCESSING WOOD YARD WHITESAND F.N. - COGEN/PELLET PLANT	8001	
		H	2013/11/04	REVISED SCREEN	TJH										
		G	2013/09/18	REVISED TO 3/8" CHIPS AND GTPH, ADD CONVEYOR	TJH										
		F	2013/08/19	REVISED TO MATCH SITE LAYOUT	TJH	TKK	DRW								
		E	2013/06/24	GENERAL REVISION, WAS DWG 8002	DTP	CPB	DRW								
		D	2013/06/05	WAS 15 MTPH	DTP	CPB	DRW								
		C	2013/05/30	FOR REVIEW	JJR	DRW	DRW								
		B	2012/04/12	REVISED FLOW RATE	DCH	DRW	DRW								
		A	2012/03/26	FOR REVIEW	DCH	DRW	DRW								
		REV.	YYYY/MM/DD												

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121-12538-01



PRELIMINARY / CONCEPTUAL

	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">J</td> <td style="width: 15%;">2013/11/08</td> <td style="width: 60%;">REVISED CONVEYORS</td> <td style="width: 10%;">TJH/SVT</td> <td style="width: 5%;">TKK</td> <td style="width: 5%;">DRW</td> <td rowspan="10" style="text-align: center; vertical-align: middle;"><b>FOR REVIEW</b></td> </tr> <tr> <td>I</td> <td>2013/09/26</td> <td>REVISED TO INDICATE GTPH &amp; DTPH</td> <td>TJH</td> <td>TKK</td> <td>DRW</td> </tr> <tr> <td>H</td> <td>2013/06/19</td> <td>WAS COND. TO BOILER</td> <td>DTP</td> <td>TKK</td> <td>DRW</td> </tr> <tr> <td>G</td> <td>2013/06/06</td> <td>GENERAL REVISIONS</td> <td>JJR</td> <td>CPB</td> <td>DRW</td> </tr> <tr> <td>F</td> <td>2013/07/17</td> <td>DWG NO WAS 8003 NOW IS 8003.1</td> <td>DTP</td> <td>CPB</td> <td>DRW</td> </tr> <tr> <td>E</td> <td>2013/06/24</td> <td>GENERAL REVISION, DWG NO WAS 8004</td> <td>DTP</td> <td>CPB</td> <td>DRW</td> </tr> <tr> <td>D</td> <td>2012/06/05</td> <td>ADD HEAT EXCHANGER AND PROCESS</td> <td>DTP</td> <td>CPB</td> <td>DRW</td> </tr> <tr> <td>C</td> <td>2013/05/30</td> <td>FOR REVIEW</td> <td>JJR</td> <td>DRW</td> <td>DRW</td> </tr> <tr> <td>B</td> <td>2012/03/28</td> <td>REVISED STEAM &amp; CONDENSATE FLOW</td> <td>DCH</td> <td>DRW</td> <td>DRW</td> </tr> <tr> <td>A</td> <td>2012/03/26</td> <td>FOR REVIEW</td> <td>DCH</td> <td>DRW</td> <td>DRW</td> </tr> </table>	J	2013/11/08	REVISED CONVEYORS	TJH/SVT	TKK	DRW	<b>FOR REVIEW</b>	I	2013/09/26	REVISED TO INDICATE GTPH & DTPH	TJH	TKK	DRW	H	2013/06/19	WAS COND. TO BOILER	DTP	TKK	DRW	G	2013/06/06	GENERAL REVISIONS	JJR	CPB	DRW	F	2013/07/17	DWG NO WAS 8003 NOW IS 8003.1	DTP	CPB	DRW	E	2013/06/24	GENERAL REVISION, DWG NO WAS 8004	DTP	CPB	DRW	D	2012/06/05	ADD HEAT EXCHANGER AND PROCESS	DTP	CPB	DRW	C	2013/05/30	FOR REVIEW	JJR	DRW	DRW	B	2012/03/28	REVISED STEAM & CONDENSATE FLOW	DCH	DRW	DRW	A	2012/03/26	FOR REVIEW	DCH	DRW	DRW					
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SCALE		N.T.S.	
DESIGNED BY:	INITIALS	YYYY/MM/DD	
DESIGN CHKD. BY:	DRW	2012/02/10	
DRAWN BY:	MJE	2012/02/24	
DRAWING CHKD. BY:			
PROJECT MANAGER	DRW		
KEYWORD			

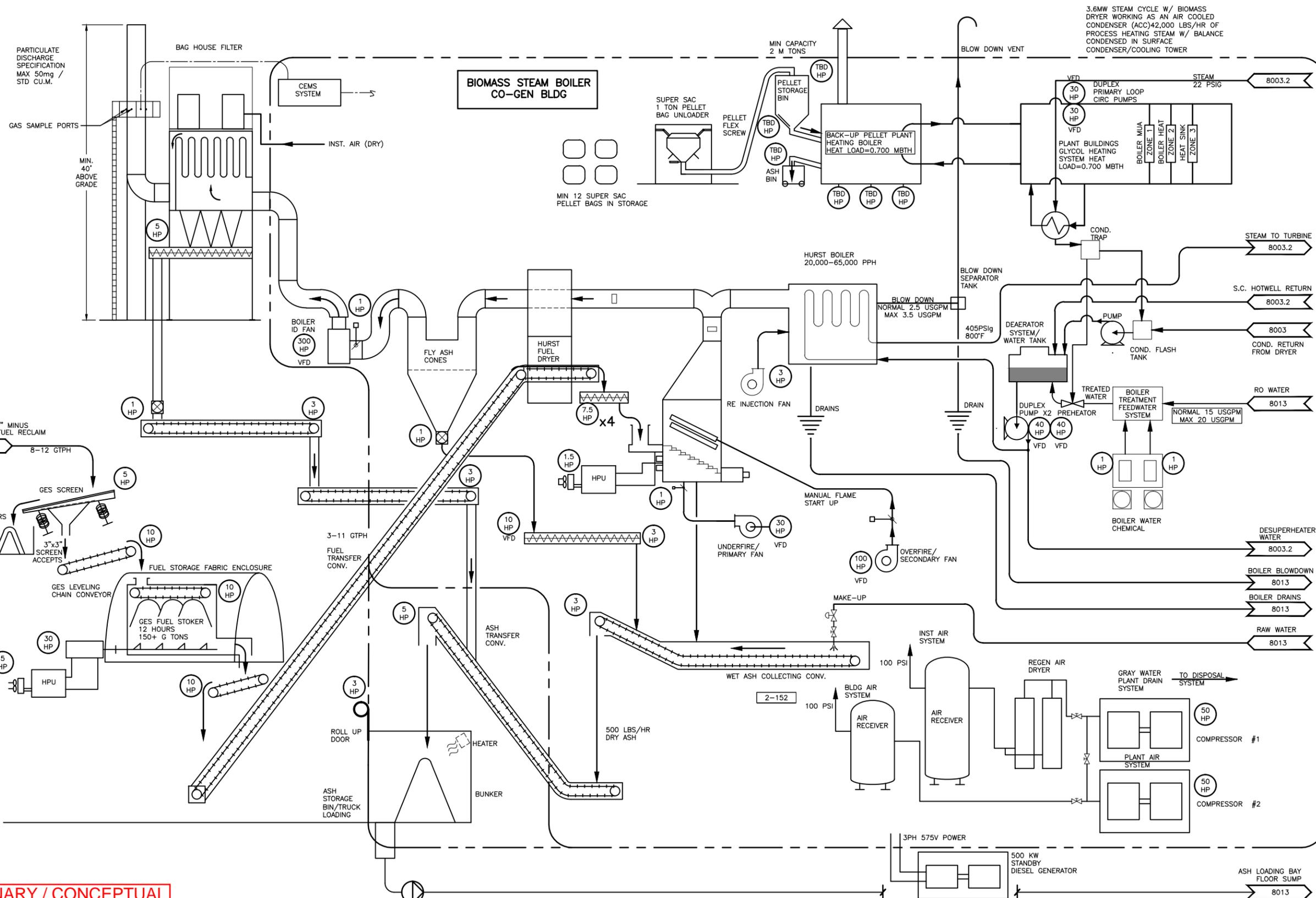
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121-12538-01

PROJECT GREAT NORTH BIO ENERGY - WHITESAND F.N.	PROJECT NO.
TITLE FLOW DIAGRAM GREEN BIOMASS BELT DRYER WHITESAND F.N. - COGEN/PELLET PLANT	
CLIENT DWG. NO.	8003



**PRELIMINARY / CONCEPTUAL**

DWG. NO.	DESCRIPTION	REV.	DATE	DESCRIPTION	DRAFTER	DESIGNER	PROJ.MGR
		I	2014/03/12	ADDED NOTES, GENERAL REVISIONS	TJH		
		H	2013/09/24	REVISED TO INDICATE GTPH	TJH	TKK	DRW
		G	2013/06/21	ADD DRAINS, FLOW, OFFSHEET DIRECTION	DTP	TKK	DRW
		F	2013/06/19	ADD SUPER SAC UNLOADER SYS, HURST FUEL DRYER	DTP	TKK	DRW
		E	2013/06/24	GENERAL REV, DWG NO WAS 8004.1, WAS 405 PSIG/770°F, ADD PUMPS	DTP	CPB	DRW
		D	2013/06/05	ISSUED FOR REVIEW	DTP	CPB	DRW
		C	2013/05/30	FOR REVIEW	JJR	DRW	DRW
		B	2012/03/28	FOR REVIEW	DCH	DRW	DRW
		A	2012/03/26	FOR REVIEW	DCH	DRW	DRW
		REV.	YYYY/MM/DD	DESCRIPTION	DRAFTER	DESIGNER	PROJ.MGR

ISSUE STATUS		
<b>FOR REVIEW</b>		

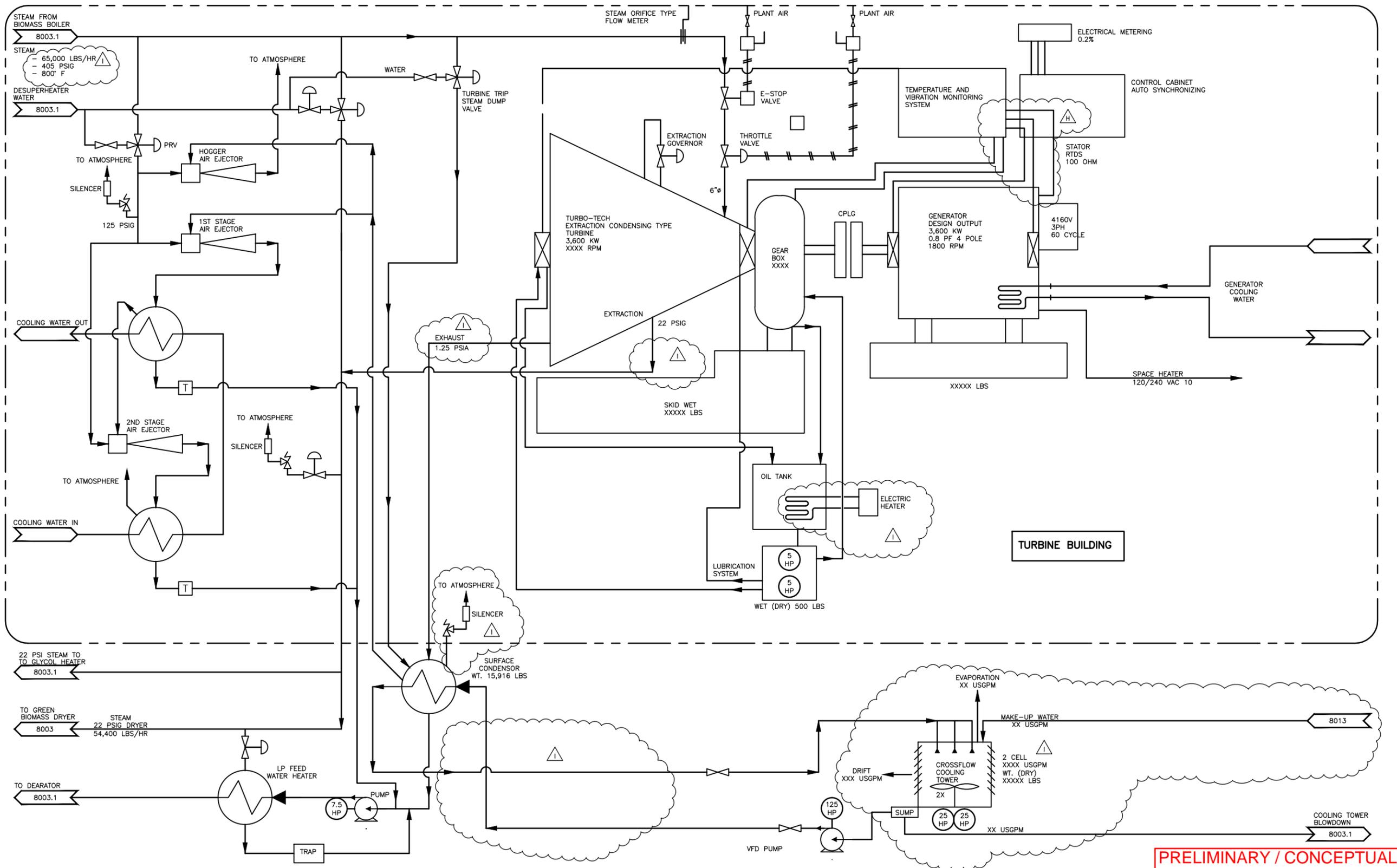
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DESIGN CHK'D. BY:		
TKK		
DRAWN BY:		
DCH/DTP		2012/03/14
DRAWING CHK'D. BY:		
TKK		
PROJECT MANAGER		
DRW		
KEYWORD		

SCALE: N.T.S.

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GENIVAR REF. NO.

PROJECT	GREAT NORTH BIO ENERGY - WHITESAND F.N.
PROJECT NO.	
TITLE	FLOW DIAGRAM BIOMASS FURNACE & STEAM BOILER SYSTEM WHITESAND F.N. - COGEN/PELLET PLANT
CLIENT DWG. NO.	8003.1



**PRELIMINARY / CONCEPTUAL**

DWG. NO.	DESCRIPTION	REV.	DATE	DESCRIPTION	DRAFTER	DESIGNER	PROJ.MGR
		I		GENERAL REVISION	TJH		
		H	2013/09/24	ADD COOL'G TOWER BLOWDOWN	TJH	TKK	DRW
		G	2013/08/19	REVISED TO MATCH SITE PLAN	TJH/DTP	TKK	DRW
		F	2013/07/17	COMPLETED CIRCUITS FOR GLYCOL HTG SYSTEM AND COOL'G TOWER	DTP	TKK	DRW
		E	2013/06/24	GENERAL REVISION, DWG NO WAS 8004.2	DTP	CPB	DRW
		D	2013/06/05	ISSUED FOR REVIEW	DTP	CPB	DRW
		C	2013/05/30	FOR REVIEW	JJR	DRW	DRW
		A	2012/03/27	FOR REVIEW	DCH	DRW	DRW
		REV.	YYYY/MM/DD	DESCRIPTION	DRAFTER	DESIGNER	PROJ.MGR

ISSUE STATUS			
<b>FOR REVIEW</b>			

SCALE	
N.T.S.	
DESIGNED BY:	DRW
DESIGN CH'CD. BY:	DRW
DRAWN BY:	DCH
DRAWING CH'CD. BY:	DRW
PROJECT MANAGER	DRW
KEYWORD	

SCALE: N.T.S.

INITIALS: \_\_\_\_\_

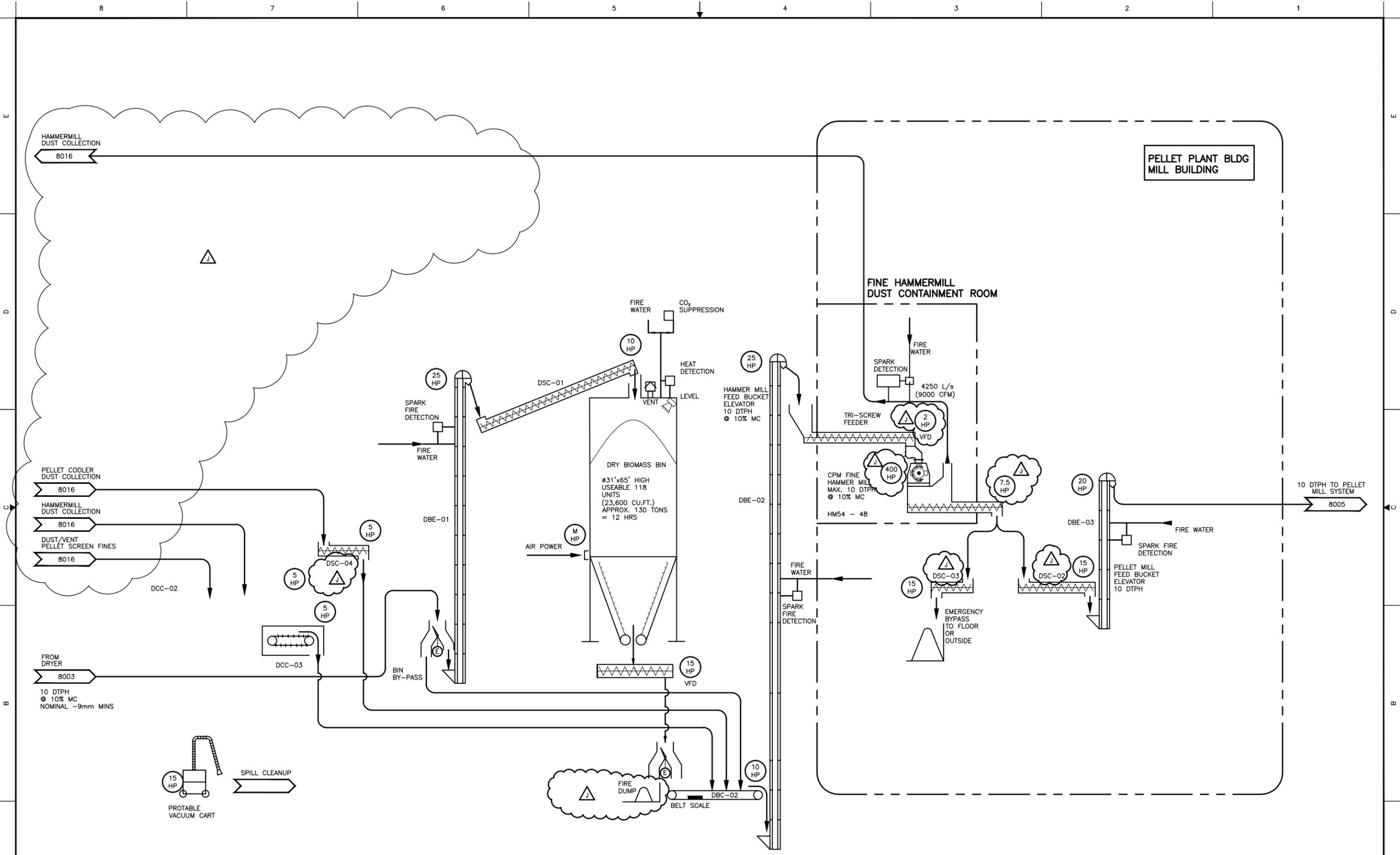
DATE: YYYY/MM/DD: 2012/03/15

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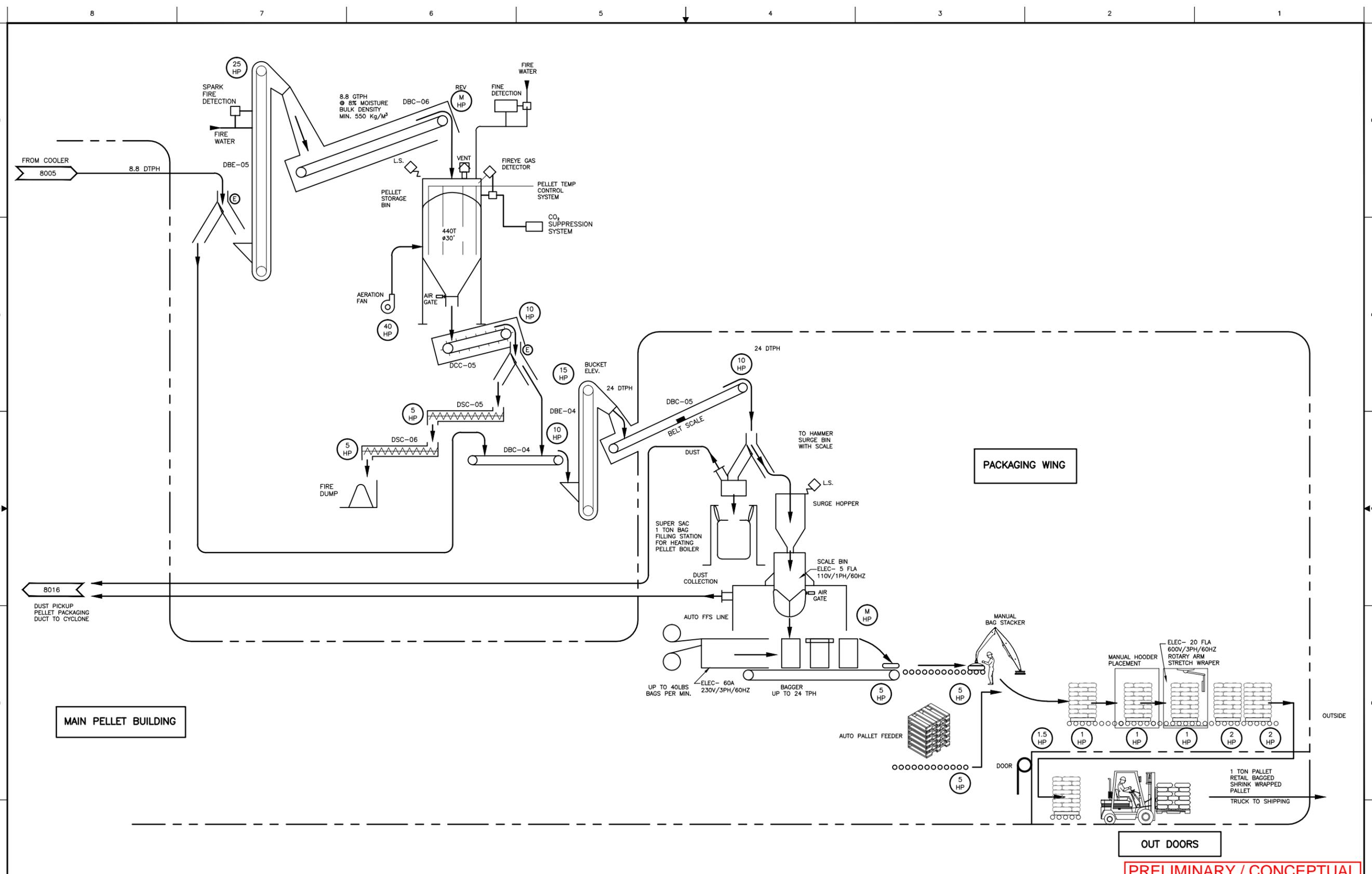
PROJECT	
GREAT NORTH BIO ENERGY - WHITESAND F.N.	
PROJECT NO.	
TITLE	FLOW DIAGRAM 4.3 MW STEAM TURBINE SYSTEM WHITESAND F.N. - COGEN/PELLET PLANT
CLIENT DWG. NO.	8003.2



**PRELIMINARY / CONCEPTUAL**

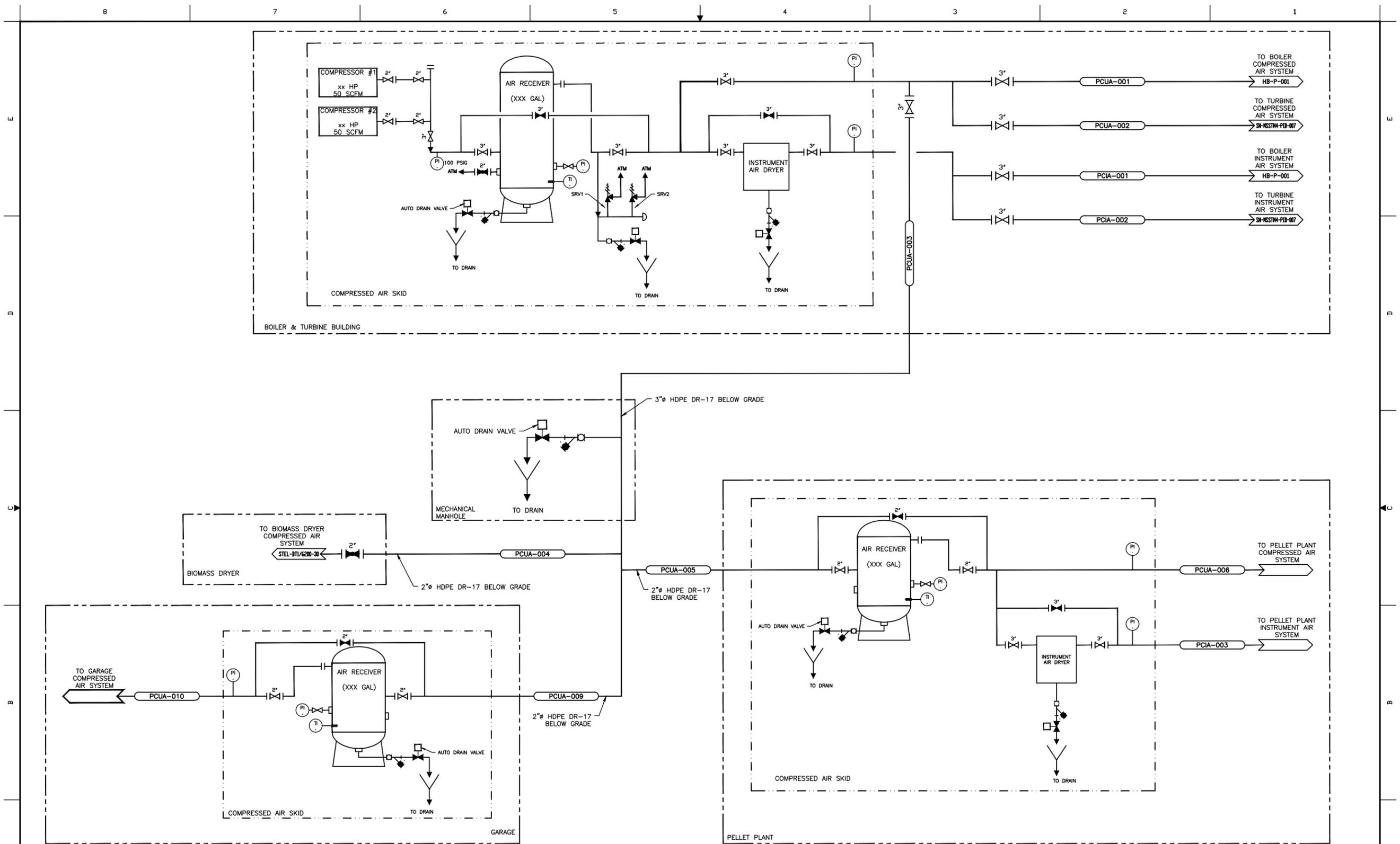
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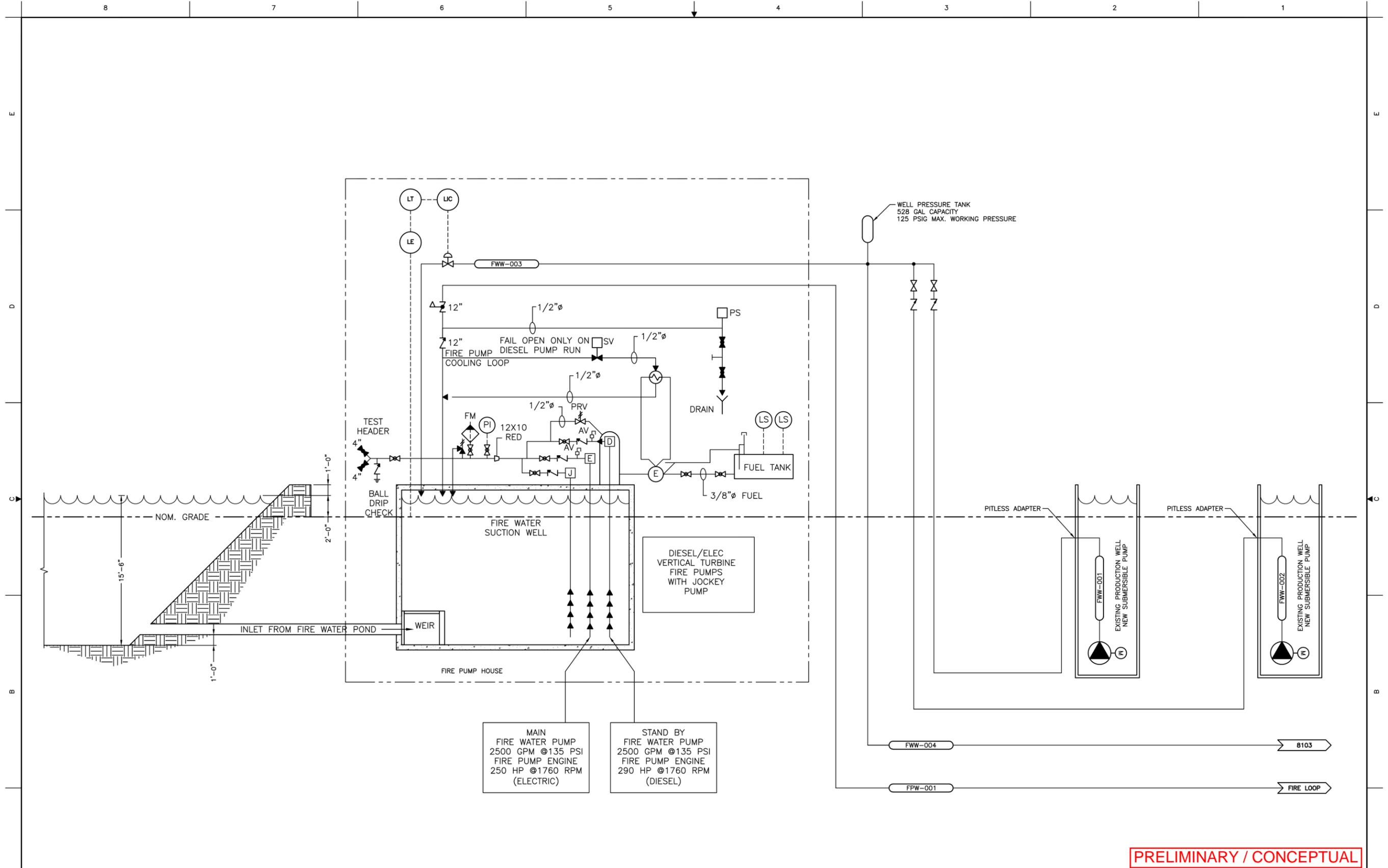
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PROJECT MANAGER:	
KEYWORD:	

Great North Bio Energy

1389 PREMIER WAY  
THUNDER BAY (ONTARIO) CANADA P7B 0A3  
WSP REF. NO. 121-12538-00-8105

TEL: 807 625-4700  
FAX: 807 625-4481

PROJECT	CLIENT DWG. NO.
GREAT NORTH BIO ENERGY - WHITESAND F.N.	
PROJECT NO.	
TITLE	
<b>FLOW DIAGRAM COMPRESSED AIR</b>	



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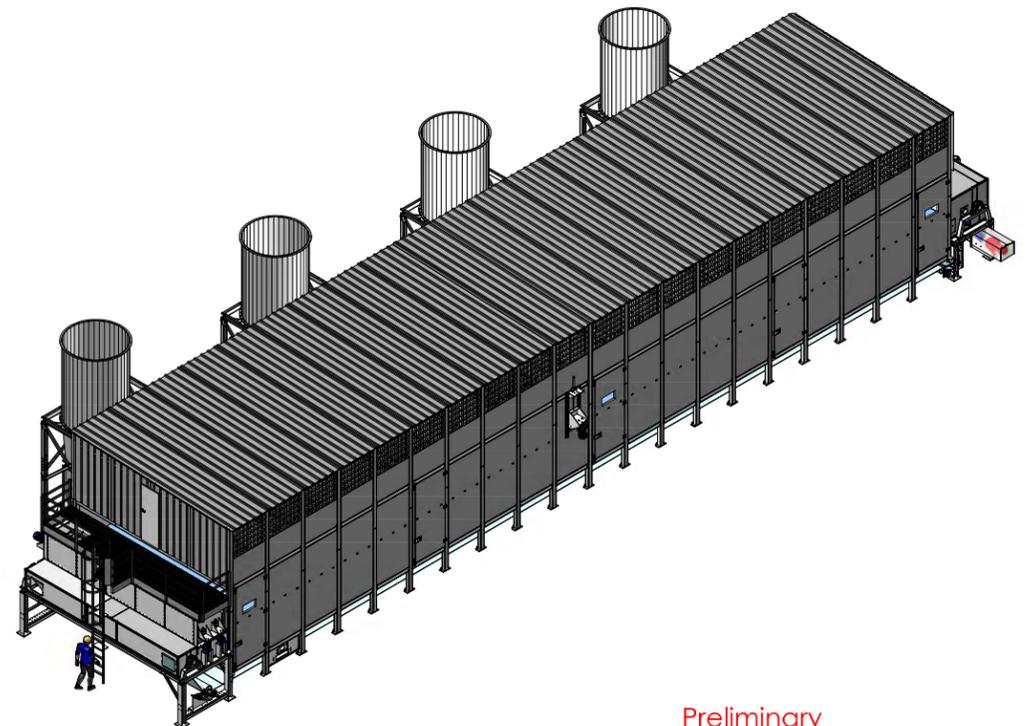
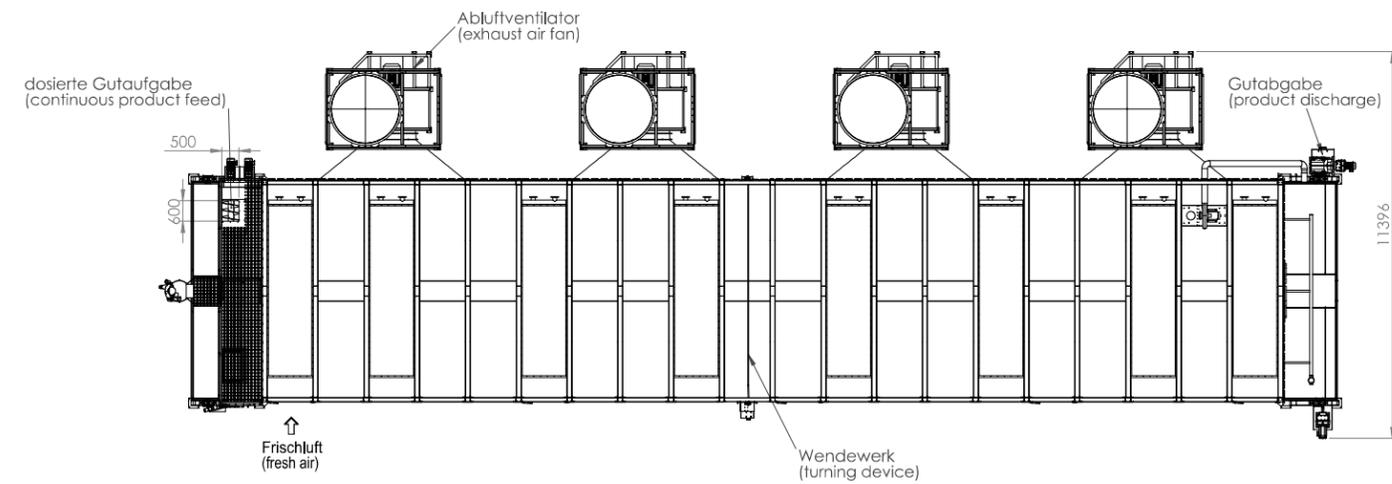
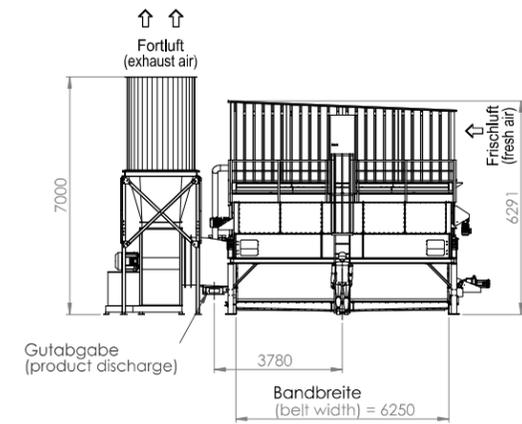
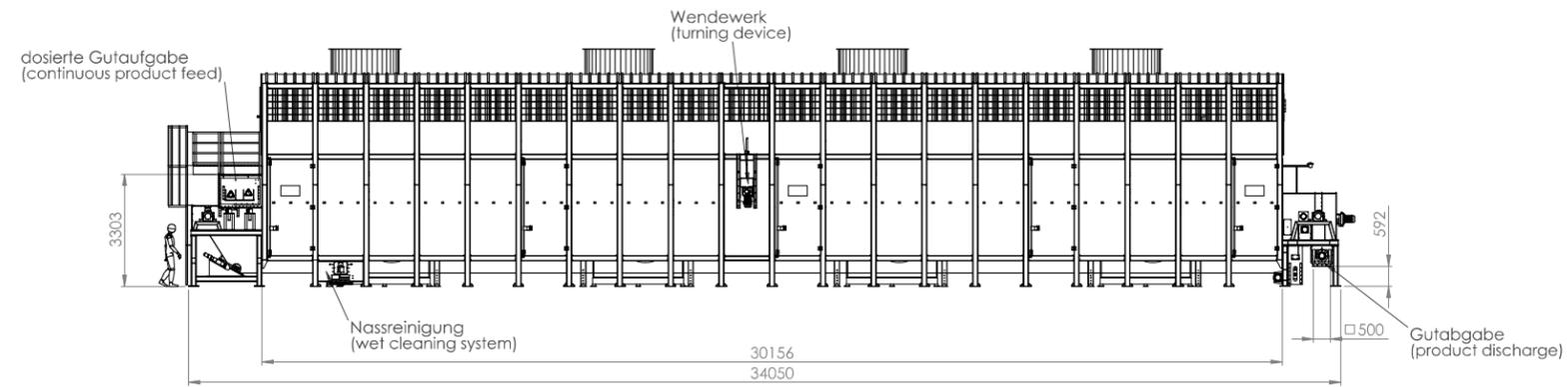
NEEGAN BURNSIDE

**Building Elevations and Sections**



NEEGAN BURNSIDE

**Biomass Belt Dryer**



Preliminary

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Typical only

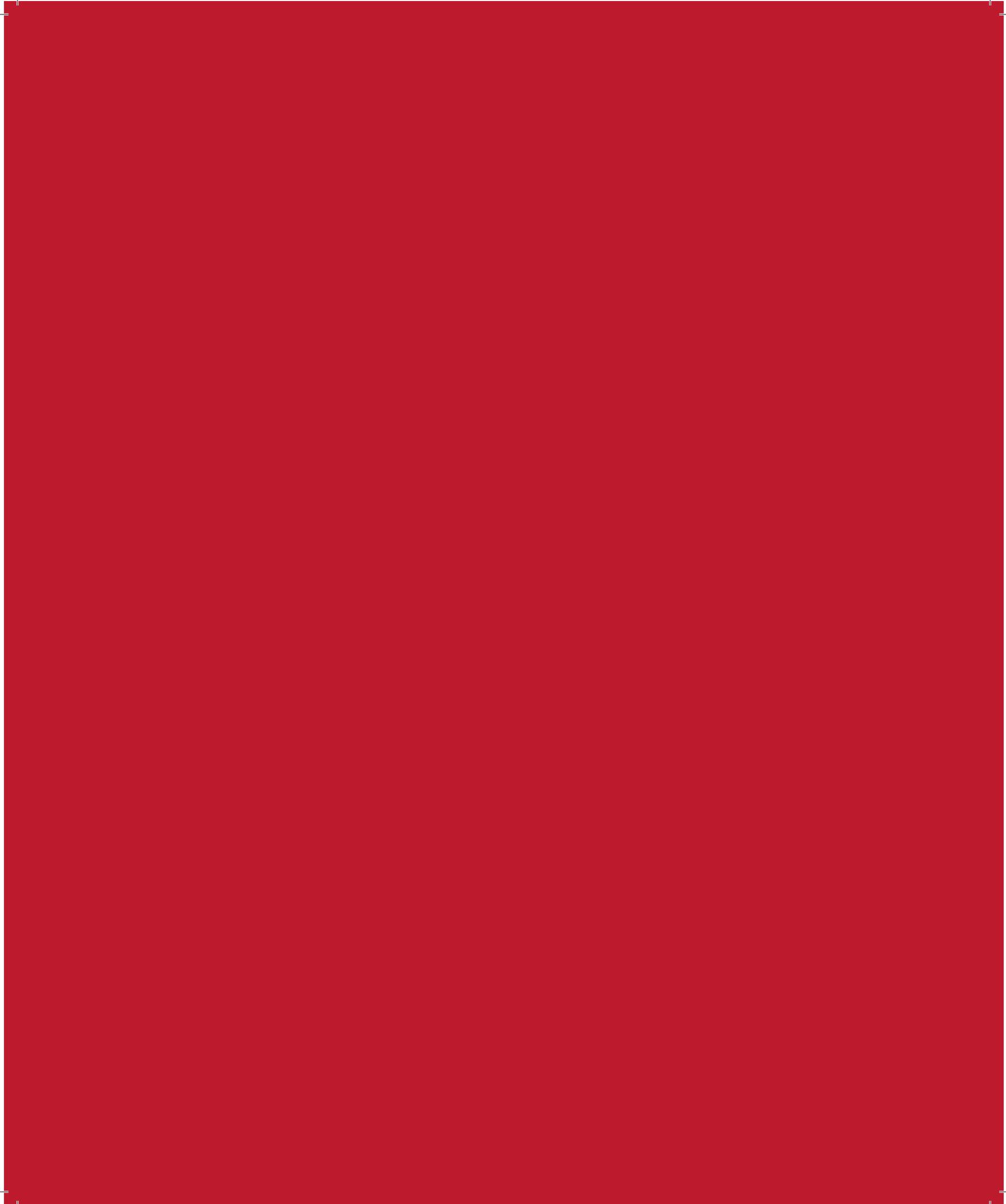
**stela** Maschinenbau  
L. A. X. H. U. B. E. R. GmbH  
84323 Mösning / Bayern

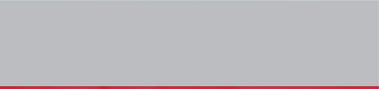
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			DIN A1	Blatt 1	
			Dokumentname	1 BL	
			BT6200-30-4x75KW		
Rev	Änderung	Name	Datum	Urspr.	Erst.

NEEGAN BURNSIDE

**Transformer Substation**







Neegan Burnside Ltd.