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2	FINAL	8/14/16	SAG	SAG	MES	MES
1	FOR REVIEW	7/30/16	SAG	SAG	KJS	MES
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**PURE FONTE LTÉE**  
**PIG IRON PRODUCTION PLANT – FEASIBILITY STUDY**  
**CUSTOMER N°: 1821**



TENOVA  
 TECHINT ENGINEERING & CONSTRUCTION

SECTION 1 - SUMMARY  
**CHAPTER 1.4**  
**PLANT LAYOUT**

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### Chapter's references:

- [1] Alain Duchesne, Martin Dolbec (SNC-Lavalin GEM Québec inc.), "Pig Iron Production Plant Port-Saguenay Chemin de la Grande-Anse Ville Saguenay (Québec) - Geotechnical Investigation," Jonquière (Québec) Canada, May 5th, 2016.
- [2] SNC Lavalin, "Agencement général de l'usine de fabrication de fonte en geuse," 2016/06/28.

## 1.4 Plant Layout

### 1.4.1 Layout Criteria

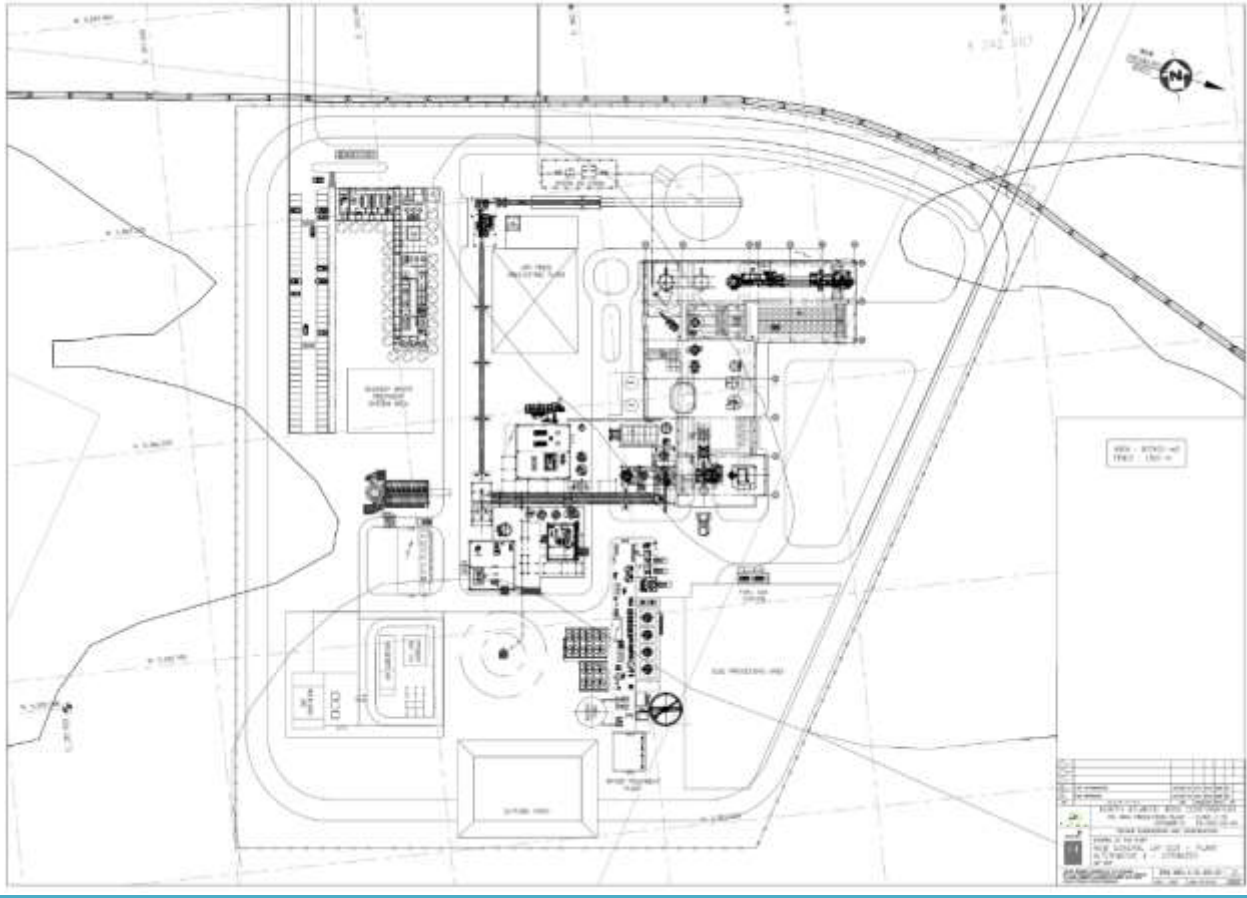


Figure 1.4-1: plan view of PURE FONTE LTÉE layout

PURE FONTE LTÉE layout has been defined by Tenova in cooperation with Techint and SNC Lavalin according to the following criteria:

- Logic utilization of the site geotechnical characteristics
- Best process flow of materials inside the plant
- Compact building and civil construction
- Minimized piping/cablng/wiring to reduce installation time/cost
- Safety and ergonomic considerations for plant workers

## 1.4.2 The PURE FONTE LTÉE site at Port Saguenay

The PURE FONTE LTÉE plant site is located approximately 2.5 km from the dock at Port Saguenay. Material will be transported from the dock to the plant site and from the plant site to the dock either by truck or a conveyor to be constructed by APS.



Figure 1.4-2.: Aerial view of PURE FONTE LTÉE site

A large portion of the PURE FONTE LTÉE site location has already been cleared of trees, levelled and filled with crushed rock. APS has committed to preparing the remainder of the area required by PURE FONTE LTÉE to the same level prior to the beginning of construction. The site is accessible by both heavy haul truck and rail. The road to the dock is well maintained and is currently used to haul bulk materials to and from the dock. PURE FONTE LTÉE will be the first permeant tenant for this Port Location and will be the anchor tenant for the Grand-Anse Maritime Terminal development. The pig iron production facility will be constructed on a portion of the lots 4 012 437 and 4 012 436, which belong to the APS, who has reserved the full lots to PURE FONTE LTÉE. The project site will eventually cover an approximate area of 10.6 hectares.

### 1.4.3 Utilization of site characteristics

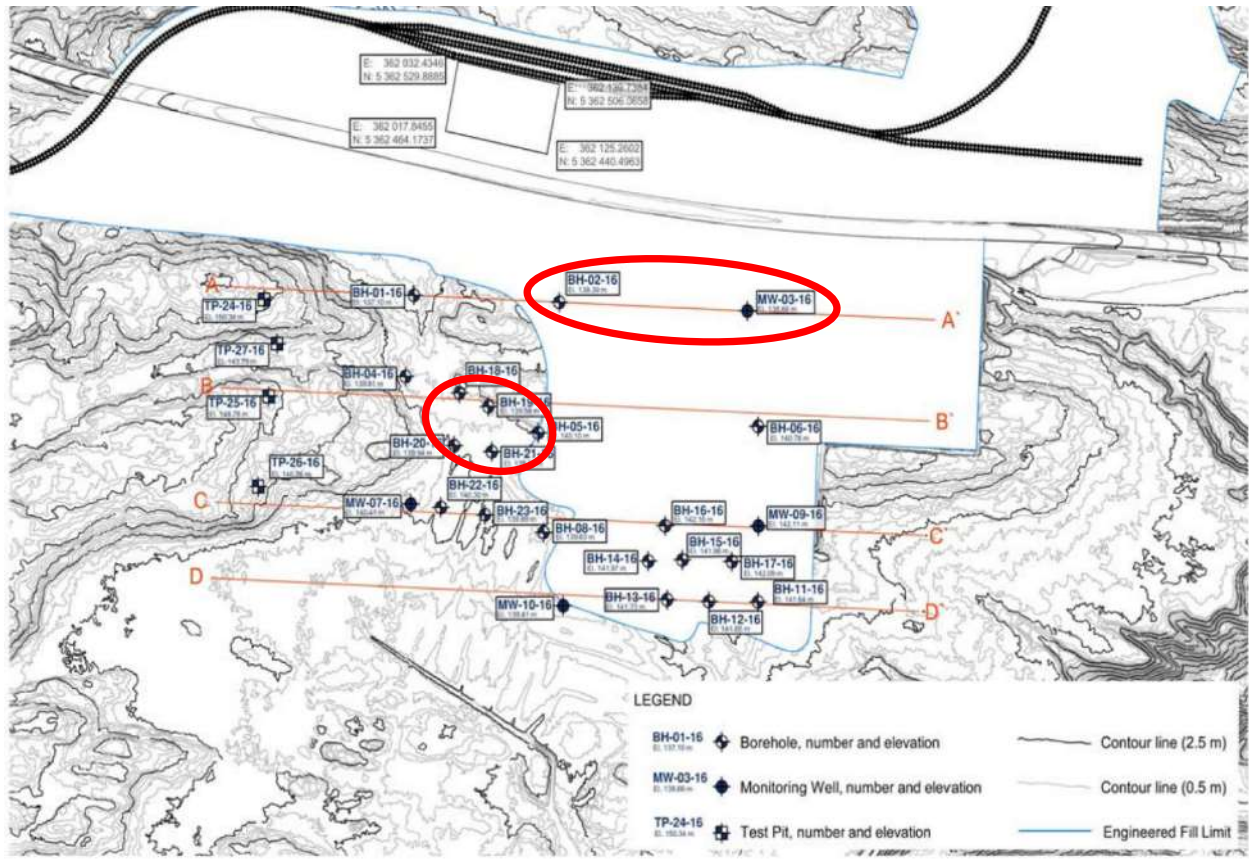


Figure 1.4-3.: Borehole location plan [1]

The PURE FONTE LTÉE site is characterized by a non-homogeneous soil with bedrock at different elevations below the surface. A detailed geotechnical report of the site was commissioned by PURE FONTE LTÉE and is included in this FS. Figure 3 is a map of the boreholes conducted as part of that study. The area around the boreholes indicated in the red circles has rock between 0.25 to 3.6 meters below surface.

The other areas of the lot reserved to PURE FONTE LTÉE have bedrock deeper below surface, and in some cases a layer of clay between the ground level and the bedrock.

Based on the data from the boreholes and to avoid additional cost from piling or other types of foundation consolidation, the position of the heaviest equipment and parts of the plant (Reactor tower, EAF and dome storage) have been located on the areas where bedrock is closest to surface.

#### 1.4.4 Process flow of materials

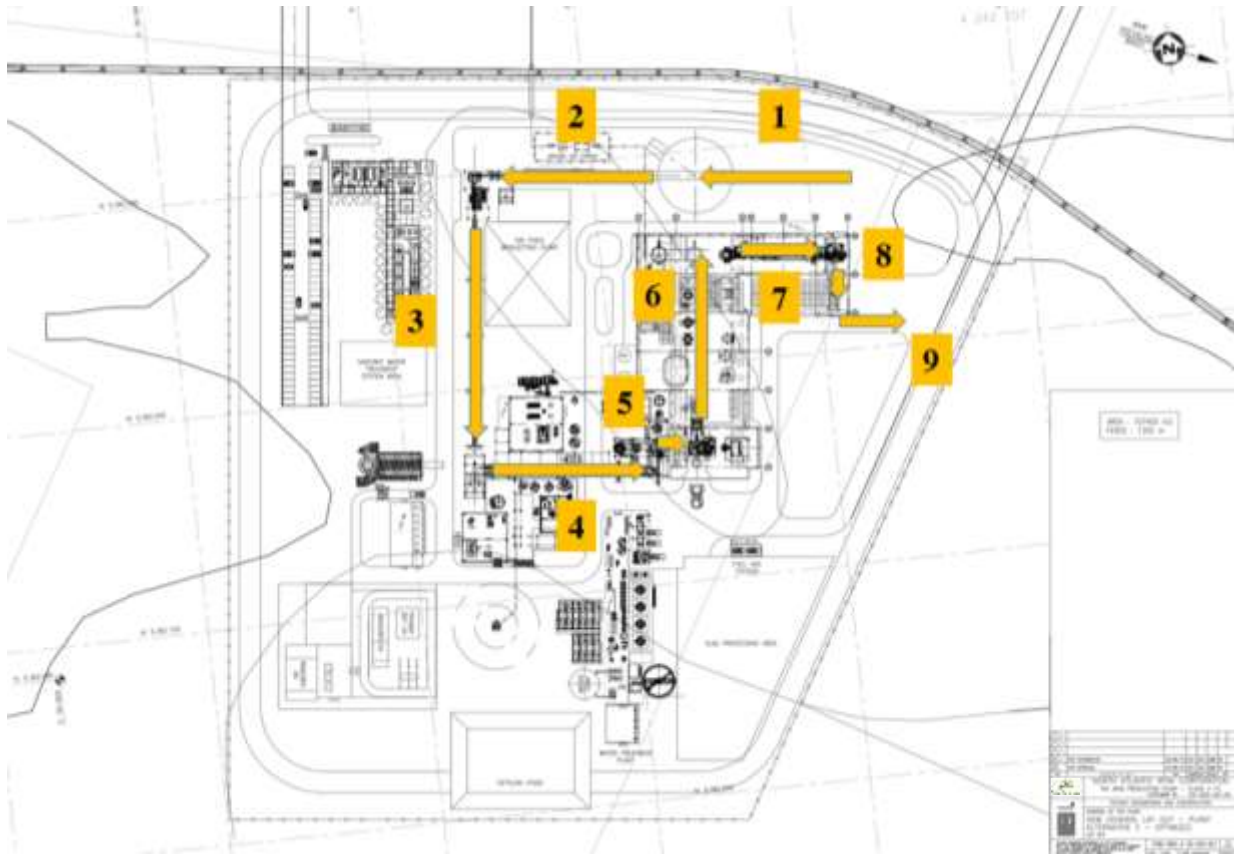


Figure 1.4-4.: Process flow of materials on the plan view

The PURE FONTE LTÉE layout will allow a simple flow of material, avoiding path crossing and maintaining operations in very well defined circle. This will allow material to arrive and depart on the same side of the plant.

- [1] IO pellets arrive and are charged into the storage dome
- [2] IO pellets transfer from the dome to screening/coating and
- [3] Coated pellets transfer to curing bins
- [4] Coated pellets transfer to DR module for reduction and
- [5] Hot DRI pellets gravity hot charge to EAF
- [6] Hot metal from EAF transferred in ladle to pig caster and
- [7] casting of hot metal into pig iron ingots
- [8] transfer to P.I. storage and
- [9] shipping of P.I.

### 1.4.5 Compact building and civil construction



Figure 1.4-5.: Identification of buildings and other plant elements [2]

The PURE FONTE LTÉE layout is characterized by its compact design that utilizes a good part of the already levelled ground and does not require further rock blasting or deforestation.

Below is a list of the plant elements:

Material handling Area (yellow)

1. Transfer building (constructed when needed to connect to belt conveyor to be built by APS)
2. Pellet storage dome
3. Screening and coating building
28. Briquetting Plant
36. Screened fines storage silo



Direct Reduction Area (green)

4. Curing bins / day bins
5. Process Gas Heater
6. DRI Reactor
7. Auxiliary equipment of the reduction area
8. Auxiliary boiler
9. CO2 removal unit
10. DMDS tank

Direct Reduction Area (green)

11. EAF area
12. EAF transformer
13. Ladle refractory maintenance area
14. Control room
15. Pig caster
16. Pig iron storage
17. Ladle preheater
18. Furnace shell refractory maintenance
29. Pulse-jet baghouse

Water Treatment Area (blue)

19. Water treatment plant
20. Water tank
21. Clarifier
22. Air coolers
23. Cooling towers
24. Sanitary water treatment area
25. Settling pond

Other areas

26. Electrical Sub Station
27. Flare
30. Electrical room for the baghouse motors
31. Slag storage
32. Fuel station for mobile equipment
33. Natural gas station
34. Administrative buildings
35. Parking

## 1.4.6 Plant water and natural gas piping

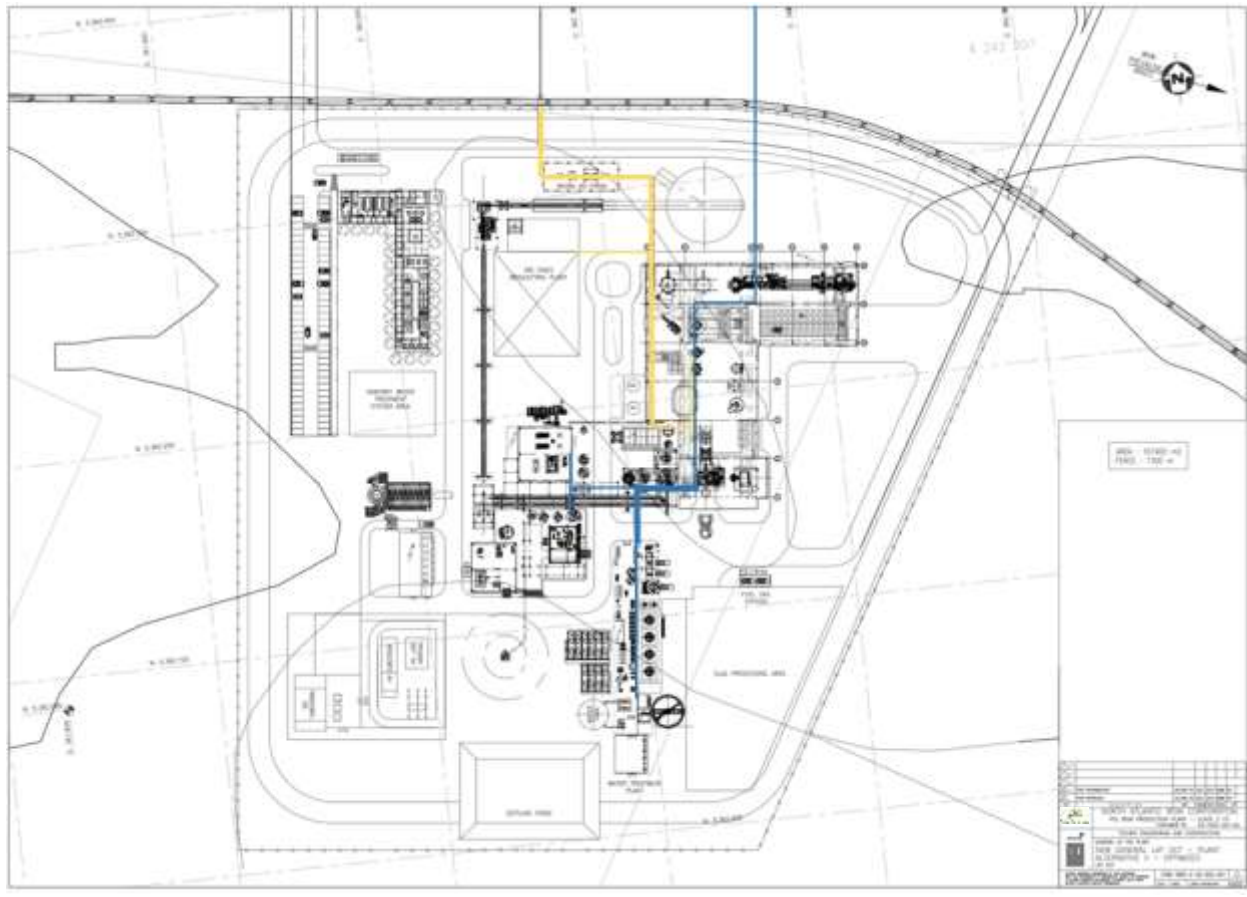


Figure 1.4-6.: Minimization of natural gas piping and water piping

When designing the plant layout, particular attention was paid to water and NG piping. Large diameter piping installation is expensive and has a large impact on the overall capex; therefore, the layout of the equipment has been designed so that the distance between the areas that require high flows of water (DR module in particular) and the Water Treatment Plant has been minimized (blue lines in the picture).

The same principle applied to the NG piping between the NG station and the Process Gas Heater.

The rest of the areas do not use water or NG or are connected with small diameter piping with a lower installation cost.

### 1.4.7 Safety and ergonomics

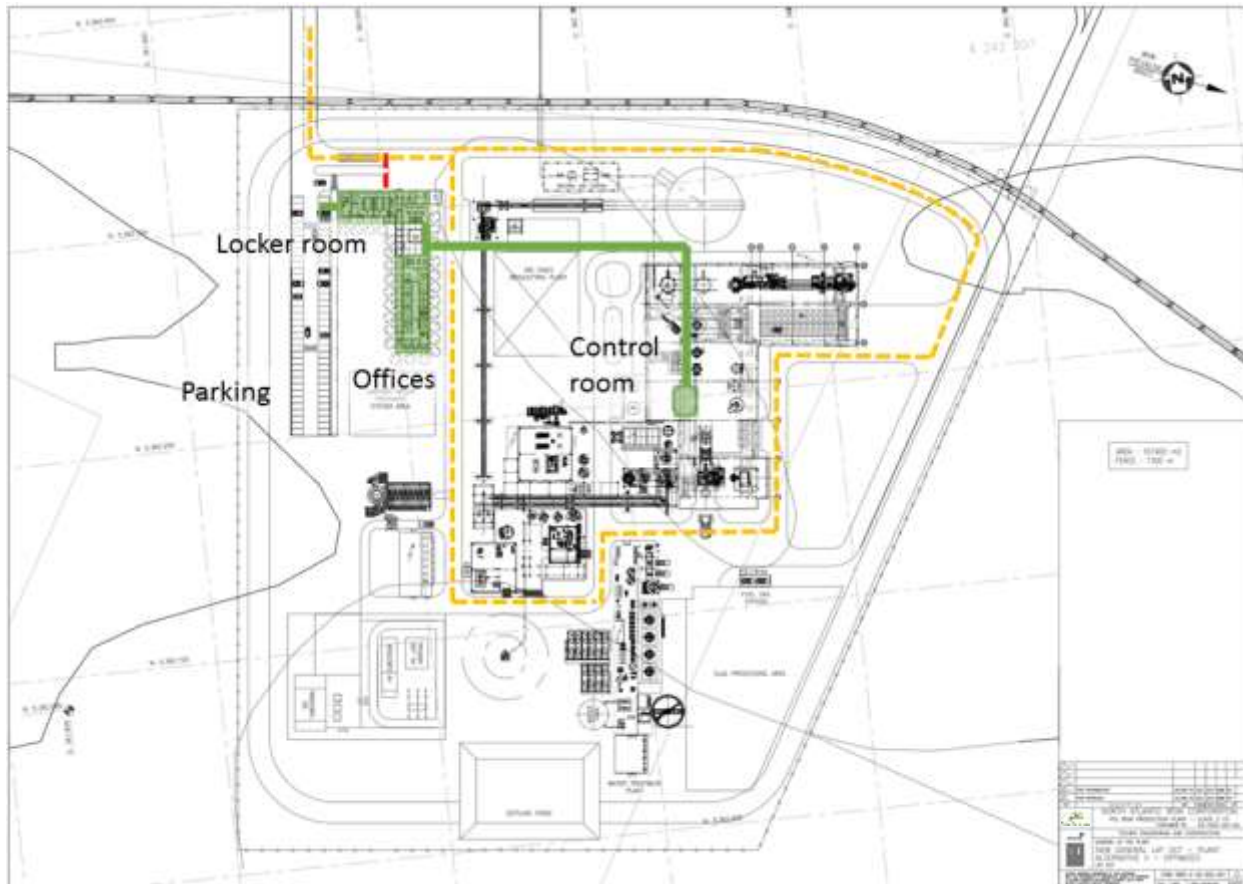


Figure 1.4-7.: paths for workers and trucks in the plant

Plant safety is both a key priority and requirement for the definition of the plant layout. With this in mind, Tenova has defined equipment that can all be controlled from a single location, accessible by workers through a short path (a straight east-west line from the locker room to the main building and from there a short north south line to the control room). No worker shall be allowed outside the control room or the walking path during normal plant operation. Private vehicles will not be allowed in the plant. The plant gate (red line in the figure) will only be opened to trucks and mobile equipment for plant operation. The plant road will be a ring surrounding the main operating equipment, where trucks will be allowed to transit in one-direction only enhancing traffic safety.