3 – JAYNES INLET FACILITY

3.1 SITE DESCRIPTION

The Jaynes Inlet site is located on the west side of Frobisher Bay approximately 60 km south of Iqaluit (Figure 1.1). Figures 1.2 and 1.3 present the site layout for the construction and operation phases, respectively, and the general arrangement showing geotechnical conditions are shown on Figure 3.1.

The Jaynes Inlet site is at the highest elevation of the two sites. The site consists of an upper lake at about 450 masl that will form a storage reservoir. It will be connected by approximately 10 km of stream length to a lower lake (at 11 masl) that discharges to the ocean. The upper lake has one main basin with a smaller arm and it has relatively steep side slopes of mostly exposed bedrock (or bedrock covered in talus) that will contain the lake when the water level is raised with the dam (Appendix A; Table A.1, Photos 1 and 2). The location of the dam at the outlet of the upper lake is shown in Photo 3. The Jaynes Inlet project requires a relatively low height dam. It is favourable to locate the dam as far upstream as possible (i.e., further from the start of the waterfalls) where the rock quality is better. It could extend a short distance into the existing lake. It is estimated that there will be less than 1 m stripping to competent rock foundations at each abutment.

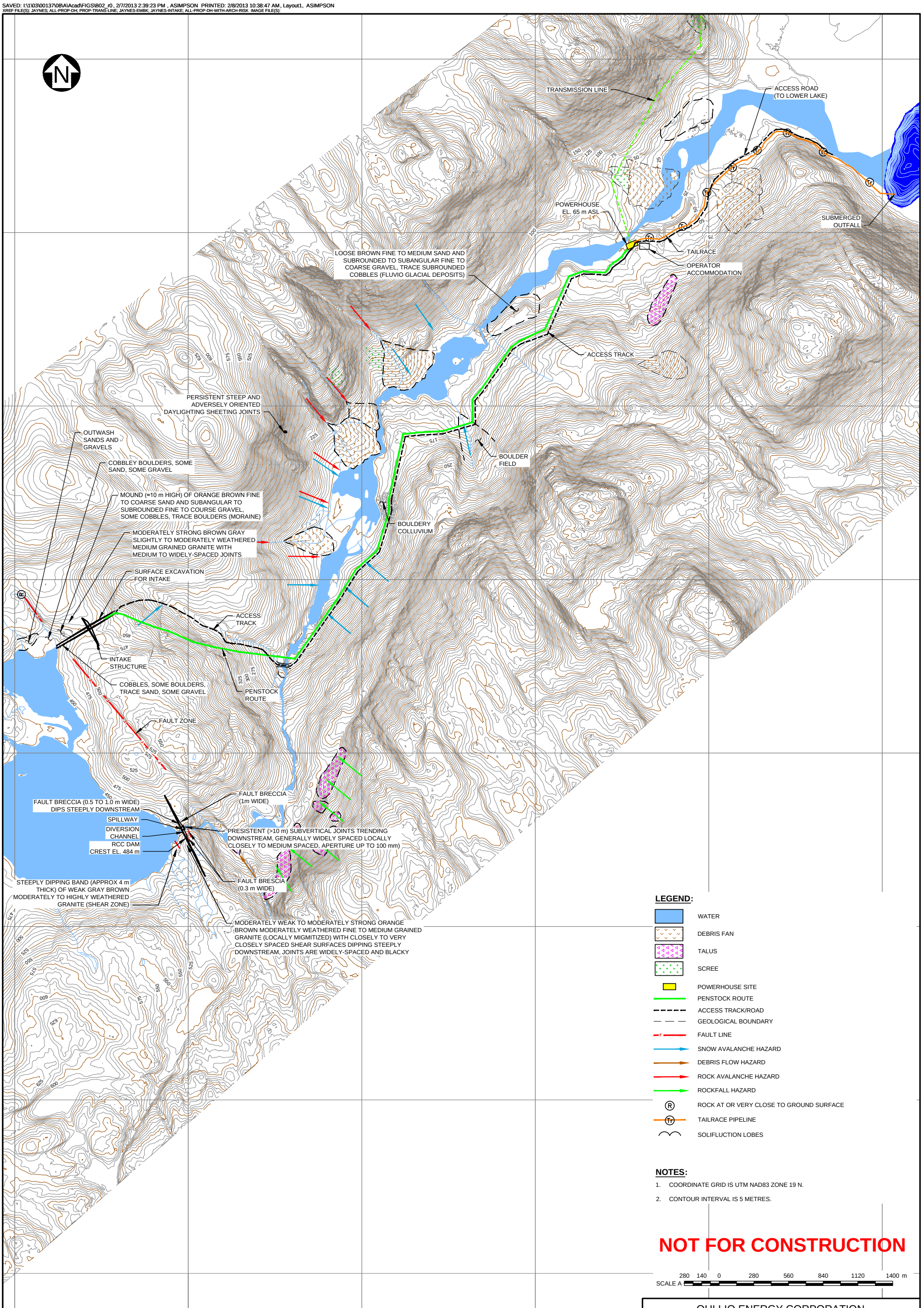
The intake site is located in a saddle area on a side lake to the north of the main lake approximately 1.5 km northwest of the dam (Figure 3.1 and in Photo 2). This location is recommended because the penstock route downstream is favourable. The proposed intake involves a deep surface excavation, though a tunnel through the hill closer to the main dam location is an option that will be explored during the feasibility study.

The excavation of the intake will be used as the quarry for the dam construction materials (rockfill or concrete aggregate) to reduce costs. The saddle has competent rock exposed at the surface. As such, all the excavation can be assumed to be in rock.

Both sides of the valley immediately downstream of the dam are very steep with large volumes of talus at the toe. This is indicative of active erosion and the presence of rock fall and debris flow hazards. These hazards are highlighted on Figure 3.1. It would be difficult to construct a surface penstock in this terrain and it is one of the reasons why the intake was located at the saddle to the north.

Downstream of the recommended intake location is a steep-sided northwest/southeast trending valley. The left (east) side of the valley has weathered rock and boulder debris and is not recommended for the penstock route. The west side of the valley has exposed rock for most of its length and is suitable for penstock construction. The rock has horizontal sheet joints and will be locally prone to sliding. Penstock pedestal blocks will have to be anchored through the surface slabs to sound rock beneath. There is a pronounced snow avalanche chute along the valley, which the penstock should preferably cross at a high elevation. The smooth surface of the rock suggests that the whole gully is an avalanche risk and that this should be considered during design. There are also some rockfall hazards along the west side of the valley. In order to mitigate these hazards, the penstock will remain at the highest elevation possible and then run directly down the spur line to the end of the valley.

SAVED: I:\1\03\00137\08\A\Acad\FIGS\B02_r0 , 2/7/2013 2:39:23 PM , ASIMPSON PRINTED: 2/8/2013 10:38:47 AM , Layout1, ASIMPSON
XREF FILE(S): JAYNES; ALL-PROP-DH; PROP-TRANS-LINE; JAYNES-EMBK; JAYNES-INTAKE; ALL-PROP-DH-WITH-ARCH-RISK IMAGE FILE(S):



LEGEND:

- WATER
- DEBRIS FAN
- TALUS
- SCREE
- POWERHOUSE SITE
- PENSTOCK ROUTE
- ACCESS TRACK/ROAD
- GEOLOGICAL BOUNDARY
- FAULT LINE
- SNOW AVALANCHE HAZARD
- DEBRIS FLOW HAZARD
- ROCK AVALANCHE HAZARD
- ROCKFALL HAZARD
- ROCK AT OR VERY CLOSE TO GROUND SURFACE
- TAILRACE PIPELINE
- SOLIFLUCTION LOBES

NOTES:

1. COORDINATE GRID IS UTM NAD83 ZONE 19 N.
2. CONTOUR INTERVAL IS 5 METRES.

NOT FOR CONSTRUCTION

SCALE A: 280 140 0 280 560 840 1120 1400 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	12FEB'13	ISSUED WITH REPORT	SRM	AS	RAC	SRM

QULLIQ ENERGY CORPORATION

IQALUIT HYDROELECTRIC PROJECT

JAYNES INLET
GENERAL ARRANGEMENT

Knight Piésold CONSULTING

P/A NO. NB103-137/8 | REF NO. 1

FIGURE 3.1 | REV 0

The side valley meets the main river valley at approximately 220 masl where there is a series of waterfalls. A number of options were considered for the penstock route, with the preferred option shown on Figure 3.1.

The proposed lower powerhouse site will be located on a suspected bedrock knoll adjacent to the lower falls shown in Photo 5. Bedrock was observed in the immediate vicinity of the powerhouse site, but confirmatory subsurface geotechnical investigations are required. The site appears to be a suitable location.

The lower lake where the tailrace will discharge below the surface is shown in Photo 6. The west end of the lake, which sits against the mountainside, is deep and is well suited for a submerged tailrace outfall structure.

Jaynes Inlet with the lower lake in the background is shown in Photo 7.

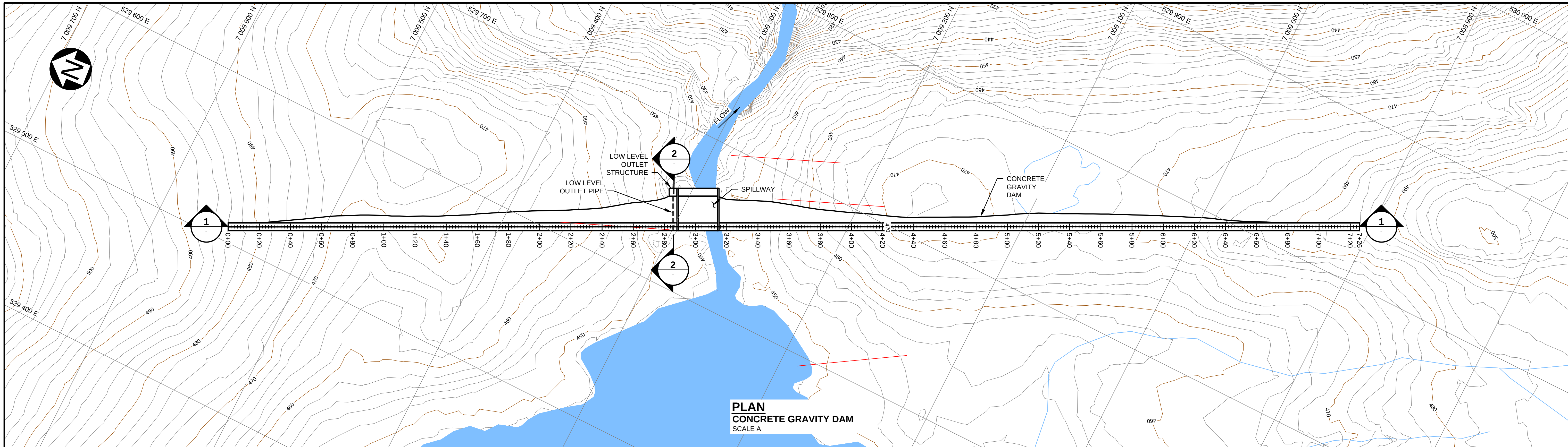
3.2 DAM AND INTAKE STRUCTURES

A concrete gravity or Roller-Compacted Concrete (RCC) dam is proposed at the outlet of the existing lake because of the good rock foundations, valley shape and confined ridge area on which the dam needs to be constructed. The spillway would pass water over the centre of the dam. The proposed dam will be about 30 m high dam at the outlet of an upper lake, with a full supply level of about 480 masl. The dam will raise the current lake level by a maximum of approximately 30 m. The plan and section of the dam is presented as Figure 3.2.

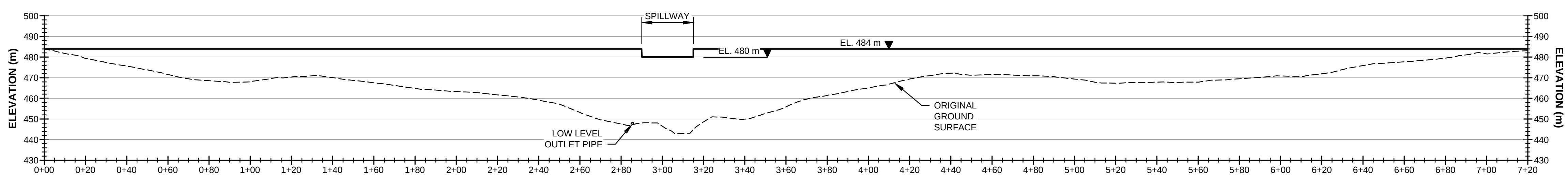
The river valley downstream of the dam forms a steep-sided gorge. In order to avoid this gorge, it is proposed to construct the intake structure in a low saddle area at the northern end of the reservoir approximately 1.5 km from the dam. The intake could be economically constructed as a surface excavation with a concrete gravity buttress, and the excavated material used for dam construction. The plan and section of the intake structure is presented as Figure 3.3.

3.3 WATER CONVEYANCE

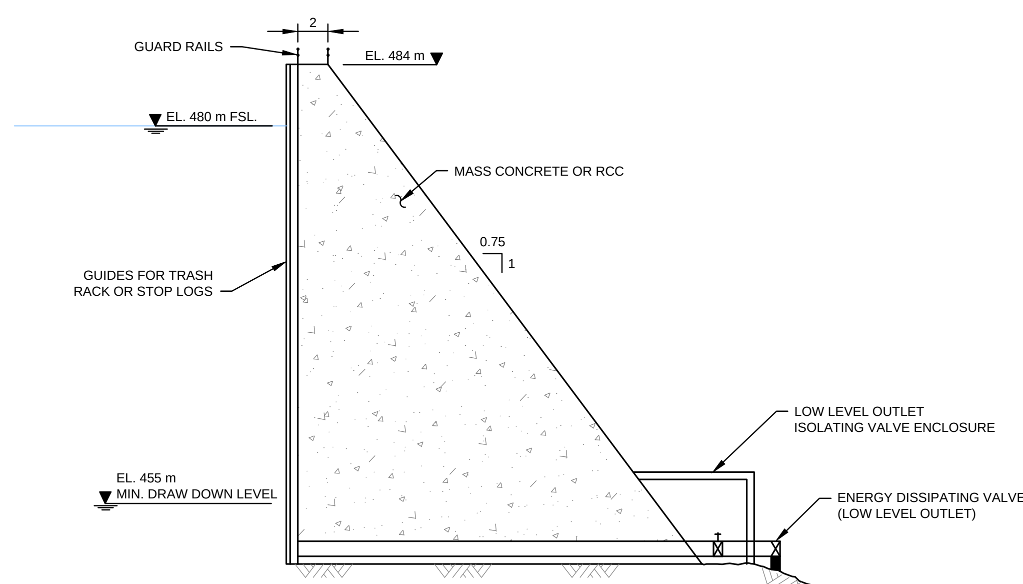
Downstream of the proposed intake site is a moderately sloping gully providing a suitable construction platform for the proposed surface mounted penstock. The alignment and details of the penstock are shown on Figure 3.4. The location of the intake also allows for a shorter penstock length. The entire penstock will be surface-mounted on concrete pedestals. The penstock will be welded steel and will be thermally insulated and heat traced over its entire length to reduce the risks of the water freezing. Concrete anchor and thrust blocks may be required at the major bends and there will be a pipe bridge crossing over the Jaynes Inlet River. The surface-mounted penstock will be approximately 5.7 km in length and 1.3 m in diameter (inside diameter). The proposed penstock will connect the intake at approximately 447 masl elevation to the powerhouse located at an elevation of 75 m.



PLAN
CONCRETE GRAVITY DAM
SCALE A



1 SECTION
CONCRETE GRAVITY DAM
SCALE A



2 SECTION
DAM AND LOW LEVEL OUTLET
N.T.S.

LEGEND:
- ORIGINAL GROUND
- FAULT LINE
- RIVER/STREAM/DRAINAGE
- MAJOR CONTOUR
- MINOR CONTOUR

NOTES:
1. COORDINATE GRID IS UTM NAD83 ZONE 19.
2. CONTOUR INTERVAL IS 2 METRES.
3. DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
4. RCC = ROLLER COMPACTED CONCRETE.

NOT FOR CONSTRUCTION

SCALE A 25 12.5 0 25 50 75 100 125 m

QULLIQ ENERGY CORPORATION

IQALUIT HYDROELECTRIC PROJECT

JAYNES INLET
MAIN DAM
PLAN AND SECTION

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB103-137/8	1

FIGURE 3.2 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	12FEB'13	ISSUED WITH REPORT	SRM	AS	RAC	SRM

SAVED: I:\1\03\00137\08\A\cad\FIGS\B09_r0, 2/7/2013 2:36:19 PM , ASIMPSON PRINTED: 2/7/2013 2:41:44 PM, DAM, ASIMPSON
XREF FILE(S): IMAGE FILE(S):