



Our reference: 8475/17303

11 June 2019

Engeny
Level 7
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4000

For the attention of **Mr. Andrew Vitale**

Dear Sir

HUGHENDEN DAMS – SAEGO DAM, SAEGO CATCH DAM AND GAP DAM - CONCEPT LAYOUTS & HIGH-LEVEL COST ESTIMATES

1. TERMS OF REFERENCE

1.1. BACKGROUND

Following certain preliminary work into possible dam sites for an irrigation project to the north of Hughenden in Queensland, the Hughenden Irrigation Project Corporation (HIPCo) appointed Engeny to confirm the optimal storage arrangements in terms of dam yield. As part of this exercise the anticipated infrastructure configurations will be evaluated by trading off infrastructure requirements against incremental changes to the system yield. To this end, high-level (low accuracy) cost estimates for a number of different dam storage levels is required.

Two dam sites were initially identified for consideration as part of this stage of the project, namely a large dam on Betts Gorge Creek (Alstonvale Dam) and a smaller storage facility on Canterbury Creek (Canterbury Creek Dam). In mid-May 2019, Engeny appointed ARQ Australia to develop high-level cost estimates for possible configurations of these dams.

HIPCo subsequently requested Engeny to develop further high-level cost estimates for potential additional dams downstream of the confluence of Betts Gorge Creek and the Flinders River, namely the Saego Dam, Saego Catch Dam and Gap Dam. The proposed scheme comprises a gravity diversion structure on the Flinders River (Saego Catch Dam) and two storage dams.

The ARQ appointment was accordingly expanded to include these dams, with the aim of developing even higher-level cost estimates for these dams, to make a comparison with the estimates made for the initially considered dams. This letter serves to summarise the assumptions and methodology applied in the development of these additional high-level costs estimates.



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1.2. SCOPE

The scope of the high-level cost estimates is limited to the development of cost estimates for the following dam configurations:

- One dam size for Saego Catch Dam (35 GL storage capacity)
- Three dam sizes for Saego Dam (400 GL storage capacity and options with 5 m higher and lower embankments)
- Three dam sizes for Gap Dam (550 GL storage capacity and options with 5 m higher and lower embankments)

The required deliverables are basic concept layout sketches of dams and high-level cost estimates for different dam options. The level of detail required for these estimates was accepted to be lower than for the initial work undertaken on the Alstonvale and Canterbury Creek Dams. Geotechnical inputs were to be limited to regional geological interpretation with no visits to site required. Unit rates developed for the preceding work would be applied without further consideration of different resource or quantity requirements.

Engeny supplied direction on the required flood handling capacities of the dams (simple extrapolations from the preceding work) as well as the various Full Supply Levels to be considered.

2. METHODOLOGY

2.1. DAM ALIGNMENTS

The dam alignments as provided by Engeny for the anticipated Saego Dam, Saego Catch Dam and Gap Dam are presented in Figure 1 below.

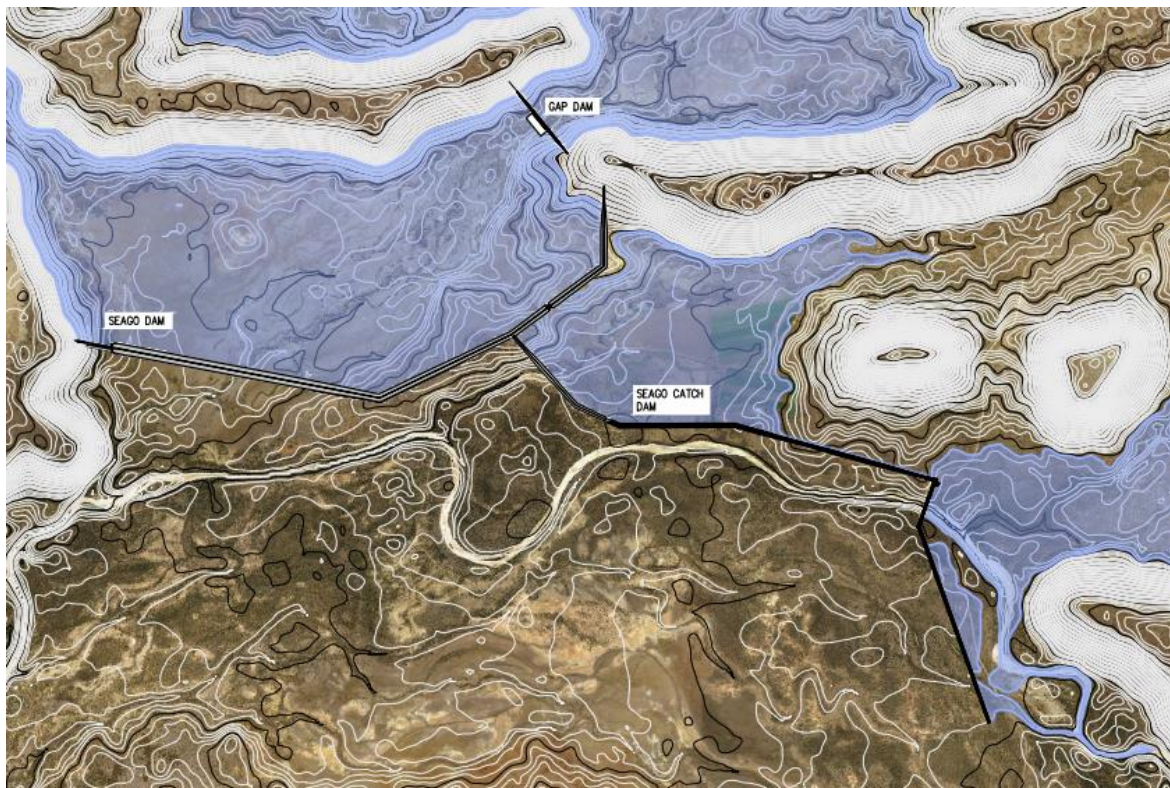
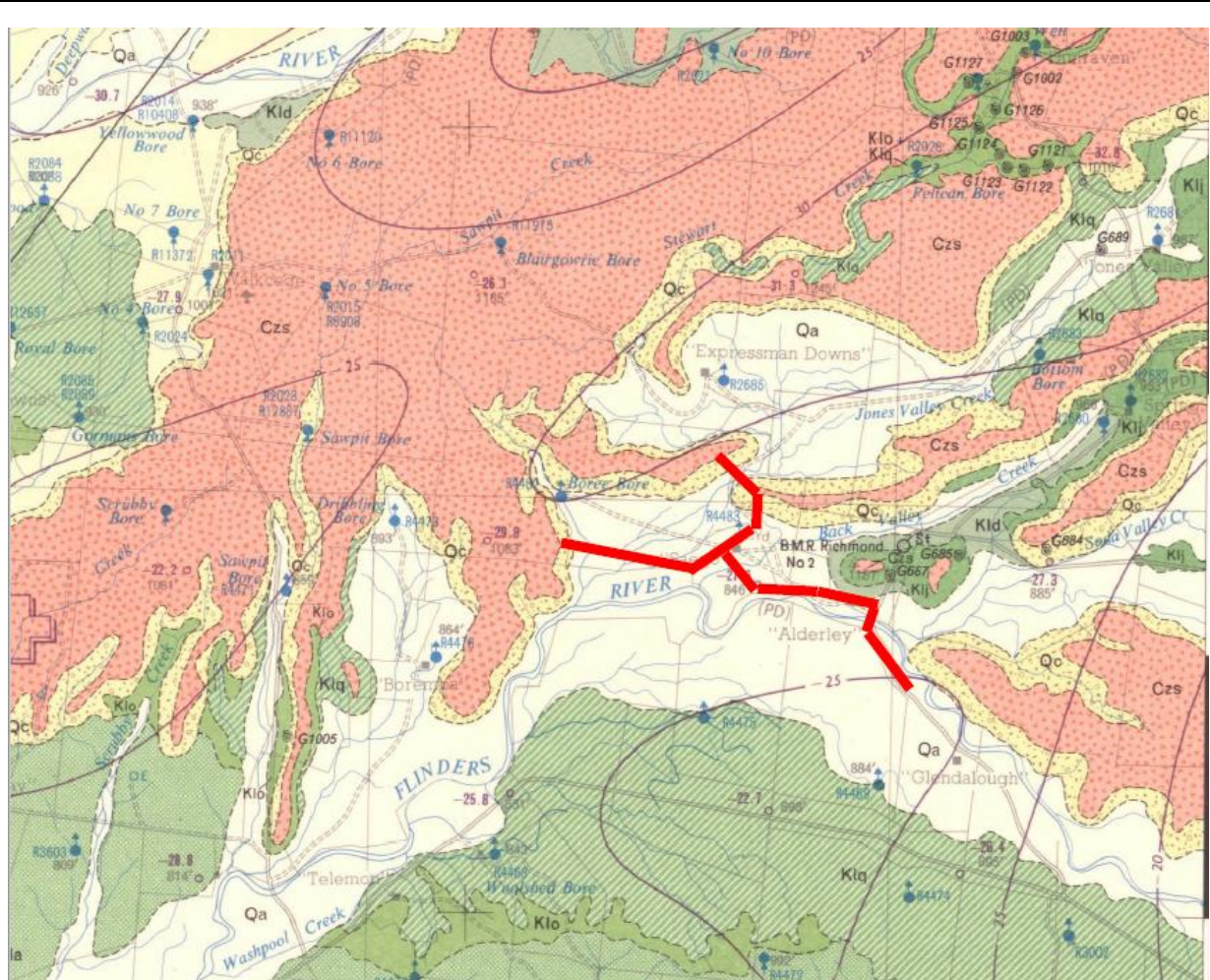


Figure 1: Dam alignment and basin for the Saego, Saego Catch and Gap Dams.

2.2. PRELIMINARY GEOTECHNICAL CONSIDERATIONS

The 1:250,000 scale Hughenden geological map shows the general area to comprise Cenozoic Age Olivine Basalts overlying Lower Cretaceous Age Siltstone and Mudstone of the Rolling Downs Group. The Basalt effectively forms a cap (from a few metres to a maximum of 30m) over the siltstone and mudstone. Valley sides are typically covered in basalt scree or Colluvium and the valley floors contain Quaternary Age sands and gravels. Figure 2 below shows an extract from geological map with lines showing the approximate dam axes.



Qa: (white) Alluvium. Mostly sands tending finer and some silt based on what was previously observed on site. Little clay reflecting high energy flows only leaving coarser fractions behind in floods. Permeable. Highly variable thickness. Would potentially be liquefiable with loose/medium dense zones.

Qc. (Yellow) Colluvium. Basalt boulders/cobbles and some clay from mass movement from higher basalt caps.

Czs: (Orange) Basalt as previous. Variable thickness forms boulders etc. Limited clay.

Kld/Klj (Green) Mudstones and siltstones effectively form basement. These would breakdown under traffic and wet/dry and will comprise poor construction materials for embankments. May be acceptable as foundation for a dam if weathered materials are removed and protected from wet/dry when exposed. Where the dam centrelines elevate over the alluvium, this may suggest local rise in this basement rock from previous river erosion although this cannot be confirmed as certain.

Figure 2: Geological Context.

The Gap dam could expect very similar conditions to Alstonvale, whereas the Saego Dams will likely be founded on the Alluvium, of variable depth.

2.3. DAM CONFIGURATIONS

2.3.1. GENERAL

While the purpose of this study is to obtain a high-level comparison of dam costs for various impoundment volumes, a comprehensive dam type selection study will ultimately still be required. This is likely to follow once the initial geotechnical and topographical studies have been completed. Accordingly, for the purposes of this study, a single dam type for each dam was considered. The proposed dam configurations were estimated on the basis of experience and desktop evaluations of hydrological aspects, geology, topography and the required storage volumes. They represent the best estimate of dam configuration at this level of study and refinement and optimisation is anticipated to follow during further phases of the project.

The alluvial foundation and underlying variable basement rock depth for the Seago dams represents a particular risk to the suitability of the configurations considered. The level of information to properly consider the founding requirements for these dams is not available to confidently select realistic configurations. Of note is the clearly variable morphology of the Flinders River, together with anticipated extremely large flood flows, which would endanger any small structure constructed in/on the alluvium. The proposed configurations should accordingly be considered at a much more preliminary level than for Alstonvale Dam, Canterbury Creek dam, or even Gap Dam. Significantly more work will be required to define the extent of such structures should this dam be taken forward to further design stages.

Appendix A includes sketches of these concept level dam configurations, conceptualised for the preferred storage volume options only.

2.3.2. GAP DAM

In accordance with the guidance provided by Engeny, the spillway facilities considered for Gap Dam should be the same as that of Alstonvale dam, including spillway length and freeboard. Considering similar geological conditions, a similar RCC gravity dam configuration with a 300 m wide uncontrolled ogee spillway and concrete apron is accepted at this level of study.

The assumptions pertaining to the development of this dam configuration are listed below:

- To allow for some difference in water levels between Gap Dam and Seago Dam, the full supply level (and consequently the non-overspill crest level) was selected as 300 mm higher than that of Saego Dam.
- Gap Dam is located inside the basin of Seago Dam (ostensibly to limit the basin area and consequently evaporation potential). It was consequently accepted that Gap Dam could store water near to full supply level on both sides of the structure.
- The founding depth for a “hard” type dam was estimated to be approximately 5 m below natural ground level. It was accepted that the siltstone at this level will be suitable for the construction of an RCC dam. Cut back slopes of 1V:1.5H from the excavation level to the natural ground level were envisaged.
- Considering the anticipated loading condition (water load on both sides), and accepting suitable foundation strength at this level, a symmetrical gravity dam configuration with upstream and downstream slopes of 1V:0.5H is anticipated to be stable under the various loading conditions.
- While energy will be dissipated on the spillway steps and a relatively high water level will be anticipated at the downstream toe (Seago Dam side), a nominal length concrete apron is provided at the downstream toe to reduce the erodibility potential at the toe. This aspect may need to be revisited when geotechnical investigations have been undertaken and the operational regime of the system is progressed in future phases of the project.

- The spillway sidewalls will extend into apron retaining walls. These walls will form the sides of the apron, with the height dictated by the ground level.
- Water loading on both sides of the structure will preclude the inclusion of a foundation drainage system. The structure will accordingly need to be considered to be undrained for stability purposes. A gallery for curtain grouting will however be provided to ensure impermeability and management of possible internal erosion of the foundation. The proposed grouting gallery will be located approximately 2m above the foundation level, and will follow the foundation up to Full Supply Level (FSL) on the flanks.
- Accepting a generally sub-horizontal geology, with possible sub-vertical secondary jointing, a vertical grout curtain with orientation 30° to the abutments was accepted for this evaluation. The grout curtain depth has been accepted to extend to 66% of the full supply water depth.
- Gravity release of water from the Seago Dam to Gap Dam will be through two 1.5 m diameter pipes (as suggested by Engeny) accommodated in an intake structure immediately to the left of the spillway. These pipes will extend through the dam and will be controlled by isolating butterfly valves and sleeve valves in a gate control tower located immediately upstream of the heel toe. Provision is made for emergency draw down of Gap dam into Saego Dam with the inclusion of two intake pipes in the gate control tower. These intakes will be connected to the gravity release pipes extending through the dam, facilitating bi-directional flow. Energy dissipation will be managed in a concrete lined stilling basin for rare occasion when draw down may be required. Both upstream and downstream intakes will include suitable trash racks and fine screens.

2.3.3. SAEGO DAM

The proposed Seago Dam will receive gravity/pump flows from Seago Catch Dam. Seago Dam will cut across a wide plain to the south of Gap Dam and to the north of the Flinders river. The largest part of the dam wall will be constructed on the flat alluvial flood plain of the Flinders River, and the wall be some 7.7 km long.

Together with a fairly low wall height, the geology and topography are indicative of an embankment type structure. To accommodate the anticipated availability of suitable construction materials, a clay cored rockfill embankment has been considered for the purposes of this study. This will be combined with a concrete gravity spillway structure on the western flank.

The assumptions pertaining to the development of this dam configuration are listed below:

- Some 5m of loose overburden material and sandy alluvium will be stripped off the full footprint of the embankment to found the rockfill on a suitable horizon not subject to possible liquefaction and consolidation.
- As the depth of the alluvium is unknown at this stage and it is anticipated that it may extend for several meters below the founding level, provision was made for a cut of structure through this material. This could take the form of jet grouting, bentonite cut-off or sheet piles. In practice, if the total depth of alluvium is suitable shallow, the clay core can simply be extended down to bedrock.
- Accepting some perviousness of the rock foundation below this level, the cut-off will be augmented with a grout curtain to approximately 66% of the full supply water depth.
- No information on the flood regime in the Flinders River is available at this stage. An approximately 3 m wide armoured rock protection layer (large diameter Rip-Rap) will however be provided on the downstream side of the embankment to provide defence against flood waters in the Flinders River. Detailed studies will need to be undertaken in later stages of the project to confirm the full extent and resistance of this protection layer.
- While a spillway release immediately into the Flinders river would have been optimal, the uncertainty off the depth of suitable founding rock below the alluvium make this an unattractive option at this level of study. A concrete ogee structure located on the far right against the basalt bank has accordingly been accepted as appropriate for the high-level costing study.

- At 300m wide, the spillway structure will accommodate a similar flood as that of Astonvale Dam. The spillway structure will be configured as a concrete gravity structure. It will be bounded on left flank by tongue walls, around which the clay core and rockfill embankment shells will wrap. A concrete gravity non overspill crest will be constructed against the right flank.
- Similar to Alstonvale Dam, the wide spillway structure will maximise energy dissipation and minimise erosion potential in the return river.
- While energy will be dissipated on the spillway steps, the residual energy will be dissipated in a stilling basin located downstream of the dam toe. Accommodating the high velocities at the toe of the dam, a Type II USBR stilling basin with an approximate length of 24 m will be provided with a cut off toe to suitable depth.
- Foundation drainage and curtain grouting will be provided from a drainage gallery to improve foundation impermeability and uplift regime. The proposed drainage gallery will be horizontal at the spillway section (approximate elevation of RL 257.00 m) and follow the foundation up to FSL on the flanks.
- A downstream spillway return channel will be excavated from the stilling basin founding level at a 1V:20H slope to the natural ground level of a small tributary evident on that side of the Flinders River. This tributary channel will be used to convey spillages back to the main Flinders River channel. Side slopes of 1V:3.0H are anticipated to be suitable for cut slopes through the alluvium.
- Similar to Alstonvale Dam, a nominal total freeboard of 4 m will be provided to accommodate conventional freeboard requirements for surge, seich, wave action, etc on the embankment structure under normal operational conditions.
- An intake structure located on the left side of the spillway will accommodate two 1.2 m diameter steel pipes extending through the dam to an outlet house located immediately downstream of the dam toe. To allow for suitable water quality extraction, three offtake levels will be provided. Each will have an isolating butterfly valve located in a dry well, which will include suitable trash racks and fine screens upstream of the valves. Butterfly valves and sleeve valves with hoods will be provided in the downstream outlet house for reservoir draw down.
- Allowance will be made for gravity releases from Seago Catch Dam into Seago Dam with the inclusion of a sluice gate structure which will house 3 No 3 m x 3 m sluice gates. Suitable fine screens and trash racks will be provided on both sides of the structure. Allowance is made for emergency stoplogs to be lowered into the same slots as the trash racks.
- The sluice gate structure will be founded on rock, and considering the expected relatively thick alluvium overburden, this founding depth may be several meters below the ground level.
- Considering the hydrostatic loads on both sides of the structure, a symmetrical concrete gravity dam configuration of an upstream and downstream slope of 1V:0.5 H is anticipated to be stable under all loading conditions.
- The sluice gate structure will be bounded on either side by tongue walls, around which the clay core and rockfill embankment shells will wrap.

2.3.4. SAEGO CATCH DAM

Seago Catch Dam will be constructed to divert flows out of the Flinders River under gravity flow conditions.

An overtoppable weir structure is required across the main Flinders River flow channel to raise water levels and divert them to a channel/dyke structure along the right bank of the river. The latter structure will be approximately 6 km long and will be located on the higher ground on the right bank of the main Flinders River channel. The fairly low wall height and anticipated alluvium foundation are indicative of an embankment structure, which is accepted to be of similar configuration as the Saego Dam embankment, including armouring and cut-off provisions.

The diversion structure will comprise a concrete ogee shaped weir across the main Flinders River channel, while a low rockfill berm will be provided across the remaining width of the braided Flinders River flood plain to assist in raising the water levels for diversion purposes.

The assumptions pertaining to the development of this dam configuration are listed below:

- Engeny indicated that the required gravity feed level of water from the Flinders river was RL 269. This level was accepted for the crest level of the diversion structure (FSL). A non-overspill crest level for the dyke/channel structure several metres above the Flinders River and 5 m above RL 269 was considered appropriate at this stage of investigation.
- The topography along the length of the embankment does not allow for gravity feed of water from the Flinders river into the Catch Dam. The NOC dyke will accordingly be augmented with a 20 m wide concrete lined canal. This will be excavated against the upstream heel of the embankment and will consequently serve as conveyance canal for normal diversion flows.
- The structure crossing the main Flinders River channel will comprise a concrete non-overspill crest structure (to elevation RL 274) on the right side, a gravity ogee overflow section across the riverbed and a gravity training wall on the left side. While the concrete NOC will serve as tongue wall for the embankment wrap around, it's main function will be to protect the embankment from direct water flow of the Flinders river. The retaining wall on the left side will extend approximately 30 m towards the downstream to deflect flood flows past the weir structure, and in so doing limit retrograde erosion.
- No provision for any silt extraction system has been included in these structures.
- All concrete structures will be founded on suitable bedrock rock, which is expected to be several meters below the ground level.
- The alignment for the structure crossing the braided Flinders River flood plain provided by Engeny generally follows the contour level of the FSL, and extends diagonally upstream from the main river channel crossing. This structure will accordingly be fairly low but will be subjected to large flows under flood conditions. Considering the extent of the alluvium on this part of the river, a concrete structure is not considered practical. A rockfill berm founded approximately 2 m below the floodplain level has accordingly been selected at this stage of the project to provide a nominal barrier across the floodplain. This structure will be subject to overtopping under flood conditions, and some damage should be expected to occur. The alignment diagonal to the main channel flow direction will exacerbate erosion, but on the other hand it is anticipated that the low height of the structure will help to minimise this. Alternative alignments perpendicular to the flow direction will require a barrier projecting a few metres above the flood plain. The higher structure will have similar lengths to the diagonal alignment select by Engeny but will be more exposed to damage from overtopping flows and is accordingly not considered at this stage of the project.

The configuration of Seago Catch Dam is not considered to be a particularly practical one. The structures will be acutely exposed to erosion as a result of alluvial founding conditions and expected large flood flows in the Flinders River and exhibit vast planar dimensions. Although some simple concepts have been developed for high-level costing purposes, these could change considerably as project information improves, specifically on the geotechnical side.

3. COST SUMMARY

3.1. COSTING MODEL AND RATES

The same costing model and unit rates as developed for the high-level cost estimates of the Alstonvale and Canterbury Creek dams has simply been utilised for the high-level cost estimates of the additional dams. No adjustment for dam locations/configurations, or differences in quantities has been made. The resulting simple spreadsheet models, comprising a bill of rates for the first pass pricing are provided in **Appendix B**.

3.2. COSTING SUMMARY

The estimated costs in Australian dollars, excluding taxes, are as follows:

Table 1 Gap Dam costs

| Crest Elevation (EL m) | Storage Capacity (GL) | Estimated Direct Cost (AUD) | Unit cost (AUD/GL) |
|---------------------------|--------------------------|--------------------------------|-----------------------|
| 278.8 | 325 | \$ 202,130,000 | \$ 621,940 |
| 283.8 | 550 | \$ 262,940,000 | \$ 478,100 |
| 288.8 | 850 | \$ 333,030,000 | \$ 391,800 |

Table 2 Saego Catch Dam costs

| Crest Elevation (EL m) | Storage Capacity (GL) | Estimated Direct Cost (AUD) | Unit cost (AUD/GL) |
|---------------------------|--------------------------|--------------------------------|-----------------------|
| 269 | 35 | \$ 581,212,000 | N/A |

Table 3 Saego Dam costs

| Crest Elevation (EL m) | Storage Capacity (GL) | Estimated Direct Cost (AUD) | Unit cost (AUD/GL) |
|---------------------------|--------------------------|--------------------------------|-----------------------|
| 278.5 | 300 | \$ 869,445,000 | \$ 2,898,150 |
| 283.5 | 400 | \$ 1,228,690,000 | \$ 3,071,700 |
| 288.5 | 500 | \$ 1,313,200,000 | \$ 2,626,400 |

The high-level costing for the Seago and Gap Dams alternative is some 2.5 times higher than the combined cost of Alstonvale and Canterbury Creek dams. This is driven by the extremely long embankment structures required, together with the relatively deep footprint excavations and cut-off requirements.


4. DISCUSSION

Cautionary Note: the configuration of the Saego Catch dam is not considered practical. The Saego dam is similarly exposed to erosion from flood flows in the Flinders river, the extent of which is yet to be determined. Prior to any further consideration of these additional dams, the abstraction concept for Saego Catch dam should be revisited in more depth for practicality.

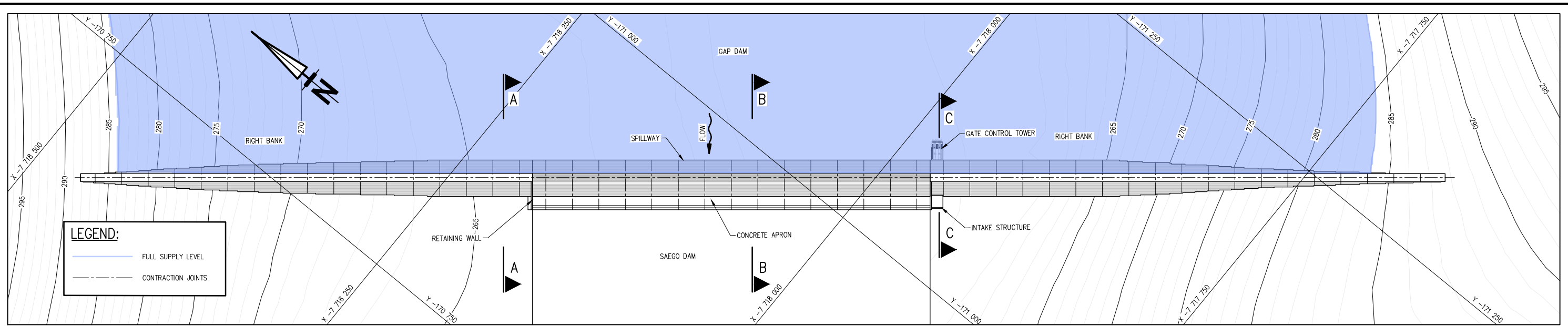
The first pass pricing exercise undertaken as discussed above only provides an indication of possible project costs as a comparison between dams of different sizes, and the previous work on the Alstonvale and Canterbury Creek Dams. Although a similar costing model to the latter dams has been applied, the uncertainties included in the configurations imply a lower confidence in final costs and, other than comparative, cannot be considered definitive.

Yours faithfully

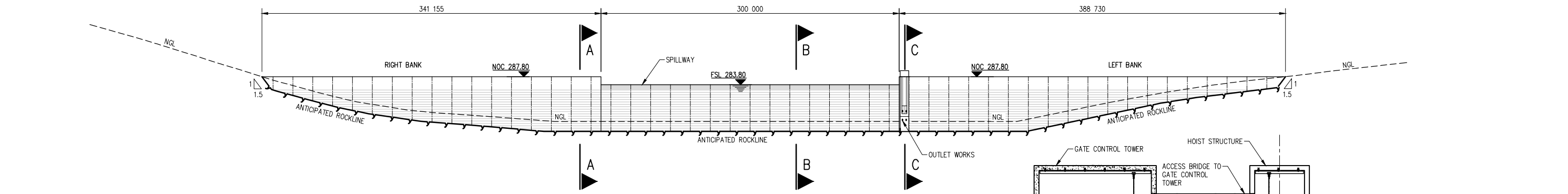

David Cameron-Ellis
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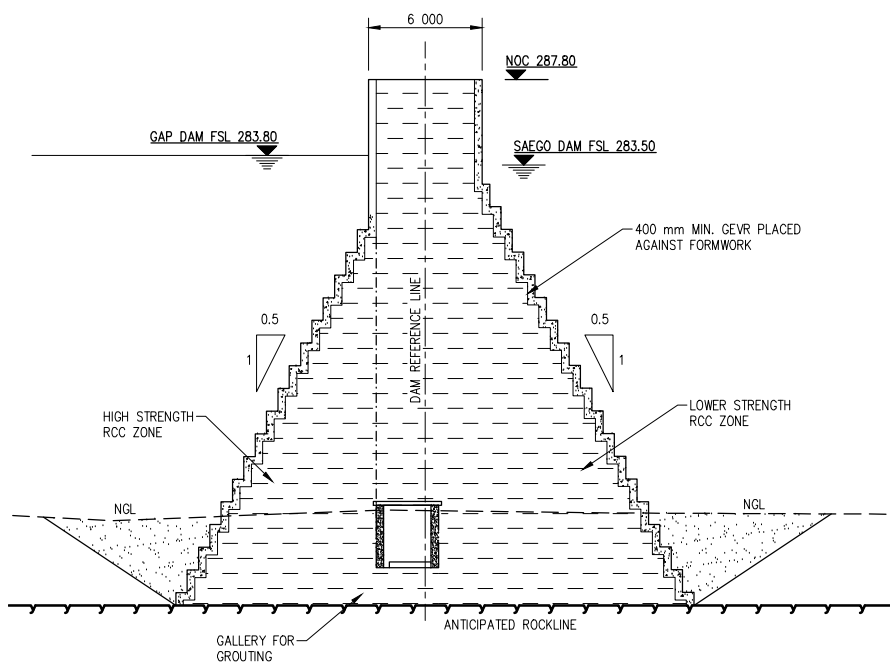
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CONCEPT LEVEL DAM
CONFIGURATIONS



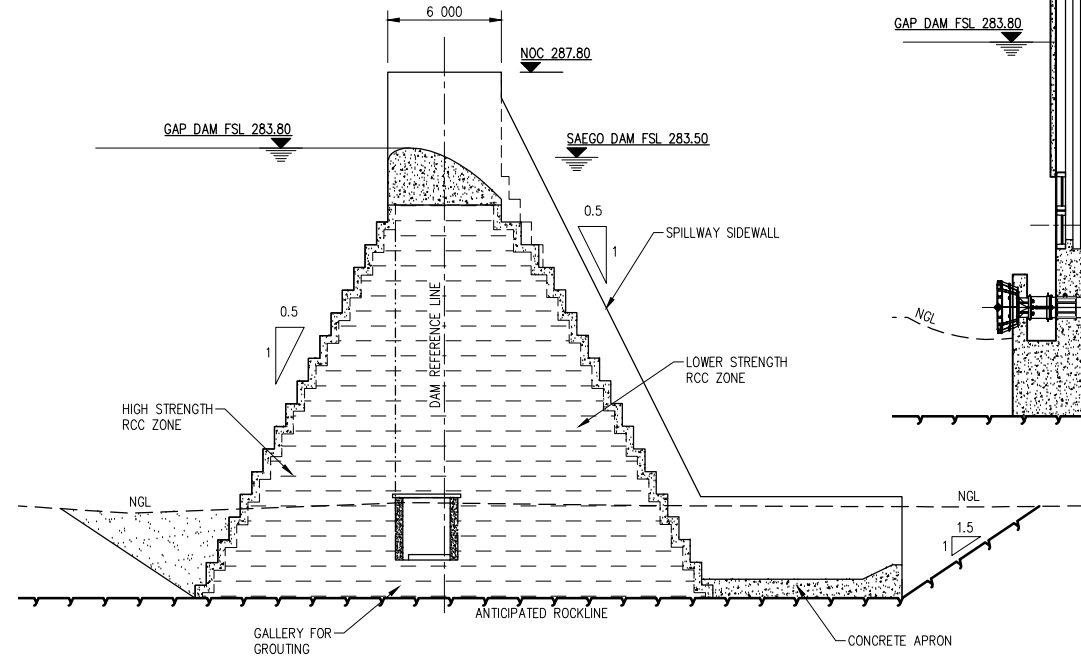
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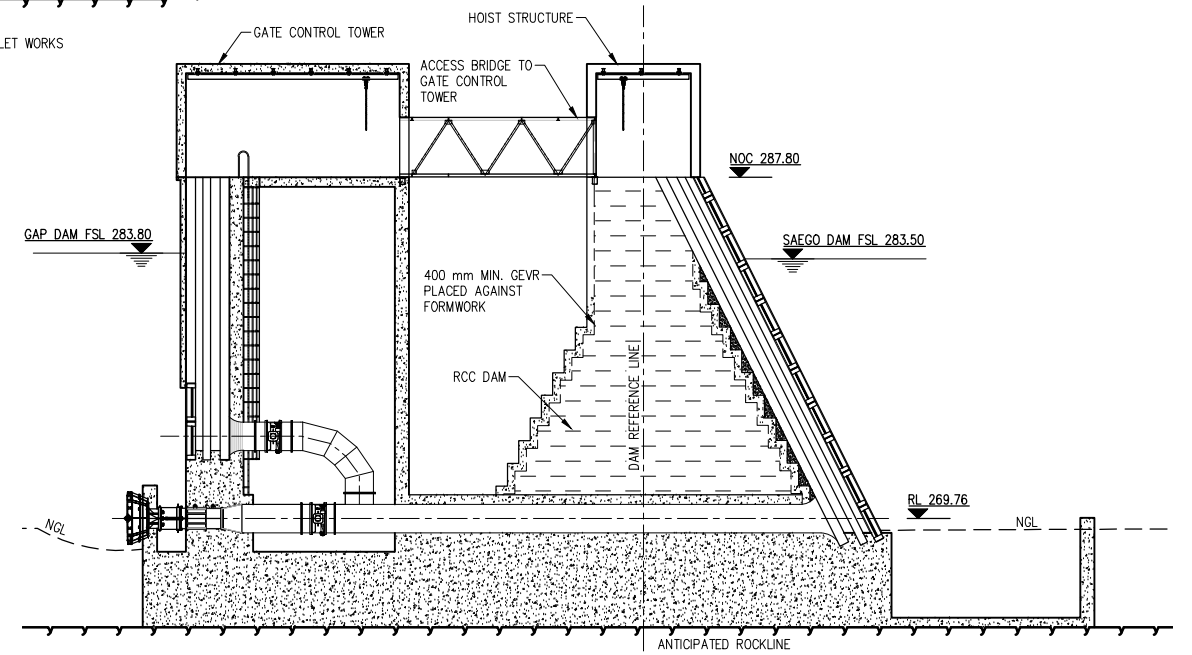
DOWNSTREAM ELEVATION OF DAM
 SCALE 1:2 000 H - 1:1 000 V



TYPICAL NOC SECTION A-A
 SCALE 1:200



TYPICAL SPILLWAY SECTION B-B
 SCALE 1:200



TYPICAL SECTION C-C THROUGH OUTLET WORKS
 SCALE 1:200

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CLIENT: **HIPCO IRRIGATION BOARD**

PROJECT: **GAP DAM**

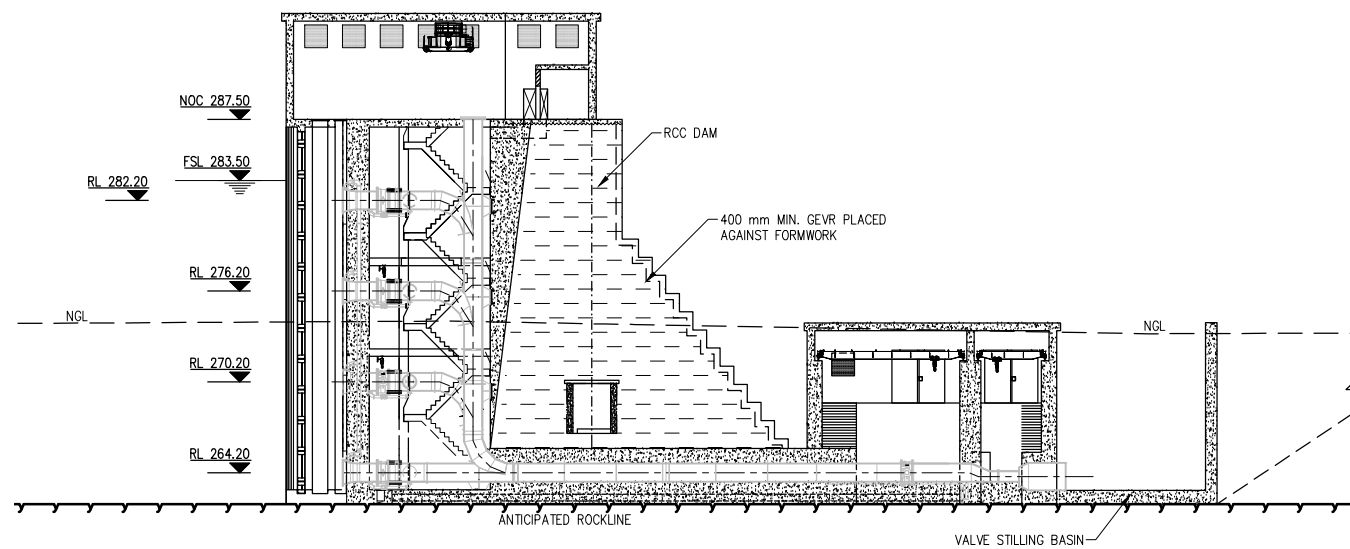
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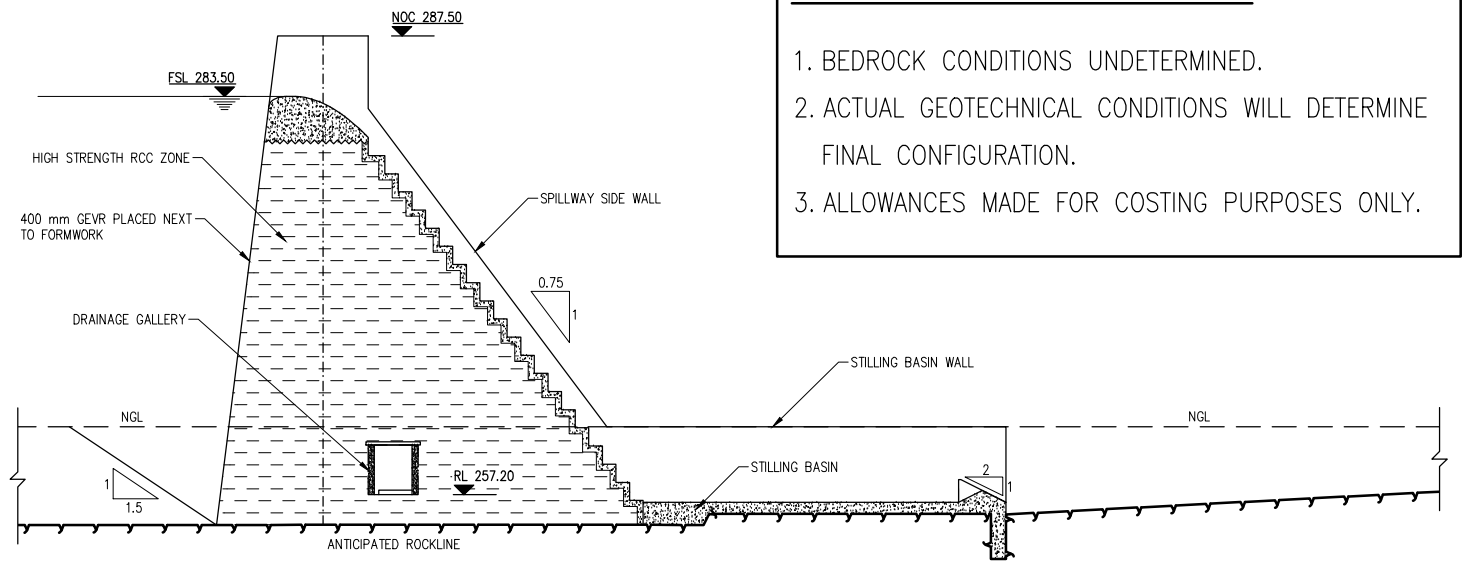
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PLAN LAYOUT OF DAM
SCALE 1:10 000



TYPICAL NOC SECTION A-A
SCALE 1:250



TYPICAL SPILLWAY SECTION B-B
SCALE 1:250

HIGH LEVEL CONCEPT ONLY:

1. BEDROCK CONDITIONS UNDETERMINED.
2. ACTUAL GEOTECHNICAL CONDITIONS WILL DETERMINE FINAL CONFIGURATION.
3. ALLOWANCES MADE FOR COSTING PURPOSES ONLY.

| No. | DATE | REVISION | APPROVED | DESCRIPTION | DWG. No. |
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| A | 11/06/19 | FOR INFORMATION | | SHEET DESCRIPTION | |
| LIST OF ASSOCIATED DRAWINGS | | | | | |

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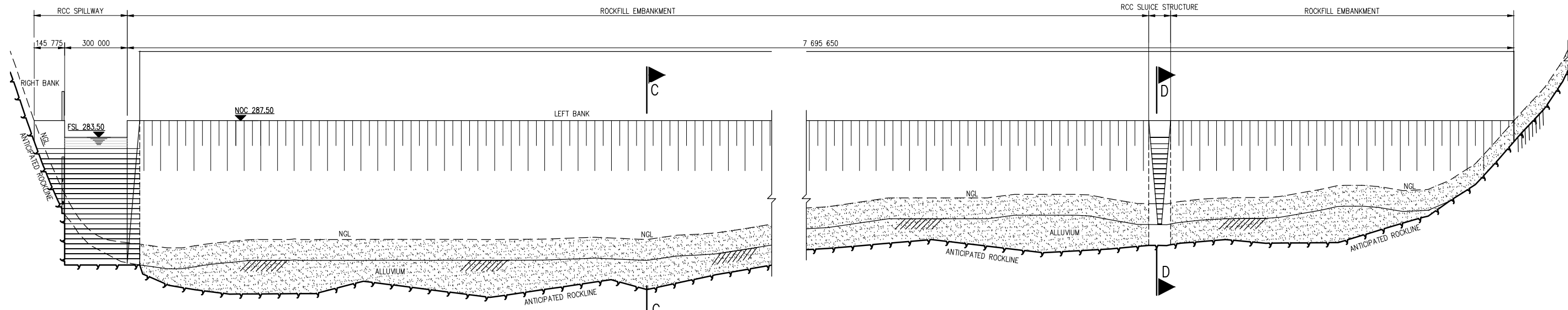
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CLIENT: **HIPCO IRRIGATION BOARD**

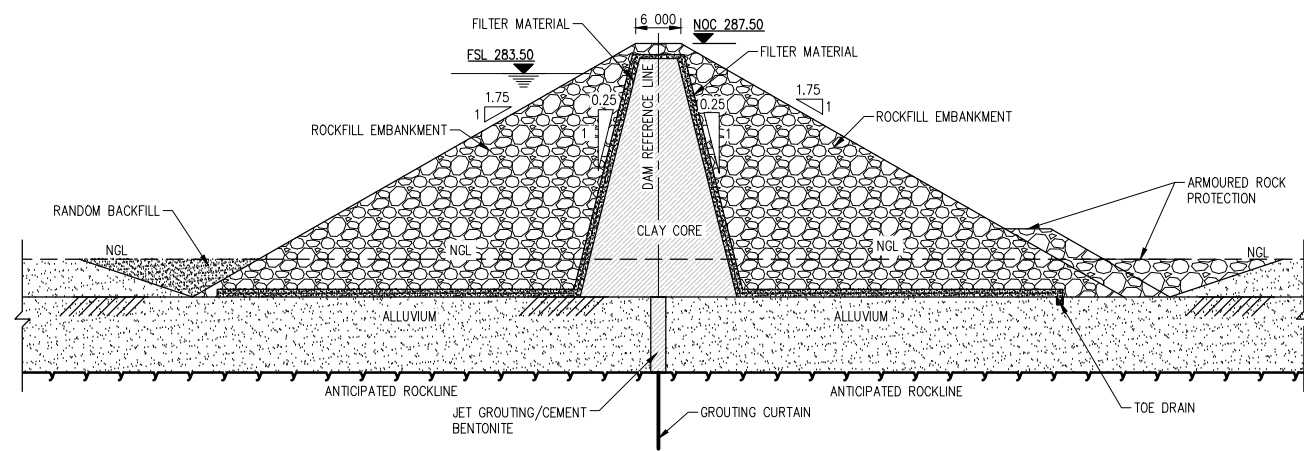
PROJECT: **SAEGO DAM**

TITLE: **RECONNAISSANCE STUDY
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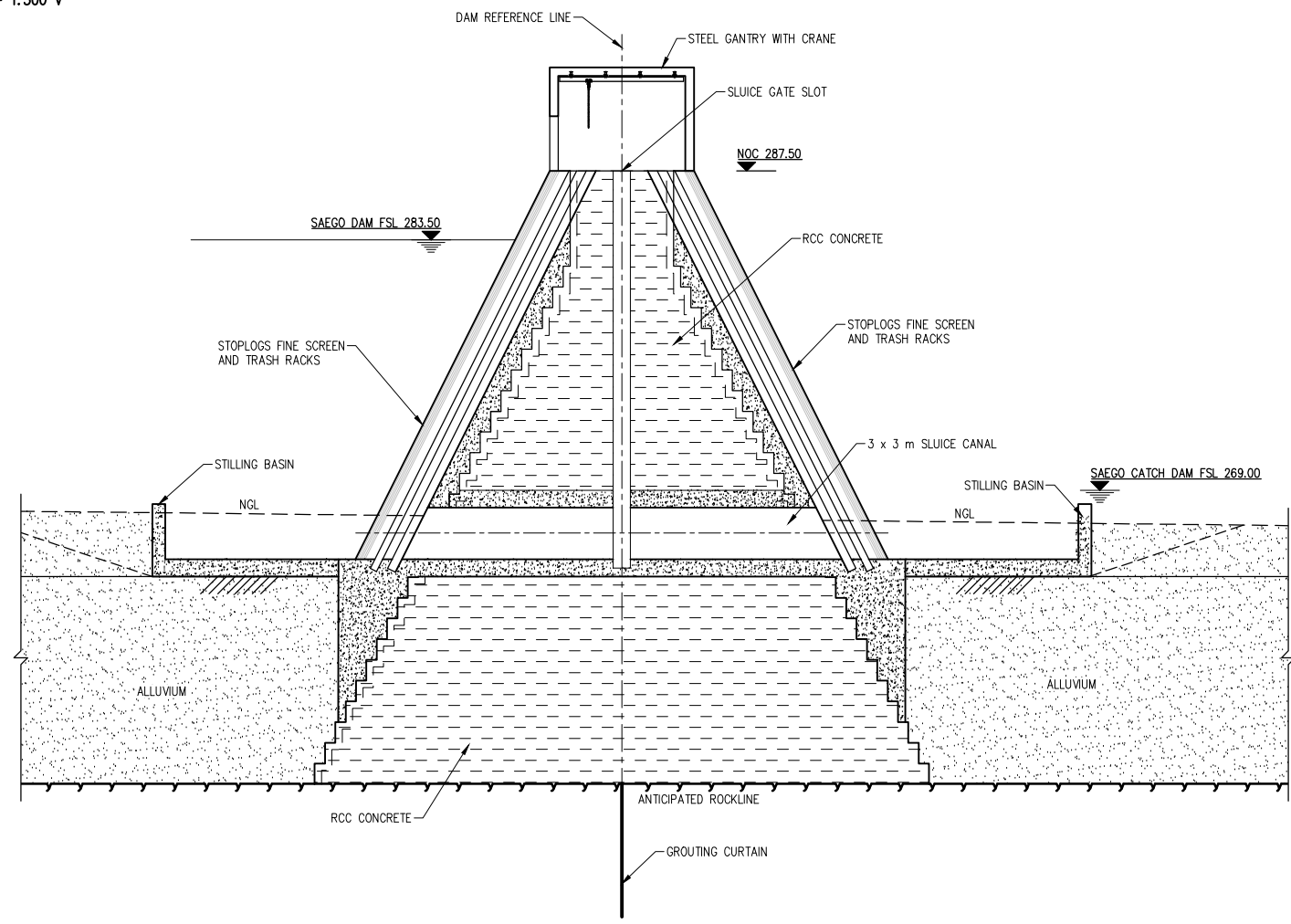
DOWNSTREAM ELEVATION ON DAM
SCALE 1:10 000 H - 1:500 V



TYPICAL SECTION C-C OF ROCKFILL EMBANKMENT
SCALE 1:500

HIGH LEVEL CONCEPT ONLY:

1. BEDROCK CONDITIONS UNDETERMINED.
2. ACTUAL GEOTECHNICAL CONDITIONS WILL DETERMINE FINAL CONFIGURATION.
3. ALLOWANCES MADE FOR COSTING PURPOSES ONLY.



TYPICAL SECTION D-D THROUGH SLUICE STRUCTURE
SCALE 1:500

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| A | 11/06/19 | FOR INFORMATION | | SHEET DESCRIPTION | |
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THE MASTER HELD AT THE ARQ HEAD OFFICE, BEARS THE ORIGINAL SIGNATURE OF APPROVAL

CLIENT: **HIPCO IRRIGATION BOARD**

PROJECT: **SAEGO DAM**

TITLE: **RECONNAISSANCE STUDY
GENERAL DETAILS 2**

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SEAGO CATCH DAM
PLAN LAYOUT
 SCALE 1:12 500

| No. | DATE | REVISION | APPROVED | LIST OF ASSOCIATED DRAWINGS |
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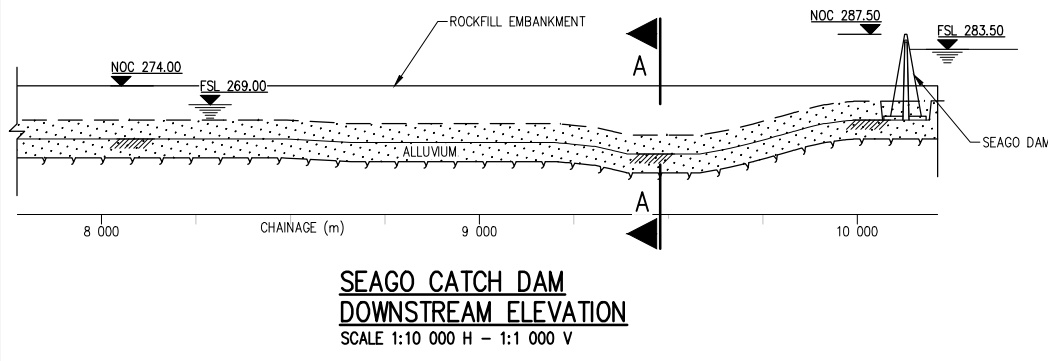
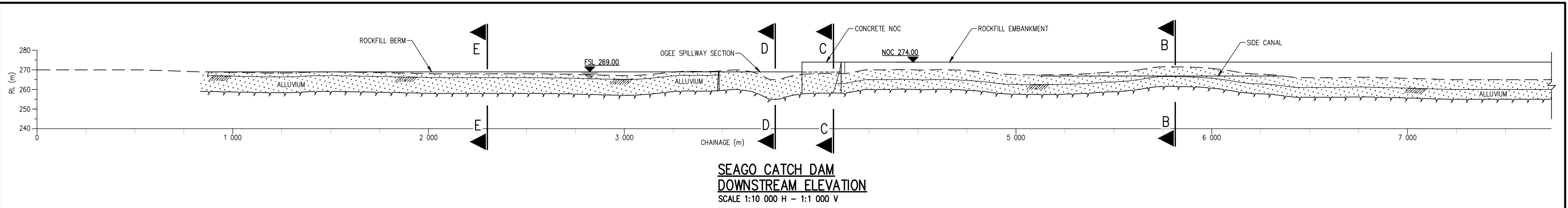
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| | |
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| CLIENT: | HIPCO IRRIGATION BOARD |
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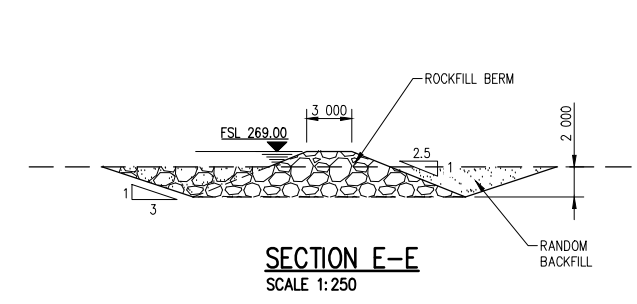
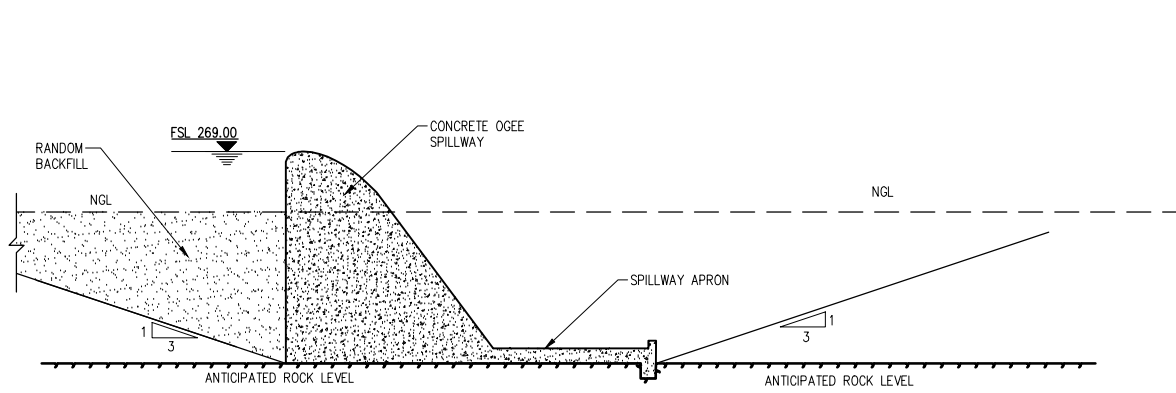
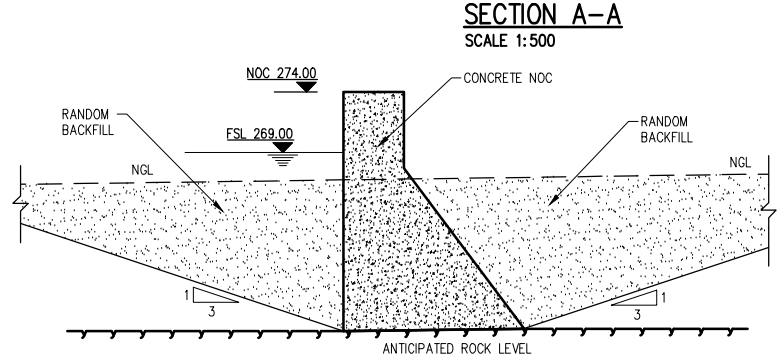
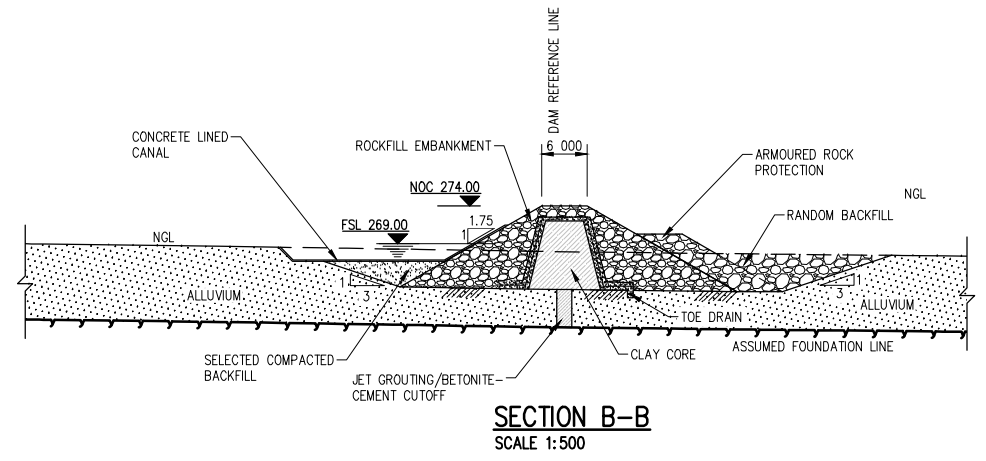
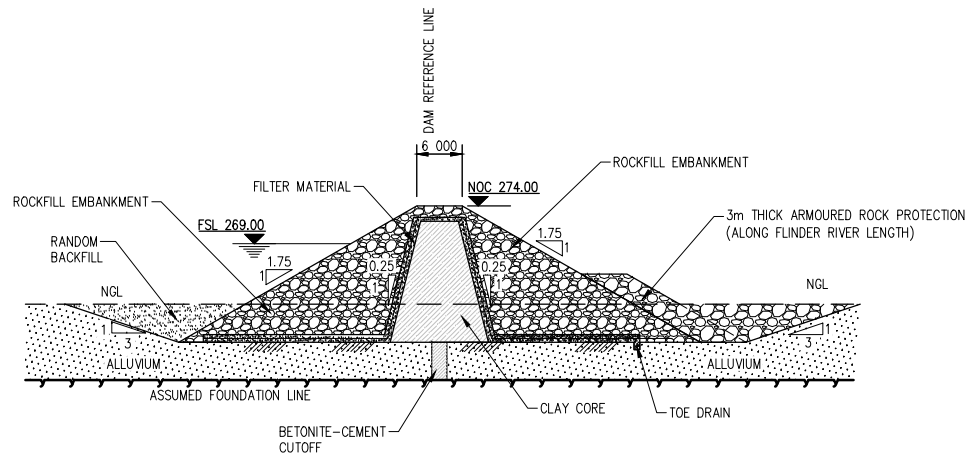
| | |
|----------|---|
| PROJECT: | SEAGO CATCH DAM |
| TITLE: | RECONNAISSANCE STUDY GENERAL DETAILS 1 |

| | | | | | |
|-----------|-----|-------------|------------|-----------|-----|
| DRAWN: | JHS | SHEET SIZE: | A1 | SHEET No: | 1/2 |
| DESIGNED: | MB | DATE: | 11/06/2019 | REV No: | A |
| CHECKED: | DCE | DRAWING No: | 8475-400 | | |



HIGH LEVEL CONCEPT ONLY:

1. BEDROCK CONDITIONS UNDETERMINED.
2. ACTUAL GEOTECHNICAL CONDITIONS WILL DETERMINE FINAL CONFIGURATION.
3. ALLOWANCES MADE FOR COSTING PURPOSES ONLY.



| No. | DATE | REVISION | APPROVED | LIST OF ASSOCIATED DRAWINGS | DWG. No. |
|-----|----------|-----------------|----------|-----------------------------|----------|
| A | 11/06/19 | FOR INFORMATION | | | |

ARQ CONSULTING ENGINEERS
 ARQ (PTY) LTD.
 6 DAVENTRY STREET TEL : 012 348 6668
 LYNNWOOD MANOR FAX : 012 348 6669
 0081 RSA EMAIL : dams@arq.co.za

THE MASTER HELD AT THE ARQ HEAD OFFICE, BEARS THE ORIGINAL SIGNATURE OF APPROVAL

CLIENT: **HIPCO IRRIGATION BOARD**

PROJECT: **SEAGO CATCH DAM**
 TITLE: **RECONNAISSANCE STUDY GENERAL DETAILS 2**

| | | |
|--------------|----------------------|---------------|
| DRAWN: JHS | SHEET SIZE: A1 | SHEET No: 2/2 |
| DESIGNED: MB | DATE: 11/06/2019 | REV No: A |
| CHECKED: DCE | DRAWING No: 8475-401 | |

APPENDIX B
HIGH LEVEL BOQ'S

| GAP DAM FSL EL 278.8 | | | | | | |
|----------------------|----------|--|----------------|----------|-----------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 1.20 | 2 607 | 3 129 |
| | | (b) Brush | ha | 0.50 | 2 310 | 1 155 |
| | | (c) Trees | ha | 2.10 | 12 258 | 25 742 |
| 2 | | River Diversion | Sum | 1 | 5 000 000 | 5 000 000 |
| 3 | | Materials | | | | |
| | | (a) Clay materials for infilling at NOC ends | m ³ | 960 | 15 | 14 076 |
| | | (b) Unselected fill - backfill at dam toe | m ³ | 41 200 | 10 | 412 000 |
| 4 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials | | | | |
| | | - Dam footprint | m ³ | 100 620 | 7 | 728 908 |
| | | (ii) Extra over for rock | | | | |
| | | - Dam footprint | m ³ | 20 120 | 14 | 277 671 |
| | | (b) Confined | | | | |
| | | (i) All materials | m ³ | 1 000 | 11 | 10 545 |
| | | (ii) Extra over for rock | m ³ | 1 000 | 18 | 18 143 |
| | | (c) Final foundation preparation | m ² | 21 820 | 92 | 2 003 345 |
| 5 | | Drilling and Grouting | | | | |
| | | (a) Curtain grouting | m drill | 8 830 | 83 | 734 303 |
| 6 | | RCC Dam | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Steps vertical | m ² | 16 600 | 253 | 4 202 506 |
| | | - Upstream Steps horizontal | m ² | 5 550 | 262 | 1 454 100 |
| | | - Downstream Steps vertical | m ² | 15 980 | 254 | 4 060 611 |
| | | - Downstream Steps horizontal and crest | m ² | 10 522 | 262 | 2 758 828 |
| | | - Around outlet pipes | m ² | 280 | 334 | 93 539 |
| | | (ii) Intricate | | | | |
| | | - Spillway Sidewalls | m ² | 250 | 431 | 107 643 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 1 085 | 690 | 748 798 |
| | | (ii) Structural | | | | |
| | | - Spillway Sidewalls | m ³ | 130 | 1 095 | 142 350 |
| | | - Crest Capping at NOC | m ³ | 1 320 | 750 | 990 348 |
| | | (iii) RCC | | | | |
| | | - Left Side | m ³ | 59 800 | 225 | 13 455 000 |
| | | - Right Side | m ³ | 56 400 | 225 | 12 690 000 |
| | | - Spillway | m ³ | 72 600 | 225 | 16 335 000 |
| | | (c) Reinforcing | | | | |
| | | - Spillway sidewalls | t | 13 | 3 059 | 39 767 |
| | | - Crest Capping at NOC | t | 132 | 3 059 | 403 788 |
| | | (d) Dowels | | | | |
| | | - Spillway sidewalls | m | 170 | 43 | 7 368 |
| | | - Crest Capping at NOC | m | 3900 | 43 | 167 843 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 22 150 | 57 | 1 265 207 |
| | | (ii) Downstream face | m ² | 22 124 | 57 | 1 262 222 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 280 | 670 | 187 600 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 70 | 666 | 46 621 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Left Side | m ² | 4 150 | 90 | 373 500 |
| | | - Right Side | m ² | 4 500 | 90 | 405 000 |
| | | - Spillway | m ² | 3 410 | 90 | 306 900 |

Continue

| GAP DAM FSL EL 278.8 | | | | | | |
|----------------------|----------|---|----------------|-----------|-------|-------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 7 | | Spillway and apron (EO Dam body) | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Apron walls basin walls | m ² | 175 | 300 | 52 563 |
| | | - Apron floor | m ² | 3 000 | 260 | 781 167 |
| | | (ii) Intricate | | | | |
| | | - Apron toe | m ² | 675 | 298 | 201 179 |
| | | - Spillway Ogee | m ² | 2 160 | 309 | 668 375 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | (ii) Structural | | | | |
| | | - Concrete apron | m ³ | 3 000 | 1 095 | 3 285 000 |
| | | - Apron toe | m ³ | 300 | 1 095 | 328 548 |
| | | - Spillway Ogee | m ³ | 4 000 | 750 | 3 000 000 |
| | | (c) Reinforcing | | | | |
| | | - Stilling basin floor | t | 300 | 3 020 | 906 103 |
| | | - Apron toe | t | 30 | 3 020 | 90 610 |
| | | - Spillway Ogee | t | 400 | 3 020 | 1 208 136 |
| | | (d) Dowels | | | | |
| | | - Concrete Apron 8m into rock | m | 6 000 | 43 | 257 938 |
| | | - Ogee into RCC | m | 2 000 | 43 | 85 980 |
| | | (e) Joints incl waterstops | | | | |
| | | (i) Mass concrete | | | | |
| | | (ii) Structural | | | | |
| | | - Concrete Apron | m ² | 300 | 679 | 203 695 |
| | | - Spillway Ogee | m ² | 200 | 679 | 135 796 |
| 8 | | Intake and Outlet works | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Intake tower Vertical | m ² | 1 600 | 283 | 452 041 |
| | | - Intake tower suspended slabs | m ² | 215 | 333 | 71 494 |
| | | - Intake tower house on crest | m ² | 260 | 283 | 73 458 |
| | | - Outlet tower slanted walls inside and outside | m ² | 970 | 283 | 274 054 |
| | | - Outlet works stilling basin vertical | m ² | 85 | 333 | 28 265 |
| | | - Outlet works stilling basin horizontal floor | m ² | 90 | 260 | 23 400 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Intake tower Base | m ³ | 470 | 690 | 324 300 |
| | | - Outlet tower Base | m ³ | 130 | 690 | 89 700 |
| | | (ii) Structural | | | | |
| | | - Intake tower walls | m ³ | 375 | 1 095 | 410 625 |
| | | - Intake tower suspended slabs | m ³ | 90 | 1 095 | 98 550 |
| | | - Intake tower house on crest | m ³ | 55 | 1 095 | 60 225 |
| | | - Outlet tower | m ³ | 265 | 1 095 | 290 175 |
| | | (c) Reinforcing | | | | |
| | | - Intake tower walls | t | 45 | 3 020 | 135 900 |
| | | - Intake tower suspended slabs | t | 11 | 3 020 | 32 616 |
| | | - Intake tower house on crest | t | 7 | 3 020 | 19 932 |
| | | - Outlet house | t | 32 | 3 020 | 96 036 |
| | | (d) Mechanical items | | | | |
| | | (i) Valves | Sum | 1 240 000 | 1 | 1 240 000 |
| | | (i) Gates and screens | Sum | 1 771 200 | 1 | 1 771 200 |
| | | (iii) Pipes and pipe specials | Sum | 1 177 600 | 1 | 1 177 600 |
| | | (iv) Cranes and hoists | Sum | 1 030 000 | 1 | 1 030 000 |
| | | (v) Structural steelwork | Sum | 328 000 | 1 | 328 000 |
| | | (vi) Steel Bridge | Sum | 300 000 | 1 | 300 000 |
| | | SUB TOTAL | | | | 90 266 218 |

Continue

| GAP DAM FSL EL 278.8 | | | | | | |
|-----------------------------|-----------------|-----------------------------------|-------------|-----------------|-------------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 9 | | Landscaping | % | 1.00 | 1 | 500 000 |
| 10 | | Measurement allowance | % | 1 | 10 | 9 026 622 |
| SUB TOTAL A | | | | | | 99 792 839 |
| 11 | | Preliminary & general | % | 1 | 40 | 39 917 136 |
| 12 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511 201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200 000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50 000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100 000 | 100 000 |
| 13 | | Accommodation | Sum | 1 | 13 125 000 | 13 125 000 |
| SUB TOTAL B | | | | | | 160 852 990 |
| 14 | | Contingencies | % | 1 | 10 | 16 085 299 |
| SUB TOTAL C | | | | | | 176 938 289 |
| 15 | | Planning design & supervision | % | 1 | 10 | 17 693 829 |
| SUB TOTAL D | | | | | | 194 632 118 |
| 16 | | TAX | % | 1 | 0 | 0 |
| 17 | | Cost of land acquisition | Sum | 1 | 5 000 000 | 5 000 000 |
| 18 | | Infrastructure Costs | Sum | 1 | 2 500 000 | 2 500 000 |
| TOTAL PROJECT COST | | | | | | 202 132 118 |

| GAP DAM FSL EL 283.8 | | | | | | |
|----------------------|----------|--|----------------|----------|-----------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 1.40 | 2 607 | 3 650 |
| | | (b) Brush | ha | 0.60 | 2 310 | 1 386 |
| | | (c) Trees | ha | 2.50 | 12 258 | 30 646 |
| 2 | | River Diversion | Sum | 1 | 5 000 000 | 5 000 000 |
| 3 | | Materials | | | | |
| | | (a) Clay materials for infilling at NOC ends | m ³ | 1 200 | 15 | 17 596 |
| | | (b) Unselected fill - backfill at dam toe | m ³ | 41 200 | 10 | 412 000 |
| 4 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials | | | | |
| | | - Dam footprint | m ³ | 122 707 | 7 | 888 909 |
| | | (ii) Extra over for rock | | | | |
| | | - Dam footprint | m ³ | 24 540 | 14 | 338 670 |
| | | (b) Confined | | | | |
| | | (i) All materials | m ³ | 1 000 | 11 | 10 545 |
| | | (ii) Extra over for rock | m ³ | 1 000 | 18 | 18 143 |
| | | (c) Final foundation preparation | m ² | 26 600 | 92 | 2 442 208 |
| 5 | | Drilling and Grouting | | | | |
| | | (a) Curtain grouting | m drill | 10 050 | 83 | 835 758 |
| 6 | | RCC Dam | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Steps vertical | m ² | 22 150 | 253 | 5 607 561 |
| | | - Upstream Steps horizontal | m ² | 13 250 | 262 | 3 471 500 |
| | | - Downstream Steps vertical | m ² | 20 700 | 254 | 5 259 991 |
| | | - Downstream Steps horizontal and crest | m ² | 12 000 | 262 | 3 146 354 |
| | | - Around outlet pipes | m ² | 370 | 334 | 123 605 |
| | | (ii) Intricate | | | | |
| | | - Spillway Sidewalls | m ² | 285 | 431 | 122 712 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 1 200 | 690 | 828 164 |
| | | (ii) Structural | | | | |
| | | - Spillway Sidewalls | m ³ | 150 | 1 095 | 164 250 |
| | | - Crest Capping at NOC | m ³ | 1 320 | 750 | 990 348 |
| | | (iii) RCC | | | | |
| | | - Left Side | m ³ | 93 000 | 225 | 20 925 000 |
| | | - Right Side | m ³ | 87 800 | 225 | 19 755 000 |
| | | - Spillway | m ³ | 110 100 | 225 | 24 772 500 |
| | | (c) Reinforcing | | | | |
| | | - Spillway sidewalls | t | 15 | 3 059 | 45 885 |
| | | - Crest Capping at NOC | t | 132 | 3 059 | 403 788 |
| | | (d) Dowels | | | | |
| | | - Spillway sidewalls | m | 200 | 43 | 8 668 |
| | | - Crest Capping at NOC | m | 3900 | 43 | 167 843 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 35 400 | 57 | 2 022 046 |
| | | (ii) Downstream face | m ² | 32 700 | 57 | 1 865 605 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 370 | 670 | 247 900 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 72 | 666 | 47 953 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Left Side | m ² | 6 200 | 90 | 558 000 |
| | | - Right Side | m ² | 6 950 | 90 | 625 500 |
| | | - Spillway | m ² | 5 450 | 90 | 490 500 |

Continue

| GAP DAM FSL EL 283.8 | | | | | | |
|----------------------|----------|---|----------------|-----------|-------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 7 | | Spillway and apron (EO Dam body) | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Apron walls basin walls | m ² | 175 | 300 | 52 563 |
| | | - Apron floor | m ² | 3 000 | 260 | 781 167 |
| | | (ii) Intricate | | | | |
| | | - Apron toe | m ² | 675 | 298 | 201 179 |
| | | - Spillway Ogee | m ² | 2 160 | 309 | 668 375 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | (ii) Structural | | | | |
| | | - Concrete apron | m ³ | 3 000 | 1 095 | 3 285 000 |
| | | - Apron toe | m ³ | 300 | 1 095 | 328 548 |
| | | - Spillway Ogee | m ³ | 4 000 | 750 | 3 000 000 |
| | | (c) Reinforcing | | | | |
| | | - Stilling basin floor | t | 300 | 3 020 | 906 103 |
| | | - Apron toe | t | 30 | 3 020 | 90 610 |
| | | - Spillway Ogee | t | 400 | 3 020 | 1 208 136 |
| | | (d) Dowels | | | | |
| | | - Concrete Apron 8m into rock | m | 6 000 | 43 | 257 938 |
| | | - Ogee into RCC | m | 2 000 | 43 | 85 980 |
| | | (e) Joints incl waterstops | | | | |
| | | (i) Mass concrete | | | | |
| | | (ii) Structural | | | | |
| | | - Concrete Apron | m ² | 300 | 679 | 203 695 |
| | | - Spillway Ogee | m ² | 200 | 679 | 135 796 |
| 8 | | Intake and Outlet works | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Intake tower Vertical | m ² | 2 250 | 283 | 635 682 |
| | | - Intake tower suspended slabs | m ² | 215 | 333 | 71 494 |
| | | - Intake tower house on crest | m ² | 260 | 283 | 73 458 |
| | | - Outlet tower slanted walls inside and outside | m ² | 1 300 | 283 | 367 289 |
| | | - Outlet works stilling basin vertical | m ² | 85 | 333 | 28 265 |
| | | - Outlet works stilling basin horizontal floor | m ² | 90 | 260 | 23 400 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Intake tower Base | m ³ | 470 | 690 | 324 300 |
| | | - Outlet tower Base | m ³ | 130 | 690 | 89 700 |
| | | (ii) Structural | | | | |
| | | - Intake tower walls | m ³ | 500 | 1 095 | 547 500 |
| | | - Intake tower suspended slabs | m ³ | 90 | 1 095 | 98 550 |
| | | - Intake tower house on crest | m ³ | 55 | 1 095 | 60 225 |
| | | - Outlet tower | m ³ | 350 | 1 095 | 383 250 |
| | | (c) Reinforcing | | | | |
| | | - Intake tower walls | t | 60 | 3 020 | 181 200 |
| | | - Intake tower suspended slabs | t | 11 | 3 020 | 32 616 |
| | | - Intake tower house on crest | t | 7 | 3 020 | 19 932 |
| | | - Outlet house | t | 42 | 3 020 | 126 840 |
| | | (d) Mechanical items | | | | |
| | | (i) Valves | Sum | 1 550 000 | 1 | 1 550 000 |
| | | (i) Gates and screens | Sum | 2 214 000 | 1 | 2 214 000 |
| | | (iii) Pipes and pipe specials | Sum | 1 472 000 | 1 | 1 472 000 |
| | | (iv) Cranes and hoists | Sum | 1 030 000 | 1 | 1 030 000 |
| | | (v) Structural steelwork | Sum | 410 000 | 1 | 410 000 |
| | | (vi) Steel Bridge | Sum | 300 000 | 1 | 300 000 |
| | | SUB TOTAL | | | | 122 894 977 |

Continue

| GAP DAM FSL EL 283.8 | | | | | | |
|-----------------------------|-----------------|-----------------------------------|-------------|-----------------|-------------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 9 | | Landscaping | % | 1.00 | 0 | 500 000 |
| 10 | | Measurement allowance | % | 1 | 10 | 12 289 498 |
| SUB TOTAL A | | | | | | 135 684 475 |
| 11 | | Preliminary & general | % | 1 | 40 | 54 273 790 |
| 12 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511 201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200 000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50 000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100 000 | 100 000 |
| 13 | | Accommodation | Sum | 1 | 13 125 000 | 13 125 000 |
| SUB TOTAL B | | | | | | 211 101 280 |
| 14 | | Contingencies | % | 1 | 10 | 21 110 128 |
| SUB TOTAL C | | | | | | 232 211 408 |
| 15 | | Planning design & supervision | % | 1 | 10 | 23 221 141 |
| SUB TOTAL D | | | | | | 255 432 549 |
| 16 | | TAX | % | 1 | 0 | 0 |
| 17 | | Cost of land acquisition | Sum | 1 | 5 000 000 | 5 000 000 |
| 18 | | Infrastructure Costs | Sum | 1 | 2 500 000 | 2 500 000 |
| TOTAL PROJECT COST | | | | | | 262 932 549 |

| GAP DAM FSL EL 288.8 | | | | | | |
|----------------------|----------|--|----------------|----------|-----------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 1.70 | 2 607 | 4 432 |
| | | (b) Brush | ha | 0.75 | 2 310 | 1 733 |
| | | (c) Trees | ha | 3.00 | 12 258 | 36 775 |
| 2 | | River Diversion | Sum | 1 | 5 000 000 | 5 000 000 |
| 3 | | Materials | | | | |
| | | (a) Clay materials for infilling at NOC ends | m ³ | 1 450 | 15 | 21 261 |
| | | (b) Unselected fill - backfill at dam toe | m ³ | 41 200 | 10 | 412 000 |
| 4 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials | | | | |
| | | - Dam footprint | m ³ | 148 475 | 7 | 1 075 577 |
| | | (ii) Extra over for rock | | | | |
| | | - Dam footprint | m ³ | 26 700 | 14 | 368 480 |
| | | (b) Confined | | | | |
| | | (i) All materials | m ³ | 1 000 | 11 | 10 545 |
| | | (ii) Extra over for rock | m ³ | 1 000 | 18 | 18 143 |
| | | (c) Final foundation preparation | m ² | 32 200 | 92 | 2 956 358 |
| 6 | | Drilling and Grouting | | | | |
| | | (a) Curtain grouting | m drill | 12 600 | 83 | 1 047 816 |
| 7 | | RCC Dam | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Steps vertical | m ² | 27 800 | 253 | 7 037 932 |
| | | - Upstream Steps horizontal | m ² | 10 345 | 262 | 2 710 390 |
| | | - Downstream Steps vertical | m ² | 27 185 | 254 | 6 907 868 |
| | | - Downstream Steps horizontal and crest | m ² | 16 450 | 262 | 4 313 126 |
| | | - Around outlet pipes | m ² | 420 | 334 | 140 309 |
| | | (ii) Intricate | | | | |
| | | - Spillway Sidewalls | m ² | 310 | 431 | 133 477 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 1 600 | 690 | 1 104 219 |
| | | (ii) Structural | | | | |
| | | - Spillway Sidewalls | m ³ | 160 | 1 095 | 175 200 |
| | | - Crest Capping at NOC | m ³ | 1 320 | 750 | 990 348 |
| | | (iii) RCC | | | | |
| | | - Left Side | m ³ | 139 450 | 225 | 31 376 250 |
| | | - Right Side | m ³ | 129 025 | 225 | 29 030 625 |
| | | - Spillway | m ³ | 155 000 | 225 | 34 875 000 |
| | | (c) Reinforcing | | | | |
| | | - Spillway sidewalls | t | 16 | 3 059 | 48 944 |
| | | - Crest Capping at NOC | t | 132 | 3 059 | 403 788 |
| | | (d) Dowels | | | | |
| | | - Spillway sidewalls | m | 235 | 43 | 10 185 |
| | | - Crest Capping at NOC | m | 3900 | 43 | 167 843 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 38 145 | 57 | 2 178 841 |
| | | (ii) Downstream face | m ² | 38 553 | 57 | 2 199 531 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 420 | 670 | 281 400 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 75 | 666 | 49 952 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Left Side | m ² | 9 200 | 90 | 828 000 |
| | | - Right Side | m ² | 12 600 | 90 | 1 134 000 |
| | | - Spillway | m ² | 5 450 | 90 | 490 500 |

Continue

| GAP DAM FSL EL 288.8 | | | | | | |
|----------------------|----------|---|----------------|-----------|-------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 8 | | Spillway and apron (EO Dam body) | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Apron walls basin walls | m ² | 175 | 300 | 52 563 |
| | | - Apron floor | m ² | 3 000 | 260 | 781 167 |
| | | (ii) Intricate | | | | |
| | | - Apron toe | m ² | 675 | 298 | 201 179 |
| | | - Spillway Ogee | m ² | 2 160 | 309 | 668 375 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | (ii) Structural | | | | |
| | | - Concrete apron | m ³ | 3 000 | 1 095 | 3 285 000 |
| | | - Apron toe | m ³ | 300 | 1 095 | 328 548 |
| | | - Spillway Ogee | m ³ | 4 000 | 750 | 3 000 000 |
| | | (c) Reinforcing | | | | |
| | | - Stilling basin floor | t | 300 | 3 020 | 906 103 |
| | | - Apron toe | t | 30 | 3 020 | 90 610 |
| | | - Spillway Ogee | t | 400 | 3 020 | 1 208 136 |
| | | (d) Dowels | | | | |
| | | - Concrete Apron 8m into rock | m | 6 000 | 43 | 257 938 |
| | | - Ogee into RCC | m | 2 000 | 43 | 85 980 |
| | | (e) Joints incl waterstops | | | | |
| | | (i) Mass concrete | | | | |
| | | (ii) Structural | | | | |
| | | - Concrete Apron | m ² | 300 | 679 | 203 695 |
| | | - Spillway Ogee | m ² | 200 | 679 | 135 796 |
| 9 | | Intake and Outlet works | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Intake tower Vertical | m ² | 2 920 | 283 | 824 974 |
| | | - Intake tower suspended slabs | m ² | 215 | 333 | 71 494 |
| | | - Intake tower house on crest | m ² | 260 | 283 | 73 458 |
| | | - Outlet tower slanted walls inside and outside | m ² | 1 640 | 283 | 463 349 |
| | | - Outlet works stilling basin vertical | m ² | 85 | 333 | 28 265 |
| | | - Outlet works stilling basin horizontal floor | m ² | 90 | 260 | 23 400 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Intake tower Base | m ³ | 470 | 690 | 324 300 |
| | | - Outlet tower Base | m ³ | 130 | 690 | 89 700 |
| | | (ii) Structural | | | | |
| | | - Intake tower walls | m ³ | 625 | 1 095 | 684 375 |
| | | - Intake tower suspended slabs | m ³ | 90 | 1 095 | 98 550 |
| | | - Intake tower house on crest | m ³ | 55 | 1 095 | 60 225 |
| | | - Outlet tower | m ³ | 440 | 1 095 | 481 800 |
| | | (c) Reinforcing | | | | |
| | | - Intake tower walls | t | 75 | 3 020 | 226 500 |
| | | - Intake tower suspended slabs | t | 11 | 3 020 | 32 616 |
| | | - Intake tower house on crest | t | 7 | 3 020 | 19 932 |
| | | - Outlet house | t | 53 | 3 020 | 159 456 |
| | | (d) Mechanical items | | | | |
| | | (i) Valves | Sum | 1 860 000 | 1 | 1 860 000 |
| | | (i) Gates and screens | Sum | 2 656 800 | 1 | 2 656 800 |
| | | (iii) Pipes and pipe specials | Sum | 1 766 400 | 1 | 1 766 400 |
| | | (iv) Cranes and hoists | Sum | 1 030 000 | 1 | 1 030 000 |
| | | (v) Structural steelwork | Sum | 492 000 | 1 | 492 000 |
| | | (vi) Steel Bridge | Sum | 300 000 | 1 | 300 000 |
| | | SUB TOTAL | | | | 160 513 530 |

Continue

| GAP DAM FSL EL 288.8 | | | | | | |
|-----------------------------|-----------------|-----------------------------------|-------------|-----------------|-------------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 10 | | Landscaping | % | 1.00 | 0 | 500 000 |
| 11 | | Measurement allowance | % | 1 | 10 | 16 051 353 |
| SUB TOTAL A | | | | | | 177 064 883 |
| 12 | | Preliminary & general | % | 1 | 40 | 70 825 953 |
| 13 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511 201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200 000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50 000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100 000 | 100 000 |
| 14 | | Accommodation | Sum | 1 | 13 125 000 | 13 125 000 |
| SUB TOTAL B | | | | | | 269 033 852 |
| 15 | | Contingencies | % | 1 | 10 | 26 903 385 |
| SUB TOTAL C | | | | | | 295 937 237 |
| 16 | | Planning design & supervision | % | 1 | 10 | 29 593 724 |
| SUB TOTAL D | | | | | | 325 530 961 |
| 17 | | TAX | % | 1 | 0 | 0 |
| 18 | | Cost of land acquisition | Sum | 1 | 5 000 000 | 5 000 000 |
| 19 | | Infrastructure Costs | Sum | 1 | 2 500 000 | 2 500 000 |
| TOTAL PROJECT COST | | | | | | 333 030 961 |

| SAEGO DAM FSL 278.5 | | | | | | |
|---------------------|----------|---|--------------------|-----------|---------|-------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 31 | 2500 | 77 500 |
| | | (b) Brush | ha | 31 | 2500 | 77 500 |
| | | (c) Trees | ha | 15 | 12000 | 180 000 |
| 2 | | River Diversion | Sum | 1 | 2000000 | 2 000 000 |
| 3 | | Materials | | | | |
| | | (a) Clay materials for infilling at NOC ends - Spillway | m ³ | 800 | 15 | 12 000 |
| 4 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials - Embankment | m ³ | 3 527 030 | 7 | 25 535 697 |
| | | (ii) Extra over for rock- Embankment | m ³ | 176 350 | 10 | 1 789 953 |
| | | (iii) All materials - RCC Spillway | m ³ | 60 000 | 7 | 420 000 |
| | | (iv) Extra over for rock - Spillway | m ³ | 12 000 | 10 | 120 000 |
| | | (v) All materials - Spillway Channel | m ³ | 327 350 | 7 | 2 291 450 |
| | | (vi) Extra over for rock - Spillway Channel | m ³ | 65 470 | 10 | 654 700 |
| | | (b) Confined | | | | |
| | | (i) All materials | | | | |
| | | - Spillway Cut-off wall | m ³ | 900 | 11 | 9 495 |
| | | - Extra over for rock | m ³ | 900 | 14 | 12 600 |
| | | (c) Final foundation preparation at RCC structure | m ² | 8 850 | 55 | 486 750 |
| 5 | | Preparation of solum | | | | |
| | | (a) All materials | m ² | 640 800 | 55 | 35 244 000 |
| 6 | | Drilling and Grouting - RCC structures | | | | |
| | | (a) Curtain grouting - RCC Spillway | m drill | 5 220 | 83 | 433 380 |
| | | (a) Curtain grouting -Sluice Structure | m drill | 930 | 83 | 77 190 |
| | | (c) Curtain grouting -Embankment | m drill | 70 850 | 83 | 5 880 550 |
| 7 | | Cut off to ensure impermeability | | | | |
| | | (a) Bentonite/jet grouting/sheetpiles cut -embankment | m ³ | 43 760 | 3100 | 135 656 000 |
| 8 | | Embankment | | | | |
| | | (a) Earthfill | | | | |
| | | (i) Clay for clay core rockfill | m ³ | 1 586 925 | 15 | 23 803 875 |
| | | (b) Rockfill | m ³ | 6 020 250 | 18 | 108 364 500 |
| | | (c) Filters | | | | |
| | | (i) Coarse Filter material - Upstream in rockfill | m ³ | 157 700 | 55 | 8 673 500 |
| | | (ii) Fine Filter material - Upstream in rockfill | m ³ | 157 700 | 56 | 8 831 200 |
| | | (iii) Coarse Filter material - Downstream in rockfill | m ³ | 157 700 | 55 | 8 673 500 |
| | | (iv) Fine Filter material - Downstream in rockfill | m ³ | 157 700 | 56 | 8 831 200 |
| | | (d) Armoured rock at rockfill embankment | m ³ | 243 530 | 25 | 6 088 250 |
| | | (e) Overhaul beyond 5km | m ³ /km | | | |
| | | (f) Extra over for toe drain | m | 7 800 | 30 | 234 000 |
| 9 | | RCC Spillway Dam | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Side sloped | m ² | 9 500 | 300 | 2 850 000 |
| | | - Downstream Steps vertical | m ² | 8 810 | 253 | 2 228 930 |
| | | - Downstream Steps horizontal and crest | m ² | 6 780 | 262 | 1 776 360 |
| | | - Around outlet pipes | m ² | 125 | 334 | 41 750 |
| | | (ii) Intricate | | | | |
| | | - Spillway Sidewalls | m ² | 330 | 431 | 142 230 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 420 | 690 | 289 800 |
| | | (ii) Structural | | | | |
| | | - Spillway Sidewalls | m ³ | 165 | 1095 | 180 675 |
| | | - Crest Capping at NOC | m ³ | 350 | 750 | 262 500 |

Continue

| SAEGO DAM FSL 278.5 | | | | | | |
|---------------------|---|--|-------|----------|---------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 10 | | (iii) RCC | | | | |
| | | - Left Side | m³ | 21 570 | 225 | 4 853 250 |
| | | - Right Side | m³ | 9 230 | 225 | 2 076 750 |
| | | - Spillway | m³ | 78 630 | 225 | 17 691 750 |
| | | (c) Reinforcing | | | | |
| | | - Spillway sidewalls | t | 17 | 3020 | 49 830 |
| | | - Crest Capping at NOC | t | 35 | 3020 | 105 700 |
| | | (d) Dowels | | | | |
| | | - Spillway sidewalls | m | 160 | 43 | 6 880 |
| | | - Crest Capping at NOC | m | 1 000 | 43 | 43 000 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m² | 9 500 | 57 | 541 500 |
| | | (ii) Downstream face | m² | 14 380 | 57 | 819 660 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m² | 125 | 670 | 83 750 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m² | 18 | 666 | 11 988 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Left Side | m² | 1 270 | 90 | 114 300 |
| | | - Right Side | m² | 490 | 90 | 44 100 |
| | | - Spillway | m² | 5 890 | 90 | 530 100 |
| | | Spillway and stilling basin (EO Dam body) | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Stilling basin walls | m² | 290 | 300 | 87 000 |
| | | - Stilling basin floor | m² | 2 400 | 260 | 624 000 |
| | | (ii) Intricate | | | | |
| | | - Chute blocks | m² | 50 | 345 | 17 250 |
| | | - Dentated Sill | m² | 105 | 345 | 36 225 |
| | | - Spillway Ogee | m² | 735 | 345 | 253 575 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | (ii) Structural | | | | |
| | | - Stilling basin floor | m³ | 2 175 | 1095 | 2 381 625 |
| | | - Chute blocks | m³ | 5 | 1095 | 5 476 |
| | | - Dentated Sill | m³ | 20 | 1095 | 21 903 |
| | | - Spillway Ogee | m³ | 1 350 | 750 | 1 012 500 |
| | | - Cutoff wall, 3m into rock | m³ | 225 | 1095 | 246 411 |
| | | - Stilling basin walls | m³ | 570 | 1095 | 624 241 |
| | | - Downstream retaining wall for channel | m³ | 700 | 1095 | 766 500 |
| | | (c) Reinforcing | | | | |
| | - Stilling basin floor | t | 218 | 3020 | 656 850 | |
| | - Chute blocks | t | 1 | 3020 | 1 510 | |
| | - Dentated Sill | t | 2 | 3020 | 6 040 | |
| | - Spillway Ogee | t | 135 | 3020 | 407 700 | |
| | - Cutoff wall, 3m into rock | t | 23 | 3020 | 67 950 | |
| | - Stilling basin walls | t | 57 | 3020 | 172 140 | |
| | - Downstream retaining wall for channel | t | 70 | 3020 | 211 400 | |
| | (d) Dowels | | | | | |
| | - Stilling basin floor 8m into rock | m | 5 600 | 43 | 240 744 | |
| | - Chute blocks into steps | m | 330 | 43 | 14 187 | |
| | - Ogee into RCC | m | 400 | 43 | 17 196 | |
| | - Downstream retaining wall for channel, 4m into rock | m | 1 010 | 43 | 43 430 | |
| | (e) Joints incl waterstops | | | | | |
| | (i) Mass concrete | | | | | |
| | (ii) Structural | | | | | |
| | - Stilling basin floor | m² | 440 | 679 | 298 751 | |
| | - Spillway Ogee | m² | 120 | 679 | 81 478 | |
| | - Stilling basin walls | m² | 45 | 679 | 30 554 | |
| | - Downstream retaining wall for channel | m² | 50 | 679 | 33 949 | |

Continue

| SAEGO DAM FSL 278.5 | | | | | | |
|---------------------|----------|--|----------------|-----------|------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 11 | | Intake and Outlet works | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Intake tower Vertical | m ² | 580 | 283 | 164 140 |
| | | - Outlet house vertical walls inside and outside | m ² | 175 | 283 | 49 525 |
| | | - Intake tower house on crest | m ² | 760 | 283 | 215 080 |
| | | - Outlet house vertical walls inside and outside | m ² | 1 070 | 283 | 302 810 |
| | | - Outlet house vertical walls inside and outside | m ² | 1 070 | 283 | 302 810 |
| | | (ii) Intricate | | | | |
| | | - Intake tower rounded intake | m ² | 80 | 329 | 26 347 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Intake tower Base | m ³ | 205 | 690 | 141 450 |
| | | - Concrete around pipes d/s of dam | m ³ | 550 | 690 | 379 500 |
| | | (ii) Structural | | | | |
| | | - Intake tower walls | m ³ | 80 | 1095 | 87 600 |
| | | - Outlet house | m ³ | 1 375 | 1095 | 1 505 625 |
| | | (c) Reinforcing | | | | |
| | | - Intake tower walls | t | 8 | 3020 | 24 160 |
| | | - Outlet house | t | 138 | 3020 | 415 250 |
| | | (d) Mechanical items | | | | |
| | | (i) Valves | Sum | 1 302 085 | 1 | 1 302 085 |
| | | (i) Gates and screens | Sum | 525 000 | 1 | 525 000 |
| | | (iii) Pipes and pipe specials | Sum | 1 554 000 | 1 | 1 554 000 |
| | | (iv) Cranes and hoists | Sum | 1 050 000 | 1 | 1 050 000 |
| | | (v) Structural steelwork | Sum | 90 500 | 1 | 90 500 |
| 12 | | Sluice Gate Structure | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Side Steps vertical | m ² | 2 720 | 253 | 688 160 |
| | | - Upstream Side Steps horizontal | m ² | 1 070 | 262 | 280 340 |
| | | - Downstream Steps vertical | m ² | 2 720 | 253 | 688 160 |
| | | - Downstream Steps horizontal and crest | m ² | 1 700 | 262 | 445 400 |
| | | - Around outlet pipes | m ² | 200 | 334 | 66 800 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 1 270 | 690 | 876 300 |
| | | (ii) Structural | | | | |
| | | - Crest Capping at NOC | m ³ | 190 | 750 | 142 500 |
| | | (iii) RCC | | | | |
| | | - Sluice gate structure | m ³ | 37 485 | 225 | 8 434 125 |
| | | (c) Reinforcing | | | | |
| | | - Crest Capping at NOC | t | 19 | 3020 | 57 380 |
| | | (d) Dowels | | | | |
| | | - Crest Capping at NOC | m | 560 | 43 | 24 080 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 3 790 | 57 | 216 030 |
| | | (ii) Downstream face | m ² | 3 790 | 57 | 216 030 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 200 | 670 | 134 000 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 11 | 666 | 7 326 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Sluice gate structure | m ² | 2 140 | 90 | 192 600 |
| | | (d) Mechanical items | | | | |
| | | (i) Gates and screens | Sum | 2 460 000 | 1 | 2 460 000 |
| | | (iii) Pipes and pipe specials | Sum | 2 208 000 | 1 | 2 208 000 |
| | | (iv) Cranes and hoists | Sum | 800 000 | 1 | 800 000 |
| | | (v) Structural steelwork | Sum | 20 500 | 1 | 20 500 |
| | | SUB TOTAL | | | | 453 657 791 |

Continue

| SAEGO DAM FSL 278.5 | | | | | | |
|----------------------------|-----------------|-----------------------------------|-------------|-----------------|-------------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 13 | | Landscaping | % | 1.00 | 0 | 500 000 |
| 14 | | Measurement allowance | % | 1 | 10 | 45 365 779 |
| SUB TOTAL A | | | | | | 499 523 570 |
| 15 | | Preliminary & general | % | 1 | 40 | 199 809 428 |
| 16 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100000 | 100 000 |
| 17 | | Accommodation | Sum | 1 | 5000000 | 5 000 000 |
| SUB TOTAL B | | | | | | 712 351 013 |
| 18 | | Contingencies | % | 1 | 10 | 71 235 101 |
| SUB TOTAL C | | | | | | 783 586 114 |
| 19 | | Planning design & supervision | % | 1 | 10 | 78 358 611 |
| SUB TOTAL D | | | | | | 861 944 726 |
| 20 | | TAX | % | 1 | 0 | 0 |
| 21 | | Cost of land acquisition | Sum | 1 | 5000000 | 5 000 000 |
| 22 | | Infrastructure Costs | Sum | 1 | 2500000 | 2 500 000 |
| TOTAL PROJECT COST | | | | | | 869 444 726 |

| SAEGO DAM FSL 283.5 | | | | | | |
|---------------------|----------|---|--------------------|-----------|---------|-------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 38 | 2500 | 95 000 |
| | | (b) Brush | ha | 38 | 2500 | 95 000 |
| | | (c) Trees | ha | 19 | 12000 | 228 000 |
| 2 | | River Diversion | Sum | 1 | 2000000 | 2 000 000 |
| | | Materials | | | | |
| | | (a) Clay materials for infilling at NOC ends - Spillway | m ³ | 800 | 15 | 12 000 |
| 3 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials - Embankment | m ³ | 4 408 800 | 7 | 31 919 712 |
| | | (ii) Extra over for rock- Embankment | m ³ | 220 440 | 10 | 2 237 466 |
| | | (iii) All materials - RCC Spillway | m ³ | 75 000 | 7 | 525 000 |
| | | (iv) Extra over for rock - Spillway | m ³ | 15 000 | 10 | 150 000 |
| | | (v) All materials - Spillway Channel | m ³ | 327 350 | 7 | 2 291 450 |
| | | (vi) Extra over for rock - Spillway Channel | m ³ | 65 470 | 10 | 654 700 |
| | | (b) Confined | | | | |
| | | (i) All materials | | | | |
| | | - Spillway Cut-off wall | m ³ | 900 | 11 | 9 495 |
| | | - Extra over for rock | m ³ | 900 | 14 | 12 600 |
| | | (c) Final foundation preparation at RCC structure | m ² | 11 060 | 55 | 608 300 |
| 4 | | Preparation of solum | | | | |
| | | (a) All materials | m ² | 43 760 | 55 | 2 406 800 |
| 5 | | Drilling and Grouting - RCC structures | | | | |
| | | (a) Curtain grouting - RCC Spillway | m drill | 5 460 | 83 | 453 306 |
| | | (a) Curtain grouting -Sluice Structure | m drill | 1 240 | 83 | 102 920 |
| | | (c) Curtain grouting -Embankment | m drill | 83 850 | 83 | 6 959 550 |
| 6 | | Drainage -RCC Spillway | | | | |
| | | (b) Drainage from gallery | m drill | 4 095 | 121 | 495 495 |
| 7 | | Cut off to ensure impermeability | | | | |
| | | (a) Bentonite/jet grouting/sheetpiles cut -embankment | m ³ | 80 570 | 3100 | 249 767 000 |
| 8 | | Embankment | | | | |
| | | (a) Earthfill | | | | |
| | | (i) Clay for clay core rockfill | m ³ | 2 231 440 | 15 | 33 471 600 |
| | | (b) Rockfill | m ³ | 9 032 800 | 18 | 162 590 400 |
| | | (c) Filters | | | | |
| | | (i) Coarse Filter material - Upstream in rockfill | m ³ | 247 970 | 55 | 13 638 350 |
| | | (ii) Fine Filter material - Upstream in rockfill | m ³ | 247 970 | 56 | 13 886 320 |
| | | (iii) Coarse Filter material - Downstream in rockfill | m ³ | 247 970 | 55 | 13 638 350 |
| | | (iv) Fine Filter material - Downstream in rockfill | m ³ | 247 970 | 56 | 13 886 320 |
| | | (d) Armoured rock at rockfill embankment | m ³ | 243 530 | 25 | 6 088 250 |
| | | (e) Overhaul beyond 5km | m ³ /km | | | |
| | | (f) Extra over for toe drain | m | 8 000 | 30 | 240 000 |
| 9 | | RCC Spillway Dam | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Side sloped | m ² | 12 100 | 300 | 3 630 000 |
| | | - Downstream Steps vertical | m ² | 11 350 | 253 | 2 871 550 |
| | | - Downstream Steps horizontal and crest | m ² | 8 735 | 262 | 2 288 570 |
| | | - Around outlet pipes | m ² | 170 | 334 | 56 780 |
| | | (ii) Intricate | | | | |
| | | - Spillway Sidewalls | m ² | 370 | 431 | 159 470 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 570 | 690 | 393 300 |
| | | (ii) Structural | | | | |
| | | - Spillway Sidewalls | m ³ | 200 | 1095 | 219 000 |
| | | - Crest Capping at NOC | m ³ | 370 | 750 | 277 500 |

Continue

| SAEGO DAM FSL 283.5 | | | | | | |
|---------------------|---|--|----------------|----------|---------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 10 | | (iii) RCC | | | | |
| | | - Left Side | m ³ | 29 400 | 225 | 6 615 000 |
| | | - Right Side | m ³ | 16 550 | 225 | 3 723 750 |
| | | - Spillway | m ³ | 112 400 | 225 | 25 290 000 |
| | | (c) Reinforcing | | | | |
| | | - Spillway sidewalls | t | 20 | 3020 | 60 400 |
| | | - Crest Capping at NOC | t | 37 | 3020 | 111 740 |
| | | (d) Dowels | | | | |
| | | - Spillway sidewalls | m | 225 | 43 | 9 675 |
| | | - Crest Capping at NOC | m | 1 100 | 43 | 47 300 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 12 000 | 57 | 684 000 |
| | | (ii) Downstream face | m ² | 18 225 | 57 | 1 038 825 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 170 | 670 | 113 900 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 20 | 666 | 13 320 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Left Side | m ² | 1 700 | 90 | 153 000 |
| | | - Right Side | m ² | 900 | 90 | 81 000 |
| | | - Spillway | m ² | 8 050 | 90 | 724 500 |
| | | Spillway and stilling basin (EO Dam body) | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Stilling basin walls | m ² | 290 | 300 | 87 000 |
| | | - Stilling basin floor | m ² | 2 400 | 260 | 624 000 |
| | | (ii) Intricate | | | | |
| | | - Chute blocks | m ² | 50 | 345 | 17 250 |
| | | - Dentated Sill | m ² | 105 | 345 | 36 225 |
| | | - Spillway Ogee | m ² | 735 | 345 | 253 575 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | (ii) Structural | | | | |
| | | - Stilling basin floor | m ³ | 2 175 | 1095 | 2 381 625 |
| | | - Chute blocks | m ³ | 5 | 1095 | 5 476 |
| | | - Dentated Sill | m ³ | 20 | 1095 | 21 903 |
| | | - Spillway Ogee | m ³ | 1 350 | 750 | 1 012 500 |
| | | - Cutoff wall, 3m into rock | m ³ | 225 | 1095 | 246 411 |
| | | - Stilling basin walls | m ³ | 570 | 1095 | 624 241 |
| | | - Downstream retaining wall for channel | m ³ | 700 | 1095 | 766 500 |
| | | (c) Reinforcing | | | | |
| | | - Stilling basin floor | t | 218 | 3020 | 656 850 |
| | | - Chute blocks | t | 1 | 3020 | 1 510 |
| | | - Dentated Sill | t | 2 | 3020 | 6 040 |
| | | - Spillway Ogee | t | 135 | 3020 | 407 700 |
| | | - Cutoff wall, 3m into rock | t | 23 | 3020 | 67 950 |
| | - Stilling basin walls | t | 57 | 3020 | 172 140 | |
| | - Downstream retaining wall for channel | t | 70 | 3020 | 211 400 | |
| | (d) Dowels | | | | | |
| | - Stilling basin floor 8m into rock | m | 5 600 | 43 | 240 744 | |
| | - Chute blocks into steps | m | 330 | 43 | 14 187 | |
| | - Ogee into RCC | m | 400 | 43 | 17 196 | |
| | - Downstream retaining wall for channel, 4m into rock | m | 1 010 | 43 | 43 430 | |
| | (e) Joints incl waterstops | | | | | |
| | (i) Mass concrete | | | | | |
| | (ii) Structural | | | | | |
| | - Stilling basin floor | m ² | 440 | 679 | 298 751 | |
| | - Spillway Ogee | m ² | 120 | 679 | 81 478 | |
| | - Stilling basin walls | m ² | 45 | 679 | 30 554 | |
| | - Downstream retaining wall for channel | m ² | 50 | 679 | 33 949 | |

Continue

| SAEGO DAM FSL 283.5 | | | | | | |
|---------------------|----------|--|----------------|-----------|------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 11 | | Intake and Outlet works | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Intake tower Vertical | m ² | 720 | 283 | 203 760 |
| | | - Outlet house vertical walls inside and outside | m ² | 175 | 283 | 49 525 |
| | | - Intake tower house on crest | m ² | 760 | 283 | 215 080 |
| | | - Outlet house vertical walls inside and outside | m ² | 1 070 | 283 | 302 810 |
| | | - Outlet house vertical walls inside and outside | m ² | 1 070 | 283 | 302 810 |
| | | (ii) Intricate | | | | |
| | | - Intake tower rounded intake | m ² | 100 | 329 | 32 934 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Intake tower Base | m ³ | 205 | 690 | 141 450 |
| | | - Concrete around pipes d/s of dam | m ³ | 580 | 690 | 400 200 |
| | | (ii) Structural | | | | |
| | | - Intake tower walls | m ³ | 100 | 1095 | 109 500 |
| | | - Outlet house | m ³ | 1 375 | 1095 | 1 505 625 |
| | | (c) Reinforcing | | | | |
| | | - Intake tower walls | t | 10 | 3020 | 30 200 |
| | | - Outlet house | t | 138 | 3020 | 415 250 |
| | | (d) Mechanical items | | | | |
| | | (i) Valves | Sum | 1 562 500 | 1 | 1 562 500 |
| | | (i) Gates and screens | Sum | 625 000 | 1 | 625 000 |
| | | (iii) Pipes and pipe specials | Sum | 1 850 000 | 1 | 1 850 000 |
| | | (iv) Cranes and hoists | Sum | 1 050 000 | 1 | 1 050 000 |
| | | (v) Structural steelwork | Sum | 107 500 | 1 | 107 500 |
| 12 | | Sluice Gate Structure | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Side Steps vertical | m ² | 3 330 | 253 | 842 490 |
| | | - Upstream Side Steps horizontal | m ² | 1 320 | 262 | 345 840 |
| | | - Downstream Steps vertical | m ² | 3 330 | 253 | 842 490 |
| | | - Downstream Steps horizontal and crest | m ² | 1 950 | 262 | 510 900 |
| | | - Around outlet pipes | m ² | 250 | 334 | 83 500 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 1 510 | 690 | 1 041 900 |
| | | (ii) Structural | | | | |
| | | - Crest Capping at NOC | m ³ | 190 | 750 | 142 500 |
| | | (iii) RCC | | | | |
| | | - Sluice gate structure | m ³ | 52 500 | 225 | 11 812 500 |
| | | (c) Reinforcing | | | | |
| | | - Crest Capping at NOC | t | 19 | 3020 | 57 380 |
| | | (d) Dowels | | | | |
| | | - Crest Capping at NOC | m | 560 | 43 | 24 080 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 4 650 | 57 | 265 050 |
| | | (ii) Downstream face | m ² | 4 650 | 57 | 265 050 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 250 | 670 | 167 500 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 11 | 666 | 7 326 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Sluice gate structure | m ² | 2 900 | 90 | 261 000 |
| | | (d) Mechanical items | | | | |
| | | (i) Gates and screens | Sum | 2 460 000 | 1 | 2 460 000 |
| | | (iii) Pipes and pipe specials | Sum | 2 208 000 | 1 | 2 208 000 |
| | | (iv) Cranes and hoists | Sum | 800 000 | 1 | 800 000 |
| | | (v) Structural steelwork | Sum | 20 500 | 1 | 20 500 |
| | | SUB TOTAL | | | | 646 448 699 |

Continue

| SAEGO DAM FSL 283.5 | | | | | | |
|----------------------------|-----------------|-----------------------------------|-------------|-----------------|-------------|----------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 13 | | Landscaping | % | 1.00 | 0 | 500 000 |
| 14 | | Measurement allowance | % | 1 | 10 | 64 644 870 |
| SUB TOTAL A | | | | | | 711 593 568 |
| 15 | | Preliminary & general | % | 1 | 40 | 284 637 427 |
| 16 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100000 | 100 000 |
| 17 | | Accommodation | Sum | 1 | 5000000 | 5 000 000 |
| SUB TOTAL B | | | | | | 1 009 249 011 |
| 18 | | Contingencies | % | 1 | 10 | 100 924 901 |
| SUB TOTAL C | | | | | | 1 110 173 912 |
| 19 | | Planning design & supervision | % | 1 | 10 | 111 017 391 |
| SUB TOTAL D | | | | | | 1 221 191 303 |
| 20 | | TAX | % | 1 | 0 | 0 |
| 21 | | Cost of land acquisition | Sum | 1 | 5000000 | 5 000 000 |
| 22 | | Infrastructure Costs | Sum | 1 | 2500000 | 2 500 000 |
| TOTAL PROJECT COST | | | | | | 1 228 691 303 |

| SAEGO DAM FSL 288.5 | | | | | | |
|---------------------|----------|---|--------------------|------------|---------|-------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 45 | 2500 | 112 500 |
| | | (b) Brush | ha | 45 | 2500 | 112 500 |
| | | (c) Trees | ha | 23 | 12000 | 276 000 |
| 2 | | River Diversion | Sum | 1 | 2000000 | 2 000 000 |
| 3 | | Materials | | | | |
| | | (a) Clay materials for infilling at NOC ends - Spillway | m ³ | 800 | 15 | 12 000 |
| 4 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials - Embankment | m ³ | 5 290 550 | 7 | 38 303 582 |
| | | (ii) Extra over for rock- Embankment | m ³ | 264 530 | 10 | 2 684 980 |
| | | (iii) All materials - RCC Spillway | m ³ | 90 000 | 7 | 630 000 |
| | | (iv) Extra over for rock - Spillway | m ³ | 18 000 | 10 | 180 000 |
| | | (v) All materials - Spillway Channel | m ³ | 327 350 | 7 | 2 291 450 |
| | | (vi) Extra over for rock - Spillway Channel | m ³ | 65 470 | 10 | 654 700 |
| | | (b) Confined | | | | |
| | | (i) All materials | | | | |
| | | - Spillway Cut-off wall | m ³ | 900 | 11 | 9 495 |
| | | - Extra over for rock | m ³ | 900 | 14 | 12 600 |
| | | (c) Final foundation preparation at RCC structure | m ² | 13 280 | 55 | 730 400 |
| 5 | | Preparation of solum | | | | |
| | | (a) All materials | m ² | 911 000 | 55 | 50 105 000 |
| 6 | | Drilling and Grouting - RCC structures | | | | |
| | | (a) Curtain grouting - RCC Spillway | m drill | 7 020 | 83 | 582 822 |
| | | (a) Curtain grouting -Sluice Structure | m drill | 1 550 | 83 | 128 650 |
| | | (c) Curtain grouting -Embankment | m drill | 102 520 | 83 | 8 509 160 |
| 7 | | Drainage -RCC Spillway | | | | |
| | | (b) Drainage from gallery | m drill | 5 265 | 121 | 637 065 |
| 8 | | Cut off to ensure impermeability | | | | |
| | | (a) Bentonite/jet grouting/sheetpiles cut -embankment | m ³ | 43 760 | 3100 | 135 656 000 |
| 9 | | Embankment | | | | |
| | | (a) Earthfill | | | | |
| | | (i) Clay for clay core rockfill | m ³ | 2 930 930 | 15 | 43 963 950 |
| | | (b) Rockfill | m ³ | 12 279 308 | 18 | 221 027 544 |
| | | (c) Filters | | | | |
| | | (i) Coarse Filter material - Upstream in rockfill | m ³ | 305 215 | 55 | 16 786 825 |
| | | (ii) Fine Filter material - Upstream in rockfill | m ³ | 305 215 | 56 | 17 092 040 |
| | | (iii) Coarse Filter material - Downstream in rockfill | m ³ | 305 215 | 55 | 16 786 825 |
| | | (iv) Fine Filter material - Downstream in rockfill | m ³ | 305 215 | 56 | 17 092 040 |
| | | (d) Armoured rock at rockfill embankment | m ³ | 99 400 | 25 | 2 485 000 |
| | | (e) Overhaul beyond 5km | m ³ /km | | | |
| | | (f) Extra over for toe drain | m | 8 500 | 30 | 255 000 |
| 10 | | RCC Spillway Dam | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Side sloped | m ² | 14 700 | 300 | 4 410 000 |
| | | - Downstream Steps vertical | m ² | 13 890 | 253 | 3 514 170 |
| | | - Downstream Steps horizontal and crest | m ² | 10 700 | 262 | 2 803 400 |
| | | - Around outlet pipes | m ² | 200 | 334 | 66 800 |
| | | (ii) Intricate | | | | |
| | | - Spillway Sidewalls | m ² | 410 | 431 | 176 710 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 670 | 690 | 462 300 |
| | | (ii) Structural | | | | |
| | | - Spillway Sidewalls | m ³ | 210 | 1095 | 229 950 |
| | | - Crest Capping at NOC | m ³ | 390 | 750 | 292 500 |

Continue

| SAEGO DAM FSL 288.5 | | | | | | |
|---------------------|---|--|-------|----------|---------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 11 | | (iii) RCC | | | | |
| | | - Left Side | m³ | 40 100 | 225 | 9 022 500 |
| | | - Right Side | m³ | 29 700 | 225 | 6 682 500 |
| | | - Spillway | m³ | 160 675 | 225 | 36 151 875 |
| | | (c) Reinforcing | | | | |
| | | - Spillway sidewalls | t | 21 | 3020 | 63 420 |
| | | - Crest Capping at NOC | t | 39 | 3020 | 117 780 |
| | | (d) Dowels | | | | |
| | | - Spillway sidewalls | m | 290 | 43 | 12 470 |
| | | - Crest Capping at NOC | m | 1 200 | 43 | 51 600 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m² | 14 700 | 57 | 837 900 |
| | | (ii) Downstream face | m² | 23 379 | 57 | 1 332 603 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m² | 200 | 670 | 134 000 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m² | 25 | 666 | 16 650 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Left Side | m² | 2 200 | 90 | 198 000 |
| | | - Right Side | m² | 1 520 | 90 | 136 800 |
| | | - Spillway | m² | 10 530 | 90 | 947 700 |
| | | Spillway and stilling basin (EO Dam body) | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Stilling basin walls | m² | 290 | 300 | 87 000 |
| | | - Stilling basin floor | m² | 2 400 | 260 | 624 000 |
| | | (ii) Intricate | | | | |
| | | - Chute blocks | m² | 50 | 345 | 17 250 |
| | | - Dentated Sill | m² | 105 | 345 | 36 225 |
| | | - Spillway Ogee | m² | 735 | 345 | 253 575 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | (ii) Structural | | | | |
| | | - Stilling basin floor | m³ | 2 175 | 1095 | 2 381 625 |
| | | - Chute blocks | m³ | 5 | 1095 | 5 476 |
| | | - Dentated Sill | m³ | 20 | 1095 | 21 903 |
| | | - Spillway Ogee | m³ | 1 350 | 750 | 1 012 500 |
| | | - Cutoff wall, 3m into rock | m³ | 225 | 1095 | 246 411 |
| | | - Stilling basin walls | m³ | 570 | 1095 | 624 241 |
| | | - Downstream retaining wall for channel | m³ | 700 | 1095 | 766 500 |
| | | (c) Reinforcing | | | | |
| | - Stilling basin floor | t | 218 | 3020 | 656 850 | |
| | - Chute blocks | t | 1 | 3020 | 1 510 | |
| | - Dentated Sill | t | 2 | 3020 | 6 040 | |
| | - Spillway Ogee | t | 135 | 3020 | 407 700 | |
| | - Cutoff wall, 3m into rock | t | 23 | 3020 | 67 950 | |
| | - Stilling basin walls | t | 57 | 3020 | 172 140 | |
| | - Downstream retaining wall for channel | t | 70 | 3020 | 211 400 | |
| | (d) Dowels | | | | | |
| | - Stilling basin floor 8m into rock | m | 5 600 | 43 | 240 744 | |
| | - Chute blocks into steps | m | 330 | 43 | 14 187 | |
| | - Ogee into RCC | m | 400 | 43 | 17 196 | |
| | - Downstream retaining wall for channel, 4m into rock | m | 1 010 | 43 | 43 430 | |
| | (e) Joints incl waterstops | | | | | |
| | (i) Mass concrete | | | | | |
| | (ii) Structural | | | | | |
| | - Stilling basin floor | m² | 440 | 679 | 298 751 | |
| | - Spillway Ogee | m² | 120 | 679 | 81 478 | |
| | - Stilling basin walls | m² | 45 | 679 | 30 554 | |
| | - Downstream retaining wall for channel | m² | 50 | 679 | 33 949 | |

Continue

| SAEGO DAM FSL 288.5 | | | | | | |
|---------------------|----------|--|----------------|-----------|------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 12 | | Intake and Outlet works | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Intake tower Vertical | m ² | 865 | 283 | 244 795 |
| | | - Outlet house vertical walls inside and outside | m ² | 175 | 283 | 49 525 |
| | | - Intake tower house on crest | m ² | 760 | 283 | 215 080 |
| | | - Outlet house vertical walls inside and outside | m ² | 1 070 | 283 | 302 810 |
| | | - Outlet house vertical walls inside and outside | m ² | 1 070 | 283 | 302 810 |
| | | (ii) Intricate | | | | |
| | | - Intake tower rounded intake | m ² | 120 | 329 | 39 521 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Intake tower Base | m ³ | 205 | 690 | 141 450 |
| | | - Concrete around pipes d/s of dam | m ³ | 600 | 690 | 414 000 |
| | | (ii) Structural | | | | |
| | | - Intake tower walls | m ³ | 120 | 1095 | 131 400 |
| | | - Outlet house | m ³ | 1 375 | 1095 | 1 505 625 |
| | | (c) Reinforcing | | | | |
| | | - Intake tower walls | t | 12 | 3020 | 36 240 |
| | | - Outlet house | t | 138 | 3020 | 415 250 |
| | | (d) Mechanical items | | | | |
| | | (i) Valves | Sum | 1 812 500 | 1 | 1 812 500 |
| | | (i) Gates and screens | Sum | 725 000 | 1 | 725 000 |
| | | (iii) Pipes and pipe specials | Sum | 2 146 000 | 1 | 2 146 000 |
| | | (iv) Cranes and hoists | Sum | 1 050 000 | 1 | 1 050 000 |
| | | (v) Structural steelwork | Sum | 124 700 | 1 | 124 700 |
| | | Sluice Gate Structure | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Side Steps vertical | m ² | 3 730 | 253 | 943 690 |
| | | - Upstream Side Steps horizontal | m ² | 1 575 | 262 | 412 650 |
| | | - Downstream Steps vertical | m ² | 3 730 | 253 | 943 690 |
| | | - Downstream Steps horizontal and crest | m ² | 2 205 | 262 | 577 710 |
| | | - Around outlet pipes | m ² | 300 | 334 | 100 200 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Around outlet pipes | m ³ | 1 820 | 690 | 1 255 800 |
| | | (ii) Structural | | | | |
| | | - Crest Capping at NOC | m ³ | 190 | 750 | 142 500 |
| | | (iii) RCC | | | | |
| | | - Sluice gate structure | m ³ | 70 560 | 225 | 15 876 000 |
| | | (c) Reinforcing | | | | |
| | | - Crest Capping at NOC | t | 19 | 3020 | 57 380 |
| | | (d) Dowels | | | | |
| | | - Crest Capping at NOC | m | 560 | 43 | 24 080 |
| | | (e) Facing (GEVR) | | | | |
| | | (i) Upstream face | m ² | 5 305 | 57 | 302 385 |
| | | (ii) Downstream face | m ² | 5 305 | 57 | 302 385 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | - One side of outlet block | m ² | 300 | 670 | 201 000 |
| | | (ii) Structural | | | | |
| | | - Through concrete capping at NOC | m ² | 11 | 666 | 7 326 |
| | | (iii) RCC (Incl water stops and joint formers) | | | | |
| | | - Sluice gate structure | m ² | 4 000 | 90 | 360 000 |
| | | (d) Mechanical items | | | | |
| | | (i) Gates and screens | Sum | 2 460 000 | 1 | 2 460 000 |
| | | (iii) Pipes and pipe specials | Sum | 2 208 000 | 1 | 2 208 000 |
| | | (iv) Cranes and hoists | Sum | 800 000 | 1 | 800 000 |
| | | (v) Structural steelwork | Sum | 20 500 | 1 | 20 500 |
| | | SUB TOTAL | | | | 691 792 342 |

Continue

| SAEGO DAM FSL 288.5 | | | | | | |
|---------------------------|----------|-----------------------------------|------|----------|---------|----------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 13 | | Landscaping | % | 1.00 | 0 | 500 000 |
| 14 | | Measurement allowance | % | 1 | 10 | 69 179 234 |
| SUB TOTAL A | | | | | | 761 471 576 |
| 15 | | Preliminary & general | % | 1 | 40 | 304 588 630 |
| 16 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100000 | 100 000 |
| 17 | | Accommodation | Sum | 1 | 5000000 | 5 000 000 |
| SUB TOTAL B | | | | | | 1 079 078 221 |
| 18 | | Contingencies | % | 1 | 10 | 107 907 822 |
| SUB TOTAL C | | | | | | 1 186 986 043 |
| 19 | | Planning design & supervision | % | 1 | 10 | 118 698 604 |
| SUB TOTAL D | | | | | | 1 305 684 648 |
| 20 | | TAX | % | 1 | 0 | 0 |
| 21 | | Cost of land acquisition | Sum | 1 | 5000000 | 5 000 000 |
| 22 | | Infrastructure Costs | Sum | 1 | 2500000 | 2 500 000 |
| TOTAL PROJECT COST | | | | | | 1 313 184 648 |

| SAEGO CATCH DAM FSL 269 | | | | | | |
|-------------------------|----------|--|--------------------|-----------|---------|------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 1 | | Site and basin clearing | | | | |
| | | (a) Sparse | ha | 23 | 2500 | 57 500 |
| | | (b) Brush | ha | 23 | 2500 | 57 500 |
| | | (c) Trees | ha | 12 | 12000 | 140 400 |
| 2 | | River Diversion | Sum | 1 | 2000000 | 2 000 000 |
| 3 | | Excavation | | | | |
| | | (a) Bulk | | | | |
| | | (i) All materials- Embankment | m ³ | 1 829 400 | 7 | 13 244 856 |
| | | (ii) Extra over for rock | m ³ | 91 470 | 10 | 928 421 |
| | | (i) All materials- Concrete weir | m ³ | 386 870 | 7 | 2 708 090 |
| | | (ii) Extra over for rock - Concrete weir | m ³ | 77 380 | 10 | 773 800 |
| | | (i) All materials- Rockfill Weir | m ³ | 177 500 | 7 | 1 242 500 |
| | | (b) Final foundation preparation at concrete structure | m ² | 59 651 | 55 | 3 280 805 |
| 4 | | Preparation of solum | | | | |
| | | (a) All materials | m ² | 344 500 | 55 | 18 947 500 |
| 5 | | Drilling and Grouting - RCC structures | | | | |
| | | (a) Curtain grouting - Concrete NOC Section | m drill | 3 210 | 83 | 266 504 |
| 6 | | Cut off to ensure impermeability | | | | |
| | | (a) Bentonite/jet grouting cut off below embankment | m ³ | 30 625 | 3100 | 94 937 500 |
| 7 | | Embankment | | | | |
| | | (a) Earthfill | | | | |
| | | (i) Clay for clay core rockfill | m ³ | 473 800 | 15 | 7 107 000 |
| | | (b) Rockfill | m ³ | 1 488 300 | 18 | 26 789 400 |
| | | (c) Filters | | | | |
| | | (i) Coarse Filter material - Upstream in rockfill | m ³ | 85 000 | 55 | 4 675 000 |
| | | (ii) Fine Filter material - Upstream in rockfill | m ³ | 85 000 | 56 | 4 760 000 |
| | | (iii) Coarse Filter material - Downstream in rockfill | m ³ | 85 000 | 55 | 4 675 000 |
| | | (iv) Fine Filter material - Downstream in rockfill | m ³ | 85 000 | 56 | 4 760 000 |
| | | (d) Armoured rock at rockfill embankment | m ³ | 223 800 | 20 | 4 476 000 |
| | | (e) Overhaul beyond 5km | m ³ /km | | | |
| | | (f) Extra over for toe drain | m | 6 300 | 30 | 189 000 |
| | | (g) Rockfill for berm | m ³ | 95 420 | 18 | 1 717 560 |
| 8 | | Concrete Weir | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Upstream Vertical Sloped of weir | m ² | 4 790 | 283 | 1 355 570 |
| | | - Upstream Vertical Sloped of NOC | m ² | 3 210 | 283 | 908 430 |
| | | - Downstream Sloped of NOC and crest | m ² | 4 560 | 283 | 1 290 480 |
| | | - Vertical slope of retaining wall | m ² | 800 | 283 | 226 400 |
| | | - Sloped side of retaining wall | m ² | 850 | 300 | 255 000 |
| | | - Horizontal of concrete apron | m ² | 4 230 | 300 | 1 269 000 |
| | | (ii) Intricate | | | | |
| | | - Spillway downstream side | m ² | 7 790 | 309 | 2 407 110 |
| | | (b) Concrete | | | | |
| | | (i) Mass | | | | |
| | | - Concrete weir | m ³ | 42140 | 690 | 29 076 600 |
| | | - NOC Section | m ³ | 21850 | 690 | 15 076 500 |
| | | (ii) Structural | | | | |
| | | - Retaining wall | m ³ | 6 200 | 1095 | 6 789 000 |
| | | - Spillway Apron | m ³ | 4 250 | 1095 | 4 653 750 |
| | | (f) Joints | | | | |
| | | (i) Mass concrete | | | | |
| | | -Joints at concrete weir | m ² | 2 100 | 670 | 1 407 000 |
| | | -Joints at concrete NOC | m ² | 1 140 | 670 | 763 800 |
| | | (ii) Structural | | | | |
| | | - At Retaining wall | m ² | 120 | 666 | 79 920 |

Continue

| SAEGO CATCH DAM FSL 269 | | | | | | |
|-------------------------|----------|-----------------------------------|----------------|----------|---------|--------------------|
| No. | Pay Ref. | Description | Unit | Quantity | Rate | Amount |
| 9 | | Concrete Canal | | | | |
| | | (a) Formwork | | | | |
| | | (i) Gang formed | | | | |
| | | - Sloped canal sides | m ² | 9 200 | 283 | 2 603 600 |
| | | - Horizontal floor of canal | m ² | 46 000 | 300 | 13 800 000 |
| | | (b) Concrete | | | | |
| | | (ii) Structural | | | | |
| | | - Reinforced concrete canal | m ³ | 13 800 | 1095 | 15 111 000 |
| | | (c) Reinforcing | | | | |
| | | - Reinforced concrete canal | t | 1 380 | 3021 | 4 168 980 |
| | | SUB TOTAL | | | | 298 976 475 |
| 10 | | Landscaping | % | 1.00 | 0 | 500 000 |
| 11 | | Measurement allowance | % | 1 | 10 | 29 897 648 |
| | | SUB TOTAL A | | | | 329 374 123 |
| 12 | | Preliminary & general | % | 1 | 40 | 131 749 649 |
| 13 | | Preliminary works | | | | |
| | | (a) Access road | km | 15 | 511201 | 7 668 015 |
| | | (b) Electricity to site | Sum | 1 | 200000 | 200 000 |
| | | (c) Construction water to site | Sum | 1 | 50000 | 50 000 |
| | | (d) Railhead & materials handling | Sum | 1 | 100000 | 100 000 |
| 14 | | Accommodation | Sum | 1 | 5000000 | 5 000 000 |
| | | SUB TOTAL B | | | | 474 141 787 |
| 15 | | Contingencies | % | 1 | 10 | 47 414 179 |
| | | SUB TOTAL C | | | | 521 555 966 |
| 16 | | Planning design & supervision | % | 1 | 10 | 52 155 597 |
| | | SUB TOTAL D | | | | 573 711 562 |
| 17 | | TAX | % | 1 | 0 | 0 |
| 18 | | Cost of land acquisition | Sum | 1 | 5000000 | 5 000 000 |
| 19 | | Infrastructure Costs | Sum | 1 | 2500000 | 2 500 000 |
| | | TOTAL PROJECT COST | | | | 581 211 562 |