**केंद्रीय विद्युत प्राधिकरण**
**Central Electricity Authority**
**जल विद्युत परियोजना प्रबोधन प्रभाग**
**Hydro Project Monitoring Division**

**Subject: Site visit to Kundah Pump Storage H.E. Project (4x125=800 MW) in Tamil Nadu being executed by M/S TANGEDCO.**

The Kundah PSP was visited by undersigned from 25th to 27th February, 2022 to review the progress of under construction works. During the visit, officers from TANGEDCO also accompanied to show the various activities under construction including Civil, Hydro-Mechanical & Electro-Mechanical works of works. During the visit, discussion also held with project officials of contractors alongwith TANGEDCO officers w.r.t. delay in construction works as earlier estimated COD i.e. April, 23. Now, developer shifted the COD to March, 24 and it seems that present pace of the civil works is good and hope plant may be commissioned to this revised schedule.

**2. Introduction**:

Kundah PSP to operate between existing Porthimund Reservoir (Upper Reservoir) having a capacity of 1.73 TMC at FRL 2220 M and existing Emerald & Avalanche Reservoirs (as lower Reservoirs) having a capacity of 5.5 TMC at FRL 1985 M. Since there is no river connected to reservoirs, generation is dependent upon the water existed in the upper reservoir plus water received from catchment area during lean season.

Civil works and Hydro-Mechanical works awarded in package-I & II. Package I was awarded to M/s Patel Engg. Ltd. on 15.2.2018 which includes Main Access Tunnel (MAT), adits in power house complex & in TRT complex, power house cavern, transfer cavern complex including bus duct & draft gate tube opening, tail race tunnel (TRT), TRT surge chamber, TRT Gate shaft, unit and common draft tube tunnels, lower intake and other associated works.

Package II was awarded to M/s Kundah PSP Consortium, Mumbai on 15.2.2018 which includes upper intake structurers (intake structure & approach channel), head race tunnel (HRT), HRT surge shaft, adits to intake structures (portal development, HRT & pressure shaft top), pressure shafts, HRT gate shaft and other associated works.

Package III for Electro-Mechanical works was awarded to M/s Megha Engg. & Infrastructure Ltd. on 28.11.2019 and Megha further given the contract to GE for supply of TGs and other associated works. However, progress of Electro-Mechanical works is very negligible as officials of Megha stated that till require civil works is not done the Electro-Mechanical works can not started. However, Megha is establishing the office and other complexes at site & other nearby palaces to carry out the works.

The total cost of EPC works out to Rs. 2424.09 crore.

3. **The salient features of the project are as under:**

- Pumped Storage Projects are energy storage systems to store the surplus energy available in the grid from the renewable energy sources.
- This project is an underground Pumped Storage with an installed capacity of 500 MW (4x125 MW)to meet the peak power demand of the State Grid with a view to provide quality & reliable power supply.
- The surplus energy available during off-peak time to be utilized for pumping water from the lower reservoir to the upper reservoir and the same water will be utilized for generation during peak time.
- The purpose of the project is to produce 3 million units per day at a cost lesser than the purchasecost of power.
- Under this Project, the existing Porthimund and Avalanche – Emerald reservoirs will be utilized asupper and lower reservoir respectively.
- The underground Power House (156m x 22m x 48m) is positioned between these two existingreservoirs and connected with water conductor system of about 3 Km length
- Rural Electrification Corporation has funded for this project.
- All the statutory clearances have been obtained including for Forest land diversion.

**4. Milestone Dates and Progress:**

| **Sl. No.** | **Description** | **Civil & Hydro-Mech. Works** | | **Electrical & Mechanical Works** |
|---|---|---|---|---|
| | | Package I | Package II | Package III |
| 1 | LOI & Zero date | 15.02.2018 | 15.02.2018 | 28.11.2019 |
| 2 | Contract Period | 48 Months | 45 Months | 42 Months |
| 3 | COD and Handing over asper Schedule | 14.02.2022 | 14.11.2021 | 27.05.2023 |

| | | | | |
|---|---|---|---|---|
| 4 | Revised COD | -<br>- | -<br>- | 27.03.2024 |
| 5 | Physical Progress | 47.00% | 28.00% | -- |

5. The progress detail of each activity of under constructions and site photograph taken by undersigned is enclosed as **Annexure-I**. The Layout plan also enclosed as **Annexure-II**.

6. The Superintending Engineer of project is also requested to furnish the estimated capital cost of project including IEDC with interest during construction (IDC) to CEA. It is also requested to submit the detail note on delay of the construction of project. They agreed for same.

Date:4.3.2022

(Bharat Gupta)
Dy. Director

Annexure-I

## Kundah Pumped Storage Hydro Electric Project: Physical Progress

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EPC Contract Package - I** | | | | | | | | | | | | | |
| **Date of Award : 15.02.2018** | | | | | | | | | | | | | |
| **Physical Progress : 47.00%** | | | | | | **Financial progress: 43.00%** | | | | | | | |
| **Sl. No** | **Component** | **Qty** | **As per Schedule** | | **As per Actual** | | **Progress Upto 23.02.2022** | | **Balance** | | **Expected Date of completion** | **Remarks** |
| | | | **Start** | **Finish** | **Start** | **Finish** | **Qty** | **%** | **Qty** | **%** | | |
| **1)** | **Main Access tunnel (Balance): [8.00m D-Shape, Length - 284m]** | | | | | | | | | | | |
| a) | Excavation | 284m | 03.06.2018 | 30.10.2018 | 15.06.2018 | 17.01.2019 | 284m | 100% | - | - | - | Completed |
| **2)** | **CCVT (Balance): [6.50m D Shape, Length-369m]** | | | | | | | | | | | |
| a) | Excavation | 369m | 03.07.2018 | 03.01.2019 | 05.06.2018 | 07.10.2018 | 369m | 100% | - | - | - | Completed. |
| **3)** | **ADITS** | | | | | | | | | | | |
| **3.1)** | **Adits in Power House complex: [Length-637.60m]** | | | | | | | | | | | |
| | Excavation | 637.60 m | 01.09.2018 | 06.11.2019 | 07.10.2018 | 21.11.2020 | 637.60 m | 100% | - | - | - | Completed |
| **3.2)** | **Adits in TRT complex: [Length-862.30m]** | | | | | | | | | | | |
| | Excavation | 862.30 m | 23.06.2018 | 28.05.2019 | 05.07.2018 | 24.01.2019 | 862.30 m | 100% | - | - | - | Completed |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **4)** | **Power House Cavern: [156.00 x 22.00 x 48.00m]** | | | | | | | | | | | |
| | Excavation | 13682 6 $m^3$ | 11.01.2019 | 10.05.2020 | 18.11.2018 | - | 115000 $m^3$ | 84% | 2182 $6m^3$ | 16 % | 20.11.2023 (Including Concreting) | Excavation below EL. +1918.00m in progress. Revised completion date for excavation: 03/2022 |
| **5)** | **Transformer Cavern Complex (Transformer Cavern, bus ducts, Draft tube gate opening) - [137.37 x 19.00 x 18.50m]** | | | | | | | | | | | |
| | Excavation | 53000 $m^3$ | 07.11.2019 | 16.02.2021 | 17.11.2018 | - | 48454 $m^3$ | 91% | 4546 $m^3$ | 9% | 09.12.2022 2 (Including Concreting) | Cavern excavation completed. Pits & trenches to be excavated |
| **6)** | **Tail Race Tunnel: [(Dia-9.30m, Length-895.00m) (Dia-6.80m, Length-141.00m)]** | | | | | | | | | | | |
| a) | Excavation | 1036m | 21.09.2018 | 24.12.2019 | 01.01.2019 | - | 939m | 91% | 97m | 9% | 21.09.2023 (Including Concreting) | TRT from gate shaft to lower intake (97m) is yet to be excavated. This will be done on completion of lining concrete on D/s of TRT. |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| b) | Concreting | 1036m | 19.11.2020 | 03.06.2021 | 05.03.2020 | - | 221m | 21% | 815 m | 79 % | 21.09.2023 | Work in progress. |
| **7)** | **Tail Race Tunnel Surge Chamber: [52.00 x 10.00 x 72.50m]** | | | | | | | | | | | |
| | Excavation | 51788 $m^3$ | 29.05.2019 | 24.12.2019 | 25.01.2019 | 15.10.2021 | 51788 $m^3$ | 100% | - | - | 28.07.2023 (Including Concreting) | Completed. |
| **8)** | **TRT Gate Shaft: [Dia-10.60m, Depth-73.50m]** | | | | | | | | | | | |
| | Excavation | 73.50 m | 01.10.2020 | 30.09.2021 | 24.10.2020 | 19.09.2021 | 73.50m | 100% | - | - | 28.08.2023 (Including Concreting) | Completed. |
| **9)** | **Unit and Common Draft Tube tunnels: [(Dia-6.90m, Length-140.04m) (Dia-5.70m, Length-85.00m) (Dia-5.10m, Length-241.00m)]** | | | | | | | | | | | |
| | Excavation | 594m | 25.12.2019 | 05.08.2020 | 23.09.2020 | - | 249m | 42% | 345 m | 58 % | 13.06.2023 (Including Concreting) | 1. Common Draft Tubes 1 & 2 Completed . 2. Unit Draft Tube mining in progress. |
| **10)** | **Lower Intake** | | | | | | | | | | | |
| | Excavation | 1No | - | - | - | - | - | - | - | - | 22.03.2024 (Including Concreting) | LC Proposal for lowering the water level in Emerald dam submitted to CE/Grid Operation on 08.10.2021. LC yet to be approved. |

| EPC Contract Package - II | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Date of Award : 15.02.2018** | | | | | | | | | | | | | |
| **Physical Progress: 28.00%** | | | | | | | | | **Financial Progress: 26.00%** | | | | |
| **Sl. No** | **Component** | **Qty** | **As per Schedule** | | **As per Actual** | | **Progress Upto 23.02.2022** | | **Balance** | | **Expected Date of completion** | **Remarks** |
| | | | **Start** | **Finish** | **Start** | **Finish** | **Qty** | **%** | **Qty** | **%** | | |
| **1)** | **Upper intake structures (Intake Structure & Approach Channel)** | | | | | | | | | | | |
| | Excavation | 45.75 m | 18.10.2018 | 13.05.2020 | 09.10.2021 | - | 10m | 22% | 35.7m | 78% | 26.08.2023 (Including Concreting) | Work commenced on 01.10.2021 and in progress. |
| **2)** | **Head Race Tunnel : 9.30m dia / 1296.0m** | | | | | | | | | | | |
| | Excavation (Benching-1.7m depth) | 1247m | 11.03.2019 | 30.10.2020 | 27.01.2020 | - | 543m | 43.5 % | 704.0m | 56.5 % | 02.05.2023 (Including Concreting) | Expected completion 03/2022. |

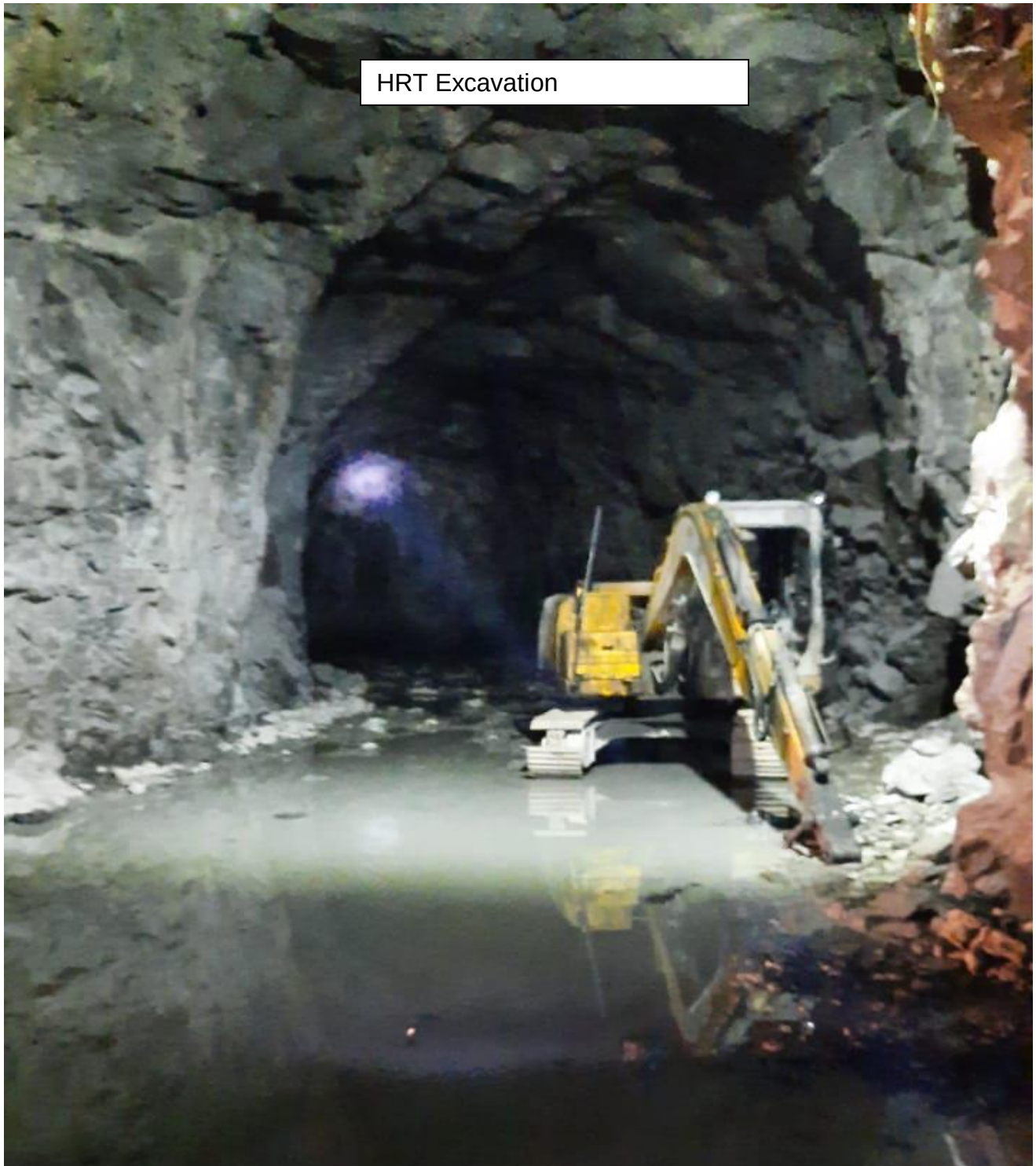
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3)** | **Head Race Tunnel Surge Shaft : Varying diameter -33.0m/17.90m/11.90m** | | | | | | | | | | | |
| | Excavation | 69m | 04.06.2018 | 24.12.2019 | 28.11.2018 | 17.04.2021 | 69m | 100% | - | - | 22.06.2023 (Including Concreting) | Completed |
| **4)** | **ADITS : D shape - 7.0m x 7.0m** | | | | | | | | | | | |
| | i) Portal Development | 1 No | 04.06.2018 | 02.08.2018 | 21.01.2019 | 17.02.2019 | 1 No | 100% | - | - | | Completed |
| | ii) To Head Race Tunnel | 433m | 03.08.2018 | 10.03.2019 | 18.02.2019 | 08.01.2020 | 433m | 100% | - | - | | Completed |
| | iii) To Pressure shaft Top | 120m | 11.12.2018 | 11.02.2019 | 10.01.2020 | 17.02.2020 | 120m | 100% | - | - | | Completed |
| **5)** | **Pressure Shafts** | | | | | | | | | | | |
| **a.** | **Pressure Shaft-1 : 6.30m dia / Pilot tunnel -3.0m dia/Unit penstock- 4.70m dia** | | | | | | | | | | | |
| | i) Top and Bottom horizontal - Excavation | 157m | 27.02.2019 | 26.04.2019 | 02.03.2019 | 31.10.2021 | 157m | 100% | - | - | 02.07.2023 (Including Ferrule erection and backfill concreting) | Completed |
| | ii) Inclined shaft - Pilot - Excavation | 298.50 m | 27.04.2019 | 26.04.2020 | 04.05.2019 | 09.04.2021 | 298.50 m | 100% | - | - | | Completed |
| | iii) Inclined shaft- widening / Slashing | 298.50 m | 27.04.2020 | 03.10.2020 | 01.12.2021 | - | 3m | 1% | 295.5 m | 99% | | Work in progress. |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **b.** | **Pressure Shaft-2 : 6.30m dia / Pilot tunnel -3.0m dia/Unit penstock- 4.70m dia** | | | | | | | | | | | |
| | i) Top and Bottom horizontal - Excavation | 163m | 12.02.2019 | 10.04.2019 | 17.04.2019 | 31.12.2021 | 163m | 100% | - | - | 02.07.2023 (Including Ferrule erection and backfill concreting) | Completed |
| | ii) Inclined shaft - Pilot - Excavation | 298.50 m | 11.05.2019 | 10.04.2020 | 03.07.2019 | 30.09.2021 | 298.50 m | 100% | - | - | | Completed |
| | iii) Inclined shaft - Widening | 298.50 m | 11.04.2020 | 17.09.2020 | - | - | - | - | 298.5 m | 100% | | Yet to commence |
| **6)** | **HRT Gate Shaft : 10.60m dia** | | | | | | | | | | | |
| | Excavation | 35.75 m | 01.04.2021 | 05.07.2021 | 05.07.2021 | - | 26m | 73% | 9.75m | 27% | 26.06.2022 (Including Concreting) | Work in progress. |

## Package-III: E&M Works (Date of Award 28.11.2019) - Physical Progress

| **Materials Supply Status** | | |
|---|---|---|
| **Sl.No.** | **Description** | **Date of Receipt** |
| 1. | Earth Rods | 24.08.2021 |
| 2. | Draft Tube Embedded parts | 16.09.2021 |

| | | |
|---|---|---|
| 3. | Turbine piping and accessories (stage-I) | 02.11.2021 |
| 4. | Embedded parts of stay ring | 30.12.2021 |
| 5. | Draft Tube Elbow and Liner for Unit 1 to 4 | From 09.01.2022 to 16.02.2022 |


HRT Excavation

**Power House excavation**

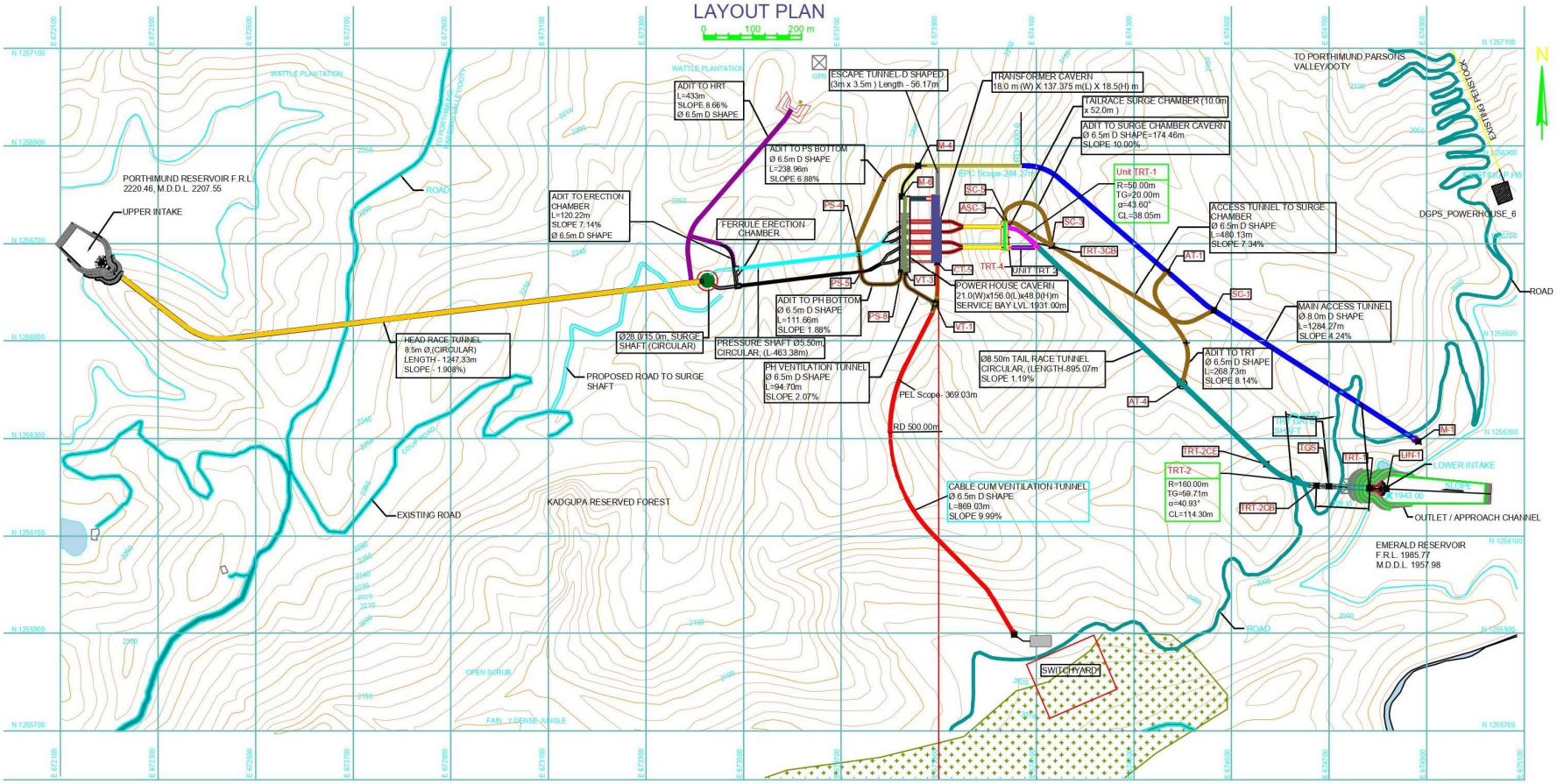
**HRT Intake excavation**

**Ferrule erection chambers**

**Under construction Coffer dam for TRT**

**Adit for TRT**

**Kundah PSP Site Office**




## LEGEND : Package - I- (MINING)

- MAT (1284 m) - 100 % COMPLETED
- CCVT (869 M) - 100 % COMPLETED
- ALL ADITS (1500 M)- 100 % COMPLETED
- TRANSFORMER CAVERN - 91% COMPLETED
- POWER HOUSE : Benching work in progress from 1931m ( 65 % work completed and further excavation under progress)
- Tail Race Tunnel : 864 m out of 895 m Completed. (91% Completed.)
- Unit TRT-1 & 2 : (100% Completed.)
- Tail Race Surge Chamber - 72.5m depth out of 72.5m completed.
- Common Draft Tube Tunnel- 1 & 2 - 100% completed.

## LEGEND : Package - II(MINING)

- ADIT to HRT & ADIT to FERRULE ERECTION CHAMBER — 533 m - 100 % COMPLETED
- PRESSURE SHAFT: Lower Horizontal portion: Pressure Shaft 1(PS_1) : 84 m, Pressure Shaft 2(PS_2) : 85 m — 100 % Completed
- Pressure Shaft 1(PS_1) : Inclined Portion - 100 % completed Pilot tunnel 299 m out of 299m completed(Slashing under progress).
- Pressure Shaft 2(PS_2) : Inclined Portion : 77 % completed Pilot Tunnel 299m out 299m completed. (Slashing under progress).
- Head Race Surge shaft - Mining Completed
- Head Race tunnel: 1247m completed.(Heading Completed benching in progress)

**TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED**

PROJECT:

KUNDAH PUMPED STORAGE HYDRO ELECTRIC PROJECT ( 4 X 125 MW) - IN THE NILGIRIS DISTRICT

Title :

GENERAL ARRANGEMENT PLAN