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PETRA CRUSHERS

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The Director- IA. II (M), Dt. 30-05-2018
Ministry of Environment, Forests & Climate Change,
Indira Paryavaran Bhawan, Jor Bagh Road,
New Delhi-110 003.

Ref. :- 1. File No. IA-J-11015/43/2018-IA-II(M)
2. 31st EAC Meeting held on 14th - 15th May, 2018

Sub.:- Environmental Clearance - Proposed "Building Stone Mine" situated at Survey Nos. 58/3-1, 58/3-3, 58/3-5, 58/3-6, 59/1-1, 59/3, 59/5, 82/1, 83/4, 86/4, 87/1, 87/2, 92/3-1, 92/3-2, 92/3-4, 92/3-5, Kootickal Village & Panchayat, Kanjirappally Taluk, Kottayam District, Kerala for an area of 6.8976 ha. - B2 Category – Clarifications - Reg.

Respected Sir,

With reference to the above mentioned subject, mentioned below is the point wise reply to the queries raised in the minutes of the 31st meeting of Expert Appraisal Committee (EAC) held on 14th – 15th May, 2018.

Q. i. The Member Secretary informed to the Committee that the Ministry has issued the directions under Section 5 of the Environment (Protection) Act, 1986, vide letter No. 1-4/2012 - RE (Pt), dated 13.11.2013 regarding prohibition of mining activity in the ESA identified by the HL WG and provided a list (State-wise, District-wise and Taluk-wise village). The Committee noted that the instant LOI/MLA is a part of the list. The project site is in Kootickal village and which is in the list. MoEF vide O.M. dt. 20-12-2013 while accepting the recommendations of HLWG report directed all concerned State Governments to demarcate the boundaries of ESA. MoEF published the draft Notification on Western Ghats dt. 04-03-2014 inviting suggestions and objections from the stakeholders. In the list published along with the draft Notification, Kootickal village in which the project site is located is not in the list. This draft Notification was Draft Minutes of 31st EAC Meeting held during 14th May – 15th May, 2018 Page 31 of 107 re-published by MoEF&CC on 27-02-2017 and in the list re-published along with the draft Notification, Kootickal village in which the project site is located is not in the list. In view of the above situation, the PP approached Hon'ble High Court of Kerala with a plea to consider the application for Environmental Clearance by SEIAA Kerala / MoEF and both were respondents in the said case. The Hon'ble High Court of Kerala vide Judgment dt. 20-02-2018 directed SEIAA Kerala / MoEF to consider the application of the PP for Environmental Clearance. In this context, the Committee suggested that the Ministry may seek the comments from concerned Division of the Ministry w.r.t. ESA identified by the HLWG and its further development, if any.

Ans. The clarification regarding the status of the project site w.r.t. ESA is attached at ***Annexure No. 1***.

Q.ii. Details of type of rock and geology, method of mining, machinery details, blasting details etc. needs to be provided.

Ans. The details of type of rock and geology, method of mining, machinery details, blasting details are attached at **Annexure No. 2.**

Q.iii. Details of haulage roads, slope at different sections needs to be provided.

Ans. The details of haulage roads, slope at different sections are attached at **Annexure No. 3.**

Q.iv. Details of Occupational health along with budgetary provisions needs to be elaborated.

Ans. The details of occupational health along with budgetary provisions are attached at **Annexure No. 4.**

Q. v. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery / toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

Ans. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery of the Satellite image of the area is provided at **Annexure No. 5.**

Q.vi. Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by State Government. A Certificate from the Competent Authority in the State Forest Department should also be provided, confirming the involvement of forest land, if any, in the project area.

Ans. There is no National Park, Sanctuary, Biosphere Reserve, Wildlife Corridor, Ramsar site Tiger/Elephant Reserve (existing as well as proposed), within 10 km. of the mine lease.
There is no forest land involved for the proposed site. A Certificate in this regard vide letter no. A5-3271/18 dt. 28-05-2018 issued by the Divisional Forest Officer, Kottayam District, Kerala is attached at **Annexure No. 6**.

Q.vii. PP needs to submit the detailed Green Belt Development plan on periphery of the lease along with type of plantation etc. Plant species needs to be revised.

Ans. The details regarding the green belt development plan proposed in the periphery of the mine lease area along with type of plantation are provided at **Annexure No. 7.**

Q.viii. Test Reports of Free Silica Concentration need to be submitted.

Ans. The test Report of Free Silica Concentration is attached at **Annexure No. 8.**

Q.ix. Details of connectivity from mine to crusher and its transportation plan needs to be elaborated.

Ans. The mined material will be transported to the proposed crusher unit located within the complex and the finished product from the crusher will be sold in the open market.

Q.x. The Committee noted that the Ministry has recently issued a circular vide no. 22-65/2017-IA.III, dated 1st May 2018 on Corporate Environment Responsibility (CER). Accordingly, PP needs to submit the details of budget and its activities as per the said Circular.

Ans. The project cost of the proposed quarry is about Rs. 8 Crores. Accordingly, the details of Corporate Environment Responsibility (CER) is provided at **Annexure No. 9.**

In view of the above submission of document, we humbly request you to accord Environmental Clearance to our project at the earliest.

Thanking you,

Yours respectfully,

For PETRA CRUSHERS

Thomas P Mathew
(Managing Partner)

Encl. :- As above

Annexure No. 1

CLARIFICATION REGARDING THE PROJECT NOT FALLING IN ESA VILLAGE

- The mine lease area (project site) was in the ESA village as identified by the High Level Working Group (HLWG) on Western Ghats for the State of Kerala. The said group submitted their report to MoEF on 15-04-2013. There were 123 ESA villages as per the report of HLWG. Kootickal Village, Kanjirappally Taluk, Kottayam District, Kerala was in the list of HLWG report.
- MoEF vide OM No. 1-4/2012-RE (Pt) dated the 20th December, 2013 had sought suggestion from the State Governments on modifications in the boundary of the ecologically sensitive area as identified by HLWG group on the basis of **physical verification.**
- Subsequently, as per the directions of MoEF, Govt. of Kerala constituted a three member Expert Committee to demarcate the ecologically sensitive area by **physical verification.** The said Committee after physical verification excluded the village in which the project site is located from ESA. The report of the said Committee was accepted by Govt. of Kerala and it was further submitted to MoEF. The main content of the report is as follows:-

> *"AND WHEREAS, the State Government of Kerala had earlier accordingly undertaken the exercise of demarcating Ecologically Sensitive Area in the State by Physical Verification the Ecologically Sensitive Area recommended by the Kerala State Government is spread over of an area of 9993.7 square kilometer, which includes 9107 square kilometer of forest area and 886.7 square kilometer of non-forest area and Ecologically Sensitive Area in that State works out to 9,993.7 square kilometer as compared to 13,108 square kilometer recommended by High Level Working Group".*

- MoEF issued a draft Notification vide S.O. No. 733 (E) dated 10th March, 2014 declaring ecologically sensitive area in the Western Ghats as demarcated by Govt. of Kerala excluding the area in which the project site is located. Since the period of draft Notification was ended, re-Notification of the draft was published by MoEF on couple of times.
- The latest draft Notification dt. 27th February, 2017 by MoEF regarding the boundary and description of Western Ghats Eco-sensitive area it is stated as follows:-

> *"The Eco-sensitive area in the State of Kerala is spread over an area of 9993.7 square kilometer which includes 9107 square kilometer of forest area and 886.7 square kilometer of non-forest area and the boundary and description of Eco-sensitive Area and the village-wise details of Eco-sensitive area proposed by the State Government are available on the website of the Kerala State Biodiversity Board."*

- From the website of Kerala State Biodiversity Board, it is observed that all the four villages in Kottayam District, Kerala including the village in which the project site is located is excluded from the list of Ecologically Sensitive Area. There are only 119 villages as ESA in the State of Kerala.
- On the basis of the exclusion of the project site from the ESA and since there was no final decision on the draft Notification by MoEF, PP approached Hon'ble High Court of Kerala for a direction to environmental Authorities for consideration of the application for Environmental Clearance. The Hon'ble High Court of Kerala vide judgment dt. 20-02-2018 directed the MoEF / SEIAA to consider application for Environmental Clearance.

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DETAILS OF TYPE OF ROCK AND GEOLOGY, METHOD OF MINING, MACHINERY DETAILS, BLASTING DETAILS

GEOLOGY AND EXPLORATION

TOPOGRAPHY

The physiography of the surrounding of the lease area is a part of elevated terrain with waste land with some native tree species, shrubs, herbs, grass, climbers, bushes etc. the topography of the lease area is hilly terrain.The highest elevation of the mine area is 500 m. MSL and lowest is 365 m MSL. As the proposed area is hilly, the drainage of the mine area is towards SE to SW. No habitants are located in the mine area. The contour map showing the topography of the mine lease area is provided at **Plate No. 2**.

REGIONAL GEOLOGY

In the north eastern part of the area covered by mapping the Archaean metamorphic rocks are traced. The rocks are predominantly charnockite and charnockite gneiss. The crystallines are overlain by Tertiary sediments and both are lateritised. Beach sand and alluvium of Quaternary period overlie the above rocks.

Since the north eastern part of the area has a thick cover of laterite and soil, the contact relationship between different rock units is not clear and their lithological boundaries are mostly inferred. The rock types met in the area are given below in a tentative geological succession.

Quaternary period	Alluvium and soil Brown sand White sand, black clay and peat
Tertiary period	Laterite Grit with some pebbles
----------unconformity----------	
Archaean	Dolerite Charnockite gneiss Charnockite
	Pyroxene granulite and garnetiferous ferruginous quartzite

(Secondary Source :- 1. District Survey Report, Kottayam District, Published by Department of Mining and Geology, Govt. of Kerala.
2. Geological Survey of India- www.gsi.gov.in

LOCAL GEOLOGY

The local geology belongs to the regional geology. Main rock type in the study area is granite building stone. At places where they are exposed, the granite building stone is medium to coarse grained with dark grey quartz. The soil & over burden thickness is varies from avg. 0.85 m. to 0.30 m. Topographically, the area is undulating.

GEOLOGICAL RESERVES:-

Summarized Reserves (in MT)	
Geological reserve (A)	**5459519**
Mineral reserve blocked (B)	3489091
Mineral reserve = A- B	**1970428**

The details are provided at the Surface cum Geological plan and sections at **Plate No. 3.**

Mining:

a. Whether manual or semi-mechanized or mechanized

Semi-Mechanized

b. If semi-mechanized or mechanized, number, type and capacity of machines to be used.

Machinery will be deployed as per requirement to meet production target. Brief details of machinery are as follows :-

SINGLE SHIFT WORKING - 8 hrs.

REQUIREMENT OF MACHINERIES :-

The calculation for requirement of different machineries to handle required production of 2,50,000 TPA of granitic building stone or 800 TPD are given below:-

DRILLING

The drilling of holes is proposed in one shift.

Drilling rate	=	5 m/ hr
Utilization of time	=	7 hrs/day in single shift
Depth of holes	=	1.5 m
Burden	=	1.5 m
Spacing	=	2.5 m
Specific gravity	=	2.5
Rocks broken per hole	=	Specific Gravity x spacing x burden x depth
	=	2.50 x 2.50 x 1.50 x 1.50
	=	14.0625 MT

Therefore, for 834 T/Day

So, 834/14 = 59.57 holes required /day

Total meterage of drilling required per day= depth of hole x no. of holes

= 1.50 x 59.57=89.355 m/day say 90 m per day

One drill machine capacity = 5 x 7 = 35 m per day,

For 90 m drilling no of machines required = 90 / 35 = 2.57 say **3 jack hammers.**

EXCAVATORS

The loading capacity of an excavator can be calculated with the following equation

(L) = B x R x N x T x E/K

Here

L = loading capacity/shift

B= bucket capacity =0.9 cu.m i.e. 0.72 cu.m. @ 80%

R= co-efficient of filling (assumed 0.8)

N= average no. of loading cycle/hrs
(assumed 120 cycle/ hr of 30 second each)

T= no. of effective wording hrs/shift= 7 hrs

E= efficiency of utilization (assumed 0.8)

K= swelling factor (taken 1.6)

L= 0.72 x 0.80 x 120 x 7 x 0.80/1.6

=241.92 cu.m. / shift/excavator

Daily ROM granitic building stone = 834 TPD / 2.5 x 1.6 =533.76 cu.m

No. of excavators requirement = 534 cu.m / 241.92

= 2.21 or say to 3 nos and one machine shall be standby, so total machines will be 3+1=**4 Excavators.**

Dumpers

Cycle time of dumper:

Spotting time = 1 min.

Loading time = 3.5 min

Travel time (loading to unloading) = 24.5 min

Unloading time = 1 min

Total time = 30 min

Utilization time = 7 hrs

No of trips/day/dumpers = 7x60/30 = 14 trips

Tonnage per day / dumper = 14*15T = 210 ton

ROM handling /day = 834 ton

No. of dumpers = 834/210=3.97 or say to 4 dumpers

Note- 1 dumpers of 10 ton capacity will be used for transportation of soil as well as for miscellaneous operations.

Total No. of dumpers = 4 + 1 = **5 dumpers**

(i) Drilling & Machines

Sr. No.	Machine Type	Required No. of Machines	Size / Capacity	Make	Source of Power
1.	Jack hammer	3	32 mm (drill hole size)	Atlas Copco	Operated through Compressor
2.	Excavator (Back Hoe)	4	0.9 m^3	Tata -Hitachi	Diesel Engine
3.	Dumper / Tipper	5	15 T	Man / Tata	Diesel Engine
4.	Rock Breaker	2	--	Furukawa	Diesel Engine
5.	Compressor	2 (1 standby)	100 CFM	LG / Atlas	Diesel Engine
6.	DG Set	1	180 kVA	Kirloskar	Diesel Engine

Miscellaneous Machinery:

S. No.	Particulars	Make/ Capacity	Number
1	Water Sprinkler	5 KL	1
2	Diesel Tanker	-	1
3	Ambulance	-	1
4	Jeep/ Van	Mahindra	2
5	Bull Dozer	Komatsu – 165 HP	1
6	Light Truck	Tata- 407 – 5 Tonnes	1
7	Mobile workshop van	Assembled	1
8	Water tanker for plantation	5 KL	1

(ii) Loading Equipment

Mechanical loading equipment such as shovel and excavators will be used for removal and loading of the mineral at face and stock yard.

(iii) Haulage and Transport Equipment

a) Haulage within mining mine hold: Loading of Stone will be done with the help of Shovel and Excavators at face and stock yard. Stone gitti are loaded in truck by manually.

b) Transport from Mine head to destination: The truck will be used for transportation of Stone and Stone Ballast from mine site to destination.

c. Whether drilling and blasting will be made use of, if yes, state monthly quantity of explosives to be consumed.

Drilling : The excavation of mineral is proposed by excavators. The mineral is fractured and easily exploitable by rock breakers and excavators. The hard strata are proposed to excavate after drilling and blasting.

Blasting: The controlled blasting is proposed by adopting all the safety measures as per "MMR 1961" and with the permission of DGMS. In this area for fragmentation of granite the blasting will be conducted. Multiple blast holes of 1.5 m depth will be drilled with the help of 32 mm drill rod, Jack Hammer and Air Compressor of 100 cfm capacity.

It is estimated about 250g of explosives per hole is required. About 59-60 holes per blast are proposed. Therefore, the requirement of explosives will be about 15 kg/ blast/day.

d. Benching pattern (height & width).

The height of bench (5 m.) will not be kept more than 5.0m at a time and the width of the benches (5 m.) will be always kept safe according to provisions.

e. Face lay out (attached development plan).

Production & Development Plan with Cross Sections enclosed **Plate No.-4**.

f. Quarry floor level (RL) at the end of the year or period of the concession

The proposed mining activity for next five year will reached up to 415 m RL and in the conceptual stage will be reached up to 380 m. RL. It is expected that mining will not intersect the water table in the area. Therefore, water quality will remain unchanged. No ground water management is required.

g. Quantity of mineral to be won (Annual level of Production)

Excavation :

The proposed method of mining will be Semi mechanized open cast mining. The basic mining techniques adopted will be uses of machines. For the systematic working of open cast mines, the main development work will be the forming of systematic benching. The height of bench (5 m.) will not be kept more than 5.0m at a time and the width of the benches (5 m.) will be always kept safe according to provisions. The Mining will be done with the help of tools such as drills, jack-hammer, compressors, hand shovel, picks, excavators etc. The targeted annual production of Stone is about 2,50,000 TPA.

Table : Year wise production of building stone for life of mine

Year	Bench	Production (MT)
I	Road dev.,495-470	250000
II	465-455	250000
III	450-435	250000
IV	430-420	250000
V	420-415	250000
VI	415-410	250000
VII	410-400	250000
VIII	400-380	250000
Total		**1970428**

The year wise tentative excavation plan is provided at **Plate No. 5**

Loading and Transportation: Loading of mineral will be done by excavator and will be sent to the crushing unit/destination. Trucks / Tippers of 15T will be used for transportation of mineral from mine site. It is expected that 55-56 trips will be required to transport on daily basis. For this, movement of truck per hour will be 6-7 only. Thus, the impact due to movement of trucks from the mine will be marginal and well within the capacity of the roads.

h. Quantity of overburden to be removed (Show location of such disposal in development plan)

Nature and Quality of Top-Soil and overburden to be generated

Top Soil

A total quantity of 58630 cu.m. of topsoil is proposed to be removed during the mining operations.

Overburden

About 20693 cu.m. of overburden will be generated throughout the mine life.

Year	Top Soil (cu. m.)	Overburden (cu. m.)
I	12827	3759
II	11932	3580
III	10917	3298
IV	9375	2956
V	4658	2691
VI	4374	2149
VII	2583	1733
VIII	1964	527
Total	**58630**	**20693**

i. Whether heavy blasting to be adopted. If yes, location of nearest habitation (to be shown in the surface plan)

No heavy blasting will be adopted. Whereas small scale blasting will be adopted**.**

Following are the parameters which is used

Depth of Hole = 1.5 m

Diameter of hole = 32 mm

Spacing = 2.5 m

Burden = 1.5 m

Sp. Gravity = 2.5

Blasting Pattern:

The blasting pattern entirely depends on the situation of the joints present in the rocks. The drilling is done as per the requirement of the rock fragmentation with desired production of mineral.

Type of Explosive to be used

Only class 2 and class 6 explosive is proposed for use as given below:-

Description	Class & division	Qty.
Nitrate mixture	2, 0	550 kg
Safety fuse	6, 1	5,000 mtrs.
Detonator fuse	6, 2	5,000 mtrs.
Detonators (Electric)	6, 3	5000 nos.
Detonators (Ordinary)	6, 3	5000 nos.

j. Safety precautions to be adopted.

PRECAUTIONS:

- Blasting in the open cast pit will be done only during day time at designated hours.
- Only competent blasters will be appointed to handle explosives.
- Explosives will be stored in approved and licensed magazine as per Explosive Act/ Rules.
- Explosives will be brought from magazine to blasting site in licensed Explosive Van under the care of blaster.
- Sufficient warning signals will be given before blasting the holes.
- Guards will be posted on all roads and paths at least 250 m. distance to stop entrance to the danger zone during blasting hour.
- Controlled blasting will be practiced to control vibrations and flying fragments.
- Optimum charge will be used, while blasting near office complex/ infrastructure site.

- Maximum charge per delay will always be less than 15 kg. to limit the PPV levels within the DGMS standards of 15 mm/sec.

k. Brief description on method of procurement and storage of explosives.

a. Proper and safe storage of explosives in approved and Licensed Magazine.
b. Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS.
c. Proper security system to prevent theft/ pilferage, unauthorized entry into Magazine area and checking authorized persons to prevent carrying of match box, lights, mobile phones, cigarette or Beedi, etc.
d. The explosives of class 2 will be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size.
e. Detonators will be conveyed in special containers. These will not be carried with other explosives.
f. The holes which have been charged with explosives will not be left unattended till blasting is completed.
g. Before starting charging, clear audible warning signals by Sirens will be given so that people nearby can take shelter.
h. Blasting operations will be carried out in day times only. However, in this project the mining operations are proposed to be carried out in day times.

Storage of Explosive

Considering low consumption, a 550 kg. magazine is for storing the explosive. The magazines available within the complex. The controlled blasting is proposed by adopting all the safety measures as per "MMR 1961" and with the permission of DGMS.

Blasting will be performed as per requirement on the face. The explosive by authorized blasting party himself and the blasting will be carried out by registered blasting contractor as per present practices.

Waste Disposal

a. Location (show it in the development plan)

Disposal of waste have been Shown in environment plan & surface runoff plan in **Plate No**.-**7 & 9**.

b. Area covered

Years	Top soil (cu.m.)	Overburden (cu.m.)	Area (ha.)
I – VIII	58630 (concurrently used)	20693 (concurrently used)	0.6248 (outside, own land)

c. Environmental safeguards for such disposal

Top Soil

The topsoil excavated from the quarry will be dumped separately at pre-determined place and subsequently will be utilized in spreading over reclaimed areas for plantation. Precautions will be taken to limit the height of the topsoil dump to 5 to 6 meters in order to preserve its fertility and shelf life. It will be suitably protected from soil erosion and infertility by planting fodder grass and leguminous plants during temporary storage.

Overburden

This waste will be utilized within the pit for lying of haul roads. At the end use, OB can be reutilized as soil base for plantation.

Safeguard measures for dump

- Proper slope will be maintained to avoid rundown of edges and sides of the dump.
- Retaining wall shall be constructed on downward side to prevent rolling of boulders outside the dumping area and also to prevent inadvertent entry by persons or animals.
- Proper heights and width of terraces will be created.
- Due care will be taken to plan the overall slope of 27° for each dump.
- Regular water sprinkling shall be carried out.
- Proper drainage plan given for prevent sliding & de-siltation runoff water

Mine drainage
(Give details of total make of water during dry and rainy season and its method of handling)

Topography:

The physiography of the surrounding of the lease area is a part of elevated terrain with waste land with some native tree species, shrubs, herbs, grass, climbers, bushes etc. the topography of the lease area is hilly terrain. The highest elevation of the mine area is 500 m. MSL and lowest is 365 m MSL. As the proposed area is hilly, the drainage of the mine area is towards SE to SW. No habitants are located in the mine area.

Rain Fall:

The normal rainfall of the district is 3347 mm. Out of this, major rainfall contribution is from SW monsoon followed by the NE.

Method of handling

Normally, the mine will be closed during rains, in case of necessity accumulated rainy water (free from suspended solid material) from pit bottom may be pumped out & may spilled over adjoining areas, which may be used by native plants (rubber / coconut) and the same will be use for watering saplings/trees in the plantation side.

Storm water management

The following measures will be taken with respect to the prevailing site conditions:-

- Storm water drains with silt traps will be suitably constructed all along the periphery of the pit area to collect the run-off from the mine area and divert into the storm water pond.
- All measures will be taken not to disturb the existing drainage pattern adjacent to the other property.
- The storm water collected from the mine area will be utilized for dust suppression on haul roads, plantation within the premises, etc. The details showing the storm water drains, retaining walls are shown in **Surface Runoff Map** and same is provided at **Plate No. 9.**

Annexure No. 3

DETAILS HAULAGE ROADS, SLOPE AT DIFFERENT SECTIONS

Haulage road :-

The gradient of the main haulage ramps must be selected to give a safe haulage profile and optimization between increased dumper cost for steeper gradient and increased construction cost for flatter gradient. Haulage ramp gradient generally used in surface mines varies from 8% to 12%.

It is generally found that there should be considerable savings in transportation cost with 8% gradient. The development of haul roads in done with a gradient of 8% to facilitate the movement of dumpers. The same gradient can be maintained in the ramps even if the excavation is carried out by benching method. As per the safety guidelines specified by the DGMS, the gradient of haul roads should not exceed 1 in 16 (6.25%) for long haul. However, it may be steepened to 1 in 10 (10%) for bench to bench ramp and short haul distance.

The plate showing the haulage roads within the mine lease area is provided at **Plate No. 10**

Slope study :-

We have prepared the contour map. The area is fully granitic rock, prepared the surface cum geological map.

The section shows the slope of the area are varies 24° to 37°, which is shown in the **Plate No.- 3**.

The slope map of the mine lease area is provided at **Plate No. 11.**

- The haul roads will be at gradient not exceeding 1:16. The benches will be joined by 5 m. wide ramps at gradient not exceeding 1:10.
- Bench height and width will be kept 5 m , which make the total slope the pit is 45° to prevent land slide.
- The high walls will slope at 72° - 75°.
- Flatter slopes angles are adopted where occurrences of loose earth are encountered.
- No disaster like land slide, flood, the opening of the pits shall be at a level 6 m above the Highest Flood Level of River.
- Unmanageable heights are not created.
- Loose rocks are properly dressed.
- Nature and structure of the rocks are properly studied for their slips.
- The hanging wall, footwall, and mineralized zone are competent to stand safely for long time.

Conclusion:- The proposed mine site is fulfilling the open cast mining conditions. As per the KMMCR, 2015 of Mining & Geology Department, Government of Kerala and SEIAA, Kerala, if the slope angle is not more than 45°, no land slide problem is expected to be occurred.

-: GENERAL RULES :-

SLOPE STABILITY IN CASE OF OPEN CAST MINE:

1. As per the Metalliferous Mines Regulations1961, for open cast working, the following precautions shall be taken namely:-
   a) In alluvial soil, morum gravel, clay debris or other similar ground-
   i. The sides shall be sloped at angle of safety not exceeding 45 degrees from the horizontal.
   ii. The sides shall be kept benched and the height of the bench shall not exceed 1.5 m and breadth thereof shall not less than the height.
2. Where the ore body consists of comparatively hard and compact rock, the regional inspector may, by an order in writing an subject to such conditions as he may specify therein, permit the height of the bench to be increased up to 7.5 m while its width not less than 6 m.
3. In an excavation in any hard and compact ground or in prospecting trenches or pits, the side shall be adequately benched, sloped or secured so as to prevent danger from fall of sides.

In morum gravel, clay debris or other similar ground the slope angle of 45 degrees is safe. Further, the mine working has been proposed by open cast semi-mechanized method by forming systematic benches of 5 m height and 5 m width. The ultimate slope angle thus by formation of benches will be 45 degrees. In comparison to the morum gravel, clay debris or other similar ground granite rock is very hard and compact and can withstand a slope angle more than 45 degrees. It is also considered safe by Directorate General of Mines Safety (DGMS). As mentioned above in case of hard and compact rock the bench height can be increased up to 7.5 m while the breadth will be 6 m, overall slope angle by formation benches of the said dimension will be 51 degrees. Therefore the slope angle in granite mine can be increased up to 51 degrees.

Granite rock is very hard and compact and on Mohs scale of hardness it ranges between 6 to7 hardness values which are on the higher side. Considering the hardness and compactness of granite the individual bench slope will be maintained at 75°-80°, and overall slope angle will be 45°. So landslide/slope failure is not anticipated at the given slope angle.

However, other parameters may affect the rock strength like rainfall which results in physical and chemical weathering of the rock. To prevent such a situation the garland drain will be constructed to channelize the water flow.

Preventive measures already given in mining plan for slope stabilization:-

- **Drainage**: - In 7.5 m Barrier zone storm water drainage is given.
  It will help in channelization of storm water.
  To prevent water flow over the slopes which may results in opening of cracks and cause slope failure.
  To collect seasonal rainfall in the area.

- **Benches**: - Development of mine will be in the form of benches of 5 m height and 5 m breadth, overall slope angle will be 45° and individual bench slope will be 72°-80 °.
  As per DGMS 45° slope angle is considered as safe.
  The hill slope will be 45°, hence there will be no landslide occurrence in the area.

- **Plantation**:- Plantation proposed in the lease area will prevent soil erosion.
  It also helps in controlling of water flow.
  It will helps in percolation of groundwater.
  Prevent rolling of stones if any.

- **Fencing**:- Fencing will be done in the lease area to prevent and control of rolling stones over slope.

  At the sites of possible rock fall rock netting will be done to prevent rock fall and if needed shortcrete will also be done.
  Jute geo matting will be done over the top soil/OB dump.

****

Annexure No. 4

DETAILS OF OCCUPATIONAL HEALTH ALONG WITH BUDGETARY PROVISIONS

INTRODUCTION

The following risks to human health from building stone mining activity are due to inhalation of airborne pollutants (dust and fumes) from mining activity, transportation and air borne wind erosion. The pollutants may trigger asthma, silicosis or other respiratory problems depending on the exposure time and exposed concentration. Free silica or crystalline silica is suspected to be a carcinogen and exposure limits prescribed by DGMS are 3 mg/m^3 for respirable dust and 5% of respirable dust for Free Silica.

The mining operations especially drilling, blasting, loading and unloading and transportation result in high noise levels causing deafness and tinnitus. The usage of drilling equipment and other hand held equipment operations may lead to excessive vibration resulting in hand arm vibration syndrome and circulatory problems. The work area ergonomics like awkward body postures or repetitive movements result in upper-limb disorders, repetitive-strain injury and other musculoskeletal conditions.

OCCUPATIONAL HEALTH

Quarrying operations should have some form of occupational health programme in place. Occupational health is about protecting the physical and mental health of workers and ensuring their continual welfare in their working environment. In addition to preventing ill health, other important aspects of occupational health include:

- ensuring fitness and physical capability to perform a job safely
- health education and promotion
- providing medical services including health surveillance
- rehabilitation after illness or injury.

Recruitment of employees shall be based on the skill set requirement of specific trade in the mining activity ranging from supervision to manual work. All employees undergo health monitoring during recruitment and periodically during employment depending on the age of employee. All employees are provided

with personal protective equipment depending on the trade, ranging from helmets, safety shoes, dust masks, safety goggles, gloves, ear plugs and ear muffs. The employees are made aware of the hazards related all mining activities and transportation of aggregate and the occupational safety practices to be adopted to ensure safe work environment. The frequency of health monitoring and type of evaluation is presented in the following table;

FREQUENCY OF HEALTH MONITORING

Occupation	Type of evaluation	Frequency
All employees in the mine	Chest X-ray, spirometry and vision testing, Far & Near Vision; Colour Vision; and Hearing tests	I . At the time of recruitment, II. Every 5 years to age <30; every 4 years to age 31 – 40; and every 2 years to age 41-50; Once a year above 50 years.
Noise prone areas - drilling, blasting, loading and unloading	Audiometry	Annual

The cost estimate (Budgetary provisions) for health monitoring is presented in the following table;

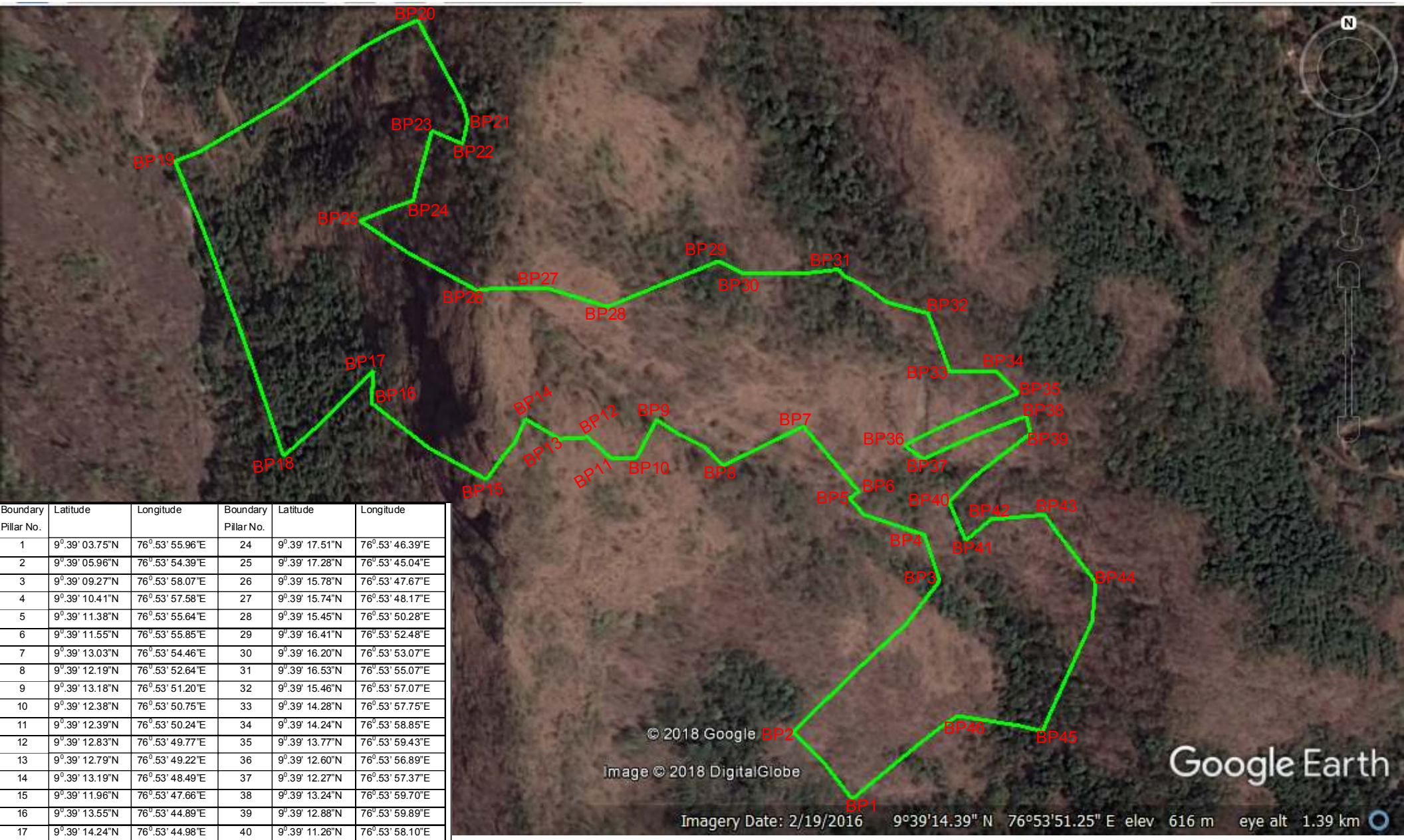
COST ESTIMATE

S. No.	Particular	Capital Cost (in Rs.)	Recurring Cost (in Rs.)
1	Initial medical check-up for all workers for lung function, audiometric test, tuberculosis and pulmonary disease	50,000	2000/Person
2	Provision for free medicines for all workers	-	7500/year
3	Provision for personal protection equipment like ear plug, dust mask, shoes, goggles and etc.	50,000	15% of capex
4	Provision for First Aid facilities	20,000/-	20% of capex

****

GOOGLE MAP – QUARRY SITE OF M/s PETRA CRUSHERS

Annexure No. 5



Boundary Pillar No.	Latitude	Longitude	Boundary Pillar No.	Latitude	Longitude
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23	9^0.39' 18.88"N	76^0.53' 46.85"E	46	9^0.39' 05.64"N	76^0.53' 58.77"E

Annexure No. 6

Office of the Divisional Forest Officer, Kottayam
2n Floor, Civil Station, Kottayam PIN 686002
Email (O): dfo-ktym.for@kerala.gov.in
Phone (O) 0481 2562276,

A5-3271/18

CERTIFICATE

This is to certify that the project site of M/s Petra Crushers at Sy No.58/3-1, 58/3-3, 58/3-5, 58/3-6, 59/1-1, 59/3, 59/5, 82/1, 83/4, 86/4, 87/1, 87/2, 92/3-1, 99/3-2, 92/3-4, 92/3-5 of Koottickal Village & Panchayath, Kanjirappally Taluk, Kottayam District, Kerala (Geo-Co-ordinates: Lattude (N) 09^0 39' 20.75" to 09^0 39.03.75" Longitude (E) 76^0 53'40.44" to 76^0 54'01.91") in an area of 6.8976 Ha. is not a forest land. There is no Wildlife Sanctuary or National Park located within 10 k.m. radius of the project site.

This certificate is issued based on the application of Sri.Thomas P. Mathew, M.D, M/S Petra Crushers and the verification report of the Range Forest Officer, Erumely for submission to Ministry of Environment, Forests & Climate Change for the purpose of obtaining environment Clearance for the minor mineral (Building Stone) mining project of M/s Petra Crushers.

Kottayam
28.05.2018

DIVISIONAL FOREST OFFICE KOTTAYAM

Divisional Forest Officer
Kottayam

Annexure No. 7

GREEN BELT DEVELOPMENT PLAN

- The year wise program of eco-restoration for the life of mine, about 14,000 trees will be planted in an area of 6.8976 ha..(@ 2,000 trees / ha.)
- Biological reclamation / ecological restoration for the mined area by plantation of the species as per the time schedule suggested below: -
    - First Six months -- Herbs & grass
    - Next Six months -- Shrubs
    - Next Six months onwards -- Trees
- The following recommendations were made for the sustainable development of the project so as to protect the biodiversity of the area. The following species of native plants can be planted in the area earmarked for green zone and also during mine closure.

Sl No.	Trees	Shrubs
1	*Briedelia retusa*	*Dendrocalamus strictus*
2	*Schleichera oleosa*	*Bambusa bambos*
3	*Artocarpus hirsutus*	*Helicteres isora*
4	*Wrightia tinctoria*	*Sida rhombifolia*
5	*Terminalia paniculata*	*Cycas circinalis*
6	*Tabernaemontana alternifolia*	*Justicia adhatoda*
7	*Tectona grandis*	*Mussaenda frondosa*
8	*Vitex altissima*	*Ochlandra sp.*
9	*Olea dioica*	*Bambusa vulgaris*
10	*Lagerstroemia microcarpa*	*Ixora coccinea*
11	*Dalbergia latifolia*	*Pseudarthria viscida*
12	*Lannea coromandelica*	*Clerodendrum infortunatum*
13	*Grewia tiliifolia*	*Capparis rheedii*
14	*Xylia xylocarpa*	*Glycosmis pentaphylla*

The green belt development plan for the mine lease area is provided at **Plate No. 6 & 8**

TEAM
Labs and Consultants

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Ph: (O) 040-23748555, 23748616
29700244, 29700221
Fax : 040-23748666,
E-mail: teamlabs@gmail.com
www.teamlabs.in

TEST REPORT

AMBIENT AIR QUALITY DATA

Issued to:
M/s Petra Crushers
Sy. Nos. 58/3-1, 58/3-3, 58/3-5, 58/3-6, 59/1-1, 59/3,
59/5, 82/1, 83/4, 86/4, 87/1, 87/2, 92/3-1, 92/3-2, 92/3-4, 92/3-5,
Kootickal Village & Panchayat, Kanjirappally Taluk,
Kottayam District, Kerala

Average Flow rate (m^3/min) (PM_{10}): 1.12

DATA OF ANALYSIS

S.No	Parameter	Result	Unit
1	Particulate Matter <10 (PM_{10}), µg	49.2	µg/ m^3
2	Free Silica	0.95	µg/ m^3

Equipment Used: Respirable Enviro Dust samplers, Model: RDS 9000.

*** End of the report***

Verified by
M. Sandhya
Environmental Chemist

Authorized by
A.Ravi Pavan
Technical Manager

Annexure No. 9

SPECIFIC PROPOSAL ON CER ACTIVITIES

INTRODUCTION

The capital investment of the project is 8.0 Crores. In compliance to O.M. No. F.No. 22-65/2017-IA.III dated 01-05-2018, an amount equivalent to more than 2% of the project cost i.e. Rs. 6.65 Lakhs (non recurring expenses) and Rs. 16.53 Lakhs (recurring expenses) (the project is a green field project and the requirement is only 2% of the project cost) is earmarked for delivery the Corporate Environment Responsibility (CER).

CORPORATE ENVIRONMENT RESPONSIBILITY ACTIVITIES

To identify the needs of the nearby community to the project site, a community need assessment study was carried out in Kootickal Gram Panchayat. The main purpose of the study was to assist the project proponent in delivering their Corporate Environment Responsibility (CER) activities.

A. Education

- The project can build a surrounding wall to the Valiyantura Anganwadi number 112. This will protect the children from beast and other harmful creatures.

Particulars	**Total (in Rs.)**	**Type of Expense**
Protection wall with gate	80,000	Non recurring
Total	**80,000**	

- The project can provide a computer to two anganwadies in the Panchayat as a teaching and learning material.

Particulars	**Amount (in Rs.)**	**Total (in Rs.)**	**Type of Expense**
Computers with speakers	30,000 x 2	60,000	Non recurring
Total		**60,000**	

- The project can build a urinal and toilet block to the boys of R. Sankar Memorial UP School, Kodunga. Now there is only one toilet in the school for 170 students.

Particulars	**Total (in Rs.)**	**Type of Expense**
Urinal and toilet block	3,50,000	Non recurring
Total	**3,50,000**	

- The project can start a scholarship programme in the Panchayat. This programme will help the children from economically back ward family to pursue their higher education.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
Professional course	30,000 x 5	1,50,000	Recurring
Degree course	10,000 x 5	50,000	Recurring
Total		**2,00,000**	

- The project can provide school kit to 100 children from economically back ward family.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
School Kit consisting of Bag, Note books, instrument box, Uniform	1000 x 100	1,00,000	Recurring
Total		**1,00,000**	

B. Health

- The project can conduct one medical camp in association with Ayurvedic dispensary of the Gram Panchayat

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
Medical camp	30,000 x 1	30,000	Recurring
Total		**30,000**	

- The project can conduct a cancer detection camp in the Gram Panchayat in association with Community Health Center (CHC), Koottikal. The project will support for the treatment of three cancer patients from economically back ward family.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
Cancer detection camp	60,000	60,000	Recurring
Support for treatment	30,000 x 3	90,000	Recurring
Total		**1,50,000**	

- The project can display awareness boards in the various places of the community and print posters to prevent communicable diseases.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
Permanent Boards	1500 x 20	30,000	Non recurring

Poster and leaflets		30,000	Recurring
Total		**60,000**	

- The project can provide 10 shelf with door and 5 beddings to the "*Sanathinilayam*" old age home. The shelf will be useful to keep the medicine and dress of inmates.

Particulars	**Amount (in Rs.)**	**Total (in Rs.)**	**Type of Expense**
Shelf	5,000 x 10	50,000	Non recurring
Beddings	4,000 x 05	20,000	Non recurring
Total		**70,000**	

- The project can provide medical aid to 35 people from economically back ward family. To get the medical aid the person should get recommendation from the Medical officer of the CHC.

Particulars	**Amount (in Rs.)**	**Total (in Rs.)**	**Type of Expense**
Medical aid	500 x 35 x 12 months	2,10,000	Recurring
Total		**2,10,000**	

- Asha Bhavan is for physically handicapped women. The project will support this home to purchase medicine and other basic utensils for the inmates.

Particulars	**Total (in Rs.)**	**Type of Expense**
Medicines	48,000	Recurring
Basic Utensils such as Walker, backrest, airbed etc.,	25,000	Non recurring
Total	**73,000**	

C. Community Development

- The project can contribute an amount for the road maintenance to the Gram Panchayat.

Particulars	**Total (in Rs.)**	**Type of Expense**
Road maintenance	2,00,000	Recurring
Total	**2,00,000**	

- The project will install 10 LED street lights in the various streets with the help of Gram Panchayat.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
LED lights	3,500 x 10	35,000	Recurring
Total		**35,000**	

- The project can provide house maintenance grant to 05 economically back ward family and can build a toilet to two houses.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
House maintenance	40,000 x 5	2,00,000	Recurring
To build toilets	25,000 x 2	50,000	Non Recurring
Total		**2,50,000**	

- The project will start a corpus fund to help the public during the time of death, marriage and other important occasions.

Particulars	Amount (in Rs.)	Total (in Rs.)	Type of Expense
Corpus fund		3,00,000	Recurring
Total		**3,00,000**	

D. Environmental Sustainability

To enhance the ground water table, the project can introduce well recharge by rain water harvesting in the region of water scarcity. The same will be done in consultation & association with Gram Panchayat

Particulars	Basis of Calculation	Total (in Rs.)	Type of Expense
Well recharge	Rs. 15,000 x 10 wells	1,50,000	Recurring
Total		**1,50,000**	

SUMMARY OF THE ABOVE CER ACTIVITIES

Sr. No.	Areas of Intervention	No. of Intervention	Recurring Expenses (in Rs.)	Non Recurring Expenses (in Rs.)
1	Education	5	3,00,000	4,90,000
2	Health	6	4,68,000	1,25,000
3	Community Development	4	7,35,000	50,000
4.	Environmental Sustainability	**1**	**1,50,000**	**Nil**
	Total	**16**	**16,53,000**	**6,65,000**

****

LIST OF PLATES

CONTOUR SURVEY PLAN -M/s. PETRA CRUSHERS

Plate No. 2

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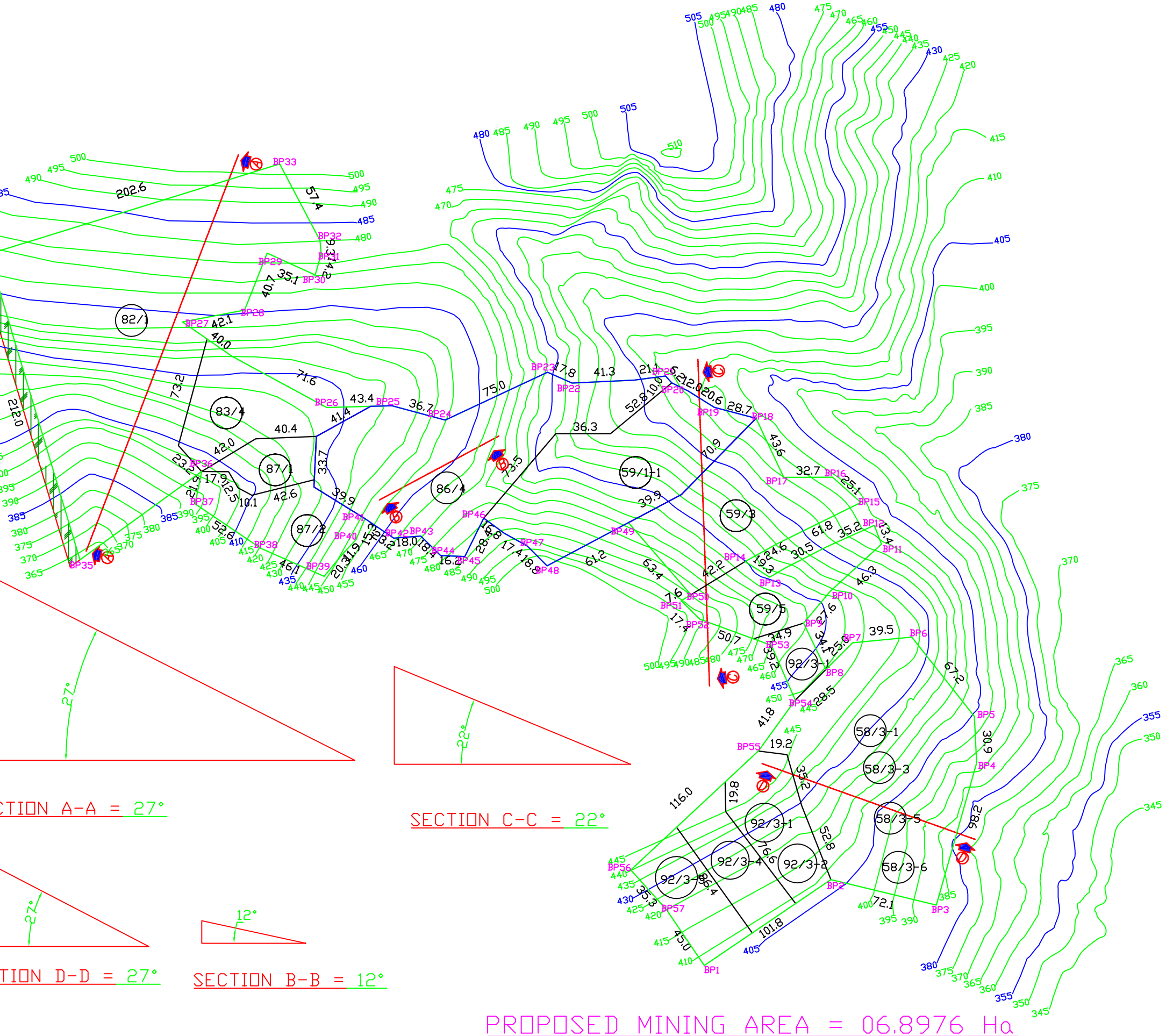


STATE	KERALA
DISTRICT	KOTTAYAM
TALUK	KANJIRAPPALLY
VILLAGE	KOOTICKAL
BLOCK.NO:	79
AREA	06.8976 Ha
SCALE	1:2000

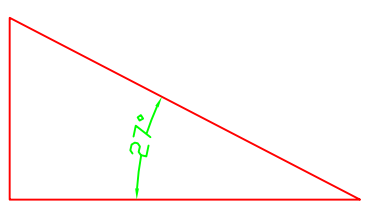
ALL DIMENSIONS ARE IN METERS

LEGENDS

PROPOSED AREA	
7.5 MTR PROTECTED AREA	
SUB-DIVISION	

SECTION A-A = 27°

SECTION C-C = 22°



SECTION D-D = 27°

SECTION B-B = 12°

PROPOSED MINING AREA = 06.8976 Ha

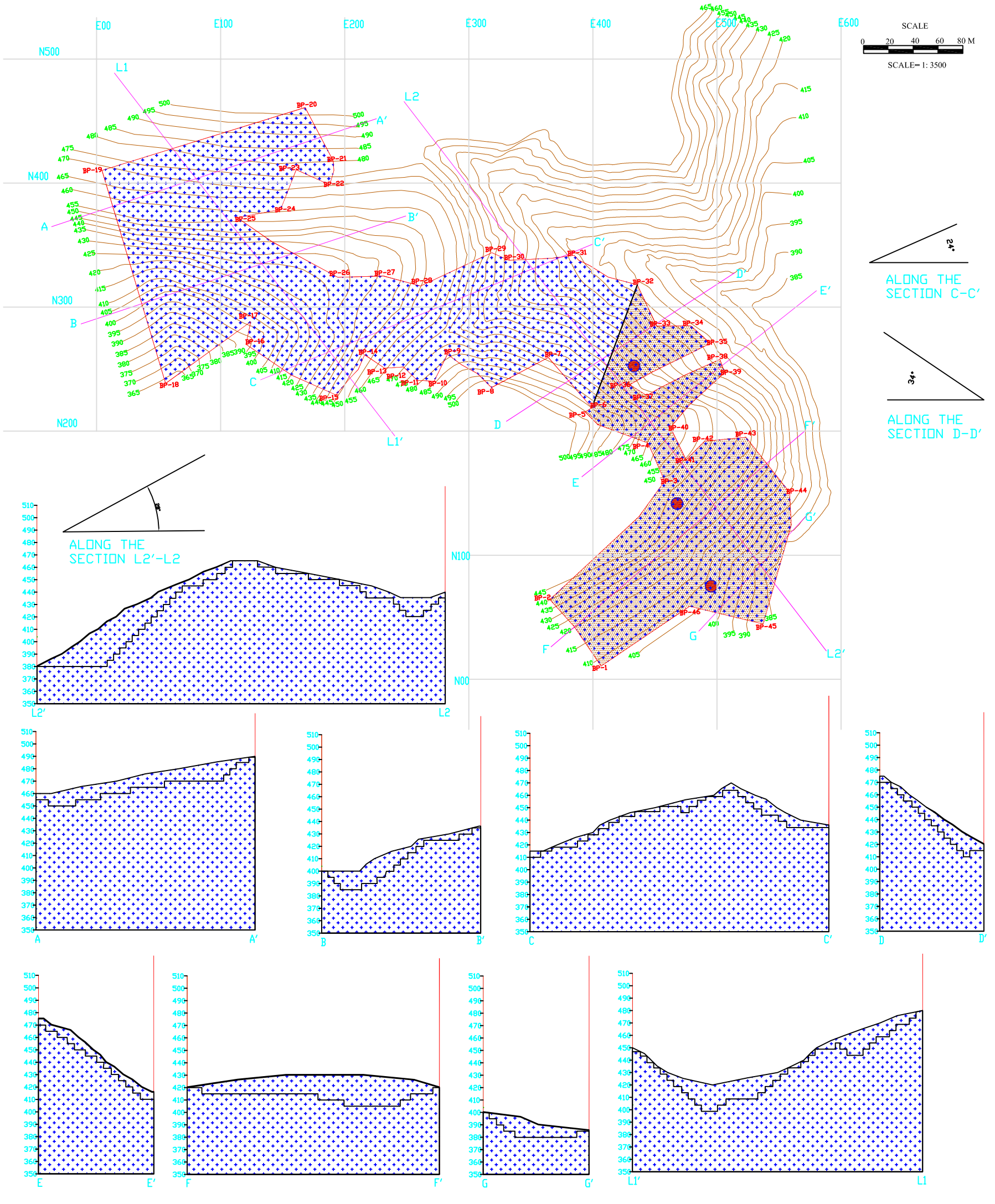
Surveyed and plan prepaired by

JAY ASSOCIATES & CONSULTANTS

DIGITAL LAND SURVEYING
Computerized Topographical Land Surveying
DREAM HOME BUILDERS
OPP. L I C NEDUMKANDAM 685553
email-jayasociates@gmail.com
Land Line : 04868234424
Mob : 9495818517

PLATE No. 3

SURFACE CUM GEOLOGICAL PLAN & SECTION



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ALONG THE SECTION C-C′

ALONG THE SECTION D-D′

ALONG THE SECTION L2′-L2

INDEX

- LEASE BOUNDARY WITH FENCING
- SOIL
- GRANITE ROCK
- CONTOUR LINE
- SECTION LINE
- PITTING

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23	9°.39' 18.88"N	76°.53' 48.85"E	46	9°.39' 05.64"N	76°.53' 58.77"E

Project Name	:- M/S. PETRA CRUSHERS
Village	:- KOOTICKAL
Panchayat	:-
Taluk	:- KANJIRAPPALLY
District	:-KOTTAYAM
State	:- KERALA
Plot area	:-6.8976 ha.

Plan Prepared by.

MUKESH SUROLIYA,
M.Sc. Geology,
Recognition as Qualified Person (RQP),
(RQP No. -RQP/AJM/321/2010/A)
Indian Bureau of Mines &
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Hydrology & Ground Water (HG) and
Geology (GEO) from National Accreditation Board for Education and Training (NABET),
Quality Council of India (QCI)

SCALE

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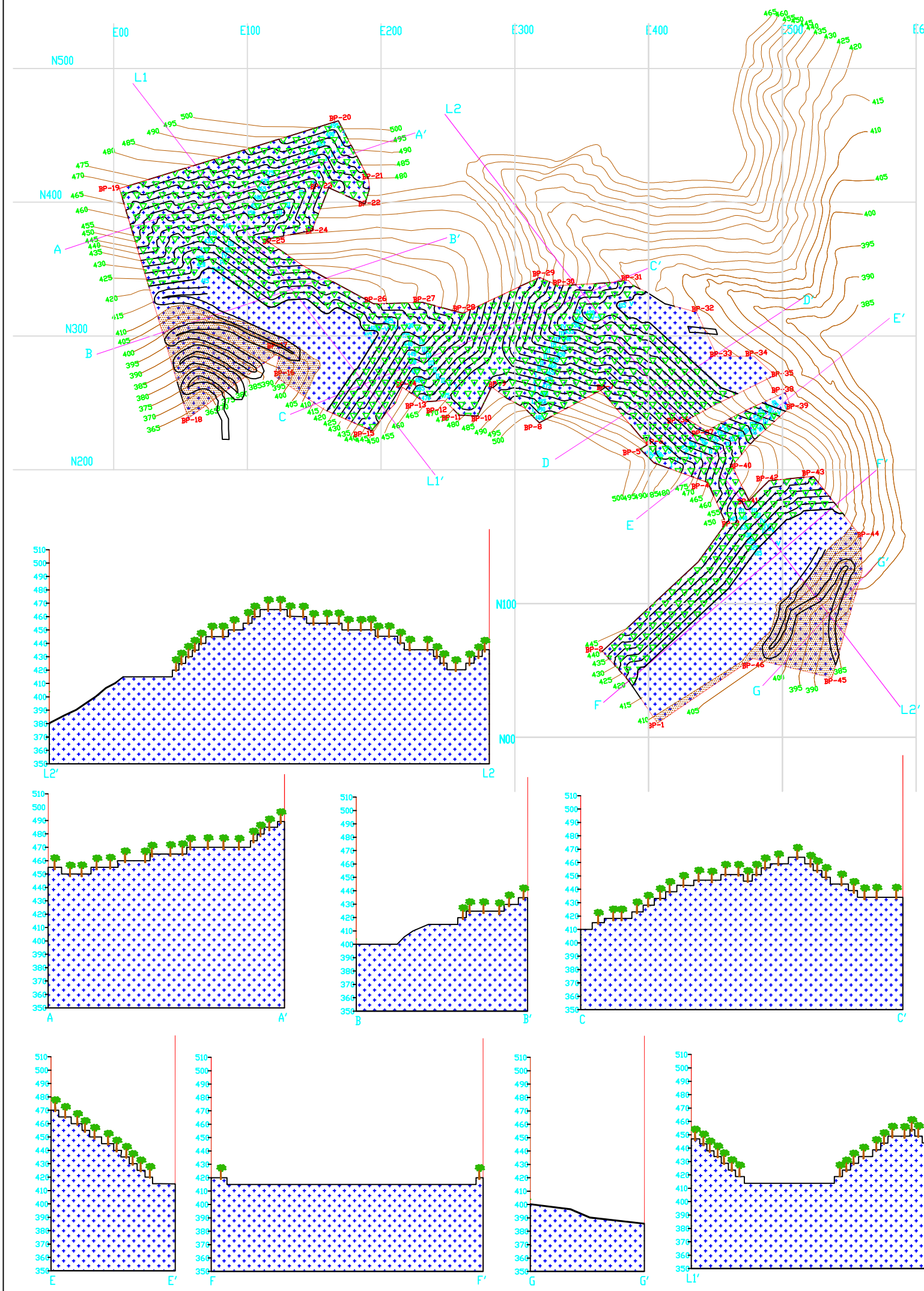

PLATE No. 4

PROD. & DEVELOPMENT PLAN & SECTION

N

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3	9° 39' 09.27"N	76° 53' 58.07"E	26	9° 39' 15.78"N	76° 53' 47.67"E
4	9° 39' 10.41"N	76° 53' 57.58"E	27	9° 39' 15.74"N	76° 53' 48.17"E
5	9° 39' 11.38"N	76° 53' 55.64"E	28	9° 39' 15.45"N	76° 53' 50.28"E
6	9° 39' 11.55"N	76° 53' 55.85"E	29	9° 39' 16.41"N	76° 53' 52.48"E
7	9° 39' 13.03"N	76° 53' 54.46"E	30	9° 39' 16.20"N	76° 53' 53.07"E
8	9° 39' 12.19"N	76° 53' 52.64"E	31	9° 39' 16.53"N	76° 53' 55.07"E
9	9° 39' 13.18"N	76° 53' 51.20"E	32	9° 39' 15.46"N	76° 53' 57.07"E
10	9° 39' 12.38"N	76° 53' 50.75"E	33	9° 39' 14.28"N	76° 53' 57.75"E
11	9° 39' 12.39"N	76° 53' 50.24"E	34	9° 39' 14.24"N	76° 53' 58.85"E
12	9° 39' 12.83"N	76° 53' 40.77"E	35	9° 39' 13.77"N	76° 53' 59.43"E
13	9° 39' 12.79"N	76° 53' 40.22"E	36	9° 39' 12.60"N	76° 53' 58.80"E
14	9° 39' 13.19"N	76° 53' 48.49"E	37	9° 39' 12.27"N	76° 53' 57.37"E
15	9° 39' 11.96"N	76° 53' 47.66"E	38	9° 39' 13.24"N	76° 53' 59.70"E
16	9° 39' 13.55"N	76° 53' 44.80"E	39	9° 39' 12.88"N	76° 53' 59.89"E
17	9° 39' 14.24"N	76° 53' 44.98"E	40	9° 39' 11.26"N	76° 53' 58.10"E
18	9° 39' 12.39"N	76° 53' 42.31"E	41	9° 39' 10.29"N	76° 53' 58.59"E
19	9° 39' 19.80"N	76° 53' 40.44"E	42	9° 39' 10.82"N	76° 53' 59.19"E
20	9° 39' 20.75"N	76° 53' 46.64"E	43	9° 39' 10.88"N	76° 54' 00.45"E
21	9° 39' 19.35"N	76° 53' 47.53"E	44	9° 39' 09.28"N	76° 54' 01.91"E
22	9° 39' 18.53"N	76° 53' 47.51"E	45	9° 39' 05.18"N	76° 54' 01.14"E
23	9° 39' 18.88"N	76° 53' 46.85"E	46	9° 39' 05.64"N	76° 53' 58.77"E

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- GRANITE ROCK
- CONTOUR LINE (380)
- SECTION LINE
- PLANTATION
- WORKING BENCH
- RECLAIMED AREA
- I-V RECLAMATION YEAR

Project Name	:- M/S. PETRA CRUSHERS
Village	:- KOOTICKAL
Panchayat	:-
Taluk	:- KANJIRAPPALLY
District	:-KOTTAYAM
State	:- KERALA
Plot area	:- 6.8976 ha.

Plan Prepared by.

MUKESH SUROLIYA,
M.Sc. Geology,
Recognition as Qualified Person (RQP),
(RQP No. -RQP/AJM/321/2010/A)
Indian Bureau of Mines &
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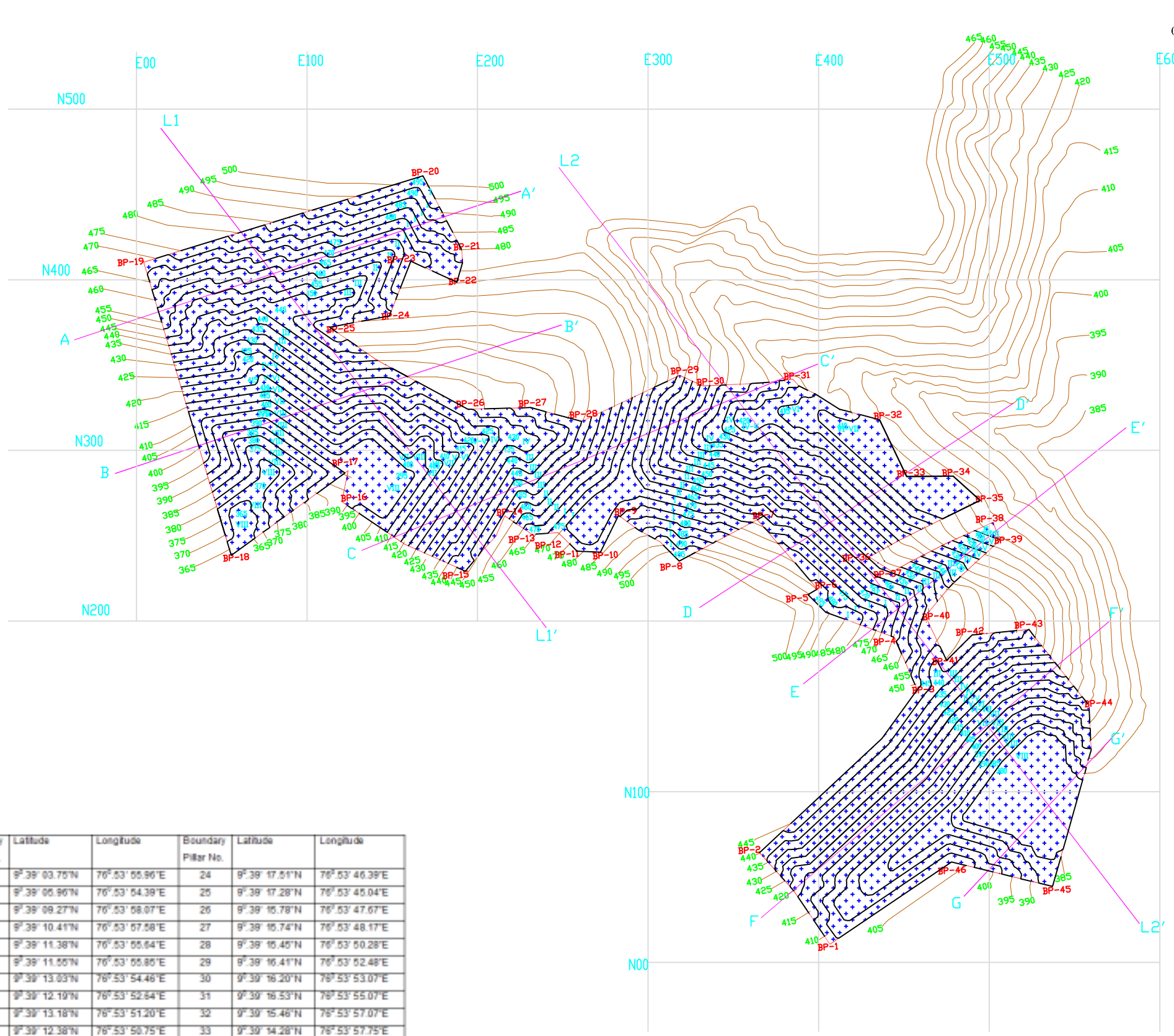
Hydrology & Ground Water (HG) and
Geology (GEO) from National Accreditation Board for Education and Training (NABET),
Quality Council of India (QCI)

PLATE No. 5

YEARWISE TANTATIVE EXCAVATION PLAN



Boundary Pillar No.	Latitude	Longitude	Boundary Pillar No.	Latitude	Longitude
1	9°.39' 03.75"N	76°.53' 55.96"E	24	9°.39' 17.51"N	76°.53' 46.39"E
2	9°.39' 05.96"N	76°.53' 54.39"E	25	9°.39' 17.28"N	76°.53' 45.04"E
3	9°.39' 09.27"N	76°.53' 58.07"E	26	9°.39' 15.78"N	76°.53' 47.67"E
4	9°.39' 10.41"N	76°.53' 57.58"E	27	9°.39' 15.74"N	76°.53' 48.17"E
5	9°.39' 11.38"N	76°.53' 55.64"E	28	9°.39' 15.45"N	76°.53' 50.28"E
6	9°.39' 11.55"N	76°.53' 55.85"E	29	9°.39' 16.41"N	76°.53' 52.48"E
7	9°.39' 13.03"N	76°.53' 54.46"E	30	9°.39' 16.20"N	76°.53' 53.07"E
8	9°.39' 12.19"N	76°.53' 52.84"E	31	9°.39' 16.53"N	76°.53' 55.07"E
9	9°.39' 13.18"N	76°.53' 51.20"E	32	9°.39' 15.46"N	76°.53' 57.07"E
10	9°.39' 12.38"N	76°.53' 50.75"E	33	9°.39' 14.28"N	76°.53' 57.75"E
11	9°.39' 12.39"N	76°.53' 50.24"E	34	9°.39' 14.24"N	76°.53' 58.85"E
12	9°.39' 12.83"N	76°.53' 49.77"E	35	9°.39' 13.77"N	76°.53' 59.43"E
13	9°.39' 12.79"N	76°.53' 49.22"E	36	9°.39' 12.60"N	76°.53' 56.89"E
14	9°.39' 13.19"N	76°.53' 48.49"E	37	9°.39' 12.27"N	76°.53' 57.37"E
15	9°.39' 11.96"N	76°.53' 47.66"E	38	9°.39' 13.24"N	76°.53' 59.70"E
16	9°.39' 13.55"N	76°.53' 44.89"E	39	9°.39' 12.88"N	76°.53' 59.89"E
17	9°.39' 14.24"N	76°.53' 44.98"E	40	9°.39' 11.26"N	76°.53' 58.10"E
18	9°.39' 12.38"N	76°.53' 42.31"E	41	9°.39' 10.29"N	76°.53' 58.59"E
19	9°.39' 18.89"N	76°.53' 40.44"E	42	9°.39' 10.82"N	76°.53' 59.19"E
20	9°.39' 20.75"N	76°.53' 46.84"E	43	9°.39' 10.88"N	76°.54' 00.45"E
21	9°.39' 19.35"N	76°.53' 47.53"E	44	9°.39' 09.28"N	76°.54' 01.91"E
22	9°.39' 18.53"N	76°.53' 47.51"E	45	9°.39' 05.18"N	76°.54' 01.14"E
23	9°.39' 18.88"N	76°.53' 46.85"E	46	9°.39' 05.64"N	76°.53' 58.77"E

N

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- 380 CONTOUR LINE
- SECTION LINE
- WORKING BENCH
- I-VIII YEARWISE WORKING

Project Name	:- M/S. PETRA CRUSHERS
Village	:- KOOTICKAL
Panchayat	:-
Taluk	:- KANJIRAPPALLY
District	:-KOTTAYAM
State	:- KERALA
Plot area	:- 6.8976 ha.

Plan Prepared by.

MUKESH SUROLIYA,
M.Sc. Geology,
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Hydrology & Ground Water (HG) and
Geology (GEO) from National Accreditation Board for Education and Training (NABET),
Quality Council of India (QCI)

PLATE No. 6

RECLAMATION PLAN & SECTIONS

SCALE

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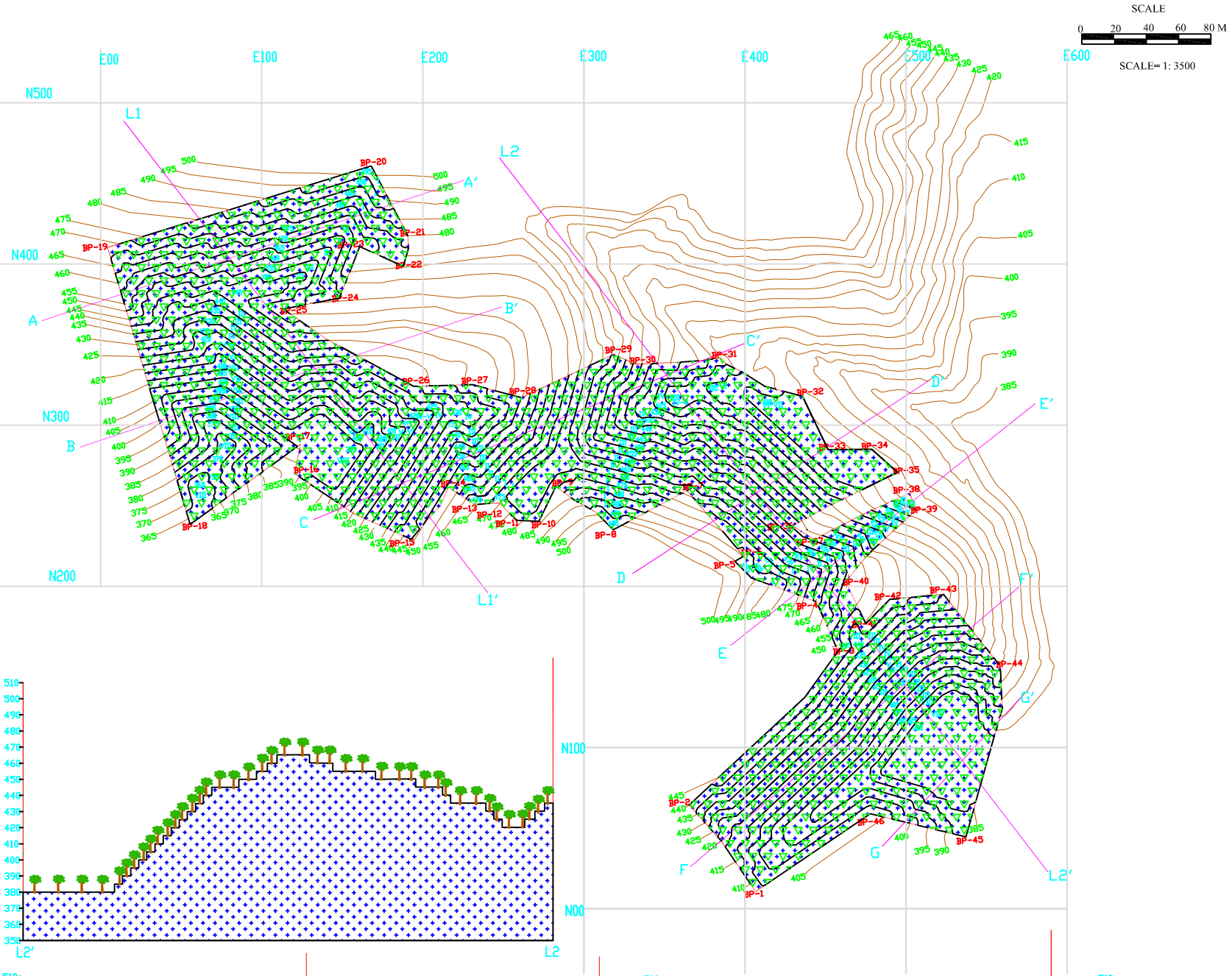
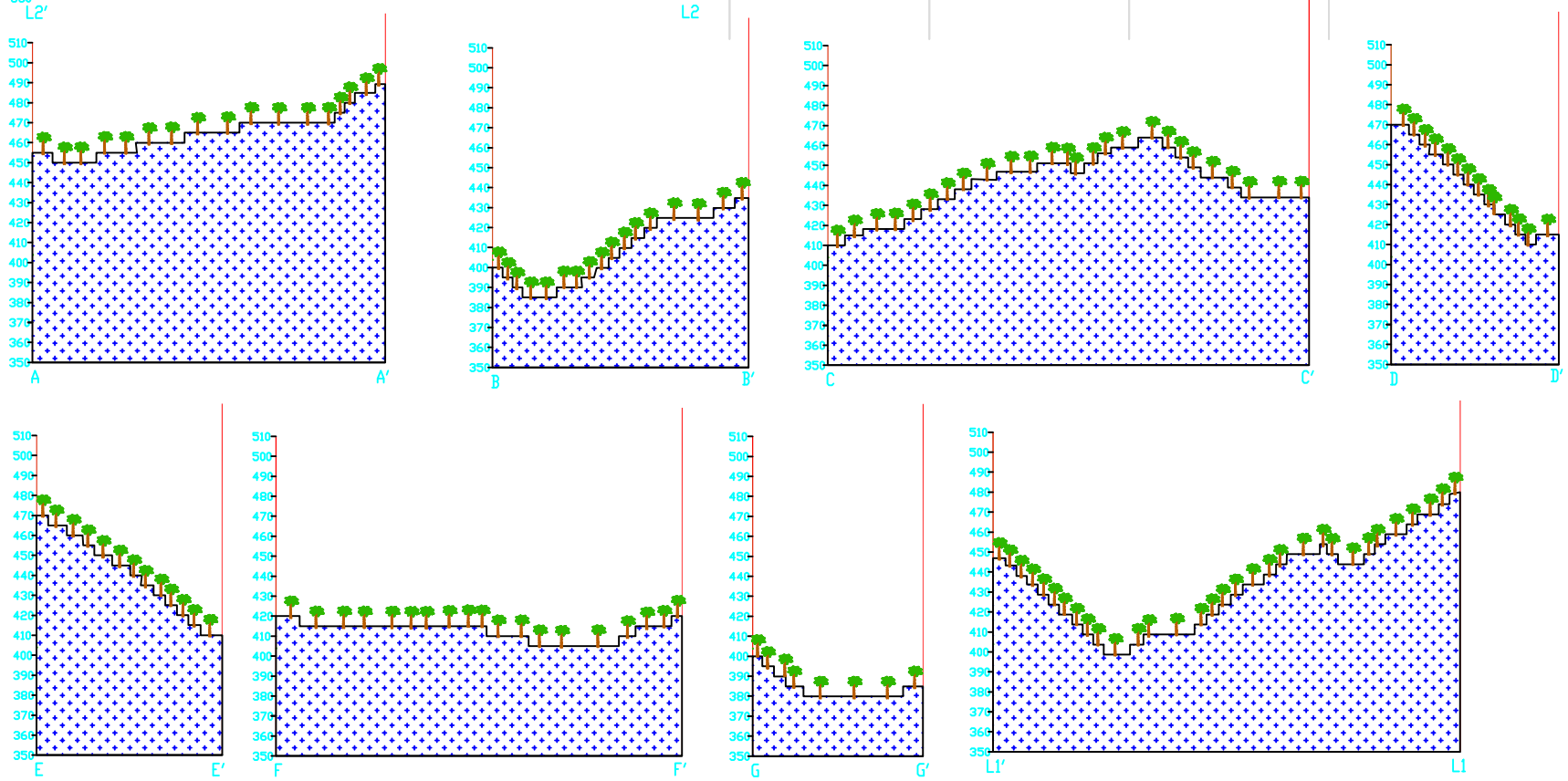
SCALE= 1: 3500





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- CONTOUR LINE
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- I-VIII RECLAMATION YEAR

Project Name	:- M/S. PETRA CRUSHERS
VIllage	:- KOOTICKAL
Panchayat	:-
Taluk	:- KANJIRAPPALLY
DIstrIct	:-KOTTAYAM
State	:- KERALA
Plot area	:- 6.8976 ha.

Plan Prepared by.

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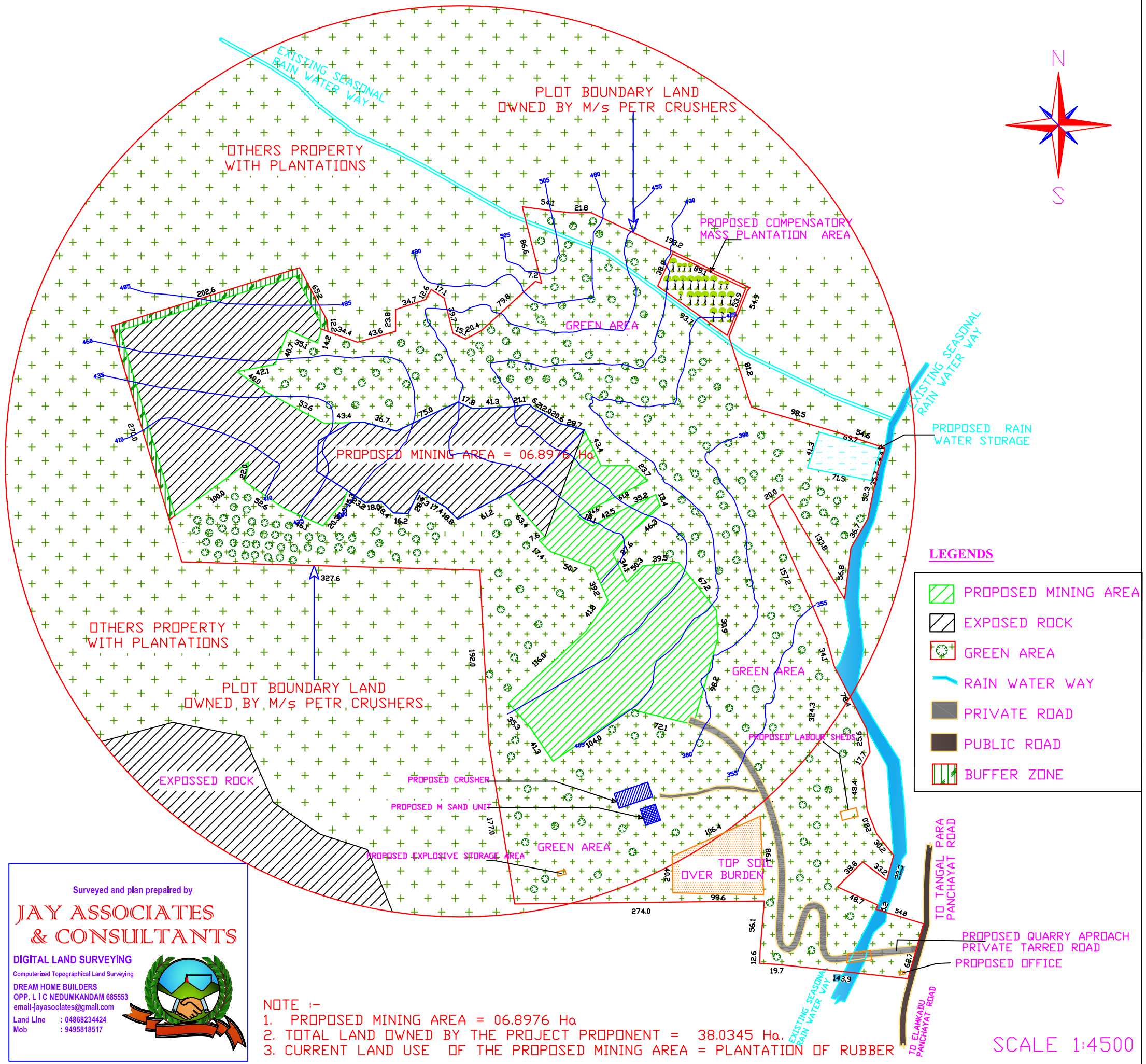
PLATE NO.-7

ENVIRONMENT PLAN - M/s.PETRA CRUSHERS



Surveyed and plan prepaired by

JAY ASSOCIATES & CONSULTANTS

DIGITAL LAND SURVEYING

Computerized Topographical Land Surveying

DREAM HOME BUILDERS
OPP, L I C NEDUMKANDAM 685553
email-jayasociates@gmail.com
Land Line : 04868234424
Mob : 9495818517

NOTE :-

1. PROPOSED MINING AREA = 06.8976 Ha
2. TOTAL LAND OWNED BY THE PROJECT PROPONENT = 38.0345 Ha.
3. CURRENT LAND USE OF THE PROPOSED MINING AREA = PLANTATION OF RUBBER

SCALE 1:4500

SCALE

0 20 40 60 80 M

SCALE= 1: 3500

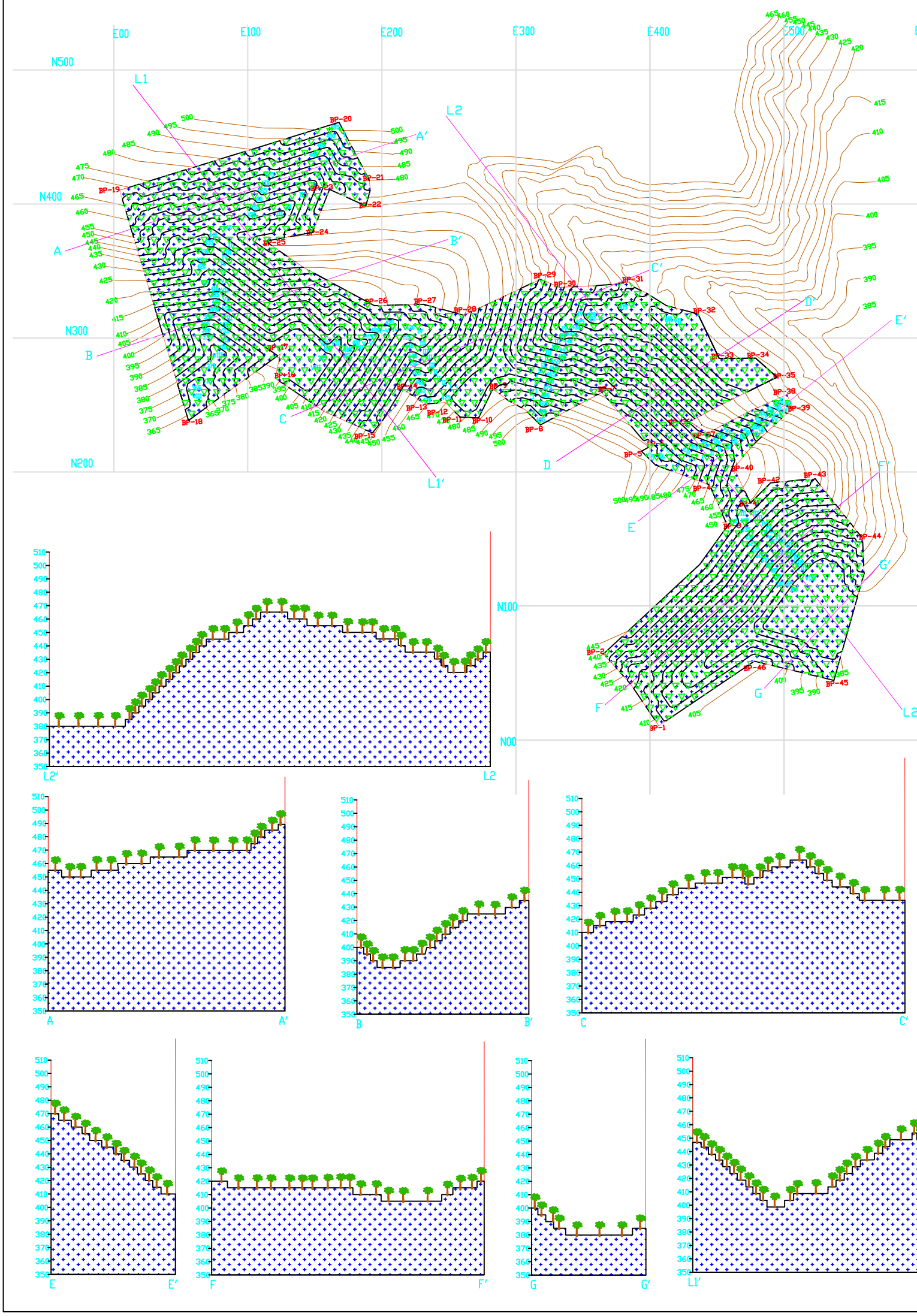


PLATE No. 8

CONCEPTUAL PLAN & SECTIONS

N

Boundary Pillar No.	Latitude	Longitude	Boundary Pillar No.	Latitude	Longitude
1	9°.39' 03.75'N	76°.53' 55.96'E	24	9°.39' 17.51'N	76°.53' 46.39'E
2	9°.39' 05.96'N	76°.53' 54.39'E	25	9°.39' 17.28'N	76°.53' 45.04'E
3	9°.39' 09.27'N	76°.53' 58.07'E	26	9°.39' 15.78'N	76°.53' 47.87'E
4	9°.39' 10.41'N	76°.53' 57.58'E	27	9°.39' 15.74'N	76°.53' 48.17'E
5	9°.39' 11.38'N	76°.53' 55.64'E	28	9°.39' 15.45'N	76°.53' 50.28'E
6	9°.39' 11.55'N	76°.53' 55.85'E	29	9°.39' 16.41'N	76°.53' 52.48'E
7	9°.39' 13.03'N	76°.53' 54.46'E	30	9°.39' 16.20'N	76°.53' 53.07'E
8	9°.39' 12.19'N	76°.53' 52.64'E	31	9°.39' 16.53'N	76°.53' 55.07'E
9	9°.39' 13.18'N	76°.53' 51.20'E	32	9°.39' 15.46'N	76°.53' 57.07'E
10	9°.39' 12.38'N	76°.53' 50.75'E	33	9°.39' 14.28'N	76°.53' 57.75'E
11	9°.39' 12.39'N	76°.53' 50.24'E	34	9°.39' 14.24'N	76°.53' 58.85'E
12	9°.39' 12.83'N	76°.53' 49.77'E	35	9°.39' 13.77'N	76°.53' 59.43'E
13	9°.39' 12.79'N	76°.53' 49.22'E	36	9°.39' 12.60'N	76°.53' 58.80'E
14	9°.39' 13.19'N	76°.53' 48.49'E	37	9°.39' 12.27'N	76°.53' 57.37'E
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16	9°.39' 13.55'N	76°.53' 44.89'E	39	9°.39' 12.88'N	76°.53' 59.89'E
17	9°.39' 14.24'N	76°.53' 44.98'E	40	9°.39' 11.26'N	76°.53' 58.10'E
18	9°.39' 12.39'N	76°.53' 42.31'E	41	9°.39' 10.29'N	76°.53' 58.59'E
19	9°.39' 18.89'N	76°.53' 40.44'E	42	9°.39' 10.82'N	76°.53' 59.19'E
20	9°.39' 20.15'N	76°.53' 46.64'E	43	9°.39' 10.88'N	76°.54' 00.48'E
21	9°.39' 19.35'N	76°.53' 47.53'E	44	9°.39' 09.28'N	76°.54' 01.91'E
22	9°.39' 18.53'N	76°.53' 47.51'E	45	9°.39' 05.18'N	76°.54' 01.14'E
23	9°.39' 18.88'N	76°.53' 48.85'E	46	9°.39' 05.64'N	76°.53' 58.77'E

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- 380 CONTOUR LINE
- SECTION LINE
- PLANTATION
- WORKING BENCH
- RECLAIMED AREA
- I-VIII RECLAMATION YEAR

Project Name	:- M/S. PETRA CRUSHERS
Village	:- KOOTICKAL
Panchayat	:-
Taluk	:- KANJIRAPPALLY
District	:-KOTTAYAM
State	:- KERALA
Plot area	:- 6.8976 ha.

Plan Prepared by.

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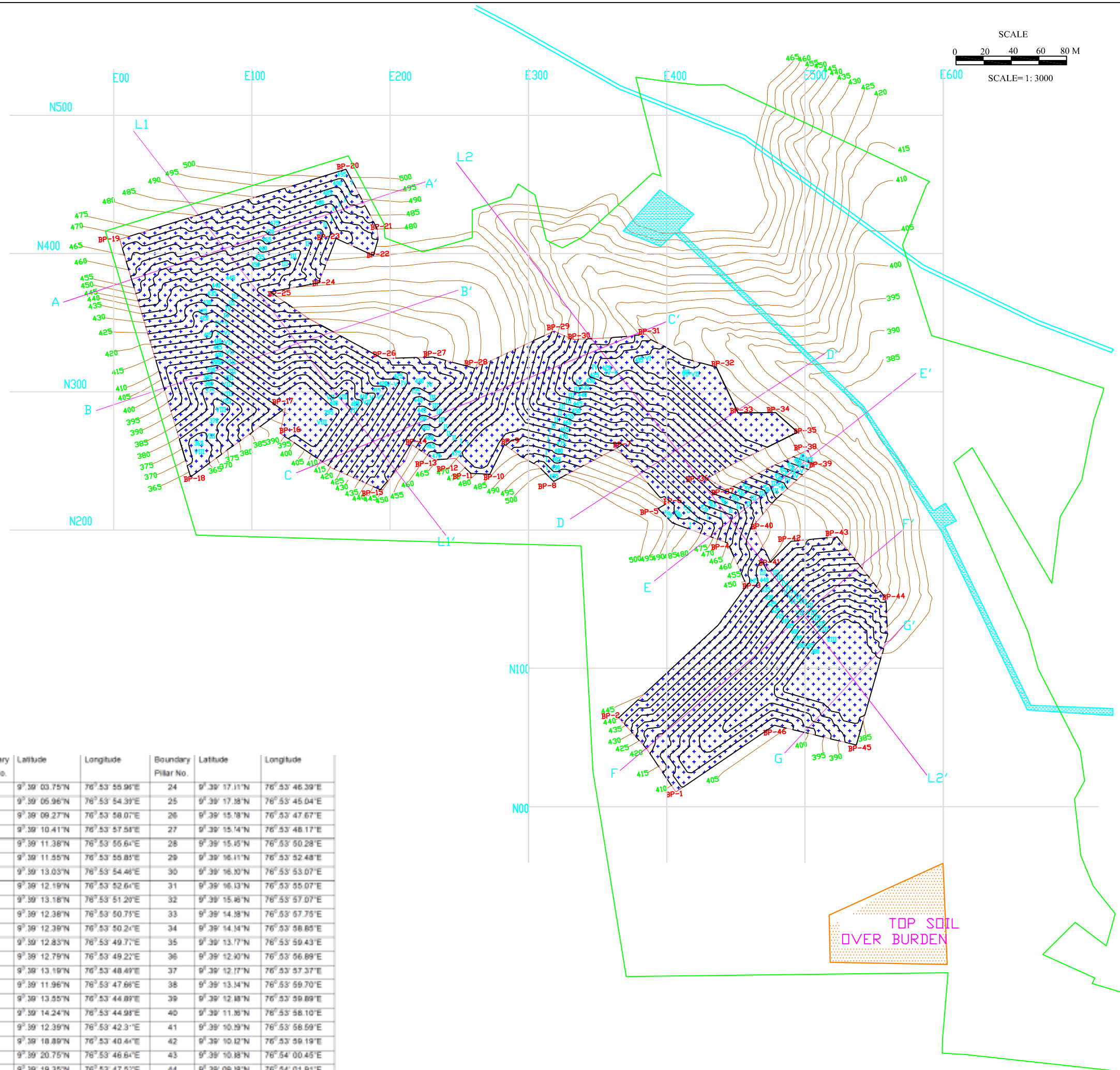

Boundary Pillar No.	Latitude	Longitude	Boundary Pillar No.	Latitude	Longitude
1	9°.39' 03.75"N	76°.53' 55.96"E	24	9°.39' 17.11"N	76°.53' 46.39"E
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6	9°.39' 11.55"N	76°.53' 55.85"E	29	9°.39' 16.11"N	76°.53' 52.48"E
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8	9°.39' 12.19"N	76°.53' 52.64"E	31	9°.39' 16.13"N	76°.53' 55.07"E
9	9°.39' 13.18"N	76°.53' 51.20"E	32	9°.39' 15.16"N	76°.53' 57.07"E
10	9°.39' 12.38"N	76°.53' 50.75"E	33	9°.39' 14.38"N	76°.53' 57.75"E
11	9°.39' 12.39"N	76°.53' 50.24"E	34	9°.39' 14.14"N	76°.53' 58.85"E
12	9°.39' 12.83"N	76°.53' 49.77"E	35	9°.39' 13.77"N	76°.53' 59.43"E
13	9°.39' 12.79"N	76°.53' 49.22"E	36	9°.39' 12.90"N	76°.53' 56.89"E
14	9°.39' 13.19"N	76°.53' 48.49"E	37	9°.39' 12.77"N	76°.53' 57.37"E
15	9°.39' 11.96"N	76°.53' 47.66"E	38	9°.39' 13.14"N	76°.53' 59.70"E
16	9°.39' 13.55"N	76°.53' 44.89"E	39	9°.39' 12.88"N	76°.53' 59.89"E
17	9°.39' 14.24"N	76°.53' 44.98"E	40	9°.39' 11.86"N	76°.53' 58.10"E
18	9°.39' 12.39"N	76°.53' 42.31"E	41	9°.39' 10.19"N	76°.53' 58.59"E
19	9°.39' 18.89"N	76°.53' 40.44"E	42	9°.39' 10.12"N	76°.53' 59.19"E
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22	9°.39' 18.53"N	76°.53' 47.51"E	45	9°.39' 05.18"N	76°.54' 01.14"E
23	9°.39' 18.88"N	76°.53' 46.85"E	46	9°.39' 05.14"N	76°.53' 58.77"E

PLATE No. 9

SURFACE DRAINAGE RUNOFF PLAN

N

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- LEASE BOUNDARY WITH FENCING
- GRANITE ROCK
- 380 CONTOUR LINE
- SECTION LINE
- WORKING BENCH
- PLOT BOUNDARY
- DE SILTATION TANK
- DRAINAGE RUNOFF /STROM WATER WAY

Project Name	:- M/S. PETRA CRUSHERS
Village	:- KOOTICKAL
Panchayat	:-
Taluk	:- KANJIRAPPALLY
District	:-KOTTAYAM
State	:- KERALA
Plot area	:- 6.8976 ha.

Plan Prepared by.

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Quality Council of India (QCI)

HAULAGE ROAD MAP -M/s. PETRA CRUSHERS

Plate No. 10

N

S

SCALE= 1: 3000

STATE	KERALA
DISTRICT	KOTTAYAM
TALUK	KANJIRAPPALLY
VILLAGE	KOOTICKAL
BLOCK,NO:	79
AREA	06.8976 Ha
SCALE	1:2000
ALL DIMENSIONS ARE IN METERS	

LEGENDS

PROPOSED AREA	
7.5 MTR PROTECTED AREA	
SUB-DIVISION	

PROPOSED MINING AREA = 06.8976 Ha

Surveyed and plan prepaired by

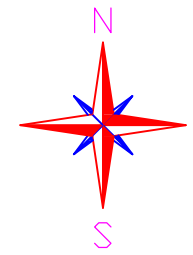
JAY ASSOCIATES & CONSULTANTS

DIGITAL LAND SURVEYING
Computerized Topographical Land Surveying
DREAM HOME BUILDERS
OPP. L I C NEDUMKANDAM 685553
email-jayasociates@gmail.com
Land Line : 04868234424
Mob : 9495818517

SLOPE MAP -M/s. PETRA CRUSHERS

Plate No. 11

SCALE= 1: 3000

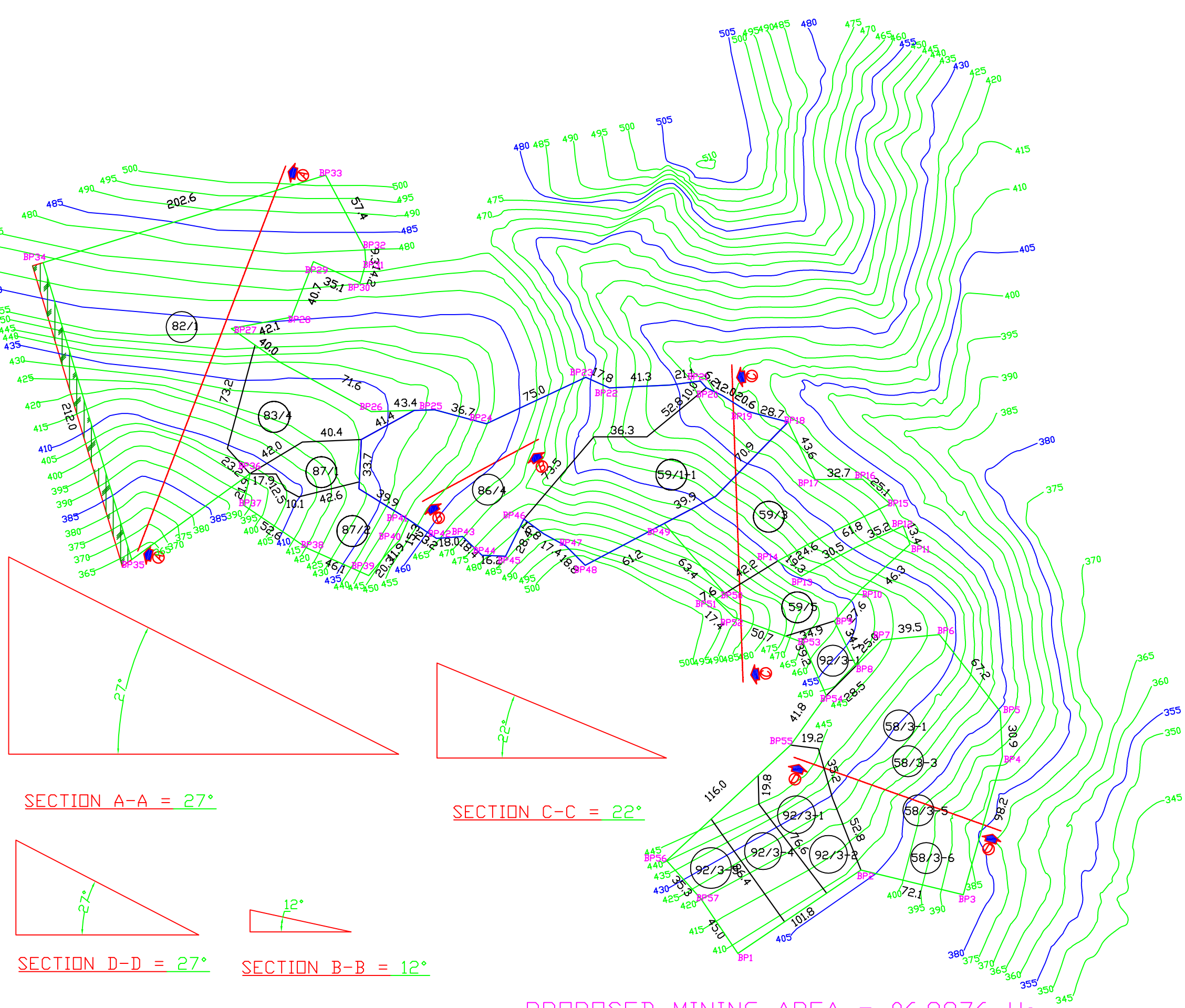


STATE	KERALA
DISTRICT	KOTTAYAM
TALUK	KANJIRAPPALLY
VILLAGE	KOOTICKAL
BLOCK.NO:	79
AREA	06.8976 Ha
SCALE	1:2000

ALL DIMENSIONS ARE IN METERS

LEGENDS

PROPOSED AREA	
7.5 MTR PROTECTED AREA	
SUB-DIVISION	



SECTION A-A = 27°

SECTION C-C = 22°

SECTION D-D = 27°

SECTION B-B = 12°

PROPOSED MINING AREA = 06.8976 Ha

Surveyed and plan prepared by

JAY ASSOCIATES & CONSULTANTS

DIGITAL LAND SURVEYING
Computerized Topographical Land Surveying
DREAM HOME BUILDERS
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