PRE-FEASIBILITY REPORT

FOR

Additional Development drilling of 9 wells and work over of 3 wells in the Discovered small fields of Koravaka, marginal fields of Mulkipalli, Magatapalli, Sirikattapalli, Chintalapalli and Medapadu in KG basin, Andhra Pradesh, India with associated Oil & gas processing facilities and evacuation pipelines

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Ponnamanda village, Magatapalli village, Morupolem village, Sivakodu village, Katreyapadulanka village in East Godavari district and Medapadu Village in West Godavari District, Andhra Pradesh, India.

Project Proponent:
M/s KEI-RSOS PETROLEUM & ENERGY PRIVATE LIMITED
#Energy House, D.No. 85-17-03,
All Bank Colony,
Rajahmundry - 533103 (A.P), India.

January 2019

1 EXECUTIVE SUMMARY

Table 1: SIGNIFICANT FEATURES

S. No	Description	Details
1.	Name of the Project	Additional Development drilling of 9 wells and work over of 3 wells in the Discovered small fields of Koravaka and marginal fields of Mulkipalli, Magatapalli, Sirikattapalli, Chintalapalli and Medapadu in KG basin, Andhra Pradesh, India with associated Oil and gas processing facilities and evacuation pipelines by KEI RSOS Petroleum & Energy Pvt Ltd
2.	Location	Ponnamanda village, Magatapalli village, Morupolem village, Sivakodu village, Katreyapadulanka village, in East Godavari district and Medapadu Village in West Godavari District, Andhra Pradesh, India.
3.	Production	Development drilling wells for Oil and gas
4.	Total land requirement for the project	1 Ha for each drilling well. Private land
5.	Total water requirement & Source	Water requirement is 40m3/day from local vendors
6.	Manpower	30 - 40 people during drilling
7.	Estimated Cost of the Project	Total 110 crores (Capital cost –Rs.10 crores per well)

Table 2: ENVIRONMENTAL SENSITIVITY

S. No	NAME/IDENTITY	Aerial distance (within 15 km) proposed project location boundary
1	Sea Godavari river	1.8 km m SE 200 m E
2	NH-214 NH-5	5 km NW 17.8 km N
3	Razole	Sensitive man-made land uses like hospitals, schools, places of worship, community facilities, etc. exist within the 8 km radius area in Razole village.
4	This is not a listed or critically polluted area	
5	The Project area falls under seismic zone-III as per IS: 1893 (Part-1): 2002	

2.0 INTRODUCTION OF THE PROJECT AND BACKGROUND

2.1 Identification of the Project and Project Proponent

M/s KEI RSOS Petroleum & Energy Pvt Ltd proposes to conduct additional development drilling of 9 wells and work over of 3 wells in the discovered small fields of Koravaka and marginal fields of Mulkipalli, Magatapalli, Sirikattapalli, Chintalapalli & Medapadu in KG basin, Andhra Pradesh, India with associated Oil & gas processing facilities and evacuation pipelines.

This Pre-feasibility report is based on the format provided by MoEFCC as part of Environmental clearance documentation. The Propose project entails a capital cost of Rs. 110 crores.

2.2 Brief Description of Nature of Project

2.2.1 Brief on Marginal Fields

Mulkipalli, Magatapalli, Sirikattapalli, Chintanapalli & Medapadu Marginal Fields have earlier been drilled and produced by ONGC Ltd and have been awarded to M/s KEI-RSOS PETROLEUM & ENERGY PVT LTD by ONGC on service contract basis to enhance oil & gas production from these fields on revenue share basis. The total allocated area of all the blocks combined is 43.4 sq.km. The description of each of the fields is as follows;

S. No	Name of the Field	Physical size	Remarks
1	Mulkipalli	5.70 sq.km	Onshore
2	Magatapalli	6.50 sq.km	Onshore
3	Sirikattapalli	3.60 sq.km	Onshore
4	Chintalapalli	17.60 sq.km	Onshore
5	Medapadu	10.00 sq.km	Onshore

2.3 Need for the Project and its Importance to the Country

India's demand for petroleum products is growing at a rapid rate, having virtually doubled from 30 million tons in 1980-81 to about 70 million tons in 1995-96 to 201 million tons in 2017-18. The oil and gas sector are among the six core industries in India and plays a major role in influencing decision making for all the other important sections of the economy. Current projections for demand and supply indicate that the level of self- sufficiency is likely to decline to about 30% over the next few years. Substantial efforts are, therefore, necessary to boost the level of exploration activity in the country so that new reservoirs can be identified to significantly enhance production of crude oil and gas in the years to come. India

today remains one of the least explored regions with oil well density per thousand sq. km being among the lowest. It is also evident that large amounts of capital investments are necessary if exploration efforts are to be substantially augmented. It is therefore required to attract both the national as well as, private sector oil companies to invest in this critical area. In future exploration for oil and gas in critical areas will be based on social, cultural environmental, recreational, economic, legal, national and international needs and would invite development of innovative and supporting technologies for clean operations.

Hence this project of exploratory drilling will help in establishing the oil/gas prospects in the block for commercial recovery, which is a need of the country for its economic development. It is expected that the proposed development drilling activities lead to augment the production of hydrocarbons, in the present scenario of growing demand of oil and gas in the country. The Govt insists to bring down its import dependence on oil and gas to 67 per cent of its requirement by 2022 thus bringing scope for additional discovery of oil & gas exploration.

2.4 Demand Supply Gap

In 1997-38, the New Exploration Licensing Policy (NELP) was envisaged to fill the ever increasing gap between India's gas demand and supply. India's economic growth is closely related to energy demand; therefore the need for oil and gas is projected to grow more, thereby making the sector quite conducive for investment.

2.5 Export Possibility

The Oil & Gas produced will be utilized for domestic purpose only.

2.6 Domestic/Export Markets

The Oil & Gas produced will be utilized for domestic purpose only.

2.7 Imports vs Indigenous Production

The Proposal will result in reduced imports of oil and gas to some extent.

2.8 Employment Generation

Direct Employment during drilling the well at each location will be 30-40 people and indirect employment will be 50. During production direct employment will be 5 and indirect employment will be 10.

3.0 PROJECT DESCRIPTION

3.1 Type of Project Including Interlinked and Interdependent Projects

There are no interlinked or interdependent projects

3.2 Location of the Project

The proposed exploratory and development drilling activity shall be carried out in the following fields. The index map indicating the fields on a google earth image is Presented in **Fig 3.2**, and **Fig 3.2.1** indicates these fields as an extract of SoI toposheet.

FIGURE 3.2 INDEX MAP OF THE PROJECT SITE

FIGURE 3.2.1 LOCATION MAP OF THE PROJECT SITE

9 Development wells will be drilled and 3 workovers will be conducted in the blocks as mentioned below:

S No	Name of the Field	Physical size	Proposed wells	Work over	Remarks
1	Mulkipalli	5.70 sq.km	1 well	1 well	Onshore
2	Magatapalli	6.50 sq.km	1 well	1 well	Onshore
3	Sirikattapalli	3.60 sq.km	2 well	-	Onshore
4	Chintalapalli	17.60 sq.km	2 well	-	Onshore
5	Medapadu	10.00 sq.km	2 well	-	Onshore
6	Koravaka	9.90 sq.km	1 well	1 well	Onshore

Process facilities and evacuation pipelines will be established in three locations as mentioned below:

- Near Koravaka field, near Mulikiapalli field & near Medapadu field
- Evacuation pipelines from all fields to the nearest processing facility.

3.3 Details of Alternate Site

For drilling, it is not possible to fix exactly the surface locations for the proposed wells. The locations of the wells are finalized based on the ongoing interpretation of well results and seismic surveys and also the success of each well as they are drilled. The drill sites have been selected away from public utilities and will confirm to the safety and environmental citing criteria

Consideration of alternate sites is not applicable as the proposed drill sites will be located within fields that has been awarded by Government of India and ONGC for exploration and production of hydrocarbons.

For workovers, no alternative sites are considered as the proposal is for the work over and testing program of already drilled three wells.

3.4 Size or Magnitude of Operation

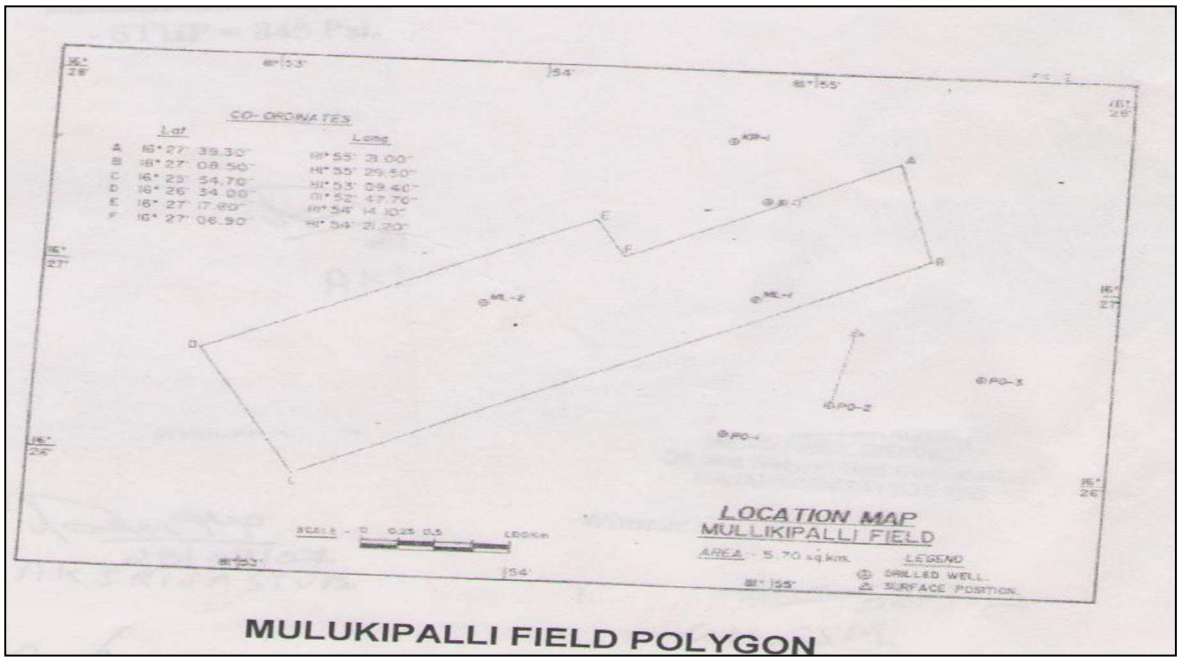
M/s KEI RSOS Petroleum & Energy Pvt Ltd proposes to do additional Development drilling of 9 wells and workover of 3 wells in the marginal fields of Mulkipalli field, Magatapalli field, Sirikattapalli field, Chintalapalli field & Medapadu field and DSF fields of Koravaka field in KG basin, Andhra Pradesh, India for hydrocarbon prospecting with associated processing facilities and gas pipelines. The co-ordinates of each of the fields is presented as follows;

Mulkipalli field co-ordinates are provided as Table-3 and drilling locations & block boundaries are provided below

Table: Mulkipalli Field co-ordinates

Mulkipalli FieldArea:5.70sq. km		
Point	Latitude	Longitude
A	16° 27' 39.30"	81° 55' 21.00"
B	16° 27' 08.50"	81° 55' 29.50"
C	16° 25' 54.70"	81° 53' 09.40"
D	16° 26' 34.00"	81° 52' 47.70"
E	16° 27' 17.80"	81° 54' 14.10"
F	16° 27' 06.90"	81° 54' 21.20"

Fig : Mulkipalli drilling locations & block boundaries

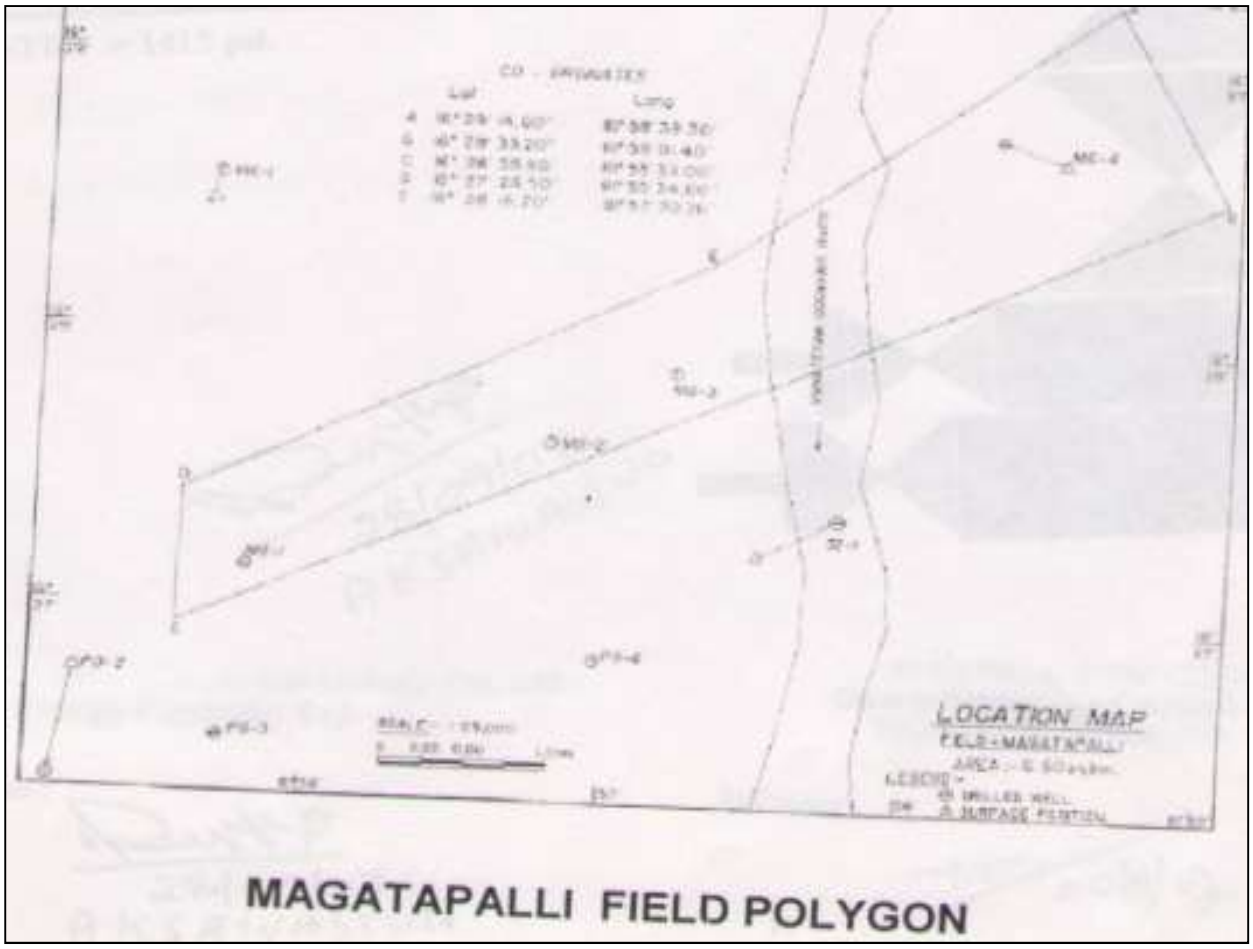


Magatapalli Field co-ordinates are provided as below and drilling locations & block boundaries are provided as below

Table: Magatapalli Field co-ordinates

Magatapalli Field Area:6.50 sq. km.		
Point	Latitude	Longitude
A	16º 29′ 14.60″ N	81º 58′ 38.30″ E
B	16º 28′ 33.20″ N	81º 59′ 01.40″ E
C	16º 26′ 55.90″ N	81º 55′ 34.00″ E
D	16º 27′ 24.50″ N	81º 55′ 34.00″ E
E	16º 28′ 16.70″ N	81º 57′ 20.20″ E

Fig: Magatapalli drilling locations & block boundaries

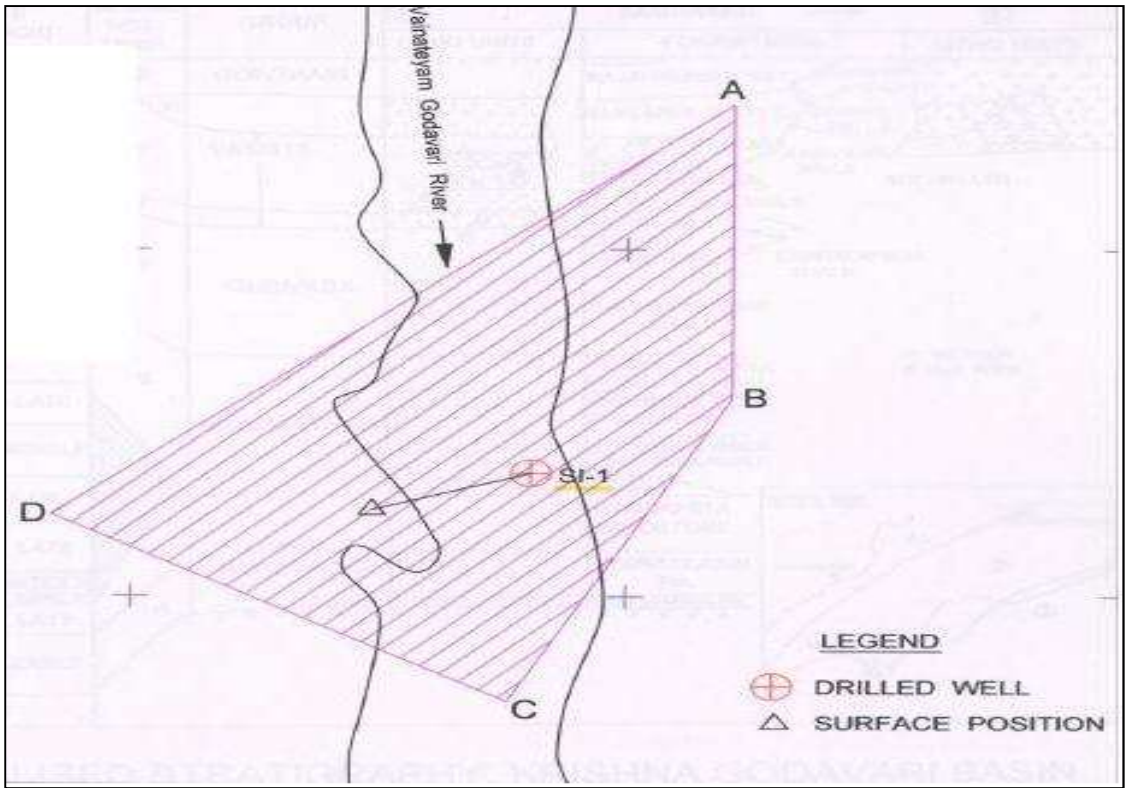


Sirikattapalli field co-ordinates are provided as below and drilling locations & block boundaries are provided as below

Table: Sirikattapalli field co-ordinates

Sirikattapalli Field Area:3.60 sq. km.		
Point	Latitude	Longitude
A	16° 28′ 24″ N	81° 58′ 13″ E
B	16° 27′ 33″ N	81° 58′ 13″ E
C	16° 26′ 41″ N	81° 57′ 46″ E
D	16° 27′ 13″ N	81° 56′ 50″ E

Fig of sirikattapalli drilling locations & block boundaries

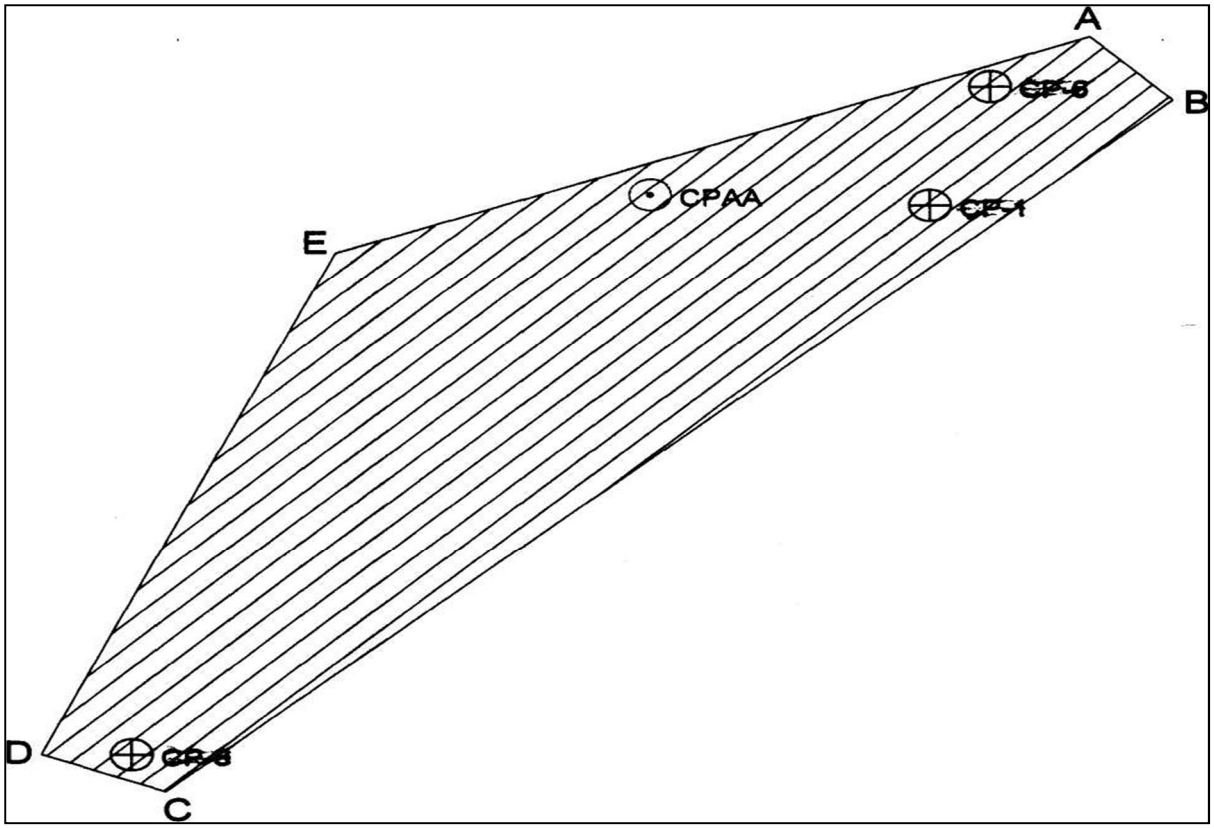


Chintanapalli field co-ordinates are provided as below and drilling locations & block boundaries are provided as below

Table Chintanapalli field co-ordinates

Chintanapalli Field Area:17.6 sq. km.		
Point	Latitude	Longitude
A	16° 28′ 07" N	81° 50′ 20″ E
B	16° 27′ 48″ N	81° 50′ 39″ E
C	16° 24′ 22″ N	81° 46′ 48″ E
D	16° 24′ 33″ N	81° 46′ 20″ E
E	16° 27′ 03″ N	81° 47′ 27″ E

Fig of Chintanapalli drilling locations & block boundaries

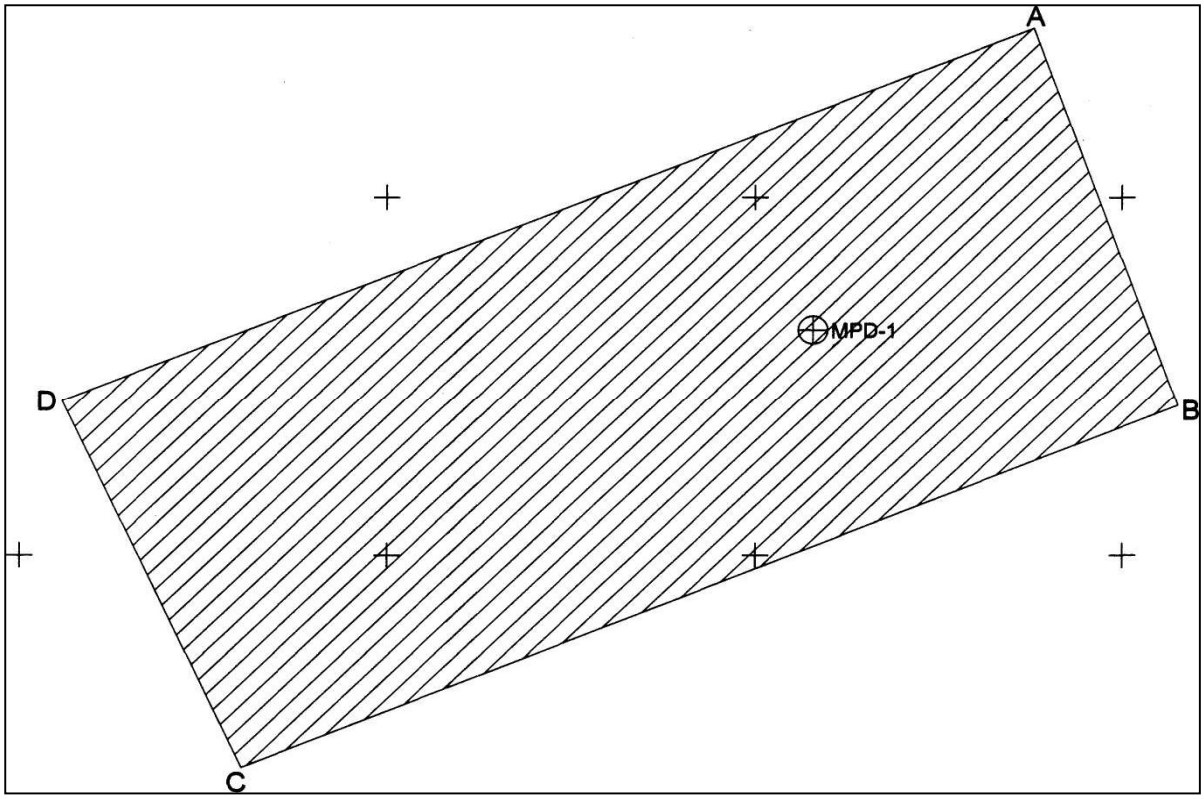


Medapadu field co-ordinates are provided as below and drilling locations & block boundaries are provided as below

Table: Medapadu field co-ordinates

Medapadu Field Area: 10.0 sq. km		
Point	Latitude	Longitude
A	16° 31′ 28″ N	81° 46′ 45″ E
B	16° 30′ 25″ N	81° 47′ 09″ E
C	16° 29′ 25″ N	81° 44′ 36″ E
D	16° 30′ 26″ N	81° 44′ 07″ E

Fig of Medapadu drilling locations & block boundaries

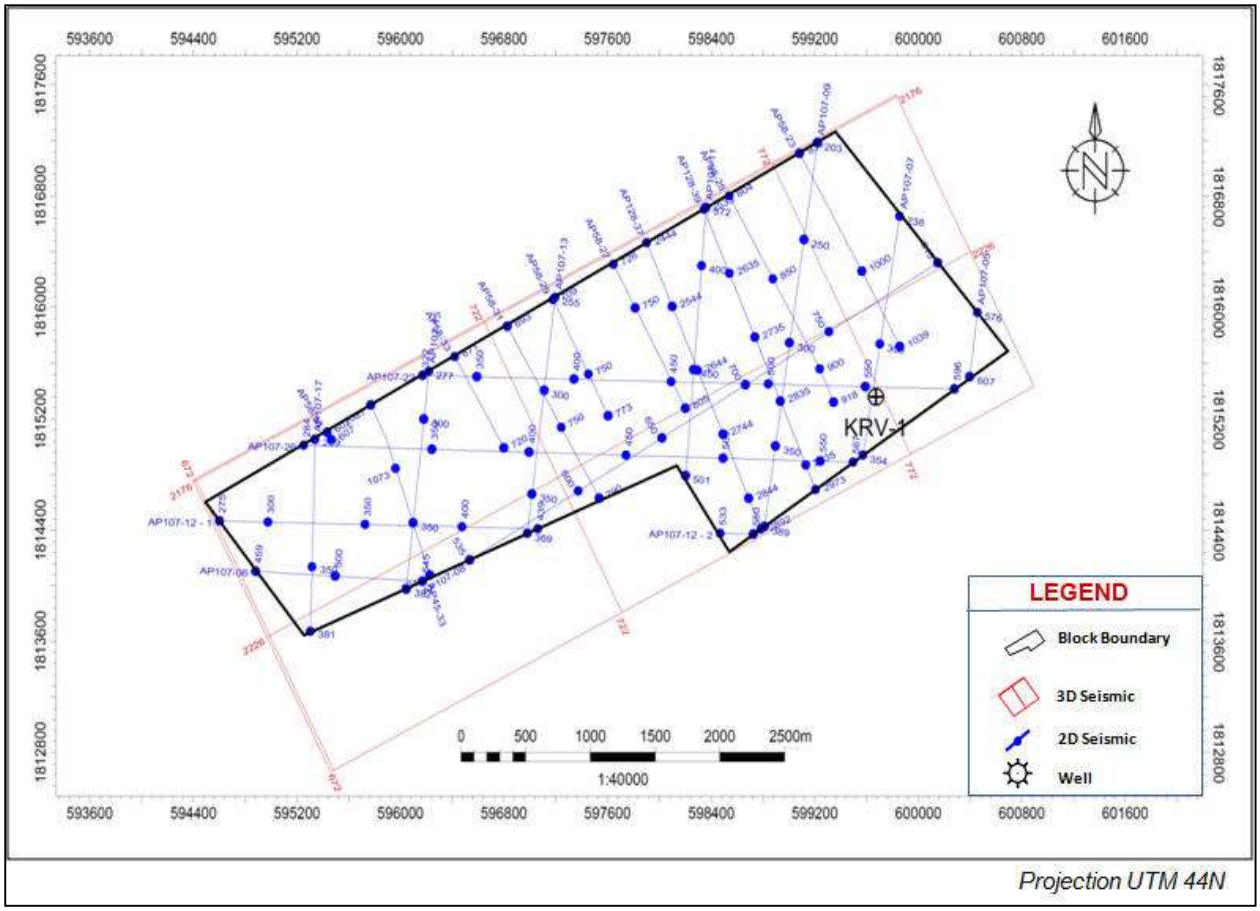


Koravaka field co-ordinates are provided as below and drilling locations & block boundaries are provided as below

Table: Koravaka field co-ordinates

Koravaka Field Area: 9.9 sq. km		
Point	Latitude	Longitude
A	16° 24′ 39.57″ N	81° 53′ 05.95″ E
B	16° 24′ 08.24″ N	81° 53′ 31.44″ E
C	16° 24′ 47.48″ N	81° 55′ 08.68″ E
D	16° 24′ 27.23″ N	81° 55′ 22.36″ E
E	16° 25′ 13.39″ N	81° 56′ 35.08″ E
F	16° 26′ 05.46″ N	81° 55′ 30.39″ E

Fig of Koravaka drilling locations & block boundaries



3.5 Project Description with Process Details

3.5.1 Brief on Marginal Fields

Mulkipalli, Magatapalli, Sirikattapalli, Chintanapalli & Medapadu Marginal Fields have been awarded to M/s KEI-RSOS PETROLEUM & ENERGY PVT LTD by ONGC on service contract basis in the year 2007 and the total allocated area of the block is 33.4 sq.km. The description of each of the fields is as follows;

S. No	Name of the Field	Physical size	Remarks
1	Mulkipalli	5.70 sq.km	Onshore
2	Magatapalli	6.50 sq.km	Onshore
3	Sirikattapalli	3.60 sq.km	Onshore
4	Chintalapalli	17.60 sq.km	Onshore
5	Medapadu	10.00 sq.km	Onshore

3.5.1.1 Mulkipalli Field

This block was explored by ONGC in year 1995, which drilled 2 wells, MLP#1 in the year 1995 (status as Gas producer) and MLP#2 in the year 1997. Mulkipalli#1 (MLP#1) produced 43.44 MMScm of natural gas by ONGC. After producing 43.44

MMScm of gas wells become low pressure and ONGC declared this field as Marginal field because it was not economically viable for ONGC.

The Mulikipalli field is situated in the Island block of East Godavari sub basin. Two exploratory wells were drilled in this field and the well Mulikipalli-1 produced gas from the sandstone reservoir within Vadaparru shale (Eocene section).

Tectonically the prospect lies in the East Godavari sub basin. The prospect is a fault closure at Eocene level. The area is characterized by southerly handing northeast – southwest trending fault systems, resulted due to fast tectonic and sedimentation loading.

The wells are drilled up to lower Eocene section in this area. The lower Eocene (Vadaparru Shale) consists of mainly shale with minor sandstone and limestone. It is overlain by the middle Eocene section, which is characterized by presence of dominantly limestone with thin Sandstone and shale alternation (Bhimanapalli Limestone). The upper Eocene (Matsyapuri Sandstone) comprises of dominantly sandstone. The overlying post Eocene section mainly consists of sandstone with minor clay/claystone.

3.5.1.2 Magatapalli Field

This block was explored by ONGC in year 1988, which drilled 4 wells, MGP#1 in the year 1988 (Abandoned due to technological complications), MG-2 have produced 6.16, MGP 3 have produced 2.6 MMm3, MGP#2 dry well. MGP 2&3 have become low pressure and ONGC declared as Marginal fields because it was not economically viable for ONGC.

The Magatapalli prospect is situated in the East Godavari sub basin of Krishna Godavari Pericratonic rift basin. A total number of 4 exploratory wells have been drilled over this prospect.

Magatapalli prospect is a NE-SW trending fault closure in the coastal tract region to the southeast of Adavipalem-Ponnamanda fault. The coastal tract-offshore region of K.G. Basin is characterized by growth-fault tectonics due to fast over loading of Tertiary basin fill causing high pressure regime. The upper structural tract of coastal region is primarily associated with Vadaparru-Pasarlapudi Petroleum system. A series of rollover anticlines associated with NESW growth fault tectonics with shale bulge at places give rise to sets of structural culminations. The north south trending cross fault system often exhibits locales of hydrocarbon pools at different stratigraphic levels.

The area witnessed extensive marine transgression concomitant with southeast basinal tilt, during early drift phase of the basin depositing Raghavapuram high Gamma-High resistively shale. On set of proto Godavari fluvial system initiated during this time and deposited huge pile of deltaic domain sedimentation (over 2 Km thick) in the south of Mastyapuri-Palakollu fault. The Tertiary sediment lies over the basin-scale spread of Razole Volcanics of Upper Cretaceous age. Base of Upper Cretaceous is dominantly a shale sequence (Raghavapuram- Shale) followed by Tirupati Sandstone of Upper Cretaceous. Palaeocene section overlies the Razole volcanics and it mainly consists of shale (Palakollu Shale). The Eocene section is divided into lower silty facies (Pasarlapudi Formation), middle limestone (Bhimanapalli limestone) and Upper arenaceous facies (Matsyapuri Sandstone). The presence of limestone facies indicates the characteristic shelf edge depositional regime. Progressively southward the entire deltaic facies transits into equivalent pro-delta regime known as Vadaparru Shale. The Oligocene section consists of mainly claystone (Narsapur claystone) with minor limestone and sandstone. The base and top of Oligocene sequence are unconformity surfaces. Early Miocene period witnessed a brief transgression followed by regression. The Mio Pliocene section is known as Rajahmundry Sandstone. This is overlain by Holocene Pleistocene alluvium.

3.5.1.3 Sirikattapalli Field

This block was explored by ONGC in year 1999, which drilled 1 well, SKP#1 in the year 1999 (status as Gas producer), Sirikapalli#1 (SKP#1) produced 12.48 MMScm of natural gas by ONGC. After producing 12.48 MMScm of gas wells become low pressure and ONGC declared this field as Marginal field because it was not economically viable for ONGC.

Sirikattapalli field of Krishna Godavari Basin is located in East Godavari district, Andhra Pradesh on the East coast of India. This prospect is situated in the SI-PS-24 ML area of East Godavari sub-basin. One well SI-1 was drilled on the Sirikattapalli prospect with a target depth of 2600 m with the objective of ploring sands within Vadaparru Shale of Middle Eocene and Matsyapuri Formation of Middle to Upper Eocene age.

The Krishna Godavari petroliferous province is a northeast southwest trending pericratonic rift basin and is situated on the eastern passive continental margin of India. The basin has a polyhistoric evolution. The basin was an intracratonic rift within Gondwana land till early Jurassic. Continental stretching under the influence of northwest southeast extensional force gave rise to the pericratonic passive margin rifting along the northeast southwest trending primeval structural grain (Eastern

Ghat orogeny). Exposure of outcrops towards northwest demarcates the northern basin margin, and towards southeast the basin extends into deep offshore. The episodic rift propagation witnessed rift, rift-drift transition and post-rift phases. The basin is divided from west to east as Krishna Graben, West Godavari sub- basin and East Godavari sub-basin separated by northeast-southwest trending basement highs namely Bapatla Horst in the west and Tanuku Horst in the east. The northeast southwest trending basement highs are affected by a number of northwest-southeast cross trends. The southern subsurface extension of Pranhita-Godavari graben towards the northeast of KG basin comprise the Permo- Triassic sediments of the palaeo-rift. The Late Jurassic to Early Cretaceous sediments got deposited during early rift phase. The basin witnessed rift-drift transition with southward basin tilt and the first marine transgression took place during early Cretaceous period . The basin witnessed volcanic event (tholeiitic basalt) during Late Cretaceous-Lower Paleocene. The southward slope is characterized by basin bound fault systems. Subsequent tectonic subsidence and sediment loading resulted in growth fault systems and shale flowage further south in the shallow offshore regime.

The Sirikattapalli field lies south of the main northeast-southwest trending Matsyapuri- Pallakollu fault, which is interpreted as the Palaeocene shelf edge. The coastal tract, offshore region of K.G.Basin, is characterized by growth fault tectonics due to fast over loading of the Tertiary basin fill sediments. A series of rollover anticlines associated with northeast-southwest growth fault system gave rise to sets of structural culminations. The hydrocarbon accumulations are primarily associated with Vadaparru-Pasarlapudi Petroleum system.

The well was bottomed in Vadaparru shale Formation of Middle Eocene age. The Vadaparru Shale consists mainly of claystone with thin beds of siltstone, sandstone and limestone. The overlying Matsyapuri Sandstone (Middle-Upper -Eocene) section consists of predominantly sandstone and claystone with occasionally few thin limestone beds. The overlying Narsapur Clay stone and Younger sediments consist of mainly claystone with streaks of sandstone.

3.5.1.4 Chintanapalli Field

This block was explored by ONGC in year 1988, which drilled 3 wells, CHP#1 in the year 1988 (Abandoned due to technological complications), CHP#6 (Abandoned) and CHP#8 (Abandoned). Chintanapalli #1 have produced 27.84 and ONGC declared as Marginal fields because it was not economically viable for ONGC.

The Chintalapalli prospect is situated in the island block between Vasisthta and Vainateyam Godavari rivers in the East Godavari sub basin of Krishna-Godavari

basin and is the strike continuation of Pasarlapudi and Tatipaka structure. In Chintalapalli prospect so far three wells had been drilled (CP#1,6,8) has been drilled and among these CP#1 and CP#6 was found to be hydrocarbon bearing. But only CP#1 produced gas from the unconventional reservoir of Spilite rock with in Razole formation (CSD-1) and CSD-3 with in Palakallu formation.

3.5.1.5 Medapadu Field

This block was explored by ONGC in year 1991, which drilled 1 well, MDP#1 in the year 1991. The well was put on production and ceased after producing 2.5 MMm3 of gas and had technical problems and ONGC declared as Marginal fields because it was not economically viable for ONGC. The well Medapadu -1 was drilled up to Upper Cretaceous section (drilled depth 4430 m). The Upper Cretaceous Section (Chintalapalli Shale Formation) consists of mainly clay I claystone with intervening sandstone beds. It is overlain by the Razole Formation (Basalt with Intertrappeans) of Lower Palaeocene age. The overlying Lower Eocene section (Pasarlapudi Formation) is primarily arenaceous in nature. The Middle Eocene is composed of limestone (Bhimanapalli Limestone) and is in tum overlain by Upper Eocene section (Matsyapuri Sandstone Formation) which is dominantly arenaceous. The Eocene section is overlain by Narsapur Claystone of Oligocene age. Miocene to Recent section comprises of coarse elastics with clay I claystone

The Krishna Godavari petroliferous province is a northeast- southwest trending pericratonic rift basin and is situated on the eastern passive continental margin of India. The basin has a polyhistoric evolution. The basin was an intracratonic rift within Gondwana land till early Jurassic. Continental stretching under the influence of northwest-southeast extensional force gave rise to the pericratonic passive margin rifting along the northeast-southwest trending primeval structural grain (Eastern Ghat orogeny). Exposure of outcrops towards northwest demarcates the northern basin margin, and towards southeast the basin extends into deep offshore. The episodic rift propagation witnessed rift, rift-drift transition and post-rift phases. The basin is divided from west to east as Krishna Graben, West Godavari sub- basin and East Godavari sub-basin separated by northeast-southwest trending basement highs namely Bapatla Horst in the west and Tanuku Horst in the east. The northeast-southwest trending basement highs are affected by a number of northwest-southeast cross trends.

3.5.2 Brief on Discovered Small Fields

Discovered small field Koravaka awarded by GOI during DSF-2016 round. The total allocated area of the block is 9.90 sq.km. This block was explored by ONGC in the year 2012 but did not put into production as it was not economically viable for ONGC.

3.5.2.1 Koravaka Block

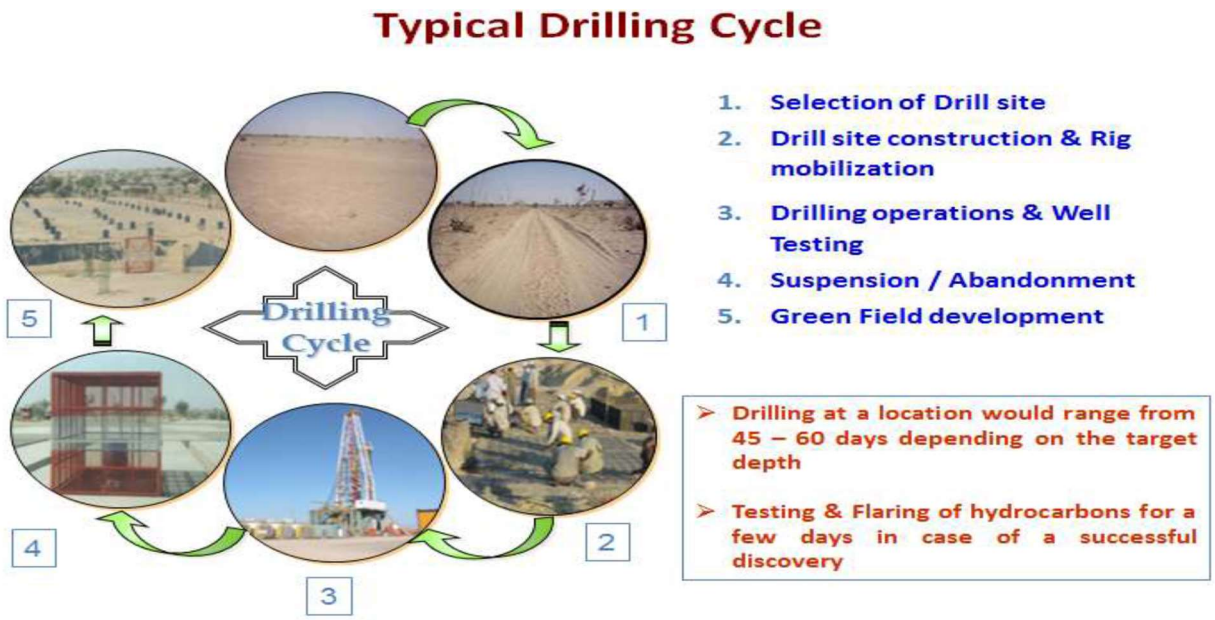
This block was explored by ONGC in year 2012, which drilled 1 well, Koravaka#1 in the year 2012 (Oil & Gas well (Temporally temporarily). No production taken from the field except for production testing. ONGC declared as Marginal fields because it was not economically viable for ONGC

The Koravaka field is located about 12 km to the South East of Razole town in East Godavari district of Andhra Pradesh. The oil field was discovered by ONGC in the year 2012

The Northern boundary of the area is defined by Matsyapuri-Palakollu Fault system, Mori Komarada fault is towards south of the Matsyapuri Palakollu fault and north of the KRV area. Towards South of Matsyapuri Palakollu fault tertiary sediments thicken with series of growth fault related structures trending NE- SW developing synchronous with prograding deltaic sedimentation. The Paleocene shale (Palakollu Shale) is overlain by the Eocene deltaic sands (Pasarlapudi play) which are major hydrocarbon bearing reservoirs, immediately South of Matsyapuri-Palakolu fault system. The fields like Pasarlapudi, Tatipaka, Razole, Lakshmaneswaram, Elamanchili, and Turputallu are producers from these reservoirs. The Eocene sediments beyond shelf comprise dominantly of finer clastics (Vadaparru shale). Further South beyond Mori-Kommarada fault the slope fans of different sequences are hydrocarbon bearing in Mori, Kommarada, Adivipalem, Sirikattapalli and Ponnamanda areas. The Oligo-Miocene and Pliocene (Matsyapuri/Ravva) Play (Kesavadasupalem, Adivipalem, Kesanapalli West fields) also makes its appearance in this area.

The KG basin is orthogonally juxtaposed to NW-SE trending Pranhita-Godavari Gondwana graben in the north. The NE-SW basin margin is the most extensive fault trend over the area. In addition to the basin margin fault, three more regional faults developed further basin ward, the on land Matsyapuri-Palakollu fault, a Miocene structure building fault in shallow water close to the coast, and a Pliocene structure building fault in deeper water. The arcuate horsts and the four regional arcuate faults are more or less parallel. In offshore, the sediments are mostly influenced by growth related tectonics.

The Koravaka field is a south east rising structural closure against NE-SW trending fault at Eocene level. The structure covers an area of about 2 sq.km at the level of Seq-1 & 2 of Eocene age of Vadaparru Shale



In house technical studies are in progress for log interpretation and evaluation of the formation and potential zone. Petrophysical and reservoir studies will be done by domain experts.

After getting environment clearance from MoEFCC, our plan is to test the wells and put them into production. With the result of existing wells, company may drill 9 more new wells to maximize hydrocarbon exploitation Government regulations will be taken into account for well spacing. Old data are being reviewed to know the details of the existing wells. Initially Company will do work over on existing wells to start production.

Our operation will be carried out in accordance and guideline prescribes by OISD and international standards. Waste will be disposed by state register agencies. Proper program of the operations will be prepared and shared to OISD/DGH prior to starting operation for review and guidance. Details of the operation (DPRs) will be sent to DGH/OISD in regular basis.

3.6 Raw Material Required along with Estimated Quantity

No Requirement of Raw Material

3.7 Availability of Water and its Source

The water is used for preparing drilling mud and for domestic needs of the campsite. The water consumption for each well ranges from 20 m^3/day and water requirement will be met from the surface water ground water/local sources through water tankers.

The domestic water consumption is estimated at 20 M^3/D. Thus, the total maximum water requirement is 40 M^3 /day.

There is abundant water available in the area and sourcing of this small quantity of will not affect the water resource.

3.7.1 Power Requirement

The total energy requirement at each drill site including campsite is around 2.5 MW which will be met through diesel generator sets (3 X 1000 KVA at drill site and 1 x 440 KVA at campsite). It is estimated that around 5.5 KLD of diesel will be consumed.

3.8 Quantity of Wastes to be Generated (Liquid and Solid) and Scheme for their Management Disposal.

The hazardous waste generated from the drilling site/ process units consists of drill cuttings, drilling mud, brine, Acid, Chemicals, used oil from maintenance activities etc. The wastes will be classified as per the Solid Waste Management Rules 2016 and be collected, stored, treated and disposed as per rules.

Drilling:

The generation of drill cuttings depends upon depth and type of casing. The estimated generation of drill cuttings per each well during the entire period of drilling for a typical depth of 3000 m is estimated as 550 m^3. The drill cuttings are generally inert since it is the formation material consisting of clay and sand. In addition to the cuttings, about 100m^3 of water based residual drilling mud is generated during well drilling program. Drilling mud composition is provided below.

Spoil generated during construction will be reused during restoration of site. Solid wastes generated from the campsites, living quarters, canteen and other wastes like plastics, paper, cardboard, etc. will be properly collected, segregated and reused appropriately (recycle, reuse, and composting). Organic wastes will be composted through natural composting.

Solid waste will be collected and disposed appropriately. Bio-degradable solid waste such as kitchen waste and sludge from septic tank would be used as compost for agricultural uses. Small quantity of metallic scrap waste and packing waste are expected and the same will be sold to recyclers.

2-3 KL well of used oil/lubricating oil per well also be generated from DG engines and other hydraulics systems. The waste residual mud and drill cuttings will be collected in-situ lined pits and solar evaporated. Depending on the quantity of generation of drill cuttings and drilling fluids the number of pits is constructed. The dimensions of the landfill pits are 25 x 10 x 2 m and lined with poly propylene sheets. In case of use of synthetic based mud, no residual mud will be disposed.

The dried drill cuttings will be buried in-situ pits and will be restored with native soil as per the MoEFCC guidelines for disposal of Drill Cutting Drilling Mud for onshore drilling activities (G.S.R. 546/E) dated 30-8-05. The used/spent oil will be collected in drums and sold to MoEFCC/APPCB authorized recyclers. Other solid wastes such as packaging waste, wooden pallets, paper and metal scrap are being sold to recyclers. In addition to the cuttings, about 100 m^3 of water based residual drilling mud is generated during well drilling program, Drilling mud composition is provided below.

Table: INGREDIENTS OF WATER BASED DRILLING FLUID

S. No	Chemicals
1	Barite
2	Bentonite
3	Carboxy Methyl Cellulose
4	Mud Thinner/Conditioner
5	Resinated Lignite
6	Non-Weighted Spotting Fluid
7	Weighted Spotting Fluid
8	EP Lube
9	Drilling Detergent
10	Caustic Soda
11	Potassium Chloride
12	Soda Ash

Table: SPECIAL ADDITIVES IN WATER BASED DRILLING FLUID

S. No.	Chemical	Function
1	Sodium bicarbonate	Eliminate excess calcium ions due to cement contamination
2	Sodium Chloride	Minimize bore hole washout in salt zone
3	Groundnut shells, mica of cell ethane	Minimize loss of drilling mud to formation
4	Cellulose polymers or starch	Counter thick, sticky filter cake, decrease filter loss to formation
5	Aluminium stearate	Minimize foaming
6	Vegetable Oil lubricant	Reduce torque and drag on drill string
7	Pill of oil-based mud spotting fluid	Counter differential pressure sticking of drilling string. Pill is placed down hole opposite contact zone to free pipe.

4.0 SITE ANALYSIS

4.1 Plant Location

The development drilling wells for oil and gas is located at Ponnamanda village, Magatapalli village, Morupolem village, Sivakodu village, Katreyapadulanka village in East Godavari district and Medapadu Village in West Godavari District, Andhra Pradesh, India. The nearest habitation from the site is Razole located at a distance of 8 km. The site is well connected to NH-214 at a distance of 5 km from the field boundary. The Nearest Airport is Rajahmundry located at a distance of 100 km from the proposed project. The nearest Railway station is Narsapur 40 km from the proposed project. Godavari River is flowing at a distance of 200 m in east direction.

5.0 PLANNING BRIEF

5.1 Planning Concept

Well site and roads will be built for transportation of rig and its equipment for work over. The operation will be installed by servicing of X-mass tree followed by checking pressures in all annulus and tubing side. Pressure testing of the casing will be done to check well integrity. Well intervention job will be carried out to find out held up depth and record current BHP. During depressurizing well, hot flaring will be carried out. Well completion methods and production strategy will be designed for longer duration of production life. Pipelines will be laid from the wells to the process facilities and thereby connected to the GAIL trunk line for oil and gas sales.

Natural gas compressor shall be installed as per sales pressure requirement which also adds water unloading of well, decrease in flow line pressure and increase in drawdown. Process facilities will be installed for oil & gas processing. After completing the production life cycle of wells, wells will be permanently abandoned, capped and land will be restored back to its original form.

5.2 Population Projection

There will be an increase of 40 people each in the proposed fields due to the drilling of wells. The proponent shall recruit local available man power to reduce in migration.

6.0 PROPOSED INFRASTRUCTURE

6.1 Drilling Operations

Drilling operations will be carried out using electrical rig for well. Drilling unit for drilling of oil and gas wells consists of a derrick at the top of which is mounted a crown block and a hoisting block with a hook. From the swivel is suspended a Kelly stem which passes through a square or hexagonal Kelly bush which fits into the rotary table. The rotary table receives the power to drive it from an electric motor. The electric motor rotates the rotary table, through which passes the Kelly bush, and the rotations are transmitted to the bit as the drilling progresses, the drill pipes in singles are added to continue the drilling process. At the end of the bit life, the drill pipes are pulled out in stands and stacked on the derrick platform. A stand normally has 3 single drill pipes. After changing the bit, the drill string is run back into the hole and further drilling is continued. This process continues till the target depth is reached.

During the course of drilling, cuttings are generated due to crushing action of the bit. These cuttings are removed by flushing the well with duplex/triplex mud pumps. The mud from the pump discharge through the rotary hose connected to stationary part of the swivel, the drill string and bit nozzles. The mud coming out of the bit nozzles pushes the cuttings up hole and transports them to the surface through the annular space between the drill string and the hole. The mud not only carries away crushed rock from the bottom of the hole but it also cools the bit as it gets heated due to friction with formation while rotating. The mud also helps in balancing subsurface formation pressures and by forming a cake on the walls of the well also diminishes the possibility of crumbling or caving of the well bore.

At the surface, the mud coming out from well along with the cuttings falls in a trough, passes through the solids control equipment's i.e. shale shaker, de-sander/ de-silter and mud cleaner. These equipment's remove the solids of different sizes, which get mixed with the mud during the course of drilling. The cleaned mudflows back to the suction tanks to be again pumped into the well. The drilling mud/fluid circulation is thus continuous cyclic operation. The most suitable clay for mud preparation is bentonite, which is capable of forming highly dispersed colloidal solutions. Various other chemicals are also used in mud preparation as per requirements dictated by the temperature/pressure conditions of the wells. The mud is continuously tested for its density, viscosity. yield point, water loss, pH value etc. to ensure that the drilling operations can be sustained without any complications.

Drilling Facilities

Drilling is a temporary activity, which will continue for about 3-5 months and testing period of 15-30 days for well drilled in the block. The rigs are self-contained for all routine jobs. Once the drilling operations are completed, and if sufficient indications of hydrocarbons are noticed while drilling, the well is tested by perforation in the production casing. This normally takes 2-3 days. If the well is found to be a successful hydrocarbon bearing structure, it is sealed off for future development, if any.

General Requirements of Drilling

Exploratory drilling program requires the following common facilities:

(a) Drilling Mud

Drilling of wells requires specially formulated mud, which basically comprise inert earth materials like bentonite, barite in water with several additives to give mud weight, fluidity and filter cake characteristics while drilling. The drilling muds have several functions like lubrication and cooling of the drill bit, balancing subsurface formation, bringing out the drill cuttings from the well bore, thixotropic property to hold cuttings during non-operations, formation of thin cake to prevent liquid loss along well bore etc. Several additives are mixed into the mud system to give the required properties. Water based mud will be used to the possible extent in exploratory drilling but use of synthetic based mud may require due to complexities associated with the geological formations and associated hole stability problems.

(b) Power Generation

The drilling process requires movement of drill bit through the draw works, which require power. The power requirement of the drilling rig will be met by using the three/four Diesel Generator with diesel consumption of about 5 kl/d. The exhaust stacks of the DG sets of land based rigs vent the emissions.

(c) Water Requirements

The water requirement in a drilling rig is mainly meant for preparation of drilling mud apart from washings and domestic use. While the former consumes the majority of water requirement, the water requirement for domestic and wash use is very less. The daily water consumption will be 40m^3/d of which 20 m^3/d will be used for mud preparation and 20 m^3/d will be used for domestic purposes including drinking.

(d) Domestic Wastewater

The operating personnel in onshore drilling site accommodation (DSA) are housed in the vicinity of the location. Septic tanks and soak pits are normally provided to dispose off the domestic wastewater in the base camps.

(e) Solids Removal

The rock cuttings and fragments of shale, sand and silt associated with the return drilling fluid during well drilling will be separated using shale shakers and other solids removal equipment like de-sanders and de-silters. The recovered mud will be reused while the rejected solids will be collected and disposed of in a line waste pit in the drill site.

(f) Drill Cuttings and Waste Residual Mud

During drilling operations, approximately 500 tones and 2500-3000 m^3 of drill cuttings and waste residual muds per well are expected to be generated depending on the type of formation and depth of drilling. In addition to the cuttings 15-20 m^3/d of wastewater is likely to be generated during well drilling. The waste residual muds and drill cuttings, which contain clay, sand etc., will be processed by employing drilling Waste Management System (DWM) and dewatering system Clear uncontaminated water will be disposed and solid will be buried in concrete pit in the well plinth after operations are completed

(g) Testing

Testing facilities will be available at drilling rig for separation of liquid phase and burning of all hydrocarbons during testing. The test flare boom will be located at a distance from the drilling rig.

(h) Chemical Storage

The drilling rig will have normal storage facilities for fuel oil, required chemicals and the necessary tubulars and equipment. The storage places will be clearly marked with safe operating facilities and practices.

(i) Manpower

The drilling rig will be operated by approx. 30 persons on the rig at any time. The manpower will operate in two shifts with continuous operations on the rig.

(j) Logistics

Crew transfers to and from the drilling rig, materials, diesel and chemicals will be made through light vehicles, trucks and trailers.

6.2 Residential Area (Non-Processing Area)

The campsite will encompass an area of approximately 0.5 Ha.

6.3 Greenbelt

The entire area will be restored back to its original form and tree plantation will be carried out to further increase the density of plantation.

6.4 Social Infrastructure

Social infrastructures like hospitals, schools, universities are present in district headquarters.

6.5 Drilling Waste Management

All hazardous wastes shall be securely stored, under a shed for eventual transportation to the authorized TSDF, the solid domestic waste shall be stored within the premises temporarily and then sent to common solid waste disposal facility.

6.6 Solid Waste Management

All the solid waste generated will be collected and given to nearby municipal facility.

6.7 Power Requirement Supply and Source

The total energy requirement at each drill site including campsite is around 2.5 MW which will be met through diesel generator sets (3 X 1000 KVA at drill site and 1 x 440 KVA at campsite). It is estimated that around 5.5 KL/D of diesel will be consumed.

7.0 REHABILITATION AND RESETTLEMENT PLAN

No R&R as the land will be taken on lease or will buy from private parties.

8.0 PROJECT SCHEDULE AND COST ESTIMATES

8.1 Likely Start Date and Completion

In house technical studies are in progress for log interpretation and evaluation of the formation and potential zone. Petro physical and reservoir studies will done by domain experts.

After getting environment clearance from MoEFCC, it is proposed to test the well and put them into production. With the result of existing wells, proponent may drill

9 more new wells to maximize hydrocarbon exploitation. Government regulations will be taken into account for well spacing. Old data's are being reviewed to know the details of the existing wells.

Initially Company will do workover on existing wells to start production.

Prior to start of our operation they will acquire the land and inform government about starting of our operation.

8.2 Estimated Project Cost

Rs. 110 Crores is the project cost.

9.0 ANALYSIS OF PROPOSAL

9.1 Financial and Social Benefits

Financial and Social Benefits with special emphasis on the benefit to the local people including tribal population if any in the area.

The proposed project will increase the employment to the locals. KRPEL will also provide CSR activities as part of the project to nearby villages.