Report On DGPS Survey & Preparation of Geo-Refferenced Cadastral Map Of Compensatory Afforestation Land Over An Area 5.160 Ha. Revenue Forest Land In The Village: Karramad, Tehsil: Durgukondal, District: Kanker, State: Chhattisgarh, Against Diversion Of 2.58 Ha. Forest Land (Approach Road 0.95 Ha. And Power Transmission Line 1.63 Ha.)

For

M/s SHRI BAJRANG POWER & ISPAT LTD.

DIST. - RAIPUR (CG)

NOVEMBER 2019

Prepared by,

Soham Ferro Manganese Private Limited (SFMPL)
NKY Tower, Block No.16/17, Ajani Sq.Wardha Road,
Nagpur-440015

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1.) INTRODUCTION

Directorate of Geology & Mining, has decided to facilitate the work of fixing of mine boundaries by carrying out survey with the help of DGPS and Total Station instruments and erection of boundary pillars in the state of Chhattisgarh in order to comply the guidelines and directions issued in Mineral (Auction) Rules, 2015/ IBM Circular no. 2/2010 and Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules-2016], by calling bids from the Empanelled Agencies.

Soham Ferro Magnese Pvt. Ltd. (SFMPL) is a leading consultant in India and empanelled with Directorate of Geology & Mining, Chhattisgarh vide Empanelment Letter/Order No. F 7-14/2013/12 dated 10.11.2014 as an expert agency specialized for survey works.

M/s SHRI BAJRANG POWER & ISPAT LTD. the project proponent is a firm having registered office in Village - Borjhara, Urla-Guma Road, Urla Growth Center, Raipur 493221, Chhattisgarh. The proponent has identified Revenue Forest Land for Compensatory Afforestation in village Karramad Area 5.160 Ha., Tehsil – Durgukondal, District – Kanker, State - Chattisgarh for diversion of 2.58 Ha. Forest Land (Approach road 0.95 Ha. and Power Transmission Line 1.63 Ha.).

CIRCULAR OF IBM 2/2010

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
OFFICE OF THE CHIEF CONTROLLER OF MINES

No. N-11013/3/MP/90-CCOM Vol-VII Nagpur, dated 06/04/2010

C I R C U L A R NO. 2/2010

Sub: Submission of Geo-referenced Cadastral Map.

As per the procedure in vogue, a Mining Lease map / Prospecting License map showing the area/areas with details on a cadastral map with the Khasra numbers / Survey Nos. for mining lease / prospecting license, granted by the state governments under Act and Rules made there-under, is a basic requirement which is enclosed alongwith the Mining Plan / Scheme of Mining / Progressive Mine Closure Plan and Scheme of Prospecting. The Mining Lease map/ Prospecting License map is a certified copy obtained from the state / district authorities which is essential for planning purpose in mining plan / Scheme of Mining etc.

In supersession to all the instructions issued on the subject, it is decided that:

1. The Mining Lease / Prospecting License boundary showing all Khasra numbers / Survey Nos. on a Cadastral Map (Khasra Plan) on original plan (not the photo copy) and duly certified by State Government on a scale of 1:3960 shall be submitted with Mining Plan / Scheme of Mining / Progressive Mine Closure Plan and Scheme of Prospecting by the Lessee / Applicant / Licensee.
2. The boundary pillars of each mine lease / prospecting license are to be fixed precisely. Each boundary pillars shall be surveyed using DGPS (at least 2 Hours observation) for its ground position by an agency recognized by the State Government).
3. The Geo-referenced mining lease / prospecting licenses map prepared using DGPS shall be superimposed on Geo-referenced vectorised cadastral map.
4. On integration, the Geo-referenced mining lease / prospecting licenses map shall duly matched with geo-referenced vectorised cadastral maps.
5. In case of forest areas, the boundary pillars shall be fixed on ground with reference to at least three permanent ground features in and around mining leases / prospecting licenses.
6. The geo-referenced mining leases / prospecting licenses map shall be superimposed on latest high-resolution satellite data (cloud-free) derived from merging of Cartosat-2 and LISS-IV (Scale 1:5,000) covering an area of 500 meters from the mining lease / applied area boundary.
7. The satellite data products are available from NRSC, Hyderabad. The superimposed output in the form of soft copy and hard copy should be submitted along with the Mining plan / Scheme of Mining / Progressive Mine Closure Plan and Scheme of Prospecting. The soft copy submission should be in the standard format and digitized maps should be in shape file, which can be imported in any GIS database.
8. The above maps will be base for preparation of all statutory as well as working plans of the mines.

This circular may be given wide publicity amongst RQPs / Mine Owners / Lessee's / Licensee's / Applicants for implementation. Further, this may be intimated to all the states.

(Ranjan Sahai)
Chief Controller of Mines In Charge

LETTER OF EMPANELMENT WITH DIRECTORATE, GEOLOGY & MINING, CHATTISGARH

By Speed post

छत्तीसगढ़ शासन
खनिज साधन विभाग
मंत्रालय
महानदी भवन, नया रायपुर–492002
//अधिसूचना//

रायपुर, दिनांक अप्रैल, 2018

क्रमांक एफ 7–14/2013/12 :: इस विभाग की समसंख्यक अधिसूचना दिनांक 10.11.2014 द्वारा कुल 10 संस्थानों को 03 वर्ष की अवधि के लिये सशर्त अधिमान्यता प्रदान की गई है, जिसकी अवधि दिनांक 09.11.2017 को समाप्त हो गई है।

2/ राज्य शासन, एतद्द्वारा निम्नलिखित 07 संस्थानों की अधिमान्यता का नवीनीकरण, आवेदन प्रस्तुत करने में हुए विलम्ब की अवधि में छूट प्रदान करते हुए उनकी अधिमान्यता दिनांक 10.11.2017 से आगामी 03 वर्ष की अवधि के लिये प्रदान की जाती है :–

क्र.	एजेंसी का नाम एवं पता
1	**M/S SHREERAM GEMICON (PVT.) LIMITED,** GEOLOGICAL AND MINING CONSULTANTS, L-09, Songanga Colony Seepat Road, Bilaspur (Chhattisgarh)
2	**M/S SINHA MINING CONSULTANCY,** Office No. 9, D.Costa Commercial Apartment, Near Old Railway Station Gate, Malbhat, Margo, Goa - 403601
3	**M/S SPATIAL PLANNING AND ANALYSIS RESEARCH CENTRE PVT. LTD.** E/11, Infocity, Chandaka Industrial Estate, Bhubaneswar, Orissa, 751024
4	**M/S SIDDHARTH GEO CONSULTANTS,** 621/3, First Floor Ramkund, Samta Colony, Behind Lifeworth Hospital, Raipur (Chhattisgarh) 492001
5	**M/S SOHAM FERO MANGANESE PVT. LTD.]** Block No. 16,17 Ground Floor N.K.Y. Tower, Anjani Sq. Wardha Road, Nagpur (Maharashtra)
6	**M/S SAN SURVEY ENGINEERING,** Regd. Off. - 465, Jiban Pal Bagan, Karbala (West), P.O. & Dist. - Hooghly,West Bengal, 712103 Contact Office - Anjali Complex, Bankim Kanan, Chinsurah Station Road, Chinsurah, Hoogly, West Bengal -712102
7	**M/S BHARAT ALUMINIUM COMPANY LIMITED,** P.O. Balco Nagar Korba(C.G.),

3/ उपर्युक्त तालिका के सरल क्रमांक–01 से 06 में उल्लिखित कंपनियों/एजेंसियों की अधिमान्यता राज्य में खनिज कोयला को छोड़कर शेष खनिजों की खनिज रियायत संबंधित डीजीपीएस सर्वे कार्य के लिये तथा सरल कमांक 7 में उल्लिखित मेसर्स भारत एल्युमिनियम कंपनी लिमिटेड की अधिमान्यता राज्य में स्थित स्वयं की खनिज रियायत संबंधित डीजीपीएस सर्वे कार्य के लिये होगी।

उपर्युक्त प्रदत्त अधिमान्यता की शर्तें निम्नानुसार होगी :–

1. Each corner of the lease area shall have a boundary pillar(corner pillar).
2. There shall be erected intermediate boundary pillars between the corner pillars in such a way that each pillar is visible from the adjacent pillar located on either side of it;
3. The distance between two adjacent pillars shall not be more than fifty meters;
4. The pillar shall be of square pyramid frustum shaped above the surface and cuboids shaped below the surface;
5. Each pillars shall be of reinforced cement concrete;
6. The corner pillar shall have a base of 0.3m X 0.3m and height of 1.30m of which 0.70m shall be above ground level and 0.60m below the ground;
7. The intermediate pillars shall have a base of 0.25m x 0.25m and height of 1.0m of which 0.70m shall be above ground level and 0.30 m below the ground;

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8. All pillars shall be painted in yellow color and the top ten centimeters in red color by enamel paint and shall be grouted with cement concrete.
9. On all corner pillars, distance and being to the forward and backward pillars and latitude and longitude shall be marked;
10. Each pillar shall have serial number in a clockwise direction and the number shall be engraved on the pillars;
11. The number of pillars shall be the numbers of the individual pillar upon the total number of pillars in the lease;
12. The tip of all the corner boundary pillars shall be a square of 15 centimeter on which a permanent circle of 10 centimeter diameter shall be drawn by paint or engraved and the actual boundary point shall be intersection of two diameters drawn at 90 degrees.
13. The lease boundary survey shall be accurate within such limits of error as the Control General, Indian Bureau of Mines may specify in this behalf;
14. The location and number of the pillars shall also be shown in the surface and other plans maintained by the lessee: and
15. In case of forest area within the lease, the size and construction and color of the boundary pillars shall be as per the norms specified by the Forest Department in this behalf.
16. The Survey Agency shall be responsible for the accuracy of the data collected during Survey.
17. Coordinates of boundary pillars shall be established in the World Geodetic System 1984 (WGS-84) Datum.
18. डीजीपीएस सर्वे कार्य हेतु पारिश्रमिक का निर्धारण अधिमान्यता प्राप्त संस्थान एवं खनिज रियायतधारी के मध्य आपसी समन्वय से किया जायेगा। किसी भी प्रकार का आपसी विवाद होने पर राज्य शासन उत्तरदायी नही होगा।
19. डीजीपीएस सर्वे कार्य के गुणवत्ता में कमी पाये जाने पर या किसी भी प्रकार की कार्य संबंधी शिकायत पाये जाने पर जांच उपरांत राज्य शासन को यह अधिकार होगा कि उक्त अधिकृत एंजेसी की मान्यता किसी भी समय समाप्त की जा सकती है।
20. डीजीपीएस सर्वे के संबंध में भारतीय खान ब्यूरो/राज्य शासन द्वारा समय–समय पर जारी निर्देशों का पालन अधिमान्यता प्राप्त संस्थान को करना होगा।
21. राज्य शासन द्वारा जारी यह अधिमान्यता 03 वर्ष के लिए होगी। समयावधि समाप्ति से 03 माह पूर्व अधिकृत एंजेसी नवीनीकरण हेतु आवेदन कर सकेगा।

4/ यह अधिमान्यता दिनांक 10.11.2017 से 03 वर्ष के लिए ही मान्य होगी।

छत्तीसगढ़ के राज्यपाल के नाम से
तथा आदेशानुसार,

(इफ्फत आरा)
उप सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

पृ0क्रमांक एफ 7–14/2013/12 रायपुर, दिनांक अप्रैल, 2018
9 APR 2018

प्रतिलिपिः–

1. सचिव, भारत सरकार, खान मंत्रालय, शास्त्री भवन, नई दिल्ली,
2. कंट्रोलर जनरल, भारतीय खान ब्यूरो, सेकेण्ड फ्लोर, ए–ब्लॉक, इन्दिरा भवन, सिविल लाईन्स, नागपुर(महाराष्ट्र)

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3. उप खान नियंत्रक, क्षेत्रीय कार्यालय भारतीय खान ब्यूरों, दूसरी मंजिल, जी.एस.आई. फील्ड प्रशिक्षण केन्द्र, महालेखाकार आफिस काम्पलेक्स, पोस्ट विधानसभा, रायपुर
4. संचालक, भौमिकी तथा खनिकर्म, छत्तीसगढ़ ब्लॉक–4, द्वितीय तल, इन्द्रावती भवन, नया रायपुर
5. समस्त कलेक्टर, जिला ———— छत्तीसगढ़
6. समस्त संबंधित ————

की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु अग्रेषित

7. संचालक, शासकीय मुद्रणालय, गोन्दवारा, भनपुरी, रायपुर(छत्तीसगढ़) की ओर राजपत्र में प्रकाशनार्थ।
8. श्री श्रीकांत राव, सहायक भौमिकी विद्, संचालनालय भौमिकी तथा खनिकर्म, द्वितीय फ्लौर, इन्द्रावती भवन, नया रायपुर। कृपया उक्त आदेश/अधिसूचना को संचानलालय की वेबसाईट में अपलोड करने का कष्ट करें।
9. गार्ड फाईल रजिस्टर

उप सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

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OUR EMPANELMENT NOTIFIED LETTER

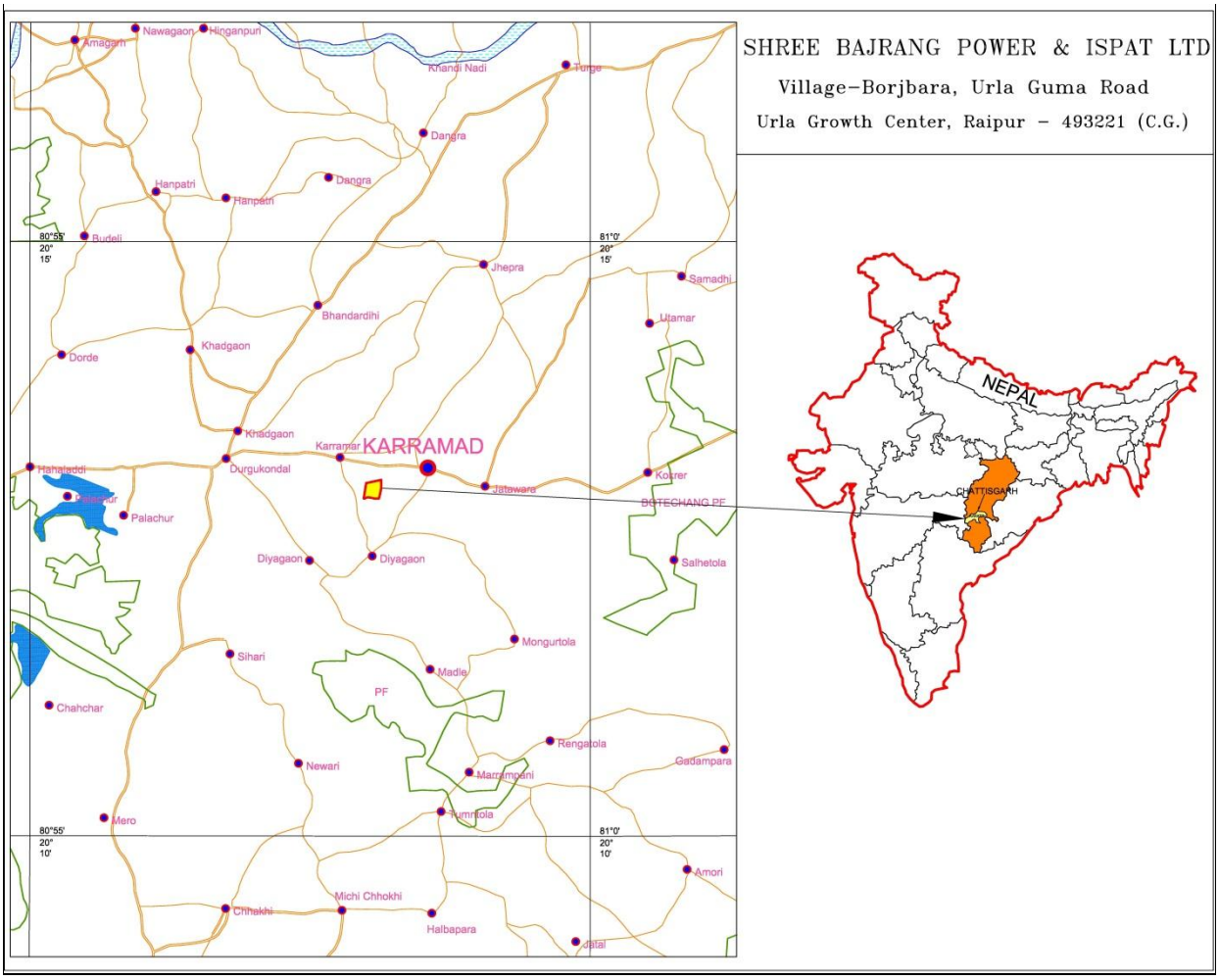
We M/s. Soham Ferro Manganese Pvt. Ltd., would like to impress upon you that, our organization has been duly empanelled by **Govt. Of Chhattisgarh, Directorate of Geology and Mining** Mahanadi Bhawan, Naya Raipur vide their order bearing no. F 7-14/2013/12 Dt. 10.11.2014 for carrying Differential Global Positioning Systems (DGPS) survey and for carrying Geo referencing and Cadastral Map as per Guide lines issued by IBM Letter No. 02/2010 Dt. 06.04.2010 and Subsequent Guide Lines.

For Soham Ferro Manganese Pvt. Ltd.,

(Nitin Y. Selukar)
Director

5) LOCATION WITH LATITUDE AND LONGITUDE COORDINATES (WGS84)

KARRAMAD BLOCK



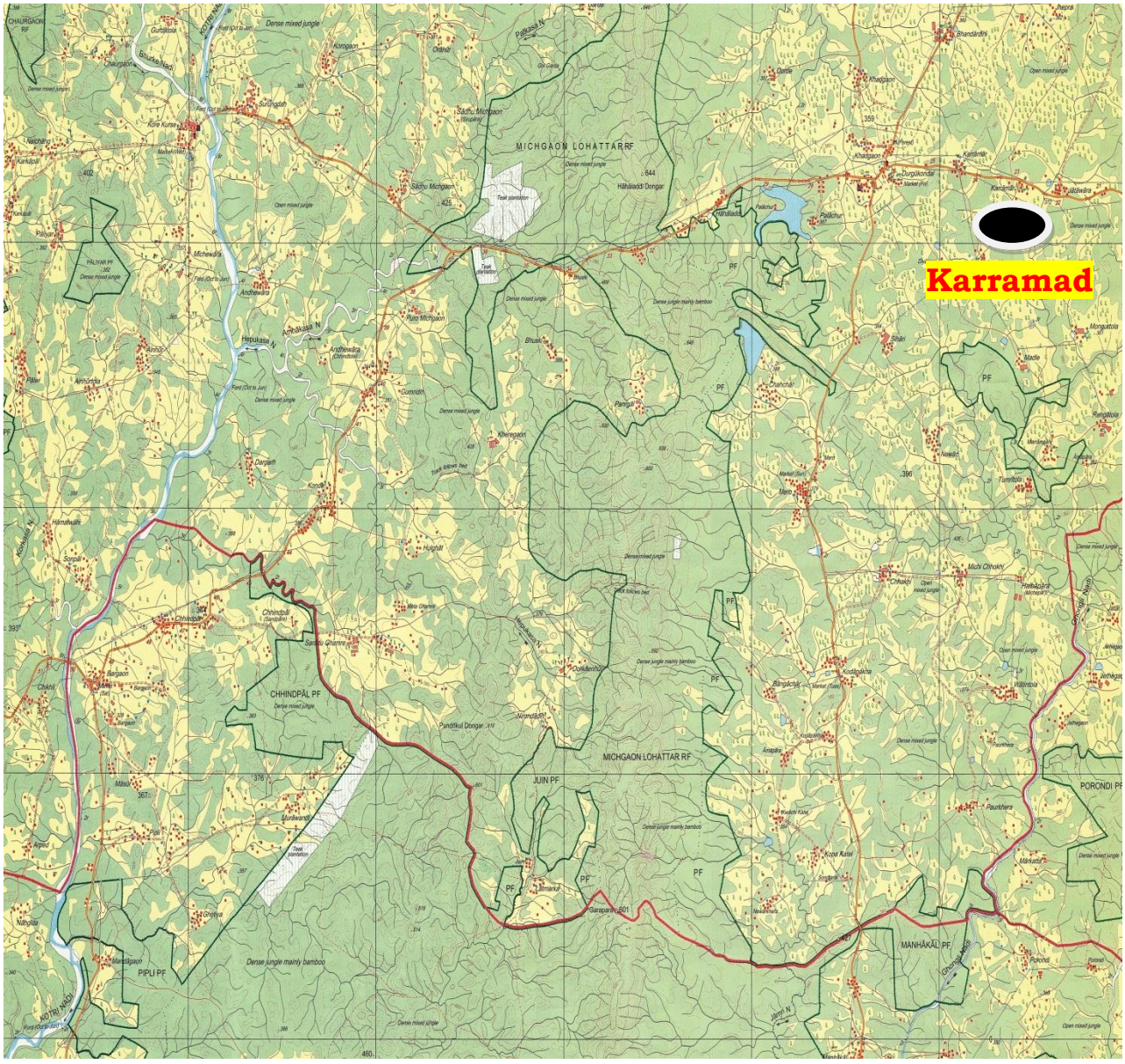
Co-ordinate of Centre of Karramad Block: Long. -: E 80°58'3.265"

Lat. - : N 20°12'54.518"

Reference Point: DGPS Bench mark point is fixed on the rock stone at CA Land area in the village Karramad. Capture a satellite signal on static mode observation 2 hours continuously on this benchmark point. Please refer on BM References and Site Location Photographs on page no-20.

6) IDENTIFICATION AND DEMARCATION

Karramad Compensatory Afforestation Land area falls in Durgukondal Tehsil at Kanker District in Chhattisgarh State. The Karramad CA Land area is approachable from district headquarter Kanker via Bhanupratappur Kanker upto of Karramad village. Karramad CA Land area is 69kms from Kanker. The CA Land area is a part of the Survey of India Topo sheets no 64D/16. Geographically the CA area falls under following co-ordinates Longitude E 80°58'3.265"& Latitude N 20°12'54.518"



Topo Sheet No. 64 D/16

7) SCOPE OF WORK AS PER TENDER DOCUMENTS:

The Scope of work for the Surveying and Associated Activities are as follows:

i. DGPS Survey: The CA Land areas provided by the client shall be surveyed by DGPS instrument. The data collected shall be duly geo-referenced using Ground Control Points (GCPs) from the nearest GSI reference/control point/GTS bench mark and collected using dual frequency DGPS receiver. A base map shall be prepared using these data.

ii. Erection of Boundary Pillars- The boundary pillars (size of Corner Pillar shall have a base of 0.30m x 0.30m and height of 1.30m whereas Intermediate Pillar shall have a base of 0.25m x 0.25m and height of 1.0m) of each mine lease are to be fixed precisely as per specifications.

iii. Preparation of geo-referenced vectorised ML/PL map using necessary digitization, amalgamation of maps, mosaicing, ground level point referring etc. all complete in all respects. On integration, the Geo-Referenced ML/PL map shall duly match with geo-referenced vectorised cadastral map.

iv. Survey of all the boundary pillar locations using DGPS.

v. Vectorised Geo-referenced ML/PL maps shall be superimposed on latest high resolution satellite data (cloud free), derived from merging of Cartosat-2 and LISS-IV (scale 1:5000) covering ML/PL area plus an area coming within the ML/PL area boundary and 500 m beyond the ML/PL boundary line.

Survey Agencies' scope of work is based on the Ministry of Mines, IBM Circular No. 2/2010 under reference no. N-11013/2/MP/90/CCOM Vol-VII dated 6/4/2010.

8) Instruments and Software Used

Hardware:

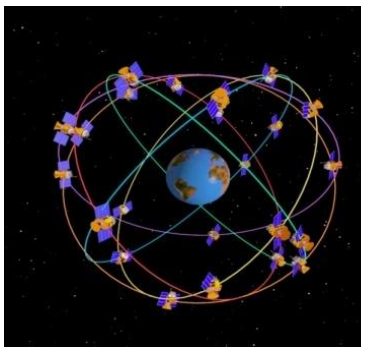
Sr. No.	*Name of Instrument*	*Make/ Model*	*Accuracy*	*Numbers*
1	DGPS (Dual Frequency)	Topcon Sokkia India Pvt. Ltd. / GSX-2	3mm±1PPM	3
2	Leica GNSS	S05	10mm+PPM	1
3.	Total Station	Leica TS 02 / 407	1-2 Sec	2
4.	Handle GPS	Garmin	3 Mt.	5

Software:

Sr. No.	Software	Make	Version
1	Magnet Tools	Topcon Sokkia India Pvt. Ltd.	1.2.1
2.	LEICA Geo Office Combined	Leica geosystems AG	7.0.1.0
3.	AutoCAD	Autodesk	2012
4.	Ms Office	Microsoft Corp.	2010
5.	EradasImagin	Eradas	8.4
6.	ArcGIS	ArcGIS	10.3

9) DIFFERENTIAL GLOBAL POSITIONING SYSTEM (DGPS)

9. a] INTRODUCTION



The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. It consists of Three Segments:-

- **User Segment**
- **Control Segment**
- **Space Segment**

GPS uses these “man-made stars” as reference points to calculate positions accurate to a matter of meters. In fact, with advanced forms of GPS you can make measurements to better than a centimeter. Surveying/Mapping most commonly used now days, in a sense it’s like giving every square meter on the planet a unique tackle.

9. b] ACCURACY & INSTRUMENT USED

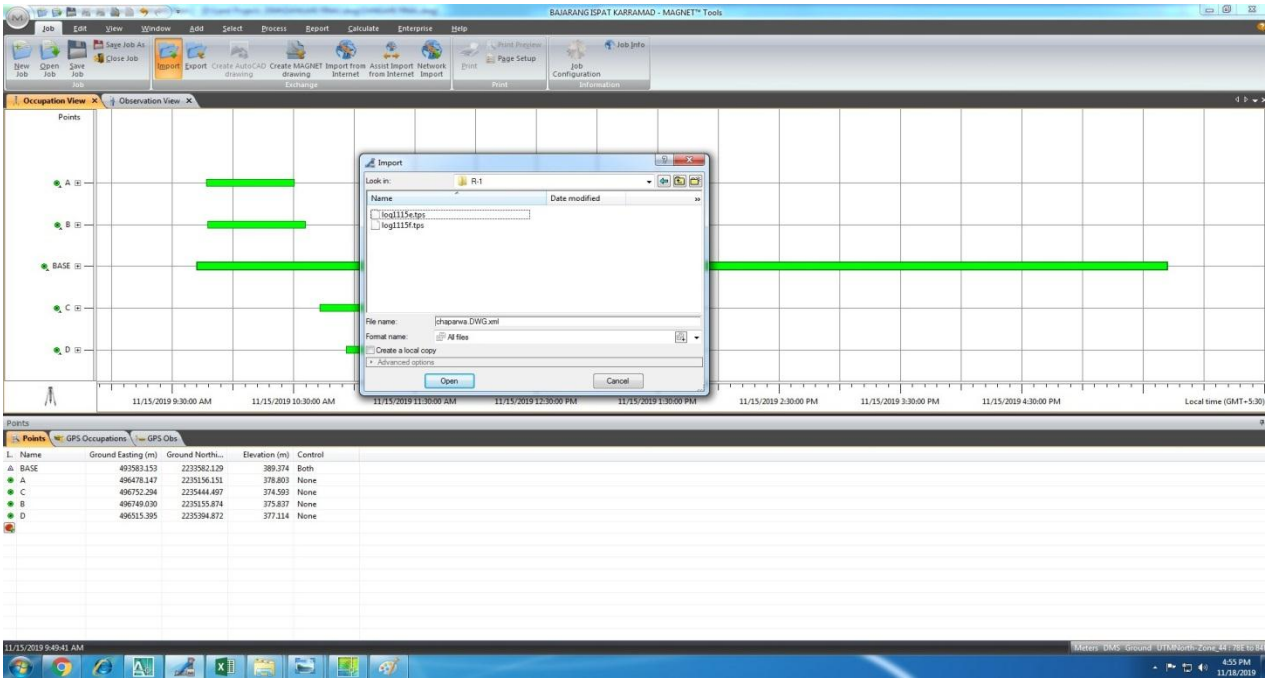
SFMPL Generally used Dual frequency Sokkia DGPS equipments are to be used for all static mode of observation. By having the base station close to the area of interest there is minimum time lag and with the appropriate DGPS receiver, an accuracy of (+/-10mm) can be achieved. The accuracy of DGPS may be increased considerably by including a reference station (GPS receiver on a site with known coordinates). In the so-called post-processing method, the observations of the rover (GPS receiver) are then corrected so that, depending on the type of receiver, accuracies of a few decimeters or a few centimeters may be reached.

9. c] DATA PROCESSING IN SOKKIA MAGNET TOOLS SOFTWARE

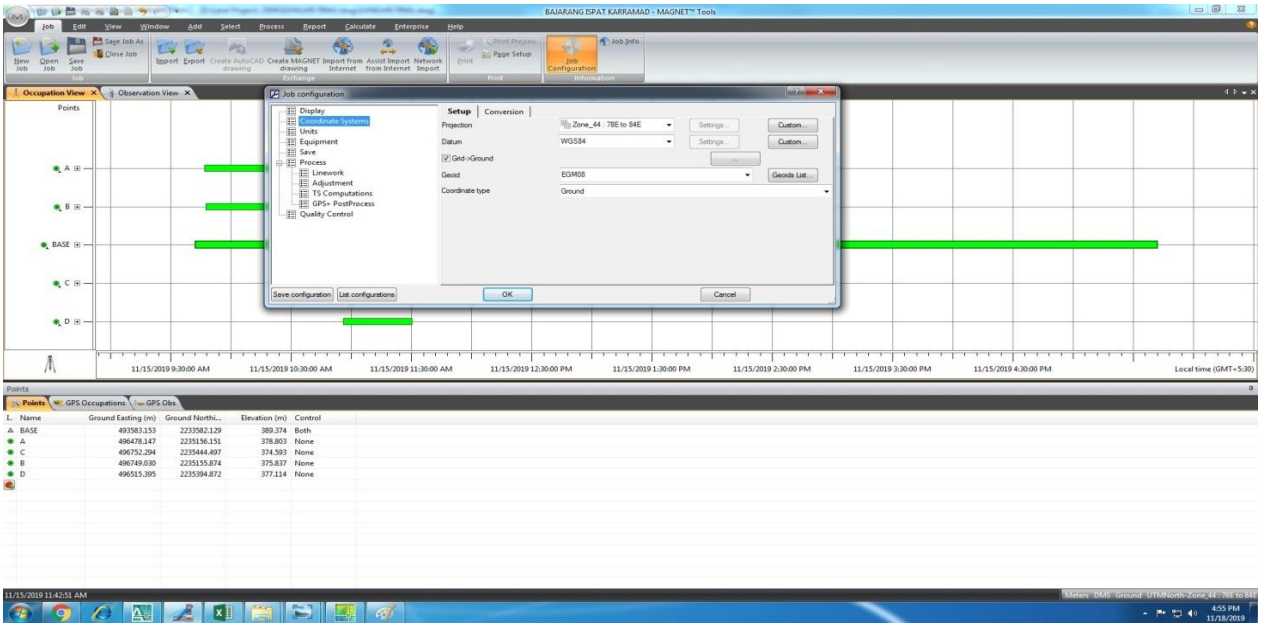
All the pillar coordinates were taken for two hours of reading and pillar points are used for geo-referencing. The processed coordinates have been exported to Shape file from the Sokkia Magnet Tools software. These coordinates are imported in to GIS software and Geo-referencing of cadastral map, lease map and LISS- IV image was carried out. The lease boundary was digitized using the processed coordinates of the pillars and geo-referenced maps. These boundary was exported to shape file for the final submission as required by IBM.

Sokkia –GSX 2 antenna recorded field survey data are downloading in Sokkia Receiver as following steps:

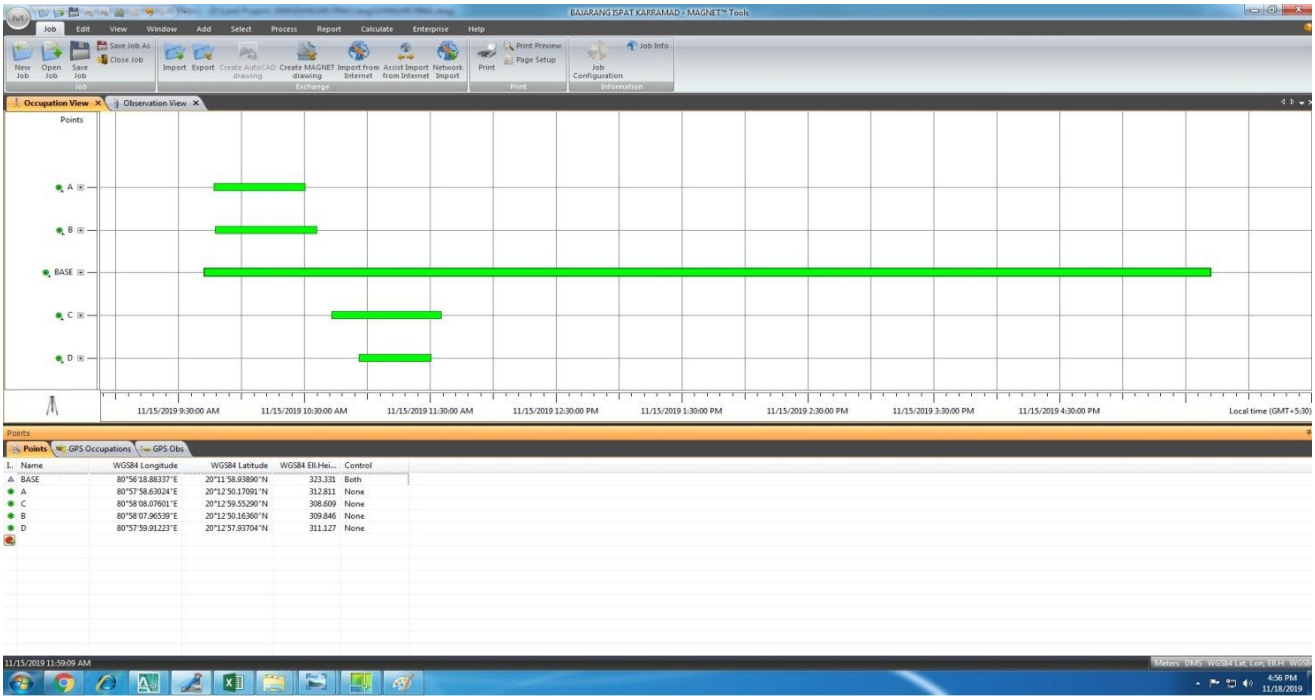
I] IMPORT



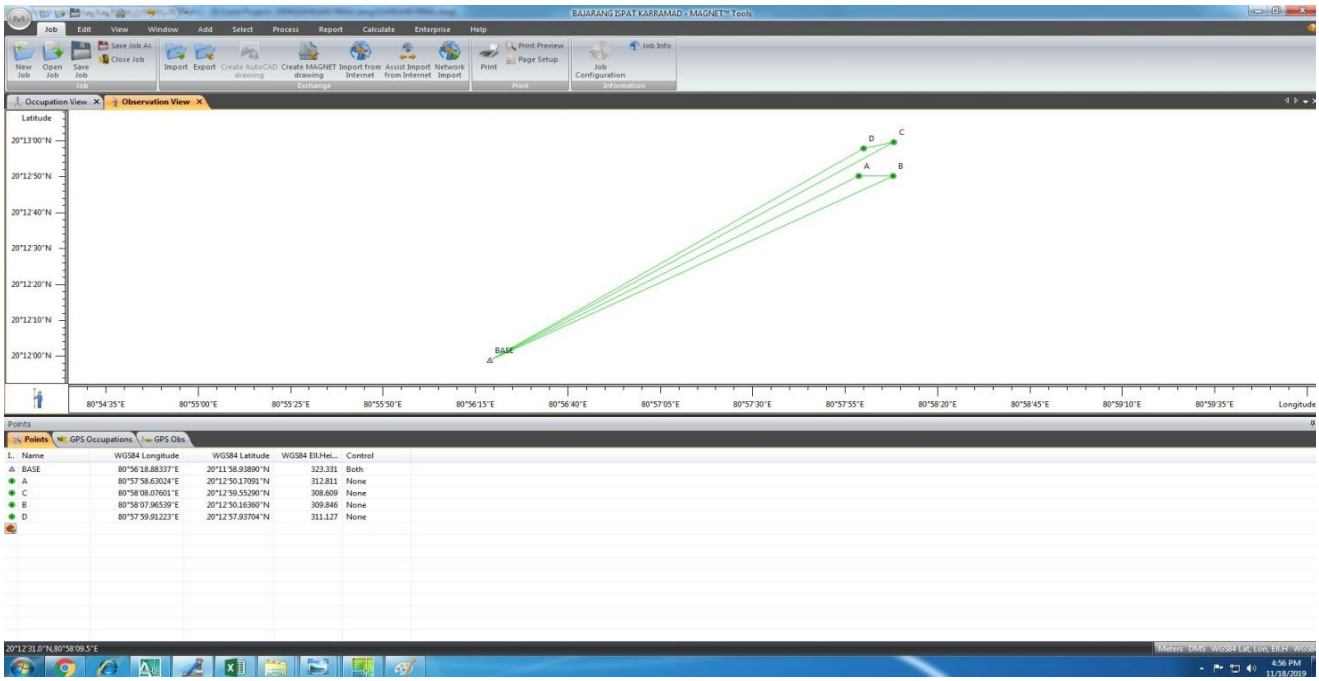
II] APPLYING PROJECTION SYSTEM



III] PROCESSING DATA



IV] POINT POSITION



10) METHODOLOGY ADOPTED FOR VECTORIZED CADASTRAL MAP AND SATELLITE IMAGING DATA

10. a] INTRODUCTION OF VECTORIZATION CADASTRAL

Cadastral surveys are specially designed large scale surveys, some in conjunction with other records, which are linked to land ownership and property. In India Normally Land Record Department created a cadastral map on Tracing film or Cloth Paper. It is usually generating in most Common Scale Factor which is to be saying that 16”=1Mile (1:3960).This paper is very essential to the rural for its village properties. The urban cadastral, although very vital needs a separate and detailed discussion. It’s seen very older and shrinkage appearance quality. Receiving those maps to land record department to start with scanning in High Resolution scale and get converted into TIF format. AutoCAD Draftsmen digitize a map on his professional skilled with Different Colours, Layer, Polyline & Block Entities Etc. on this way generated a accurate scale map to help us the geo reference.

10. b] GEO REFERENCE VECTORIZATION CADASTRAL MAP

The term is commonly used in the geographic information systems field to describe the process of associating a physical map or raster image of a map with spatial locations. Geo reference means triangular Combination of DGPS Control points (Static Based), Topographic Survey and Vectorized Cadastral Map (Raster image). Geo referencing may be applied to any kind of object or structure that can be related to a geographical location, such as points of interest, roads, places, bridges, Forest munara or field bund. Geographic locations are most commonly represented using a coordinate reference system, which in turn can be related to a geodetic reference system such asWGS-84. There are various GIS tools available that can transform image data to some geographic control framework, like the commercial ArcMap, or ERDAS Imagine Recorded Survey data importing in Arc Map For instance, a DGPS device will Easting and nothing coordinates for a given point of interest, effectively geo referencing

this point. A geo reference must be a matchless identifier. In other words, there must be only one location for which a geo reference acts as the reference.

10. c] METHODOLOGY OF SATELLITE IMAGERY

Ideal recent satellite data are characterized by intersection of features, such as roads, canals or streams. Considering the high resolution of satellite data (IKONOS) has been used mostly Geo-Tiff Format image is preferred. Satellite data typically on basis of different forest band applicable it's depend upon mineral of that area.

The following list describes the main phases applied in the present study, for the creation of the land cover maps:-

- Preparation of Digital Map
- Satellite data selection
- Geo reference satellite image in WGS84 Coordinates
- Satellite data classification, Selection & Estimation WGS84 Coordinates.
- Satellite data interpretation and vectorization of the resulting units,
- Post Processing of DGPS Data, Validation of decision Observation Period
- Field checking

For this methodology most preferable software's are been used i.e. Erdas imagine 8.4, ArcGIS &Autocad Map.

11. BM REFERENCES AND SITE LOCATION PHOTOGRAPHS

KARRAMAD BLOCK

BLOCK BOUNDARY POINT

BLOCK BOUNDARY POINT

BLOCK BOUNDARY POINT

BLOCK BOUNDARY POINT

SHRI BAJRANG POWER & ISPAT LTD.

KARRAMAD BLOCK

LEASE AREA :- 5.160 HA.

TEHSIL - DURGUKONDAL, DISTRICT - KANKER, STATE - CHHATTISGARH

LIST OF DGPS BOUNDARY PILLAR CO-ORDINATE

SR. NO.	BP No.	UTM NORTH WGS 84		WGS 84 DMS	
		EASTING	NORTHING	LATITUDE	LONGITUDE
1	BP-1	496751.433	2235368.423	20˚12'57.078"	80˚58'8.047"
2	BP-2	496750.856	2235317.312	20˚12'55.413"	80˚58'8.027"
3	BP-2/1	496740.586	2235268.378	20˚12'53.821"	80˚58'7.673"
4	BP-2/2	496730.252	2235219.457	20˚12'52.229"	80˚58'7.317"
5	BP-3	496714.548	2235155.909	20˚12'50.162"	80˚58'6.777"
6	BP-4	496636.237	2235155.989	20˚12'50.164"	80˚58'4.078"
7	BP-4/1	496587.505	2235167.179	20˚12'50.528"	80˚58'2.398"
8	BP-5	496547.980	2235174.315	20˚12'50.760"	80˚58'1.036"
9	BP-6	496485.855	2235205.553	20˚12'51.776"	80˚57'58.895"
10	BP-6/1	496493.564	2235254.956	20˚12'53.383"	80˚57'59.160"
11	BP-6/2	496501.272	2235304.358	20˚12'54.990"	80˚57'59.426"
12	BP-6/3	496508.98	2235353.76	20˚12'56.597"	80˚57'59.691"
13	BP-7	496515.395	2235394.872	20˚12'57.935"	80˚57'59.912"
14	BP-7/1	496564.333	2235389.388	20˚12'57.759"	80˚58'1.598"
15	BP-7/2	496613.271	2235383.905	20˚12'57.580"	80˚58'3.285"
16	BP-7/3	496662.208	2235378.422	20˚12'57.402"	80˚58'4.971"
17	BP-7/4	496711.146	2235372.938	20˚12'57.224"	80˚58'6.658"