

**COMPLIANCE REPORT**  
**AS PER CONDITIONS STIPULATED IN**  
**ENVIRONMENTAL CLEARANCE**  
**(LETTER NO. J-11015/23/2009-IA.II (M) DATED APRIL 16<sup>th</sup>, 2010)**

**OF**  
**MINISTRY OF ENVIRONMENT & FORESTS, NEW DELHI**  
**(Compliance Period: April 2011 to September 2011)**

**For**

**SHRI PONGURU MAGNESITE MINE**  
**(M.L.Area-77.50 Ha, Production Capacity 38,000 TPA)**

**At**  
**VILLAGE-JAGIR AMMAPALAYAM, TALUKA & DISTRICT SALEM**  
**(TAMILNADU)**

**Applicant**

**M/s. SHRI PONGURU MAGNESITE MINES**  
**5/12 A, PERIAGOLLAPATTI, KANNANKURICHI**  
**POST-SALEM, DISTT.-SALEM (TAMILNADU)**

**Point Wise Reply of Condition Stipulated in Environmental Condition Letter no. J-11015/23/2009 IA. II (M) Dated April 16<sup>th</sup>, 2010 for Sri Ponguru Magnesite Mine at village- Jagir Ammapalayam Taluka & District Salem, Tamil Nadu by M/s Sri Ponguru Magnesite Mines.**

<b>S. No.</b>	<b>ENVIRONMENTAL CLEARANCE CONDITIONS</b>	<b>REPLY</b>
<b>A. SPECIFIC CONDITION</b>		
i.	Top soil shall be stacked properly with adequate protection measures at earmarked sites and used for reclamation and rehabilitation of the mined out areas.	Top soil stacked properly with adequate protection measures at earmarked sites and shall be used for reclamation and rehabilitation of the mined out areas.
ii.	Wildlife Conservation Plan shall be prepared in consultation with the office of the Chief Wildlife warden and implemented. The plan shall comprise of in-built monitoring mechanism with special emphasis to protection of Schedule-I species. The status of implementation shall be submitted to the Ministry. Chain link fencing shall be installed around the mine lease area to prevent injury to the animals. Further, measures shall be taken to control the fire.	The wild life conservation plan have been prepared and enclosed as <b>Annexure- 1</b>
iii.	Mineralogical composition of the dust along with percentage of silica fractions in the dust particle and particle size analysis shall be carried out. Further, personnel exposure monitoring for dust shall be carried out for the workers.	Shall be complied with
iv	Fugitive dust generation shall be controlled. Fugitive dust emission shall be regularly	Fugitive dust generation will be controlled by regular sprinkling of water

	monitored at locations of nearest human habitation (including schools and other public amenities located nearest to sources of dust generation as applicable) and records submitted to the Ministry.	on mine haul roads. The monitored data of fugitive dust emission on different locations is enclosed as <b>Annexure-2</b>
v	Monitoring of ground and surface water quality shall be regularly conducted and records maintained and data submitted to the Ministry regularly. Further, monitoring points shall be located between the mine and drainage in the direction of flow of ground water and records maintained. Monitoring for Arsenic in ground water shall be undertaken.	Monitoring of ground and surface water quality were regularly conducted The results of the same is enclosed as <b>Annexure-3</b>
vi	Data on ambient air quality (PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>x</sub> ,) should be regularly submitted to the Ministry including its Regional office located at Bangalore and the State Pollution Control Board / Central Pollution Control Board once in six months. The critical parameters such as PM <sub>10</sub> /PM <sub>2.5</sub> , NO <sub>x</sub> in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [(TDS, DO, pH) and total Suspended solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the company in public domain. The circular no.]-	The same shall be complied in future and also carried out monitoring for ambient air quality the results are enclosed as <b>Annexure- 4</b> .  The half yearly compliance report we are regularly submitted to the concerned, receipt of last compliance report submission (June 2011) is enclosed as <b>Annexure-5</b> for your ready reference.  Sampling and analysis of mine sump water was done and results are enclosed as <b>Annexure-6</b>

	2001211/2006-IA.II (M) dated 2.5.2009 issued by the Ministry of Environment and Forests, which is available on the website of the Ministry <a href="http://www.envfor.nic.in">www.envfor.nic.in</a> shall also be referred in this regard for its compliance.	
vii	Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transportation of ores and others shall have valid permissions under Central Motor Vehicle Rules, 1989 and its amendment. The number of shifts for mine operations could be as prescribed in the approved Mine Plan. However, the number of shifts or hours permissible for external vehicular traffic shall not exceed the limits in vogue for the area under consideration or in the event of passage through forest roads or public places, as may be applicable in this case. The limits prescribed by the local authorities shall not be exceeded. If no such guidelines for time restrictions are applicable, then external transport shall be preferably confined to two shifts.	Vehicles using for mining operation have valid PUC certificates. The number of shifts for mine operations is as per approved mining plan.
viii	The company shall ensure that no silt originating due to mining activity is transported in the surface water course (if any) flowing in the area. Proper drainage of the waste dumps shall be provided to prevent siltation of downstream water bodies. The dumps per se shall be drained and surface of the dump should be properly vegetated.	No surface water will be affected due to mining operations, proper drainage system of the dumps will be provided to prevent the siltation of downstream water bodies, the dumps are properly drained and vegetated.
ix	Measures for prevention and control of soil erosion and management of silt shall be	Proper measures will be adopted to



	undertaken. Protection of dumps against erosion shall be carried out with geo textile matting or other suitable material, and thick plantations of native trees and shrubs shall be carried out at the dump slopes. Dumps shall be protected by retaining walls.	control the soil erosion. Dumps will be protected by thick plantation of native trees and shrubs and retaining walls will be constructed for the protection of dumps.
x	Rain water harvesting shall be undertaken to recharge the ground water source. Status of implementation shall be submitted to the Ministry within six months.	The condition shall complied with
xi	Need based assessment for the nearby villages shall be conducted to study economic measures with action plan which can help in up liftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such programme. Company shall provide separate budget for community development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self employment and jobs.	All the necessary measures will be adopted for up liftment of the poor section of the society.
xii	Occupational Health Cell shall be created at the company level under the charge of an officer of adequate seniority who is a qualified person in occupational health.	Various community development programmes were under taken for upliftment of weaker section of the society in previous year
xiii	Occupational health and safety measures for the workers including identification of work related health hazards, training on malaria eradication, HIV, and health effects on exposure to mineral	Various community development programmes were under taken for upliftment of weaker section of the society in previous year

	dust etc. shall be carried out. Periodic monitoring for exposure to respirable mineral dust on the workers shall be conducted and records maintained including health records of the workers. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipment etc. shall be carried out periodically. Review of impact of various health measures undertaken (at interval of five years or less) shall be conducted followed by follow up action wherever required.	
xiv	Green belt development and selection of plant species shall be as per CPCB guidelines. Herbs and shrubs shall also form a part of afforestation programme besides tree plantation. Details of year wise afforestation programme including rehabilitation of mined out area shall be submitted to the Ministry within six months. The DFO/Agriculture University shall be consulted to increase the density of plantations.	The Plantation program in mined out area being carried out as per programme submitted in approved mining plan for the stabilization of the stacking area
xv	Provision shall be made for housing the laborers within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	No major construction work was done on the mine site office was constructed and workers involved in construction activities came from near by villages.
<b>B. GENERAL CONDITIONS</b>		
i	No change in mining technology and scope of working shall be made without prior	Without prior approval of the Ministry of Environment & Forests, No change in

	approval of the Ministry of Environment & Forests.	mining technology and scope of working will be made
ii	No change in the calendar plan including excavation, quantum of mineral and waste shall be made.	Agreed, no change in calendar plan including excavation, quantum of mineral and waste will be made
iii	Fugitive dust emissions from all the sources shall be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points shall be provided and properly maintained.	Regular water sprinkling on haul roads, loading and unloading and at transfer points will be carried out for the control of fugitive dust emission.
iv	Four ambient air quality-monitoring stations shall be established in the core zone as well as in the buffer zone for PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>x</sub> , monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	Based on the meteorological data, topographical features and environmentally and ecologically sensitive targets, ambient air quality monitoring stations were established in core as well as buffer zone
v	Measures shall be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. shall be provided with ear plugs / muffs.	The ambient noise monitoring was carried out and the results of same is enclosed as <b>Annexure-7</b>
vi	Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 <sup>th</sup> May, 1993 and 31 <sup>st</sup> December, 1993 or as amended from time to time. Oil	No waste water is being generated from mine site and there is not any work shop at mine site the vehicle used for mining purpose is on hired basis so full maintenance will be the part of vehicles

	and grease trap shall be installed before discharge of workshop effluents.	owner.
vii	Personnel working in dusty areas shall be provided with protective respiratory devices and they shall also be imparted adequate training and information on safety and health aspects.	Shall be complied with
viii	A separate Environmental Management Cell with suitable qualified personnel shall be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.	Structure of Environmental Management Cell is enclosed as <b>Annexure - 8</b>
ix	The project authorities shall inform to the Regional Office of the Ministry located at Bangalore regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	The same has been complied
x	The Regional Office of the Ministry located at Bangalore shall monitor compliance of the stipulated conditions. The project authorities shall extend full cooperation to the officer(s) of the Regional Office by furnishing the requisite data/ information/ monitoring reports.	Agreed
xiii	The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Bangalore, Central Pollution Control Board and State Pollution Control Board. The	We are regularly submitting the six monthly progress report of the condition stipulated in environmental clearance last six monthly compliance report was submitted in June 2011 copy of receipt in enclosed as <b>Annexure -5</b>

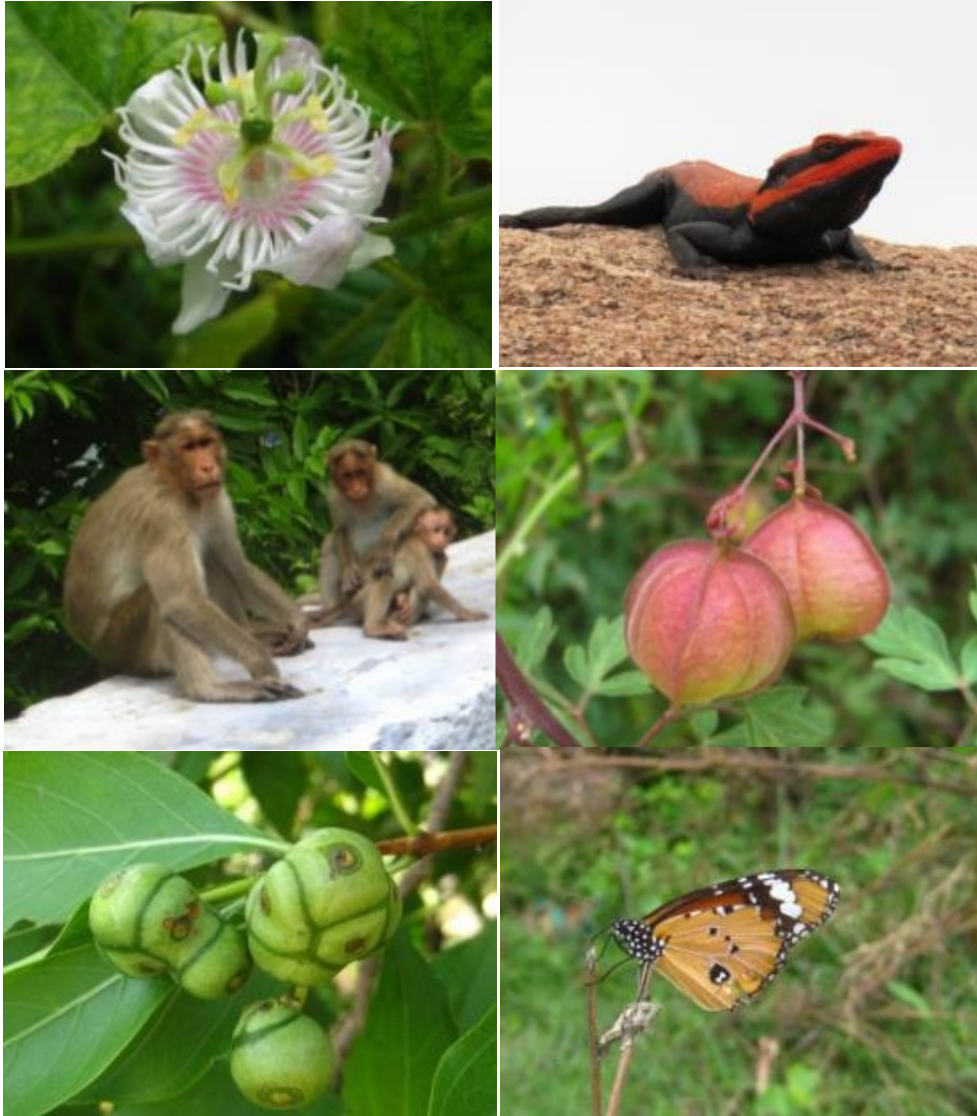
	<p>project proponent shall upload the status of compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests, Bangalore.</p>	
xiv	<p>The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality, / office of Municipal Corporation/Gram Panchayat concerned and on the company's web site within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board/Committee and may also be seen at Website of the Ministry of Environment and Forests at <a href="http://envfor.nic.in">http://envfor.nic.in</a>.</p>	<p>We have advertised in two widely circulated news papers</p> <ol style="list-style-type: none"> <li>1. The Hindu dated 08.05.2010</li> <li>2. Dailly Sandhi dated 08.05.2010</li> </ol> <p>We already have been submitted with previous compliance report.</p>
xv	<p>A copy of clearance letter will be marked to concerned Panchayat/local NGO, if any, from whom suggestion / representation has been received while processing the proposal. The clearance letter shall also be put on the website of the company.</p>	Complied
xvi	<p>State Pollution Control Board shall display a copy of the clearance letter at the Regional office, District Industries Centre and Collector's office / Tehsildar's Office for 30</p>	Complied

	days.	
xvii	The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted to the State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and shall also be put on the website of the company along with the status of compliance of environmental clearance conditions. The same shall also be sent to the Regional Office of Ministry by e-mail.	Shall be complied with
	The Ministry of Environment and Forests reserves the right to revoke the clearance if conditions stipulated are not implemented to the satisfaction of the Ministry. MoEF may impose additional environmental conditions or modify the existing ones, if necessary.	Agreed
	In case of any deviation or alteration in the project proposed from those submitted to this Ministry for clearance, a fresh reference should be made to the Ministry to assess the adequacy of the condition(s) imposed and to add additional environmental protection measures required, if any.	Agreed
	Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Agreed
	Any appeal against this environmental	

	<p>clearance shall lie with the National Environment Appellate Authority, if preferred, within a period of 30 days as prescribed under Section 11 of the National Environment Appellate Authority Act, 1997.</p>	
	<p>The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention &amp; Control of Pollution) Act, 1974, the Air (Prevention &amp; Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India / High Court of Tamil Nadu and any other Court of Law relating to the subject matter.</p>	<p>Agreed</p>

## Annexure- 1

### WILDLIFE CONSERVATION PLAN FOR SRI PONGURU MAGNESITE MINES, JAGIR AMMAPALAYAM, DISTRICT SALEM, TAMILNADU, INDIA.



2011

Surveillance, Research & Photography

**Dr Manoj R. Borkar Ph.D., PGDEE, FBRS, FASc(AW), FIAES**

**QCI-NABET ACCREDITED FAE (Ecology & Biodiversity)**

**J.M.ENVIRONET PVT. LTD. NCR - GURGAON**



# **Wildlife Conservation Plan**

For

## **Sri Ponguru Magnesite Mines**

Jagir Ammapalayam, Salem District

Tamilnadu, India.

**September, 2011**

### **CONSULTANTS**

**J M EnviroNet Pvt Ltd., Gurgaon**

NCR- New Delhi

**QCI-NABET Accredited FAE (Ecology, Biodiversity & Wildlife):**

**Dr. Manoj R. Borkar Ph.D., PGDEE, FBRs, FASc (AW), FIAES**

### **Disclaimer by the Author/ Consultant Dr Manoj R. Borkar**

This report has been prepared based on field visits for Ground-truthing, perusal of scientific literature, inputs from cross section of stakeholders, and a spirit of scientific inquiry. No facts have been consciously undermined and/or ignored, and the ethics of conservation have been upheld and balanced with entrepreneurial aspirations of the Project Proponent. The report is aimed at facilitating holistic understanding of the locale specific issues, concerns and responses, and should not be interpreted or quoted on piecemeal basis. All the photographs have been taken by the author and copyrighted, except if acknowledged otherwise. No unauthorized usage, alterations, additions and deletions in the textual and pictorial contents of this report are permissible without the permission of the author/consultant. The author of the report stands indemnified against prosecution for liabilities arising from unforeseen dimensions of the project proposal beyond the scope of his expertise.

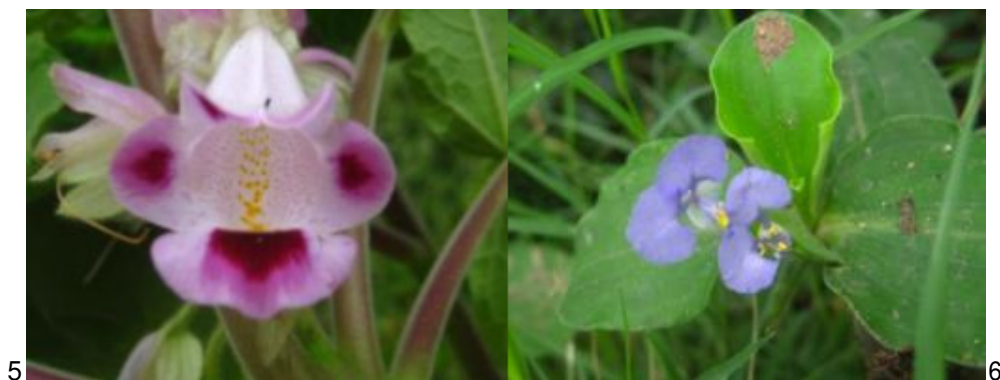
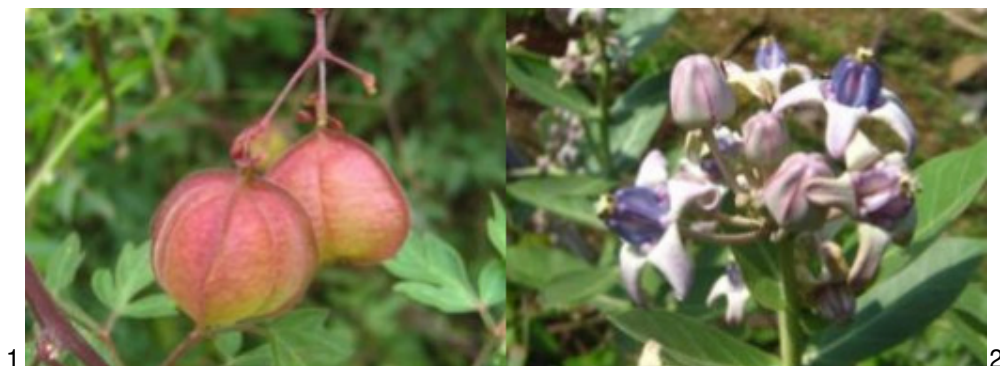
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**FLORAL DIVERSITY OF THE CORE & BUFFER ZONES OF SRI PONGURU  
MAGNESITE MINES AT JAGIR AMMAPALAYAM, SALEM TAMILNADU**

Photography by DR. MANOJ R BORKAR ©

PHOTOPLATE-1





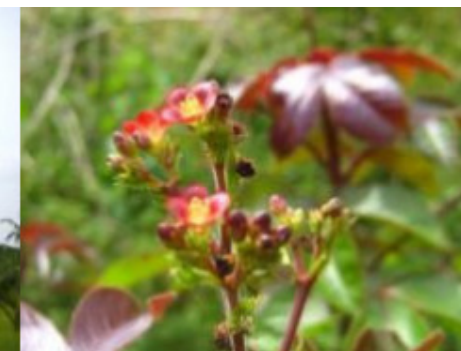
### LEGENDS TO PHOTOGRAPHS ON PHOTOPLATE-1

1. *Cardiospermum helicacabum*
2. *Calotropis gigantea*
3. *Solanum anguivi*
4. *Passiflora foetida*
5. *Martynia annua*
6. *Commelina benghalensis*
7. *Ipomea carnea*
8. *Phyla nodiflora*

**FLORAL DIVERSITY OF THE CORE & BUFFER ZONES OF SRI PONGURU  
MAGNESITE MINES AT JAGIR AMMAPALAYAM, SALEM TAMILNADU**

Photography by DR MANOJ R BORKAR ©

PHOTOPLATE -2



## LEGENDS TO PHOTOGRAPHS ON PHOTOPLATE-2

9. *Delonix regia*
10. *Casuarina equisetifolia*
11. *Pongamia pinnata*
12. *Morinda citrifolia*
13. *Borassus flabellifer* & *Cococs nucifera*
14. *Jatropha gossypifolia*
15. *Euphorbia hirta*
16. *Physalis minima*



**FAUNAL DIVERSITY OF THE CORE & BUFFER ZONES OF SRI PONGURU MAGNESITE MINES AT JAGIR AMMAPALAYAM, SALEM TAMILNADU** \*Photography by DR MANOJ R BORKAR ©





## LEGENDS TO THE PHOTOPLATE ON FAUNAL DIVERSITY

17. **Grey Pansy** (*Precis atlites*)
18. **Tawny Coster** (*Acraea violae*)
19. **Toad** (*Bufo melanostictus*)
20. **South Indian Rock Agama** (*Psammophilus dorsalis*)
21. **Garden Lizard** (*Calotes versicolor*)
22. **Asian Baya Weaver Bird** (*Ploceus philippinus*)
23. **Bonnet Monkey** (*Macaca radiata*)
24. **Ground Skimmer Dragon fly** (*Diplocodes trivialis*)

## **1. A SYNOPTIC OVERVIEW OF THE PROJECT**

The Project Proponent Sri Ponguru Magnesite Mines with Mining Lease area of 77.50 ha proposes Magnesite production capacity of 38,000 TPA at village Jagir Ammapalayam, Taluka & District Salem of Tamil Nadu state and hence sought the mandatory Environmental Clearance for the same from Ministry of Environment & Forest, GoI, New Delhi. As per the New EIA Notification dated 14<sup>th</sup> September 2006, the proposed project falls under Category A, Project or Activity 1(a).

### **PROFILE OF THE PROJECT PROPONENT**

The Mining lease was granted in favour of M. Subramaniam by G. O. Ms.No.3140 Industries Labour & Co. Op Department dated 12.06.1963, comprised in Survey No. 178 situated in Jagir Ammapalayam Village, Salem Taluka & District, Tamil Nadu for the purpose of quarrying Magnesite.

In the year 1992 the lessee M. Subramaniam died on 20.04.1992 and on the death of M. Subramaniam, his legal heirs 1) S. Jeyakumar 2) S. Balakumar and 3) S. Sundararajan were brought on record. They partitioned the properties & the above said mining lease area was given to his legal heir Shri. S. Sundararajan. Mr.Sundararajan after obtaining the entire legal rights of area changed the name of the concern in the name & style **Shri Ponguru Magnesite Mines** on 30/07/1997.

Originally the Mining lease was granted for two years from 1963. Subsequently the lease was renewed vide letter no. G.O.MS.No. 4295 dated 2nd September 1965 for a period of twenty years. The first mining plan was approved by Indian Bureau of Mines (IBM) vide letter no. TN/SLM/MP/269/MDS dated 19th September 1989. Subsequently scheme of mining was approved by IBM vide letter no. TN/SLM/MS/MP/07-MDS dated 16th March 1995. Another mining plan was approved by IBM vide letter no. TN/SLM/MP/MG- 1238-MDS dated 31st May 2000. The scheme of mining and progressive mine closure plan was approved by IBM vide letter no. TN/SLM/MG/MS-254/MDS dated 12th November 2004. Another scheme of Mining including the Progressive Mine closure Plan has been approved by IBM vide their letter no. TN/SLM/MG/MS-501-SZ dated 24th April 2009.

### **PRESENT STATUS AND STAGE OF REGULATORY CLEARANCES LIKE APPROVAL OF THE MINING PLAN, FORESTRY CLEARANCE ETC**

Originally the Mining lease was granted for a period of two years from 1963. Subsequently the lease was renewed vide letter no. G.O.MS.No.4295 dated 2<sup>nd</sup> September 1965 for a period of twenty years.

The first mining plan was approved by Indian Bureau of Mines (IBM) vide letter no. TN/SLM/MP/269/MDS dated 19<sup>th</sup> September 1989. Subsequently scheme of mining was approved by IBM vide letter no. TN/SLM/MS/MP/07-MDS dated 16<sup>th</sup> March 1995. Another mining plan was approved by IBM vide letter no. TN/SLM/MP/MG- 1238-MDS dated 31<sup>st</sup> May 2000. The scheme of mining and progressive mine closure plan was approved by IBM vide letter no. TN/SLM/MG/MS-254/MDS dated 12<sup>th</sup> November 2004. Another scheme of Mining including the Progressive Mine closure Plan has been approved by IBM vide their letter no. TN/SLM/MG/MS-501-SZ dated 24<sup>th</sup> April 2009.

## **TOPOGRAPHY AND PHYSIOGRAPHIC FEATURES**

The idea that habitat management is the highest form of wildlife management is catching up, and appropriately so because the conservation prospects of wildlife is intrinsically linked with the integrity and resourcefulness of the habitat in which it dwells. Wildlife in any given area is affected and influenced by the climate, Substrate and vegetation of the place. A good combination of all three is desirable for making a habitat suitable for occupancy and viable settlement. However the present scenario of Indian landscape is that of fragmented, degraded and diminishing landscapes and thus ideal wildlife habitats are scarce. Another dimension of the problem is when a landmass has a multi-utility potential and is thus a multi-stakeholder resource, there is a spectrum of pressures due to inter-sectoral conflicts. If the stakes are from any commercial enterprise that involves earth moving operations such as in case of mining then there is alteration of landscape which is often contrary to the interest of resident and transient biodiversity.

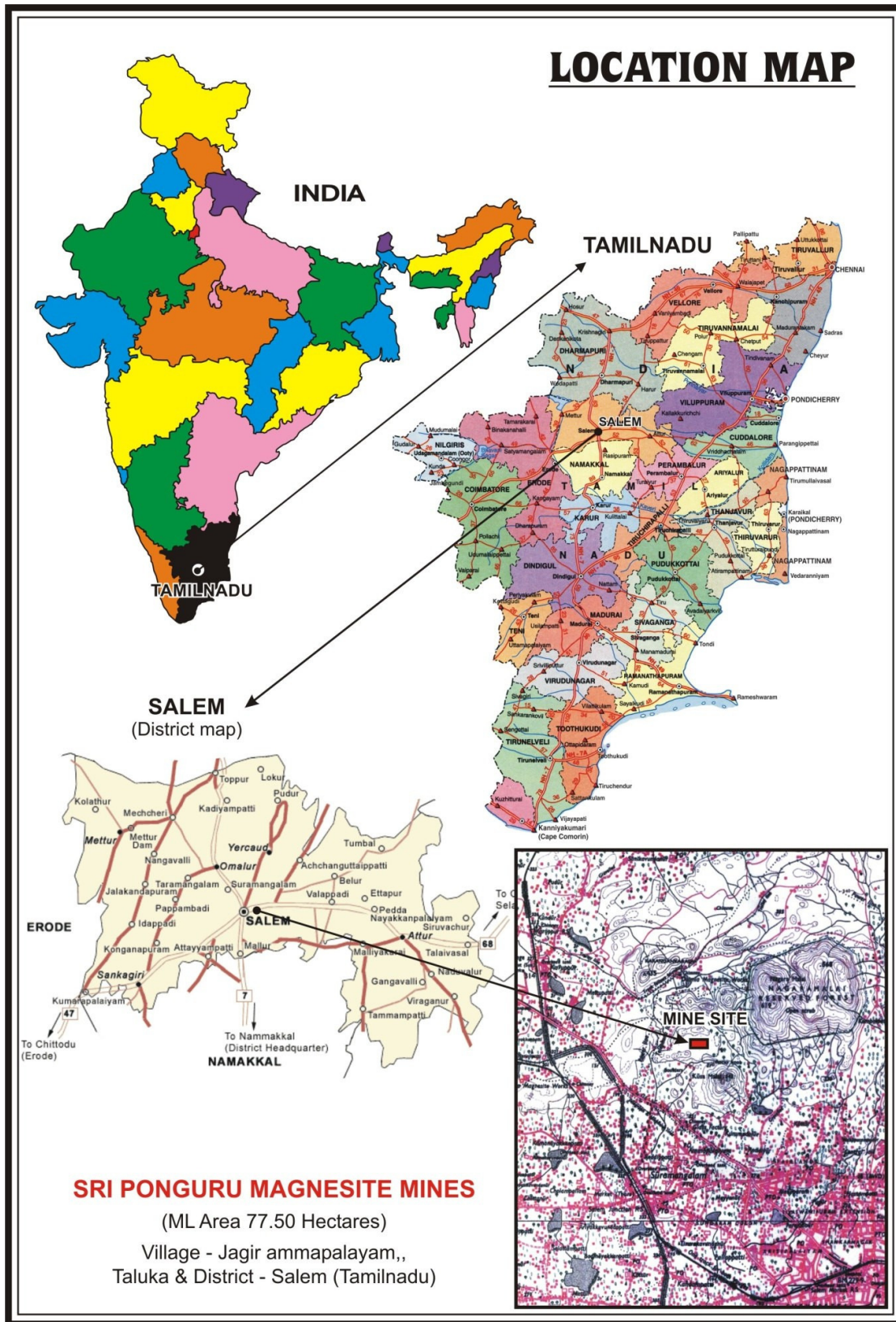
Against this background it is easy to understand that writing a conservation Plan for Wildlife necessitates a good understanding of habitat topography and physiography. In the case of the present proposal the lease is surrounded by RFs and hence it is prudent to verify whether the area probably constitutes a part of corridor for movement of wildlife. Further it is necessary to evaluate the likely impact of the mining operations on the conservation future of biodiversity in general and wildlife in particular.

The mining lease area is gently undulating with elevations ranging generally from 85 to 130 m above MSL. The area is located amidst moderately higher hillocks namely *Nagara Malai* in North and Northeast, *Kusamalai* in the South East. Towards North and northeast part of the leased mine area is an important range of hills called *Shevaroy*s. It has geomorphology of plateau type. The highest peak has elevation of 1630 m above MSL at Karadipon coffee estate in the north east of the Shevaroy's. The general direction of the *Shevaroy*s hills is from North-East to the South-West and the slopes enclose several valleys, some of which are deep and narrow. The general direction of the drainage is towards south and south-west in the study area, sparing mining related terrigenous inputs in any major lentic or lotic water bodies.

Forests in the hills are confined to the hill slope and outlying spurs. Most of the area is under coffee estates and other forms of cultivation and homogenised due to monocultures.

There are residual hills which are towards North-east and South-west direction and are distributed in South and West of the leased mine area. The nallas are oriented in North-east and South-west directions in the plain. All the nallas flow from *Shevaroy*s and *Nagaramalai* hills.

The following pages present the maps of the geographic location, Key Plan and the satellite Image of the Mining lease in question. These pictorial representation shall clarify the spatial contexts of the lease vis a vis its surrounding area, where there exist a number of Reserve Forests , besides settlement zone, industrial area, national highways and other terrestrial features. The spatial coordinates having been defined, it will be easier to understand the apprehensions on wildlife movement and conflicts.



**Fig. 1. A map mosaic showing the location of Sri Ponguru Magnesite Mines at village Jagir Ammapalayam, in Salem, Tamilnadu**



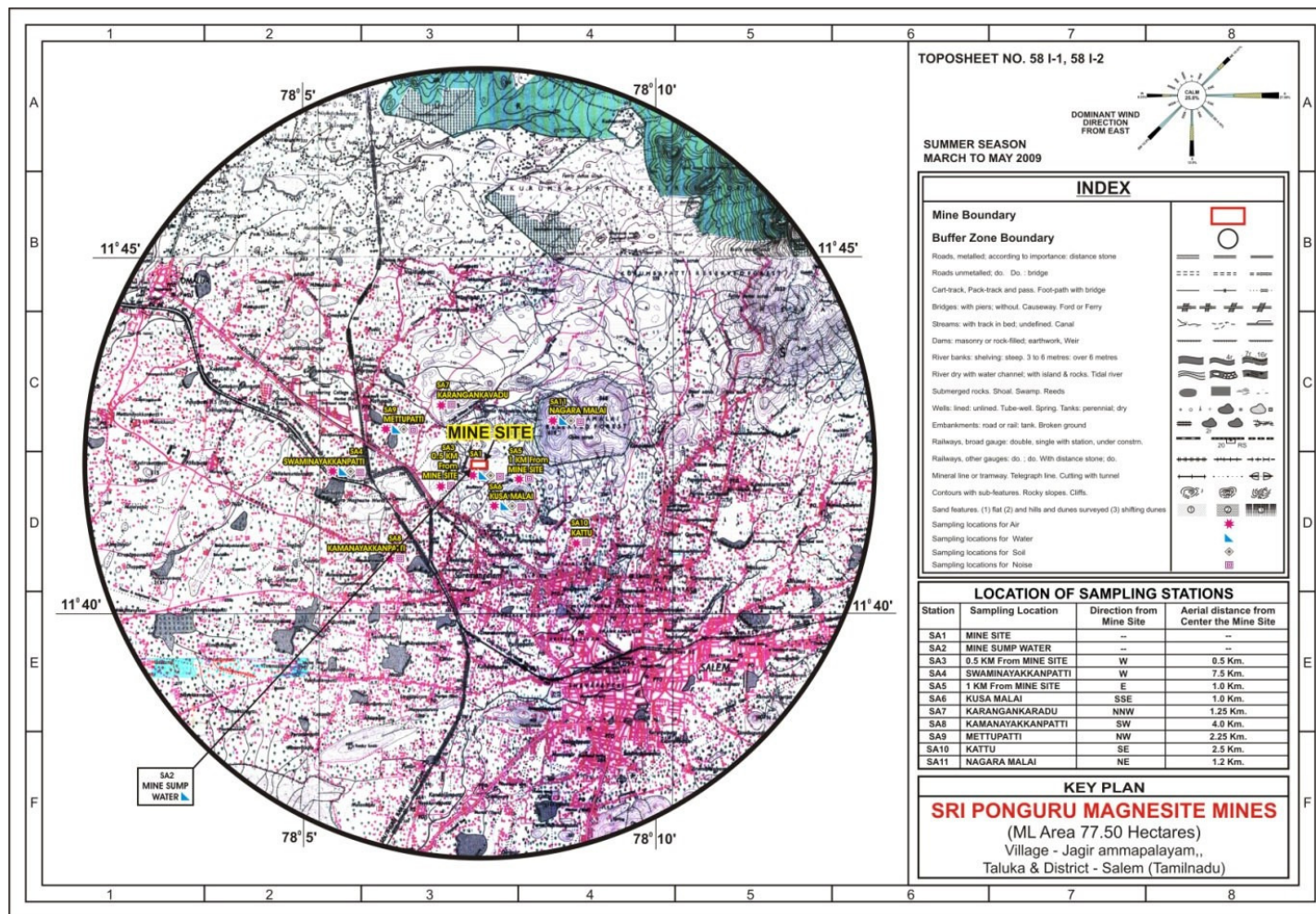
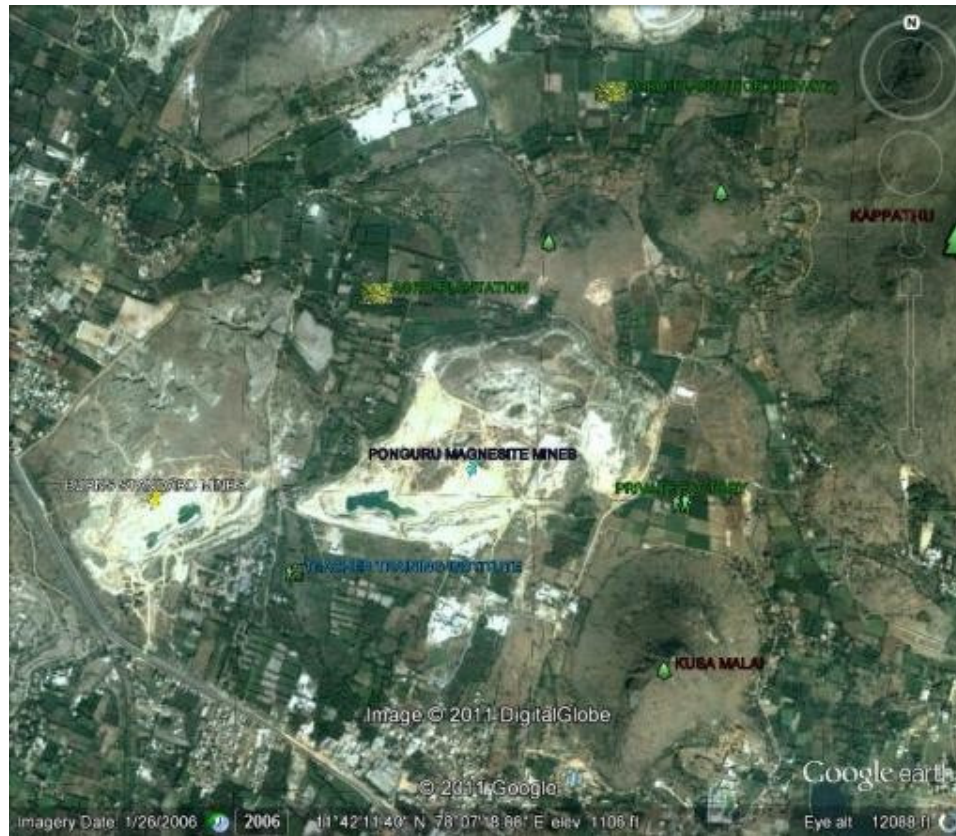


Fig. 2. Key Plan of the Sri Ponguru Magnesite Mines and its Buffer zone of 10km radius



**Fig. 3. Satellite Image highlighting the Sri Ponguru Magnesite Mining Lease and its Buffer zone.**

## **2. REQUISITION OF WILDLIFE CONSERVATION PLAN–THE STATUTORY CONTEXT**

Wherein the PP has been accorded Environmental Clearance by the EAC vide its decision taken in the meeting held on 25-26<sup>th</sup> March 2010 and the same had been communicated to the PP vide letter No. MoE&F, GoI-11015/23/2009-IA.II (M) dated April 16, 2010. While granting this EC, there were specific conditions laid down for compliance by the PP. This document on WLCP has been in accordance and compliance with specific conditions A-II laid down in the letter as above, where in the EAC had requisitioned preparation of WLCP in consultation and concurrence with the office of CWW, with a special emphasis on protection of Schedule I species if any and addressing the concerns of (Forest) Fires.

The PP having engaged the expertise of M/S J M Environet Pvt Ltd, Gurgaon, Dr. Manoj R. Borkar NABET-QCI accredited FAE (E&B) was deputed to visit the site and its buffer and the RFs therein for groundtruthing and assessment of wildlife potential and evolve an appropriate Conservation Plan in consultation with all the stakeholders, to commensurate with all the apprehensions and concerns raised by the statutory body.

The FAE (E&B) of the consultants having had perused all the correspondence and pertinent documents, having visited the site and the RFs falling within the buffer and well beyond, collected primary data as well as interacted with the stakeholders to delve into the wildlife concerns and has come up with this Wildlife Conservation Report. In preparation of this document, priority has been accorded to issues relevant to the PP besides putting in place pragmatic, implementable suggestions. The spatial contexts of the lease *vis a vis* the RFs have been resolved through study of satellite imageries as well as by field visits. The assessment of wildlife here (Lease Core and Buffer) is inferred based on desk-top research involving perusal of available secondary databases, direct sightings and reliable stakeholder's inputs. Conservation measures have been suggested taking into account the holistic picture and not on piecemeal basis. The report has been prepared in the true spirit of conservation ethics without being influenced by the entrepreneurial interest of the PP.

The apprehensions raised on wildlife associated with the RFs as well as the probability of human-Wildlife conflicts has been examined using scientific criteria.

### **3. FIELD VISIT & SURVEILLANCE FOR ASSESSMENT OF RESERVE FORESTS & WILDLIFE**

The Sri Ponguru Magnesite Mines were visited in the month of June 2011 along with the representatives of the lessee and Shri Govind Ranjan of the J M Environet Pvt Ltd. The office of the said mining company was visited to acquaint ourselves with an update on the process, scale and status of the proposed mining activity, besides verifying several documents including the ToR, EIA document and EC.

The entire lease was visited for understanding the nature of the substratum and vegetation as well as for groundtruthing the geographic coordinates as defined in the Key Plan and other maps. The core was carefully surveyed for direct /indirect signs of wildlife if any. The sighted floral and faunal taxa were recorded, photographed and inventoried. The buffer zone was visited in a vehicle and the entire survey path plotted on the satellite image as shown later.

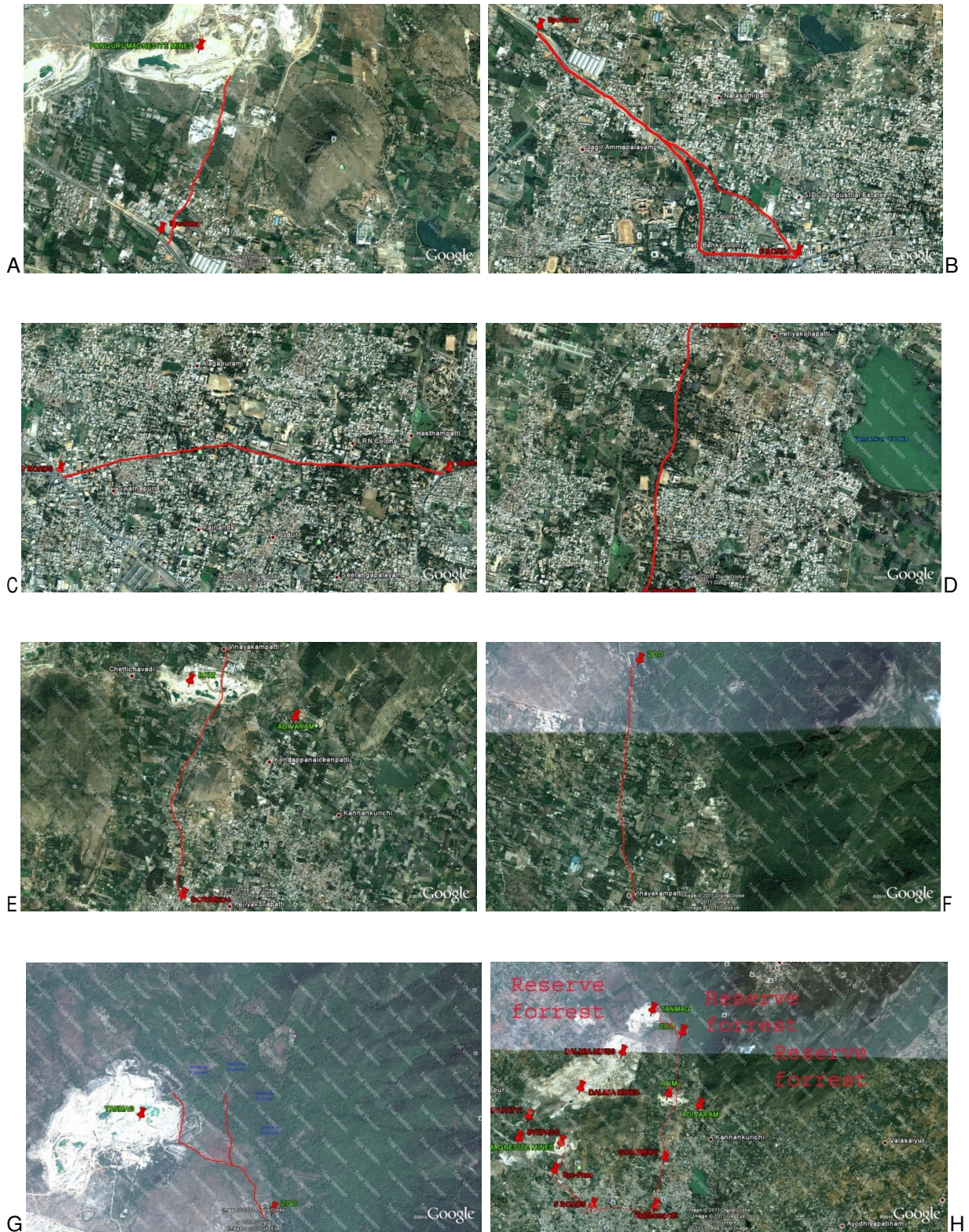
The geographic proximity and continuum between the various RFs and the mining lease was evaluated. Special attention was paid to understanding the fragmentation of the entire landscape here.

From the analysis of the satellite imageries as also from groundtruthing it is amply clear that the Sri Ponguru Magnesite Mines Lease is isolated from the general landscape by its very location at a higher elevation. Also, none of the Reserve Forests mentioned in the EAC letter are in the near vicinity nor connected with the lease, in fact the urban settlements and the other artefacts of industrialisation in Salem town have surrounded the lease disallowing any continuum or corridor for wildlife, also there are no significant natural water bodies in the immediate vicinity of the lease.



Of course the lease shows presence of impounded water held by some of the low lying pits and this can attract some waders and wetland birds such as the Spot-Bill Duck, Black Drongo, Black Kite, Little Cormorant, Large Pied Wagtail, Indian Robin, Asian Koel, Barn Owl and small Bee Eater . The lentic artificial impoundments support a diversity of Odonates including Dragonflies and Damselflies listed elsewhere. Butterflies such as Great Orange Tip, Common Mormon, Common Jezebel, Common Mime, Common Rose, Chocolate Pansy, Common Emigrant, Plain Tiger, Tawny Coster, Common Crow, and Blue Pansy, lemon pansy Lime Butterfly have been sighted here. The lease as seen is quite barren with little or no tree cover; barring a few species that have been planted here such as the *Casuarina equisetifolia*, *Mangifera indica*, *Syzigium cumini* , *Azadirachta indica* and Bamboo species. Importantly note the number of other active and closed mining leases of TANMAG, RK Magnesite Mines, and Dalmiya in the immediate vicinity of the RFs. Paradoxically the TANMAG Magnesite Mines, a State Government undertaking operates right in the middle of a dense expanse of Reserve Forests. Also, it is pertinent to note that the base of the northern boundary of the SPMM is occupied by horticultural plots and agro-plots and human settlements. This is a major deterrent to any kind of animal movement to and fro the lease under investigation. Presence of cattle on the lease rule out the presence of any large predator on the lease or in its vicinity. There are no reports of any sightings of scheduled wildlife on the lease or any episodes of wildlife incursions or human wildlife conflicts on the lease precincts. .

**Fig 4. PHOTOMONTAGE OF GOOGLE IMAGES SHOWING THE TOPOGRAPHY AND OTHER SPATIAL FEATURES OF THE SRI PRNGURU MINING LEASE AT JAGIRPALAYAM OF SALEM DISTRICT IN TAMILNADU, INDIA.**



The Transect lines shown in Red indicate the path along which the wildlife Expert of the consultants carried out surveillance for assessment of Wildlife and Reserve Forests, well beyond the buffer zone.

**LEGENDS TO THE PHOTOMONTAGE HIGHLIGHTING THE SURVEY PATH TAKEN BY THE FAE (E&B) DURING THE SURVEILLANCE.**

- A.** Sri Ponguru Magnesite Mines to Bangalore-Coimbatore Highway NH-7 via the Mines Bypass.

Note that on the south-eastern side of the mines the Kusa Malai (Perumal malai) Hill is clearly seen and is a major terrestrial barrier.

- B.** Highway to 5 roads junction and bifurcation of Town Road. Note the density of urban settlement.

- C.** 5 Roads Junction to Hasthampatti

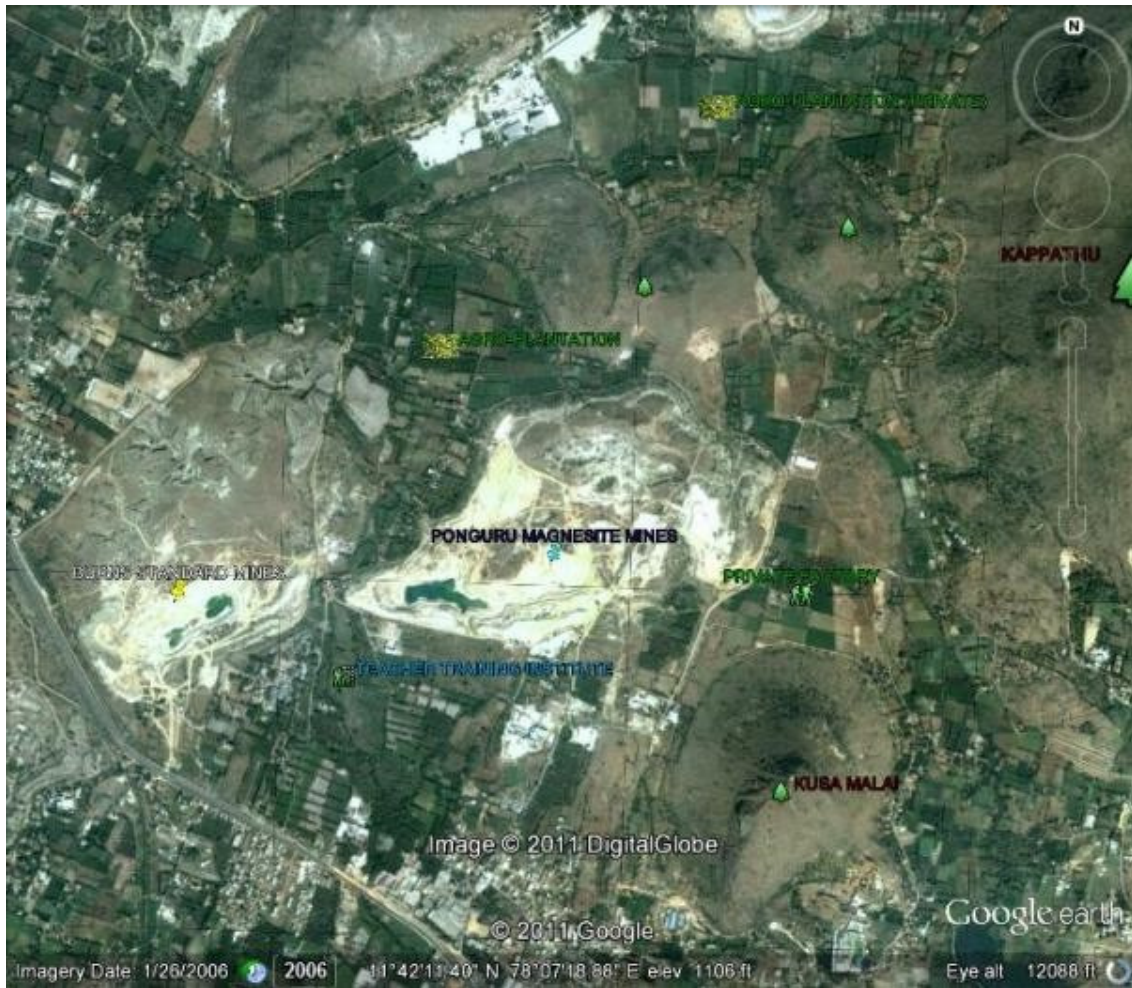
- D.** Hasthampatti to Gorimedu. Note the KannanKurichi lake on the eastern side of the landscape.

- E.** Gorimedu to Vinayakampatti via the closed Ramakrishna Magnesite Mines. Adivaram seen on the south-eastern side of the RK Magnesite Mines is the foothills of Yercaud.

- F.** Vinayakampatti to the Kurumbapatti Zoo.

**G & H.** Kurumbapatti to the TANMAG mines nestled amidst Reserve Forests.

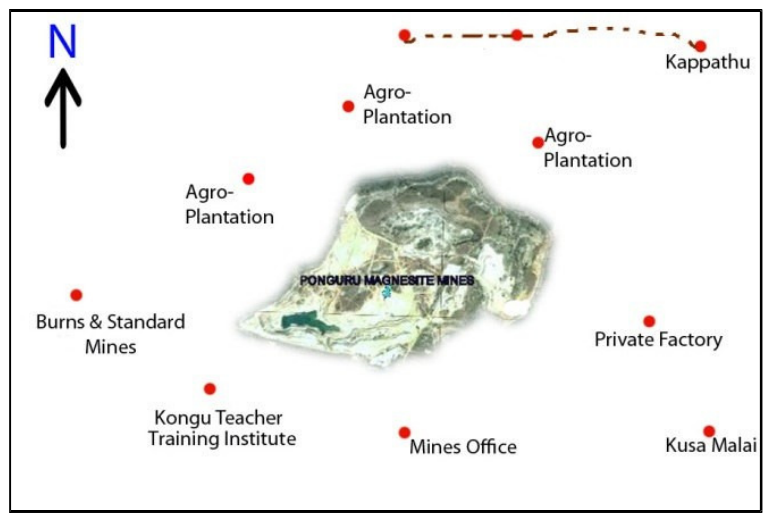




**Fig. 5. Satellite image focussing on the Sri Ponguru Magnesite Mines and its immediate ambience**

### **Legends to Fig. 5**

Note the fragmented landscape around the Sri Ponguru Magnesite Mines in this satellite image. The northern boundary of the mine is close to agro-plantations whereas the eastern boundary shows the presence of a private factory. In the southern aspect of the lease is seen a Teacher's Training Institute and the passage of NH-7. Similarly the south-western boundary of the lease is contiguous with Burns Standard Mines and at a short distance in the south-eastern aspect of the lease can be seen the *Kusa Malai* or *Perumal Malai*.



**Fig. 6. Schematic diagram of the Sri Ponguru Magnesite Mining lease and its immediate surrounding landscape.**



**Fig. 7.** Google Image showing the spatial relationship and distances between the various Hills/Reserve Forests, viz. Nagar Malai, Kappathu, Kusa Malai and Kanja Malai. Note the Township in the eastern and southern direction of the SPMM lease and the maze of National Highways



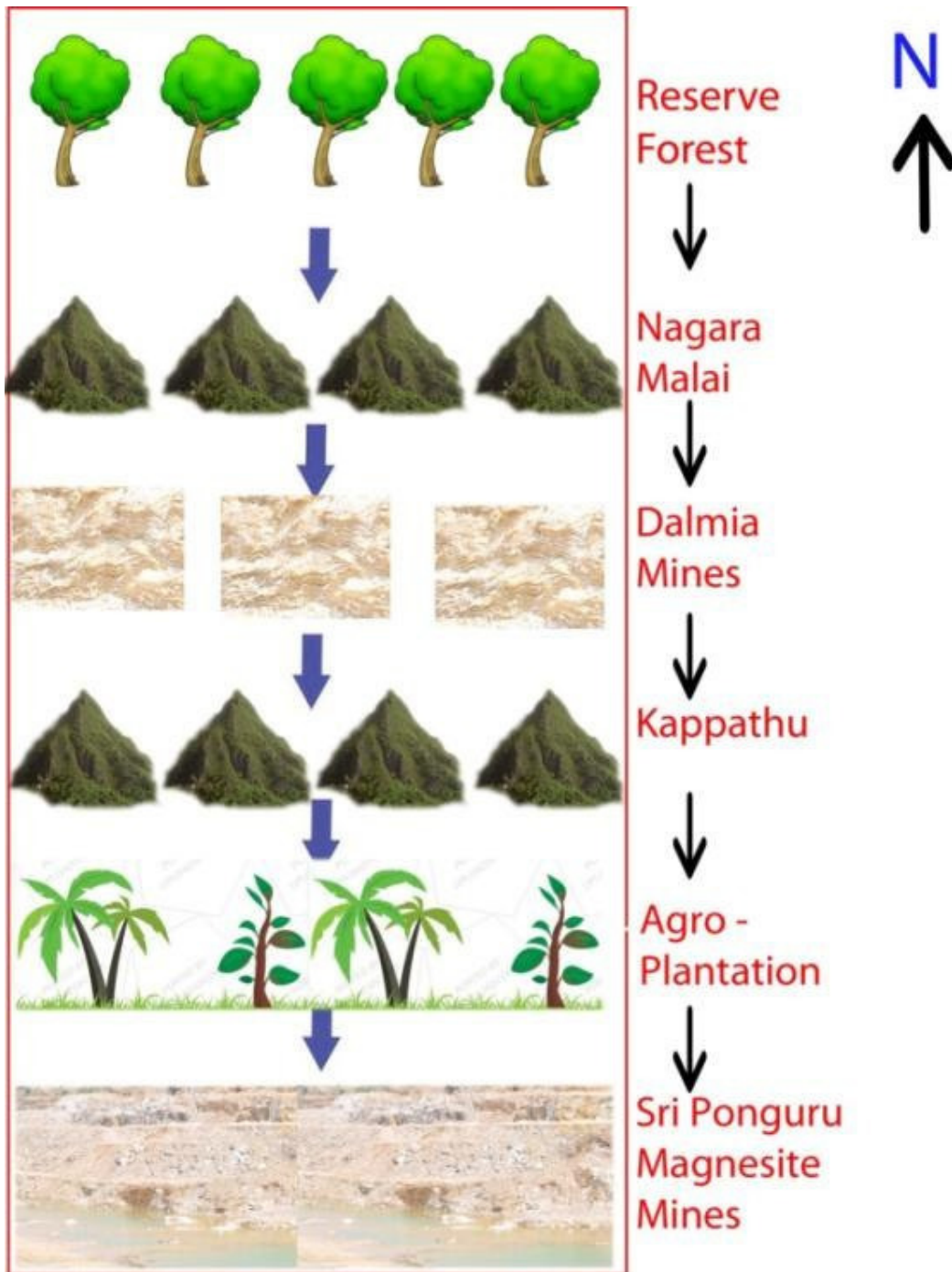


**Fig. 8. Reserve Forests & Mining leases around the Sri Ponguru Magnesite Mines (SPMM) area.**

Note the diagonal disposition of the leases along the North-South direction starting with TANMAG nestled amidst the cluster of RF in close proximity of Yercaud hills and Nagarmalai RF, followed by a vast lease expanse of Dalmiya Mining leases. Towards the lower eastern side of the Dalmiya lease is seen the R K Mines. The Kappathu RF is a stretch extending between the Lower aspect of Dalmiya and R K Mines. On the southern side of the Kappathu RF is the Sri Ponguru Mining Lease, the latter has its western boundary in proximity of Burns Standard Mines. The Southeastern side of the SPMM lease is a small hill called Kusa Malai RF. The only sizeable lentic water body seen in this image is the Kannankurichi Lake; however this is well beyond the buffer zone of SPMM and not within the zone of influence of the proposed activity.

The image clearly establishes the fragmented nature of this landscape. The fragmentation having been caused by mining leases, industries, agro and horticultural plots, national highways and other roads and settlement zone. Further the fact that the RFs mentioned in the ToR are all distantly located though some within the buffer have no continuum or connectivity with the lease in question, SPMM is evident from the spatial contexts. Thus, the wildlife if any presumed resident within the RFs have no exclusive or particular impact from the proposed mining activity within the confines of the SPMM. Also, going by the terrain character of the lease core, sparse or no vegetation and absence of large wild herbivores; barring a few lesser species, there seem no reasons to believe that the lease core is a habitat or a transit passage for any significant wildlife, leave aside schedule I species. The only closest RF that is Kusa Malai is a steep hill with a Temple on its summit. The Yercaud Hills known to be teeming with Wildlife is towards the distant northern direction and is in the vicinity of the TANMAG, where as the Nagarmalai RF is between the southern part of TANMAG and Northern portion of the Dalmiya mines. There is a little chance for any wildlife movement between the 4 RFs highlighted as each of them stand like an isolated island in the sea of fragmented landscape. Also, this puts to rest any speculations and concerns regarding the Human-Wildlife conflicts within the core as well as buffer of the SPMM lease.





**Fig. 9. Schematic diagram showing linear landscape barriers between the Reserve Forest of the Yercaud range and the Sri Ponguru Magnesite Mines. (For explanation see the following account.)**

## EXPLANATION OF FIG. 9

The schematic representation projected in the Fig. 9 clearly implies that, there is no continuum between the Yercaud Hill range and the adjoining Reserve Forests and the Sri Ponguru Magnesite Mines, the landmass being interrupted by *Nagar Malai* hill range, Dalmiya mines, Kappathu RF, and Agro-plantations. These are contrary to the integrity of wildlife habitats and impediments to wildlife movements and as such may not allow any movements and migrations of wildlife from the *Yercaud* range towards the SPMM lease. Importantly, the fringe zone beyond the lease boundary on the north, eastern and southern sides is riddled with urban settlement and industrial units. It is unreasonable to believe that the wildlife could endure such strata of barriers and disturbances and still make it to the lease, which by itself is a poor and degraded habitat and does not support any significant wildlife and in the least any Scheduled species covered under Wildlife Protection Act, 1972. The PP has undertaken to increase the 'Green biomass' through the Green-belt implementation with the help of villagers and the work force.

#### **4. LEASE LOCATION & CHARACTER VIS A VIS APPREHENSIONS OF IMPACT ON RESERVE FORESTS & WILDLIFE: AN ANALYSIS.**

The buffer area of around 25 km surrounding the Sri Ponguru Magnesite mining Lease located at Jagir Ammapalayam in Salem district is a mosaic of many operational mining leases, cultivated croplands, horticultural orchards, lentic water bodies, wastelands and most importantly settlement areas. The buffer is dissected by a national highway No. NH-47, popularly called the Bangalore-Coimbatore Highway, besides numerous other roads and village pathways. The sprawling settlements of villages and proliferating township as far as the eyes can see; coupled with undulating mountainous terrain with steep slopes and sharp ascents make it a rather hostile terrain/corridor for animal/wildlife movements if any. Besides, the location of the S.P.M. Mining lease is such that it is nestled amidst an elevated plot surrounded by a number of urban artefacts and anthropogenic paraphernalia. A cursory examination of the satellite imagery confirms that the lease is far away from the Reserve Forests and there are a number of geographical and manmade barriers between the two.

The continuum between the Reserve Forests and the lease in question is broken in a number of places by geographical as well as man-made barriers and as such may not allow any lease-ward movement of the fauna associated with these habitats if any. Forest cover here is patchy and is fragmented owing to operational mines of M/S TANMAG, Dalmia & Ramkrishna Mines. The demographic character of the villages surrounding the SPM mining lease and the associated human activity is a detriment to the wildlife and may discourage any intrusion by wildlife into these areas. The traffic density on the NH- 47 adds further impediment to the prospects of any wildlife approaching the lease. In fact perusal of records on road kills available with the forest authorities of the region confirmed that there was no appreciable movement of fauna and wildlife in this direction. The noise levels associated with the operational status of the mining leases in the area shall be another detriment to the prospects of wildlife settling in this area.

Perusal of literature and pertinent media reports show that recently a Workshop on Animal-Human conflict was conducted at Lake Forest Hotel in Yercaud in Salem district on 8th September 2011. In course of deliberations the experts opined that the absence of predators such as Leopards and Panthers has triggered an exponential increase in the population of Indian Gaur found abundantly in Shevaroyan Hills, which in turn is the cause of frequent skirmishes between the animals and humans. This was highlighted by a diverse group of animal lovers, environmentalists, hoteliers and planters of Yercaud and officials from Department of Forest who also deliberated in detail on how to contain the growing population of bison ( Indian Gaur) and on how to prevent the human-animal conflict. Organised jointly by Eco Tourism Society of India (ESOI) in association with Ministry of Environment and

Forests, INDeco's Lake Forest Hotel, Yercaud and Planters Association of Yercaud and Shevroys Planters Association, the one-day consultation meet concluded with a call to hoteliers and planters to make the hill a safe place for both men and animals by practising sustainable tourism and plantation practices.

A delegate Mr. Mohan Rajesh, a senior planter, in his speech on flora and fauna native to the Shevroys, noted that the population of bison had witnessed an increase while the local Ibex population had been totally wiped out. "The reasons for increase in bison population are the construction of railway lines, Mettur Dam and the national highways (NH.7) between Salem and Bangalore. The infrastructure development had restricted the movement of Predatory cats," he pointed out. He said bison raided saplings, coffee, oranges and silver oaks causing heavy losses to planters. To prevent such acts he suggested measures which planters could undertake fencing of plantations and establishment of animal sanctuary should be encouraged. Birth control measures to contain bison population and introduction of predators such as panthers, use of repellent sprays or ultrasonic noise and introduction of native species such as Ibex especially in Sengalathupadi can provide solutions to the issue. Interestingly suggestion of introduction of predators is far from being scientific and pragmatic and can actually prove to be counterproductive. In fact the ways and means of discouraging crop raiding by the Gaurs, should be the focus of this management intervention suggested the delegates.

Mr. Vijayan Rajes, another leading planter, pointed out that the main reason for bison to venture into coffee plantations was due to decrease in fodder in reserve forests. M.G.Rao, Chief Conservator of Forests, in his speech on 'Policies and Programs and Way Forward,' stressed on two issues with regard to bison population and its related problems - encroachment of humans into the habitat of animals and conservation of wildlife. The Forest Department had undertaken several measures to reduce conflict by creating water holes in Reserve Forests, removing exotics and planting edible fodder. Stakeholders involved in tourism industry had to take up responsibility to restrict number of tourists in an effort to make tourism sustainable. Planters, hoteliers and forest department were to preserve the biodiversity. They also insisted that the enumeration of Gaur population be undertaken to assess the carrying capacity and in case of population being above the sustainable limit, measures such as fencing, creation of fodder and water holes in reserve forests and translocation of animals could be undertaken. The migration/movement of Bisons (Gaurs) be mapped and buffer zones should be created between the villages and forests to reduce conflict.

The foregoing excerpts clearly indicate the contemporary status of wildlife and in particular the big cats in the wilderness and Reserve Forests is far from being encouraging. The trend seems to be towards increasing prey base as exemplified by rise in population of Gaur due absence of predatory pressure and in turn forcing the herbivores out of the RFs due to fodder

crises resulting in crop raiding episodes and human-wildlife conflicts. However, these reported HWC happen in the Yercaud range which is far away from the Sri Ponguru Magnesite Mines. Further, there is no possibility of the herbivore herds shifting towards the lease in question for more than one reasons. Firstly as has been emphatically pointed out all throughout with evidences of satellite images, the barriers are too many for the ungulates or other species to cross and reach the lease. Secondly the lease does not fill the requirements of feeding grounds for herbivores as it does not support any fodder species except perhaps ephemeral grasses at certain times of the year. There is however the menace of invasive species such as *Lantana sp.* and *Chromolena sp.* on the lease and its buffer. Also, the agro-plantations in the immediate vicinity of the lease have not reported any episodes of crop raiding by wild herbivores.

It is reasoned that the recommendation by the Environmental Appraisal Committee of the MoE&F, GoI for a Wildlife Conservation Plan as a compliance for the conditional EC would have been based on the presumption / apprehension as under:

1. The Salem district where the S. P. Mining lease is located owes its etymology to being nestled among the hills. Perusal of e-literature and other secondary databases convey the impression that the area is richly forested and hence should also be a habitat for rich spectrum of wildlife. There are a few Reserve Forests in the proximity of the lease Buffer zone and as such it is believed that these RFs are habitat for Wildlife. It may also have been presumed for some reason or the other that the Lease buffer supports wildlife and that the mining operations could hamper the habitat prospects of resident / in transit wildlife therein.
2. The operational status of the lease has been believed to have a far reaching impact on the Reserve Forests well beyond the buffer of 10 km radius and the Wildlife endowment thereof. Specific apprehensions could have been fancied as far as the movements of wildlife are concerned and the consequent need to address impending human-wildlife conflict situations.
3. There have been a few media reports on the bush fires in the month of March 2009 caused by the ignition of dry leaf litter in one of the RF attributed to carelessly discarded lit cigarette. However, the RF in question was well beyond the zone of influence of the present mining lease and its activities.

The PP having engaged the expertise of NABET-QCI accredited FAE (E&B) have carried out Wildlife Survey and risk assessment *vis a vis* the threat of forest fires consequent of the mining lease for which the EC has been granted. In fact the mining lease precincts and the buffer zone of approximately 30 km radius have been intensively surveyed for assessing wildlife diversity. The Reserve Forests as far as the Nagarmalai hills and RF situated between Tanmag and Dalmiya mines, Kurumbapatti RF in a village with the same name and Kapputhu RF between south of Dalmiya Mines and north east of Sri Ponguru Magnesite Mine site have

been scanned for the purpose of conceptualising a Wildlife Conservation Plan. Based on perusal and review of secondary databases, stakeholder's inputs and groundtruthing; the PP wishes to make the following submissions.

1. The entire area on which the lease is situated is at a higher elevation as compared to the general topography of the surroundings. The northern, western and eastern lease boundaries descend with a sharp non- negotiable slope. The north wards boundary descends into villages and agro-plots facing the Dalmiya mines where the human presence is high and continuous, negating prospects of any wildlife presence and movement, except for birds. However the biological surveillance by this expert revealed very poor bird diversity barring the presence of a few nocturnal species like the owls. Major frugivorous birds were lacking from the core altogether, probably due to absence of fruit bearing trees on the lease.
2. There is no forest corridor connecting the Sri Ponguru Mining lease with any of the Reserve Forests that have been mentioned in the ToR, or for that matter any other RF except the Kusa-Malay /Peru-Malay hills that stand in the eastern side of the lease. These twin hills have a small shrine on the summit that hosts an annual celebration.
3. There are a number of natural topographical and man-made barriers separating the lease in question from the surrounding RFs thereby denying wildlife any continuum for movement between the two.
4. The area already has been under considerable pressure of mineral extraction of higher magnitude and environmental consequences by other operational mining leases, some of which like the TANMAG are state undertakings and operate right in the middle of the RF; as compared to the relatively benign proposed operational scale of the PP.

The lease is worked upon as seen from excavated portions, some of which are filled with rain water. Tree density and diversity here is very poor except for ephemeral flora, consequently no major vertebrate taxa are seen. There are evidences of feral cattle and goats entering the lease due to porous boundaries. The benches of the excavated portions provide nesting habitat for birds such as the Green Bee-eaters, Owls and Wagtails. The water filled low lying areas within the lease supports a moderate Odonate fauna such as Scarlet Marsh Hawk (*Aethriamanta brevipennis*), Ditch Jewel (*Brachythemis contaminata*), Ground Skimmer (*Diplocodes trivialis*), Crimson-tailed Marsh Hawk (*Orthetrum pruinosum*) and Golden Dartlet (*Ischnura aurora*) though a very poor Ichthyofaunal diversity.

As the butterfly diversity of the lease and its precincts goes the species recorded here by the FAE (E&B) were butterflies such as Great Orange Tip (*Hebomoia glaucippe*), Common Mormon (*Priniceps polytes*), Common Jezebel (*Delias eucharis*), Common Mime (*Chilasa clytia*), Common Rose (*Pachliopta aristolochiae*), Chocolate Pansy (*Precis iphita*), Common

Emigrant (*atopsilia Pomona*), Plain Tiger, Tawny Coster, Common Crow, and Blue Pansy (*Precis orithya*), Lemon Pansy (*Precis lemonias*) and the Lime Butterfly (*Papilio demoleus*).

On enquiry with the lease officials and representatives of the PP, presence of Black-naped Hare (*Lepus negricolis*), Mongoose (*Herpestes edwardsi*) and Snakes such as Striped Keelback (*Amphiesma stolatum*), Indian Rat Snake (*Ptyas mucosus*) and Spectacled Cobra (*Naja naja*) were reported; though there were no sightings at all. Thus at the time of this visit there were no evidences of presence on the lease of any large mammals. Also, there were no bases for confirming any intrusions by wildlife here on the lease in the recent past from the surrounding forested areas. However it is noteworthy that there are evidences of presence of the Bonnet Monkeys (*Macaca radiata*) in the villages within the buffer of the lease.

The lease being sparsely occupied by large trees of a few species like *Delonix regia*, *Syzigium sp.*, *Mangifera indica*, *Ailanthus excelsa*, *Azadirachta indica*, *Hortensia millingtonia* *Bamboosa sp.* Interestingly, there is a high density of *Moringa citrifolia* all over the western portion of the lease. The invasive species such as the *Lantana camara* and *Chromolaena odorata* abound here. Similarly *Calotropis gigantea* is a commonly occurring milk-weed that attracts a lot of butterflies specially the Danaids. The lessee has shown interest in developing an open access Butterfly Garden under the Green Belt Development to enrich lepidopteran species diversity in the core as well as buffer. An inventory of butterflies recorded during this surveillance is annexed elsewhere along with prescribed list of food and host plants recommended for plantation.

5. The EAC, MoE&F, GoI has expressed a specific concern regarding Forest Fires and recommended that measures be taken for averting Forest Fires, though the spatial contexts of this apprehension have not been defined, that is to say whether there have to be fire prevention management on the lease core or the buffer. However it seems prudent and logical that the Lessee ought to take adequate measures to avoid fire hazard on the lease precincts due to accumulation of dry leaf litter in certain seasons. Lateral linkages by the lessee with the state sponsored fire prevention and control programmes will facilitate synergy of efforts and expenditure.
6. A key component of Wildlife Conservation and Management is known to be 'Stakeholder's sensitisation' and education. The lessee has been supporting local festivals and socio-cultural events such as *Dhakkaliamman* Festival in Sattur Village, Kusa malai Function at mount Kusa malai and Redippatti Festival - Redippatti Village and has a rapport with the local community. There shall be a more focussed effort and a discrete budgetary head for infusing conservation messages/ agenda among the villagers by educating people in the buffer villages and the entire workforce of the lessee.

7. The wildlife component shall be integrated with the EMP submitted along with EIA. It is envisioned to have annual taxon specific annual winter surveys for larger vertebrates such as birds and mammals. Wildlife intrusions if any on the lease or the surrounding villages in the buffer shall be monitored with the help of locals and forest department and logbooks maintained. The lessee shall support all such ongoing state sponsored wildlife conservation and conflict mitigation programmes and contribute towards generating popular literature on wildlife in Tamil language, besides funding eco-clubs in some of the villages of the buffer zone.



**PHOTOMONTAGE OF THE SRI PONGURU MAGNESITE MINING LEASE CORE & BUFFER.**

Photographs by DR MANOJ R BORKAR©

PHOTPLATE- 4



**1. The Core of SPMM Lease**

**2. A Magnesite Ore Consolidate**

**3. Water Impoundment within the lease.**

**4. View of the lease and Kusa Malai**

**5. Burn-Standard lease in distance**

**6. Agro-plantations outside the lease.**

**PHOTOMONTAGE OF THE SRI PONGURU MAGNESITE MINING LEASE CORE & BUFFER.**

Photographs by DR MANOJ R BORKAR©

**PHOTPLATE- 5**



7



8



9



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12

**7. Kurumbapatty Zoological Park**

**8. Kurumbapatty Reserve Forest**

**9. TANMAG Checkpost**

**10. TANAG Mining lease within the RF**

**11. Dalmiya Mines**

**12. "Muniyappan" Deity of Komampatty Village**

## **5. GEOLOGY, CONCEPTUAL MINING PLAN & PROJECT DETAILS.**

### **General Geology**

Ultramafic bodies like Dunite and Peridotite are known to occur along major deep seated or lineaments in Tamil Nadu. The ultramafic intrusive of the “Chalk Hills” occur in foliated biotite gneiss and migmatites, Magnesite quartzite, garnetiferous pyroxene, granulite, hornblende granites, quartzite veins and pegmatite basic dykes constructing younger intrusive occur in *Nagaramalai* area.

The ultramafic intrusive occur as two bodies separated by gneisses & granulites and both are disposed as two bodies in an echelon fashion in an ENE-WSW direction parallel to the general foliation trend of the adjoining gneisses. The larger one occupying an area about 14.4 sq m forms the northern belt and the southern belt occupies an area of about 2.8 sq km.

### **Local Mine Geology**

Sri Ponguru Magnesite Mines which is located in Southern belt is essentially made up of Dunite, Peridotite, Serpentinite, Hornblndtite, and Magnesite. The Dunite and Peridotite are the dominant rock types in both the belts and are often weathered. The serpentinite occur replacing dunite. At places the serpentinite with asbestos is replaced by magnesite. The geological setting of the area is summarized as follows:

- Basic dykes
- Lamprophyre
- Olivine gabbro
- Peridotite
- Pyroxenite
- Dunite
- Pyroxenite
- Charnockite
- Quatrzo-feilspathic gneiss
- Pyroxene-amphibole gneiss –garnet gneiss
- Hornblende gneiss

- Hornblende-biotite gneiss (foliated)

Magnesite of cryptocrystalline variety associated with secondary silica occurs as veins traversing in Dunite-peridotite and it is characteristically absent in pyroxenite. The veins are considered as thicker and the quality of Magnesite is better in peridotite than in Dunite.

The magnesite veins vary in length from a fraction of a metre to hundreds in all directions. The thickness varies from a fraction of a centimeter to as much as 1.5 m. In many places they occur as thin ramifying and reticulate veins.

The lease area is located in the eastern and southern belt of "Chalk Hills" the Magnesite deposits found in this area has the dunite as associated rock in major portion and in the ridges peridotite also bears Magnesite veins. The weathering to the associated rock has been found deep-seated. On the eastern side, pyroxene side of the Dunite bearing belt hornblende-gneiss and in the eastern side pyroxene amphibole garnet gneisses are found as country rocks.

The general strike is north-east to south-west and the dip is in North west-south east directions.

Geological Plan and Sections & Conceptual Plan and Sections have been annexed beneath.

Fig.10. GEOLOGICAL PLAN OF THE MINING LEASE OF SRI PONGURU MAGNESITE MINES





Fig. 11. GEOLOGICAL SECTION DRAWING

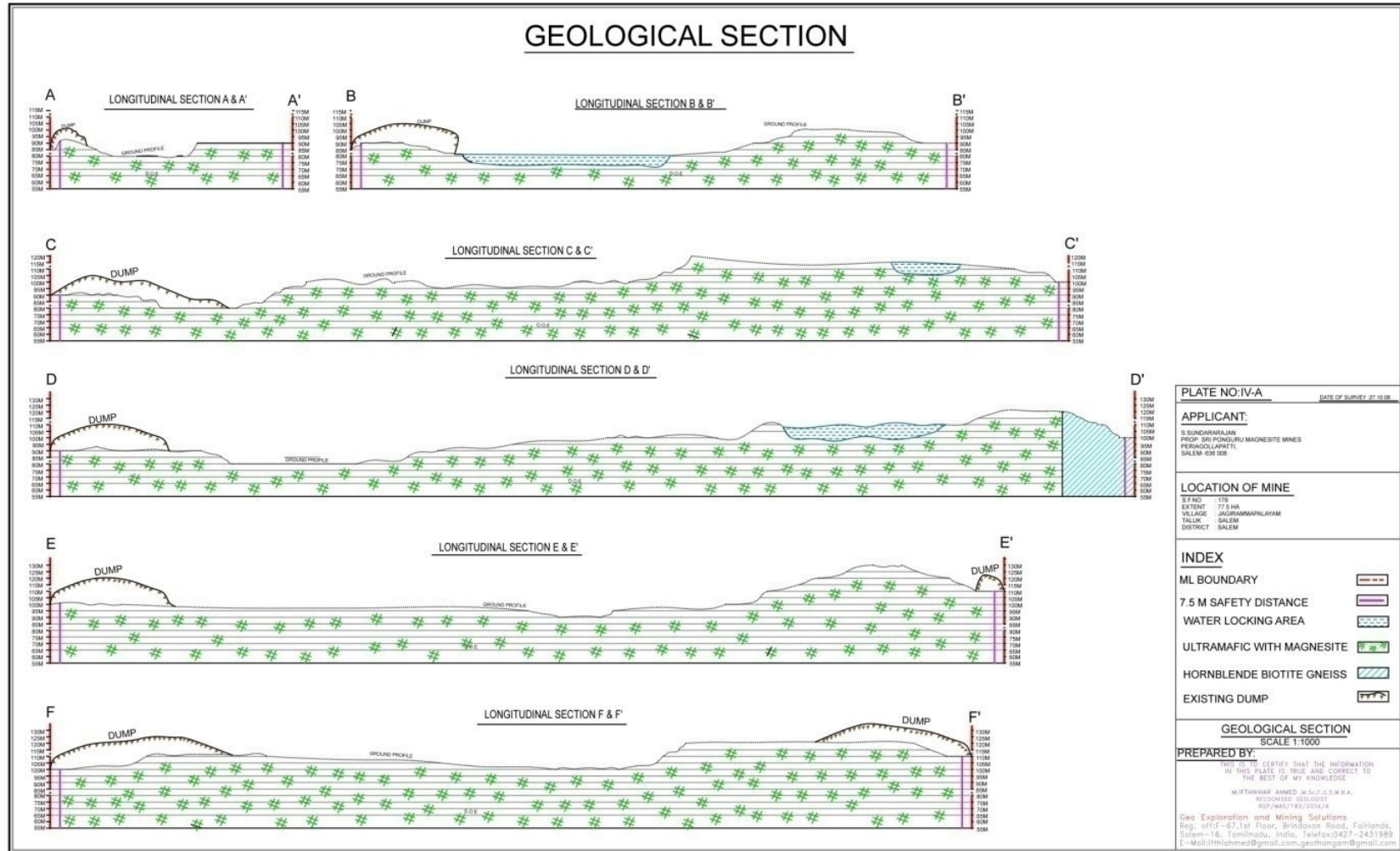
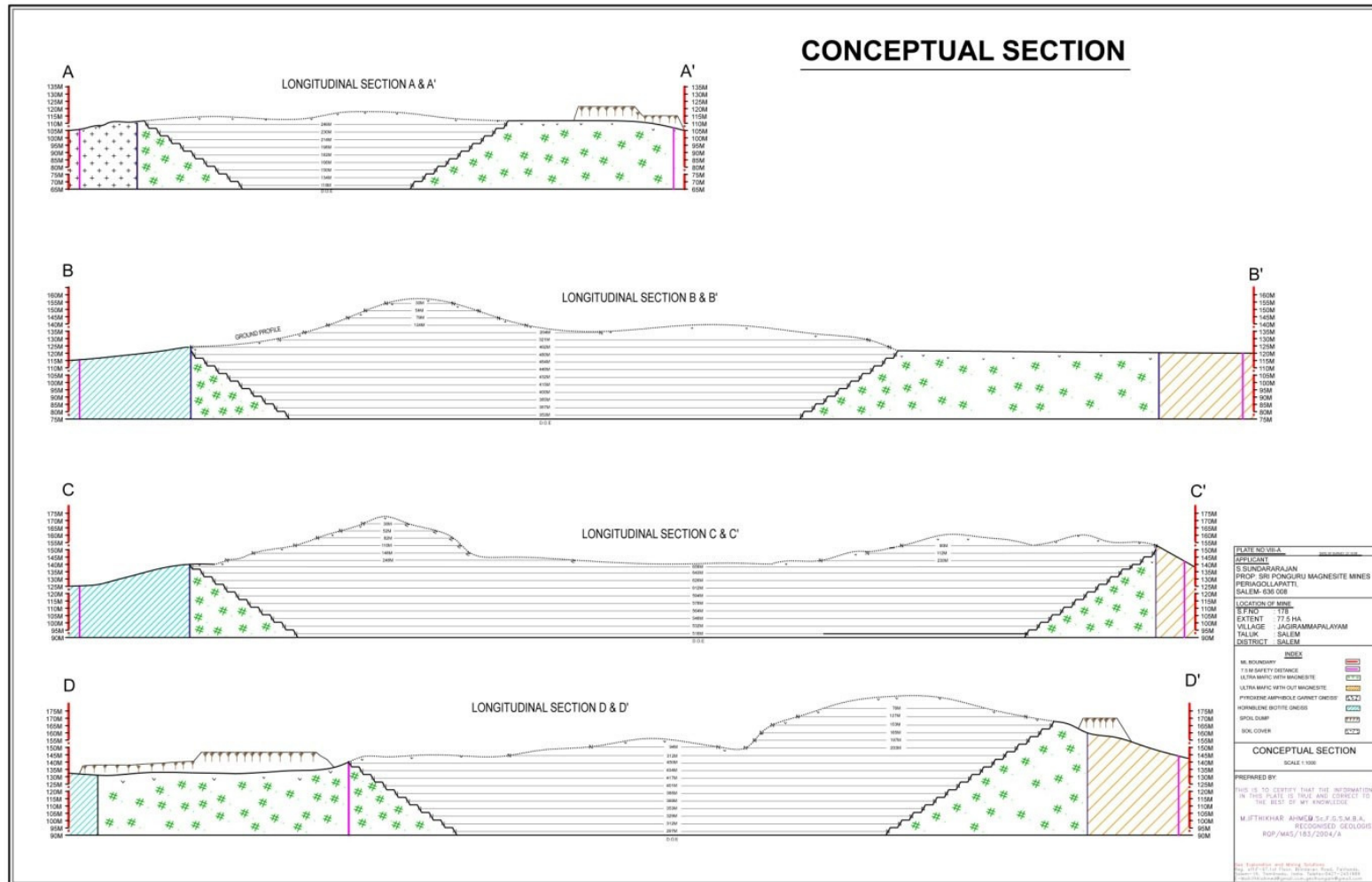




Fig. 13. CONCEPTUAL SECTION DRAWING.





## REQUIREMENTS FOR THE PROJECT

Land required for the proposed project is 77.50 ha which Government Barren land. Total water requirement for the mine with the proposed production will be 15 KLD which would be used for mine Operation, green belt development and domestic purpose. It will be sourced from mine sump water and bore well. The following Table 1 quantifies the water requirement.

**Table1. TOTAL WATER REQUIREMENT**

S. No.	Purpose	Peak Demand
1.	Drilling and Dust Suppression	9 KLD
2.	Plantation/Green Belt	5 KLD
3.	Drinking /Domestic	1 KLD
<b>Total</b>		<b>15 KLD</b>

Total manpower required for the project is 120. Locals would be preferred for the same.

**Table 2. TOTAL MAN POWER REQUIREMENT**

S. No.	Employee	No. of Employees
1.	Highly Skilled	5
2.	Skilled	15
3.	Semi skilled	25
4.	Unskilled	75
<b>Total</b>		<b>120</b>

### Extent of Mechanization

Details of machinery/equipments used in the mine are as given below:

**Table 3. LIST OF MACHINERY**

S. No	Machinery Name	Quantity	Details
1.	Hydraulic Excavators	1	TATA Hitachi, 120 HP, 0.9 m <sup>3</sup>
2.	Wagon drill	1	Atlas Copco , 110 mm dia, 120 HP
3.	Jack hammer drill	4	Atlas Copco, 32 mm,
4.	Compressor (Tractor mounted)	2	Atlas Copco , 145 HP diesel, 140 cfm 100psi
5.	Leyland Tippers	2	Ashok Leyland, 80 HP, 9 tonnes

*Source: Scheme of mining & Progressive mine closure plan*

## EXPLORATION

The magnesite bearing area of the “Chalk Hills” has already been thoroughly explored by agencies like Geological Survey of India, State Geology Department and other local agencies like Burn Standard Co. Ltd., Tamil Nadu Magnesite Ltd. and Dalmia Magnesite Corporation” and the depth persistence, availability, quality etc. of magnesite have been clearly established. Hence further programme of exploration is considered to be redundant.

## RESERVES & GRADES

Estimation of reserves is shown in the table 4.

**Table 4. Estimated Geological Reserves classified under UNFC code are as follows:**

S. No.	Reserves	Proved (Tonnes)	Probable (Tonnes)	Grade
1.	Geological (In situ)	6,44,23,008	Nil	Refractory grade: LOI :46.6% SiO <sub>2</sub> : 4.52% Fe <sub>2</sub> O <sub>3</sub> : 1.25% Al <sub>2</sub> O <sub>3</sub> : 0.82% CaO:2.31% MgO: 44.50%
2.	Mineable (In situ)	3,22,41,628	Nil	
3.	Mineable (In situ) with recovery of 3.5%	11,28,457	nil	

*Source: Scheme of mining & progressive mine closure plan*

**Mineable Reserves and Anticipated Life of Mine** The total geological reserves of Magnesite is 6,44,23,008 tones. The proved & probable category reserves are jointly considered as Mineable reserve which is in the order of 11,28,457 tones. The expected life of the mine with the proposed production of 38,000 TPA works out to be 30 years.

## METHOD OF MINING

As is outlined in the Project Proposal, mining operation shall be carried out by engaging both Jack Hammer and Wagon Drills with intermittent heavy blasting as and when required. Besides this, regular blasting will be carried out with jackhammer drilling. Loading and transport of mineral and waste is done by hydraulic excavator and tippers. The collection, segregation, dressing and stacking of ore are done partially by manual means and partially by machinery depending upon the situation. Whenever, there is heavy accumulation of waste, a contractor shall be engaged to clear the waste with mechanical loading. Since the Magnesite outcrops right on the surface, there is no overburden or topsoil as such. Benches have been formed to a height 5.0 m and width more than that with 60° slope.

Proper footpaths and haul roads have been provided wherever necessary for easy access of manpower to the mineral. Haul roads for movement of compressors and tippers with crossing platforms are provided conforming to statutory standards. There are mainly three working

areas, which are Pit- A, Pit-B and Pit-C. During the proposed plan period, working will be mainly at Pit -C as Pit- A is not encouraging. Blasting is done in two steps to keep the bench at 5.0 m level. In each step, the hole depth is maintained at 3.0 m with sufficient allowance for “Toe” and intimation. Depth of the small diameter hole beyond 3.0 m depth leads to caving and the drill roads getting “stuck up” as the strata is fractured in nature.

**Table 5. DETAILS OF BLASTING PARAMETERS**

S. No.	Blasting Parameters	Details
1.	Burden	1.0 m
2.	Spacing between holes	1.5 m
3.	Charge per Hole	7 cartridges of 140 g each or 0.98 kgs.
4.	Powder factor	9.0 tonne /kg of explosives
5.	Diameter of hole	32 mm
6.	Depth	3.0 m

*Source: Scheme of mining & progressive mine closure plan*

**MINING SCHEDULE DURING NEXT 5 YEARS**

In the first three years, the mine will be developed in the north-eastern boundary of the lease area. In the fourth and fifth year, mine will be developed in the South Western portion of leasehold area. The waste for next five years will be dumped on existing dump yard which is located in northern boundary. During the first three years- Pit C will be worked from 130 m RL to 100m RL covering about 170m X 120 m area. Bench height will be maintained at about 5 m and width will be more than that. Waste will be disposed off on the existing waste dump on northern side. During the next two years, Pit-B will be worked from 100 mRL to 85 mRL covering about 160m X 80m area. Bench height will be maintained at about 5 m and width more than that. Waste will be disposed off on the existing waste dump on northern side.

**PROPOSED PRODUCTION DURING THE SCHEME PERIOD** The quantum of development (soil and waste rock removal), tonnage and grade of production proposed during next five years of scheme of mining (i.e. from year 2009 – 2014) is given below in Table 6.

**Table 6. PROPOSED PRODUCTION**

<b>Production &amp; development of Magnesite (Quantity in Tones)</b>				
<b>Year</b>	<b>ROM Quantity</b>	<b>Refractory grade of magnesite 3.5% of ROM</b>	<b>Mineral waste 96.5 %</b>	<b>Ore waste ratio</b>
2009-2010	1085000	37,975	10,47,025	1:27.5
2010-2011	1085000	37,975	10,47,025	1:27.5
2011-2012	1085000	37,975	10,47,025	1:27.5
2012-2013	1085000	37,975	10,47,025	1:27.5
2013-2014	1085000	37,975	10,47,025	1:27.5
<b>Total</b>	<b>5425000</b>	<b>1,89,875</b>	<b>52,35,125</b>	1:27.5

*Source: Scheme of mining & progressive mine closure plan*

#### **HANDLING OF WASTE MATERIAL**

In the next five years, there will be no generation of topsoil or side burden. On an average, 96.5% of ROM will be generated as waste i.e. Mineral waste. Presently the waste is dumped over the existing dump yards. The waste for next five years will be dumped on existing dump yard which is located in northern boundary. Nearly **52,35,125** tonnes of waste will be generated in the next five years and **3,11,13,171** tonnes during the life of mine. Width of the dump vary from 20 m to 80 m with maximum height of 20 m at places. Dumps will be maintained at 45° angle to avoid sliding. Plantation will be done on the slopes to attain slope stabilisation and prevention of soil erosion.

#### **CONCEPTUAL MINING PLAN**

Conceptual Mining plan is necessary to know the ultimate limit of the pit crust at the end of lease period. It is also necessary to select the sites for waste dump, site service, plantation etc in such a place that these sites should not get any disturbance during the life of the mine.

#### **POST MINING RECLAMATION**

The entire mined out area shall be used as water reservoirs for storing storm water run-off which could be used for agricultural and domestic purposes. The possibility of developing Pisciculture shall also be explored. Parapet wall will be constructed around the pit to prevent inadvertent entry of cattle and human beings. The top soil shall be utilized at various places to cover ground and dumps etc. and converted into a green belt/area to reduce impact of air borne soil dust and noise and improve the aesthetic beauty.

**Table No.7 LAND - STAGE WISE LAND USE AND RECLAMATION AREA (ha.)**

S. No.	Land use category	Present	At the end of 5 <sup>th</sup> Year	At the end of life of mine
1.	Top Soil Dump area	-	-	-
2.	Waste Dump (External)	14.30	16.56	16.56*
3.	Excavation	34.0	37.85	37.85
4.	Road	6.50	6.50	6.50
5.	Build up area	1.0	1.0	1.0
6.	Afforestation (Green Belt)	4.0	4.0	4.0
7.	Mineral processing yard	1.0	1.0	1.0
8.	Undisturbed area	16.70	10.59	10.59
	<b>Total</b>	<b>77.50</b>	<b>77.50</b>	<b>77.50</b>

*Source: Scheme of mining & progressive mine closure plan*

\* Waste dump area of 16.56 ha will be covered by plantation after maturity.

Sr. No.	Common Name	Local Name	Scientific Name	Numbers Surviving.
1	Bamboo	Kal Mungil	<i>Dendrocalamus strictus</i>	2000
2	Cassowary Tree	Chavukku	<i>Casuarina equisetifolia</i>	2000
3	Teak	Tekkumaram	<i>Tectona grandis</i>	250
4	Margosa Tree	Vepu Maram	<i>Azadirachta indica</i>	1500
5	Indian mulberry	Nunaakai	<i>Morinda citrifolia</i>	2000
6	Coconut Tree	Thenai	<i>Cocos nucifera</i>	250
7	Baniyan Tree	Al	<i>Ficus benghalensis</i>	10
8	Eucalyptus Tree	Nilgiri	<i>Eucalyptus globulus</i>	100
9	Palmyra Palm	Nungu	<i>Borassus flabellifer</i>	10
10	Date Palm	Karchuram	<i>Phoenix dactylifera</i>	10
			<b>Total</b>	<b>8130</b>

**Data as of December, 2011.**

## **SITE SERVICES**

Following site services are proposed for use for smooth operation: –

### **Statutory Obligation**

#### **(A) First Aid Station / Room**

First-Aid room has been provided in the mine office building with equipment specified in Second Schedule of Mines Rules, 1955. A qualified and experienced person will be the in-charge of the First-Aid room. In addition to this, first aid boxes containing the necessary equipments and medicines as specified in Third Schedule of Mines Rules, 1955 will also be provided at different points e.g. Mines Office etc.

#### **(B) Rest Shelter**

Rest shelter has been provided near the mine office, which will be used by employees for food and during interval.

#### **(C) Lavatories**

Lavatories has been provided to facilitate persons working at different locations i.e. mines office, workshop etc.

#### **(D) Adequate Lighting Arrangement**

Adequate lighting arrangement has been made at the quarry, faces and haulage roads as per the statutory requirements. The lighting towers will be erected at appropriate places inside mine.

#### **(E) Drinking Water**

Water is drawn from the bore well. Drinking water will be analyzed periodically by third party and at government laboratories to test for its potability. Earthen pots/pitchers will also be provided at all the working places and mine office.

### **Administration**

The administration building is situated near the mines office. A Diesel storage tank is provided to dispense diesel in dumpers, jeep, explosive van etc. For mining machinery, a mobile diesel van is provided.

### **Welfare Amenities and Recreational Services**

#### **a) Educational Facilities**

Company provides support for better educational facilities to the near by villagers.

#### **b) Communication**

The project site is well connected by communication facilities like telephone lines.

c) **Site Office**

A site office is there for supervisory staff as well as for keeping the records.

d) **Store**

A storeroom is there for keeping the tools etc.

## **6. IMPACT ANALYSIS OF MAGNESITE MINING WITH SPECIAL REFERENCE TO WILDLIFE OF THE LEASE CORE.**

### **Environmental Impact of the Process**

The Chalk Hills region of Salem in the South Indian state of Tamil Nadu where this lease is located has been the producer of Magnesite of both calcination and refractory grades, for more than a century. Due to the vein type nature of the mineralisation, mining of this white carbonate of magnesium involves employment of men and deployment of heavy earth moving machines. The mining activity comprising of drilling, blasting (both primary and secondary), loading of waste, transport of over burden and crushing of ore is having considerable impacts on the environment.

### **DUST POLLUTION**

Dust generation, elevated noise levels and ground vibrations are some of the major Environmental Impacts. Salem in Tamil Nadu, South India, is the hub of basic refractory industry in the country. Magnesite, the chief raw material for basic refractories as well as combination of both calcined Magnesia, is being mined from three large and several small mines located in Salem. The ultramafic complex of Salem spreads over an area of 30 km<sup>2</sup> and is known as the Chalk Hills region. It is the repository of both, refractory and non-refractory grades of Magnesite. The dust settles on the flora impacting the vital photosynthetic efficiency and eventually reducing the primary productivity. The dust can also contribute to turbidity of water bodies in the region interfering with the transparency and thereby the aquatic production.

The deposits occupy numerous N-S trending small and moderately high hillocks (ranging in height from 5m to 70 m from the mean ground surface). In addition to Magnesite, Dunite ore of the host rocks of mineralisation is also being mined.

Crow-bars and sledge hammers are a common site in these mines, where Heavy Earth Moving Machines (HMM) like wagon drills, dozers, dumpers and hydraulic excavators are deployed. The absence of distinct overburden and mineral beds coupled with hard formations necessitates the employment of men and deployment of machines, simultaneously.

Modern opencast mining involves a high degree of mechanisation of the operations. Deep hole drilling, blasting of formations and sizing by crushing of the mineral are essential

activities in most large open cast mines. Heavy Earth Moving Machines (HEMM) are the essential features of all large open mines. Operation of HEMM, crushers and blasting causes environmental degradation from dust, noise and ground vibration. Mining environment is often encountered with major environmental pollution from dust. Drilling, blasting, haulage of HEMM, loading of ore/overburden by shovels, crushing and screening of ore and noxious fumes generated by explosives during blasting etc. lead to excessive production and accumulation of dust in the atmosphere. Excessive dust in the working environment can smother leaves of trees hampering their productivity and also add sediment load to water bodies in the zone of influence, thus impacting aquatic productivity.

Inhalation of this dust in excess can lead to Pneumoconiosis, a general occupational lung disease, which depends on the quantity, quality and size distribution of air-borne dust, period of exposure and the susceptibility of the individual subjected to exposure.

Dust can impede with the functioning of machines too. Engine life of machines, working in excessively dusty conditions, tends to be reduced. Efficiency of machines is also affected. Sensitive electronic parts of electronic equipment, especially the optical, sonic and heat sensors attached to automatic Fire Detection and Extinguishing Systems wherever installed become less sensitive or malfunctional.

Notably there are agro-plots in the vicinity of the lease though at lower levels of topography. Some of the crops grown in the buffer zone are Tapioca (*Manihot esculenta*), Ground Nut (*Arachis hypogaea*), Paddy (*Oryza sativa*), Sugar cane (*Saccharum sp.*), Turmeric (*Curcuma longa*), Maize (*Zea mays*), Coconut (*Cocos nucifera*), Betel Nut (*Areca catechu*) and Sesame (*Sesamum indicum*). Agricultural crops cultivated near mining sites also are affected by dust deposited on the leaves. Crops like cotton and chilly are found to be affected by dust as the process of photosynthesis is interfered by partially obstructing the sunrays required for the process. This leads to a fall in the crop yield of about 20%. Spoil dumps, devoid of vegetation allows blowing hot winds to lift dust from the exposed surface of land.

## **NOISE POLLUTION**

Noise emitted by machines in a mine during drilling, blasting, crushing and loading ranges from 64 dBA to 115dBA. Increased noise levels can be a severe impediment to resident birds and their nesting behaviour. However over a prolonged period of time the fauna adapts to higher levels of ambient noise due to physiological resilience. Vibration is a reciprocating motion, which reverses itself twice every cycle.

Vibration due to mining operations can be from three sources viz. Tools and equipment in a mechanised mine, blasting of rock formations and movement of HEMM. Generally the vertical component of vibration is more severe. Below the



Frequency of 2 Hz. the human body responds as a single mass. Between 4 Hz. and 8 Hz. considerable amplification of vibration is achieved and results in increased discomfort to the operators of hand held drills, dozer, shovel, tractor and dumper. Vehicle driven vibration can be detrimental to spinal health and cause digestive disorders to operators of the above equipment. While noise is a potential impact on avifauna of the region, vibrations can take a toll on the burrowing fossorial fauna such as snakes, rodents and mongoose.

Driver's steering ability, foot pressure, reaction time, and vision are affected by continuous exposure to vibration. High frequency (above 20 Hz.) can cause head resonance. Frequency between 60 Hz. and 90 Hz. causes eyeball resonance. Intense, high frequency vibration of the hands (4 Hz. to 250 Hz.) may lead to nervous and circulatory damage known as 'Reynauld's Disease'.

One of the undesirable effects of rock blasting is ground vibration, which may result in structural damage. Ground vibrations are due to transmission of energy from explosive charge in waveform. These waves, called seismic or elastic waves depend on the elasticity of rocks. Some of the opencast workings are located near surface structures like residential buildings, schools, commercial buildings, hutments with large population etc. During rock blasting in a mine only about 20 % to 30 % of the energy released is utilized for rock fragmentation. The remaining energy is transmitted

#### **DEFORESTATION AND LOSS OF SURFACE SOIL**

Though this is not a new Mining lease and the existing plot has already been worked upon since quite some time, cleaning the surface of vegetation precedes any opencast mining operation. Felling of trees leads to changes in the land run-off patterns, soil erosion and weather pattern; besides threatening the life of fauna living in it. It can lead to local increase in the diurnal temperatures, in addition to losing aesthetic beauty. The humus rich surface soil is to be scraped off before planning a box-cut and drilling blast holes. The invaluable topsoil is sometimes transported to the spoil dumps and is lost forever due to burial under the instantaneously infertile strata in the mine.

The total area of surface disturbance resulting from Project operation within the lease and process area would be 77.50 ha. This would include approximately similar extent of habitat of flora and some lesser fauna. The loss of wildlife habitat would directly or indirectly displace resident birds within or near the Project mine and process area. The Project would also result in an incremental loss of foraging habitat for wildlife and/or migratory species such as bats and raptors. The effects of the loss of habitat from the Project on wildlife would continue over the life of the Project, and some of the effects would continue for an extended period following final reclamation. Wildlife would eventually return to the Project mine and process area as vegetation reestablishes and disturbed surfaces are reclaimed or

recover. However, the projected period before conditions return to an approximate pre- Project

status with respect to wildlife carrying capacity may exceed several decades after the lease period of 30 years, following completion of the active life of the Project. To compensate for this reduction in carrying capacity, the Wildlife Conservation Plan contains many measures to reduce the impacts on habitat and associated wildlife which uses/used this habitat; reduce the long-term impacts of the Proposed Action; provide off-site compensation for these habitat losses; and enhance reclamation. These are each discussed below, as is the level of significance for each.

As discussed elsewhere, the lease was a part of the larger landscape of the mountainous terrain which subsequently got fragmented and shrunk due to expanding urban settlements and industrial artifacts. The biodiversity and wildlife of the area thus was denied a continuum of habitat for settlement and movement. The hilly terrain of Salem is known to be a particularly important habitat for ungulates like Gaur (*Bos gaurus*) a Schedule- I species as per WPA, 1972, Bonnet monkey (*Macaca radiata*) and other wildlife species such as Wild boar (*Sus scrofa*) etc.

Some modern protocols of wildlife management and conservation prescribe replacement of habitat "on-site" and "in kind" when habitat is impacted as a result of proposed projects. This means that sensitive habitat lost within a proposed project area as a result of proposed project process would be required to be replaced by the project applicant with the same type and quality of habitat somewhere within the project area when possible, or outside of the project area when on-site replacement is not possible. The PP has initiated praiseworthy efforts to generate an effective Green belt, the qualitative and quantitative details of which are annexed elsewhere.

Wildlife and ecosystem processes are also expected to benefit from off-site compensation of habitat for certain species of mammals, birds, and reptiles near compensation lands (Green belt) that is in close proximity to the Project mine and process area, of equal or better habitat quality, and of similar vegetation community, elevation, hydrology, wind patterns, and substrates, would provide the greatest benefit.

## **IMPACTS ON WILDLIFE AND WILDLIFE MOVEMENT**

It is important to prospect whether the wildlife species which inhabit, move through, or forage within the approximately 77.50 ha of surface area disturbed within the Project area as also the buffer within the zone of influence would be subject to increased mortality or displacement as a result of the Proposed Action.

It is expected that increased mortality would result from direct physical impacts or entombment during mining activities, or result in indirect mortality from stress or increased predation pressure resulting from displacement into off-site areas. This is true in case of smaller fossorial fauna such as ground dwelling reptiles, foraging birds, amphibians and a host of invertebrate taxa which are difficult to enumerate. Individual animals could also be subject to injury or mortality during on-site blasting and continued mining operations and allied survey activities, and increased mortality from project-related stresses, including night lighting, in the vicinity of the Project mine and process area. Noise-sensitive species would be

expected to avoid both the Project area and neighbouring areas within the zone of influence over the life of the Project, but would be expected to return when noise generating operations are discontinued. Similarly, species intolerant of surface disturbance and human activities would also be expected to avoid the Project area and neighbouring areas over the life of the Project.

**However, notwithstanding the apprehensions as above, because of the substantial amount of alternative habitat available, these impacts to wildlife and wildlife movement are not considered significant.**

Some wildlife species might come under increased pressure from opportunistic predators (i.e., Owls, Kites and Crows) attracted to the Project area by increased water availability, refuse, or noise. In addition, during the life of the Project the movements of some wildlife through the Project mine and process area would be restricted as a result of the perimeter fence, the constructed Project features (such as the pits, waste rock stockpiles, and heap), or the general level of human presence and activity. **Because of the substantial open space surrounding the Project mine and process area, these effects are not considered significant.**

Over the life of the Project, additional injuries and mortality to wildlife would be expected to result from direct impacts with motor vehicles commuting to the Project area and other equipment travelling to and from the Project mine and process area and the ancillary area. Experience in other remote areas suggests that measures to reduced speeds on public roads, such as posting reduced speed limits, to minimize inadvertent vehicle impacts with wildlife are impractical to enforce. Individual animals attracted to the Project area from available water sources in the area may also be injured or killed by vehicles on the roads inside the Project mine and process area and in the Project ancillary area. These species are expected to acclimate to the new roads, but there may be some permanent displacements and readjustments of home ranges, even though the road realignment and ancillary area access roads are temporary. **These impacts to wildlife and wildlife movement from roads and vehicles are not considered significant.**

Wildlife could be affected by the hazardous chemicals used by the Project. There would be a potential for impacts to wildlife due to the transport of hazardous chemicals such as the explosives for blasting, oil and paints used for repairs and maintenance of vehicles etc. to the Project area via public highways and access roads. The probability of hazardous chemical spillage occurring due to a transport accident is considered low, but the potential for occurrence cannot be entirely eliminated. **The preventative and corrective measures to be adopted by the PP during the operational phase of the mines would reduce both the potential risk of and effects to wildlife resulting from spills of hazardous chemicals being transported to the Project area to below the level of significance.**

Individual animals could also be subject to drowning in mine process, and water impoundments. **The Proposed Action includes measures to prevent wildlife from entering process ponds, and the residual effects would be below the level of significance.**

There are currently no transmission lines in the mining lease except at the entrance office, thereby greatly reducing the temporary and short-term impacts on wildlife and wildlife movement. The few tress and rocky projections as well as incavings around the pits could also increase the availability of potential perch/roost sites for birds in the area. The transmission lines would have surely increased the potential for collisions or electrocutions of raptors and other bird species. However, all of these impacts are much below the level of significance due to non-existence of transmission lines.

Currently at the mining lease site there are 3 active pits besides one pit is filled with water. The mining would result in the excavation of more pits in future which would remain as a slight long-term impediment to the movement to some wildlife species on the lease core. Individual terrestrial wildlife species could become injured or killed by falls within this open pit, although as part of the proposed action a rock rubble barricade could be constructed around the open pit to prevent vehicular access and limit pedestrian and wildlife access, and haul roads within the open pit would be regarded such that wildlife or humans would still be able to use them to exit the open pit should they pass beyond the barricade.

Ground water could accumulate in the bottom of the open pit and form a pit lake, although this is not likely, and measures are incorporated as part of the Proposed Action to reduce the possibility further. Although any water in a pit lake would not be injurious to wildlife, wildlife species coming to drink could be exposed to predators which may use the pit area as a place to wait for prey. The proposed mitigative action also includes measures to offset the net reduction of habitat as a consequence of the open pits. **The effects of the Proposed Action on general wildlife species and wildlife movement would be below the level of significance.**

Entomo-fauna such as the butterflies and other lepidopterans that have their host and food plants within the lease shall be disturbed. In fact a good number of butterflies have been recorded by the FAE (E&B) within the lease despite the short duration of the survey. The occurrence of these species here is because the project occurs within the geographic range of this species, and because its host/food plants are present here. Since these are present, the butterflies such as Great Orange Tip, Common Mormon, Common Jezebel, Common Mime, Common Rose, Chocolate Pansy, Common Emigrant, Plain Tiger, Tawny Coster, Common Crow, and Blue Pansy, lemon pansy Lime Butterfly and specially the Lycaenids (Little Blue Butterflies) would be subject to habitat loss associated with initial blading and grading activities. However the geographic range of this species is extensive and occurrence sites widely dispersed. The short flight season of adults and the indeterminate timing of adult

emergence may be one reason for relatively poorer species diversity on records. Therefore, information necessary to determine the effects of the Proposed Action on the various species of butterflies other than those recorded is unavailable. There is no substantial evidence that the Proposed Action would substantially affect the butterflies or their habitat; therefore, impacts would be below the level of significance. Mitigation measures such as increasing Green belt density with food plants have been incorporated into the Project design to further reduce the long-term impacts of the Project on potential butterfly habitat. **(See Table on Green belt species survival)**

Another prominently occurring reptilian species all throughout the lease is the South Indian rock Agama (*Pssamophilus dorsalis*) and the Garden Lizards (*Calotes versicolor*). These agamid lizards are known to display high site fidelity; the males assuming bright colours on their heads during the breeding seasons and displaying a head cocking behaviour to entice the female and mark their territory. These reptiles would not be expected to flee the area as a result of disturbance. As such, the Rock Agamas and the garden lizards present within the Project area could be killed or injured as a result of surface disturbance associated with mine construction and ore extraction and processing. **Any impacts to this Agamid lizards or its habitat would be below the level of significance.**

Small Green Bee Eaters (*Merops orientalis*) are common and widely distributed in the area. On the basis of direct and indirect evidences, it is suggested that there is a high likelihood that nesting occurs within the lease area. During the survey it was seen that a few birds use the Project area for foraging and/or nesting. Also, the pits filled with water are habitat for waders. During mining activities within the lease area, a little extent of potential bird habitat would be disturbed, displacing the avifauna to neighbouring unmodified lands. Individual nests may be destroyed, resulting in mortality to nestling birds or abandonment of eggs if disturbance occurs during the spring breeding period. **Because of the availability of substantial off-site habitat for Small Green Bee Eaters and other birds recorded from the lease, the effects of the Proposed Action on the bird habitat would be below level of significance.**

Mining operations would result in a small reduction of the regional foraging habitat available to migrating birds like the Spot-billed Duck (*Anas poecilorhyncha*), resulting in a minor behavior modification of individual birds that cross the Project area. **Based on the low numbers in which these local and distant migrants are projected to utilize the Project area, and the availability of off-site foraging habitat, the effects of the mining on the Spot-billed Duck and its habitat would be below the level of significance.**

There has been a sighting of Barn Owl (*Tyto alba*) in the lease. Natural caves, fissures, old mine tunnels and shafts, or abandoned buildings often used for Barn Owl for nesting are not present within the Project area. Project development would potentially result in the creation of barn owl nesting within storage sheds, maintenance buildings, or other "open" structures.

Since this species has been recorded in the general area, **Project operations within the Project area would result in the potential reduction of of Barn owl foraging habitat. Based on widespread availability of off-site foraging habitat for barn owls, the effects of the Proposed Action on this species and its habitat would be below the level of significance.**

Observations at dusk by the FAE has shown presence of Fruit Bat (*Rousettus leschenaulti*) but no sensitive bat species were recorded within the Project mine and process area during the original biological surveys. No mine caves, or large rock crevices exist in the Project area, thereby limiting the species of bats which may 'day roost' within the mine and process area. However, some bat species could roost in trees or in small rock crevices. Large numbers of bats would neither be killed nor displaced by the Project. Foraging habitat would be affected, but similar habitat is widespread around the Project area. Night lighting from the Project if any would attract insects and could result in a net increase in bats foraging in the vicinity of the Project mine and process area. This could lead to individual bat collisions with lights or drownings in ponds. **However, based on the availability of off-site day roost areas and foraging habitat, the effects of the Proposed Action on sensitive bat species and their habitat would be below the level of significance.**

The Proposed Action would impact ungulate habitat by eliminating the use of the Project mine and process area by ungulates over the life of the Project, until habitat is re-established, and would permanently eliminate the majority of the open area from ungulate habitat. Project-related impacts to wildlife habitat could result in a slight net reduction in the numbers of wild species that seasonally utilize the Project area, and/or that may reside in the Project area due to the availability of water in mine pits located in the Project mine and process area. Potential impacts to wildlife habitat would include:

1. The general loss of most of the Sri Ponguru Magnesite mine lease and process area as foraging habitat during the life of the Project, and in particular the loss of the approximately 77.50 ha of habitat for resident fauna even if not categorised as scheduled under WPA, 1972, which would be compromised during the operational phase.
2. To the extent the Project mine and process area serves as a habitat for Black-naped Hare, Mongoose, Certain birds and a number of butterflies habitat, the approximately 77.50 ha of land would be altered and fragmented due to the very nature of the mining activity.
3. Restricted access through the Project mine and process area as a result of fencing or chain links as suggested by the EAC MoE&F, GoI may limit movement of wildlife in the vicinity of the mine and process area. Importantly, it will serve as a barrier preventing intrusion of wildlife into the lease and /or their entry and entrapment into



the pits therein.

4. Noise from equipment operation, blasting activities, and human presence, as well as night lighting of the mine and process area facilities, would be expected to inhibit faunal/wildlife activity in the immediate vicinity of the Project mine and process area in the short-term; however, wildlife would be expected to acclimate to Project noise over time and resume utilization of the areas outside the boundaries of the mine lease and process area. This vindicates the argument of resilience of wildlife as well as wildlife habitats.
5. Vehicles commuting on roads to the Project mine and process area would increase the potential for vehicle impacts with fauna and resulting injuries and mortality. If the Project results in an approximate five (5) percent increase in traffic, then a proportional potential increase in traffic-related mortality of mobile fauna on the lease would be expected to result.
6. Wildlife that penetrates the perimeter fence and/or process fence of the Project mine and process area would be subject to an increased potential for vehicle impact injuries and mortality and ingestion of potentially harmful process residue or other chemicals stored and used within the Project mine and process area.
7. Realignment of access road or any major alteration in the landscape in the vicinity of the lease at any stage of the mining operations could potentially impact migration routes, dispersal corridors and animal movement. Animals are expected to acclimate to the road realignment; however, there may be some permanent displacement.
8. Water could accumulate in the Pits and attract fauna including mammals and birds to the new water source. Limited access to and from the pit(s) could potentially render them vulnerable to decimation.
9. Animals, both domesticated and/or wild that strays into the lease area may become stressed and go berserk inviting hostility from the workforce leading to human-wildlife conflict situation.
10. **Because of the low density and scattered distribution of wild fauna in the area, and the relative abundance of similar habitat in the vicinity of the Project area, the Proposed mining would not be expected to directly or indirectly impact a large number of species.** Some species would be indirectly impacted by reduction of habitat quality through vegetation removal. Given conflicting professional opinion as to the importance of the Project area and vicinity for use as habitat for several species as mentioned earlier, the specific significance of the impacts of the Proposed Action on fauna and their habitat without the implementation of those measures designed into the Proposed Action to reduce the impact and compensate for the adverse effects on this

habitat is uncertain. **However, with the implementation of these measures, impacts on species and their habitat are below the level of significance.**

11. Applicant has already installed a fence around the entire Project mine and process area. The fence is about (4) feet in height with 3-strands of smooth wire, or equivalent. That portion of the perimeter fence constructed along the western boundary of the Project mine and process area, including all of the fenceline shall be a chain-link fence, no less than six (6) feet in height, to restrict public access to the Project mine and process area. (See Photo)
12. Applicant shall routinely inspect and repair the fences, as necessary.
13. Applicant shall document any large animals including birds, reptiles and mammals or other wildlife mortalities observed within the Project mine and process area, and shall maintain a monthly report of such mortalities and submit the same to the forest division within whose jurisdiction the lease falls. The Project proponents must also implement additional or amended measures to reduce the mortalities in consultation with the local Forest Authorities.
14. A Field Contact Representative (FCR) shall be responsible for maintaining the records of perimeter fence inspections and repair, and shall have authority to direct the repair of damaged or destroyed fences. The FCR may be a Project Manager, Company Environmental Manager/Engineer, Contract Biologist, or other person identified as responsible by the Applicant.

**The following strategies and actions are recommended for execution by the Project Proponents Sri Ponguru Magnesite Mines, Jagir Amapalyam, Salem from the view point of protecting the extant biodiversity in and around the mining lease area.**

**An exclusive 'Biodiversity Monitoring Cell' (BMC) be established with a discrete budgetary provision to undertake a comprehensive inventory and status survey of the various taxonomic groups, particularly focusing on inventorying all the taxonomic components of biodiversity representing all seasons. The presence and documentation of the various components shall be undertaken to build baseline for future monitoring. A particular focus will be given to neglected groups such as the non-flowering, non-vascular flora, amphibians, reptiles, birds, invertebrates etc.**

1. The endemics and threatened taxa will be assessed continuously and closely monitored for long term conservation.
4. There is an urgent need to appreciate and enhance understanding of community traditions, knowledge, practices and livelihood related to biodiversity amongst all the stakeholders of the concerned ecosystem. The PP is already doing this by supporting a lot of local festivals, the same need to scaled up.

5. Encourage community maintenance of biodiversity related traditional knowledge repositories and databases of formal scientific information in appropriate forms; including oral, written and electronic media. This concern will be addressed in the light of erosion of ethnic knowledge and urgent steps must be initiated to facilitate continuation, systematization and where appropriate, recording of such information.
6. It shall be prudent to set up a modest 'Butterfly Garden' as has already been agreed upon by the PP. This is in keeping with the moderate species diversity of butterflies recorded from the lease. The consultants shall provide the list of food/host plants for the various butterflies recorded here.
6. The services and expertise of the proposed BMC shall be utilized to build capacity amongst all the stakeholders to understand, appreciate and act on matters relating to sustainable utilization and conservation of the biodiversity. The entire workforce of the project shall be sensitised to the concerns of biodiversity and wildlife conservation.
7. It is necessary to strengthen measures to control and eliminate poaching as well as mitigate human-wildlife conflicts especially from the adjacent villages through more enhanced intelligence gathering and patrolling measures; this will be achieved particularly through proactive involvement of local community.
8. There is also a need to involve locals, including joint patrolling teams. Substantial rewards and other social recognition shall come forth for reporting poachers and poaching activity. The necessary provisions for such incentivisation shall be made.

The following range of incentives shall be provided for community based conservation

An action plan has been envisioned by the lessee to provide a series of incentives such as recognition, reward, publicity etc. and benefit sharing measures to encourage the local community to participate in biodiversity and in particular wildlife conservation in the concerned area. A few areas have been spelt out as under.

- i) Rewards shall be given and public honors bestowed on individuals for commendable work in conservation and harmonizing livelihood and biodiversity conservation.
- ii) Biomass and Water Resource rights shall be given for bonafide use of the traditional communities, who voluntarily maintain lifestyles in balance with nature.
- iii) Financial, legal and other assistance shall be provided for community conserved species.
- iv) Local population shall have prioritized employment in local conservation and development related activities.

- v) The lessee shall support ecologically sound developmental activities, as far as possible with in consonance with the local traditions and cultural values.
- vi) An assured backflow of a certain percentage of the profits earned by the lessee shall be ploughed back into biodiversity conservation programs by the lessee.
- vii) Financial incentives / technical support shall be given to conserve domesticated biodiversity of the locals.
- viii) Community Conserved Areas such as the Sacred Groves if any shall be supported for sustainable management and conserved with the involvement of the locals.

## **7. POTENTIAL HUMAN- WILDLIFE CONFLICTS (HWC) SITUATIONS**

### **Justification**

As stated previously Salem district where this mines are located has its own share of forests and wildlife. A few Reserve Forests occur in the buffer zone of the Sri Ponguru Magnesite Mines and hence there were justifiable apprehensions on the likelihood of the proposed mining activity interfering with and impacting the prospects and conservation future of wildlife resident within these forests. The same have been addressed in a previous section ruling out any such possibility in the core area. In fact the potential impact has been discussed at length with reference to each species recorded in the lease. Also, it has been categorically pointed out that the likelihood of any wildlife incursions on the lease is a remote possibility due to the loss of continuum between the RFs and the lease in question due to fragmentation and a significant number of natural and man-made barriers and overwhelming human presence. However there are a few reported episodes of HWC in the villages of the buffer zone though not in the immediate vicinity of the lease. These villages hold a significant acreage of cultivated plots and agro-plantations besides perennial water bodies that attract herbivores for crop raiding.

Discussions with the Range Forest officials brought to light an incident of an Indian Gaur (*Bos gaurus*) straying into the human habitation in the year 2008, at the foothills of Shevaroyan Hills at *Chettichavadi* a village located between eastern border of Dalmiya mines and the R K Mines near the foothills of *Yercaud* range. The male gaur weighing about one tonne had fallen into a 20-ft trench, dug for an irrigation well, at *Chettipatti*. The animal, according to forest officials, might have strayed from the nearby Shevaroyan Hills into the cultivated field of Vanilla in search of water. A team of forest officials led by Shevaroyan Hills (South) Range Forester K. Balasubramaniam had rescued the animal. In a similar incident, a Gaur, which fell into irrigation well full of water at *Ayothiapattinam* had died after being hauled up.

The villagers living on the fringe of forests have been complaining that the animals had been

destroying their fields during nights for the last one month and had sought compensation for the crop losses. Also documented by the local press is on record a case of an Indian Gaur that strayed into a human habitation from the nearby forests died after it fell into irrigation well at *Achankuttaipatti*. Forest Department officials had confirmed to the local media *The Hindu*, that the 20-year-old animal was found struggling in the 70-foot-deep well of a farmer in the morning. The farmer alerted the Forest Department and fire service personnel. As the animal weighed nearly 100 kg, the rescue team could not haul it up. So, it brought in a veterinarian, who sedated the animal in the well itself. However the animal could not be resuscitated. A senior Forest Department official said the animal might have fallen into the well on Tuesday night while searching for water, while migrating from the near-by *Kalrayan Hills* to *Yercaud hills*.

These and many unreported incidents form the basis of this section on HWC and the need to mitigate the same.

### **Introduction**

HWC is a growing global problem, which is not restricted to particular geographical regions or climatic conditions, but is common to all areas where wildlife and human population co-exist and share limited resources. Dense human populations in close vicinity to nature reserves seem to pose the greatest challenges in many countries. Conflicts become more intense where livestock holdings and agriculture are an important part of rural livelihoods. Competition between rural communities and wild animals over natural resources is more intense in developing countries, where local human populations tend to suffer higher costs. Also, inter-sectoral conflicts arising out of common resources in short supply trigger HWC.

Considering the current human population growth rate, increasing demand for resources and the growing demand for access to land, it is clear that human wildlife conflicts will not be eradicated in the near future. For this reason a better understanding of conflict management options is crucial. The review reveals that the problem is multifaceted: some management practices are ineffective; others are financially unsustainable or too technologically complex and costly for underprivileged rural communities to adopt. However, HWC can be minimized through good management practices and approaches involving low cost technologies. A number of innovative strategies, such as electric fencing, natural resource use compensation systems, community based natural resource management schemes and incentive and insurance programmes also seem to be sustainable and should be scaled up.

In order to make wildlife protection more effective, conservation should be based on sound scientific knowledge, combined with indigenous knowledge, practical local knowledge and collaboration. According to world conservation Union, HWC occurs when wildlife's requirements overlap with those of human populations, creating costs to residents and wild

animals. Direct contact with wildlife occurs in both urban and rural areas, but it is generally more common inside and around protected areas, where wildlife population density is higher and animals often stray into adjacent cultivated fields or grazing areas. HWC has far reaching environmental impacts. Species most exposed to conflict are also shown to be more prone to extinction because of injury and death caused by humans; these can be either accidental, such as road traffic and railway accidents, capture in snares set for other species or from falling into farm wells, or intentional, caused by retaliatory shooting, poison or capture. Such human-induced mortality affects not only the population viability of some of the most endangered species, but also has broader environmental impacts on ecosystem equilibrium and biodiversity preservation.

Human-wildlife conflicts also undermine human welfare, health and safety, and have economic and social costs. Nuisance encounters with small animals, exposure to zoonotic diseases, physical injury or even death caused by large predators' attacks have high financial costs for individuals and society in the form of medical treatments to cure and prevent infections transmitted from animals. Humans can be economically affected through destruction and damage to property and infrastructure (e.g. agricultural crops, orchards, grain stores, water installation, fencing, pipes), livestock depredation, transmission of domestic animal diseases, such as foot and mouth. Negative social impacts include missed school and work, additional labour costs, loss of sleep, fear, restriction of travel or loss of pets.

A set of global trends has contributed to the escalation of HWC worldwide. These can be grouped into human population growth, land use transformation, species habitat loss, degradation and fragmentation, growing interest in ecotourism and increasing access to nature reserves, increasing livestock populations and competitive exclusion of wild herbivores, abundance and distribution of wild prey, increasing wildlife population as a result of conservation programmes, climatic factors and stochastic events

### 1. Human Population Growth.

Demographic and social changes place more people in direct contact with wildlife: as human populations grow, settlements expand into and around protected areas as well as in urban and sub-urban areas. The demographic profile of the buffer villages is annexed at the end of this section.

**Demographic Profile of the Villages in the Core Zone and Buffer Zone**

S. No.	Name of the Village	SC	ST	Others	Total	Number of Household	Literacy Population	
							Male	Female
		Number of Population						
1.	Perumampatti	237	0	3257	3494	864	920	508
2.	Reddipatti	690	0	575	1265	343	348	188
3.	Mettur	45842	10353	322142	378337	93404	129471	84472
4.	Mettur	26618	8770	179343	214731	53947	67206	38240
5.	Mettur	19224	1583	142799	163606	39457	62265	46232
6.	Pallipatti	388	0	6311	6699	1554	1900	937
7.	Annadanapatti	451	0	1591	2042	508	592	353
8.	Sikkanampatti	1287	0	2252	3539	797	1047	622



9.	Kannankurichi (TP)	2000	13	12981	14994	3522	5202	3865
10.	Periyeri	1086	0	3290	4376	1030	1587	1112
11.	Korathupatti	729	0	711	1440	348	325	234
12.	Umayalpuram	811	0	1562	2373	616	793	587
13.	Salem	134966	10687	925558	1071211	255192	386436	298204
14.	Salem	41839	9012	207575	258426	64444	79829	50609
15.	Salem	93127	1675	717983	812785	190748	306607	247595
16.	Kumarasamiyur	100	0	447	547	117	147	92
17.	Karungalpatti	152	109	140	401	108	98	67
18.	Olaijadi	69	0	643	712	190	273	208
19.	Periyavelampatti	3	215	2	220	66	46	46
20.	Maramangalathupatti (CT)	1504	94	9787	11385	2882	4318	3406
21.	Singipuram	711	0	5452	6163	1579	2239	1488
22.	Omalar	1443	16	11832	13291	3078	5120	4098
23.	Chittur	1015	0	10766	11781	3095	3148	1617
24.	Kaminaickanpatti.	416	0	2294	2710	710	870	508
25.	Reddipatti	690	0	575	1265	343	348	188
26.	Arikkavandanpatti	0	0	955	955	244	373	202
27.	Dalavaipatti (CT)	645	4	5575	6224	1481	1989	1290
28.	Puthur	0	800	58	858	212	201	116
29.	Neykkarappatti (CT)	975	3	8891	9869	2372	3122	2005
30.	Nayakkanpatti	0	0	858	858	237	268	130
31.	Tirumalagiri	1295	0	3244	4539	1063	1238	782
32.	Nallampatti	8	0	428	436	118	131	69
33.	Kullampatti	717	0	2035	2752	705	994	734
34.	Muduthurai	0	0	501	501	142	178	97
35.	Pumandapatti	11	0	144	155	43	56	40
36.	Vattamuthampatti	167	0	2801	2968	727	846	452
37.	Muthunaickenpatti	1071	0	10264	11335	2794	3652	2108
38.	Chellapillaikuttai	1336	0	5274	6610	1636	2287	1379
39.	Kottavarudampatti	0	0	306	306	81	117	59
40.	Puliyampatti	808	0	2047	2855	669	972	543
41.	Kunnur	0	1384	1	1385	317	59	23
42.	Vellalapatti	1378	5	4019	5402	1376	1837	1173
43.	Tekkalpatti	18	161	985	1164	291	412	275
44.	Mungilpadi	291	0	3326	3617	855	1147	621
45.	Kanmalapatti	243	570	1410	2223	558	551	397
46.	Kondappanayakkanpatti	858	138	4329	5325	1272	1954	1398
47.	Vettaikkaranur	5	0	1253	1258	312	467	326
48.	Pottipuram	1579	0	3694	5273	1353	1496	819
49.	Vellalapatti	1378	5	4019	5402	1376	1837	1173

## 2. Land Use Transformation

This driving force is very much associated with the previous one, as the transformation of forests, savannah and other ecosystems into agrarian areas or urban agglomerates is a consequence of the increasing demand for land, food production, energy and raw materials. This causative factor has been discussed in great details in the earlier sections of this report.

## 3. Species Habitat Loss, Degradation and Fragmentation

Species habitat loss, degradation and fragmentation are also interconnected with population growth and land use change. Increasing livestock populations and competitive exclusion of wild herbivores. Growing densities in livestock populations can create an overlap of diets and forage competition with wild herbivores, resulting in overgrazing and decline or local extinction in wild herbivore populations. In India, domestic animals often outnumber wild ungulates within protected areas. It has been ascertained that livestock becomes an important source of prey for predators.

#### **4. Abundance And Distribution of Wild Prey**

Many authors recognize that when native prey is abundant, wild predators consume it in preference to livestock and that impoverishment of prey populations is one of the major causes of carnivores shifting their diets to livestock. Clearly, this is due to the ease of capture and limited escape abilities of domesticated livestock. There are definite evidences of the lease being used by cattle for grazing. This has to be controlled from the viewpoint of keeping away the potential predators.

#### **5. Increasing Wildlife Population as A Result Of Conservation**

Beyond the ongoing problems of HWC, new questions have emerged. In recent years, the successful recovery of depleted or near extinct species is attributable to the success of pragmatic conservation programmes. Recent recovery programmes, however have contributed to the re- colonization by wolves of their original home range, including rural areas; and in the process have increased the potential for conflict, especially where domestic livestock is a major economic activity.

#### **6. Climatic Factors**

Although not often mentioned, perhaps because they cannot be controlled, climatic trends are an important cause of HWC. Seasonal changes in rainfall are directly correlated with predation intensity in many parts of the world. During drought periods, ungulates spend most of their time near a limited number of water sources and thus they are easily found and killed; when rain fills seasonal pools.

#### **7. Stochastic Events**

These sporadic events are difficult to forecast and prevent, yet also have an impact on human- wildlife conflicts. A best known example of this is the forest fire.

HWC is more intense in the tropics and in developing countries where livestock holdings and agriculture are an important part of rural people's livelihoods and incomes. In these regions, competition between local communities and wild animals, for the use of natural resources, is particularly intense and direct and resident human populations are very vulnerable. conflict is particularly common in reserve borders, where species that rely on extensive territories come into contact with human settlements. In effect, border zones of protected areas may be considered population sinks: critical zones in which conflict is the major cause of mortality.

In India, traditions and cultural/religious attitudes towards wild animals make local people more tolerant towards wildlife, despite the damage to crops and livestock it causes. Orthodox Hindus for instance consider monkeys to be sacred animals, to be revered and protected. This religious belief and traditional attachment to monkeys greatly influences people's perception of the conflict, resulting in its partial

acceptance. Interestingly the lease buffer supports a viable population of Bonnet monkeys.

To better understand why many different remedial measures have been developed around the world but have not been implemented globally, it is essential to underscore that although the management strategies have similar goals, they are embedded in different ecological, social, cultural and economic realities; they are also targeted towards different taxonomic groups. Mitigative strategies attempt to reduce the level of impact and lessen the problem; while preventative strategies endeavour to prevent the conflict occurring in the first place and take action towards addressing its root causes. Some are efficient in the short-term while others show results only in the long-term; others are more effective within defined geographic regions or specific taxonomic groups.

## **PREVENTIVE STRATEGIES**

### **1. Artificial and Natural Barriers (Physical And Biological)**

Barriers have the function of preventing spatial overlapping among wild animals and local communities; they are usually man-made, but natural barriers such as rivers, coasts or mountain ranges may occur along a nature reserve boundary. As has been discussed in sufficient details in the earlier sections of this report, there are significant barriers, both physical and biological around the lease and as far as the Reserve Forests. These are deterrents for animal movements towards the lease. Further, the PP has installed fence in 3 directions viz East , West and North and a part of South West. The entrance to the lease is guarded by a gate in the south. Checkered fencing of rock blocks of 7 feet height and a linear gap distance of 10 ft , with 8 levels of aluminium rods has been put around the lease in compliance with the requirement of the EAC, MoE&F, GoI. The entrance to the lease on the southern side is also gated and shall not allow animal intrusions on the lease.

Fencing may affect the population dynamics of animals and hinder their natural migratory and dispersal behaviour, especially in the case of highly territorial species like lions. It is also essential to take into consideration the different, unexpected effects that fencing may have on a wide range of non-target species. It is clear that physical barriers are not always an economical management practice. They frequently require additional labour from farmers and their family members and never ensure complete protection. The reason for this failure can be explained by the behaviour of different animal species. Burrowing animals for instance, breach the barrier and permit access to other species.

Simple strategies for substantial improvement of defence against predators can make a difference in rural livelihoods; in some states of India, Himachal Pradesh,

farmers have covered their livestock pens with chain-link fences and reported that this chain-link ceiling is one of the anti-predator management techniques that is significantly reducing livestock predation. In conclusion, all the barriers discussed above have some limitations as they cannot deter every single species of animal and they can be breached by particularly strong or agile target species.

## **2. Waste Management Systems That Restrict Wildlife Access To Refuse**

Good standards of waste management are important to avoid attracting wild animals to human settlements and to prevent wild populations being augmented and artificially sustained by human induced food availability. Each stage of waste handling should be addressed, from collection to transportation to disposal.

## **RECOMMENDATIONS**

In tackling the issue of Human –Wildlife Conflicts, there are wide range of taxa-specific management options, which have been applied in diverse economic and cultural contexts. However these are by no means exhaustive. Some invaluable lessons can be learnt from each of the cases described in the previous chapter and practical recommendations can be inferred in order to design better interventions and to improve existing conflict management practices. Therefore, this final chapter suggests and discusses potential areas of improvement.

### **Conservation education for local populations**

Education and training activities at different stakeholders levels, for instance in schools or in adult education arenas such as farmer field schools, would have the objective of sensitising and disseminating innovative techniques, building local capacity in conflict resolution and increasing public understanding of Human-Wildlife conflicts. Educating rural villagers in practical skills would help them to deal with dangerous wild animal species and to acquire and develop new tools for defending their crops and livestock. The PP shall endeavour to facilitate such conservation education in the buffer villages.

Overtime it would result in a change of behaviour amongst local populations and would contribute to reduced risks, improvements in local livelihoods and a reduction in their vulnerability. In an optimistic scenario, education and training would promote commitment towards conservation, raise awareness on the essential role of wildlife in the ecosystem functioning and its ethical and economic value, as well as its recreational and aesthetic importance.

### **Prediction of hot spots, data collection and evaluation of the impact**

Good-quality and high-value information could be gathered through **archival** records, questionnaires, and interviews with women, community groups, village leaders, household heads, local government officials and other seasonal forest users. The challenge would be to develop and maintain an updated database containing the broadest array of records

documenting the type and location of the incidents. Such a database would provide a detailed overview of the impact on local populations; better identify which geographical zones are more vulnerable to HWC and which species are commonly involved in the conflict.

### **Promotion of dialogue and cooperation among different stakeholders**

The success of wildlife conservation and HWC reduction largely depends on the ability of managers to recognize, embrace and incorporate differing stakeholder values, attitudes and beliefs. The commitment and coordination of different stakeholders such as local government Wildlife Services or Forestry Departments, non-governmental organization (NGOs), conservation organizations, wildlife managers, the scientific community, tour operators and the tourism industry.

## **ACTIVITIES OF THE PP SRI PONGURU MAGNESITE MINES & HWC IN THE BUFFER VILLAGES.**

**Photography by Suresh & Laxmi Narayanan**



1



2



3



4



5



6

1. Dhakkaliyamman Festival

2. Local Festival

3. Green Belt Development

4. Fencing lease perimeter.

5. Rescue operations of Gaur (see context)

6. Plantation commemorated

## 8. **Sri Ponguru Magnesite Mines Vis A Vis Forest Fires: Issues, Concerns & Responses**

The EAC, MoE&F, GoI in its letter conveying EC to Sri Ponguru Magnesite Mines, besides mandating a Wildlife Conservation Plan has also requisitioned a section on measures to prevent /control fires. *Prima facie* this clause seems to be guided by the recent outbreaks of forest fires in and around Salem. The PP has therefore sought advice on the measures and means to prevent and mitigate fires in general and forest fires in particular. Fires are a widespread phenomenon in Indian forests. Most fires today are attributed to human causes and are commonly considered to be a major cause of forest degradation. The ubiquitous occurrence of fires, despite over a century of strict fire suppression, suggests that fires potentially play an important role in people's management of their landscapes. However, our knowledge of the causes of fires, about their extent, their effect on forest ecosystems, and their link to the goods and services that are derived from forests is extremely limited and warrants a detailed research in the Indian context.

Interestingly the causes of fire are varied and without a proper understanding of the causes and effects of fire, whether ecological, socioeconomic, or cultural, it is not possible to strive for fire management that meets the livelihoods needs of forest-dependent communities while also conserving forests and biodiversity. Such understanding is essential to meet the challenge of shrinking natural resources in the present, and the challenge of climate change in the future; such understanding is also essential to arrive at negotiated tradeoffs in integrating actual fire management practices into existing forest management.

Human-caused fires are a ubiquitous phenomenon in Indian forests, and they probably date back to the first arrival of people on the Indian subcontinent. Humans have long used fire as a forest management tool, whether for hunting, to clear land for agriculture, to promote the growth of fodder for grazing livestock, or to facilitate their collection of non-timber forest products (NTFP). It has long been held that such fires have been inseparably connected with the development of grasslands in India.

Fires continue to be a significant influence on Indian forests even today. At the end of the 19th century Dietrich Brandis, the then Director General of the Indian Forest Service, had observed that half to three quarters of mature trees in the plains and lower hills of India were hollow, and hence were inflammable. As recently as 1999, government estimates were that 35 million ha of Indian forests (~54%) are affected by fire annually. Estimates of the proportion of forests affected by fire vary among the states.

Due to a complete dearth of information and knowledge about the ecological and socio-economic drivers and consequences of forest fires, such episodes have generally been viewed

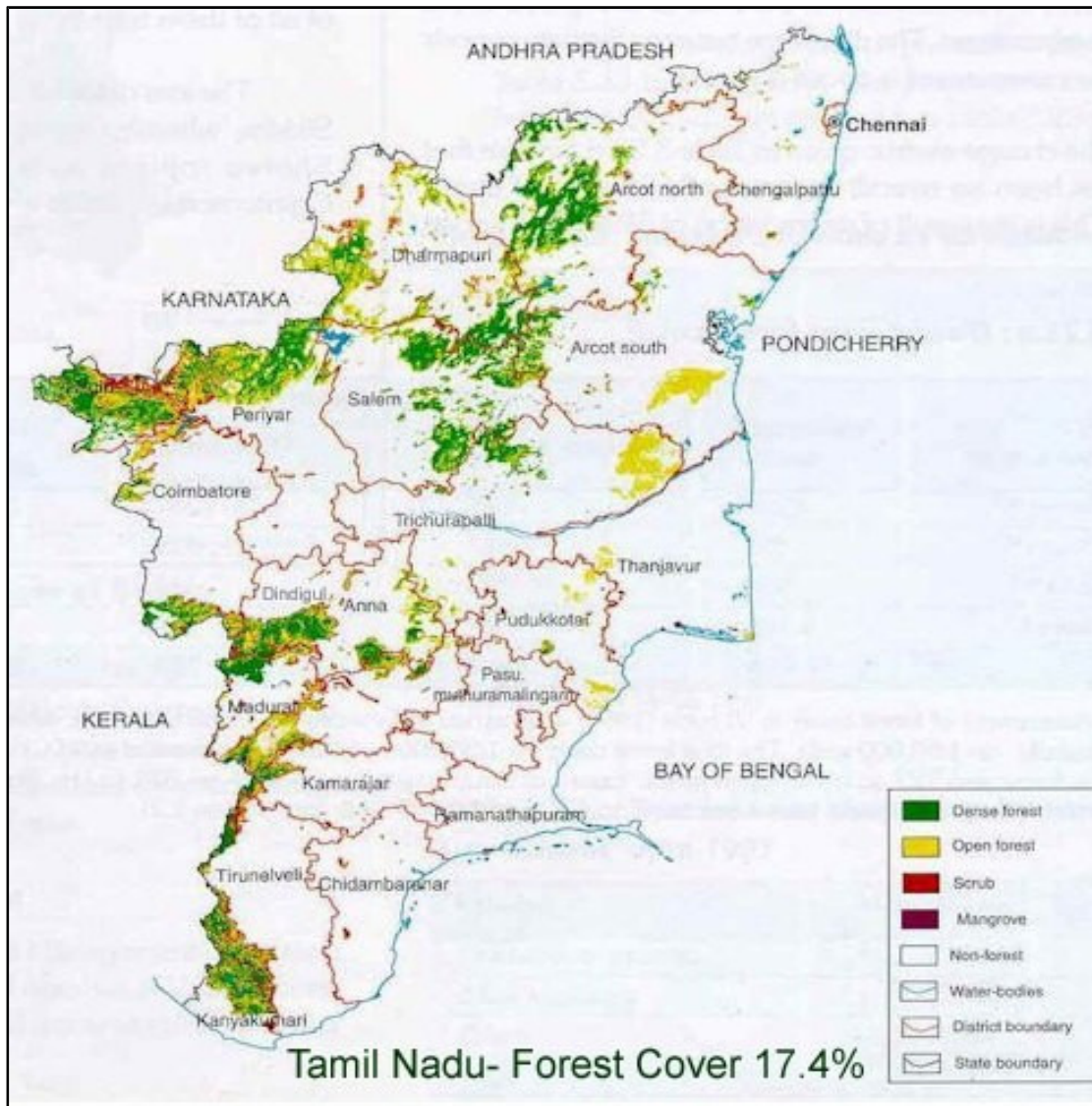


within a degradation paradigm. Thus, the effects of fire are thought to be uniformly disastrous, across the diversity of country's ecological and socioeconomic landscapes. However, the idea of "degradation" in the context of ecosystems under human management is more of a social phenomenon than a purely ecological one. It is strongly linked to the perspective of the forest user and the benefits that he or she derives from the forest. Forest fire management in India has to be seen from this perspective. Forest fires that are deliberately set to gain specific ecosystem services (ES) are a tool to reduce degradation as perceived by the beneficiary of these services, while on the other hand, the same fires may be considered by foresters, ecologists, and forest managers, to be the cause of forest degradation. Just as the perceptions of fires vary, so also management goals can vary.

For example the goals of management for one particular forest may focus on tangible services like fodder and NTFP (Ecological Services, for which the demand is essentially local), while the management goals for another forest may focus on less-tangible services like carbon sequestration, biodiversity, and soil and water conservation (ES for which the demand may be national or even global). Conflicts can arise when different management goals are applied to the same area.

The foregoing discussion emphasises the need to define stakeholder's contexts in evaluating a forest fire and the inputs in terms of fire management. India has a policy of fire suppression which dates back to the first formal articulation of Forest Policy in 1927. Yet, even today, almost a century later, fire continues to be an annual phenomenon in almost all Indian forests. This obvious contradiction between fire policy and fire reality raises a number of questions regarding the drivers of fire, the role that fire plays in ecological processes, the extent of fires in India, and the existing fire policy.

In Salem the contexts of fire assessment and management are grossly prejudiced and misconstrued as damaging to the ecology. This section on Fire prevention and management required perusal of pertinent literature and its relevance to the lease in question. To start with the distribution of forests in the state of Tamilnadu was studied to ascertain the vulnerability and predisposition of the Salem district in particular since the lease is located here.



**Fig. 13. MAP SHOWING DISTRIBUTION OF DIFFERENT FOREST TYPES IN VARIOUS DISTRICTS OF TAMILNADU.**

Note that Salem has a fair share of dense forests towards the eastern part of the district. Much of the Forest cover as well as diversity however is confined to the fringe bordering Karnataka and Kerala. The name 'Salem' appears to have been derived from *Sela* or *Shalya*; the term referring to the country around the hills, as in the inscriptions. Salem has its fair share of dense forests. Their presence coupled with rising ambient temperatures of the summer often recording the highest values in the state of TN have fueled bush fires in various hills surrounding Salem.

Such catastrophic fires engulfing the vast stretches of forest areas have been recorded in the

year 2009 in and around Salem and are a cause of concern and statutory cognizance. The last recorded episode of such inferno was in *Yercaud*, a Hill Town, which after devouring the dry forest litter had started spreading. Tourists, plantation workers and hill dwellers had then alerted the Forest and Fire Service personnel who fought incessantly and contained the same. Also on record are the bush fires that broke out on the *Nagarmalai* hills near city forcing the forest officials to undertake a concerted effort to contain the ravaging fires.

Since the Salem city is surrounded by hills and with unusually high summer temperatures, the Forest department has asked the general public and tourists to be aware of forest fires. Since prevention is the only practical strategy in averting such fires, a lot of emphasis needs to be given on vigilance and intelligence to avert such natural /manmade disasters. A ban on cigarettes and match sticks inside the forest areas has to be mandated.

In an article published by the Hindu, reportedly there has been a significant decrease in the number of forest fires in the State in the summer of 2011. Quoting A.S. Balanathan, Principal Chief Conservator of Forests, Tamil Nadu, the article confirms that 180 incidents of forest ground fires were reported in the State, affecting 8,744 hectares of forest area in comparison with 2009, when the number of incidents was over 180 and the area affected extended over 12,000 hectares.

Perhaps a good precipitation in some of the interior areas in the forests in the State was one of the causes of reduction in the number of fire accidents, it is presumed. Various factors could have contributed to the reduction in the number of fire accidents. The key factors, according to the PCCF, Tamil Nadu State, were better patrolling and the fire prevention measures taken by field staff. Another important aspect that helped in averting forest fires was the awareness creation among people living close to the forest areas. Forest fires are monitored through satellite, and within six hours of their occurrence, they would be spotted by the Department's Geographical Information System Centre at Panagal buildings in *Saidapet*. The District Forest Officer concerned is immediately alerted and the DFO, in turn, will send field staff to put it out. Using the satellite facility, the Centre had already identified fire-prone areas in both the Eastern and Western Ghats. The field staff is alerted well in advance about the fire season which starts from the middle of January and lasts till the end of May. The field staff will start cutting the fire lane in the forests, which will help in controlling the spread of fire.

Theni, Kodaikanal, Dindigul, Nilgiris, Mudumalai, Pollachi and Coimbatore in the Western Ghats; Sathyamangalam, Tiruppattur and Vellore in Vellore district, Tiruvannamalai and Hosur in the Eastern Ghats were fire-prone areas identified by the Centre. The lease in question is not located in or close to any of these.

Nevertheless the PP, Sri Ponguru Magnesite Mines shall invest in awareness building and sensitization programme for a range of stakeholders within their buffer zone. Popular literature and signage on forest fire Prevention and management shall be created in local

languages and awareness spread through folk art /media during the local festivals. The PP shall also synergize with the ongoing state sponsored/run programmes on Fire prevention and management. PP also undertakes to integrate efforts at generating database on the fire vulnerability of the Reserve Forests within its buffer zone and take adequate measures to avert even bush fires on its lease.

In February 2007, a workshop deliberating different dimensions of forest fire in India was jointly organized by the Institute of Silviculture, University of Freiburg, and the Ashoka Trust for Research in Ecology and the Environment (ATREE), in collaboration with the Foundation for Ecological Security (FES) and the Evergreen Trust. The international event drew participants from different parts of India as well as from Indonesia, Germany, Switzerland, and the US. Perhaps this was one of the recent gatherings of regional experts on forest fires and the proceedings are valuable from the view point of understanding and strategising to meet the contingency of forest fires. Forest fires are a driving factor in shaping forest vegetation and landscape in many parts of India. Even so, very little is known about the extent and causes of ignition of these fires, and the role played by these fires in local forest management practices and in the supply of forest services. Most of our existing knowledge about fires is based on a very thin layer of empirical research and scientific certainty.

Tropical forests can be classified into fire sensitive, fire dependent, and fire independent ecosystems. Ecosystems where most plant life forms do not show specific adaptations to fire are considered fire sensitive, since they have not evolved with fire as a repeated process. Nevertheless, fire could create important habitats and niches. When fire moves the entire ecosystem beyond a certain threshold, or as happens very frequently, it causes severe damages and could lead to a complete loss of the ecosystem. Species composition and vegetation structure in fire independent ecosystems hinder ignitions and fire spread through low flammability. Most species lack abilities to respond to fire and mortality is usually high, especially in fire sensitive ecosystems.

Fire becomes a threat only if there are significant changes to these ecosystems caused by land use activities, species invasions, or climate change. Altered fire regimes have been identified as one of the key threats to biodiversity. A fire regime can be modified by human activities, such as excessive or inappropriate burning, by ecosystem conversion or fragmentation of the natural environment, but also by fire suppression and prevention. As a consequence, the resulting altered fire regime may affect the structure of desired ecosystems and the sustainability of goods and services that those ecosystems deliver. To maintain desired structure, composition, and functioning of certain ecosystems, humans have been changing fire regimes for millennia to keep their environment in a stable condition. As a result, an ecologically appropriate fire regime is not necessarily a natural fire regime. There are various reasons why humans have been burning when inhabiting a fire-prone environment, however,

this often resulted in frequent burning. Smaller populations in smaller areas in the past were often able to manage their ecological resources through a bottom-up approach. When a region is small enough, all individuals are often able to observe their immediate impact on the environment and adjust their behaviour accordingly.

In ideal cases, people solve these collective ecological problems by cooperation. For larger societies with centralized political organisation there is a lack of reliable ways through which to transfer local people's knowledge to facilitate effective resource management. Ecological resources are generally managed with a top-down approach where rules are set to maintain ecosystem productivity below an appropriate set carrying capacity for the maximum benefit of society. Often these benefits are difficult to quantify and are not seen in the timescale of one generation. Additional confounding factors include corruption and a general lack of good governance in many rural areas of the developing world which can limit the successful implementation of a community-based management approach. Given all these socially and economically limiting factors, communities are in need of fire management strategies that are consistent with their needs and abilities to react to ecosystem changes, while not having detrimental impacts on the environment.

## **CAUSES OF FOREST FIRES**

Forest Fires are nothing unusual and occur regularly, especially in summers, throughout the world. Forest fires can broadly be classified into three categories based on the causes.

### **1. Natural or controlled forest fires.**

Many forest fires start from Natural causes such as lightning which set trees with inflammable dry biomass on fire. Periodic lightning induced fires have been recorded throughout history from India, South-eastern and Central United States, Australia, Finland and Eastern and Southern Africa. However, normal precipitation in form of rain is enough to extinguish such fires without causing much damage. In fact in some parts of the world such as in the United States such Natural Fires are allowed to burn and die out as a part of Forest Management strategy.

### **2. Forest fires caused by heat generated in the litter and other biomes in summer through carelessness of people (human neglect)**

The most forest fires are the result of human neglect. A casual unwary throwing away of a smouldering bidi, cigarette butt or a spark from a picnicker's open hearth in a desiccated forest can often be sufficient to start a fire in summer. Such fires usually start on the ground as the dry forest litter (senescent leaves and twigs) catches fire easily. Then, flamed by strong winds, the flames soon engulf vast tract forest turning them to ashes and, therefore, cause extensive damage unless controlled in time.

### **3. Deliberate Blaze**

Forest fires purposely caused by local inhabitants as a matter of protest or some short term Ecosystem Service.

#### **Types of Forest Fires**

Forest fires differ depending upon their nature, area over which it spreads, speed with which it spreads, behavior etc. Basically this can be sub grouped into four types depending upon their nature and size as follows:

#### **Underground Fire**

Under ground fire is the fire of low intensity consuming the organic matter beneath and the surface litter of forest floor is sub-grouped as underground fire. In most of the dense forests occurring in the wetter parts of Himalayas, a thick mantle of organic matter is found on top of the mineral soil. This fire spreads in by consuming such materials. These fires usually spread entirely underground and burn for some meters below the surface.

This fire spreads very slowly and in most of the cases it becomes very hard to detect and control such type of fires. They may continue to burn for months and destroy vegetative cover of the soil. The other terminology for this type of fire is Muck fires while in some countries; it is referred to as Ground fires.

#### **Surface Fires**

Surface fire is the most common forest fires that burn undergrowth & dead material along the floor of the forest. In general it is very useful for the forest growth and regeneration. If grow in size this fire not only burns ground flora but also results to engulf the undergrowth and the middle story of the forest. Surface fires spread by flaming combustion through fuels at or near the surface- grass, dead & down limbs, forest needle & leaf litter, or debris from harvesting or land clearing. Thus a surface fire is "A fire that burns surface litter, other loose debris of the forest floor and small vegetation. This is the most common type of fire in timber stand of all species. It may be a mild, low-energy fire in sparse grass and pine needle litter, or it may be a very hot, fast moving fire where slash, flammable under story shrubs, or other abundant fuel prevails. A surface fire if spreads, may burn up to the taller vegetation and tree crowns as it progresses.

#### **Ground Fires**

There is no clear distinction between underground and ground fires. The smouldering for sometime underground fires changes into Ground fire. This fire burns root & other material on or beneath the surface i.e. burns the herbaceous growth on forest floor together with the layer of organic matter in various stages of decay. They are more damaging than surface fires they can destroy vegetation completely. These fires are fires in the sub surface organic fuels, such as duff layers under forest stands, Arctic tundra or taiga, and organic soils of swamps or bogs.

Ground fires burn underneath the surface by smouldering combustion & are most often ignited by surface fires. Thus a Ground Fire consumes the organic material beneath the surface. Glitter of the forest floor. In many forest types, particularly in northern latitudes, at higher elevations, and in bog areas in all locations, a mantle of organic material accumulates on top of the mineral soil. A true ground fire spreads by a slowly smoldering edge with no flame and little smoke. These fires are often hard to detect and are the least spectacular & slowest moving.

### **Crown Fires**

Crown fire is the most unpredictable fire, which burns the top of trees & spread rapidly by wind. In most of the cases surface fires invariably ignite these fires. Thus a Crown Fire is a fire that advances from top to top of trees or shrubs more or less independently of the surface fire. In dense conifer stands on steep slopes or on level ground, with a brisk wind, the crown fire may race ahead of the supporting surface fire. This is most spectacular kind of forest fire.

Since it is over the heads of ground force it is uncontrollable until it again drops to the ground, and since it is usually fast moving it poses grave danger to the fire fighters becoming trap

### **Fire Prevention**

According to the Indian Forest Act of 1927 setting fires is a punishable offence and it is mandatory for all forest dwellers to assist in the prevention of fire. The National Forest Policy of 1988 has the same spirit although it lays greater emphasis on the use of modern fire prevention tools while continuing to stress the involvement of local communities in the prevention of fires. The essential goal to have forests free of the influence of fire has remained the same over almost a century.

- The success of Forest Fire Prevention depends on the efficiency and accuracy of forest fire warning system. The fire risk warning in turn requires assessment of Fire Index value (Fire probability) reaching a given threshold value that is locale and weather specific. In implication this requires services of a Meteorologist who can monitor meteorology of the forests and their ambient zones of influence around within a radius of 5 km. Perhaps the PP can benefit from the regional/state meteorology weather station.
- The ideal Fire Risk Assessment system shall comprise of public announcements of the fire warning and an Internet service directed to fire officials providing information of the fire risk index. Fire officials also have access to an Internet page providing online information about lightning and rain patterns as seen by nation-wide lightning detection and the weather radar networks.
- Future developments of the risk assessment system could involve integration of all relevant weather information, and especially the fire index, wind data, lightning information, into one user interface. The interface could show past, present and predicted values (up to 24-48

hours ahead) of the fire index, intensity of rainfall, overlaid on geographical maps. Fire incidence detected by the satellite could also be overlaid on maps with the weather information.

However while this is being recommended, the consultants are fully conscious that there are limitations on the part of PP for execution of such a scheme that shall involve huge expenditure and manpower and is therefore prohibitively expensive. Instead the PP must liaison with the state authorities and foster lateral linkages.

## **FIRE DETECTION AND MONITORING**

- Detection of forest fires is primarily based on the observation by local people as these are the first witnesses thereof (90%), by the airborne surveys conducted by state or private stakeholders in some cases where stakes are high (10%), and by two local video cameras. The airborne surveys are initiated when the value of forest fire index reaches a critical level of 4.0, which means that the forest is moderately dry.
- When we talk about any fire detection system there are at least four important factors.  
  
First of all the system has to be quick. Usually, the quicker any fire is detected the lesser is the damage. In addition to this, the system also has to be able to transmit the information to the alarm centre in minutes. This means that the whole process should not take more than half an hour.
- The second factor is that the system has to be reliable with least possibility of false alarms.
- The third factor is the exact location of the fire. The system has to locate the fire as precisely as possible.
- Fourthly, there should be a fair amount of predictability estimates on fire spread, i.e. in what direction and at what speed the fire is moving forward, depending on the velocity and direction of the wind.
- When the regional dispatching centres (or other fire authorities) receive smoke observations from the public/private sector, it is important that the authorities are aware of the general fire pattern in their environment. As smoke can be detectable several hundred kilometres from the fire site, fire authorities should have access to a fire map covering their territory +/- at least 100 km.
- Extinguishing is performed by the civic fire brigade. A local municipal fire officer is responsible for leading the operation inside the local municipal area.



## 9. POTENTIAL FOR NONI (*Morinda citrifolia*) PLANTATIONS ON GREEN BELT OF THE LEASE AREA

### Justification

The Sri Ponguru Magnesite mining lease at village Jagir Ammapalayam has sparse vegetation and relatively poor floral species diversity, but shows a good distribution and density of the medicinal Noni tree. In fact at the time of this surveillance visit for prospecting wildlife potential, the trees were in inflorescence and fruiting. In the northern aspect of the lease on the highest point, the *Morinda citrifolia* (Noni) trees abound. Ripe fruits had fallen on the ground attracting a few butterflies to their gelatinous pulp. The leaves had a lot of Weaver ants (*Oecophylla smaragdina*) and are known to be a good fodder for livestock. Ecologically, the tree is known to stabilise soil even under arid conditions and allows ground vegetation to establish.

It is only prudent to account for this untapped bio-resource and propose bio-prospecting. The consultant having explained the medicinal value of this tree, the PP has agreed to propagate this floral candidate on their lease and if possible also include Noni in their green belt development. Possibly, this activity also has a potential for CSR linkage and community involvement and needs to be encouraged. Following section describes the Noni tree and relevant information.

### Introduction

A member of family Rubiaceae (coffee family) the Noni tree (*Morinda citrifolia*) is a native of Southeast Asia (Indonesia) and Australia but now has spread across the tropical region. The tree is typically 3–6 m (10–20 ft) tall at maturity. This species is associated with a wide range of common coastal and littoral forest shrubs, as well as numerous cultivated plants. Its growth rate is moderate, and generally about 0.75–1.5 m/yr (2.5–5 ft/yr) and is known to be growing in extremely wide range of soils. The tree is known to yield Up to 80,000 kg of fruit per hectare

Noni is noted for its extremely wide range of environmental tolerances. It can grow in infertile, acidic, and alkaline soils and is at home in very dry to very wet areas. It is found naturally in relatively dry to mesic sites or lowland areas in close proximity to shorelines, or as an important forest understory species in low-elevation Pacific island forests and rainforests. Noni can grow from elevations of 500 m (1640 ft) down to near sea level. Noni's extensive range of environmental tolerances also includes exposure to wind, fire, flooding, and saline conditions. Although not considered to be invasive to a degree that threatens ecosystems, Noni is treated as a weed in some settings, is very persistent and difficult to kill, and is one of the first plants to colonize harsh waste areas or lava flows. All parts of the plant

have traditional and/or modern uses, including roots and bark (dyes, medicine), trunks (firewood, tools), and leaves and fruits (food, medicine). The medicinal applications, both traditional and modern, span a vast array of conditions and illnesses, although most of these have yet to be scientifically supported. *Noni* is well suited for intercropping within traditional agro-forestry

subsistence farming systems or as a monocrop in full sun. The tree has attained significant economic importance worldwide in recent years through a variety of health and cosmetic products made from its leaves and fruits. These include fruit juices as well as powders made from the fruit or leaves.

Rooting habit Noni has a rooting habit similar to that of citrus and coffee, with an extensive lateral root system and a deep taproot. The wood of noni is a yellowish color and the fruits have a unique and distinct disagreeable odor when ripe

### **Propagation**

Noni is relatively easy to propagate from seeds, stem or root cuttings, and air-layering. The preferred methods of propagation are by seed and by cuttings made from stem verticals.

#### **Propagation from seed**

##### ***Seed Collection:***

Noni flowers and fruits year-round. Fruits are harvested when they start turning white, or even when they have become fully ripe, i.e., turned soft, translucent, and characteristically odorous. For seed production, the riper the fruit, the better. Collect fruit from plants that have desirable characteristics, such as large fruit for fruit production, vigorous leaf growth for hedges, etc.

##### ***Seed Processing***

After picking, let the fruit ripen fully until it all turns soft (almost mushy) and translucent. This may take 3–5 days if only semi-ripe fruits were collected. Once the fruits have fully softened, press them against a screen or colander with holes slightly smaller than the seeds. The soft, fibrous pulp will slowly be removed from the seeds as they are rubbed. Growing in a crack in lava rock, noni is tenacious in this hot, windy, and dry area of Salem. It may take 15 minutes to completely remove the clinging flesh. Rinsing in water periodically helps float off the pulp. The seeds have an air bubble trapped inside, so unlike most other seeds, healthy noni seeds float in water. If the seeds are to be used immediately, soft fruits can be suspended in water and subjected to short pulses in a blender, very sparingly, to remove most of the flesh while slightly scarifying the seeds (see next section). If the seeds are to be stored, the flesh should be removed completely, then the seeds air-dried and stored in a paper bag in a cool room with low humidity. It is unknown how long seeds remain viable; however, 1 year is thought to be a reasonable storage time. Germination is high for fresh seeds, often over 90%. There are approximately 40,000 seeds/kg (18,000 seeds/lb).

##### ***Pre-planting Seed Treatment***

Without pre-treatment, Noni seeds germinate sporadically over 6–12 months. Scarification of the tough seed coat although not a requirement can shorten the time required for seed germination and increases the overall germination percentage. Scarification can be achieved by any physical

method that abrades, damages, penetrates, or cuts open the seed coat. A simple method is to place ripe fruits in a blender and pulse the blending mechanism a few times to cut open the noni seeds before separating them from the pulp. A more time-consuming method that results in higher germination percentage consists of clipping off the tip of noni seeds near the embryo to allow water to penetrate the seed coat. Germination time for scarified noni seeds is 20–120 days, depending upon temperature, environment, and variety or genotype. Seed germination can be rapid and uniform (20 days) in full sun to partial shade and mean temperature of approximately 38°C (100°F).

### ***Potting Media***

Weed and nematode-free natural or local forest soil mixed with sand, volcanic cinder and/or composted organic matter are excellent for seedling production. Noni seeds can remain viable floating in water for months.

A very reliable but time-consuming way to scarify Noni seeds is to clip the pointed end of the seeds with a fingernail clipper, which allows water to quickly enter the seed coat. Rooting medium for noni seeds is light and well drained but inherently moisture-retaining, slightly acidic to slightly alkaline (depending on locally available source material), aerobic, and high in organic matter derived from compost or peat. Nematode-infested soils or media should be avoided or treated with heat (at least 50°C [122°F] for 15 minutes) prior to using. Most nurseries prefer natural potting media rather than commercial media for Noni production. Mulch (e.g., cinder, sawdust, leaf litter, or sand) may be placed over the seeds for weed control and moisture retention.

### ***Growing Area***

A rain- and wind-protected but sunlit area (such as a Green-house with a clear film roof ) is recommended for germination in trays. Warm, moist, and light conditions are beneficial for optimal germination. Noni seeds can germinate in conditions ranging from deep shade to full sun. Most uniform germination is achieved in light partial shade (20–30%). After the germination and early establishment phases, partial shade (20–30%) is used for growing out the individual seedlings in containers.

### ***Establishment Phase***

Sow the scarified seeds evenly in germination trays or pots filled with a moisture-retaining, sterile or pathogen-free growth medium, perhaps a mixture consisting of one part perlite to one part peat. Cover lightly with 5–10 mm (0.2–0.4 in) of potting media. Keep moist with a fine sprayer so as not to disturb the seeds or the medium. The seedling trays or pots may be kept in shade or in full sun.

An even temperature of 38°C (105°F) is recommended, which can be achieved with bottom heat. Active growth phase When the seedlings reach the four-leaf stage, carefully transplant them to individual containers for the growth phase. Root-training pots approximately 6 cm

(2.5 in) square by 12 cm (5 in) deep or larger work well. Four-litre (1 Gal) root-training containers can also be used.

Seedlings should be grown in partial shade and moved into full sun after 1–2 months. Keep seedlings spaced well apart to allow maximum penetration of sunlight and air circulation. In some cases, amending with additional fertilizer such as a light top-dressing of slow-release or organic 8-8-8 will aid in growth and development.

The size of noni plants at time of outplanting depends on the seedling age, fertility of the medium, pot size, noni variety, and the shade level used for seedling cultivation. A hardened seedling having at least 20–25 cm (8–10 in) of woody stem tissue (being at least 150–180 days old) has excellent performance after out-planting.

### ***Time to Out-planting***

Noni seedlings (if not direct-seeded into the ground) may be outplanted about 2–12 months after germination. Young noni seedlings (8–12 weeks old; 10–15 cm (4–6 in) tall) may require more care and may be more vulnerable to environmental fluctuations and pest attack than older seedlings. Older seedlings, grown in full sun in 2- or 3-liter (2–3 quart) pots for 24–36 weeks, are preferred for their vigor and ability to establish quickly. Even older seedlings (1–3 years old) may be outplanted if they are healthy and not significantly root-bound. For older seedlings, loosen root systems gently by hand after removing them from their pots or containers.

### ***Seedling Development***

After out-planting, the first year of seedling development is slow due to transplant shock and the establishment of a root system. Afterward, seedling growth is much more rapid as the crown gains size and photosynthetic mass.

### ***Using Volunteer Seedlings***

As an alternative to sowing noni seeds in seed-germination beds, young Noni seedlings can be collected carefully from forest areas and transplanted into pots or also be sown onto raised mounds and outplanted as bareroot seedlings, although this is not a preferred method of seedling production.

### ***Propagation from Stem Cuttings***

Varying sizes of stem cuttings can be used, but 20–40 cm (8–16 in) cuttings are manageable and effective. Stem cuttings may root in 3 weeks and be ready for outplanting in 6–9 weeks. As with plants derived from seeds, rooted stem cuttings may be grown in pots for up to 26 weeks or more with excellent results when outplanted.

### ***Maintenance Requirements***

Noni is a low-maintenance landscape plant. It responds well to mulching as long as the mulch is kept away from direct contact with stem. Noni can be pruned or thinned to virtually any extent without

damaging the plant. “Stumped” plants may grow back even bushier than before. Plants require very little fertilizer, but do respond well to periodic applications of organic or inorganic, balanced fertilizers. Extra phosphorous may be applied to simulate flowering and fruit production. Typical balanced fertilizers used include 13-13-13 and 16-16-

16. To stimulate flowering and fruit production use 10-20-10, if a soil test indicates that phosphorous levels are low. If Noni leaves are turning yellow, they could be fertilized with about 225–450 g (0.5–1 lb) of fertilizer per plant, depending on age. The plants also respond very well to foliar fertilizers. Because Noni plants are salt-tolerant, it is very unusual for their root systems to be burned by excess fertilizer.

#### ***Special considerations regarding Leaf, Branch, and Fruit drop***

Fruit drop occurs year round. Dropping fruits are not considered to be a hazard to humans or animals during normal conditions or during storms. People could slip on ripe fruits along footpaths and sidewalks. Noni trees do not topple easily during foul weather, although branches can break, especially when heavy with fruit. Climbing Noni trees should only be done with caution, as branches can suddenly crack off.

#### ***Nuisance Issues***

The fruits have a strong, unpleasant aroma which is considered by some to be a nuisance. The foul odor of noni fruits is considered by many to be a significant detriment to using Noni in a landscape.

#### ***Hazards***

Noni plants are not toxic to humans or animals, nor are there any spines, thorns, etc., on the plant.

Practically every part of the tree has some or the other use and application, though the medicinal uses of the species have been greatly projected. However the commercial aspects are far fro the scope of this report.

**Annexure-2**

<b>S. No.</b>	<b>Name of Monitoring Location</b>	<b>fugitive dust emission (<math>\mu\text{g}/\text{m}^3</math>)</b>
		<b>SPM</b>
<b>1</b>	Mine site	373.24
<b>2</b>	0.5 km from Mine site	341.11
<b>3</b>	0.1 km from Mine site	179.56
<b>4</b>	Village Swaminayakanpati	185.18
<b>5</b>	Village Karangankaradu	177.53
<b>6</b>	Village Kamanayakkanpatti	197.46
<b>7</b>	Village Kattu	173.41
<b>8</b>	Village Nagar Malai	175.67

**Annexure-3**

**Ground and Surface Water Monitoring Results**

S. No.	Parameter	Mine site	Near Mine Site	Village-Swaminayak kanpati	Near Village Kusa Malai	Village-Kattu	Village-Karangankaradu	Village-Kamanayak kanpatti	Village-Mettupatti	Limits of IS:10500 -1991	
										Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)
1.	pH (at 25 °C)	7.99	7.84	7.84	7.88	7.29	7.92	8.03	7.59	6.5 to 8.5	No Relaxation
2.	Colour (Hazen Unit)	<5	<5	<5	<5	<5	<5	<5	<5	5	25
3.	Turbidity (NTU)	<1	<1	<1	<1	<1	<1	<1	<1	5	10
4.	Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	-
5.	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-
6.	Total Hardness as CaCO <sub>3</sub> (mg/l)	384.00	412.00	476.00	492.00	356.00	492.00	516.00	528.00	300	600
7.	Calcium as Ca (mg/l)	86.17	68.14	116.23	112.22	88.18	92.18	98.60	86.57	75	200
8.	Alkalinity as CaCO <sub>3</sub> , (mg/l)	370.42	326.58	471.24	490.60	273.24	410.02	396.00	435.60	200	600
9	Chloride as Cl (mg/l)	19.71	17.74	295.65	231.59	17.74	37.45	35.48	169.51	250	1000
10	Magnesium as Mg (mg/l)	41.07	58.80	45.20	51.52	33.05	63.67	65.61	75.82	30	100
11	Total Dissolved Solids (mg/l)	528.00	586.00	1412.00	1002.00	429.00	628.00	612.00	934.00	500	2000
12	Sulphate as SO <sub>4</sub> (mg/l)	50.16	72.42	271.77	68.06	22.34	46.61	53.06	176.21	200	400

13	Fluoride as F (mg/l)	0.35	0.38	0.84	0.28	0.13	0.70	0.23	0.73	1.0	1.5
14	Nitrate as NO <sub>3</sub> (mg/l)	6.71	9.29	19.70	22.10	1.18	13.84	12.89	14.32	45	No Relaxation
15	Iron as Fe (mg/l)	0.07	0.03	0.03	0.07	0.04	0.02	0.03	0.06	0.3	1.0
16	Aluminium as Al (mg/l)	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.2
17	Boron (mg/l)	<0.50	0.57	0.77	0.67	0.83	0.52	<0.50	0.87	1	5
18	Phenolic Compounds (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002
19	Zinc as Zn (mg/l)	<0.10	<0.10	<0.10	0.11	0.12	0.10	<0.10	0.13	5	15
20	Copper as Cu (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	1.5
21	Manganese as Mn (mg/l)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	0.3
22	Cadmium as Cd (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation
23	Chromium as Cr (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	No Relaxation
24	Sodium as Na (mg/l)	31.20	36.20	262.00	168.00	17.80	32.90	34.20	54.40	-	-
25	Potassium as K (mg/l)	3.60	4.10	6.80	1.80	3.10	4.10	2.80	4.10	-	-
26	Phosphate as PO <sub>4</sub> (mg/l)	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	-	-



**Ambient Air Quality Monitoring Results**

S. No.	Name of Monitoring Location	Ambient Air Quality ( $\mu\text{g}/\text{m}^3$ )		
		PM 10	NO <sub>x</sub>	SO <sub>2</sub>
1.	Mine site	92.39	23.86	9.47
2.	0.5 km from Mine site	64.75	15.59	6.56
3.	0.1 km from Mine site	72.69	15.28	7.02
4.	Village Swaminayakanpati	86.21	18.44	7.69
5.	Village Karangankaradu	88.68	20.27	7.94
6.	Village Kamanayakkanpatti	85.61	20.50	9.21
7.	Village Kattu	83.21	18.93	8.24
8.	Village Nagar Malai	74.94	15.11	7.01

All Subject to Salem Jurisdiction

Mines : 0427-2345937  
Residence : 0427-2400136

### SRI PONGURU MAGNESITE MINES

Prop.: S. SUNDARARAJAN

Ores Mined: Magnesite,

Mfrs. of : Dead-Burnt Magnesite, Lightly Calcined Magnesite, Magnesite Cibs, Magnesite Powder.

(Mines: Jagir Ammapalayam, Salem-636302)

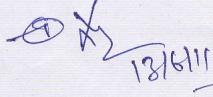
Periagollappatty, SALEM-636008

मंत्रालय, पर्यावरण व वन  
Ministry of Env. & Forests  
के. वेंकटराव, भारत सरकार  
के. ए. एन. भवन, नई दिल्ली  
के. स. व. परिसर, लोदी रोड  
CGO Complex, Lodi Road  
नई दिल्ली / New Delhi-110510

Ref. No.

Date: 13.06.2011

To,  
The Director,  
Ministry of Environment & Forests,  
Government of India,  
Paryavaran Bhawan, C.G.O. Complex,  
Lodhi Road, New Delhi.



**Sub.: Half yearly Compliance Report of Environment Clearance Compliance Conditions for mining project of Sri Ponguru Magnesite mines at Village Jagir Ammapalayam, Taluka and District Selam, Tamil Nadu (ML Area 77.50 ha and Production Capacity 38,000 TPA of Magnesite)**

**Ref.:** MoEF Environmental Clearance Letter No.: J-11015 /23/2009 IA.II (M) dated 16<sup>th</sup> April, 2010.

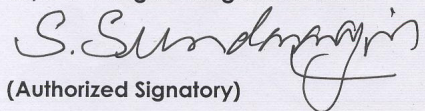
Sir,

This has reference to the above subject and MoEF Letter No. cited above, we hereby submit the **Half yearly Compliance report (Oct.2010 To March 2011)** of Conditions stipulated in Environment Clearance letter issued by MoEF, New Delhi for Sri Ponguru magnesite mines

This is for your kind consideration and record.

Thanking you with regards,

For  
M/s. Sri Ponguru Magnesite mines

  
(Authorized Signatory)

**Enc.:** Half yearly Compliance Report (Oct.2010 to March 2011) of Compliance of conditions stipulated in Environment Clearance Letter

Cc to:

- 1) MoEF, Regional Office, Bangalore.
- 2) Central Pollution Control Board, New Delhi,
- 3) Tamil Nadu Pollution Control Board

**Mine Sump Water Analysis Results**

<b>S. No.</b>	<b>Parameter</b>	<b>Result</b>
<b>1.</b>	pH (at 25 °C)	8.01
<b>2.</b>	Total Dissolved Solid (mg/l)	247.00
<b>3.</b>	Total Suspended Solid (mg/l)	<5.0
<b>4.</b>	Dissolved Oxygen (mg/l)	5.77

### Ambient Noise Level Result

S. No.	Name of Monitoring Location	Noise level Monitoring Unit - dB (A)					
		Day Time (6:00 a.m. to 10:00 p.m.)			Night Time (10:00 p.m. to 6:00 a.m.)		
		L <sub>eq</sub>	L <sub>min</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>min</sub>	L <sub>max</sub>
1	Mine site	54.50	44.10	61.50	45.10	41.50	49.80
2	Near Mine office	53.96	41.80	60.30	42.60	36.70	51.20
3	1 Km East from mine site	54.20	43.80	61.50	45.10	42.10	53.00
4	Village Karangankaradu	49.50	43.10	55.80	41.20	39.10	48.30
5	Village Nagar Malai	48.80	41.40	55.20	43.10	41.20	50.30
6	Village Saminayakkanpati	47.80	39.60	47.80	43.39	36.20	48.70
7	Village Mettupatti	47.80	41.60	57.20	43.70	36.50	51.20
8	Village Kusa Malai	49.20	39.30	54.80	43.58	36.50	52.10

1. Day Time is from 6.00 a.m. to 10.00 p.m.

2. Night Time is reckoned between 10.00 p.m. to 6.00 a.m.

**Environment Management Cell**

