Impact of the Proposed diversion of 4.89 Ha of RF land for Mica, Quartz & Feldspar Mining on Ecology and Biodiversity

Study and Report by

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Sub: Diversion of 4.89 Ha of forest land in Compartment No.121 of Utukuru Reserved Forest Nellore Division for grant of quarry Lease of Mica, Quartz & Feldspar in favour of M/s. P.Dilip Kumar -Reg

Ref: 1. Letter from the PCCF Rc.No.EFS02-15029/6/2021-FCA- SEC PCCF/FCA-3, Dated: 25/08/2021.
2. File No.EFS02-15029/6/2021-FCA SEC-PCC

I.i: Introduction

With reference to the above, the user agency, namely, M/s. P.Dilip Kumar described hereafter as the Project Proponent (PP) engaged the services of Prof.K.B. Reddy, for assessing the impacts of the proposed diversion of forest land and the mining on the flora & fauna within the 4.89 Ha of forest land located in Compartment No.121 of Utukuru (Vutukur) RF and the adjoining RFs through primary survey. The survey also taken in to consideration the preventive and protective measures that need to be incorporated as a part of Environment, Ecology and biodiversity conservation. Primary survey was carried during the last week of September 2021. The objective of the assessment area:

1. Assessment of the flora and fauna of the proposed forest diversion of and biodiversity within the 4.89 Ha of forest land in Compartment No.121 of Utukuru RF for mining of Mica, Quartz and Feldspar and the adverse impacts of the proposed action if the forest land is diverted.
2. Assessment of the status of flora and fauna of the forest and non-forest areas with special reference to rare or endangered or threatened (RET) species and the Schedule I fauna, if any in a radius of 10 km from the proposed site.
3. Whether the proposed diversion and activity is compatible with the National and global objectives of “No net loss of biodiversity”?
4. The assessment also takes in to account the impact of the proposed mining on ecology, especially, soil erosion in and around the mining which may cause sedimentation and silting of lotic and lentic water bodies around the proposed my lease.
5. To suggest desirable and practically feasible mitigative measures to prevent loss to flora and fauna besides prevention of soil erosion in and around the proposed mining area.

I.ii: Proposed Mine Lease Area: Extent and location of land proposed for diversion:

The proposed forest land for diversion is located in Compartment No.121 of Vutukur Reserved Forest, Nellore Division. Diversion is for non-forest quarry lease of Mica, Quartz and Feldspar in favour of M/s.P.Dilip Kumar. Total land proposed to be diverted is 4.89 Ha. The 10 km radius buffer zone around the RF land proposed for diversion is shown in Fig 1.

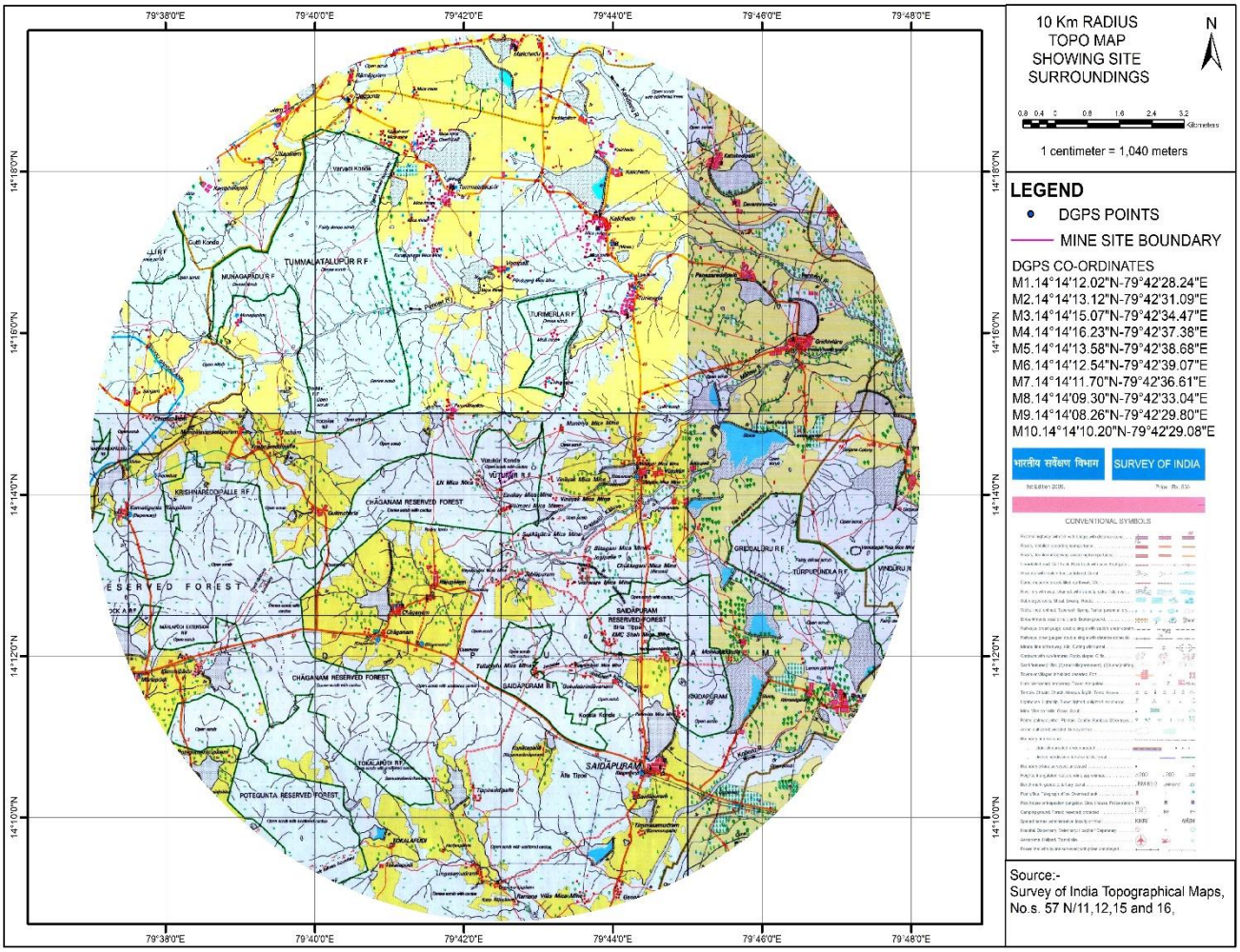


Fig 1. 10 Km radius buffer zone of the proposed forest land for mining.

Fig 1: Map showing the proposed mine lease along with the proposed road

I.iii: Eco-sensitivity of the proposed mine lease:

There are no Eco-sensitive areas such as the Biosphere reserves or National Parks or Wildlife Sanctuaries or migratory corridors of Elephants or Tigers or Nature Heritage sites or Important bird areas (IBAs) or Ramsar wetlands or other protected areas except reserve forests within a radius of 10 km from the mine lease area. Sri Penusila Narasimha Wildlife Sanctuary, Nelapattu Bird Sanctuary and the Pulicat Lake Bird Sanctuary are more than 20 Km away from the mine lease. As shown in Fig 1, there area a number of scattered isolated blocks of reserved forests and mica mines within 10 km from the mine lease. There, are also a few hills and hillocks in the buffer zone. The Vutukur or Utukuru R.F in which the mine lease falls and other forests in the buffer zone belong to Southern dry evergreen scrub. Trees are uncommon and thorny shrubs, succulents and drought-resistant shrubs are predominant. Based on plant cover they range from open to moderately closed scrub forests. There are scattered patches of impenetrable thickets over grown by climbers. The study area comprising of the mine lease (Core area) and its buffer zone of 10 km radius is shown in Fig 1. A list of Reserved forests and Mica mines found in the 10 km buffer zone is given in Table 1.

Table 1. List of Reserved forests and Mica mines present in the buffer zone of the proposed mine lease			
Reserved Forests in the buffer zone		Operating Mica mines in the buffer zone	
Name of the reserved Forest	Direction WRT to the proposed mine	Name of the Mica mine	Direction WRT to the proposed mine
Utukuru R.F	Part of the Mine lease	Mica mine in Turimerla R.F	North
Chaganam RF	West and Southwest	Mica mine in Turimerla R.F	North
Sidapuram RF	South east	Muniriya mica mine	Northeast
Griddalur RF	Southeast	Vinayak mica mine	East
Turpupundala RF	Southeast	Tellabodu Mica Mine	South
Vinduru RF	Southeast	Esvikay mica mine	South
Krishnareddipalli RF	West	Palmani mica mine	South
Tokalapudi RF	Southwest	Sukkapatra mica mine	Southeast
Potegunta RF	Southwest	L.N. mica mine	West
Marlapudi RF	Southwest	Kanakadurga mica mine	Northwest
Munagapadu RF	Southwest	Chukkugani mica mine	South
Tummalatalupur RF	Northwest	Panduranga mica mine	North
Turimerla RF	North	Nityakalyanai Mica mine	South

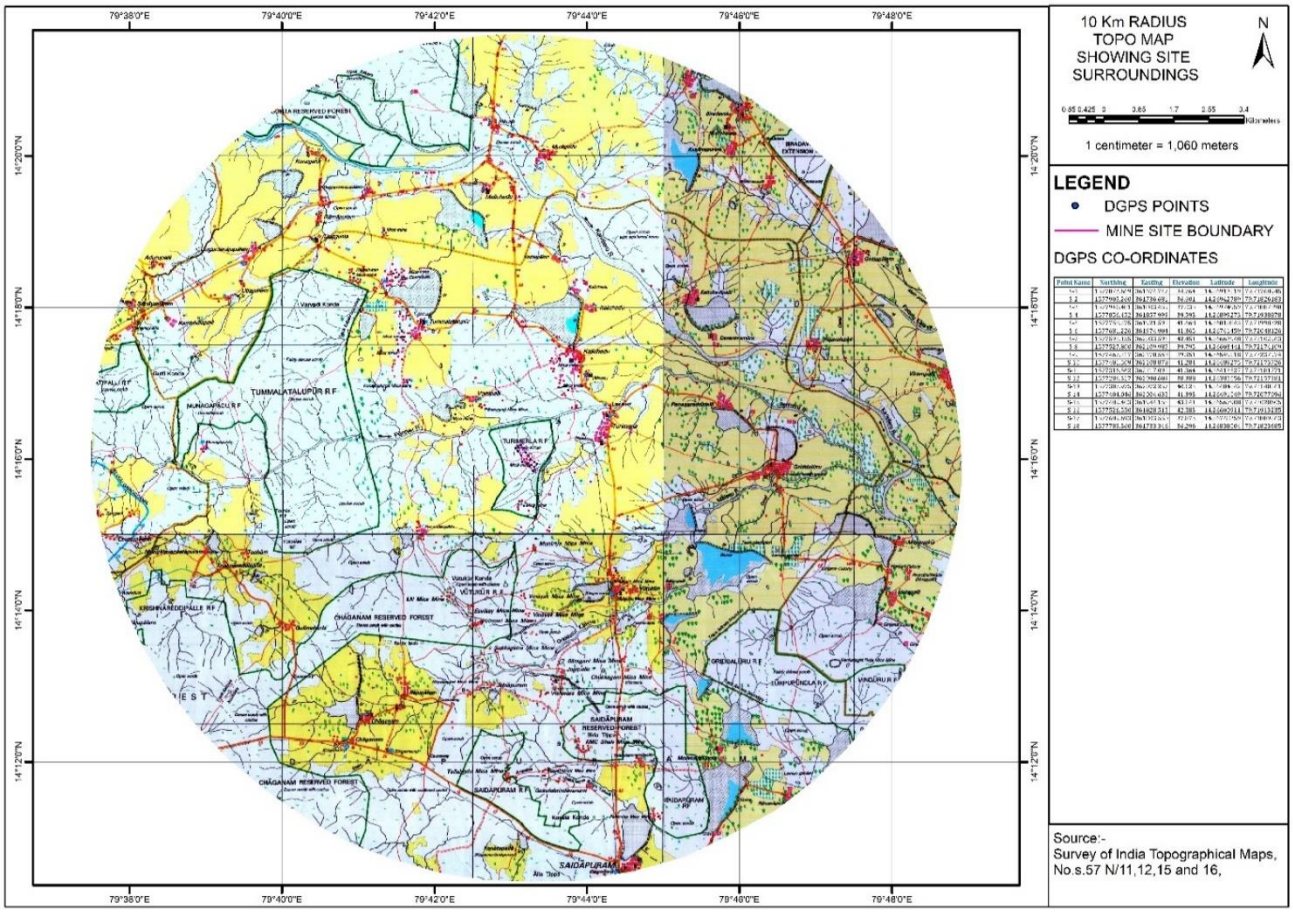


Fig 2: Topo map of the study area.

II: BASELINE DATA

II.i: Forest vegetation and Flora of the reserved forests in and around the proposed mine lease:

As a part of the present study, a rapid primary survey of vegetation, flora and fauna within a radius of 10 km from the proposed project site was caried out on 26th and 27th September 2021 covering the area shown in Fig 1. As per Champion and Seth's classification, SPSR Nellore Division has five major forest types. They are:

(1) Dry Red Sanders bearing forest
(2) Southern Tropical Dry Mixed Deciduous forests
(3) *Hardwickia binata* forest
(4) Southern Tropical Thorn Forest and
(5) Southern Topical Dry evergreen forest.

The RFs in the study area come under the Southern Tropical Thorn Forest and Southern Topical Dry evergreen forests. There was no distinct demarcation between the two in the study area. There was no zonation and merging or mixing of one type with the other was pretty common. The forest vegetation was altered by the invasion of Mesquite (*Prosopis juliflora)* which occupied many forest gaps and open areas both in the forest and non-forest areas. There were also invasive shrubs like Siam weed (*Chromolaena odorata*), Lantana (*Lantana camara*) and *Hyptis suaveolens.*

Rao (1991) studied the flora and vegetation of Nellore district. He reported 926 species belonging to 525 genera and 142 families. Dry deciduous forests, mixed forests, scrub forests, coastal and mangrove vegetation are the chief vegetation types in the district. The forests found in the study area belong to the thorny Scrub forests. They are seen in all parts of the Sri Potti Sriramulu Nellore (SPSR Nellore) district. The trees like *Bauhinia racemosa, Butea monosperma, Albizia amara* and thorny shrubs such as *Acacia horrida, Carissa spinarum; Ziziphus nummularia;* evergreen shrubs like *Dodonaea viscosa* were predominant*. Ziziphus xylopyrus, Ziziphus oenoplea, Ziziphus nummularia, Trema orientalis, Drypetes sepiaria* , *Tarenna asiatica* etc are common in these forests. Succulents like *Opuntia dillenii, Euphorbia antiquorum, Euphorbia tirucalli, Cissus qaudrangularis* are quite common. The thorny shrubs are overgrown by *Daemia extensa, Wattakaka volubilis, Canavalia gladiata, Leptadenia reticulata, Tinospora cordifolia, Cardiospermum halicacabum, Cassytha filiformis, Cissampelos pareira, Cocculus hirsutus, Corallocarpus epigaeus, Decalepis hamiltonii, Hiptage benghalensis, Piper sylvestre, Tylophora indica e*tc. The ground is covered by grasses and forbs*. Spermacoce hispida, Ocimun canum, Senna uniflora, Celosis argentea, Andrographis echinoides, Lepidagathis cristata* and many others. All gaps in the forests are extensively covered by *Prosopis juliflora.*

According to the records of the forest department, the density of the adjacent RF is 0.4. This area falls in Eco-Class IV (Tropical thorn forests and tropical dry evergreen forests). They are open scrub forests. This area does not fall in any Sanctuary. The species such as *Ziziphus xylopyrus, Ziziphus jujube, Acacia leucophloea, Diospyros chloroxylon, Dodonaea viscosa, Carissa spinarum, Euphorbia antiquorum* etc are the most predominant species both in the proposed mine lease area and in the forests of the buffer zone. There is no endemic or threatened taxa in the forests of the study area. A list of all plant species found in the 4.89 Ha forest area proposed for diversion (Core area) is given in Table 2. A list of all plants found in the Reserve forests around the mine lease in 10 km radius is presented in Table 3. It may be stated that this is not an EIA report and hence detailed list of flora present in the non-forest areas of the buffer zone is not included. In accordance with the envisaged objectives of the work, only the list of species found in the reserve forests is given in Table 3. Photos of the existing vegetation of the proposed mine lease within the Turimerla RF are shown in Figs 2, 3 and 4. As the Vutukur (Utukuru) RF block is relatively small and isolated, is was exposed

to biotic pressure from all sides. The forest is only a very minor source of NTF such as the minor forest fruits like Carissa, Ber, *Canthium* etc. However, sheep and goats consume the thorny bushes. Scattered clumps of Reddish yellow beard-grass (*Chrysopogon fulvus)* are conspicuous in the open areas. It is a perennial palatable grass.

Table 2. List of trees, shrubs and perennial climbers found in the proposed mine lease during September 2021.

Scientific name	Common / local name	Family	Habit
Acacia chundra	Sandra	Mimosaceae	Tree
Acacia leucophloea	Tella thumma	Mimosaceae	Tree
Acacia nilotica	Nalla thumma	Mimosaceae	Tree
Achyranthes aspera	Vuttareni	Amaranthaceae	Herb
Agave americana	Kalabanda	Agavaceae	Shrub
Alangium salvifolium	Nalla Vuduga	Alangiaceae	Tree
Albizia amara	Narlinga	Mimosaceae	Tree
Asteracantha longifolia	Neeru gobbi	Acanthaceae	Herb
Asystasia gangetica	Ganges primrose	Acanthaceae	Herb
Blumea lacera	Malay blumea	Asteraceae	Herb
Boerhavia diffusa	Punarva	Nyctaginaceae	Herb
Calotropis gigantea	Tella jilledu	Asclepiadaceae	Shrub
Calotropis procera	Jilledu	Asclepiadaceae	Shrub
Canthium dicoccum	Nalla balusu	Rubiaceae	Shrub
Carissa spinarum	Vaaka / Kalivi	Apocynaceae	Shrub
Cassia auriculata	Tangedu	Caesalpiniaceae	Shrub
Cassia fistula	Rela	Caesalpiniaceae	Tree
Catunaregam spinosa	Managa	Rubiaceae	Shrub
Chromolaena odorata	Siam weed	Asteraceae	Shrub
Chrysopogon fulvus	Reddish yellow beardgrass	Poaceae	Grass
Cissus qaudrangularis	Nalleru	Vitaceae	Climber
Clerodendrum splendens	Bharangi	Verbenaceae	Shrub
Croton bonplandianum	Three-leaved caper	Euphorbiaceae	Herb
Cryptostegia grandflora	Rubber Wine	Asclepiadaceae	Climber
Cyperus rotundus	Tunga gaddi	Cyperaceae	Sedge
Datura metel	Vummetta	Solanaceae	Herb
Decalepis hamiltonii	Peru Nannari	Periplocaceae	Climber
Desmodium triflorum	Three flowered tickerfoil	Fabaceae	Herb
Desmostachya bipinnata	Halfa grass	Poaceae	Grass
Dichanthium annulatum	Marvel grass	Poaceae	Grass
Dichrostachys cinerea	Veluthuru Chettu	Mimosaceae	Tree
Diospyros chloroxylon	Green Ebony	Ebenaceae	Tree
Dodonaea viscosa	Bandedu	Sapindaceae	Shrub
Echinops echinatus	Brahmadanda	Asteraceae	Herb
Emilia sonchifolia	Red tassel flower	Asteraceae	Herb
Euphorbia antiquorum	Jemudu	Euphorbiaceae	Shrub
Euphorbia tirucalli	Pencil Tree	Euphorbiaceae	Shrub

Grewia villosa	Tavidu / Tavadu	Tiliaceae	Tree
Heteropogon contortus	Spear grass	Poaceae	Grass
Hiptage benghalensis	Madhavilatha	Malpighiaceae	Climber
Holoptelea integrifolia	Nemalinara	Ulmaceae	Tree
Hyptis suaveolens	American Mint	Lamiaceae	Herb
Ipomoea carnea	Pink Morning glory	Convolvulaceae	Shrub
Ipomoea obscura	Goat's foot	Convolvulaceae	Climber
Ipomoea palmata	Railway Creeper	Convolvulaceae	Climber
Jatropha curcas	Wild Castor	Euphorbiaceae	Shrub
Jatropha gossypifolia	Siria Amanakku	Euphorbiaceae	Shrub
Lantana camara	Lantana	Verbenaceae	Shrub
Melinis repens	Purple top grass	Poaceae	Grass
Mimosa rubicaulis	Rasne / Urisige	Mimosaceae	Shrub
Opuntia elatior	Prickly Peer	Cactaceae	Shrub
Oxalis corniculata	Creeping wood sorrel	Oxalidaceae	Herb
Parthenium hysterophorus	Congress grass	Asteraceae	Herb
Pergularia daemia	Chebira	Asclepiadaceae	Climber
Phoenix sylvestris	Yeetha chettu	Arecaceae	Palm
Prosopis juliflora	English Thumma	Mimosaceae	Tree
Prosopis spicigera	Jammi	Mimosaceae	Tree
Randia dumetorum	Nalla balusu	Rubiaceae	Shrub
Ruellia prostrata	Prostrate wild petunia	Acanthaceae	Herb
Ruellia tuberosa	Snapdragon root	Acanthaceae	Herb
Sida acuta	Common wireweed	Malvaceae	Herb
Sida cordifolia	Heart-leaf sida	Malvaceae	Herb
Sida rhombifolia	Arrowleaf sida	Malvaceae	Herb
Sida spinosa	Prickly fanpetals	Malvaceae	Herb
Solanum torvum	Turkey berry	Solanaceae	Shrub
Solanum xanthocarpum	Yellow berried nightshade	Solanaceae	Herb
Tridax procumbens	Coat buttons	Asteraceae	Herb
Tylophora indica	Naippalai	Assclepiadacae	Climber
Vachellia horrida	Robber Thorn	Mimosaceae	Shrub
Vitex negundo	Nirgundi	Verbenaceae	Shrub
Waltheria indica	Sleepy morning	Malvaceae	Herb
Wattakaka volubilis	Sneeze Wort	Asclepiadaceae	Climber
Wrightia tinctoria	Sweet Indrajao	Apocynaceae	Tree
Xanthium strumarium	Common cocklebur	Asteraceae	Herb
Ziziphus nummularia	Nela regu	Rhamnaceae	Tree
Ziziphus horrida	Tella regu	Rhamnaceae	Tree
Ziziphus xylopyrus	Gotti chettu	Rhamnaceae	Tree

Vegetation of 4.89 ha of forest land in compartment No.121 of Utukuru Reserve Forest. It is an open dry semievergreen scrub forest. Evergreen shrubs like D*odonaea viscosa*, *Diospyros Chloroxylon*, *Maytenus emarginata*, *Cassia auriculata*, *Carissa spinarum* etc makes it green

Fig 2. Vegetation of the reserve forest area proposed for transfer.

Vegetation of the 4.89 ha of forest land in compartment No.121 of Utukuru Reserve Forest. It is an open dry semievergreen thorny scrub forest. Thorny shrubs like *Acacia*, *Ziziphus*, *Maytenus*, *Randia*, *Prosopis juliflora* are common

Fig 3. Vegetation and terrain of the reserve forest land proposed for transfer.

Vegetation of 4.89 ha of forest land in compartment No.121 of Utukuru Reserve Forest. It is an open dry semievergreen scrub forest. Evergreen shrubs and thorny bushes are common.

Fig 4: Existing vegetation of the proposed mine lease area.

Table 4. List of trees, shrubs and perennial climbers found in the forests of the buffer zone

Scientific name	Common / local name	Family	Habit
Abutilon indicum	Duvvena benda	Malvaceae	Shrub
Acacia chundra	Sandra	Mimosaceae	Tree
Acacia leucophloea	Tella thumma	Mimosaceae	Tree
Acacia nilotica	Nalla thumma	Mimosaceae	Tree
Acalypha indica	Kuppi	Euphorbiaceae	Herb
Acanthospermum hispidum	Mulla banthi	Asteraceae	Shrub
Achyranthes aspera	Vuttareni	Amaranthaceae	Herb
Aerva javanica	Maga beera	Amaranthaceae	Herb
Aerva lanata	Pindi donda	Amaranthaceae	Herb
Aeschynomene indica	Jeeluga	Fabaceae	Herb

Agave americana	Kalabanda	Agavaceae	Shrub
Ageratum conyzoides	Goat weed	Asteraceae	Herb
Alangium salvifolium	Nalla Vuduga	Alangiaceae	Tree
Albizia amara	Narlinga	Mimosaceae	Tree
Albizia lebbeck	Dirisana	Mimosaceae	Tree
Alternanthera philoxeroides	Ponnaganti	Amaranthaceae	Herb
Alternanthera pungens	Khaki weed	Amaranthaceae	Herb
Alternanthera sessilis	Ponnaganti	Amaranthaceae	Herb
Alysicarpus monilifer	Alyce clover	Fabaceae	Herb
Amaranthus spinosus	Mulla thotakura	Amaranthaceae	Herb
Amaranthus viridis	Siri kura	Amaranthaceae	Herb
Ammannia baccifera	Blistering ammannia	Lythraceae	Herb
Andrographis echinoides	Lavalata	Acanthaceae	Herb
Andrographis paniculata	Nela Vemu	Acanthaceae	Herb
Antigonon leptopus	Coral Creeper	Polygonaceae	Climber
Argemone mexicana	Balurakkasi	Papavarceae	Herb
Asteracantha longifolia	Neeru gobbi	Acanthaceae	Herb
Asystasia gangetica	Ganges primrose	Acanthaceae	Herb
Azadirachta indica	Vepa	Meliaceae	Tree
Biophytum sensitivum	Lajalu	Oxalidaceae	Herb
Blepharis maderaspatensis	Creeping Blepharis	Acanthaceae	Herb
Blumea lacera	Malay blumea	Asteraceae	Herb
Boerhavia diffusa	Punarva	Nyctaginaceae	Herb
Boerhavia erecta	Erect spiderling	Nyctaginaceae	Herb
Borreria hispida	Madanganti	Rubiaceae	Herb
Borreria pusilla	Tiny false buttonweed	Rubiaceae	Herb
Brachiaria deflexa	Annual brachiaria	Poaceae	Grass
Brachiaria erusiformis	Sweet signal grass	Poaceae	Grass
Brachiaria ramosa	Browntop millet	Poaceae	Grass
Brachiaria reptans	Running grass	Poaceae	Grass
Calotropis gigantea	Tella jilledu	Asclepiadaceae	Shrub
Calotropis procera	Jilledu	Asclepiadaceae	Shrub
Canthium dicoccum	Nalla balusu	Rubiaceae	Shrub
Cardiospermum halicacabum	Budda budusa	Sapindaceae	Climber
Carissa spinarum	Vaaka / Kalivi	Apocynaceae	Shrub
Cassia auriculata	Tangedu	Caesalpiniaceae	Shrub
Cassia fistula	Rela	Caesalpiniaceae	Tree
Cassia occidentalis	Kasinda	Caesalpiniaceae	Herb
Cassia pumila	Dwarf cassia	Caesalpiniaceae	Herb
Cassia tora	Tagirise	Caesalpiniaceae	Herb
Catunaregam spinosa	Managa	Rubiaceae	Shrub
Celosia argentea	Cock's comb	Amaranthaceae	Herb
Chloris barbata	Purple chloris	Poaceae	Grass
Chromolaena odorata	Siam weed	Asteraceae	Shrub
Chrozophora rottleri	Yerra miriyam	Euphorbiaceae	Herb
Chrysopogon fulvus	Reddish yellow beardgrass	Poaceae	Grass
Cissus qaudrangularis	Nalleru	Vitaceae	Climber
Cissus vitiginea	Adavi gummadi	Vitaceae	Climber
Cleome gynandra	Vaminta	Cleomaceae	Herb
Cleome monophylla	Spindle pod	Cleomaceae	Herb

Cleome viscosa	Kukkavaminta	Cleomaceae	Herb
Clerodendrum splendens	Bharangi	Verbenaceae	Shrub
Commelina benghalensis	Neeru kassuvu	Commelinaceae	Herb
Commelina diffusa	Climbing dayflower	Commelinaceae	Herb
Commelina forskaolii	Rat's ear	Commelinaceae	Herb
Convolvulus arvensis	Field bindweed	Convolvulaceae	Herb
Conyza bonariensis	Asthma weed	Asteraceae	Herb
Conyza canadensis	Canadian horseweed	Asteraceae	Herb
Corchorus aestuans	Kajati / Kalasa	Tiliaceae	Herb
Corchorus capsularis	White jute	Tiliaceae	Herb
Corchorus fascicularis	Tall wild jute	Tiliaceae	Herb
Crotalaria prostrata	Rattlepod	Fabaceaeae	Herb
Crotalaria verrucosa	Giliginta	Fabaceaeae	Herb
Croton bonplandianum	Three-leaved caper	Euphorbiaceae	Herb
Cryptostegia grandflora	Rubber Wine	Asclepiadaceae	Climber
Cyanotis axillaris	Golla gundi	Commelinaceae	Herb
Cyanotis cristata	Crested cat ears	Commelinaceae	Herb
Cynodon dactylon	Garika gaddi	Poaceae	Grass
Cyperus brevifolius	Mullimbimby couch	Cyperaceae	Sedge
Cyperus compressus	Poorland flatsedge	Cyperaceae	Sedge
Cyperus difformis	Variable flatsedge	Cyperaceae	Sedge
Cyperus eragrostis	Pale galingale	Cyperaceae	Sedge
Cyperus haspan	Haspan flatsedge	Cyperaceae	Sedge
Cyperus iria	Ricefield flatsedge	Cyperaceae	Sedge
Cyperus kyllingia	White head spike sedge	Cyperaceae	Sedge
Cyperus rotundus	Tunga gaddi	Cyperaceae	Sedge
Cyperus tenuispica	Slender spiked sedge	Cyperaceae	Sedge
Cyperus triceps	---	Cyperaceae	Sedge
Dactyloctenium aegyptium	Crowfoot grass	Poaceae	Grass
Dactyloctenium scindicum	Crowfoot grass	Poaceae	Grass
Pergularia daemia	Chebira	Asclepiadaceae	Climber
Datura metel	Vummetta	Solanaceae	Herb
Decalepis hamiltonii	Peru Nannari	Periplocaceae	Climber
Desmodium gangeticum	Sal leaved desmodium	Fabaceae	Herb
Desmodium laxiflorum	Loose flowered desmodium	Fabaceae	Herb
Desmodium triflorum	Three flowered tickerfoil	Fabaceae	Herb
Desmostachya bipinnata	Halfa grass	Poaceae	Grass
Dichanthium annulatum	Marvel grass	Poaceae	Grass
Digera arvensis	False amaranth	Amaranthaceae	Herb
Digitaria sanguinalis	Large crabgrass	Poaceae	Grass
Dinebra retroflexa	Viper grass	Poaceae	Grass
Diospyros chloroxylon	Green Ebony	Ebenaceae	Tree
Dodonaea viscosa	Bandedu	Sapindaceae	Shrub
Echinochloa colona	Jungle rice	Poaceae	Grass
Echinochloa crusgalli	Barnyard grass	Poaceae	Grass
Echinops echinatus	Brahmadanda	Asteraceae	Herb
Eclipta alba	Guntakalakara	Asteraceae	Herb

Eclipta prostrata	Prostrate False Daisy	Asteraceae	Herb
Eleusine indica	Goosegrass	Poaceae	Grass
Emilia sonchifolia	Red tassel flower	Asteraceae	Herb
Eragrostis unioloides	Chinese lovegrass	Poaceae	Grass
Euphorbia antiquorum	Jemudu	Euphorbiaceae	Shrub
Euphorbia dracunculoides	Tillakada	Euphorbiaceae	Shrub
Euphorbia hirta	Asthma herb	Euphorbiaceae	Herb
Euphorbia hypersifolia	Graceful sandmat	Euphorbiaceae	Herb
Euphorbia indica	---	Euphorbiaceae	Herb
Euphorbia thymifolia	Gulf sandmart	Euphorbiaceae	Herb
Evolvulus alsinoides	Vishnukranti	Convolvulaceae	Herb
Evolvulus nummularius	Roundleaf bindweed	Convolvulaceae	Herb
Fcus hispida	Hairy Fig	Moraceae	Tree
Ficus benghalensis	Marri	Moraceae	Tree
Ficus racemosa	Medi	Moraceae	Tree
Ficus religiosa	Raavi	Moraceae	Tree
Fimbristylis dichotoma	Forked fimbry	Cyperaceae	Sedge
Fimbristylis miliaceae	Grass-like fimbry	Cyperaceae	Sedge
Gardenia resinifera	Konda manda	Rubiaceae	Shrub
Glinus lotoides	Lotus sweetjuice	Molluginaceae	Herb
Glinus oppositifolius	Bitter cumin	Molluginaceae	Herb
Gnaphalium polycephalum	White balsam	Asteraceae	Herb
Gomphrena decumbens	Prostrate globe-amaranth	Amaranthaceae	Herb
Grewia villosa	Tavidu / Tavadu	Tiliaceae	Tree
Heliotropium indicum	Indian heliotrope	Boraginaceae	Herb
Heliotropium ovalifolium	Grey leaf heliotrope	Boraginaceae	Herb
Heteropogon contortus	Spear grass	Poaceae	Grass
Hibiscus lobatus	Atakanara	Malvaceae	Herb
Hibiscus micranthus	Tiny flower Hibiscus	Malvaceae	Herb
Hibiscus panduriformis	Yellow hibiscus	Malvaceae	Herb
Hibiscus vitifolius	Grape-leaved mallow	Malvaceae	Herb
Hiptage benghalensis	Madhavilatha	Malpighiaceae	Climber
Holoptelea integrifolia	Nemalinara	Ulmaceae	Tree
Hyptis suaveolens	American Mint	Lamiaceae	Herb
Indigofera cordifolia	Heart leaf indigo	Fabaceae	Herb
Indigofera linifolia	Grass-leaf Indigo	Fabaceae	Herb
Indigofera linnaei	Birdsville indigo	Fabaceae	Herb
Ionidium suffruticosum	Spade flower	Violaceae	Herb
Ipomoea cairica	Cairo morning glory	Convolvulaceae	Climber
Ipomoea carnea	Bush morning glory	Convolvulaceae	Climber
Ipomoea carnea	Pink Morning glory	Convolvulaceae	Shrub
Ipomoea coccinea	Red star	Convolvulaceae	Climber
Ipomoea hederacea	Obscure morning glory	Convolvulaceae	Climber
Ipomoea obscura	Goat's foot	Convolvulaceae	Climber
Ipomoea palmata	Railway Creeper	Convolvulaceae	Climber
Ischaemum indicum	Indian murainagrass	Poaceae	Grass
Ischaemum rugosum	Wrinkled duck-beak	Poaceae	Grass
Jatropha curcas	Wild Castor	Euphorbiaceae	Shrub
Jatropha gossypifolia	Siria Amanakku	Euphorbiaceae	Shrub

Lantana camara	Lantana	Verbenaceae	Shrub
Leonitis nepetaefolia	Lion's ear	Lamiaceae	Shrub
Leptochloa chinensis	Chinese sprangletop	Poaceae	Grass
Leucaena leucocephala	Subabul	Mimosaceae	Tree
Leucas aspera	Tummi	Lamiaceae	Herb
Malvastrum coromandelianum	Spine seeded falsemallow	Malvaceae	Herb
Melinis repens	Purple top grass	Poaceae	Grass
Melochia corchorifolia	Chacolate weed	Sterculiaceae	Herb
Merremia aegyptia	Hairy woodrose	Convolvulaceae	Climber
Merremia dissecta	White convolvulus creeper	Convolvulaceae	Climber
Merremia emarginata	Kidney leaf morning glory	Convolvulaceae	Climber
Mimosa pudica	Touch-me -not	Mimosaceae	Herb
Mimosa rubicaulis	Rasne / Urisige	Mimosaceae	Shrub
Mollugo nudicaulis	Nakedstem carpetweed	Molluginaceae	Herb
Mollugo pentaphylla	Five leaved carpetweed	Molluginaceae	Herb
Oldenlandia corymbosa	Diamond flower	Rubiaceae	Herb
Oldenlandia diffusa	Snake Needle Grass	Rubiaceae	Herb
Oldenlandia herbacea	Slender Oldenlandia	Rubiaceae	Herb
Oplismenus burmannii	Wavy-leaf Basket Grass	Poaceae	Grass
Opuntia elatior	Prickly Peer	Cactaceae	Shrub
Oxalis corniculata	Creeping wood sorrel	Oxalidaceae	Herb
Oxlis martiana	Lilac oxalis	Oxalidaceae	Herb
Parthenium hysterophorus	Congress grass	Asteraceae	Herb
Paspalidium dilatatum	Dallis grass	Poaceae	Grass
Paspalidium flavidum	Yellow Watercrown Grass	Poaceae	Grass
Paspalum distichum	Knot grass	Poaceae	Grass
Peristrophe paniculata	Panicled peristrophe	Acanthaceae	Herb
Phalaris minor	Little seed canary grass	Poaceae	Grass
Phaseolus trilobus	Pilli pesara	Fabaceae	Herb
Phyla nodiflora	Texas frogfruit	Verbenaceae	Herb
Phyllanthus amarus	Nela usiri	Phyllanthaceae	Herb
Phyllanthus maderaspatensis	Madras leaf-flower	Phyllanthaceae	Herb
Physalis minima	Sunberry	Solanaceae	Herb
Physalis peruviana	Cape goose berry	Solanaceae	Herb
Polygonum plebeium	Small knotweed	Polygonaceae	Herb
Polypogon monspeliensis	Annual rabbitsfoot grass	Poaceae	Grass
Portulaca oleracea	Common purslane	Portulaceae	Herb
Portulaca quadrifida	Chickenweed	Portulaceae	Herb
Prosopis juliflora	English Thumma	Mimosaceae	Tree
Prosopis spicigera	Jammi	Mimosaceae	Tree
Randia dumetorum	Nalla balusu	Rubiaceae	Shrub

Rhynchosia minima	Gaddi chikkudu	Fabaceae	Climber
Rottboellia cochinchinensis	Itch grass	Poaceae	Grass
Ruellia prostrata	Prostrate wild petunia	Acanthaceae	Herb
Ruellia tuberosa	Snapdragon root	Acanthaceae	Herb
Rungia pectinata	Comb Rungia	Acanthaceae	Herb
Rungia repens	Creeping rungia	Acanthaceae	Herb
Saccharum spontaneum	Wild sugarcane	Poaceae	Grass
Sacciolepis indica	Glenwood grass	Poaceae	Grass
Setaria glauca	Yellow foxtail	Poaceae	Grass
Setaria viridis	Green foxtail	Poaceae	Grass
Sida acuta	Common wireweed	Malvaceae	Herb
Sida cordata	Heartleaf fanpetals	Malvaceae	Herb
Sida cordifolia	Heart-leaf sida	Malvaceae	Herb
Sida rhombifolia	Arrowleaf sida	Malvaceae	Herb
Sida spinosa	Prickly fanpetals	Malvaceae	Herb
Solanum nigrum	Black nightshade	Solanaceae	Shrub
Solanum trilobatum	Thoodhuvalai	Solanaceae	Shrub
Solanum xanthocarpum	Yellow berried nightshade	Solanaceae	Herb
Sonchus asper	Spiny sowthistle	Asteraceae	Herb
Sonchus oleraceus	Smooth sowthistle	Asteraceae	Herb
Sopubia delphinifolia	Common sopubia	Scrophulariaceae	Herb
Sorghum halapense	Johnson grass	Poaceae	Grass
Sphaeranthus indicus	East Indian globe thistle	Asteraceae	Herb
Spilanthes acmella	Pellitary	Asteraceae	Herb
Sporobolus diander	Indian drop seed	Poaceae	Grass
Stachytarpeta indica	Aaron's rod	Verbenaceae	Herb
Stemodia viscosa	Sticky blue rod	Scrophulariaceae	Herb
Striga asiatica	Witch weed	Orobanchaceae	Herb
Themeda triandra	Red oat grass	Poaceae	Grass
Trianthema portulacastrum	Horse purslane	Aizoaceae	Herb
Tribulus terrestris	Palleru	Zygophyllaceae	Herb
Trichodesma indicum	Indian borage	Boraginaceae	Herb
Trichodesma zeylanicum	Camel bush	Boraginaceae	Herb
Tridax procumbens	Coat buttons	Asteraceae	Herb
Trifolium fragiferum	Strawberry clover	Fabaceae	Herb
Trigonella polycerata	Wild fenugreek	Fabaceae	Herb
Triumfetta rhomboidea	Burbush	Burbush	Herb
Tylophora indica	Naippalai	Assclepiadacae	Climber
Urena lobata	Caesarweed	Malvaceae	Herb
Urena sinuata	Bur mallow	Malvaceae	Herb
Vachellia horrida	Robber Thorn	Mimosaceae	Shrub
Verbascum chinense	Chinese mullein	Scrophulariaceae	Herb
Vernonia cinerea	Little ironweed	Asteraceae	Herb
Vitex negundo	Nirgundi	Verbenaceae	Shrub
Waltheria indica	Sleepy morning	Malvaceae	Herb
Wattakaka volubilis	Sneeze Wort	Asclepiadaceae	Climber
Wrightia tinctoria	Sweet Indrajao	Apocynaceae	Tree
Xanthium strumarium	Common cocklebur	Asteraceae	Herb
Ziziphus nummularia	Nela regu	Rhamnaceae	Tree

Ziziphus horrida	Tella regu	Rhamnaceae	Tree
Ziziphus xylopyrus	Gotti chettu	Rhamnaceae	Tree
Zornia gibbosa	Grasslike zornia	Fabaceae	Herb

II.ii: Present stage and Status of the proposed 4.89 Ha Reserve forest land meant for diversion:

As stated earlier, the proposed lease area is located in an open degraded reserve forest. There are no trees. The thorny shrubs of *Carissa, Vachellia horrida* and *Ziziphus* in open areas assumed spreading habitat owing to lack of competition. The open forest areas look more like a non-productive wasteland. It is not a part of any prime forest land though it is legally a reserve forest land. Most of the plants present in the area proposed to be diverted are likely to be destroyed owing to site clearance for mining; opening of mining pits and dumping of over burden and waste. But there shall be no loss of any species listed under the threatened category by the Botanical Survey of India (BSI) since no such species is found in the zone of impact. However, loss of the existing ground and canopy cover may increase or accelerate soils erosion.

II.iii: Terrestrial Fauna of the Proposed Mine Lease and the Adjacent Reserve Forests

The study area under consideration is not a part of any Eco sensitive area. There are no National Parks or Biosphere Reserves or Wildlife Sanctuaries or IBAs or other protected areas like Wetlands other than the village irrigation tanks. There are no breeding grounds or feeding grounds or migratory corridors of any Schedule I species of Wildlife (Protection) Act. There are no cases of conflict between humans and wildlife. A list of forests found in the 10 km radius is given in Table 1. A list of vertebrates (other than Aves) either spotted or reported from the study area is given in Table 4. A list of Birds either spotted or reported from the study area is given in Table 5. There are no rare or endangered or threatened (RET) or Schedule I species in the study area.

Table 4. List of vertebrates other than birds either found or known to have been spotted earlier. Core area is the 4.89 Ha forest area proposed for diversion. LC means Least concern

MAMMALS:			
Common name	Latin name	Whether found in the core area	IUCN / WPA
Lesser Bandicoot	*Bandicota bengalensis*	Yes	LC / IV
Greater Bandicoot	*Bandicota indica*	Yes	LC / IV
Indian Jackal	*Canis aureus*	No	LC / II
Three striped squirrel	*Funambulus palmarum*	Yes	LC / IV
Porcupine	*Hystrix indica*	No	LC / III
Indian hare	*Lupus nigricollis*	Yes	LC / IV
Rhesus Monkey	*Macaca mulatto*	No	LC / II
Indian field rat	*Mus booduga*	Yes	LC / IV
House rat	*Mus muscuius*	No	LC / IV
Common Languor	*Presbytina entellus*	No	LC / II
House Rat	*Rattus rattus*	No	LC / IV
Fruit bat	*Rousettus leschnaulti*	No	LC / V
Wild boar	*Sus scroffa*	Yes	LC / III
Common Mongoose	*Herpestes edwardsii*	Yes	LC / II
Indian Fox	*Vulpes bengalensis*	No	LC / II
REPTILES			

Green Vine Snake	*Ahaetulla nasuta*	Yes	LC / II
Krait	*Bungarus caeruleus*	Yes	LC / II
Garden lizard	*Calotes versicolor*	Yes	LC / IV
Chameleon	*Chameleon zeylanicum*	No	LC / II
Whip Snake	*Dryphis nasutus*	Yes	LC / II
Saw scaled viper	*Echis carinatus*	No	LC / II
Grass skink	*Eutropis carinata*	Yes	LC / IV
Wall lizard	*Hemidactylus flaviviridis*	Yes	LC / IV
Small wall lizard	*Hemidactylus frenatus*	Yes	LC / IV
Termite hill Gecko	*Hemidactylus triedrus*	Yes	LC / IV
Cobra	*Naja naja*	Yes	LC / II
Rat snake	*Ptyas mucosus*	Yes	LC / II
Blind Snake	*Ramphotyphlops braminus*	Yes	LC / II
Russell's viper	*Vipera russseli*	No	LC / II
AMPHIBIANS			
Ordinary frog	*Rana hexadactyla.*	Yes	LC / IV
South Indian Toad	*Bufo melonosticatus*	Yes	LC / IV
Tree Frog	*Polypedates maculatus*	Yes	LC / IV
Burrowing frog	*Cacopus bystema*	No	LC / IV
Tiger Frog	*Rana tigrina*	Yes	LC / IV

Table 5: List of Birds either spotted or reported from the study area. Core area is the 10.72 Ha Forest area proposed for diversion. No rare or endangered or threatened (RET) bird species was either spotted or reported.

Latin name	Common name	Local Name	WPA Schedule	Whether found in core area
Accipiter badius	Shikra	Shikra gradda	LC / IV	No
Acridotheres tristis	Common Myna	Goruvanka	LC / IV	Yes
Alauda gulgula	Small sky Lark	Uttara guvva	LC / IV	Rare
Alcedo atthis	Common kingfisher	Lakhumukhi Pitta	LC / IV	Rare
Anthus novaeseelandiae	Paddy field Pipit	Varimadi Pipit	LC / IV	Rare
Apus affinis	House Swift	Babila	LC / IV	Yes
Ardea alba	Large Egret	Pedda tella konga	LC / IV	Rare
Bubulcus ibis	Cattle Egret	Konga	LC / IV	Yes
Burhinus oedicnemus	Stone curlew	Raati curlew	LC / IV	Rare
Butastur teesa	White eyed buzzard	Tella kannu buzzard	LC / IV	Rare
Butorides striatus	Little Green Heron	Chaarala konga	LC / IV	Rare
Cacomantis merulinus	Plaintive Cuckoo	Chaarala Kokila	LC / IV	Rare
Calidris minuta	Little Stint	Chinna stint	LC / IV	Rare
Caprimulgus asiaticus	Indian Night jar	Maamulu night jar	LC / IV	Rare
Centropus sinensis	Crow pheasant	Jamudu kaaki	LC / IV	Yes
Ceryle rudis	Lesser Pied Kingfisher	Lakumukhi Pitta	LC / IV	Rare

Charities dubious	Little Ringed plover	China valaya plover	LC / IV	Rare
Chloropsis aurifrons	Green bulbul	Bulbul	LC / IV	Yes
Colomba livia	Blue Rock pigeon	Paavuram	LC / IV	Yes
Copsychus saularis	Magpie Robin	Tella chaara nalla pitta	LC / IV	Yes
Coracias benghalensis	Blue jay	Paala pitta	LC / IV	Rare
Corvus macrorhynchos	Jungle Crow	Adavi kaaki	LC / IV	Yes
Corvus splendns	House crow	Kaaki	LC / V	Yes
Coturnix coturnix	Common quail	Puredu pitta	LC / IV	Yes
Cypsiurus parvus	Palm swift	Taati swift	LC / IV	Yes
Dendrocitta vagabunda	Rufous treepie	Tree Pie	LC / IV	Rare
Dicaeum erythrorhynchos	Pale billed flower pecker	Puvvu pitchuka	LC / IV	Rare
Dicrurus adsimilis	Black drongo	Nalla drongo	LC / IV	Yes
Dicrurus caerulescens	White bellied drongo	Tella potta drongo	LC / IV	Rare
Dicrurus remifer	Lesser Rocket tail drongo	Podavu thoka nalla pitta	LC / IV	Rare
Dinopium benghalense	Golden backed wood Pecker	Bangaru vadrangi pitta	LC / IV	Rare
Egretta garzetta	Little Egret	China tella konga	LC / IV	Yes
Egretta intermedia	Median egret	Konga	LC / IV	Yes
Elanus caeruleus	Black winged kite	Nalla rekkala gadda	LC / IV	Rare
Esacus magnirostris	Great stone plover	Pedda raati flover	LC / IV	Rare
Eudynamys scolopacea	Asian Koel	Kokila	LC / IV	Yes
Francolinus pondicerianaus	Gray Patridge	Ooda kamuju	LC / IV	Rare
Galerida cristata	Indian crested lark	Juttu lark	LC / IV	Rare
Halcyon smyrnesis	White breasted Kingfisher	Tella yeda lakhumukhi pitta	LC / IV	Rare
Haliaistur indus	Brahminy kite	Brahmana gradda	LC / IV	Rare
Hemiprocne longipennis	Crested tree swift	Juttu swift	LC / IV	Rare
Himantopus himantopus	Black winged stilt	Nalla rekkala stilt	LC / IV	Rare
Hirundo daurica	Striated swallow	Cchaarala pitta	LC / IV	Rare
Hirundo rustica	Common Swallow	Swallow	LC / IV	Rare
Lanius excubitor	Grey Shrike	Uuda shrike	LC / IV	Rare
Lonchura malabarica	White throated Munia	Tella gontu munia	LC / IV	Rare
Lonchura malacca	Black headed munia	Nalla tala munia	LC / IV	Rare
Lonchura punctulata	Spotted munia	Chukkala munia	LC / IV	Rare
Megalaima haemacephala	Copper smith	Raagi pitta	LC / IV	Rare
Merops orientalis	Green bee-eater	Mirapakaya pitta	LC / IV	Rare
Merops philippinus	Blue tailed bee Eater	Mirapakaya pitta	LC / IV	Rare
Micropternus brachyurus	Rufous woodpecker	Vadrangi pitta	LC / IV	Rare
Milvus migrans	Black Kite	Peethiri gadda	LC / IV	Yes
Motacilla alba	Pied wagtail	Toka oopu tella chaara pitta	LC / IV	Yes

Motacilla flava	Yellow wagtail	Toka oopu pasupu pitta	LC / IV	Yes
Nectarinia lotenia	Loten's sunbird	Sunbird	LC / IV	Rare
Nectarinia asiatica	Purple sunbird	Yerra sunbird	LC / IV	Yes
Nectarinia zeylonica	Plum rumped sunbird	Yerra veepu sunbird	LC / IV	Rare
Netta rufina	Red crested Pochard	Erra juttu baatu	LC / IV	Rare
Nettapus coromandelianus	Cotton Teal	Tella paraja	LC / IV	Rare
Nycticorax nycticorax	Night Heron	Sabari Konga	LC / IV	Rare
Oriolus oriolus	Golden oriole	Bangaru pitta	LC / IV	Yes
Orthotomus sutorius	Tailor Bird	Tailor pakshi	LC / IV	Rare
Parus major	Grey Tit	Ooda tit	LC / IV	Rare
Passer domesticus	House sparrow	Pitchuka	LC / IV	Yes
Pelargopis capensis	Spot billed kingfisher	Chukka mukku lakhumukki pitta	LC / IV	Rare
Phalacrocorax carbo	Large Cormorant	Pedda neeti kaaki	LC / IV	Rare
Phalacrocorax niger	Little Cormorant	Neeti kaaki	LC / IV	Rare
Pioceus manyar	Streaked weaver bird	Padmasale pitta	LC / IV	Rare
Pitta porphyria	Indian Pitta	Pitchuka	LC / IV	Rare
Ploceus philippinus	Baya	Common Weaver	LC / IV	Yes
Podiceps ruficollis	Dab Chick	Budga baathu	LC / IV	Rare
Porphyrio porphyria	Purple Moorhen	Erra neeti kodi	LC / IV	Rare
Pseudibis papillosa	Black Indian Ibis	Nalla konkanam	LC / IV	Rare
Psittacula krameri	Rose ringed parakeet	Ramachiluka	LC / IV	Yes
Pterocles exustus	Indian sand grouse	Kamju	LC / IV	Yes
Pycnonotus cafer	Red vented bulbul	Bulbul	LC / IV	Yes
Rallus striatus	Blue breasted banded rail	Neeti kodi	LC / IV	Rare
Recuvirostra avosetta	Avocet	Avocet	LC / IV	Rare
Rostratula benghalensis	Painted Snipe	Painted Snipe	LC / IV	Rare
Saxicoloides fulicata	Indian robin	Nalla pitta	LC / IV	Yes
Streptopelia chinensis	Spotted dove	Chukkala guvva	LC / IV	Yes
Streptopelia decaocto	Collared dove	Valaya guvva	LC / IV	Yes
Sturnus contra	Pied Myna	Gorinka	LC / IV	Rare
Tadorna ferruginea	Brahminy duck	Brahmana baatu	LC / IV	Rare
Tephrodornis pondicerianus	Common wood shrike	Wood shrike	LC / IV	Rare
Tringa glareola	Wood sand piper	Kalap Isuka plover	LC / IV	Rare
Tringa nebularia	Green Shank	Patcha shank	LC / IV	Rare
Tringa ochropus	Green Sandpiper	Patcha Sand piper	LC / IV	Rare
Tringa tetanus	Red Shank	Erra shank	LC / IV	Rare
Turdoides striatus	Jungle babbler	Adavi babbler	LC / IV	Rare
Tyto alba	Barron Owl	Tella gudlaguba	LC / IV	Yes
Upupa epops	Hoopoe	Oohuu pitta	LC / IV	Yes
Vanellus cinereus	Grey headed lapwing	Lapwing	LC / IV	Yes
Vanellus indicus	Redwattled lapwing	Erra teeturu	LC / IV	Yes
Vanellus malabaricus	Yellow wattled Lapwing	Passupu teeturu	LC / IV	Rare
Zosterops palpebrosus	Oriental White eye	Tella kannu pitchuka	LC / IV	Yes

III: PREDICTION OF IMPACTS

Biological Impact Assessment (BIA) is an important and integral part of the EIA. Prediction of impacts is based both on the direct and indirect; short-term as well as long-term; irreversible and irreversible impacts that are most likely to occur owing to the proposed mining activity during operations. The ecological factors that are considered most significant as far as the impact on flora and fauna are concerned:

1. Whether there shall be any reduction in species diversity
2. Whether there shall be any habitat loss or fragmentation
3. Whether there shall be any additional risk or threat to the rare or endangered or endemic or threatened (REET)species
4. Whether there shall be any impairment of ecological functions such as

(i) Disruption of food chains, (ii) decline in species population and or (iii) alterations in predator-prey relationships.

The direct and the most destructive impacts of the project are limited to the mine lease area only. For the purposes of the BIA, the study area is divided in the core and buffer areas. The direct impacts shall be limited to the core area of 10.723 Ha. The proposed Mine is a new mine located in a Forest area. Owing to site clearance, denudation, opening of mine pits; dumping of waste and overburden; establishment of onsite facilities and transport of mineral, the existing vegetation and flora of the mine lease area including the land diverted for road gets severely damaged and destroyed. But yet there shall not be any loss of plant diversity since all the plant species found in the mine lease are of common and widespread occurrence. There are no National Parks, Wildlife sanctuaries, Biosphere reserves or other protected areas either in the core area or in the buffer zone. While assessing the impacts on Biodiversity (BIA), it is important to consider the following in decision making:

- All species are not equally important from the point of conservation. For instance, we try to eradicate invasive weeds.
- The BIA of the core area should be based on endemicity or degree of endemism (Proportion of endemic species); conservation status (RET and Schedule I species are more important than others); Economic value and the importance of the species for the stability of the Ecosystem (the structural stability of the forests is due to its tree cover).

When the above issues are considered, there are no endemic or RET or Schedule I species in the core area. There are no economically valuable species. The forest under consideration has not reached the climatic climax stage and its apparent stability is due to disturbance. It is a disclimax. Hence, the loss of 4.89 Ha of forest is not going to make any difference as far as the biodiversity is concerned.

There is going to be no change in the land use and land cover of the adjacent forest or non-forest areas on account of the proposed mine. Among the plant species that are going to be lost, the annuals and therophytes which are highly resilient can come back once the intensity and frequency of disturbances are over. As there are no rare or endangered or endemic or threatened (REET) species, proposed mining activity will not pose any additional threat to any REET species. Hence, the impact of the project on flora is negligible. As far as the fauna is concerned, the proposed mining activity could pose no additional threat to the habitat of RET or Schedule I species mainly because of the absence of such species in the zone of impact. Proposed mining activity is incapable of posing any additional threat to any

Schedule I species either directly or indirectly since no such species occur in the area that is likely to be impacted by the mining.

III.i: Quantification of Impacts

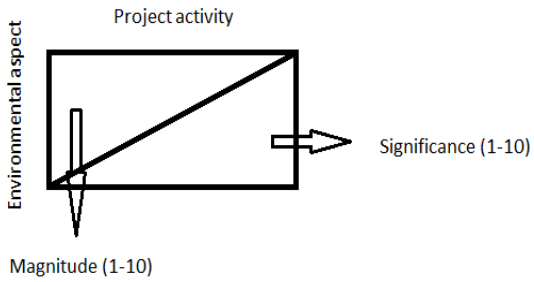
Ultimate objective of present study is to find out how the proposed project activity is going to impact the Flora, Fauna, Ecology and biodiversity of the nearby RFs. In order to predict the impacts, it is essential to understand how the proposed activity is going to bring about changes in the surrounding environment. A brief account about the likely changes is given below:

a). Spatial and Temporal changes: Changes over a period of time (temporal changes) and space (Spatial changes) are quite natural and may be brought about by natural forces without any outside intervention. Such changes are usually characteristic of pristine, uninhabited naturally subsidized or unsubsidized solar powered natural Ecosystems like virgin forests and oceans. But the RFs under consideration are highly modified on account of anthropogenic and biotic pressure. Hence, changes are common even without the proposed project.

b) Magnitude (mi) and Direction of Change*:* Change has a magnitude and it may also have a direction. Natural changes in a stable ecosystem are very slow and perceptible over a long period of time. Hence, they are difficult to perceive in our lifetime. But man-made changes are very rapid and hence they could be realized almost immediately. Magnitude of change depends on frequency and intensity of impacts. Disturbances of high frequency and high magnitude will have severe adverse impacts which may lead to regressive or retrogressive changes. On the other hand, moderate and occasional disturbances are known to enhance biodiversity, according to the Intermediate Disturbance Hypothesis (IDH). Changes may have a direction (Directional changes) or may be random and non-directional. Directional changes such as Ecological succession are predictable. When the impacts are quantified, magnitude of impact is indicated by a symbol mi.

c): Sensitivity or significance of the Impacts (si): In conservation biology, and impact predictions, apart from the mi, sensitivity or significance of the impact has its own weightage. For instance, the outcome of denudation of a grassland and a tropical rainforest are totally different. Loss of an invasive weed is beneficial but not a rare or endangered species.

d): Combined impact of the magnitude (mi) and sensitivity (si) is the product of misi. Si may be positive or negative. For each of Environmental parameter, the combined impact can be quantified as illustrated below

Magnitude (mi) and sensitivity or significance (si)of Impact			
	Magnitude	Sensitivity	Impact
	mi	si (+ or -)	misi
	0 to 10	0 to 10 and -0 to -10	Maximum 100 for each parameter

e).Direct and Indirect changes: If a project or activity is directly responsible for a change, such as change from terrestrial to aquatic habitat when an area like forest is submerged due to storage of water in a reservoir. That is a direct change. A project may also be indirectly

responsible for a change due to changes in land-use-land-cover; cropping pattern; crop intensity etc.

f).Reversible and Irreversible changes*:* Changes may be temporary and reversible or may be permanent and irreversible.

g).Catalytic changes: Project in many cases may just act as a catalyst and hence it can increase pace or magnitude of change. For instance, influx of people when a large power plant or steel plant is constructed.

h).Qualitative and quantitative changes: changes may be qualitative hence they are tough to quantify or measure. Quantitative changes on other hand can be measured and quantified provided there is a reference point.

III.ii: Impact identification by Checklist method:

This is a very common simple method. It is mainly a qualitative YES or NO type method. For instance, the impact of a hydroelectric project on air quality is NO while the impact of a thermal power plant on air quality is YES.

Simple Matrix method: This is simply a list of environmental aspects listed along the vertical axis, against which we determine whether an activity would have an adverse effect, no effect or beneficial effect. A simple "x" or "tick" is given under the appropriate column.

Impact of activity or Project on Environmental component	Adverse or negative impact	No impact or neutral	Positive or beneficial
Air (In case of a thermal power plant) √	√	**X**	**X**
Water (in case of a Bulk drug unit)	√	**X**	**X**
Soil			
Biodiversity			
Noise			
Health			

III.iii: Most likely impacts of the proposed mining activity:

The proposed mine lease area is an open scrub forest. It is more like a wasteland. Tree density, growth and productivity is very low. Detailed mining plan shall be prepared after obtaining the forest clearance. Hence, the information about the method of mining; generation of overburden, and disposal of stony waste are being worked out. The proposed mine lease comprises of Pegmatite (Mica, Quartz and Feldspar) and Quartzite which occur as discontinuous veins. Mining involves drilling and blasting. About 1 kg of gun powder and explosive slurry per ton of rock blasted is going to be used. Overburden and stony waste are going to be dumped within the mine lease The predictable impacts of the proposed activity on the flora and fauna of the core area and buffer zone are summarized in Table 6. As the local flora is highly resilient to changes; drought, pollution and cutting, the mild impacts around the mine pit can't alter the community structure and floristic composition unless done deliberately.

Table 6: Most probable impacts of the proposed mining activity on the flora and fauna of the core area and the nearby forests in the buffer zone

Nature of impact	Magnitude and significance of impact	Control / Remediation plan
Dust emissions during drilling and blasting	Negligible and for a very short time only	Drilling area shall be covered by tarpaulin or wet gunny.

Noise during drilling and blasting	No impact outside the mine pit	Workers will use ear plugs / mufflers.
Fugitive dust emissions during loading and unloading	Since the material is mostly stony with very little dust, dust emissions are negligible.	Water shall be sprayed if required.
Fugitive dust emissions during transport	Haul roads do not contain any loose soil. They have hard rocky top or covered with broken rock . Hence, dust emissions during transport are very slight	The trucks shall be covered with tarpaulin and the haul roads are mostly hard top. Water shall be sprayed in areas prone to dust generation,
Stack emissions	There is no stack and no stack emissions.	Not applicable
Air emissions and air pollution	The area is not critically polluted and the additionality due the proposed mining is negligible	Dust suppression by water spraying during dry period.
Water pollution due to discharge of trade effluents	No treated or untreated effluents are going to be discharged	Domestic sewage shall be treated in soak pit.
Impacts on soil	Adverse impacts on soil shall be limited to the mine pit and the haul roads	Integrated soil, water and nutrient systems are suggested
Chances of enhanced soil erosion	Enhanced soil erosion is possible when the existing vegetation is removed.	The impacts on neighbouring areas shall be controlled by making garland drains, rain water harvesting pits, rock-filled check dams; sedimentation and silting ponds within the mine lease .
Impact on Forests, flora and fauna	Mild impacts could occur around the mine pits and transport route within a radius of 100 m during dry season	No chances for any loss of biodiversity as there are no RET or schedule I species. Fugitive dust emissions are suppressed by spraying water.

As shown in Table 6, the direct or indirect adverse impacts of the proposed mining activity on the flora and fauna of nearby forests is negligible and it is not going to bring about any changes in community structure or composition. Further, the area is neither critically polluted nor ecologically sensitive. Apart from it, there are several operating mica mines as shown in Table 1 and there were no reports or complaints of any adverse impacts on any of the components of the Ecosystem.

The area that comes under the project impact zone (PIZ) will not extend beyond 250 m from the mine pit and 100 m on either side of the haulage road. The area is not a home for any rare or endangered or endemic or threatened (REET) species or Schedule I fauna and hence no REET species or Schedule species is going to be impacted. When all aspects are considered and a holistic view is taken, it can be safely concluded that the proposed diversion of 4.89 Ha of forest land for mining activity with the routine safety and control measures is totally safe for the nearby forests and the wildlife.

III.iv: Impacts on air and water bodies:

Open caste Mining generates dust due to site clearance by denudation; dumping of overburden and waste; haulage of the material over unpaved roads. The dust can settle on the surrounding areas and can cause damage to the vegetation and crops in the surrounding areas. Hence, dust suppression by sprinkling or spraying water during dry season shall be done. Further

haulage route within the mine lease shall be laid with stony waste so that the soil doesn't break up.

There are both lotic and lentic water bodies in the buffer zone. Penneru and Kandleru Rivers are in the northern part of the proposed mine lease. Kolleru River touches the buffer zone in the South east. There are tanks on all sides. Mining can enhance erosion and rain water carrying degraded and suspended solids and soil particles can be carried into the nearby water bodies. As the rain water doesn't flow towards the northern side, no sediments are going to enter the Penneru and Kandleru Rivers. The only possibility is that the rain water from the mining site may reach the tanks located towards the easter side. In order to prevent such possibility, garland drains around the mine lease and the overburden dumps shall be made. Rain water shall be diverted to localized sedimentation pits within the mine lease for groundwater recharge and sedimentation. Legumes like Hamata grass and soil binders shall be grown on the bunds.

III.v: Compensatory Afforestation (CA):

Within the mine lease area of 4.89 Ha, there shall be a safety sone plantation where all the existing shrubs shall be retained and the gaps shall be covered with trees. Along the boundary, a garland drain shall be dug out and the excavated soil shall be used for making a bund along the boundary. The trench cum bund serves the dual purpose of a garland drain and also as a barrier for any movement of domestic or wildlife across the boundary. Over the bund in the safety zone, fodder legumes like Subabul, Sesbania, Stylo and others shall be grown for enriching the soil though biological nitrogen fixation. Within the safety zone trees that can attract birds, primates by providing shelter and fruit shall be grown. The list of trees includes common Figs like Banyan, Peepal, Cluster Fig, Neem, Jamun, Singapore Cherry, Guava and also Mango.

The applicant has already submitted documents and ready to hand over 10.99 Ac in Sy. No.714/4, 715/1/B, 718/1, 718/4 & 722 in Mettupalli Revenue village, Owk (M), Kurnool District for compensatory Afforestation. As far as the productivity and carbon sequestration is concerned, CA is expected to be slightly better than the open scrub jungle that is sought for mining. Once the mine is closed, scrub jungle similar to the original vegetation comes back within a few years since the species found in the area are highly resistant to drought and dust pollution. However, the applicant shall reclaim and restore the mine lease area as per the approved mine closure plan.

IV: Environmental Impact Assessment (EIA):

Once the land under consideration is diverted for mining of Mica, Quartz and Feldspar further steps would follow leading to an EIA study. Mining plan shall be prepared and approval from the competent authority shall be obtained. During the EIA study, baseline data with regard to air, water, soil, ecology and biodiversity, noise and socio-economic aspects would be collected in accordance with the terms of reference. Additional impacts due to the proposed mining shall be computed and final quality of air, water, soil and noise environment shall be assessed. Suitable control measures shall be suggested. The final EIA is evaluated by the SEAC before the Environmental clearance (EC) is grated. If the SEAC feels that the proposed activity poses a threat to flora and fauna, no EC is granted. With such safety regime in place, there is no cause for any kind of concern due to the diversion of the 4.89 ha of forest land for mining.

V: Summary and Conclusions:

- As the area sought for diversion is an open scrub and as the land is already allocated for CA in accordance with the Forest (Conservation) Act, 1980 the net loss of any productivity and the intangible Ecological benefits of forests can be quicky compensated through CA.
- There are no Eco-sensitive areas such as the Biosphere reserves or National Parks or Wildlife Sanctuaries or migratory corridors of Elephants or Tigers or Nature Heritage sites or Important bird areas (IBAs) or Ramsar wetlands or other protected areas except reserve forests within a radius of 10 km from the mine lease area
- On account of mining the vegetation and flora of the mine lease area is going to be damaged or destroyed but there shall be no loss of any REET species or Schedule I fauna or economically important species.
- The adverse impact of the proposed mining does not extend beyond the mine safety zone of the mine leas. It is not going to alter the structure and composition of the nearby forests.
- Owing to the rocky terrain, gravelly soil, dust emissions are not going to be an issue. Any little dust can be easily supressed by spraying water.
- Enhanced soil erosion due to deforestation of the mine lease is only a minor problem and it will be controlled by means of integrated soil, water, nutrient conservation and safety sone plantations.
- The land allocated towards CA is more than a match for the mine lease area in terms of productivity and carbon sequestration.
- The PP shall incorporate all details in the EIA report after the allotment of the proposed land.

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