Central Armed Police Forces' Institute of Medical Sciences (CAPFIMS)

Maidangarhi, New Delhi

IMPACT, MITIGATION AND WILDLIFE CONSERVATION PLAN FOR CENTRAL ARMED POLICE FORCE INSTITUTE FOR MEDICAL SCIENCES (CAPFIMS), DELHI

(Issue 01, Rev 0, July 2016)

Prepared by

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1.0 INTRODUCTION

The proposed Central Armed Police Forces Institute of Medical Sciences (CAPFIMS) will be located at Maidan Garhi, New Delhi. The total plot area is 2,08,009.30 sqm (51.4 acres) out of which 44200.00 sqm shall be utilized as Ground Coverage. The land is allotted By DDA vide allotment letter no. F.22 (3)10/IL/1429 dated 27/7/2012.

The proposed national level "CAPFIMS" will provide medical facilities with highest standards. It will render tertiary and specialised treatment to troops and families of forces like CRPF, BSF, CISF, ITBP, SSB, NSG and Assam Rifles as well as to Central Police Organizations which function under the Union Home Ministry. The Hospital and its Institutes will provide the best medical care infrastructure with teaching in the country which is currently available at AIIMS, New Delhi and R&R Hospital of the Army in Delhi. Besides having a multi-speciality hospital (1100 bedded), the CAPFIMS will also have its Medical Institute; a college of nursing and a school of paramedics; modern residential campus for students, doctors and its health workforce; an air ambulance unit and fast field Mobile Hospital unit for the CAPFs & CPOs.

Hence, the project falls under the category 8 (b) of the EIA Notification, 2006 and required environmental clearance. The project proponent applied for seeking Terms of Reference (TOR).

Need for study

As per TOR granted to the project vide Minutes of 143rd meeting of Expert Appraisal Committee for Projects related to Infrastructure Development, Coastal Regulation Zone, Building/Construction and Miscellaneous projects held from 6th-7th January, 2015, various conditions have been prescribed. Condition no. ii prescribes "PP shall obtain clearance from NBWL". For compliance to TOR condition, the application for National Board of Wildlife (NBWL) clearance along with relevant documents and Annexures was submitted vide letter No. DO/PC/RSR/2017/CAPFIMS/61 dated February 20, 2015. Furthermore, as per 34th minutes Standing Committee of NBWL and subsequent letter no. 1018/CWLW/2015/563-64 dated 22.02.2016 from Department of Forests and

Wildlife, Govt. Of NCT of Delhi, CAPFIMS has been directed to prepare "Impact, Mitigation and Wildlife Conservation Plan", which includes development of soil moisture and ground water improvement in and around the ecosensitive zone area of sanctuary falling in the CAPFIMS campus jurisdiction. Accordingly, this report has been prepared.

Ridge Management

Out of the total project area of 51.4 acres, an area of 17.75 acres falls under the Southern Ridge/Geo-morphological ridge wherein no construction can be permitted. This can be seen in **Fig 1**, where the red line shows the line demarcating the geo-morphological ridge, which lies north of the red line.

A meeting was also conducted in this regard by Joint Secretary (UT) and Project Director, CAPFIMS on 15th April, 2015 to discuss the issues relating to construction related activities of CAPFIMS wherein the Joint Secretary agreed for exclusion of the project area falling under Ridge/Morphological Ridge. Thus, the maps and project details as submitted for TOR stand modified. The revised Master plan is shown in **Fig 2**.

The revised proposal was presented to Ridge Management Board during their meeting dated 6th June 2016, which was prima-facie approved.

2.0 SALIENT FEATURES OF THE PROJECT

2.1 Location and Communication

The proposed Central Armed Police Forces Institute of Medical Sciences will be located at Maidan Garhi, New Delhi.The project site is well connected with road. The nearest railway station is Tughlakabad Railway Station at a distance of 8.5 km east. Airport is Safdarjung Airport at a distance of 11.8 km north. National Highway NH-236 is at a distance of 5.3 km North West.

The project will be located at 28° 28' 28.65" N Latitude and 77° 12' 54.87" E longitude. The project is located within 10 km of Asola Wildlife Sanctuary (Eco Sensitive areas) as seen in **Fig 3**.

FIG 1: MASTER PLAN OVERLAPPING GEOMORPHOLOGICAL RIDGE

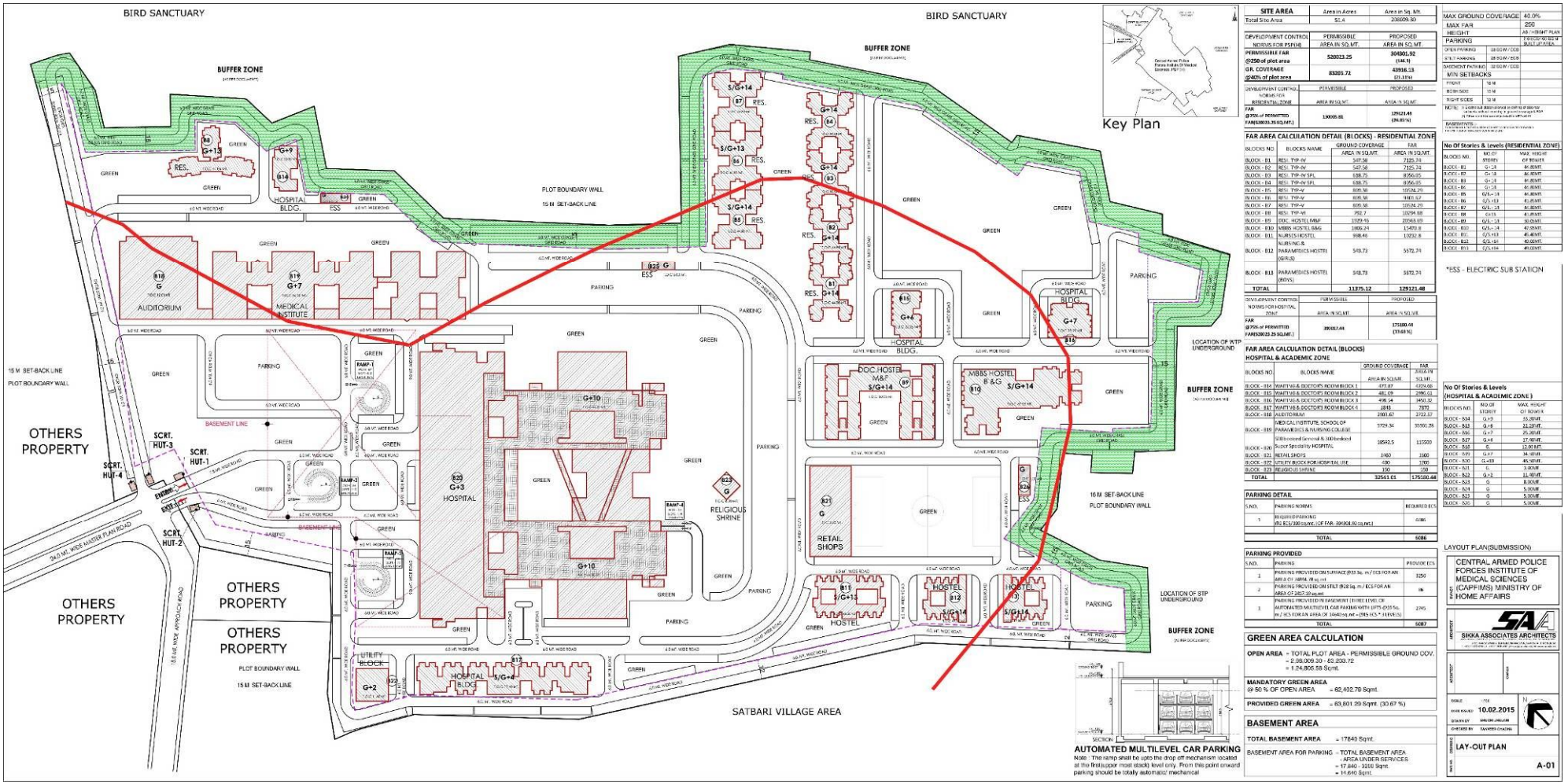


FIG 2: REVISED MASTER PLAN EXCLUDING CONSTRUCTION ON GEO-MORPHOLOGICAL RIDGE

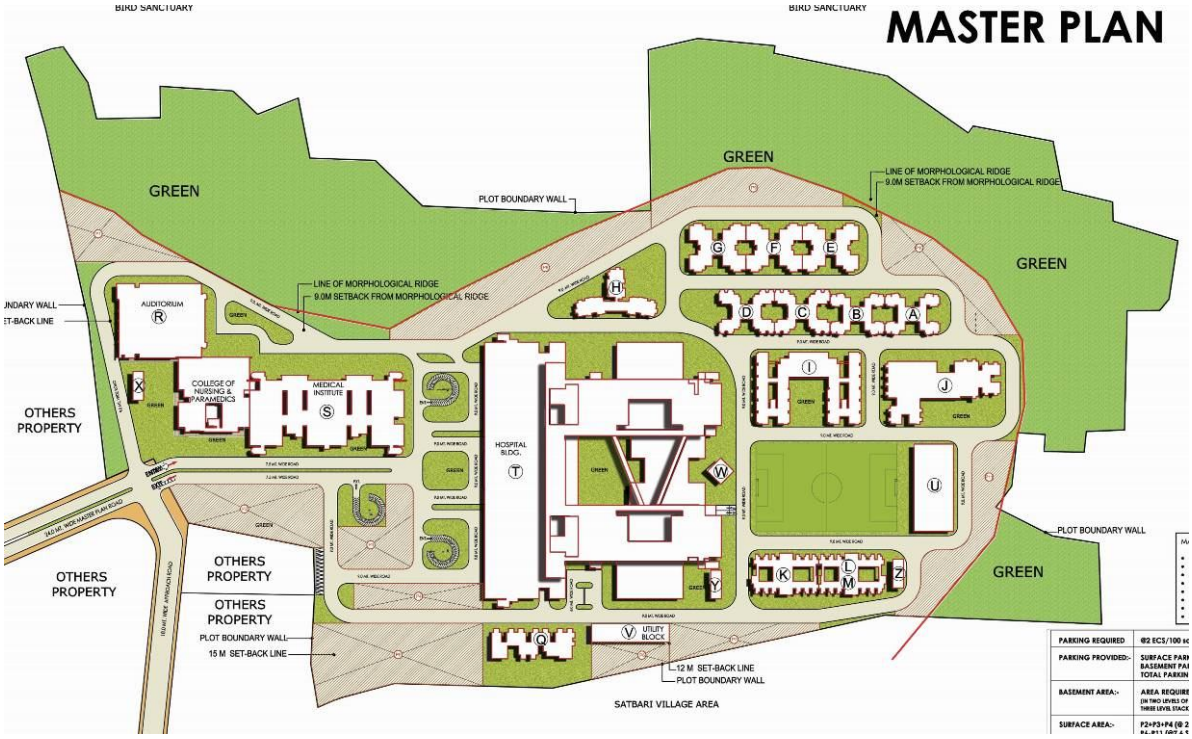
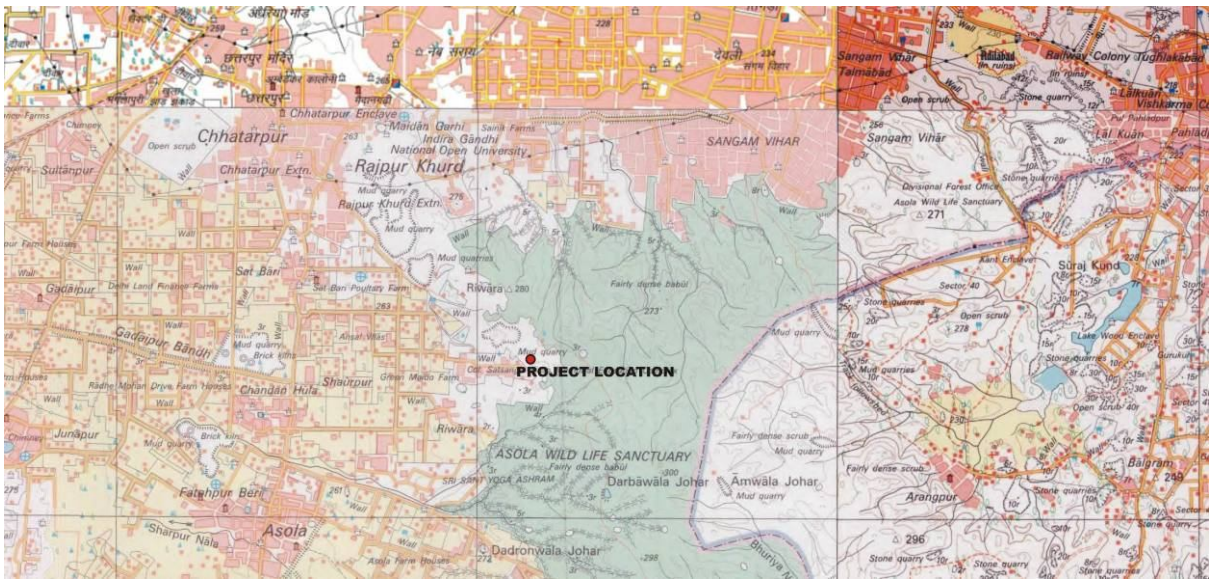


FIG 3: LOCATION MAP



2.2 Project Parameters

The salient features of the project are tabulated below:

Sl. No.	Building	Features
1.	General Hospital	500 Beds
2.	Super Speciality Hospital	300 Beds
3.	Medical Institute	Max. 100 Intake Per Annum (As Per MCI Norms)
4.	College Of Nursing	60 Intake
5.	College Of Paramedics	300 Intake
6.	Auditorium	700 Capacity
7.	Hostels	4 Hostels
8.	Dwelling Units	440 Units (Type IV- 110, Type IV Spl-118, Type V-170, Type VI-42)
9	Mess & Inns	0
10.	Barracks	462 Occupancy
11.	Sports Complex	

During construction phase, total water requirement is expected to be 10 KLD which will be met by tanker water supplier. During the construction phase, soak pits and septic tanks will be provided for disposal of waste water. Temporary sanitary toilets will be provided for the labour force.

The total population of the Hospital has been estimated to be 6960, out of which the patients (IPD) will be 800, patients (OPD) will be 4000, hospital staff and visitors will be 2160, hospital attendants will be 1200, hostel students will be 2144, mess capacity will be 200, barracks residents will be 462, college staff will be 1140, visitors will be 114, and residential will be 3520.

During operational phase, total water demand of the project is expected to be 2502 KLD and the same will be met by Delhi Jal Board & Recycled Water. Wastewater generated (1645 KLD) will be treated in 1 STP of total 2000 KLD capacity. 1562 KLD of treated wastewater will be recycled (1044 KLD for flushing, 64 KLD for gardening, 444 KLD for cooling& 10 KLD for miscellaneous purposes). Total wastewater generated from labs & OT will be 144 KLD which will be treated in ETP of 175 KLD. 130 KLD of treated water will be generated from ETP which will be disposed in to sewer.

About 5144 Kg/ day solid waste will be generated from the project. The biodegradable waste (3600 Kg/ day) will be treated in Organic Waste Converter and the non-biodegradable waste generated (1544 Kg/ day) will be handed over to authorized local vendor. Biomedical waste of 200 kg/ day will be given to approve Biomedical waste service provider.

The total power requirement during construction phase is 100 KVA and will be met from 1000 KVA DG set and total power requirement during operation phase will be 14162.23 KW and will be met from BSES.

Rooftop rainwater of buildings will be collected in 19 RWH pits of dia 2.0 m & depth 3.0 m for recharging the ground water.

Parking facility for 6684 ECS is proposed to be provided against the requirement of 6668 ECS (according to local norms).

3.0 PRESENT STATUS OF ECOLOGY

The study has been done for (i) Project Area and (ii) Area within 10 km radius around it, which includes the Asola Bhatti wildlife Sanctuary and is referred to as "study area".

The present status of the ecology has been determined by study of secondary data sources such as publications of Zoological Survey of India, renowned authors, etc.; study of maps and satellite images and visit to project site.

3.1 Forest

Maheswari (1963) describes the vegetation as semi-arid thorny scrub while Champion and Seth (1968) designate it as northern tropical thorn forest with Open canopied thorny appendages, wax coated, succulent and tomentose leaves. In spite of the tremendous anthropogenic pressures the sanctuary displays sufficient samples of the native floral and faunal communities necessitating reinforcement of its conservation.

3.2 Flora

(a) Project Area:

The project area is having sparser vegetation than the adjoining forest with approximately 15 trees. A satellite view of the project can be seen in **Fig 4**.

FIG 4: SATELLITE VIEW OF THE PROJECT

The photographs of flora at the project site are given below:






It can be seen that there is predominantly grass, weeds and few shrubs in vegetated area, with an occassional tree.

(b) 10 km radius study area:

There are various land uses present in 10 km radius of project. These include schools, hospitals, places of worship etc. Apart from this, Asola Bhatti Wildlife Sanctuary is adjacent in North East to proposed CAPFIMS campus. Sanctuary has many species of flora and fauna. As per "Some Selected Fauna of Asola Bhatti Wildlife Sanctuary (Delhi)" by Zoological Survey of India- Kolkata, Sawarkar and Hussain (1997) have reported that according to an unpublished report of the herbarium section of the Wildlife Institute of India, Dehra Dun there are about 150 species of plants in Asola-Bhatti Wildlife Sanctuary, Delhi, including native ones, some of which are listed in **Table 1**.

TABLE 1
LIST OF FLORA IN STUDY AREA

Sl. No.	Botanical Name	Common Name	Family
1.	*Accacia nilotica*	Babool	Mimosaceae
2.	*Accacia leucopholea*	Hiwar	Mimosaceae
3.	*Accacia catechu*	Khair	Mimosaceae
4.	*Accacia modesta*	Phulahi	Mimosaceae
5.	*Achyranthus aspera*	Chaff Flower	Amaranthaceae
6.	*Aerva sanguinolenta*	Nuria	Amaranthaceae
7.	*Alycicarpus vaginaliis*	Buffalo clover	Fabaceae
8.	*Anogeissus pendula*	Kardhai	Combretaceae
9.	*Ariostida*	wiregrass	Poaceae
10.	*Butea monosperma*	Palash	Leguminosae
11.	*Cassia fistula*	Amaltas	Caesalpiniaceae
12.	*Capparis sepiaria*	Kabra	Capparaceae
13.	*C. deciduas*	Karira	Capparaceae
14.	*Croton sparaiflorus*	Ban Tulsi	Euphorbiaceae
15.	*Cenchrus cilliaris*	Buffel grass	Poaceae
16.	*Calotropis procera*	Rubber bush	Asclepiadaceae
17.	*Ergostis poaeodes*	Cane grass	Poaceae
18.	*Euphorbia hierta*	Asthma weed	Euphorbiaceae
19.	*Peristrophe bicalyculata*	Anghedi	Acanthaceae
20.	*Prosopis juliflora*	Keekar	Fabeacae
21.	*Pupalia lappacea*	Forest Burr	Amaranthacea
22.	*Salavadora persica*	Meswak	Salvadoraceae
23.	*Saccharum spontaneum*	Sugarcane	Poaceae
24.	*Tephrocia pumila*	Pea	Fabaceae
25.	*Tridax procumbens*	Coat button	Asteraceae
26.	*Tribulus terrestris*	Tackweed	Zygophyllaceae
27.	*Vetiveria zizanioides*	Khus	Poaceae
28.	*Withania somnifera*	Ashwagandha	Solanacea
29.	*Zizyphus oenoplia*	Jujubae,	Rhamnaceae

Source : Adapted from Some Selected Fauna of Asola Bhatti Wildlife Sanctuary (Delhi)" by Zoological Survey of India- Kolkata, April 2003

Most dominant species in the Sanctuary is of *Prosopis juliflora*. Besides above mentioned plants, trees of *Psidium guajava, Ficus religiosa, Syzigium cumini, Polyalthia longifolia, Mangifera indica, Azadirachta indica* etc are found in the study area. These are found along the roads, in the gardens and are also grown in the houses along with ornamental plants.

3.3 Fauna

Fauna in the study area includes common aves, reptiles, amphibians and mammals. Aves found in the study area includes house sparrow, crow, pigeon, myna, koel, egret, indian roller etc.; reptiles include lizard garden as well as house lizard, cameleon, etc.; and mammals such as domestic animals like cow, buffalo, goat, dog cat and others like mouse, hare, etc.

As per "Some Selected Fauna of Asola Bhatti Wildlife Sanctuary (Delhi)" by Zoological Survey of India, the main faunal element includes Nilgai, Jungle Cat, Small Indian Civet, Ruddy Mongoose and Small Indian Mongoose, Rufous Tailed hare, Porcupine, Spiny tailed lizard and about 200 species of resident and migratory birds. Hyaena, Leopard, Wolf and Chinkara, reported in the Gazetteer of Delhi, have not been sighted after 1940. The comprehensive and updated faunal profile provided incorporated inventory of 246 species of fauna spreading over 3 species of Mollusca, one species of Thysaneura, one of Odonata, nine of Orthoptera, four of Isoptera, 4 of Coleoptera, one Diptera, 4 Lepidoptera, 5 Hymenoptera, 3 Chilopoda amongst invertebrates, and 2 species of Amphibia, 3 species of Reptilia, 196 species of Aves and ten species of Mammalia amongst vertebrates. Due to dismal degradation, erosion, mining and other human intererence over the time, the species have reduced.

List of Threatened faunal species found in Asola Bhatti Wildlife Sanctuary as listed in the Red Data Book (RDB) of the Zoological Survey of India (ZSI) and International Union for Conservation of Nature and Natural Resources (IUCN) respectively, vis-a-vis their status as assigned in Indian Wildlife (Protection) Act, 1972, their designation in the appendices of Convention on International Trade in Endangered species of Fauna and Flora (CITES) is given in **Table 2**. Details of Schedule I animals is given in ***Annexure I***.

TABLE 2
LIST OF THREATENED FAUNA IN THE ASOLA BHATTI WILDLIFE SANCTUARY

Zoological Name	Common/ English name	Red Data Book ZSI, 1994	W (P) Act 1972	Cites
Macaca mulatta	Monkey	-	Sch. II	-
Canis aureus	Jackal	-	Sch. II (I)	-
Viverricula indica	Indian civet	-	Sch. II (II)	App. III
Herpestes edwardsii	Indian Grey Mongoose	-	Sch. IV	App. III

Zoological Name	Common/ English name	Red Data Book ZSI, 1994	W (P) Act 1972	Cites
Herpestes smithi	Ruddy Mongoose	-	Sch. IV	App. III
Canis hyaena	Hyaena	-	Sch. III	-
Felis chaus	Jungle cat	-	Sch. II (II)	App. II
Antilope cervicarpa	Black buck	Vu	Sch. I	App. III
Manis crassicaudata	Pangolin	Vu	Sch. I	App. II
Pavo cristatus	Pea-fowl	Vu	Sch. I	App. I

Problems of management and conservation

Certain environmentalist groups feel that the Asola-Bhatti WLS though designated as a sanctuary, is actually a misnomer (WWF, 1995) since the only wildlife to be seen would be Nilgai (Blue Bull) and couple of recently introduced Blackbucks, besides birds. It is further apprehended that since the water are a scare commodity and the water table being 600 ft below the surface with the area full of mica, the chances of carnivores making the sanctuary a home, are little. In addition, the immigration possibilities of other dry habitat species are remote since there are no corridors left that might connect the protected area to the large patch of scrub forest.

Besides this, there are numerous settlements already existing around the fence of the sanctuary and the new ones coming up unchecked. The boundary of the Wildlife Sanctuary is broken at various places. Movements of cattle inside the sanctuary are very common. The use/abuse of the premises of the Wildlife Sanctuary for defecation, easement and various other purposes like cattle grazing, extraction of fuel and firewood or medicinal plants etc. by the residents around Wildlife Sanctuary.

4.0 THREATS TO WILD LIFE

The ever-increasing anthropogenic pressure in the last fifty years has resulted in substantial loss of the area of wild habitat. Among the wild ungulates (Chinkara and Blackbuck) that were once native to the environs of Delhi, only Nilgai has managed to survive in the fragmented habitat while the others have locally extirpated. At the same time the livestock is increasing day by day and trespasses is in plenty.

The impacts due to project would be there but the fauna is greatly affected when it competes with human beings for minor and major forest produce. The habitat of the animals is a usually source of income, food and material for the villagers living near the forests. However, in this current case, this is not the case since the human settlement is urbanised and not interacting with the ABWLS for forest produce. However, human interference leads to encroachment in forests and

overgrazing by cattle, therefore, degrading the habitat. Thus, the socio-economic profile of the people is an important factor in habitat degradation or animal conservation. However, in this case, the project is neither encroaching into the sanctuary area nor will use any of its resources.

There is no organized poaching in the area but sometimes some poachers sell the animal parts, its fur, bones, teeth and other parts in the illegal animal trade market due to their high demand. Hunters use the animals for meat.

Natural causes such as fires, droughts, animal epidemic and other such catastrophes adversely effect the habitats and consequently the animal population.

There are specific impacts due to specific activities of the humans on the animals. The use of pesticides and organic chemicals leads to bio-accumulation in food chain leading to adverse egg shell formation of several birds.
Besides this, other perceptible threats are as follows:

- The presence of privately owned farmlands on the north-eastern and northern periphery of the sanctuary where the encroachment is imminent;
- Dumping garbage and use of the sanctuary area around Sanjay Vihar by locals for shitting, collection of fire and fuel wood is a perpetual threat to the existence of wildlife;
- Its use and abuse by ever increasing pressures mainly for extraction of quartzite commonly known as Badarpur or Bajri by mining communities;
- Farming along its fringes;
- Collection of non wooded forest produce like Ber for personal and commercial use as well;
- Transportation of truckloads of Badarpur sand; fodder collection; collection of medicinal plants etc.

The impacts can be mitigated through animal conservation and management plan as described subsequently.

5.0 IMPACT OF THE PROJECT

As the project shares a common boundary with the Asola Bhati Wildlife Sanctuary (ABWLS), the project will have impact on the sanctuary as follows. However, each of them is manageable and with proper precautions:

1) Air pollution due to operation of DG sets will go towards ABWLS when the wind direction is towards the sanctuary.

2) Noise from the campus, though minimal, may affect immediate adjoining areas upto a distance of 100 m.

3) Impact due to water consumption

4) Impact due to waste water generated from the project

5) Impact during transportation or movement of vehicles on roads outside project site or when the fauna comes on the roads within the project during its natural movement, road kill can occur.

6) Impact due to solid waste generated from hospital, hostel, mess etc. Such as domestic waste, medical waste.

7) Man animal conflict which can arise due entry of wildlife into the premises

6.0 SUGGESTED MEASURES TO MITIGATE THE THREATS TO WILD LIFE

6.1 Plantation

The various steps that will be taken for habitat conservation and restoration of plantation and afforestation within as well as outside the project are essential components. Planting of native species is proposed to help restore the ecology of the area. More than 1600 trees are proposed to be planted as outlined in **Table 3**. Plantation shall be done along the boundary of complex and in open areas of native species. Plantation in the geo-morphological ridge shall be with due permission from the statutory authority.

TABLE 3
LIST OF SPECIES PROPOSED FOR PLANTATION

Name of Species proposed	Numbers proposed
Delonix regia (Gulmohar)	107
Roystonea regia (Royal Palm)	48
Azadirachta indica (Neem)	332
Schleichera oleosa (Kusum)	315
Dalbergia sissoo (Shisham)	248
Ficus carica (Fig)	307
Cassia fistula (Amaltas)	49
Phoenix dactylifera (Date palm)	30
Magnolia champaca (Safed Champa)	202
Total	**1638**

6.2 Supporting Forest department in improvement of habitat, food and water availability in AWLS

As few ponds are located in the study area, wild animals can survive even during the pinch period. It is proposed to coordinate with the Forest & Wildlife department and support (through manpower, material or finances) the making of any new watering holes also which will be fed during the summer season through tankers/ pipelines established by the sanctuary authority. Construction of check dams on seasonal nalas will also create small water bodies for few months, hence the same will be supported, if required by the AWLS. As the soil lacks salt, so artificial salt licks have been created for the animals in the Sanctuary by the Wildlife department. Forest Department is carrying out plantation regularly in AWLS, of native trees as well as fruit bearing trees. Any of these measures can be supported by CAPFIMS in consultation with Forest Department and with their due permission.

6.3 Cordoning the ridge, project activities from the surroundings

Since some land is left as it falls under ridge area, it is proposed to it cordon it off by appropriate method such as chain link fence or greenbelt to protect it so that it forms a safety barrier for between the sanctuary and project activities. The project itself will have a boundary for safety of the project as well as to deter movement of terrestrial fauna into the project.

6.4 Public education and awareness promotion

To prevent man animal conflict, awareness will be created through informal education using films and video shows, street plays, story telling, seminars, different competitions and talks, posters, leaflets, brochures etc. The target group will be the residents of the project as well as local villagers. A function shall be separately organised during wildlife week. It is proposed to give special awards to persons helping in protection of wildlife. Installation of caution boards at wildlife crossing and regarding permitted speed and speed breaking bumps shall be done.

6.5 Cattle vaccination

To prevent spread of diseases to wildlife present in Asola wildlife Sanctuary, awareness shall be given to cattle grazers to vaccinate their cattles against various communicable diseases. Grazers would be motivated to take free advice from Veterinary Doctor present in the animal house.

6.6 Create awareness amongst drivers

Create awareness amongst drivers for protection of animals at wildlife crossings. The drivers will be sensitized through “driver tip cards” and putting up posters at truck stops. It is important to avoid animal hits not only for the safety of the animals but also for the protection of the vehicles. The most important thing

drivers can do to protect themselves and wildlife is slow down. Drivers need to give themselves enough reaction time. If drivers come upon an animal in the middle of the road, they should apply brake, not swerve. Retaining control of the vehicle is extremely important before, during and after a collision with an animal. Other tips for drivers include being especially alert at dawn and dusk, being ready for more animals if one is seen near the road, and watching for shining eyes at night.

Project management shall hire experienced drivers and training to lesser experienced drivers shall be given. Apart from this, sensitisation of drivers towards wildlife shall be done. What action has to be taken if encountered and how to avoid roadkill shall explained.

6.7 Land scaping proposal

In order to develop the soil moisture and ground water improvement in and around the ecosensitive zone area of sanctuary falling in the CAPFIMS campus jurisdiction, it is proposed to have surface water harvesting structures such as ponds as well as plantation on the Southern Ridge land on which no construction is proposed. There is proposal for landscaping in the geo-morphological redge as seen in **Fig 5** to **7**. This will serve as a micro habitat for birds and small mammals as well as aid in recharge of water to the ground besides conserving soil.

6.8 Minimising Man animal conflict

To minimise man animal conflict, the following precautions will be taken in the project:

- Boundary wall will be constructed around the project for safety of the project which will ensure that the wandering fauna do not enter the project and get themselves harmed in the process.

- To minimize man-animal conflict due to monkey, the solid waste collection site shall be constructed to restrict its entry. Warning and information and contact numbers of forest department shall be displayed at prominent locations in the project complex in scenario where in monkeys enter campus. If required or necessary langur shall be adopted to keep monkeys away

- To minimize conflict arising due to entry of any mammalian predators (leopards from other areas of Haryana) or stray black buck/ nilgai, warning and information and contact numbers of forest department shall be displayed at prominent locations in the project complex. People in the campus will be made aware to stay calm, inform wildlife department and remain safe.

- Plantation along the boundary shall act as buffer for avifauna and it shall be ensured that a safe distance from Asola Wildlife Sanctuary is kept for any activity in the project premises.

6.9 Soil moisture conservation

The type of soil and water conservation measure will depend on the size and shape of the areas to be developed for plantation, its location within the watershed of which this area is a part, the kind of plantation being taken up etc. For small areas, in situ conservation practices such as formation of basins, or micro relief systems and agronomic conservation practices may suffice whereas for large plantations, watershed scale development work may have to be taken up. The various available methods are construction of diversion drains, bunding & terracing, weirs, waterways, loose boulder check dams, etc.

(1) Diversion/ interceptor drains

The project area is a small area and all of the stated measures are neither applicable nor required. It is proposed to have diversion drains or interceptors drain to collect to divert runoff water coming from the upper slopes of the project site so as to avoid erosion. They will be aligned along contour as far as possible with some gradient provided to facilitate flow of runoff water. The diversion drains will be designed to safely convey the peak runoff from the watershed area. They are proposed to be of trapezoidal cross section with stable side slopes, pitched with stone, if required.

A perusal of the contour survey map of the project shows that the northern portionof the project is haing higher elevation than the southern portion. It can be seen that the highest portion is the north-central edge. A further perusal of the surrounding topography outside the project area shows that northern side outside the project is at a still higher elevation than the northern edge of the project, thus, water will flow towards the project from north side.
A perusal of the proposed landscape plan on the geo-morphological ridge shows that water bodies have been proposed on the surface for rain water harvesting and recharge.

Hence, diversion drains or interceptors drain along the northern boundary to divert water to the proposed surface water bodies will aid in ground water recharging as well as soil moisture conservation.

(2) Percolation tanks

The surface water bodies proposed in the landscaping area in the north side will act as percolation tank. It will be constructed by excavating a depression, forming a small reservoir or by constructing an embankment in a natural ravine or gully to form an impounded type of reservoir.

(3) Mulching

Mulch is a protective covering, usually of organic matter such as leaves, straw, or peat, placed around plants to prevent the evaporation of moisture, and the

growth of weeds. Th practice of mulching helps to retain soil moisture, prevents weed growth and enhances soil structure. There are various types of mulching such as surface mulching, vertical mulching, polythene mulching, pebble mulching, dust mulching live vegetative barriers, straw mulching etc. Mulching proves to be beneficiary though increment in soil moisture, reduction in soil erosion, maintenance of soil temperature etc. It helps in improvise in soil structure, soil fertility and soil biological regime.

Hence, it is proposed to use mulch in the landscaped area for soil moisture conservation.

Glyriciidia is proposed to be grown in part of the landscaped area and be used as mulch-cum manure for the tree plantations for conserving soil moisture and improving soil fertility.

6.10 Ground water improvement

As seen in **Fig 5**, water bodies are proposed in the landscaping area in the geo-morphological ridge in the north side. These water bodies will act as surface water run off collection tanks and also percolation tank. Thus, rain water harvesting would have been carried out to recharge the ground water. The area of the water body has been arrived on the following basis:

Total Potential Annual Runoff (in cum)	74 542
Proposed minimum holding capacity in the water body of total annual discharge	20%
Proposed total runoff approx holding capacity in the water bodies (c.u.m)	14 908
Recommended Average depth of water body (metre)	2.5
Required water body area (s.q.m)	5 963
SAY (in sqm)	6 000

6.11 Project specific Mitigation measures

The activities of the project which will have impact on the flora and fauna will be specifically addressed and the proposed mitigation measures are as follows:

1. Impact due to operation of DG Sets will be temporary (during power failure only) and reversible. With the improved power supply situation in the city, the DG sets are expected to operated approximately once in a week. The DG sets will have emissions well within the limits specified by CPCB and periodic maintenance as well emission monitoring will be done to ensure that the emissions are within limits. Baseline data for Ambient air quality has been collected by Perfact Researchers Pvt. Ltd. from December 2014 to

March 2015. Maximum value during monitoring season at the site in North direction towards Asola Bhatti WLS for PM 10 is found 122.9 µg/$m^{3,}$ for PM 2.5 is found 51.3 µg/m^3, for SO2 is found 7.4 µg/$m^{3,}$ and for NOx is found 30.3 µg/$m^{3,}$

EIA/EMP Report has been prepared by M/s Perfact Envirosolutions Pvt. Ltd. Which is available at MoEF&CC website on the following link- http://environmentclearance.nic.in/writereaddata/FormB/EC/EIA_EMP/28072016RMFJVCFZEIA.pdf. The predicted impact on nearest habitats as per report towards in North direction of site towards Asola Bhati WLS for various ambient air quality parameters is given in **Table 4**.

TABLE 4
MAXIMUM INCREMENTAL GLCFROM PROPOSED STACKS (µg/m^3)

Pollutant	Highest concentration observed (µg/m^3)	Maximum Incremental anticipated GLC from site (µg/m^3)	Total resultant concentration (µg/m^3)	NAAQS, 2009
PM_{10}	122.9	0.34 (0.28%)	123.24	100
SO_2	7.4	0.59 (7.9%)	7.99	100
NOx	27.8	2.66 (9.5%)	30.46	100

The predicted incremental maximum concentration for PM 10 is very low i.e. 0.28%. As can be seen from the above table, baseline ambient air quality for PM 10 is above the limit as specified in NAAQS 2009. This scenario is pre existing all over the city of Delhi due to heavy urbanization and high vehicular traffic. The projects anticipated contribution will be negligible, temporary and reversible.

The predicted incremental maximum concentration for SO2 and NOx is 7.9% and 9.5% respectively. But, the resultant concentration shall remain well below NAAQS 2009. Hence, mitigation measures as sugested in EIA/EMP Report shall be taken so that it does not cross the limit of the Standard.

2. Noise generated from the campus shall be minimized by plantation. It is well established that greenbelts and walls act as noise barriers. The project has a green belt proposed along its entire periphery as well as a boundary wall which will absorb the noise and attenuate any noise from the campus to the ambient noise levels by the time it reaches the boundary of ABWLS.

3. Impact due to water consumption or waste water generation is not anticipated as the entire waste water will be treated and resused. Treated waste water will be used to develop a greenbelt as well as undertake plantation on ridge land (if permitted), which in turn will create a micro habitat for birds and smaller mammals.

4. Solid waste management will be done in a regulated manner. The collection of waste will segregated at the residential colony and it will be taken at the common collection site. The collection site will be constructed such that it will restrict the entry of monkey. At the hospital complex, the solid waste shall be segregated (biomedical waste, organic waste etc.) at the respective Departments and wards. These shall be collected at the basement and the entry of truck shall be directly at the basement so that no contamination occurs and waste will be taken for disposal.

7.0 BUDGETARY PROVISION FOR WILDLIFE MANAGEMENT

Budgetary provision for wildlife management is given in **Table 5**. In first year, construction of water ponds and awareness programmes like posters, signboards, notices etc. shall be done. Monitoring of the area will be done regularly by the appointment of one person from the project personnels. User agencies will deposit fund after getting the clearance in the office of Divisional Wildlife Officer, Delhi for various conservation measures.

TABLE 5
BUDGETARY PROVISION FOR WILDLIFE CONSERVATION AND MANAGEMENT

Sl. NO.	Particulars of Activity	Rs. (in lakhs)	
		Capital	Recurring
1	Plantation	1.5	1.0
2	Construction of Boundary wall	Included in project cost	
3	Public education and awareness programmes	0.50	0.50
4	Man-animal conflict minimisations		Included in points 1,2 & 3
5	Soil moisture conservation	10.0	1.0
6	Ground Water improvement-Rain water harvesting structures	5.0	1.0
7.	Pollution control from project	5.0	3.0
Grand Total		**22.0**	**6.5**

FIG 5: LANDSCAPING PROPOSAL IN GEO-MORPHOLOGICAL RIDGE- OVERVIEW

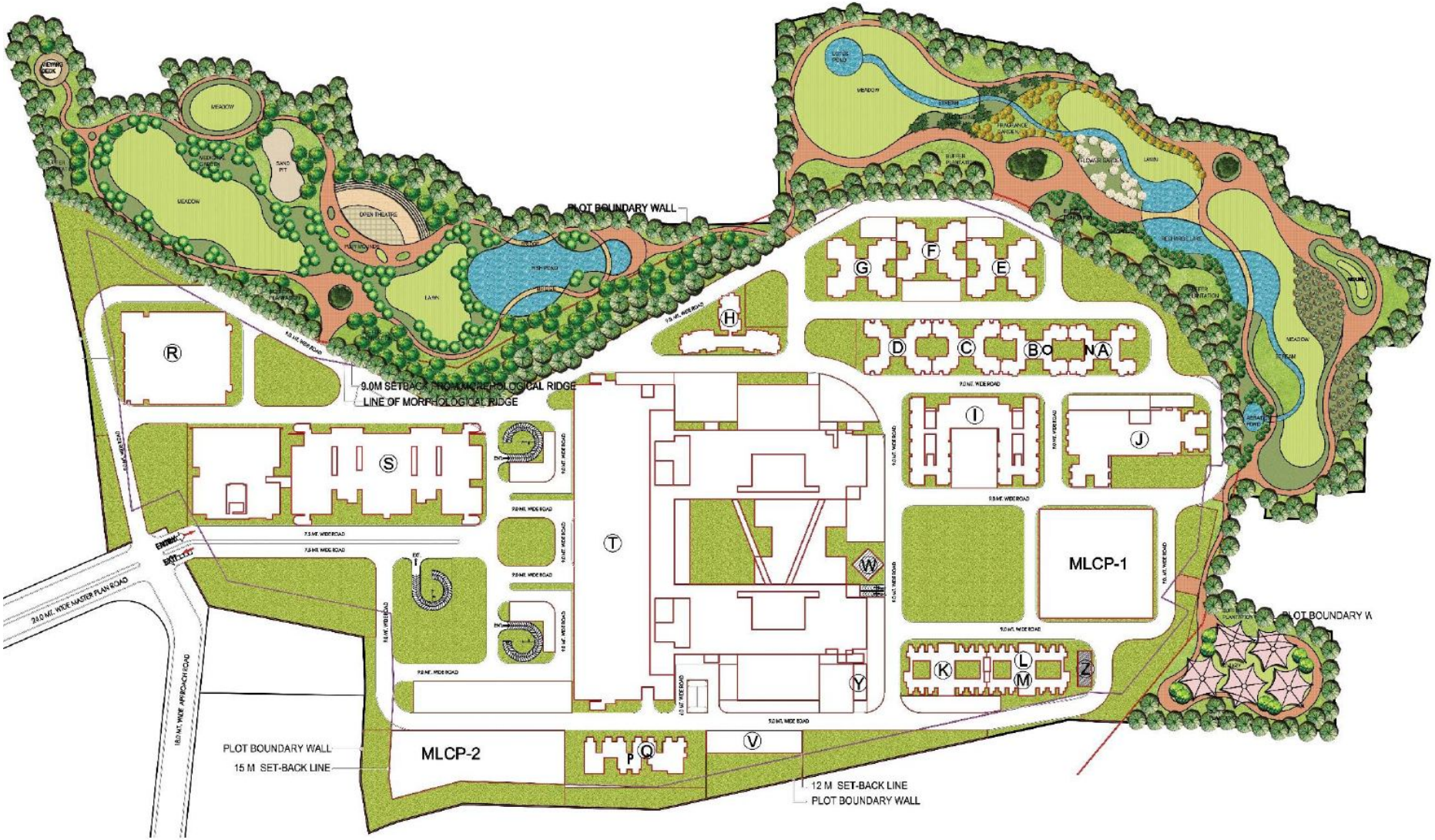


FIG 6: LANDSCAPING PROPOSAL IN GEO-MORPHOLOGICAL RIDGE- BIODIVERSITY PARK-A

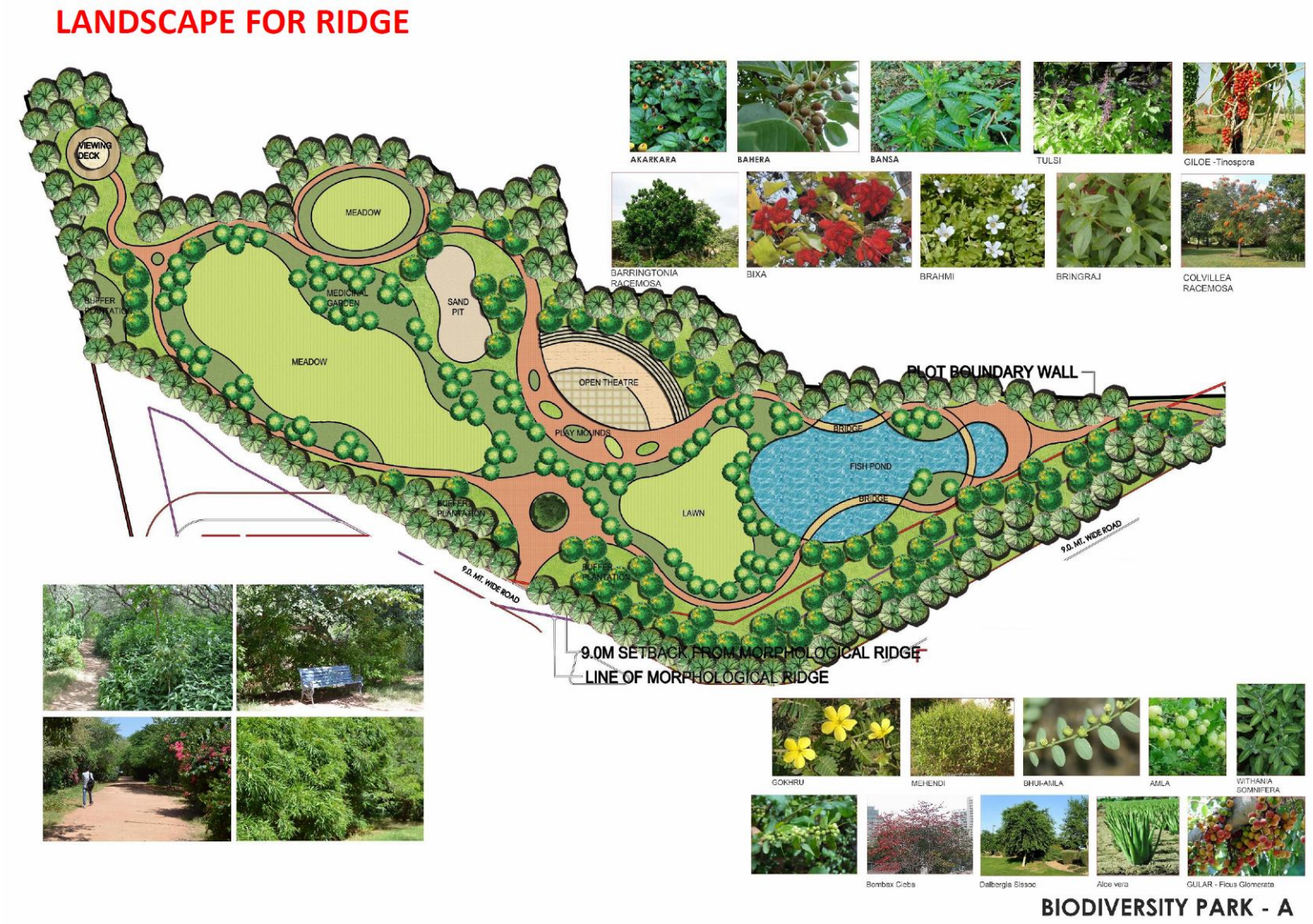


FIG 7: LANDSCAPING PROPOSAL IN GEO-MORPHOLOGICAL RIDGE- BIODIVERSITY PARK B