

VERIFICATION REPORT OF THE GREEN BELT / PLANTATION

Developed By: M/s Jindal Steel & Power Limited
Dongamahua Captive Power Plant, Tamnar
Dongamahua, Raigarh – 496107
(Chhattisgarh)
Phone No.: 07762 227001 – 10 (10 Lines)
Web: www.jindalsteelpower.com



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Chhatauna, Mandir Hasaud, Raipur, Chhattisgarh**



**In Association With
Aaditya Environet LLP**



(ISO / IEC 17025, 2017 (NABL Certified Laboratory), ISO 9001:2015, 14001:2015, 45001:2018 Certified Laboratory)

Corporate Office: 685/69, Vikas Vihar, Raipura, Raipur (CG)

Report on**Verification of Green belt / Plantation****M/s Jindal Steel & Power Limited,****Dongamahua Captive Power Plant, Tamnar****Raigarh – 496107, Chhattisgarh****Date of Site visit: 2 to 7 February 2025**

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Prepared and certified by**Dr. Yogendra Kumar****PhD. in Chemical Environmental Engineering
NIT-Raipur, Chhattisgarh****Viewed and certified by**
**Dept. of Chemical Engg.
R.I.T., Raipur****Dr. Vijendra Kumar Sahu****HOD Department of Chemical Engineering
RITEE, Chhatauna, Mandir Hasaud Raipur C.G**

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INTRODUCTION

Green vegetation cover is beneficial in many ways leading to conservation of biodiversity, retention of soil moisture, recharge of ground water and maintaining pleasant micro climate of the region. In addition, vegetation cover can also absorb pollutants from the environment and helps in effective pollution control.

Green belts are planned open spaces safeguarded from developmental activities such as construction of buildings, factories, dams, etc. Safeguarded in the sense that no infrastructural development will be allowed on such designated areas and these areas will only be used for growing vegetation cover on it. Green belts in and around urban and industrial areas are important to the ecological health of any given region.

In history, there are very few records of green belts. One of the important examples is of Queen Elizabeth I of England. She had banned new buildings in a three mile wide belt around the City of London in 1580. In very recent time, the green belt policy was pioneered in the United Kingdom in the 1930s. Campaign to Protect Rural England (CPRE) and various other organizations have helped to spread awareness about Green belts in United Kingdom.

The objective of Green belt varies from country to country and region to region. The common objectives are to protect natural environments such as biodiversity etc, to improve air quality of the region, pollution control, to maintain micro climate of the region, etc. Green Belt Development is an important tool that aims at overall improvement in the environmental conditions of the region.

Regulations / environmental law for Green Belts Development in India

Environmental protection has been considered as an important domain for industrial and other developmental activities in India. Ministry of Environment & Forests (MoEF) has taken several policy initiatives and promoted integration of environmental concerns in developmental projects. One such initiative is the notification on Environmental Impact Assessment (EIA) of developmental projects issued in 1994 and further revised notification in year 2006 under the provisions of Environment (Protection) Act, 1986. EIA is now mandatory for 40 categories for developmental projects. EIA Guidance Manual for building, construction, townships and area development projects proactively talks about the importance of green belts in such projects.

Environmental Guidelines for Industries developed by MoEF, suggest that the industries must care about the surrounding environment and minimize the adverse impacts of industrial operations in the immediate neighborhood as well as distant places. Therefore, these guidelines mandate project owners to maintain the certain distances by the industries from the areas like ecologically sensitive areas, Coastal areas, Flood Plain of the Riverine Systems, Transport/Communication System and Major settlements.

In addition, these guidelines also mandate that economic and social factors have to be recognized and assessed while citing industry. Following are the key points that all industries need to follow while moving ahead with the establishment of manufacturing/processing unit in certain areas. These are;

1. No forest land shall be converted into non-forest activity for the sustenance of the industry.
2. No prime agricultural land shall be converted into industrial site.
3. Within the acquired site the industry must locate itself at the lowest location to remain obscured from general sight.
4. Land acquired shall be sufficiently large to provide space for appropriate treatment of waste water still left for treatment after maximum possible reuse and recycle. Reclaimed (treated) wastewater shall be used to raise green belt and to create water body for aesthetics, recreation and if possible for aquaculture. The green belt shall be 1/2 km wide around the battery limit of the industry. For industry having odour problem it shall be a kilometer wide.
5. The green belt between two adjoining large scale industries shall be one kilometer.
6. Enough space should be provided for storage of solid wastes so that these could be available for possible reuse.
7. Lay out and form of the industry that may come up in the area must conform to the landscape of the area without affecting the scenic features of that place.
8. Associated township of the industry must be created at a space having physiographic barrier between the industry and the township.
9. Each industry is required to maintain three ambient air quality measuring stations within 120 degree angle between stations.

As per the National Forest Policy, 1988 (NFP), It is necessary to encourage the planting of trees alongside of roads, railway lines, rivers and streams and canals, and on other unutilized lands under State/corporate, institutional or private ownership. NFP give emphasis on the green belt development. It says – Green belts should be raised in urban/industrial areas as well as in arid tracts. Such a programme will help to check erosion and desertification as well as improve the microclimate.

As per the stipulations of MoEF, green belt is to be provided all around the power station boundary by planting trees and the total green area including landscaping area will be 1/3rd (About 33%) of the plant area. This will include Lay down area which will be later on converted into Green area.

In India, there is no exclusive green belt regulation/policy. However, under the purview of other regulations such as Environmental Guidelines for Industries, Environment Management Plan, National Forest Policy, Forest Conservation Act, etc; certain percentage of land designated for green belts is recommended for different categories of industrial projects. Expansion of agricultural, urban and industrial activities are causing additional burden on natural resources. Industrial development is causing severe health hazards due the exceeded level of pollution. Green belt not only restrict environmental pollution but it helps to maintain the ecological balance of the region.

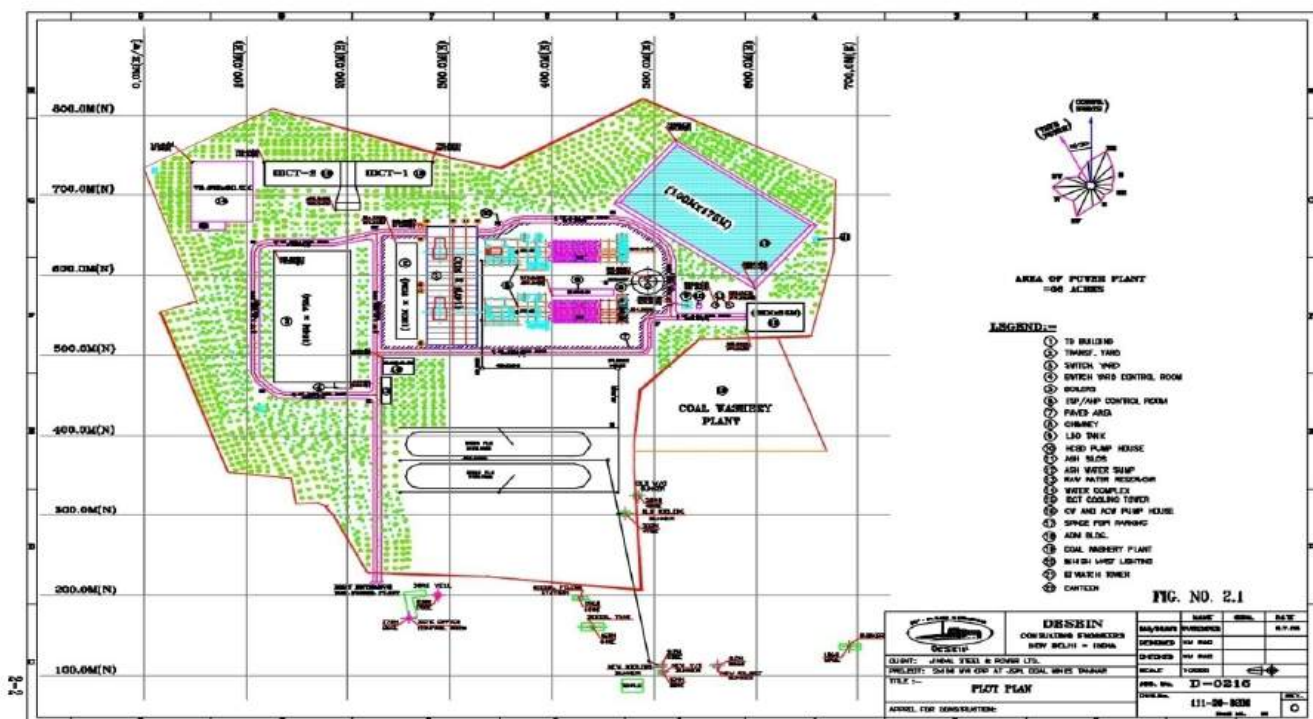
The Aaditya Environet LLP and Raipur Institute of Technology (RITEE), Raipur Chhattisgarh has been taken the responsibility of verification of the green belt developed in the Jindal Steel & Power Limited, Dongamahua Captive Power Plant Tamnar, Raigarh, Chhattisgarh.

ABOUT THE COMPANY

Brief History: The Dongamahua Captive Power Plant (DCPP) is a coal-fired power plant in Chhattisgarh, India that was commissioned in 2010. The plant supplies power to the Jindal Steel and Power Limited (JSPL) facilities in Tamnar and Raigarh.



LAYOUT OF DCP R AIGARH



The present production capacity of JSPL including its own captive power and various units is as mentioned below:

PRODUCTION UNIT	UNIT	CAPACITY
Captive Power Plant	MW	4x144

Technology:

Coal-based power plants, also known as thermal power plants, generate electricity by burning coal to produce steam, which then drives turbines connected to generators. The process involves pulverizing coal, burning it in a boiler, and using the resulting steam to power turbines and generate electricity.

Here's a more detailed breakdown:

1. Coal Preparation and Combustion:

- **Coal Handling:**

Coal is first crushed and pulverized into a fine powder to ensure efficient combustion.

- **Boiler:**

The coal is burned in a boiler, generating heat and high-pressure steam.

- **CFBC Technology:**

Most modern coal plants use "CFBC" technology, where coal is crushed and burned to produce steam.

2. Steam Turbine and Generator

- **Steam Turbine:**

The high-pressure steam from the boiler drives a steam turbine, which is connected to a generator.

- **Generator:**

The rotating turbine spins the generator, converting mechanical energy into electrical energy.

3. Condensation and Cooling:

- **Condenser:**

After the steam has driven the turbine, it is cooled and condensed back into water in a condenser.

- **Cooling Water:**

River water, lake water, or cooling towers are used to cool the steam in the condenser.

- **Water Cycle:**

The condensed water is then pumped back to the boiler to start the cycle again.

4. Efficiency and Environmental Considerations:

- **Efficiency:**

The overall efficiency of a coal-fired power plant depends on the type of boiler and steam turbine used.

- **Environmental Concerns:**

Coal-fired power plants are known contributors to carbon dioxide emissions and other pollutants like nitrogen oxides, sulfur dioxide, and particulate matter.

- **Clean Coal Technologies:**

Advancements in technology, like cleaner coal technologies and more efficient emission control systems, aim to mitigate these environmental impacts.

SALIENT FEATURES OF DCPD RAIGARH

Name of organization	Dongamahua Captive Power Plant (DCPD)
Plant Capacity	4x144 MW
Year of Establishment	2010
Total Land Area	Approx. 96 Acres
Location	The Plant is situated in the state of Chhattisgarh. It is about 50 km from Raigarh town (which is district headquarters) on the state highway linking Raigarh with Kharsia and Bilaspur.
Coordinates	22.1279449, 83.5359192
Altitude	244 above MSL
Seismic Zone	Zone – III
Nearest river	Kelo river
Certifications	Certified with ISO 9001 Certified with ISO 14001 Certified with ISO 45001 Certified with ISO 50001

ENVIRONMENT MANAGEMENT PRACTICES

A. ABOUT THE TEAM -DCPP at Raigarh has built up a strong Environment Management Department (EMD) having multi-disciplinary team of professional and technical staff with vast experience - fully abreast of state-of-the-art technologies and having an intimate understanding of the latest environmental scenario. Responsibilities of this department are to carry out impact assessment of new projects, obtain environmental clearances from Government bodies, ensuring compliance to statutory obligations, environmental monitoring to check efficacy of environment management practices, developing greenery in and around JSPL Plant and creating environmentally aware workforce. There are sophisticated monitoring equipment available in Environmental laboratory like Combustion Online Ambient Air Quality Monitoring Stations and CEMS with Centralized data acquisition system, Flue Gas Analyzer, Stack Monitoring Kits, High Volume Sampler & Respirable Dust Samplers, pH meter, Spectrophotometer, Turbidity meter, Flame Photometer, CO Monitor etc. We have established a very sophisticated Environmental Laboratory for testing water quality.



B. ISO CERTIFICATION -DCPP, Raigarh is an ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 Certified Company by BSI, having integrated documentation system for QMS, EMS and OH&S Management system. At DCP, more than 15 departments/sections are covered under ISO Systems which is being audited two times in a year through trained ISO Internal Auditors and two External Audits by Certification Body to check fulfillment of requirement as per ISO standards.

Satellite image of DCP



C. AIR POLLUTION CONTROL –DCPPis deeply passionate about maintaining a clean and green environment in & around its area of operation. Air pollution is one of the major challenges that any company has to overcome in order to adhere to environmental norms. Keeping this in mind, JSPL follows a procedure of Total Productive Maintenance (TPM) for prevention of Air Pollution. Every aspect of pollution generated due to plant activities is monitored in detail and adequate steps are taken to minimize it. The company has installed state-of-art pollution control devices suitable for the purpose of reducing atmospheric pollution. Real time check on performance of these devices is done through automated online analyzers such as Opacity Meters, gaseous analyzers and Ambient Air Quality Monitoring Stations (AAQMS). Results are directly linked to website and CPCB server.



D. WATER MANAGEMENT -Water pollution is a major environmental concern today that adversely effects the surroundings causing serious injury to environment as well as human health. At JSPL, water pollution is controlled by adopting a range of monitoring processes and treatment measures. Resource conservation through optimization of water use and their reuse after required treatment is an integral aspect of the company's environment management plan. Various conservation, treatment and reuse measures are implemented which includes adoption of close circuit system, neutralization pit, effluent recycling system, effluent treatment plants, oil-water separators, sewage treatment plants etc.



E. SOLID WASTE MANAGEMENT -Waste minimization and utilization with proper management is a prime focus of DCP. Organization has adopted 4 “R”s namely Reuse, Recycle, Reduce & Recover and is making all possible efforts to convert waste into wealth. We have made systematic procedure to identify, segregate of solid waste and store in the specific destination for temporary basis.

F. HOUSEKEEPING -DCPP adopts mechanized housekeeping methods in order to keep the area clean and dust free. The environment management department monitors the housekeeping operations, which are carried out on a regular basis. Training programs are offered to the employees of different departments to increase their awareness in housekeeping. Shop floor employees are also posted in various departments who work under the guidance of the housekeeping coordinators to keep the surroundings clean.

All Roads are cleaned and sanitized. Work areas are regularly maintained and well painted. Drains have been provided along the roads to carry runoff water and water stagnation is not allowed. Scrap yard developed to put all scrap/ wastes at an identified place. Waste bins are provided at required locations for waste collection. Segregated waste is systematically and scientifically disposed.

VARIFICATION OF GREEN BELT:-

In India green belt development is mandatory as per rules and regulation by Ministry of Environment, Forest & Climate Change (MoEFCC), Central Pollution Control Board (CPCB) and State Pollution Control Board. To fulfill this requirement JSPL has established an environment management department (EMD), which is responsible for compliance of all applicable regulatory requirements i.e. pollution control, horticulture activities, housekeeping and greenbelt development in the plant area.

QUANTITATIVE ANALYSIS:-

For the verification of the green belt developed by Jindal Steel & Power Limited, Dongamahua Captive Power Plant Tamnar Raigarh plant team M/s Aaditya Environet LLP and RITEE, Raipur visited the plant and meet the official of the Environment Management Department, and discussed with them about their environment management practices. After that representative of Aaditya Environet LLP & RITEE, Raipur visited all the plantation sites for the physical verification and remuneration was carried out with the EMD staff of the plant. The detail of plantation activates and horticulture development is given in table below.

MAJOR SPECIES OF PLANTS –

Sl.No.	Common Name	Scientific Name	Tree Planted
Forest Species			
1	Arjun	Terminalia	1129
2	Bar (Bargad)	Ficus bengalensis	526
3	Pipal	Ficus religiosa	900

4	Neem	Azadirachta indica	1507
5	Khamhar	Gmelina arborea Roxb.	518
6	Alostania	Alstonia kurzii	203
7	Kaner	Thevetia species	522
8	Kadam	Neolamarckia cadamba	612
9	Bamboo	Bambusa strictus	1109
10	Shisham	Delbergia sissoo	980
11	Bel	Aegle marmelos	436
12	Mahua	Madhuca latifolia	512
13	Chakundi	Cassia siamea	310
14	Karanj	Pongamia pinnata	561
15	Arjun	Terminalia arjuna	435
16	Chhatwan	Alstonia scholaris	228
17	Amrud	Psidium guajava	155
18	Gulmohar	Delonix regia	816
19	Babul	Prosopis juliflora	642
20	Moringa	Moringa oleifera	155
21	Sagon	Tectona grandis	928
22	sal	Shorea robusta	160

Sl.No.	Common Name	Scientific Name	Tree Planted
Avenue / Flowering Species			
1	Peltophorum	Peltophorum ferruginum	7841
2	Amaltas	Cassia fistula	5010
3	Gulmohur	Delonix regia	4713
4	Ashok	Sarracenia indica	4551
5	Lagerstromia	Lagerstromia speciosa	3841
6	Kachnar	Bahunia alba	3437
7	Plumeria	Plumeria alba	3328
8	Kaner	Thevetia species	3168
9	Oleander	Thevetia species	3018
10	Silver oak	Grevillea robusta	1210
11	Taubabia	Taubabia urgentia	511
12	Caesalpinia	Caesalpinia pulcherrima	814
13	Palash	Butea monosperma	529
14	Cordia	Cordia sebestena	471
15	Hibiscus	Malvaceae	365
16	Gliricidia	Gliricidia maculata	934

Sl.No.	Common Name	Scientific Name	Tree Planted
Fruit Species			
1	Mango	Mangifera indica	208
2	Guava	Psidium guajava	216
3	Sharifa	Annona reticulata	128
4	Kathal	Artocarpus heterophyllus	121
5	Litchi	Litchi chinensis	20
6	Aonla	Phyllanthus Emblica	185
7	Kaju	Anacardium occidentale	46
8	Coconut	Cocos nucifera	26
9	Jamun	Syzygium cumini	89
10	Ber	Ziziphus mauritiana	35
11	Imli	Tamarindus indica	32
12	Lemon	Citrus limon	15
13	Papaya	Carica papaya	26
14	Sahjan	Moringa oleifera	155

Sl.No.	Common Name	Scientific Name	Tree Planted
Palms & Cycads			
1	Cycus	Cycus revoluta	10
2	Cycus	Cycus crenallus	11
3	Fish tail Palm	Caryota mitis	15
4	Fish tail Palm	Caryota urens	9
5	Bismarkia Palm	Bismarkia nobilis	14
6	Chamaedorea	Chamaedorea elegans	11
7	Betel Nut	Areca catechu	8
8	Metallica Palm	Chamaedorea metallica	5
9	Areca Palm	Chrysalidocarpus lutescens	16
10	Red Areca	Cyrtostachys renda	10
11	Licuala	Licuala grandis	7
12	Chamaedorea	Chamaedorea adscendeus	13
13	Phoenix	Phoenix canariensis	17
14	Phoenix	Phoenix roebelenii	14

SUMMARY		
1	Forest Species	22
2	Ornamental Species	16
3	Fruit Bearing Species	14
4	Palms & Cycads Species	14
TOTAL NO.OF SPECIES		66

FACILITIES - To cater the horticultural need of complex, various nurseries have been developed, where saplings of forestry trees, ornamental trees, shrubs and green foliage are prepared and nursed. In forestry nursery, company has capacity of generating about 10 thousand saplings, which is used for their own requirements as well as of others as and when demanded. In horticultural nursery company has capacity of generating about 10 thousand saplings of various ornamental trees, shrubs and foliage etc.



PLANTATION DETAIL (In side and outside of the Plant)

S. No.	Common Name	Scientific Name	Sapling Planted
1	Arjun	Terminalia	1129
2	Bar (Bargad)	Ficus bengalensis	526
3	Pipal	Ficus religiosa	900
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5	Khamhar	Gmelina arborea Roxb.	518
6	Alstonia	Alstonia kurzii	203
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11	Bel	Aegle marmelos	436
12	Mahua	Madhuca latifolia	512
13	Chakundi	Cassia siamea	310
14	Karanj	Pongamia pinnata	561
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19	Babul	Prosopis juliflora	642
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22	sal	Shorea robusta	160
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26	Ashok	Sarracenia indica	4551
27	Lagerstromia	Lagerstromia speciosa	3841
28	Kachnar	Bahunia alba	3437
29	Plumeria	Plumeria alba	3328
30	Kaner	Thevetia species	3168
31	Oleander	Thevetia species	3018
32	Silver oak	Grevillea robusta	1210
33	Taubabia	Taubabia argentea	511
34	Caesalpinia	Caesalpinia pulcherrima	814
35	Palash	Butea monosperma	529
36	Cordia	Cordia sebestena	471
37	Hibiscus	Malvaceae	365

38	Gliricidia	Gliricidiamaculata	934
39	Mango	Mangifera indica	208
40	Guava	Psidium guajava	216
41	Sharifa	Annona reticulata	128
42	Kathal	Artocarpus heterophyllus	121
43	Litchi	Litchi chinensis	20
44	Aonla	Phyllanthus Emblica	185
45	Kaju	Anacardium occidentale	46
46	Coconut	Cocos nucifera	26
47	Jamun	Syzygium cumini	89
48	Ber	Ziziphus mauritiana	35
49	Imli	Tamarindus indica	32
50	Lemon	Citrus limon	15
51	Papaya	Carica papaya	26
52	Sahjan	Moringa oleifera	155
53	Cycus	Cycus revoluta	10
54	Cycus	Cycus crenatus	11
55	Fish tail Palm	Caryota mitis	15
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60	Metallica Palm	Chamaedorea metallica	5
61	Areca Palm	Chrysalidocarpus lutescens	16
62	Red Areca	Cyrtostachys renda	10
63	Licuala	Licuala grandis	7
64	Chamaedorea	Chamaedorea adscendeus	13
65	Phoenix	Phoenix canariensis	17
66	Phoenix	Phoenix roebelenii	14
Total			58547

SUMMARY OF AREA VS TREE PLANTATION

Unit Name	Area in Acre	Area in Ha	Total Trees	Plantation Area in Ha	Density/Ha	% of plantation area	Survival Rate
DCPP Raigarh	96	38.85	29577	12.83	2305	> 33%	85%

Note: More than 33% area has been covered under Plantation / Green belt / A forestation of the total project area.

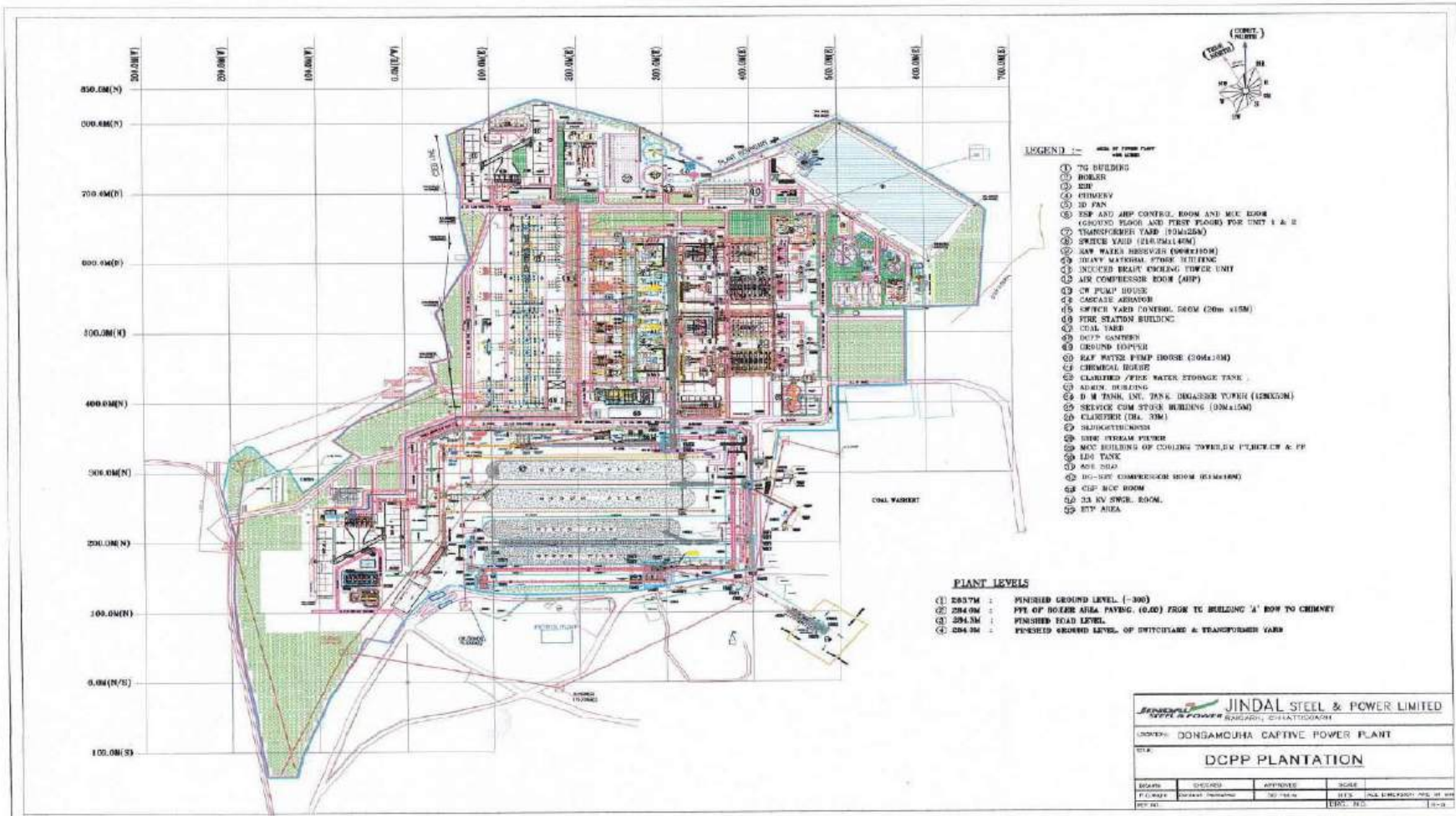
Total Plantation 58547 No. done in and around of the plant (Inside a Plant-29577 Nos. and nearby villages-28970 Nos.).

Density of the plantation inside the plant is 2305 Nos. per hectare.

Expenditure incurred: Project Proponent Informed around INR 8.2 crores Incurred till date for the development of the green belt.

Date of Site visit: 2 to 7 February 2025

MASTER PLAN OF DCPD RAIGARH



PART – B**Conclusion and Suggestions**

1. Jindal Steel & Power Limited, Dongamahua Captive Power Plant Tamnar, Raigarh has established a dedicated Environment Management Department (EMD) which continuously monitors all the applicable parameters as stipulated by statutory bodies, which includes air, water, solid waste, hazardous waste etc.
2. A Horticulture Division has been established which maintains green areas on regular basis and should report to EMD.
3. Plantation and greenery can be seen all around the plant premise.
4. The survival rate and the growth of the plantation are very good.
5. The horticulture division has developed their own nurseries where they prepare new plant saplings of different varieties and species.
6. JSPL,DCPP has established vermin-composting facility that not only takes care of waste, but produces organic manure for supporting such a large area of green cover.
7. It was also observed that the dependency on chemical fertilizers is very less and they prefer their own manure to support their horticultural need.
8. At DCPP, JSPL, various plantation sites within the plant area developed as green belt. The green belt can be seen from entrance of factory gate. In plant operation areas also, greenery, lawns and gardens are developed wherever open space is available. Most of the plants are grown up as trees and their survival rate is good.
9. Most of plantations are 10 to 15 years old and in the old plantation sites the plants are grown up as trees. The plantations are done in different phases (years) and it is considered as good practice. The average heights of the plants are 10 to 35 feet.
10. JSPL, DCPP Raigarh has actively taken part in various green belt and plantation programs organized by local government and Forest Department viz. Operation Oxygen, Operation SIMUNI (Sitafal, Mosambi, Neem), Harihar Chhattisgarh and many more.
11. Old and abandoned dumping sites are reclaimed with top soil, dressing, leveling and dense vegetation cover.
12. The overall impression of the green belt developed under environment management of Jindal Steel & Power Limited DCPP Unit seems as they have paid more attention on planting

decorative as well as evergreen plants. They have also considered the other species keeping pollution control in mind.

13. The greenery of the plant premise shows the zeal and dedication of the Environment Management Department and they appreciated for such a good job as the place is quit green and well planned that attracts the residents as well as outsiders to visit and spent some time in and around these green areas, which is was unique experience.

Suggestions for improvement:

1. The selection of the plants for the development of greenbelt should be focused on their pollution control ability.
2. Crown canopy plants should be preferred for better pollution control.
3. It is advised to minimize the plantation of decorative plants as they have less pollution control values.
4. Plantation and their managements should be a continue practice.
5. The company should involve and encourage the local villagers/ inhabitant for some useful plantation in their own land. The company may provide some plants and other help for these propose.
6. The company may add plantation work in their CSR, CER activities.

A Word of Appreciation:

M/s Jindal Steel & Power Limited,Dongamahua Captive Power Plant Tamnar, Raigarh plant management with their EMD team has done extremely well in developing greenery and green belt in their premise. Especially the green belt developed around the boundary walls and surrounding is very good. Their initiative of distributing plants among local villagers and school children is a very good practice in creating awareness among citizens about environment protection. We appreciate Jindal Steel & Power LimitedDongamahua Captive Power Plant Tamnar,Raigarh administration and their Environment management department for their commitment and commendable efforts.

KML File where Green color shows Green belt / Plantation area of the total project area.



GLIMPSES OF GREENERY AT JSPL – DCP, Dongamahua





PARTICIPATION IN TREE PLANTATION PROGRAM







Few Relevant information of Green Belt Development

Adequate greenery in industrial establishment helps in creating better environment in many ways.

- It provides a sylvan surrounding to improve the aesthetical condition which, in turn, improves the working condition of the workers.
- Tall trees attract birds to roost and also provide shelter to small creatures like squirrel, snakes etc. thus biodiversity is restored.
- A properly designed green belt of adequate width acts as a filter of our pollutants for outside. Fugitive emissions are mainly controlled by the green belt.
- Plantation of pollution indicating species at strategic locations can indicate the air pollution status of the area. These are plants species which are sensitive to sensitive air pollutants. Such species serves as “bio indicators”.
- Green belt acts as a noise barrier for outside.
- Treated waste water of an industry is always recommended for maximum utilization within the premises. If the waste water is used for irrigation of green belt and other plantation within, the objective is partially achieved.

Planning of green belt:-

Planting of green belt requires the following considerations:-

1. Choice of the species
2. Design of the belt
3. Width of belt

Choice of the plants species depends upon the nature of fugitive gaseous pollutants coming from the industries. Obviously those plants should be resistant to the pollutants. Besides, trees with large crown are preferred because they served as a good barrier for particulate and gaseous emissions. In between the resistant, species and within the industrial premises, some strategic locations as these species indicate the status of pollution.

The design of the greenbelt should be such that it should form an effective shield against pollutants to outside. A three tier plantation of small medium and large size plants can achieve the same. Typical 50 m width green belt may have 3 layers may consist of bushes (small tree). The inner layer may have large tree with good crown and under growth. The middle layer in between can have bushes and shrubs (small and medium size tree)

The width of the green belt should be carefully & judiciously decided; because of the cost of the land there is always a demand from the industry to a narrow belt. Ideally the width should be such to have maximum attenuation. The attenuation factor can be expressed as:

AF = pollution level at a point a just outside without the greenbelt / pollution level at a with the green belt

The attenuation factor for a well designed green belt attains a limiting value after a certain width and becomes more effective with the increasing height at trees. For the green belt, with Indian trees species (tropical forest species) longer width may not be necessary for maximum attenuation.

Generally for a large industry a belt width of 150 – 200 meters may be adequate but these can be increased where pollution level is high. For a less polluting industry, a belt less then 150 mtr can also do.

The design and nature of green belts will vary according to the place and the type of industry. Some of the factors which influence the design of green belts are-

1. Climatic factors such as wind velocity, temperature, rainfall, sunlight, humidity etc.
2. Assimilation capacity of the ecosystem.
3. Height and canopy of trees.
4. Topography.
5. Size of land available.
6. Distance from source.
7. Soil and Water quality.
8. Nature and extend of pollutants.

Advantages of green belts:

- Noise control- A green belt reduces the intensity of sound. Function as a barrier. Trees can either deflect, refract or may absorb sound to reduce its intensity. The intensity reduction depends on the distance sound has to travel from source. Trees can also modify suitably the humidity and climate which affects sound intensity.
- Help in soil erosion control. Plant species help in improving soil quality and bind soil particles thereby preventing erosion.
- Green belts also help in containing water run offs.
- Climate Control
- Trees help in removing carbon dioxide and other pollutants from air and by release of O₂ into the air thereby improving air quality. A green belt development can also help in removing particulate matter from the air by trapping such particulate matter.
- Water Pollution control- Some species can remove some pollutants from water. Example- copper absorbed by *Chlorella vulgaris* and Scandium buy *Astragalus*, zinc by *Typhalatifolia*, chromium by *Salvinianudans*.

Annexure

	
क्षेत्रीय कार्यालय छ.ग. पर्यावरण संरक्षण मंडल टी.व्ही.टॉवर रोड, जिला-रायगढ़ (छ.ग.) Email – roraigarh.cecib@gmail.com	
जाचक क्र. 2330 /क्षे. का./प.सं.मं./2025	रायगढ़, दिनांक 10/01/2025
प्रति,	सूची संलग्न,

विषय :-	माननीय एन.जी.टी. प्रिंसिपल बैंच के प्रकरण क्रमांक 970/2024 के संबंध में कार्ययोजना के परिपालन बाबत।
संदर्भ :-	माननीय एन.जी.टी. द्वारा पारित आदेश दिनांक 25.11.2024.
-----00-----	
उपरोक्त विषयांतर्गत लेख है कि माननीय एन.जी.टी. प्रिंसिपल बैंच के प्रकरण क्रमांक 970/2024 में पारित आदेश अनुसार कार्ययोजना तैयार की गई है। उक्त कार्ययोजना में निम्नलिखित कार्यों का परिपालन 03 माह में किया जाना है :-	
01. The third party verification report of plantation should contain the minimum basic information inter-alia including total area of the Industry/Project, area covered under plantation, density of trees, types of species, survival rate, expenditure incurred, layout plan to the scale, duration of verification etc. The audited report should be uploaded on the website of the company with all details as mentioned. 02. The steel unit may also explore the possibility of installation of cement grinding unit for utilisation of locally generated fly ash. 03. Industries must install brick manufacturing unit and explore the possibility of manufacturing of fly ash based product, utilization and for disposal in eco friendly manner. 04. Fly ash generating industry shall effectively comply with regular submission of fly ash utilisation returns and Annual Fly Ash Management Audit report to this office and the same may be uploaded on the website of the Company. 05. Thermal Power Plants shall provide the list of fly ash bricks/block manufacturing plants to which fly ash is provided outside their premises.	
उपरोक्तानुसार आवश्यक कार्यवाही कर, की गई कार्यवाही से इस कार्यालय को अवगत कराना सुनिश्चित करें अन्यथा उद्योग पर सूसंगत धाराओं के तहत कार्यवाही की जायेगी, जिसकी संपूर्ण जिम्मेदारी उद्योग प्रबंधन की होगी।	
 क्षेत्रीय अधिकारी छत्तीसगढ़ पर्यावरण संरक्षण मंडल, रायगढ़ (छ.ग.) रायगढ़ दिनांक	
पु. जाचक क्र. /क्षे.का./पर्या.सं.मं./2025	
प्रतिलिपि :-	01. सदस्य सचिव, छ.ग. पर्यावरण संरक्षण मण्डल, पर्यावास भवन, नार्थ ब्लॉक, सेक्टर-19, नवा रायपुर, अटल नगर जिला-रायपुर (छ.ग.) की ओर कृपया सूचनार्थ प्रेषित। 02. श्री पी. जगन, क्षेत्रीय निदेशक, केन्द्रीय प्रदूषण नियंत्रण बोर्ड, भोपाल (म.प्र.) की ओर कृपया सूचनार्थ प्रेषित। 03. कलेक्टर महोदय, कार्यालय कलेक्टर, जिला-रायगढ़ (छ.ग.) की ओर कृपया सूचनार्थ प्रेषित।
 क्षेत्रीय अधिकारी छत्तीसगढ़ पर्यावरण संरक्षण मंडल,	