Chapter 3

Prediction of Impacts

The environmental impact due to Bordi nalla medium project have been forecasted on the basis of available secondary data from the various Government Agencies and collection of Primary data by the NEERI for one season.

3.1 Impact during Pre-construction Phase

The impact occurs during pre-construction phase are mainly due to land acquisition, compensation their off and resettlement and rehabilitation of project affected persons in the project area.

In Bordi nalla medium project, total land requirement for project is about 532.31 ha of which 524.86 ha is private land and 7.45 ha forest land. The area is flat and plain. Forest area is used for the construction of the Bordi nalla medium project. No any gaothan is coming under submergence.

The water spread area is marked FRL is 532.3 ha which will be inundated with construction of dam. Balancing barrage and other land required canals/feeder canal. This submergence area is covered most of the agricultural fertile land. The total estimates of loss of agricultural land, crops from the submergence area have not been assessed so

far. The direct impacts on land and agricultural crops will occur at the dam construction site and the submergence area. Loss of the agricultural crops will be the permanent loss.

The water spread area is marked upto FTL which is 448.75 ha and submergence ratio calculated is 11.03% which is within the permissible limit. The total submergence area of the whole project is 493.27 ha. The submergence area is distributed as submergence under the main dam 273.05 ha (inclusive of 7.45 ha of forest land), the submergence under Kondwardha balancing barrage is 175.70 ha the Megha river diversion, feeder channel is 44.52 ha.

The impact during preconstruction phase of the project will be marginal. However the crop production revenue income will be forever. The loss of the submergence area may be evaluated with help of former and Agricultural officer of their area.

3.2 Impact during Construction Phases

3.2.1 Air Environment

The only significant air quality consideration is potential impact on human comfort and health. The material required for the construction of the project are carried by road thereby increasing the vehicular traffic. During construction phase of the project, the major activities are drilling, blasting, quarrying transportation and construction of barrage and other components of project. All these activities lead to on increase in concentration of air pollutants, particularly SPM, NOx and hydrocarbons (HC) which are further added due to increased vehicular traffic. However, the levels of SO_2, NOx and Hydrocarbons were observed well below the stipulated standards during the construction phase. Quarry operations and blasting are localized, with limited local impacts due to noise and dust generation. Traffic-generated dust along with road as well the dust generated during road construction activities creates an appreciable nuisance and possible health hazard in settlement. These impacts will cease following completion of construction and the vegetative stabilization of slopes and bore ground. Due to non-existence of air polluting sources like industries, thermal power plant and mining generation in the region, air quality in the region is only affected due to movements of the vehicles. For the purpose of construction of dam all the materials required will be brought by truck on road. Therefore the air quality impact will be only due to the transportation activity on nearly road and constructional activities of the dam during construction phase only. The vehicular traffic as

well as operations of other equipment will be minimized on completion of the construction phase of the project.

During the construction phase, increase in SPM because of dust emission is expected. However, the impact will be confined upto limited distance from the construction site. During construction phase air pollutants are likely to be emitted from increased transportation activities (Vehicular Traffic). These pollutants includes NOx, SPM, HC and CO but the incremental rise over the existing background levels of air pollutants due to increase in vehicular traffic offer the construction of the dam will be marginal and expectable air quality parameters will remain well within the stipulated standards by CPCB (GOI). Increase in the existing background levels of air pollutants is not expected during operational phase and ambient air quality parameters will remain well within the stipulated standards as prescribed by CPCB.

3.2 .2 Micrometeorology

The reservoir formed at Bordi nalla medium dam may marginally alter micro-meteorological conditions. The micro-meteorological parameters, which may be affected, are local winds, relative humidity, atmospheric temperature and atmospheric visibility. The seasonal change in submergence area will be insignificant hence the variation in local wind pattern generated by water body will remain almost similar throughout the year. The variation in relative humidity will mainly be governed by the evaporation losses. Presence of a large mass of water contributes to the stabilization of temperature with a decrease of maximum daily temperature and an increase in minimum daily temperature already in Bordi nalla medium project.

The evaporation losses will be particularly significant during summer season. The increase in evaporation losses will slightly increase the moisture content of the atmospheric layer existing above the water surface. This moisture will ultimately spread to their place due to wind and turbulence. The evaporation process through reservoir will result in increased day-time temperature.

The existence of water body will cause the formation of lake breeze during day time and land breeze during night time. The lake breeze will enhance the natural upslope winds during day time, whereas land breeze will increase down slope wind during night time.

The minimum and maximum temperature difference is small and hence it is expected that the micro climatic change due to reservoir will be on both the sides.

For the impact of vehicular activity on air quality adjacent to vehicular movement of state highway road, the meteorology is considered as given in Chapter 2.

3.3 Air Pollution Impacts due to Vehicular Movement

The project site is 45 km away from the Amravati city. It is situated in Chandur Bazar Taluka. The proposed dam will be constructed on Bordi nalla. The potential air pollution sources are due to vehicular traffic, presently the traffic density is concentration on state high way. The vehicular density will be expected to rise after the construction of proposed dam is completed. The impact of vehicular activity on air quality adjacent to vehicular movement on state highway is predicted using CALINE 4 (CL4) model developed by USEPA.

(a) Vehicular Emissions

The details presented in **Table 3.1** are considered for vehicular air pollution model.

Emission factors as recommended by Mukhopadhyay Committee under the New Auto Fuel Policy for India have been considered for estimating vehicular emissions. The emission factors and emissions due to vehicular movement for various pollutants are given below in **Table 3.2**.

The length of road is considered to be 1.6 km for air quality modeling.

(b) Air Quality Modeling and Predictions

The impacts due to proposed dam are predicted by using CL4 model. CL4 (Caltrans, 1989) is a dispersion model that predicts concentrations of pollutants emitted by vehicles i.e. Carbon Monoxide (CO), Oxides of Nitrogen (NOx) and hydrocarbons (HC) near roadways. CL4 is a simple line source Gaussian plume dispersion model and predicts air pollutant concentrations for averaging periods of 1 hour and 8 hour. The user defines the proposed roadway geometry, worst-case meteorological parameters, anticipated, traffic volumes, and receptor positions. The user must also define emission factors for each roadways link. CL4 is a graphical windows-based user interface, designed to ease data entry and increase the on-line help capabilities of CL4.

The purpose of the model is to assess air quality impacts near transportation facilities in what is known as the microscale region. Given source strength, meteorology, site geometry, and site characteristics, the model can reliably predict pollutant concentrations for receptors located within 500 meters of the roadways.

In this modeling exercise, 8 hourly concentrations of CO, NOx, HC and SPM are predicted for the duration 10-17 Hrs, 18-01 Hrs and 02-09 Hrs.

CL4 divides individual highway links into a series of elements from which incremental concentration are computed and then summed to form a total concentration estimate for a particular receptor location. The receptor distance is measured along a perpendicular from the reactor to the highway centerline. The first element is formed at this point as a square with sides equal to the highway width.

Thus, as element resolution becomes less important with distance from the receptor, elements become larger to permit efficiency in computation. The choice of the element growth factor as a function of roadway-wind angle (PHI) range represents a good compromise between accuracy and computational efficiency. Finer initial element resolution is unwarranted because the vertical dispersion curves used by CL4 have been calibrated for the link half – width (W2) distance from the element center point.

Each element is modeled as an "equivalent" finite line source (EFLS) positioned normal to the wind direction and centered at the element midpoint. A local x-y coordinate system aligned with the wind direction and originating at the element midpoint is defined for each element. The emissions occurring within an element are assumed to be released along the EFLS representing the element. The emissions are then assumed to disperse in a Gaussian manner downwind from the element. The length and orientation of the EFLS are functions of the element size and the angle (PHI,ϕ) between the average wind direction and highway alignment. Values of PHI = 0 or PHI = 90 degrees are altered within the program an insignificant amount to avoid division by zero during the FELS trigonometric computations.

CL4 treats the region directly over the highway as a zone of uniform emissions and turbulence. This is designated as the mixing zone, and is defined as the region over the traveled way (traffic lanes – not including shoulders) plus three meters on either side. The additional width accounts for the initial horizontal dispersion imparted to pollutants by the vehicle wake effect. Within the mixing zone, the mechanical turbulence created by moving vehicles and the thermal turbulence created by hot vehicle exhaust is assumed to predominate near the ground.

In the present case, prediction of impacts has been carried out for winter season on 8 hourly basis upto a distance of 500 m on either side of the road State Highways

. It is predicted that the maximum contribution to ground level concentrations of CO, HC, NOx and SPM due to vehicular movement will be less than 5 $\mu g/m^3$ beyond 500 m from the road. It is noteworthy, that this activity is mainly located away from this proposed project.

Table 3.1.1

Traffic Density in State Highway during Study Period (1 hr)

Sr. No.	Location	Heavy Vehicle	Medium Vehicles	Light Vehicles
1.	State highway Amravati Chandur Railway Road	72	48	188

Table 3.1.2

Emission factors and emissions due to vehicular movement

Pollutant	Emission factor (gm/km-vehicle)		Emission (kg/hr-km)		Total Emission (kg/hr-km)
	Four	Two	Four	Two	

	Wheelers	Wheelers	Wheelers	Wheelers	
CO	1.39	1.4	2.78	3.5	6.28
HC	0.15	0.7	0.3	1.75	2.05
NOx	0.12	0.31	0.24	0.775	0.775

3.4 Noise Environment

Noise Sources

Presently there is no activity at the Dam site. Noise attenuation, particularly due to air absorption and crops/grass/shrubs/plantation will be about 8 to 10 dBA. The background noise levels in the nearest habitation at barrage Mohana located at about 2 km and from the site of operations will increase by 1-2 dBA.

3.4.1 Noise Due to Transportation

The equivalent noise level due to traffic is estimated using FHWA (Federal Highway Administration) Traffic noise model, as follows:

$$Leq(h)i = Lo_e + 10 \text{ Log } (Ni/ Si Ti) + 10 \text{ Log } (15/D)^{(1+a)} + So-13$$

where,

Leq(h)i = Leq at hour h for i^{th} vehicle type

Loe = Reference mean energy level for i^{th} vehicle type

Ni = Number of i^{th} type vehicle passing during time T

Si = Average speed for the i^{th} vehicles type in km/hr

T = Duration for which Leq is desired

= Perpendicular distance in meters from centerline of the traffic lane to the location

= Factor relating to absorption characteristics of ground cover between the roadway and the observer

So = Shielding factor

Noise levels for light, medium and heavy vehicles on the roads are calculated using the above model and cumulative effect is computed using the following model :

$$Leq\ (Total) = 10\ Log\ (10^{\ Leq\ L/10} + 10^{\ Leq\ M/10} + 10^{\ Leq\ H/10})$$

Where Leq_L, Leq_M, Leq_H are equivalent noise levels for light, medium and heavy vehicles respectively.

The study area is heavily affected by transportation due to State Highways i.e. Amravati Chandur Railway Road. The trucks, buses, cars, jeeps and two wheelers are running through this route. There will be marginal increase in traffic due to proposed Dam

on Pedhi river. Considering natural growth and increase due to proposed project, following traffic composition was considered for Amravati Chandur Railway Road :

Type of Vehicle	Amravati Chandur Railway Road
Heavy vehicles	72
Medium Vehicles	48
Light vehicles	188

Following input parameters are also considered to predict increase in noise levels:

Vehicular speed:

Heavy vehicles	:	40 kmph
Medium vehicles	:	45 kmph
Light vehicles	:	50 kmph

The shielding factor (D) and factor related to absorption coefficient (a) is considered to be 3 dBA and 0.

The predicted cumulative noise level at 50m -100m from the center of the road i.e. SH-6 ranges between 65-70 dBA. On SH-200 the cumulative noise level at 50-100 m varied between 62-65 dBA. The cumulative noise level on SH-194 is predicted to be in the range of 55-57 dBA at 50-100m from centre of the road.

Noise levels were measured in and around the project sites and the human settlement. The major sources/activities of noise in the project area could be classified as follows :

Stationary and mobile sources at quarry sites

Transportation of construction materials

Stationary and mobile sources at construction sites

The noise generated by the construction equipments and heavy machineries do not contribute to the background noise levels of the herby human settlement as these settlements are at a considerable distance from the quarrying and barrage construction sites. The noise levels in the nearby human settlements and at quarrying and barrage

construction sites are well within the standards promulgated by World Health Organisation (WHO) and Occupational Safety and Health Administration (OSHA).

During the dam construction activity, the noise levels at the construction will increase for few hours of the day due to blasting, dumping and dozing activities and also due to heavy machinery like air-compressors, trailers, road rollers, motor graders, vibrator rollers and heavy mobile cranes etc. The impact of these activities will be temporary in nature, as this is one time activity during specific part of the day.

The major sources/activities of noise in the study area can be classified as follows:

Stationary and mobile sources at construction site

Transportation of construction materials

The details of equipment for construction and heavy machineries to be employed, with details of expected noise levels from these equipment are presented in **Table 3.2.1**. The noise generated due to construction will be only one time activity. The noise generated by these sources will not contribute to the background noise levels of the nearby human settlements, because these settlements are at a considerable distance from dam site and surrounded by vegetation. If live stationary sources of 90 dBA are considered to be prevailing at the dam site for few hours, the impact at a distance of two kilometers from the site will be in the range of 42-44 dBA. Temporary colony of workers established near the dam site will face marginal noise impact during some part of the day. Significant direct impact on the communities due to the project activities is not expected since the construction works are one time activities.

There will be substantial noise attenuation due to growth in vegetation. The nearest habitation sites are more than 1 to 2 km from the construction sites. Hence, the increase in noise levels during construction phase will be insignificant.

It can be concluded that the noise levels in the nearby human settlements will be well within the standards promulgated by Central Pollution Control Board, New Delhi (GOI).

3.4.2 Impact of Noise on Occupational Health

Equivalent sound pressure level (Leq) averaged over 8 hours is used to describe noise exposure in work place environment. The damage risk criteria for hearing as enforced by CPCB and OSHA (Occupational Safety and Health Administration) stipulates that the noise levels upto 90 dBA are acceptable for 8 hour exposure per day.

3.4.3 Impact on Community

The community level impact of noise is predicted as equivalent noise level during daytime (6.00 A.M. to 10.00 P.M) and during night time (10.00 P.M. to 6.00 A.M). A 10 dB(A) penalty factor is added to Leq during night time for computing equivalent noise level during day and night (24 hourly average). This penalty is added to account for the fact that noise during night (sleeping) time is judged to be more annoying than the same noise level during daytime. Equivalent noise levels for day-night are used to describe community noise exposure.

Compressor, feed pumps and generator etc. would be the main sources of noise during the construction phase of the dam. The noise levels expected would be in the range of 75-85 dBA due to construction activity. This temporary increase in noise levels would not have any significant impact on the community.

3.10

Table 3.4.1

Predicted Noise Levels due to Equipment to be Used during Construction Phase

Sr. No.	Source	Noise Level (dBA)
1.	Scrapper	95
2.	Loader	95
3.	Shovel	83
4.	Dumper (35 t capacity)	90
5.	Dumper (50 t capacity)	97
6.	Lorry	82
7.	Dozer	96
8.	Drill	85
9.	Crusher (150 5/hr)	80-82
10.	Water Tanker	85
11.	Mixer	80
12.	Blasting (Charge 2000 kg)	120

3.11

3.5 Water Environment

Groundwater quality was monitored to assess the impact of the proposed activity. The assessment parameters indicated that groundwater is good physico-chemically. The groundwater collected from various source such as dugwell, bore well and hand pumps contain high dissolved solids. However there will be maximum dilution due to rain water runoff collected in the dam if river and Nallahs are discharged in to the Dam. If the discharges are properly managed, then there will not be any impact of these rivers and nallahs on the dam water collected during rainy season. The groundwater is not faecally contaminated and useful for drinking purposes. However this surface water will be used for irrigation purpose mostly. The details regarding the utilization, storage and distribution of this dam water is given below in water resources. Faecal contamination of groundwater was also observed at some locations due to local activities. So it should be chlorinated before use.

The water collection system, the construction of earthen dam across the Bordi Nalla upstream of village Borgaon Mohana, water from Megha river is diverted in the Bordi nalla dam with the help of intake structure and this water is lifted to balancing reservoir of Kondwardha village and Megha river respectively.

3.5.1 Water Resources

3.5.1.1 Catchment Area

The catchment area at dam site is 70.89 sq.km., the Megha diversion barrage of village Pala is 252 sq.km. and balancing reservoir of Kondwardha river is 29.375 sq.km. The total catchment are of the project is 352.26 sq.km.

3.5.1.2 Rainfall Data

Megha diversion barrage are 3 raingauge stations were identified for calculating yield at dam site. The rainfall data from 1948 to 2002 has been considered for calculations purpose. The 75% dependable weighted rainfall works out to 775.60 mm.

3.5.1.3 Yield

The total catchment area upto dam site is 70.89 sq.km. for calculating yield 75% dependability rainfall series from 1948-2002 is considered. The 75% dependable yield work out to be 6.905 Mm^3 including 0.312 Mm^3 per month flow additional 21.049 Mm^3 water of Megha river is diverted into Bordi Dam.

	Bordi Nalla (Mm^3)	Megha River (Mm^3)
a. 75% dependable yield	6.593	43.944
b. Per month flow 5%	0.312	2.090
c.Total yield at site	6.905	46.023
d. Evaporation losses	2.588	-

3.5.1.4 Water Availability

Bordi nalla is right bank tributary of river Purna in Tapi basin. The catchment area upto Bordi dam site will be available, 6.903 Mm^3, 75% dependable yield and 21.049 Mm^3 from the river Arna (Megha) into the Bordi nalla so the total water available in this scheme 27.949 Mm^3. To provide irrigation benefits to the village Kondwardha and Inayatpur on balancing barrage is proposed at 5.0 km U/s of Bordi near village Kondwardha. It is proposed to lift the stored water in Bordi dam with the help of lift irrigation system, stored water will be available upto 8.03 Mm^3 into the Balancing barrage. At this Kondwardha barrage two head regulators are proposed on either side to irrigate 2651 ha of land. Farmers from village Kondwardha and Inyatpur will lift the water from barrage to irrigate 489 ha area. One H.R. is proposed as R.D. 1320 m of Bordi dam and it is proposed to irrigate 986 ha of land by flow irrigation. Thus scheme will irrigate 4126 ha of land.

3.5.1.5 Water Requirement

The water requirement for crop has been calculated. The average rainfall for the period from 1948-2002 have been calculated. The crop water requirement has been worked out as per modified penman method considering the rainfall data of Achalpur and Chandur bazaar rainguage station and Eto values of Amravati District. The water requirement for 1000 ha has been workout to be 4.973 Mm^3 considering 70% overall efficiency.

The yield available for planning the scheme is 52.928 Mm^3, thereby annual utilization is 27.949 Mm^3.

Proposed utilization for the scheme is 27.949 Mm^3. Storage capacity is as

follows :

Storage Capacity	Bordi Nalla (Mm^3)	Balancing Barrage (Mm^3)
a. Gross storage	10.000	8.031
b. Live storage	9.550	7.440
c. Dead storage	0.457	0.591
d. Total utilization	27.949	-
e. For water supply	2.631	

3.5.1.6 Distribution of Catchment Area of the Project

The Bordi nalla medium project is situated in Tapi basin and sub-basin of purna. The total 75% dependable yield of Bordi nalla is 6.593 Mm^3 and the Megha river is 43.944 Mm^3. Arna/Megha river flows from M.P. to Maharashtra and meet to river Purna, a tributary of Tapi basin. The Megha river flows in MP. All that terrain is hilly and reserved forest hence no scheme is constructed till today in that catchment .

The total yiled is calculated as site of Bordi nalla and Megha river 6.905 Mm^3 and 46.023 Mm^3 respectively. The water is available for planning is 52.928 Mm^3 but the annual utilization 27.949 Mm^3. The evaporation losses is 2.588 Mm^3. The maximum flood discharge is 1325.76 m^3/second.

3.5.1.7 Water Requirement for Irrigation and Drinking

The water requirement for the irrigation is 22.386 Mm^3 and for drinking purpose 2.631 Mm^3. The scheme irrigates 4126 ha of land of 13 villages of Chandur Bazar tahasil and three villages of Achalpur tahasil.

Bordinalla is right side tributary of Purna river. The nalla meets the Purna river near the village Rajana, which is near about 3 km downstream from the dam site. The overall bed gradient of nalla is in 260.

After studying the topography for the purpose of command area, it is found that the only flow irrigation will not be economical. Hence main canal was proposed through under ground pipes and then 986 ha irrigation is proposed by flow irrigation. Also 3140 ha irrigation is proposed with the help of lift irrigation system from the balancing weir at village Kondwardha located at 4 km upstream of main dam, lined canal is proposed for 986 ha flow irrigation.

3.5.1.8 Inter State Water Right

No interstate aspect are involved in this project.

3.5.1.9 Total Yield at Project Site

The project has been planned at 75% dependability. The monsoon rainfall of the influencing rainguage station has been worked out for the period from 1948-2002. The weighted average rainfall has been arranged in the descending order and 75% dependable rainfall workout to be 77.56, the average annual rainfall of the area is 74.47 cm.

The total yield is computed on the basis of rainfall runoff correlation equation of Tigaon project. The total yield worked out in this way is 6.595 Mm^3 including 0.312 Mm^3

per month flow at 5% of total yield. The net yield available for planning the scheme would be 6.905 Mm^3.

Arna/Megha river flow from Madhya Pradesh to Maharashtra and meets to river Purna a tributary of Tapi. Catchment area of Megha river is 252 sq.km. draining 46.023 Mm^3 yield. Out of that only 21.049 Mm^3 flood water is diverted into the Bordi dam with the help of intake structure and feeder canal. It is proposed to regrade the Bordi nalla so as to pass the required discharge safely. Catchment area of Megha river lies in Madhya Pradesh. All that terrain is hilly and reserved forest. Sharing of Benefits and lost acceptance of submergence in upstream state.

Catchment area Arna/Megha is belonging to the of Madhya Pradesh for collecting the water and transfer to Bordi nalla dam. The sharing of the cost with Madhya Pradesh Government is not arrived. All the submergence area of Bordi nalla medium project comes under Maharashtra state. The sharing of benefits and cost acceptance of submergence in upstream state does not arrive :

Inter state/International adjudication through catchment area of Arna/ Megha river is belong to Madhya Pradesh and Catchment area of Bordi nalla, the command area of Bordi nalla medium project comes in Maharashtra state only hence this problem does not arrive

Inter state/international aspects of territory property etc. coming under submergence out stees as rehabilitation. The catchment area of Arana/ Megha river belong to Madhya Pradesh the flood water is diverted into Bordi dam with the help of intake structure and feeder chanal remaining. Catchment area and command area are belonging to Maharashtra state only. The problem does not arrive

Any other aspect of project involving interstate/international problem. The problem about the catchment and command are of Bordi nalla medium project does not arrive

3.6 Land Environment

The advent of irrigation infrastructure changes the scenario of economic growth of the area by the increase of agricultural production. Assure water supply is conductive in the introduction of high yielding varies (HYV) and for intensive cultivation it will also result in extension of sound area in the irrigated villages. The best use of land resources for agricultural production is possible with irrigation if judiciously applied. To hardness the

available water and to make the best use of available resources increase in use of fertilizers, pesticides and other agriculture inputs will be observed and the inter cultural practice will be increased with requires labour. This will create employment generation and expand commercial activities in the area due to the requirement of agriculture input and better purchasing power of the people. The live stock density is likely to increase due to increase tempo of agricultural activities. The groundwater table is expected to rise and thus rising the level of water in dug wells.

The change that fallow in agricultural practice do not necessarily promote a more efficient use of resource with the introduction of irrigation, the natural existing balance may be disturbed. Seepage from irrigation canal water course and application of large dose of irrigation water to the field find their way down to the groundwater table, ultimately leading to water logging and increase in salinity of soil over watering not only fails to provide additional yield but also, it persisted in, has a very serious, consequence in the raising water table plant root level thus making the land unculturable. The increased use of water cause water logging. Excessive application of fertilizer also play a role in increasing the salinity of soils deep percolation of water through the soil leads to leaching of available nutrients which deteriorates soil quality and contamination of groundwater with fertilizers and pesticides.

Water logging, salinity and loss of top soil are the problem of paramount importance and the measure needs to be taken to keep it in control. The canal and water courses should be well lined and maintained in order to check the loss of precious water and to prevent water logging and salination of nearby soils. The farmers/cultivators of the area should be made aware of the water conservation practices proper use of fertilizers and the impact of excess use of water, fertilizers and pesticides. The farmers should be encouraged for the adaptation of irrigation system in order to conserve water and to prevent deep percolation of water. Soil conservation measures need tobe taken in order to prevent the loss of top soils due to water erosion and by taking measures like controlled grazing/restricted grazing of cattle. The proposed cropping pattern need to be reviewed periodically considering the fluctuating prices and demand of agricultural outputs.

The increased in live stock density may result in overgrazing to pastures and well create a resultant pressure of fooder resources. The overgrazing leads to heavy

losses of top soil and thus makes the land barren. The resultant pressure on fodder resources can be met with the proposed cropping pattern.

3.16

Reservoir Details

Bordi nalla project envisages construction of earthen dam across the Bordi nalla, up stream of village Borgaon-Mohana in Chandur Bazar. The Bordi nalla is a right-bank of tributary of Purna river in Tapi Basin. The Dam site is located on latitude of $21^{O}13'07''$ and longitude of $77^{O}36'55''$. The gross storage capacity at FRL of Bordi Nall dam is 10.007 Mm^3 but annual utilization is 27.949 Mm^3. The catchment area of Bordi dam site is 70.84 sq.km. draining 6.903 Mm^3 yield. It is proposed to divert the river Arna (Megha) into the Bordi nalla with the help of intake structure at village Pala feeder canal upto the basin of Bordi nalla.

Arna/Megha river flow from Madhya Pradesh to Maharashtra and meet to river Purna tributary of Tapi. The catchment area of Megha river is 252 sq.km. and draining 46.023 Mm^3 yield out of that only 21.049 Mm^3 flood water is diverted into the Bordi dam with the help of intake structure and feeder channel, the catchment area of Megha river lies in Madhya Pradesh. All that terrain is hilly and reserved forest.

Balancing Reservoir at Kondwardha

Water from Megha river is diverted in to the Bordi nalla dam with the help of intake structure and this water is lifted to balancing reservoir of Kondwardha village. The balancing reservoir have store 8.03 Mm^3 water and also store the monsoon water. Then there is the possibility of the silt accumulation so far silt rare is calculated as 6.0 ha m/100 sq.km. If the life of the reservoir is consider for 30 year the total silt accumulation will be 0.9755 Mm^3 similarly silt accumulated for sixty year (60 years) will be 1.951 Mm^3 and Dam at Borgaon Mohana, if the life is considered. The total silt accumulation is 2.680 Mm^3.

By the construction of various component of the Bordi nalla medium project, 511.34 ha land will be used. This is loss of agricultural land. The abstract of the total land will be used as follows :

Particulars	Land in ha

		Private land	Govt. land	Total land
Head Work				
1. Main Dam				
i.	Submergence	387.12	12.72	394.57
ii.	Dam Site	10.00	25.85	10.00

Particulars	Land in ha		
	Private land	Govt. land	Total land
2. Balancing Tank	0	0	0
i. Submergence	91.18	12.72	91.18
ii. Barrage site	8.00	25.85	8.00
3. Feeder channel	25.00	-	25.00
4. Nalla Regredation	40.52	-	40.52
5. LI Scheme and Intake Structure Jack well etc. Intake 1.0+ LIS 2.50 = 3.50 ha	0	0	0
Total for Head Work	**561.82**	**12.72 + 25.85**	**561.82**
Main canal			
6. Main canal from main dam (R.B.C.)	2.50		2.50
7. LBC from balancing tank	6.33		6.33
8. RBC from balancing tank	17.94		17.94
Total for Main Canal	**26.77**	**-**	**26.77**
Grant total for Head Work and Main Canal	**588.59**	**12.72 + 25.85**	**627.16**

Water Available for Irrigation

Bordi nalla is right bank tributary of river Purna in Tapi basin. The catchment area upto Bordi dam site will be available 6.903 Mm^3 and 21.049 Mm^3 is from the river

Arna (Megha) into the Bordi nalla with the help of intake structure at village Pala. The total water available in this scheme 27.949 Mm^3. To provide irrigation benefit to the village Kondwardha and Inyatpur on balancing barrage is proposed at 5.0 km upstream of Bordi near village Kondwardha. It is proposed to lift the stored water in Bordi dam with the help of lift irrigation system 8.03 Mm^3 water will be available in balancing reservoir for irrigation. At this Kondwardha barrage two head regulators are proposed on either side to irrigate 2651 ha of land. Farmers from village Kondwardha and Inyatpur will lift the water from barrage to irrigate 489 ha area one H.R. is proposed as R.D. 1320 m of Bordi Dam and it is proposed to irrigate 986 ha of land by flow irrigation. Thus scheme irrigate 4126 ha of land.

Sr. No.	Controlling Levels	Bordi Dam (m)	Balancing Barrage (m)
1.	N.B.L.	335.030	353.50
2.	M.D.D.L.	340.995	-
3.	Crest R.L.	349.000	368.50
4.	F.R.L.	351.000	368.50
5.	H.F.L.	351.000	370.00
6.	T.B.L.	354.000	371.50

Cropping Pattern

Due to the irrigation in the command area the cropping pattern may be change.

Nature of the Soil

The nature in the command area are generally black cotton soil and overlying alluvial beds at staggered depth. The soil in the command area well drained soils. These soils are mostly suitable for crops slike cotton, chillies, Hy. Jowar, pulses, wheat, gram oil seed etc.

Existing Cropping Pattern

The existing cropping pattern in the command area has been complied from village statistics. The major crop under the cultivation are cotton, jowar, hy. Jowar, ground nut, pulses, wheat, chillies and other perennials.

The existing cropping patter of the study area is as follows :

Sr. No.	Name of the Crops	% of the Crops

1.	Soyabean	-
2.	Cotton	41
3.	Hybrid Jowar	15
4.	Pulses	11
5.	Groundnut/soyabean	6
6.	Wheat	2
7.	Channa	1
8.	Vegetable	11
9.	Oranges	13

Proposed cropping pattern for Bordinalla Medium Project

Sr. No.	Name of the Crops	Proposed in %	Irrigated area in ha
A. Kharif Irrigated			
1.	Paddy	2	82.52
2.	Hybrid Jowar	20	82.52
3.	Chillies	10	
4.	Vegetables	15	618.90
5.	Hybrid cotton	15	618.90
6.	Ground nut	20	825.20
B. Kharif Unirrigated			
1.	Pulses	10	412.60
2.	Sunflower/Soyabean	08	330.08
C. Rabi Crops			
1.	Wheat	10	412.60
2.	Gram	25	1031.50
3.	Sunflower/Soyabean	10	412.60
4.	Vegetables	15	618.90
	Grand Total	**160**	**4126**

The water requirement for 1000 ha work out to be 4.973 Mm^3 considering overall efficiency.

Villagewise statistics of command area for Bordi Nalla Medium Project

Sr. No.	Name of Village	Taluka	GCA (ha)	CCA (ha)	ICA (ha)

A. Flow Irrigation from Main Dam

1.	Tabaswadi	Chandur (Bz)	204.38	171.64	145.89
2.	Talani	Chandur (Bz)	461.88	399.63	339.68
3.	Taker Kheda	Chandur (Bz)	692.63	588.74	500.43
	Total		**1358.89**	**1160.01**	**986.00**

Sr. No.	Name of Village	Taluka	GCA (ha)	CCA (ha)	ICA (ha)
B. Irrigation Through Lift Irrigation System (LIS) at Kondwardha Barrage					
1.	Borgaon (Mohana)	Chandur (Bz)	554.44	517.54	465.77
2.	Tuljar (Ganahi)		185.57	168.21	151.39
3.	Pipari (Talegaon)	Chandur (Bz)	297.73	252.93	227.64
4.	Mohankheda	Chandur (Bz)	312.76	281.69	253.52
5.	Talegaon (Mohana)	Chandur (Bz)	323.38	289.69	260.72
6.	Fajalpur	Chandur (Bz)	464.63	438.58	394.72
7.	Belas	Chandur (Bz)	309.88	287.35	258.61
8.	Ramapur	Achalpur	284.04	276.39	248.75
9.	Meghnathpur	Achalpur	136.05	125.23	112.71
10.	Bhugaon	Achalpur	289.41	257.65	231.89
11.	Rajana	Chandur (Bz)	56.52	50.31	45.28
12.	Kondwardha	Chandur (Bz)	431.99	384.47	346.00
13.	Inyatpur	Chandur (Bz)	227.42	158.88	143.00
	Total (B)		**3873.90**	**3488.91**	**3140.00**
	Total (A+B)		**5233**	**4649**	**4126**

Earthen Dam

An earthen dam of length 1620 m is proposed across the Bordi nalla and side spillway is proposed with 30 gates of size 8m x 2m to pass the designed flood 1325.76 cumecs safly. The maximum height 19.97 m george portion to impound a gross storage of 12.58 Mm^3 Central Gated spillway is proposed from R.D. 700 m to 745 mts to pass the 1.5 times inglish flood i.e. 1325.76 cumecs. This project is framed as medium Project 3140 ha. Irrigation is to be done by lift irrigation system and 986 ha by flow canal.

Bordi nalla is a right side tributary of Purna river. The nalla meets to the Purna rivers near the village Rajana which is about 3 km down stream from the dam site. The overall bet gradient of nalla is in 1 in 260. From the visual inspection it appears that exposed rock is not found the river bed. Trial bore hole in river portion was taken upto the depth of 30 m and it is found that rock is not available within this depth.

3.7 Biological Environment

The area under submergence is mostly agriculture, ranted farming with low plant and animal diversity. No endangered or edemic plant was recorded from study area. Faunal diversity was observed. Biodiversity or plant and animals would not be adversely affected. The biological activity will be improved due to availability of water.

Bordi Nalla is a seasonal, so fishery activities is not prominent so fishery activity may not be affected. Beacause of dam formation, the fishery production will be improved and the local people may get benefit of good fishery production.

3.8 Socio-economic Environment

Critically analyzing the existing environmental status of the socio-economic profile and visualizing the scenario with the project, the impacts of the project would be varied and may generate both positive and negative impacts in the region that are stated below.

Prediction of qualitative impacts on socio-economic environment is shown in **Table 3.8.1**. Expected change in subjective quality of life (QoL) may increase up to 0.49 and cumulative may increase to 0.50 in the project region as the activity may bring development. The expected change in the quality of life after the implementation of environment management plan has been presented in **Table 3.8.2** and **Table 3.8.3** respectively.

The project will create employment and business opportunities during construction phase at local. Agriculture related employment will continue during operation phase of the project. Increased revenue to the government through taxes will be on indirect benefit.

Improved infrastructural facilities like road, communication, market, health, services and other amenities will help in the development of the region. These facilities would be used by local people and would helpful for the betterment and enlistment of the quality of life of local people.

Due to large scale of labours, concentration of workers and their dependents, some health related problems may be encountered due to the diseases like malaria transmitted by the infected incoming workers to the labor force and local residents. The strengthening of primary health centre is necessary to cope up with increased number of patients.

Positive Impacts

Construction of dam is positively important for the control of floods

The irrigation facilities will be improved to the great extent that may benefit

the farmers for increasing the agricultural production

Increase in the employment opportunities mainly during construction phase of the project

Standard of living of the project affected people will improve as the infrastructure facilities may increase in the region

Expansion of business and marketing services

Auxiliary and ancillary industries may develop in the region ultimately increasing the economic status of the people

The dam mainly aims at developing irrigation facilities in the area and looking at the fact that this is no source of irrigation facilities to the areas. It can be definitely stated that the project would benefit socio-economic environment of the area. This is also because agriculture is the only sector giving employment and these are no other employment opportunity like industries, mines construction, transport etc.

The irrigation facilities would improve crop yield in the command area and the land which is presently not cultivated due to insufficient irrigation facilities would also come under cultivation. This will lead to improved employment and income

There is some provision for providing drinking water to the area

Negative impacts

The major issue that may arise due to the project is of land acquisition as most of the agricultural land is acquired for the proposed project.

Proposed project will deteriorate the economic condition of farmers from project affected villages as agriculture is the major source of income.

Relocation/ resettlement may possibly affect the life style of the people

During the time of construction the quality of water may deteriorate

During construction phase there may be increase in areas or breeding of mosquitoes and related insects that may develop the diseases like malaria and schistosomiasis affecting the health of the local people residing near the dam

Influx of population from different areas may affect the socio-cultural environment and may also cause strain on the available infrastructure resources of the region

Soil erosion may deteriorate the quality of soil that may bring loss of diversity of food base in the region

Project may cause economic loss to the project affected people whose agricultural land has been acquired for the project and due to the loss of fertile and manageable soil

There would be increase traffic in the area, noise and dust pollution may disturb the area besides there would be some accidents etc. if proper care is not taken

Table 3.8.1

Predication of Likely Impacts on Socio-economic Environment

Parameter	Local	Regional	Direct	Indirect	Reversible	Irreversible
Employment	+	•	+	+	+	•
Income	+	•	+	+	•	•
Transport	+	+	+	+	+	•
Education	+	•	+	•	•	+
Medical facilities	+	•	+	•	+	+
Communication	+	+	+	+	+	•
Availability of power	+	+	+	•	•	+
Sanitation	-	•	-	•	-	•
Housing	+	•	+	•	•	+
Health	-	•	-	•	-	-
Recreation	+	+	+	•	+	•
Agriculture	-	•	•	-	-	-
Cost of living	+	+	+	+	-	•
Business	+	+	+	+	+	+
Per Capita Income	+	+	+	+	+	•
Pollution	-	•	-	•	-	•

+ : Positive Impact

- : Negative Impact

• : Insignificant

3.25

Table 3.8.2

Quality of Life (Subjective) in the Surveyed Villages

Sr. No.	Name of the villages	QoL(s) prior to commissioning of the project	QoL(s) after implementation of suggested EMP measures
1.	Borgaon Mohna	0.49	0.52
2.	Talegaon Mohna	0.47	0.49
3.	Amrullapur	0.45	0.47
4.	Pimpri Talegaon	0.44	0.46
5.	Fazlapur	0.45	0.47
6.	Tuljapur Gadi	0.48	0.50
7.	Kond Wardha	0.43	0.46
8.	Kurha	0.49	0.52
9.	Saidapur	0.45	0.47
10.	Sarfapur	0.50	0.51
11.	Innayatpur	0.46	0.48
12.	Belaj	0.45	0.47
13.	Bhugaon	0.48	0.49
14.	Tamaswadi	0.49	0.51
15.	Rajna	0.47	0.49
16.	Megnathpur	0.44	0.46
	Total	**0.46**	**0.49**

QoL(s) = Subjective Quality of Life

Table 3.8.3

Quality of Life (Cumulative) in the Surveyed Villages

Sr. No.	Name of the villages	QoL(c) prior to commissioning of the project	QoL(c) after implementation of suggested EMP measures
1.	Borgaon Mohna	0.50	0.51
2.	Talegaon Mohna	0.48	0.51
3.	Amrullapur	0.46	0.47
4.	Pimpri Talegaon	0.45	0.48
5.	Fazlapur	0.46	0.49
6.	Tuljapur Gadi	0.49	0.51
7.	Kond Wardha	0.44	0.46
8.	Kurha	0.50	0.52
9.	Saidapur	0.46	0.48
10.	Sarfapur	0.51	0.52
11.	Innayatpur	0.47	0.5
12.	Belaj	0.46	0.48
13.	Bhugaon	0.49	0.51
14.	Tamaswadi	0.50	0.52
15.	Rajna	0.48	0.5
16.	Megnathpur	0.45	0.47
	Total	0.47	0.50

QoL(c) = Cumulative Quality of Life

3.27