

Name of Project: Rehabilitation and Up-gradation to 2-lane with paved shoulders of Seling-Dulte section (Economic Corridor) of NH-6 from Existing Chainage km 0+000 to km 69+015 (Design Chainage km 0+000 to km 62+200) (Package-1, 2, 3 & 4) in the state of Mizoram under Bharatmala Pariyojana on EPC mode				
User Agency		NHIDCL		PMU Seling, Mizoram
COST BENEFIT ANALYSIS				
Calculation of Cost Part				
Table-B: Estimation of cost of forest diversion				
SN	Parameters	Criteria	Amount (In Rs)	Remarks
1	Ecosystem services losses due to proposed forest diversion	Economic value of loss of eco-system services due to diversion of forests shall be the net present value (NPV) of the forest land being diverted as prescribed by the Central Government (MoEF& CC).	₹ 2,61,51,171	Details are at Enclosure-I
		<i>Note: In case of National Parks the NPV shall be ten (10) times the normal NPV and in case of Wildlife Sanctuary the NPV shall be five (5) times the normal NPV or otherwise prescribed by the ministry or any other competent</i>		
2	Loss of animal husbandry productivity, including loss of fodder	To be quantified and expressed in monetary terms or 10% of NPV applicable whichever is maximum	₹ 26,15,117	Taken as 10% of NPV
3	Cost of human resettlement	To be quantified and expressed in monetary terms as per approved R&R plan	NIL	There is no human resettlement in the forest land along the project road & in Non-forest land; the Assessment is being made by Competent Authority under NH Act, 1956
4	Loss of public facilities and administrative infrastructure (Roads, building, schools, dispensaries, electric lines, railways, etc.) on forest land, which would require forest land if these facilities were diverted due to the project	To be quantified and expressed in monetary terms on actual cost basis at the time of diversion	NIL	There are no public facilities and administrative infrastructure Roads, Building, School, Dispensaries, Electric Lines, Railways etc) on Forest land.
5	Possession Value of forest land diverted	30% of environmental costs (NPV) due to loss of forests or circle rate of adjoining area in the district should be added as a cost component as possession value of forestland whichever is maximum	₹ 78,45,351	30 % of NPV

COST BENEFIT ANALYSIS				
Calculation of Cost Part				
Table-B: Estimation of cost of forest diversion				
SN	Parameters	Criteria	Amount (In Rs)	Remarks
6	Cost of suffering to oustees	The social cost of rehabilitation of oustees (in addition to the cost likely to be incurred in providing residence, occupation and social services as per R&R plan) be worked out as 1.5 times of what oustees should have earned in two years had he not been shifted.	NIL	The Road alignment has been kept to have minimum impact on agricultural land. No grazing land is going to be affected so there is no suffering to oustees.
7	Habitat Fragmentation Cost	While the relationship between fragmentation and forest goods and services is complex, for the sake of simplicity the cost due to fragmentation has been pegged at 50% of NPV applicable as a thumb rule.	₹ 1,30,75,585	50 % of NPV
8	Compensatory afforestation and soil & moisture conservation cost	The actual cost of compensatory afforestation and soil & moisture conservation and its maintenance in future at present discounted value	₹ 34,81,253	Rate for CA scheme as per Standard analysis taken as Rs. 1,25,00 per Ha
		Total	₹ 5,31,68,477	

### Calculation of Benefit Part

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S.No	Parameters	Criteria	Amount (In Rs)	Remarks
1	Increase in productively attribute to the specific project	To be quantified & expressed in monetary terms avoiding double counting	₹ 5,00,000.00	Increase in trade and commerce in the state of Mizoram and neighboring states as the safety and security of country as a whole including prevention of smuggling valuable goods and establishment of law and order in the State will result subsequent economic growth as well as radical development of the society. This benefit parts cannot be directly quantified. However, approx amount will be around Rs 50 Lakhs
2	Benefits to economy due to the specific project.	The incremental economic benefit in monetary terms due to the activities attributed to the specific project	₹ 5,00,00,000.00	Long term planning has to be kept in view for economic and social benefit as a result of economic activities growing in the State and whole country. Therefore, this project is expected to serve tremendous economic and social causes. Economic growth in project district considering 0.1% enhances growth of the state GDP against normal benefit will be for 5 years.
				(0.01 Lacs Crore/annum in 2020-21 However, approx amount= Rs. (10000 x 0.001 x 5 x 0.01) = Rs 5 Crores NB: Considered the 0.1 factor on the total amount
3	No. of population benefited due to specific project	Total no. of potential benefited is 20000.	₹ 25,00,000.00	All those travelling on the road can save on fuel and time, reducing pollution and carbon emission. For those residing on the region will be less exposed to the air and noise pollution. Small scale business & other trade likely to be generated as soon as this highway is developed. This benefit part cannot be directly quantified. However, approx amount will be Rs 25 Lakhs .

### Calculation of Benefit Part

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S.No	Parameters	Criteria	Amount (In Rs)	Remarks
4	Economic benefits due to of direct and indirect employment due to the project		₹ 62,50,000.00	Approximately 200 Nos of Villagers likely to be employed on self employment basis due to likely development of small scale industries as well as general development of economy is expected to occur due to this highway development. This amount cannot be directly quantified. However, this is taken as (250 days/year x 50 nos x 500 INR) Rs. 62,50,000
5	Economic benefits due to Compensatory afforestation	Benefits from such compensatory afforestation accruing over next 50 years monetised and discounted to the present value should be included as benefits of compensatory afforestation.*For benefits of CA the guideline of the Ministry for NPV estimation may be consulted.	₹ 25,00,000.00	The Benefits from compensatory afforestation accruing over next 50 years will result into yield of a large volume of timbers, fruits and enviornmental growth. However, these benefits cannot be exactly calculated. The approx amount will be Rs. 25 Lakhs
		<b>Total</b>	<b>₹ 16,27,50,000.00</b>	
			<b>COST</b>	<b>BENEFIT</b>
			<b>₹ 5,31,68,477.00</b>	<b>₹ 16,27,50,000.00</b>
		<b>COST BENEFIT RATIO</b>	<b>1</b>	<b>3.06</b>

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**Calculation of Net Present Value**

<b>Sl.No.</b>	<b>Area of forest land proposed to be diverted (Ha)</b>	<b>27.85002</b>	<b>Remarks</b>
1	Eco-Class of the forest land to be diverted	Class-I	Assuming dense forest
2	Vegetation Density (As per DFO's report)	0.5-0.6	Assumed
3	Rate per eco-class of the forest area	₹ 9,39,000	
4	Resultant cost of Net Present Value	<b>₹ 2,61,51,171</b>	

The total forest area to be diverted 27.85002 Ha  
 NPV of the forest area to be diverted Rs. 9,39,000 X 27.850022 Ha  
**NPV            ₹ 2,61,51,171**

**ANALYSIS OF PER HA RATE FOR VARIOUS WORK ITEMS UNDER COMPENSATORY  
AFFORESTATION TO BE TAKEN UP UNDER FOREST (CONSERVATION) ACT, 1980**

Rs 270/- per manday

(1100 plants per ha)

Sl. No	Item of work	Manday required (in No.)	Labour Component (in Rs)	Material Component (in Rs)	Cost/Ha (in Rs)
1	2	3	4	5	6
1	<b>Advance works including nursery</b>				
	(a) Survey and demarcation including mapping	3	810		810
	(b) Area preparation by cutting grasses & shrubs	20	5400		5400
	(c) Fire line cutting, burning and maintenance	6	1620		1620
	(d) Clearance of site for nursery, preparation of nursery bed, filling of poly-bags, manuring, shed erection	20	5400		5400
	(e) Cost of seeds, poly-bags, implements etc	0		1890	1890
	(f) Treatment and sowing of seeds	5	1350		1350
	(g) Weeding & watering	11	2970		2970
	<b>Sub Total</b>	<b>65</b>	<b>17550</b>	<b>1890</b>	<b>19440</b>
2	<b>Creation of plantation</b>				
	a) Site preparation, alignment, preparation of stakes, digging of pits, preparation of planting materials, carriage to planting site, planting/sowing, construction of camp shed, inspection path, signboard and other misc. works	25	6750		6750
	(b) Weeding 3 times including vacancy filling and watch & ward	67	18090		18090
	(c) Fire protection measures like fire line cutting, engagement of fire watchers	3	810		810
	<b>Sub Total</b>	<b>95</b>	<b>25650</b>		<b>25650</b>
3	<b>Maintenance of Plantation</b>				
	<b>(i) Maintenance after 1st year</b>				
	(a) Weeding 3 times + vacancy filling (10+9+5)	24	6480		6480
	(b) Fire protection measures	3	810		810
	<b>Sub Total</b>	<b>27</b>	<b>7290</b>		<b>7290</b>
	<b>(ii) Maintenance after 2 years</b>				
	(a) Weeding 2 times (10+5)	15	4050		4050
	(b) Fire protection measures	3	810		810
	Add 25% for anticipated revision of wage rate				1215
	<b>Sub Total</b>				<b>6075</b>

Sl. No	Item of work	Manday required (in No.)	Labour Component (in Rs)	Material Component (in Rs)	Cost/Ha (in Rs)
	<b><i>(iii) Maintenance after 3 years</i></b>				
	(a) Weeding 2 times (8+5)	13	3510		3510
	(b) Fire protection measures	3	810		810
	Add 25% for anticipated revision of wage rate				1080
	<b><i>Sub Total</i></b>				<b>5400</b>
	<b><i>(iv) Maintenance after 4 years</i></b>				
	(a) Weeding 2 times (8+5)	13	3510		3510
	(b) Fire protection measures	3	810		810
	Add 50% for anticipated revision of wage rate				2160
	<b><i>Sub Total</i></b>				<b>6480</b>
	<b><i>(v) Maintenance after 5 years</i></b>				
	(a) Weeding/tending	12	3240		3240
	(b) Fire protection measures	2	540		540
	Add 50% for anticipated revision of wage rate				1890
	<b><i>Sub Total</i></b>				<b>5670</b>
	<b><i>(vi) Maintenance after 6 years</i></b>				
	(a) Weeding/tending	12	3240		3240
	(b) Fire protection measures	2	540		540
	Add 75% for anticipated revision of wage rate				2835
	<b><i>Sub Total</i></b>				<b>6615</b>
	<b><i>(vii) Maintenance after 7 years</i></b>				
	(a) Weeding/tending	10	2700		2700
	(b) Fire protection measures	2	540		540
	Add 75% for anticipated revision of wage rate				2430
	<b><i>Sub Total</i></b>				<b>5670</b>
	<b><i>(viii) Maintenance after 8 years</i></b>				
	(a) Weeding/tending	10	2700		2700
	(b) Fire protection measures	2	540		540
	Add 100% for anticipated revision of wage rate				3240
	<b><i>Sub Total</i></b>				6480
	<b><i>Total of Plantation Cost</i></b>	289		1890	<b>94770</b>
4	Soil & Moisture Conservation measures including construction of check dams, gully plugging, contour trenching, water harvesting structures etc. whatever necessary within the project area (15% of				14120
5	Fencing (5% of plantation cost)				4738
6	Monitoring & Evaluation (2% of plantation				1895
7	Overheads (10% of plantation cost)				9477
	<b>Grand Total :</b>				<b>125000</b>

Package-I

Calculation of Net Present Value for Widening and Upgradation of NH-54 with geometric Improvements  
from km 8.00 – km 125.00, Mizoram

Sl.No	Area of forest land proposed to be diverted	11.61 ha
1.	Eco-class of the forest land to be diverted	Class-I
2.	Vegetation Density (As per DFO Aizawl Forest Division report at Item No. 6 of Part-II of Form-A of FC Clearance	Canopy Density - 0.4 Dense Forest
3.	Rate per eco-class of the forest area	Rs. 9,39,000.00
4.	Resultant cost of Net Present Value	Rs. 10901790.00

Package-II

Calculation of Net Present Value for Widening and Upgradation of NH-54 with geometric Improvements  
from km 125.00 – km 250.00, Mizoram

Sl.No	Area of forest land proposed to be diverted	0.48 ha
1.	Eco-class of the forest land to be diverted	Class-I
2.	Vegetation Density (As per DFO Lunglei Forest Division report at Item No. 6 of Part-II of Form-A of FC Clearance	Canopy Density - 0.7 Dense Forest
3.	Rate per eco-class of the forest area	Rs. 9,39,000.00
4.	Resultant cost of Net Present Value	Rs. 450720.00

Package-III

Calculation of Net Present Value for Widening and Upgradation of NH-54 with geometric Improvements  
from km 250.00 – km 380.00, Mizoram

Sl.No	Area of forest land proposed to be diverted	(4.81+ 6.37)= 11.18 ha
1.	Eco-class of the forest land to be diverted	Class-I
2.	Vegetation Density (As per DCCF, MADC & LADC ) report at Item No. 6 of Part-II of Form-A of FC Clearance	Canopy Density – (0.5 & 0.6) Dense Forest
3.	Rate per eco-class of the forest area	Rs. 9,39,000.00
4.	Resultant cost of Net Present Value	( 4516590 + 5981430) = Rs. 10498020.00

Total amount of NPV payable (Package I, II & III) = Rs. 21850530.00  
( Two hundred eighteen lakh fifty thousand five hundred and thirty only)



(LIANDAWLA)

Addl. Principal Chief Conservator of Forests  
& Nodal Officer (FCA)