

CHECKLIST NO-05**COST BENEFIT ANALYSIS AS PER GUIDELINES ISSUED UNDER FOREST
CONSERVATION ACT**

Purpose: Diversion of 4.7732 Hectare Reserve Forest Land for upgradation of Kalavad-Jamnagar section (PKG-II) of NH-927D in the State of Gujarat from 2 lane to four lane.

Table-A: Cases under which a cost-benefit analysis for forest diversion is required

S. No.	Nature of proposal	Applicability	Remark
1	All categories of proposals involving forest land up to 20 hectares in plains and up to 5 hectares in hills.	Applicable (Roads)	Diversion Proposal 4.7732 ha. Reserved Forest land for up gradation from 2 lane to Four lane in Kalavad to –Jamnagar section of NH-927D.
2	Proposals for defense installation purposes and oil prospecting (Prospecting only).	Not applicable	----
3	Habitation, establishment of industrial units tourist lodges/ complex and other building constructions.	Not applicable	----
4	All other proposals involving forest land more than 20 ha in plains and more than 5 ha in hills including roads, transmission lines, minor, medium and major irrigation projects, hydro projects, mining activities, railway lines, location specific installation like micro-wave stations, auto repeater controls, TV towers etc.	Not applicable	----
5	Total Cost (Investment incurred)		
(a)	Civil Construction cost of the Project.		550 Cr.
(b)	Alternate plantation/ Environment Cost/Substitute.		Environment budget taken in DPR as 2.94 Cr.
(c)	NPV Cost of 4.7732 ha. RF land to be diverted in district		NPV cost= 9.58 lakhs/ ha*4.7732 ha= 45.72 Lac.

(06)	Benefit (Construction of Four lane road).		47.572 Km design length four lane shall be developed all the Major junction with underpasses and provision of service road/slip road for the benefits of local users and Flyover which enhances the safety for road users.
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Table-B: Estimation of Cost of Forest Diversion

S. No.	Parameters	Remarks
1	Ecosystem services losses due to proposed forest Diversion.	<ul style="list-style-type: none"> NPV value as per Forest Conservation Act 1980 & amendments is in between Rs. 9.58 lakhs to Rs. 15.96 lakhs per hectare. NPV value for proposed diverted forest land is calculated Jamnagar 45.72 Lac for 4.7732 ha forest land.
2	Loss of animal husbandry, productivity including loss of fodder.	NIL
3	Cost of human settlement.	NIL
4	Loss of public facilities and Administrative (Roads, buildings, schools, dispensaries, electric lines, railways etc.) on forest land or which would require forest land if these facilities were diverted due to the project.	No Loss of public facilities and Administrative buildings on forest land or which would require forest land because forest land comprises of only Reserved forest Land in some patches.
5	Possession value of Forest land diverted.	<p>Possession value of Forest land will be 30% of NPV as per circular issued by MOEF vide No. 7-69/2011-fc (pt) dated 01.08.2017. Hence It will be 30% of 9.58 Lac = 2.87 Lac per hectare.</p> <p>For estimation purpose, average rate considered is Rs. 2.87 Lac per hectare. So. Possession value of Forest Land as per Circle rates = 2.87 Lac/ha x 4.7732 ha = 13.69 Lac</p>
6	Cost of Suffering Oustees.	NIL
7	Habitant Fragmentation Cost.	NIL
8	Compensatory Afforestation and soil & moisture conservation cost.	Tentative Cost of Compensatory afforestation (CA) double degraded forest land $4.7732 \times 2 = 9.5464$ ha. $\times 9.58 \text{ Lac/Ha.} = 91.45 \text{ Lac.}$

Table-C: Existing Guidelines for estimating benefits of forest diversion in CBA

S. No.	Parameters	Remarks						
1	Increase in productivity attributable to specific project	Due to upgradation of the existing highway from two to Four lane with paved shoulder configuration, there will be overall development of the Project area. There would be easy and fast movement of the traffic, so that it will save time, fuel and maintenance cost of the Vehicle. This will also result in reduction in congestion on road, saving in travel time and reduction in accidents. Hence widening of road will result in improved traffic condition and saving in travel time of about 1 hour. This will also result in economic benefit of the tune of Rs. 46554 Cr. (Refer Annexure for Economic analysis using HDM-4)						
2	Benefits to the economy due to the specific project	<p>The project usually contributes the growth of local economy by increased commercial and agriculture and tourism activities due to improvement of highway.</p> <p>Following economic benefit due to project below.</p> <ul style="list-style-type: none"> • Reduce pollution level due to better surface quality and traffic speed will be increase 100kmh. • Fuel consumption is estimated to be reduce and saving in travel time. • Provision of Safety measures, Road furniture along the road and truck lay bye rest area and bus bays, necessary amenities provides and reduction in accident. • Vehicle operating cost will be reducing due to better transportation. • Social economics growth will be takes place of people unconnected in remote area. <p>Based on the economic analysis of the project. Economic internal rate of return is as follows</p> <table border="1"> <thead> <tr> <th>Project</th><th>EIRR</th><th>NPV(9.58 lacs/ha)</th></tr> </thead> <tbody> <tr> <td>Construction of four lane from km 50+925to km 4+700</td><td>19.6. %</td><td>4.7732*9.58 = 45.72 lacs</td></tr> </tbody> </table>	Project	EIRR	NPV(9.58 lacs/ha)	Construction of four lane from km 50+925to km 4+700	19.6. %	4.7732*9.58 = 45.72 lacs
Project	EIRR	NPV(9.58 lacs/ha)						
Construction of four lane from km 50+925to km 4+700	19.6. %	4.7732*9.58 = 45.72 lacs						
3	No of population Benefited due to specific project	The project stretch passing through Jamnagar district having population 2,160,119 which shall be directly benefitted.						
4	Economics benefited due to of direct and indirect employment due to project	<ul style="list-style-type: none"> • The Kalavad-Jamnagar section of NH-927D shall provide direct employment to approx. 200 no of unskilled and semiskilled persons during its construction period of 2 years. As a result of this, 200 persons x 25 Working days/ month x 24 month = 1.20 lacs (approx.) of man days will be generated. 						

S. No.	Parameters	Remarks
		<p>This will result in substantial indirect employment to people and direct benefit to small scale industrial units in the area.</p> <ul style="list-style-type: none"> Approximately 20 persons will be engaged permanently as staff at Toll plaza and other road operation activities.
5	Economics benefit due to Compensatory Afforestation	<ul style="list-style-type: none"> In lieu of total trees to be removed from proposed PROW in Reserved forest land along the project road. It is proposed to undertake at least twice of the affected trees as compensatory afforestation and as per Forest (Conservation) Act 1980. So, the net productivity will increase. Apart from complementary plantation / road side plantation the compensatory afforestation will be taken up in about Forest land which is at least two times of the area proposed to be diverted. The compensatory afforestation will be done in 9.5464 ha. of degraded forest land which is down the line having a forest density of 1.0. The ecological value for a 50 years period for the density of 1.0 is Rs. 126.74 lakhs per hectare (as per Forest (Conservation) Act 1980). By considering 1.0 density the ecological gain for this project would be 126.74 lakh x 4.7732 ha = 6.01 Cr.

Summary of Cost–Benefit Analysis for the Project

S. No.	Loss (in Lakhs)	Benefit (in Lakhs)
1	Ecosystem service losses Rs. 45.72 Lacs.	Ecological gain from compensatory afforestation on 9.5464 ha. (at least) of land would be Rs. 6.01 Cr.
2	Loss of animal husbandry productivity including loss of fodder = NIL	<ul style="list-style-type: none"> 1,20,000 man days will be generated for unskilled/ semiskilled worker in terms of Salary and Wages & Rs. 500/ day (average) = Rs. 500 x 1,20,000 = 6.00 Cr.(considering semi skill per day wage Rs 500) Approx. Permanent employment for toll plaza operation approximately 20 person and Rs 2,50,000 average annual income for toll period 10 years e.g Rs.2,50,000 x 20 x 10= 5 Crore Basic living amenities including alternative fuel (LPG, Solar Cooker etc.) will be supplied to labors/ workers during construction period
3	Loss of Public Facilities – NIL	
4	Possession Value of Forest land diverted (@ 2.87 Lac/ha) = 13.69 Lac.	
5	Habitat fragmentation cost = NIL	
6	Compensatory afforestation and soil	

	and moisture conservation cost = 91.45 Lac.	
7	Total Cost/ Loss = 45.72 Lac + 13.69 Lac + 91.45 Cr. = 1.50 Cr.	Total gain/ benefit from project = 6.01 Cr. + 6.00 Cr. + 5 Cr. = 17.01 Cr.
Project Cost = 550 Cr.		

Cost Benefit Ratio = Total Benefit/ Total Loss = 17.01 Cr. / 1.50 Cr. = 11.34 which is > 1, so project is found to be viable based on data for described area.

HDM-4 ECONOMICS ANALYSIS SUMMARY ATTACHMENT

HDM - 4

HIGHWAY DEVELOPMENT & MANAGEMENT

Economic Analysis Summary

Study Name: Doraji Jamnaqar

Run Date: 07-10-2015

This report shows total economic benefits using the following:

Currency: Rupee (millions).

Discount rate: 12.00%.

Analysis Mode: Analysis-by-Project

Alternative: With Project vs. Alternative: Without Project

	Increase in Road Agency Costs			Savings in MT VOC	Savings in MT Travel Time Costs	Savings in NMT Travel & Operating Costs	Reduction in Accident Costs	Net Exogenous Benefits	Net Economic Benefits (NPV)
	Capital	Recurrent	Special						
Undiscounted	3,547.53	155.77	0.00	24,169.99	25,029.50	75.45	0.00	0.00	45,544.37
Discounted	4,006.59	177.51	0.00	3,943.51	4,255.80	13.55	0.00	0.00	4,031.45

Economic Internal Rate of Return (EIRR) = 19.6% (No. of solutions = 1)

HDM-4 Version 1.3

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Place: Rajkot


Executive Engineer
National Highway Division
RAJKOT.