

COST BENEFIT ANALYSIS – PORAHAT FOREST DIVISION

Table-B Estimation of Costs for Cost Benefit Analysis

| Sl. No. | Parameters | NPV Factor as per guidelines | Remarks |
|---------|--|------------------------------|--|
| 1 | Ecosystem services losses due to proposed forest diversion | 1 | The total area considered for diversion is 18.28 ha. The economic value of loss of eco-system services due to diversion of forests is taken as the NPV of the forest land being diverted as per MoEFCC, forest type and forest class is considered as per FSI report 2015, and NPV value as per MoEFCC guidelines dated 05.02.2009 at Rs.803000/- for Dense forest class-III, density >0.4. The value is calculated at Rs.146.78 lakhs for the forest area diverted. |
| 2 | Loss of animal husbandry productivity, including loss of fodder | 0.1 | The economic value of loss due to diversion of forests is taken as the NPV of the forest land being diverted as per MoEFCC, forest type and forest class is considered as per FSI report 2015, and NPV value as per MoEFCC guidelines dated 05.02.2009 at Rs.803000/- for Dense forest class-III, the value is calculated at Rs.14.67lakhs for the forest area diverted. |
| 3 | Cost of human settlement | | Nil, as No human settlement is displaced in forest area. |
| 4 | Loss of public facilities and administrative infrastructure (Roads, buildings, schools, dispensaries, electric lines, railways, etc.) on forest land, which would require forest land if these facilities were diverted due to the project | | Diversion is made only for widening and upgradation to intermediate lane of existing alignment. |
| 5 | Possession value of forest land diverted | 0.3 | The loss is calculated as per the NPV value and factor as per guidelines. This value is calculated at Rs.44.03 lakhs for the forest area diverted. |
| 6 | Cost of suffering of oustees | | Nil, no displacement of people is anticipated. |
| 7 | Habitat fragmentation cost | 0.5 | The loss is calculated as per the NPV value and factor as per guidelines. This value is calculated at Rs.73.39 lakhs for the forest area diverted. |
| 8 | Compensatory afforestation and soil and moisture conservation cost | | This is calculated as per the CA costs as per Jharkhand Government Forest guidelines The total value of CA scheme is calculated at Rs.72 lakhs. |
| | | Total | The total cost in terms of NPV for the forest land diversion is calculated at Rs.350.87 lakhs. |

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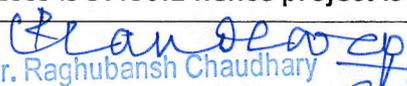
Table-C – Existing guidelines for estimating benefits of forest diversion in CBA

| Sl. No. | Parameters | Descriptions |
|---------|--|--|
| 1 | Increase in productivity attributable to the specific project | The Overall output of the industries established in the vicinity of the area will be increased as the Project road will provide them fast and safe transportation system which will decrease their transportation charge in terms of diesel consumption and hauling capacity due to time saving in hauling with respect to the present condition of the road. Moreover this Project road will also provide a safe and fast access to of the forest officials, Increase in productivity with respect to time saved in travel and manpower hours saved are addressed. This NPV comes to Rs.513.82 Lakhs in 20 years @ 12% interest rate. |
| 2 | Benefits of economy | During and after the construction of Project road, local people and the industries situated in this area will be benefitted greatly. The construction of the road will provide a safe and fast transportation to people which in turn will accelerate the rate of growth in this area .Industries in this area will be benefitted by the construction of this road as it would prove to be a better transportation facility for them. Increase in District GDP/per capita income and saving in fuel costs would be a direct indicator for benefit to the economy. This comes toRs.12,334 lakhs at 12% NPV rates. |
| 3 | No. of Population benefitted | While overall the populations of Jharkhand state (3.29Cr.) will benefit from the project. Specifically, the population of districts West Singhbhum (15.02 Lakhs) through which the alignment passes will benefit largely. (Source: Census 2011, Jharkhand). More specifically the populations of the following blocks namely Sonua, Anandpur, Goilker, Gudri and Manonarpur will benefit. Population benefitted as on 2011for these 5 blocks would be 324546. Projected population based upon 2001-2011 population growth rates of 21.75% comes to 395135 in 2021. |
| 4 | Economic benefits due to direct and indirect employment due to the project | 300 employees during the construction phase will be employed. During the construction period approx. 99000 man-days will be generated and after the construction indirect employment will be generated due to development of shop along the project road. 99000 man-days will be benefitted in terms of salary and wages @Rs.350/day =Rs.346.50 lakhs. |
| 5 | Economic benefits due to Compensatory afforestation | Considering the total forest diverted area for CA i.e. 18.28 ha and the NPV of forest the Economic benefit would be Rs.72 Lakhs ones the total CA is done and similar benefits are accrued as in forest areas. |

Total benefit accrued due to the project at NPV is Rs13,263 lakhs.

^Note: A period of 20 years is considered as per SP-30 for calculating economic returns due to the project, Economic analysis of Highway projects for benefits calculation. Net present value of benefits is also calculated to compare the cost vs benefit at 12% interest rate. NPV included project construction cost.

Benefit-Cost Ratio = Net Benefit/Net Loss is 37.80:1 hence project is viable


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Considering the tangible benefits, the project is found to be viable. If considers the intangible benefits also, then the projects become even more viable and attractive.

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Date: 21/6/21

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DIVISIONAL FOREST OFFICER
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Annexures of CBA

| West Singhbhum Census data and projection of population | | | | | | |
|---|--------------------|--------|--------|----------------|------------------------|---------------------------------|
| Blocks | Population 2011 | Male | Female | House holds | Decadal Popl. GR | Projected Population 2021 |
| Sonua | 77,697 | 38,612 | 39,085 | 16,408 | 21.7500 | 94,596 |
| Gudri | 38,282 | 19,445 | 18,837 | 7,245 | Annual GR | 46,608 |
| Goilkera | 74,019 | 37,167 | 36,852 | 15,072 | 2.175 | 90,118 |
| Anandpur | 44,406 | 22,158 | 22,248 | 8,371 | | 54,064 |
| Manoharpur | 90,142 | 45,471 | 44,671 | 18,260 | | 1,09,748 |
| Total 2011 | 3,24,546 | | | | Total popl.2021 | 3,95,135 |

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Increase in productivity attributable to the specific project

| | | | Percapita income West Singhbhum | Rs.30546/ Annum 2018 | Monthly Income base values |
|-----|------|----------|---------------------------------------|-----------------------------------|----------------------------------|
| Sl. | YR. | VEHICLES | Hrs Saved/day | Total savings in man hours Rs. | 2545.5 |
| 1 | 2013 | 1000 | 500.0 | 1749000 | HOURLY INCOME |
| 2 | 2014 | 1020 | 510.0 | 1783980 | 10.6 |
| 3 | 2015 | 1040 | 520.2 | 1819660 | |
| 4 | 2016 | 1061 | 530.6 | 1856053 | |
| 5 | 2017 | 1082 | 541.2 | 1893174 | |
| 6 | 2018 | 1104 | 552.0 | 1931037 | |
| 7 | 2019 | 1126 | 563.1 | 1969658 | |
| 8 | 2020 | 1149 | 574.3 | 2009051 | |
| | | | | | Per Hr income/saving |
| 9 | 2021 | 2297 | 1148.7 | 3965397 | 10.46 |
| 10 | 2022 | 2355 | 1177.4 | 4267758 | 10.98 |
| 11 | 2023 | 2414 | 1206.8 | 4593175 | 11.53 |
| 12 | 2024 | 2474 | 1237.0 | 4943404 | 12.11 |
| 13 | 2025 | 2536 | 1267.9 | 5320339 | 12.72 |
| 14 | 2026 | 2599 | 1299.6 | 5726015 | 13.35 |
| 15 | 2027 | 2664 | 1332.1 | 6162623 | 14.02 |
| 16 | 2028 | 2731 | 1365.4 | 6632523 | 14.72 |
| 17 | 2029 | 2799 | 1399.6 | 7138253 | 15.46 |
| 18 | 2030 | 2869 | 1434.6 | 7682545 | 16.23 |
| 19 | 2031 | 2941 | 1470.4 | 8268339 | 17.04 |
| 20 | 2032 | 3014 | 1507.2 | 8898800 | 17.89 |
| 21 | 2033 | 3090 | 1544.9 | 9577334 | 18.79 |
| 22 | 2034 | 3167 | 1583.5 | 10307605 | 19.73 |
| 23 | 2035 | 3246 | 1623.1 | 11093560 | 20.71 |
| 24 | 2036 | 3327 | 1663.6 | 11939444 | 21.75 |
| 25 | 2037 | 3410 | 1705.2 | 12849827 | 22.83 |
| 26 | 2038 | 3496 | 1747.9 | 13829626 | 23.98 |
| 27 | 2039 | 3583 | 1791.6 | 14884135 | 25.18 |
| 28 | 2040 | 3673 | 1836.3 | 16019050 | 26.43 |
| 29 | 2041 | 3765 | 1882.3 | 17240503 | 27.76 |
| | | | Total | 191340255 | |
| | | | NPV @12% interest rate | ₹ 5,13,81,592 | |
| | | | In Lakhs | ₹ 513.82 | |

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Benefits of economy

| GDP BENEFITS AND FUEL SAVINGS | | | | | | | | | | |
|-------------------------------|-----------------|--------|-------|-------------------|---|-------------|------------------------------------|-----------------------------|-------------------------------|-------------------|
| Year | Vehicle numbers | | | Population growth | Per capita income Rs./year West Singhbhum | Rs.30546/- | GDP due to new road | | | Business as usual |
| | 450 | 72 | 25 | | | | Per capita income growth @5%/annum | GDP Due to Road improvement | Per capita income BAU @ 4.90% | |
| 2021 | 1410750 | 338580 | 70125 | 395135 | 30546 | 12069793710 | 30546 | 12069793710 | 30546 | 12069793710 |
| 2022 | 1438965 | 345352 | 71528 | 403729 | 32073 | 12948927309 | 32073 | 12948927309 | 32043 | 12936594998 |
| 2023 | 1467744 | 352259 | 72958 | 412510 | 33677 | 13892094802 | 33677 | 13892094802 | 33613 | 13865646270 |
| 2024 | 1497099 | 359304 | 74417 | 421482 | 35361 | 14903960257 | 35361 | 14903960257 | 35260 | 14861418056 |
| 2025 | 1527041 | 366490 | 75906 | 430650 | 37129 | 15989527463 | 37129 | 15989527463 | 36988 | 15928701940 |
| 2026 | 1557582 | 373820 | 77424 | 440016 | 38985 | 17154164669 | 38985 | 17154164669 | 38800 | 17072633616 |
| 2027 | 1588734 | 381296 | 78972 | 449587 | 40935 | 18403631138 | 40935 | 18403631138 | 40701 | 18298717604 |
| 2028 | 1620508 | 388922 | 80552 | 459365 | 42981 | 19744105621 | 42981 | 19744105621 | 42696 | 19612853732 |
| 2029 | 1652918 | 396700 | 82163 | 469356 | 45130 | 21182216915 | 45130 | 21182216915 | 44788 | 21021365533 |
| 2030 | 1685977 | 404634 | 83806 | 479565 | 47387 | 22725076639 | 47387 | 22725076639 | 46982 | 22531030665 |
| 2031 | 1719696 | 412727 | 85482 | 489995 | 49756 | 24380314409 | 49756 | 24380314409 | 49284 | 24149113530 |
| 2032 | 1754090 | 420982 | 87192 | 500653 | 52244 | 26156115559 | 52244 | 26156115559 | 51699 | 25883400230 |
| 2033 | 1789172 | 429401 | 88935 | 511542 | 54856 | 28061261627 | 54856 | 28061261627 | 54233 | 27742236030 |
| 2034 | 1824956 | 437989 | 90714 | 522668 | 57599 | 30105173770 | 57599 | 30105173770 | 56890 | 29734565517 |

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|--------------|-----------------------|--------------------|-------------------|--------|-------|----------------------------|-------|----------------------------|
| 2035 | 1861455 | 446749 | 92528 | 534036 | 60479 | 32297959365 | 59678 | 31869975641 |
| 2036 | 1898684 | 455684 | 94379 | 545651 | 63503 | 34650461980 | 62602 | 34158741844 |
| 2037 | 1936657 | 464798 | 96267 | 557519 | 66678 | 37174315004 | 65669 | 36611877508 |
| 2038 | 1975391 | 474094 | 98192 | 569645 | 70012 | 39881999174 | 68887 | 39241186951 |
| 2039 | 2014898 | 483576 | 100156 | 582035 | 73513 | 42786904288 | 72263 | 42059322222 |
| 2040 | 2055196 | 493247 | 102159 | 594694 | 77188 | 45903395430 | 75803 | 45079843992 |
| 2041 | 2096300 | 503112 | 104202 | 607629 | 81048 | 49246883994 | 79518 | 48317286798 |
| Total | 36373815 | 8729716 | 1808055 | | | 559658283124.24 | | 553046306386.66 |
| NPV | ₹ 1,21,28,366 | ₹ 29,10,808 | ₹ 6,02,872 | | | ₹ 1,52,22,91,66,835 | | ₹ 1,51,01,17,49,793 |
| | Total benefits | ₹ 12,331 | | | | Improvement in GDP | | |
| | | | | | | ₹ 1,21,74,17,043 | | |
| | Total Cost | 351 | | | | | | |
| | Total benefits | ₹ 13,263 | | | | | | |
| | CBR | 37.80 | | | | | | |


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